



REALOBJECTS

**PDF**reactor®

# LIBRARY MANUAL

Version 12.2.1

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# 1. INSTALLATION

PDFReactor can be deployed in various ways:

- **Java library:** Use this to integrate PDFReactor directly into your Java applications.
- **Command line:** Use the PDFReactor command line application for direct integration into shell scripts.

## Note

For details about system requirements and information about the latest changes, please see the `readme` and `changelog` files contained within the PDFReactor installation package.

## 1.1 The PDFReactor Library

The PDFReactor package comes with two PDFReactor libraries:

- "pdfreactor.jar" — located in the "PDFReactor/libs" directory
- "pdfreactor-uber.jar" — located in the "PDFReactor/libs/uber-jar" directory

It is generally recommended to use the "pdfreactor.jar". It only contains PDFReactor, while required and optional 3<sup>rd</sup> party libraries are contained in the "required" and "optional" directories, which should be added to the PDFReactor class path manually depending on whether or not they are already installed on the server or their functionality is desired.

For a quick and easy integration of PDFReactor, you can also use the "pdfreactor-uber.jar" which contains all 3<sup>rd</sup> party libraries required by PDFReactor. This JAR file is a stand-alone PDFReactor library. No other libraries are required.

## Note

Please refer to the "README.txt" in the "PDFReactor/libs" directory for more information about the 3<sup>rd</sup> party libraries.

## Using a Dependency Management System

When using a dependency management system such as Maven, it is recommended to use the "pdfreactor.jar" in conjunction with the POM file located in "PDFReactor/libs/dependencies/pom.xml" so that dependencies are included automatically in your application.

## 1.2 The Command Line Application

To use the PDFReactor on the command line, no installation is required. You just need the "pdfreactor-uber.jar" file.



## 1.3 The PDFreactor Preview Application

PDFreactor Preview is a desktop application that is automatically installed when using one of the PDFreactor installers for Windows or macOS. This application can be used in evaluation or development to quickly convert and preview documents. It is not recommended for use production since it only offers a limited feature set compared to a full PDFreactor integration.

# 2. INTEGRATION

You can integrate PDFReactor by directly using it as a Java library or by running it on the command line.

## 2.1 Basics

When integrating PDFReactor into your application, keep in mind your desired workflow. PDFReactor can convert one single HTML or XML document to PDF or image. If you want to convert multiple documents, you have to run multiple conversions. Another important factor is how the input document is supplied. In some workflows, the document already exists on a local or remote server, others might use a template engine to compile and render the document on-the-fly. Depending on the integration and your application, these processes can be parallelized. The following chapters explain comprehensively what steps you have to take to convert a document.

### See

Additional information about the various input and output formats can be found here:

- [HTML input \(p. 37\)](#)
- [XML input \(p. 38\)](#)
- [PDF output \(p. 68\)](#)
- [Image output \(p. 89\)](#)

### See

Additional information about the various integration options can be found here:

- [PDFReactor Java library \(p. 13\)](#)
- [PDFReactor Command Line Application \(p. 19\)](#)

### 2.1.1 Creating a PDFReactor Instance

To convert a document to PDF or image, you first have to create a PDFReactor instance. This is done with the constructor of the PDFReactor class.

A PDFReactor instance is designed to be reusable, so you only have to create it once.

### Note

This part does not apply when using the PDFReactor command line application.

```
PDFReactor pdfReactor = new PDFReactor();
```

See [Using the Java library \(p. 13\)](#) for a more extensive sample.

## 2.1.2 Configuring the Conversion

Now that you have a PDFReactor instance (or not if you are using the command line), you have to pass configuration properties to PDFReactor. Configuration instances are designed to be one-use, and it is not recommended to use the same configuration instance for multiple conversions.

```
Configuration config = new Configuration();
```

## 2.1.3 Specifying the Input Document

PDFReactor can convert a source document in HTML or XML format to PDF or image, depending on the licensed options. Since you already have a [configuration \(p. 9\)](#) from the previous chapter, you can pass the input document with the `document` configuration property. This property is the only one which actually required (all other configuration properties are optional), and the conversion will fail if it is not set.

The `document` configuration property is polymorphic and takes a string in various formats, such as a HTML document or a URL. Depending on the integration or client used, it may support other data types. The following table highlights some of the most common use cases for the source document and shows what data types are usually most appropriate. Examples follow after the table.

### Common Use Cases

Use Case	Data Type
Local document: A document that exists locally on your server's file system.	file URL as string
Remote document: A document that exists on an external server, accessible via HTTP.	HTTP(S) URL as string
Dynamically rendered template: A document that is generated from a template and rendered by a template engine.	Content as string or binary*

\* Binary data is represented as a byte array (`byte[]`) in Java and .NET, and as a base64-encoded string in other service clients.

### Important

PDFReactor does not support file system paths for the source document directly. To convert a document on a file system, use a file URL<sup>1</sup>, i.e. a URL that starts with `file://` followed by the absolute path to the document (on Windows, this path also needs to start with a slash).

<sup>1</sup> RFC 8089

*Example 1: Source document use cases*

**Use case:** A local document exists on the file system at `/local-folder/document.html` (Linux and Mac) or `c:\local-document\document.html` (Windows).

```
config.setDocument("file:///local-folder/document.html"); // Linux/Mac
config.setDocument("file:///c:/local-folder/document.html"); // Windows
```

All languages (p. 410)

**Use case:** A remote document that can be accessed via `https://some-server.com/document.html`.

```
config.setDocument("https://some-server.com/document.html");
```

All languages (p. 410)

**Use case:** A template is rendered to a string.

```
String renderedTemplate = renderMyTemplate();
config.setDocument(renderedTemplate);
```

All languages (p. 411)

The rendered template is represented in the examples above as a variable whose value is computed by the fictional function `renderMyTemplate`, which represents the business logic in your workflow that would populate and render the template into a variable of string (or binary) data. In cases of REST and the CLI, the rendered template must either already exists as a local or remote document, or the document has to be passed directly as HTML content. This is of course also possible for all other integration scenarios and clients, but might not be ideal.

The `document` configuration property is required, all other configuration properties are optional.

## 2.1.4 Starting the Conversion

Now that you have created your configuration by at least specifying an input document, you can start the conversion. This is explained in detail in the respective integration-specific chapters:

- [Conversions \(p. 13\)](#) in the Java library
- [Conversions \(p. 19\)](#) in PDFReactor Command Line Application

## 2.1.5 Processing the Result

Once the conversion is finished, you either receive a `Result` object, the converted document as raw bytes, or other API-specific data types. In this chapter, we will focus on the `Result` object as it not only contains the converted document but also other conversion-specific metadata that may be useful for integrators. It contains the following properties:

### Result Properties

Property	Description
<code>document</code>	The converted document as binary data.
<code>documentArray</code>	The converted <a href="#">multi-image (p. 89)</a> as an array of binary data (each array item represents a separate page image).

Continued

Continued

Property	Description
log	The log of the conversion. See <a href="#">Logging (p. 19)</a> .
numberOfPages	The total number of laid out pages.
numberOfPagesLiteral	The actual number of pages of the resulting PDF. This page count can differ from <code>numberOfPages</code> if post-layout steps change the PDF further, such as <a href="#">Pages Per Sheet (p. 136)</a> .
conversionName	The conversion name as specified in the <code>conversionName (p. 20)</code> configuration property.
javascriptExports	Data that was exported during JavaScript processing. See <a href="#">Exporting Data From JavaScript (p. 65)</a> .
exceedingContents	Exceeding content data if PDFReactor is configured to observe it. See <a href="#">Exceeding Content (p. 22)</a> .
missingResources	Missing resources if PDFReactor is configured to observe them. See <a href="#">Missing Resources (p. 23)</a> .
connections	Connections established during the conversion if PDFReactor is configured to observe them. See <a href="#">Connections (p. 23)</a> .

The result document can be accessed like this:

```
byte[] pdfOrImage = result.getDocument();
byte[][] imagePages = result.getDocumentArray();
```

[All languages \(p. 411\)](#)

Note that the result object has either a `document` or a `documentArray` depending on the specified [output format \(p. 68\)](#), but never both. In most scenarios, converted documents need to be processed further by the integrator's own business logic.

Please refer to the API documentation of the client or integration for more details and on how to access these properties.

## Result Streams

For large documents, it is usually better to stream the result either directly to the file system or to other application components.

### See

[Writing Result Documents directly into OutputStreams \(p. 17\)](#) for information on how this is implemented in PDFReactor.

## 2.2 Memory

Depending on the input documents, PDFReactor may require additional memory. Large and especially complex documents, e.g. documents containing several hundred pages or documents using a complex nested HTML structure, may require even larger amounts of memory. In addition, concurrent conversions also increase memory consumption since they occur simultaneously in the same Java VM.

The exact amount of memory required depends nearly entirely on the input document. Should you run into any issues converting a document, we recommend increasing the memory to e.g. 2GB or higher before attempting another conversion. First signs of memory running short are unusual long conversion times and high CPU usage of multiple threads, even if only one document is being converted.

Should PDFReactor run out of memory, you will usually experience a `java.lang.OutOfMemoryError`. When using the PDFReactor Web Service or a PDFReactor Docker Container, they may crash, since the application is not recoverable after such an error. Should such a situation occur, it is recommended to increase the amount of memory available to PDFReactor or to reduce the number of concurrent conversions.

Depending on which PDFReactor integration or application you use, the memory configuration is different.

### PDFReactor Java Library

To adjust the amount of memory available to PDFReactor, you have to start the Java VM with an appropriate `Xmx` parameter, such as `-Xmx2048m` for 2GB of memory.

### PDFReactor Command Line Application

Pass the `Xmx` parameter as argument to the `java -jar` command.

### PDFReactor Preview

To increase the amount of memory available to the PDFReactor Preview app, you need to adapt the "PDFReactor/bin/PDFReactor Preview.vmoptions" file.

To increase the memory to e.g. 4GB, change the parameter to `-Xmx2048m` or `-Xmx4g` and restart the PDFReactor Preview app.

#### Important

It is not recommended to increase the memory available to PDFReactor to an amount which is greater than the amount of memory available on the system, after subtracting what the OS and other processes already consume. This can lead to instability of the Java VM.

### 2.2.1 Parallel Conversions

When doing multiple parallel PDF conversions, it is important to adapt the available memory to the number of parallel conversions.

Generally, a common document requires no more than 64MB of memory. To safely convert up to 16 of these documents in parallel, PDFReactor requires at least 1GB of memory (16 \* 64MB). Keep in mind that this is merely a rule of thumb and that the amount of required memory may vary depending on the documents and integration environments.

## 2.2.2 Extensive Conversions

Most commonly, memory is the limiting factor when trying to convert very large or complex documents. Besides increasing the amount of memory, PDFReactor offers other strategies you could employ which will reduce memory pressure. See [Converting Large Documents \(p. 147\)](#) for general recommendations on how to convert particularly large jobs.

## 2.2.3 Analyzing Memory Consumption

When converting documents with PDFReactor, Java will consume certain amounts of memory (depending on the size and complexity of the document), up to its configured maximum heap size. Should it run out of free available memory, the Java VM will perform a so-called garbage collection. This will free up unused memory.

However, if a conversion is finished, Java actually won't automatically perform a garbage collection as it is not necessary. When using non-Java system tools to inspect memory usage, this behavior may appear problematic since Java seems to retain more and more memory without freeing it up even if there are currently no conversions running. Nevertheless, this is normal and intended Java behavior.

Java only frees up memory if necessary and won't do so merely because a process such as a PDFReactor conversion ends. This means memory issues can't reliably be analyzed using non-Java system tools since they don't actually show how much memory can be freed up after a garbage collection.

To properly analyze memory issues, we recommend Java-specific tools like VisualVM<sup>2</sup>.

## 2.3 Using the Java library

With just a few lines you can create PDFs inside your applications and servlet.

---

<sup>2</sup> <https://github.com/oracle/visualvm>

The following sample program converts <https://www.realobjects.com/> to PDF and saves it as output.pdf.

```
import java.io.FileOutputStream;
import java.io.IOException;
import java.io.OutputStream;

import com.realobjects.pdfreactor.PDFreactor;
import com.realobjects.pdfreactor.Configuration;
import com.realobjects.pdfreactor.Result;
import com.realobjects.pdfreactor.Exceptions.PDFreactorException;

public class FirstStepsWithPDFreactor {
    public static void main(String[] args) {
        PDFreactor pdfReactor = new PDFreactor();
        // configuration settings
        Configuration config = new Configuration();
        // the input document
        config.setDocument("https://www.realobjects.com");
        // conversion result
        Result result = null;

        try {
            // render the PDF document
            result = pdfReactor.convert(config);
            byte[] pdf = result.getDocument();

            try (OutputStream outputStream = new FileOutputStream("output.pdf")) {
                outputStream.write(pdf);
            } catch (IOException e) {
                e.printStackTrace();
            }
        } catch (PDFreactorException e) {
            // partial result without PDF
            result = e.getResult();
            e.printStackTrace();
        }
    }
}
```

### See

The API documentation for details.

## 2.3.1 Using PDFreactor in a Servlet

When used in a Servlet to generate a PDF that is returned to the client (e.g. a browser) PDFreactor can write directly to the `ServletOutputStream`:

```
ServletOutputStream out = response.getOutputStream();
response.setContentType("application/pdf");
pdfReactor.convert(config, out);
out.close();
```

## 2.3.2 Java Logging

When used as a Java library, PDFreactor uses two technologies for logging: The Java logging API (`java.util.logging`) and SLF4J.



## Java Logging API

PDFReactor uses the Java Logging API to output information about its progress. To get a formatted log message, PDFReactor provides the `DefaultHandler` class as a `Handler` implementation. A simple console logger can be created like this:

```
Logger pdfReactorLogger = Logger.getAnonymousLogger();
pdfReactorLogger.setLevel(Level.INFO);
pdfReactorLogger.addHandler(new DefaultHandler());
config.setLoggers(pdfReactorLogger);
```

### See

<https://docs.oracle.com/javase/8/docs/technotes/guides/logging/>

## SLF4J

When no **Java loggers** (p. 14) are specified, PDFReactor logs to SLF4J using `com.realobjects.pdfreactor.PDFReactor` as a logger name.

### Note

PDFReactor does not provide a default implementation for SLF4J. If you don't have an implementation already in your classpath, SLF4J will log errors. If logging to neither the Java logging API nor SLF4J is not desired, it is recommended to use the SLF4J NOP bindings<sup>3</sup>.

## 2.3.3 OSGi Support

PDFReactor provides support for OSGi out of the box. The Manifest of the self-contained variant of PDFReactor ("pdfreactor-uber.jar") includes all entries required to deploy it as a bundle in your OSGi environment. Only the self-contained version of PDFReactor is OSGi compatible. The non-self-contained variant of PDFReactor ("pdfreactor.jar" and associated libraries) does not contain appropriate Manifest entries.

## 2.3.4 Running PDFReactor Without Graphics Environment

If you are using PDFReactor on a system without a graphics environment like X11, you need to enable the headless mode of Java. This can be done by setting the appropriate Java system property. You can either set the property as a Java VM argument or you can set it inside your Java code. It is recommended to set it as early as possible, as changing it affects the entire Java VM instance. In any case it is important to set the property before PDFReactor is instantiated.

### As a Java VM Argument

```
java -Djava.awt.headless=true
```

<sup>3</sup> <https://mvnrepository.com/artifact/org.slf4j/slf4j-nop>

**In Java Code**

```
public class MyPDFReactorIntegration {
    // set the headless system property
    static {
        System.setProperty("java.awt.headless", "true");
    }

    public void createPDF() {
        PDFReactor pdfReactor = new PDFReactor()
        // ...
    }
}
```

**Important**

If the headless mode is not enabled on a system without a graphics environment, you might experience an error similar to this:

```
java.lang.InternalError: Can't connect to X11 window server using '' as the value of the
DISPLAY variable
```

**2.3.5 Improving Cold Start Performance**

When running PDFReactor as a command line application or in certain cloud environments, the time required for the cold start of the JRE can be a significant portion of the total time required to convert each document. Note that when running PDFReactor as a library that is part of a larger application, this will only affect the first conversions, so no action is required.

***Pre-initialization***

To mitigate this, it is recommended to call the static method `PDFReactor.preinit()` before the first conversion, ideally as early as possible. It initializes some PDFReactor classes in separate threads, significantly reducing the performance penalty of the first conversion.

***Eclipse OpenJ9 Class Data Sharing***

As a further solution, you could use the Eclipse OpenJ9<sup>4</sup> runtime, specifically its feature "Class Data Sharing"<sup>5</sup>. Creating and using a cache for shared classes will significantly improve the cold start time for the command line. This can improve conversion time up to 30% - 50% for smaller documents.

There is an example (a batch file or a shell script, depending on your installation) on how to use the OpenJ9 runtime in "path-to-PDFReactor/bin/openj9". Important: It is for reference only and is not intended for productive use. You will have to edit the file and configure the path to your OpenJ9 Java executable in order to use it. You may want to use a different set of OpenJ9 parameters depending on your environment and requirements.

<sup>4</sup> Eclipse OpenJ9: <https://eclipse.dev/openj9/>

<sup>5</sup> Introduction to class data sharing: <https://eclipse.dev/openj9/docs/shrc/>

## 2.3.6 Writing Result Documents directly into OutputStreams

When using the Java library, PDFReactor can write converted documents directly into `OutputStream`s via the method `convert(Configuration, OutputStream)`.

*Example 2: Writing a result directly into a file*

```
import java.io.FileOutputStream;
import java.io.OutputStream;

import com.realobjects.pdfreactor.Configuration;
import com.realobjects.pdfreactor.PDFReactor;

public class ConvertIntoOutputStream {
    public static void main(String[] args) throws Exception {
        PDFReactor pdfReactor = new PDFReactor();
        Configuration config = new Configuration();
        config.setDocument("https://www.realobjects.com");

        try (OutputStream outputStream = new FileOutputStream("output.pdf")) {
            pdfReactor.convert(config, outputStream);
        }
    }
}
```

## 2.3.7 Writing Multi-Images directly into OutputStreams

When converting to formats that require one image per page, i.e. most image formats, an `OutputStreamProvider` can be passed to `convert(Configuration, OutputStreamProvider)` to dynamically provide an `OutputStream` for each page. The `Function`-like method receives an `OutputItem` for information about the page and some advanced control. This `convert` method enables [Multi-Image \(p. 89\)](#) output by default.

Writing the images to numbered files can be achieved with just one line of code. Output items each belong to a group. The group in combination with the item number represent a unique identifier for each file. For programmatic purposes, you can also use the `index` of an output item as a unique identifier. Contrary to the `itemNumber`, the `index` starts at 0 and is unique for each output item of a conversion.

*Example 3: Writing a multi-image directly into files*

```
import java.io.FileOutputStream;

import com.realobjects.pdfreactor.Configuration;
import com.realobjects.pdfreactor.Configuration.OutputFormat;
import com.realobjects.pdfreactor.Configuration.OutputType;
import com.realobjects.pdfreactor.PDFReactor;

public class ConvertIntoDynamicOutputStreams {
    public static void main(String[] args) throws Exception {
        PDFReactor pdfReactor = new PDFReactor();
        Configuration config = new Configuration();
        config.setDocument("https://www.realobjects.com");
        config.setOutputFormat(new OutputFormat().setType(OutputType.PNG));

        pdfReactor.convert(config, oi -> new FileOutputStream(
            oi.getGroup().getText() + oi.getPaddedItemNumber() + "." +
            oi.getFileExtension()));
    }
}
```

In a similar way conversion results can be written directly into a zip file. To prevent PDFReactor from automatically closing the `ZipOutputStream` `OutputItem.setKeepOpen()` can be set to `true`:

*Example 4: Writing a multi-image directly into a ZIP*

```
import java.io.BufferedOutputStream;
import java.io.FileOutputStream;
import java.util.zip.ZipEntry;
import java.util.zip.ZipOutputStream;

import com.realobjects.pdfreactor.Configuration;
import com.realobjects.pdfreactor.Configuration.OutputFormat;
import com.realobjects.pdfreactor.Configuration.OutputType;
import com.realobjects.pdfreactor.PDFReactor;

public class ConvertIntoZipOutputStream {
    public static void main(String[] args) throws Exception {
        ZipOutputStream zos = new ZipOutputStream(
            new BufferedOutputStream(new FileOutputStream("images.zip")));
        Configuration config = new Configuration()
            .setDocument("https://www.realobjects.com")
            .setOutputFormat(new OutputFormat().setType(OutputType.PNG));

        new PDFReactor().convert(config, oi -> {
            oi.setKeepOpen(true);
            zos.putNextEntry(new ZipEntry(
                oi.getGroup().getText() + oi.getPaddedItemNumber() + "." +
                oi.getFileExtension()));
            return zos;
        });
        zos.close();
    }
}
```

The `OutputStream`s can also be accessed after the item was written, e.g. to retrieve the data. The `OutputItem` of that callback allows retrieving the `OutputStream` previously created for that item:

*Example 5: Using multi output streams after writing*

```
import java.io.ByteArrayOutputStream;
import java.util.ArrayList;
import java.util.List;

import com.realobjects.pdfreactor.Configuration;
import com.realobjects.pdfreactor.Configuration.OutputFormat;
import com.realobjects.pdfreactor.Configuration.OutputType;
import com.realobjects.pdfreactor.PDFReactor;

public class ConvertIntoCollection {
    public static void main(String[] args) throws Exception {
        Configuration config = new Configuration()
            .setDocument("https://www.realobjects.com")
            .setOutputFormat(new OutputFormat().setType(OutputType.PNG));

        List<byte[]> imgList = new ArrayList<>();
        new PDFReactor().convert(config, oi -> {
            oi.setCallback(oic -> imgList.add(
                ((ByteArrayOutputStream)oic.getOutputStream()).toByteArray()));
            return new ByteArrayOutputStream();
        });
        // use data from 'imgList'
    }
}
```

## 2.4 Using the Command Line Application

PDFReactor comes with a command line interface for easy integration in shell scripts or batch files. It is included in the `pdfreactor-uber.jar` which is located in the "PDFReactor/lib/uber-jar" directory. For Windows systems a compiled version is provided which is located in the "PDFReactor/bin" directory. It can be used like this:

```
java -jar pdfreactor-uber.jar -i input.html -o output.pdf
```

Make sure that you are located in the "PDFReactor/lib/uber-jar" directory when executing the command. Alternatively, you can indicate the full path to the "pdfreactor-uber.jar".

For a full list of all arguments and parameters, use the following command:

```
java -jar pdfreactor-uber.jar --help
```

### Note

When using the Windows executable or the Python Command Line client, replace `java -jar pdfreactor-uber.jar` with `pdfreactor.exe` and `python pdfreactor.py`, respectively.

The Windows executable is located in the "PDFReactor/bin" directory, the Python client is located in the "PDFReactor/clients/cli" directory.

### 2.4.1 Standard input and output

The Java command line interface supports standard input and output (`stdin` and `stdout`). To read from `stdin`, you have to specify the input argument as "stdin". To write to `stdout`, you have to specify the output argument as "stdout".

*Example 6: Using stdin and stdout with the Java command line interface*

Reading from `stdin`:

```
java -jar pdfreactor-uber.jar -i stdin -o output.pdf < input.html
```

Writing to `stdout`:

```
java -jar pdfreactor-uber.jar -i input.html -o stdout > output.pdf
```

Combining both:

```
java -jar pdfreactor-uber.jar -i stdin -o stdout < input.html > output.pdf
```

## 2.5 Logging

PDFReactor can produce a detailed log of the entire conversion. To enable logging you have to set an appropriate log level first using the configuration property `LogLevel`, e.g. like this:

```
config.setLogLevel(LogLevel.WARN);
```

All languages (p. 411)

To retrieve the logs, use the `log` property of the `Result` object. This gives you a `Log` object and access to the following logs:

### Main log

The main log contains all relevant log information for that conversion. It can be accessed via the `records` property of a `Log` object.

### CSS log

This log contains detail information for certain CSS warnings or errors. Those may occur in abbreviated form in the main log but are usually not critical for the conversion. It can be accessed via the `recordsCss` property.

### JavaScript log

PDFReactor logs JavaScript output similar to a browser. While it is also available in the main log, the JavaScript log provides a more comprehensive and machine-readable access to the output. It can be accessed via the `recordsJs` property.

The logs are only populated if logging is enabled. Logs can be retrieved from the `Result` object like this:

```
Log log = result.getLog();
if (log != null) {
    Record[] mainLog = log.getRecords();
    Record[] cssLog = log.getRecordsCss();
    Record[] jsLog = log.getRecordsJavaScript();
}
```

[All languages \(p. 411\)](#)

Additionally, you can retrieve the logs using appropriate debug settings. Refer to [Development and Debugging Tools \(p. 25\)](#) for more information.

## Examples

The following examples show how to enable logging by setting an appropriate log level and then appending the log to the generated PDF.

### Example 7: Enable logging

```
Configuration config = new Configuration();
config.setLogLevel(LogLevel.DEBUG);
config.setDebugSettings(new DebugSettings()
    .setAppendLogs(true));
```

[All languages \(p. 411\)](#)

## 2.5.1 Conversion Name

You can specify an arbitrary name for each conversion using the `conversionName` configuration property. This name will be logged as the first and last line in each conversion log. This makes it easy to match a conversion log to a particular document.

## 2.5.2 Log Capacity

During the course of the conversion, PDFReactor stores several messages in internal logs so that they can be accessed afterwards. Those internal logs have a limited capacity. By default, each log stores 100 000 entries. This should be sufficient for most documents. In the rare cases where this number needs to be adjusted, you can use the configuration property `logMaxLines` like this:

```
config.setLogMaxLines(100);
```

[All languages \(p. 412\)](#)

If the log capacity is exceeded, the oldest entries will be removed to make room for the new ones.

## 2.6 License Key

### 2.6.1 Evaluation Mode

Without a license key PDFReactor runs in evaluation mode. In evaluation mode it is possible to integrate and test PDFReactor just like the full version but the resulting PDF document will include watermarks and additional evaluation pages.

### 2.6.2 Receiving a License Key

To obtain a license key, please visit the [PDFReactor website \(https://www.pdfreactor.com\)](https://www.pdfreactor.com). It provides information about all available licenses and how to receive license keys.

### 2.6.3 Setting the License Key

RealObjects provides you a license key file in XML format.

The license key can be set as a string using the `licenseKey` configuration property.

*Example 8: Setting the license key*

```
String licensekey = "<license>... your license ...</license>";
config.setLicenseKey(licensekey);
```

[All languages \(p. 412\)](#)

#### Note

You can ensure that no eval or license notices are added to PDF documents using an appropriate error policy:

```
config.setErrorPolicies(ErrorPolicy.LICENSE);
```

[All languages \(p. 412\)](#)

This forces PDFReactor to throw an exception instead of adding notices to PDF documents (see [Error Policies \(p. 23\)](#)).

## 2.7 Observing Document Content

When converting documents into PDF, it may be desirable to programmatically observe certain parts of the document content to ensure that the PDF result is as expected. This can be especially important for highly dynamic input documents for which the result might not have been validated prior to the conversion.

There are currently two parts of the content that can be observed: Exceeding content and missing resources. Exceeding content observes content that overflows certain boundaries, missing resources observes all resources that could not be loaded during conversion.

All content observed this way is logged in the normal PDFReactor log. In addition to that, it is logged in separate, machine-parseable logs which can be retrieved and analyzed after the conversion has finished to verify the result.

A content observer can be configured like this:

[All languages \(p. 412\)](#)

```
ContentObserver contentObserver = new ContentObserver();
// set up contentObserver, see below...
config.setContentObserver(contentObserver);
```

### 2.7.1 Exceeding Content

Content that does not fit into its pages can be logged as well as programmatically analyzed. This functionality is enabled and configured by using the content observer and requires two arguments:

The first one specifies what to analyze:

Constant	Description
<code>ExceedingContentAnalyze.NONE</code>	Disable this functionality (default)
<code>ExceedingContentAnalyze.CONTENT</code>	Analyze content (text and images) only
<code>ExceedingContentAnalyze.CONTENT_AND_BOXES</code>	Analyze content as well as boxes. (catches exceeding borders and backgrounds)
<code>ExceedingContentAnalyze.CONTENT_AND_STATIC_BOXES</code>	Analyze content as well as boxes, except for those with absolute or relative positioning

The second one specifies how to analyze:

Constant	Description
<code>ExceedingContentAgainst.NONE</code>	Disable this functionality (default)
<code>ExceedingContentAgainst.PAGE_BORDERS</code>	Find content exceeding the actual edges of the page
<code>ExceedingContentAgainst.PAGE_CONTENT</code>	Find content exceeding the page content area. (avoids content extending into the page margins)
<code>ExceedingContentAgainst.PARENT</code>	Find content exceeding its parent (i.e. any visible overflow)

For example:

[All languages \(p. 412\)](#)

```
contentObserver
    .setExceedingContentAnalyze(ExceedingContentAnalyze.CONTENT_AND_STATIC_BOXES)
    .setExceedingContentAgainst(ExceedingContentAgainst.PAGE_CONTENT);
```



To programmatically process the results you can get an array of `ExceedingContent` objects using the property `exceedingContents`. Please see the API documentation for details on this class.

```
ExceedingContent[] exceedingContents = result.getExceedingContents();
```

[All languages \(p. 413\)](#)

## 2.7.2 Missing Resources

To ensure that all resources referenced in the input document (or in other resources) are loaded, configure the content observer like this:

```
contentObserver.setMissingResources(true);
```

[All languages \(p. 413\)](#)

After the conversion, you can access and analyze a log containing all missing resources using the property `missingResources`. It returns an array of `MissingResource` objects which contains the resource description, type (e.g. style sheet, image, etc.) as well as a description why the resource is missing. If the log is `null`, no resources are missing. Please see the API documentation for details on this class.

```
MissingResource[] missingResources = result.getMissingResources();
```

[All languages \(p. 413\)](#)

## 2.7.3 Connections

It is also possible to log all connections or connection attempts performed by PDFReactor. For this, configure the content observer like this:

```
contentObserver.setConnections(true);
```

[All languages \(p. 413\)](#)

A log containing all connections or connection attempts can be accessed after the conversion via the `connections` property. It returns an array of `Connection` objects which contain data about the connection. For HTTP connections, the data includes the status code as well as request and response headers. Please see the API documentation for details on this class.

```
Connection[] connections = result.getConnections();
```

[All languages \(p. 413\)](#)

Please note that connections that were blocked due to [security settings \(p. 28\)](#) are not included in this log since PDFReactor blocked the connection before even attempting to open it.

## 2.8 Error Policies

It is possible to adjust PDFReactor's default error policy. Depending on the configured policy, the conversion will now fail if certain criteria are met. The following error policies can be set and will terminate the conversion:

- `LICENSE` The conversion will now fail if no full license key is set. This ensures that generated PDFs won't contain any evaluation watermarks.
- `MISSING_RESOURCE` The conversion will now fail if any resources could not be loaded. If a detailed list of missing resources is required, use an appropriate `ContentObserver` (see [Missing Resources \(p. 23\)](#)) instead.

- `UNCAUGHT_JAVASCRIPT_EXCEPTION` The conversion will now fail if there are uncaught JavaScript errors in any of the input JavaScript resources, including syntax errors.
- `CONFORMANCE_VALIDATION_UNAVAILABLE` The conversion will now fail when the PDF's conformance could not be validated even though [conformance validation \(p. 75\)](#) was enabled. The conversion will also fail if the validation module is not available or the conformance format is not fully supported for validation.

This policy is recommended if you exclusively convert documents where validation is supported and strictly required.

- `IGNORE_INVALID_MERGE_DOCUMENTS_EXCEPTION` The conversion will no longer fail when exceptions occur during merge operations (e.g. when trying to merge encrypted documents for which no owner password or an invalid password was supplied). PDFReactor now ignores merge documents that cause any exceptions, and they will be omitted from the final PDF.
- `WARN_EVENT` The conversion will now fail if any warning event occurs. Warnings usually don't fail the conversion because a valid result can be produced, but the fidelity of the result might be negatively impacted. This error policy ensures that no such results will be produced.

Error policies can be set like this:

```
config.setErrorPolicies(
    ErrorPolicy.LICENSE,
    ErrorPolicy.MISSING_RESOURCE);
```

All languages (p. 414)

## 2.9 Limiting Conversion Times

To limit conversion times and to prevent certain inputs to cause extremely long or even indefinite conversion times, you can specify timeouts. If a timeout is exceeded, the conversion will be aborted.

Conversion times can be limited by specifying a `conversionTimeout` in seconds.

```
config.setConversionTimeout(30);
```

All languages (p. 414)

### See

To specifically limit JavaScript processing times, see [JavaScript Timeout \(p. 65\)](#).

### See

To limit resource loading times, see [Resource Timeout \(p. 41\)](#). These timeouts will not cause the conversion to abort.

## 2.10 Development and Debugging Tools

### 2.10.1 Debug Settings

When integrating PDFReactor, especially during the trial and development phases, it might be useful to retrieve debugging information about the conversion. The most convenient way to do this is by enabling the various debugging tools of PDFReactor. This can be done in the configuration like this:

```
config.setDebugSettings(new DebugSettings().setAll(true));
```

[All languages \(p. 414\)](#)

This causes PDFReactor to do the following:

- Set the log level to the most verbose level, i.e. `LogLevel.PERFORMANCE`.
- Append logs to the generated PDF with that log level. Can be controlled with the `appendLogs` property of the `DebugSettings` object.
- Attach various debug files to the generated PDF. Can be controlled with the `attachConfiguration`, `attachDocuments`, `attachResources`, and `attachLogs` properties of the `DebugSettings` object.
- No longer throw any exceptions. Instead, in case of an exception, a text document is returned that contains the conversion log as well as the exception that would have been thrown. Can be controlled with the `forceResult` property of the `DebugSettings` object.

The following debug files are attached by default:

#### Debug Files

Group	Attachment URL	File	Description
documents	#, #originalsource	OriginalSource.txt	The original input document
	#finalsource	FinalSource.txt	The input document after XSLT preprocessing
	#originaldocument	OriginalDocument.txt	The initially parsed input document
	#originaldocumentpp	OriginalDocumentPP.txt	A pretty-printed version of the above
	#finaldocument	FinalDocument.txt	The input document after all modifications (JavaScript etc.) are completed
	#finaldocumentpp	FinalDocumentPP.txt	A pretty-printed version of the above
configuration	#configuration	Configuration.txt	The configuration object passed to the PDFReactor instance
		ClientConfiguration.txt	The configuration object sent to the PDFReactor Web Service (if used)

Continued

Continued

Group	Attachment URL	File	Description
resources	#resources	Resources.dat	All used external resources like style sheets, scripts, images etc. as a ZIP file
logs	#log	Log.txt	The main PDFReactor conversion log
	#logcss	LogCss.txt	The PDFReactor CSS log
	#logjavascript	LogJavaScript.txt	The PDFReactor JavaScript log
	#systemproperties	SystemProperties.txt	A list of the current Java system properties
	#connections	Connections.txt	A log of all URL connection attempts performed by PDFReactor
	#missingresources	MissingResources.txt	A log of all resources that could not be loaded

### Important

Debug settings are intended for investigation purposes only and not for production use. Activating some or all debug settings may change other configuration properties, such as the [log level \(p. 19\)](#). This is done for convenience to get the most verbose result when debugging.

### Controlling Debug Behavior

If only specific debugging tools are required, instead of setting the `all` property, you can use the appropriate debug settings to enable the desired setting manually. The following properties are available:

- `all` — Activates all of the following debugging tools
- `attachDocuments` — Attaches all debug files belonging to the group "documents"
- `attachResources` — Attaches all debug files belonging to the group "resources"
- `attachLogs` — Attaches all debug files belonging to the group "logs"
- `appendLogs` — Appends the PDFReactor log to the generated PDF
- `forceResult` — Forces PDFReactor to return a result even if an exception occurred during the conversion

## Debug File Dump

In certain cases where no converted document could be created (e.g. when a specific PDF/A conformance could not be achieved) it may be helpful to have access to the debug files mentioned previously. To do this, it is possible to specify a local directory when configuring the debug settings. If such a directory is specified, PDFReactor will attempt to write all available debug files as a single ZIP into that directory. The local directory can be specified like this:

[All languages \(p. 414\)](#)

```
config.setDebugSettings(new DebugSettings()
    .setAll(true)
    .setLocalDirectory(Paths.get("c:\\debug")));
```

PDFReactor will create a ZIP file with the naming scheme

```
PDFReactor-dump-yyyy-MM-dd-HH-mm-ss-SSS
```

where `yyyy-MM-dd-HH-mm-ss-SSS` represents the serialized date of the dump.

## Attaching Debug Files Manually

If you only want specific debug files attached, you can forgo enabling the debugging tools entirely and use the [Attachments \(p. 86\)](#) feature to make PDFReactor attach the appropriate file. For that, use the URLs mentioned in the [Debug Files \(p. 25\)](#) table.

## 2.10.2 Inspectable Documents

To create inspectable documents that can be used with the PDFReactor Inspector application, use the `inspectableSettings` configuration option like this:

[All languages \(p. 414\)](#)

```
config.setInspectableSettings(new InspectableSettings()
    .setEnabled(true));
```

### Note

A license key is required to enable the creation of inspectable documents.

### Note

Creating inspectable documents increases the conversion time and may require additional memory.

# 3. SECURITY

PDFreactor converts HTML or XML documents which can contain external style sheets, scripts, images or other resources. Depending on the use case, these documents and resources may come from untrusted sources, such as third-party users. This means they might contain malicious code or content which may be used to access private resources through Server-Side Request Forgery.

To protect against potential attacks, PDFreactor has a security layer in place which restricts certain functionality and filters URLs according to configurable security settings via the configuration properties `securitySettings` and `customUrlStreamHandlers`.

## Important: Supplemental Security Measures

Depending on your use case and processing chain, you should consider supplementing the security features offered by PDFreactor with your own security measures that can protect your system e.g. on the network layer (such as firewalls), which is beyond the scope of PDFreactor.

## 3.1 SSL Certificate Validation

When accessing resources from HTTPS, PDFreactor will automatically verify the target SSL certificate. If the certificate is invalid, PDFreactor will refuse the connection. If this certificate is still deemed trustworthy (e.g. because the target is located in the intranet or the certificate is self-signed) or during the development phase, you can configure PDFreactor to automatically trust all certificates. This can be done with the `trustAllConnectionCertificates` security property like this:

```
config.setSecuritySettings(new SecuritySettings()
    .setTrustAllConnectionCertificates(true));
```

All languages (p. 415)

Please note that this approach is insecure and only recommended if you can verify that the target server is trustworthy.

## 3.2 Connection Security

Whenever PDFreactor attempts a URL connection to a source from an untrusted security context, the URL is vetted against certain criteria before the connection is opened.

### 3.2.1 Trusted and Untrusted Contexts

PDFreactor distinguishes between two security contexts when applying the security settings: Trusted and untrusted. The PDFreactor API (i.e. the configuration object that is passed to the `convert` methods) is considered a trusted security context, because usually only integrators have access to it. Any documents or resources that are specified there are not subject to the connection security, although [Custom URL Filtering \(p. 35\)](#) still works. So no matter how you configure the connection security settings, resources specified in

configuration properties such as `document`, `userStyleSheets`, `baseUrl` etc. are always allowed because it is assumed they have been set by the integrator.

Please note that this is not transitive. Even though user style sheets and user scripts are always allowed, resources that they load, e.g. via "@import" rule or XHR are subject to the connection security.

System fonts can also always be loaded, however they can be disabled separately.

All other resources, especially those that are part of the input document which is potentially produced by untrusted third parties, are vetted according to the configured security settings.

### Untrusted Clients

When using PDFReactor as a publicly available service or in certain other scenarios, PDFReactor processes configurations that may not have been specified by the integrator or that come from user machines which are by default untrusted environments. Additionally, if at any point in your processing chain it is possible for third parties to inject code or content into the configuration object, then the entire configuration object should be considered untrusted.

To protect yourself, you can use the `untrustedApi` property to configure the security layer in such a way that PDFReactor treats the API as an untrusted context. This means that all security checks are also applied to any resources specified in the PDFReactor configuration object, including the input document. In addition to that, machine-specific information is omitted from the logs.

```
config.setSecuritySettings(new SecuritySettings()
    .setUntrustedApi(true));
```

[All languages \(p. 415\)](#)

### Author API Overrides

Input documents may be authored by third parties which don't have the same privileges as PDFReactor integrators or admins. In this case, it is undesirable that such authors can override API settings, such as by using [PDF Output Options \(p. 63\)](#). So by default, PDFReactor prevents access to these features unless it is specifically allowed via the `allowAuthorApiOverrides` security setting.

```
config.setSecuritySettings(new SecuritySettings()
    .setAllowAuthorApiOverrides(true));
```

[All languages \(p. 415\)](#)

## 3.2.2 Automatic Redirects

By default, PDFReactor follows redirects automatically. You can disable this with the `allowRedirects` property:

```
config.setSecuritySettings(new SecuritySettings()
    .setAllowRedirects(false));
```

[All languages \(p. 415\)](#)

### 3.2.3 Connection Rules

You can define security rules that either deny or allow connections to certain resources. These rules support wildcard patterns for their hosts and paths. Each rule also has a priority. Rules are evaluated in order of their priority, starting with the highest priority value. If rules have the same priority, they are evaluated in the same order as they were inserted in the API. The priority is 0 by default.

If a resource is not matched by any of the rules (or if there are no rules), the [default security behavior \(p. 33\)](#) is applied.

If multiple resource properties of a rule such as `protocol`, `host`, `port` or `path` are specified, the resource must match all of the defined properties.

#### How Path Normalization Works

When PDFReactor vets resource paths according to security policies, it normalizes the path, ignoring any query parameters and the fragment component. Additionally, relative path segments are resolved and non-URI characters are URL encoded. So for the purposes of path vetting, the path

```
/part/../resource path/file?param=value#fragment
```

is normalized to

```
/resource%20path/file
```

#### Wildcard Patterns

Both the host and the path in connection rules support wildcard patterns, meaning that you can substitute characters for the "?" or "\*" characters. "?" represents a single wildcard character while "\*" represents any single wildcard path segment (when used in the `path` property) or one domain label (when used in the `host` property). If you want to represent zero or any number of path segments or domain labels, use "\*\*\*" instead.

**Important:** Invalid URI characters (according to RFC 2396) must be URL encoded for path segments!

The matching of hosts is always **case-insensitive**. The matching of paths is **case-insensitive**, unless the property `caseSensitivePath` of the connection rule is set to `true`.

Note that `path` patterns must always start with a slash.



*Example 9: Allowing and Denying Connections*

This example illustrates how to allow connections to the internal host "company-cms" as well as connections to certain paths of a publicly available CDN. All other connections are automatically denied.

All languages (p. 416)

```
config.setSecuritySettings(new SecuritySettings()
    .setConnectionRules(
        new ConnectionRule()
            .setAction(ConnectionRuleAction.ALLOW)
            .setName("Allow internal company CMS")
            .setHost("company-cms"),
        new ConnectionRule()
            .setAction(ConnectionRuleAction.ALLOW)
            .setName("Allow public company CDN")
            .setProtocol("https")
            .setHost("cdn.company.com"),
            .setPath("/public%20assets/**") // Encode invalid URI characters
        new ConnectionRule()
            .setAction(ConnectionRuleAction.DENY)
            .setName("Deny all")
            .setPath("/**")
            .setPriority(-1) // Make sure this rule is evaluated last
    )
);
```

*Example 10: Wildcard Host Pattern*

The pattern

```
*.pdfreactor.com
```

matches the hosts

```
cloud.pdfreactor.com
www.pdfreactor.com
```

but not

```
pdfreactor.com
www.cloud.pdfreactor.com
```

To match these hosts as well, you could use

```
**.*pdfreactor.com
```

*Example 11: Wildcard CSS File Pattern*

To allow only CSS files, more specifically files with the extension "css", regardless of the host and path, you could use the following `path` pattern:

```
/**/*.*css
```

**Important: Content from Untrusted Sources**

To ensure that no URLs can be accessed, you can deny all URLs with a rule:

[All languages \(p. 416\)](#)

```
config.setSecuritySettings(new SecuritySettings()
    .setConnectionRules(
        new ConnectionRule()
            .setAction(ConnectionRuleAction.DENY)
            .setName("Deny all")
            .setPath("/**")
            .setPriority(-1)
    )
);
```

Make sure to set the `path` property to `"/**"`, so that it works for URL types that do not have a host (such as file URLs).

**Data URIs and Blobs**

Data URIs and Blobs are not subject to connection security, and thus cannot be blocked by connection rules since this would be impractical. The single exception is the `allowedProtocols` setting which can be used to block data URIs or Blobs altogether by not allowing the "data" or "blob" protocol, respectively.

**JAR URLs**

When using JAR URLs, security rules apply only to the URL to the JAR file, not the whole JAR URL. When the security settings allow access to a JAR file, access is also automatically granted to all of its entries. You can control access to certain JAR entries by using the `entry` property of a connection rule. Entries are treated as paths, so you can use wildcard notation.

*Example 12: Granting Access to a Resource inside a JAR*

The following rule grants access to all resources inside the "resources" directory in a specific JAR file. Since an entry is specified, the rule does not grant access to the JAR file itself. Also note that the protocol is "file" and not "jar", since rules apply to the URL to the JAR file and not the whole URL.

[All languages \(p. 417\)](#)

```
config.setSecuritySettings(new SecuritySettings()
    .setConnectionRules(
        new ConnectionRule()
            .setAction(ConnectionRuleAction.ALLOW)
            .setName("Allow access to resources inside a JAR")
            .setProtocol("file")
            .setPath("/path/to/my.jar")
            .setEntry("/resources/**")
    )
);
```

The example above would grant access to e.g. the resource:

```
jar:file:///path/to/my.jar!/resources/image.png
```

**Note**

If an entry is specified for any connection rule, the rule will no longer apply to the URL itself, only the entry. This means that specifying an entry on rules to non-JAR files makes them useless.

**Note**

Regardless of any more specific rules, access to the JAR itself needs to be ensured first. This means that the "jar" protocol itself needs to be allowed in addition to other adjustments that depend on the used URL.

For example with a Jar URL like `jar:file:///path/to/my.jar!/resources/image.png`, would need the "file" protocol as well as file system access to load the jar. In case of a URL like `jar:http://www.jar-server.com/jars/my.jar!/resources/image.png` the "http" protocol would need to be enabled as well as any connection rules needed to access the URL to the JAR itself.

## 3.2.4 Default Security Behavior

The default security behavior is applied to any URL to which no **connection rule** (p. 30) matched. The appropriate configuration properties are grouped in the `defaults` property of the `securitySettings`. Checks are applied in the following order:

### 1. `allowSameBasePath`

*This property is considered `true` if not specified.*

When a document is converted from URL or a base URL is specified, access to resources within the same base path is allowed. No further security checks will be made for that resource. Please note that this allows for HSTS, i.e. when the base or document URL is HTTP, then resources within the same base path using HTTPS are also allowed.

This check is always skipped if the `untrustedApi` property is `true`.

- **If a resource is within the same base path, it is allowed. Otherwise, subsequent default checks below are applied.**

### What Is a Base Path?

The base path is the normalized part of the URL leading to the input document (or the base URL if specified), up to the last slash. For HTTP or HTTPS URLs, the base Path consists of at least the host, even if the URL does not end with a slash. For file URLs, it is ensured that the base Path is never the root directory.

For example, if the following URL is the input URL of your document:

```
http://myServer/document.html
```

Then the base path is the following URL:

```
http://myServer/
```

### 2. `allowProtocols`

*This property is considered to have the values `"http"`, `"https"`, `"data"` and `"blob"` if not specified.*

A list of URL protocols (as lower-case strings) that are allowed. If the protocol of a resource is not contained within this list, the resource is not loaded. Note that the "file" protocol is not handled by this setting. Use `allowFileSystemAccess` to allow or restrict file URLs.

- **If the resource's protocol is not allowed, the resource is denied. Otherwise, subsequent default checks below are applied.**

**3. allowFileSystemAccess**

*This property is considered `false` if not specified.*

Allows access to the file system. This is prohibited by default.

- **If a resource points to a file and file system access is not allowed, the resource is denied. Otherwise, subsequent default checks below are applied.**

**4. allowAddresses**

*This property is considered to have the values `PUBLIC`, `PRIVATE` and `LOCAL` if not specified.*

Allows connections to a certain type of host or IP address. Possible values are:

- `PUBLIC` — Public hosts or IP addresses.
- `PRIVATE` — Hosts in private networks or IP addresses in the private range.
- `LOCAL` — Hosts or IP addresses pointing to the local machine.
- `LINK_LOCAL` — Link-local addresses or auto-IPs which are usually assigned automatically and are usually not used to provide any useful resources for the conversion. Unless explicitly required, it is recommended to not grant access to this type of address.

- **If a resource points to a network address that is not allowed, the resource is denied.**

**JAR URLs**

When using JAR URLs, the URL to the JAR file is also validated against file system access, allowed protocols as well as allowed addresses. Security rules only apply to the URL to the JAR file.

*Example 13: Allowing File System Access*

To allow global file system access, you could use the following default settings. This is not recommended when processing content from untrusted sources!

```
config.setSecuritySettings(new SecuritySettings()
    .setDefaults(new SecurityDefaults()
        .setAllowFileSystemAccess(true)));
```

All languages (p. 417)

### 3.2.5 Custom URL Filtering

To further filter URLs, you can implement custom `URLStreamHandlers`<sup>6</sup> for specific protocols. These are used before the internal security checks are made. It is also possible to register such a handler for all protocols, in this case use an asterisk for the protocol in the API. Only one `CustomUrlStreamHandler` can be used for a particular protocol. If more are specified, the first one is used. If one for a specific protocol and one for all protocols is defined, the one for the specific protocol is always used.

#### Example 14: Register a Handler for File URLs

All languages (p. 418)

```
config.setCustomUrlStreamHandlers(
    new CustomUrlStreamHandler()
        .setProtocol("file")
        .setHandler(new URLStreamHandler() {
            // your implementation
        })
);
```

#### Example 15: Register a Handler for any URL

All languages (p. 418)

```
config.setCustomUrlStreamHandlers(
    new CustomUrlStreamHandler()
        .setProtocol("*")
        .setHandler(new URLStreamHandler() {
            // your implementation
        })
);
```

### 3.2.6 Non-local File URLs

PDFReactor automatically considers all file URLs to be invalid that have an authority component other than "localhost". For example, the file URLs `file:///dir/file` (no host) and `file://localhost/dir/file` are considered valid but `file://host/dir/file`, `file://LOCALHOST/dir/file`, and `file://localhost:8080/dir/file` are not.

Enabling this setting allows for arbitrary authority components in file URLs but may cause system-specific behavior. On Windows systems for example, a file URL with a non-local host is interpreted as a UNC path. This might allow potentially malicious authors gain information about the server's OS and available network resources.

Since this affects the creation of URLs, they are checked before any other security checks are made.

#### Example 16: Allowing non-local file URLs

All languages (p. 418)

```
config.setSecuritySettings(new SecuritySettings()
    .setAllowNonLocalFileUrls(true));
```

<sup>6</sup> [java.net.URLStreamHandler](http://java.net.URLStreamHandler)

### 3.3 External XML Parser Resources

By default, PDFReactor does not load external resources during XML parsing, such as DTDs, entities or XIncludes. To allow this for documents, you can use the `allowExternalXmlParserResources` property of the `SecuritySettings`.

*Example 17: Enable Loading of External XML Parser Resources*

```
config.setSecuritySettings(new SecuritySettings()  
    .setAllowExternalXmlParserResources(true));
```

All languages (p. 418)

### 3.4 Hiding Version Information

While information about the used PDFReactor version can be generally useful, disclosing version information can give potential attackers knowledge of the underlying system who may then develop attacks targeting a specific version of PDFReactor. To hide version information, use the security setting `hideVersionInfo`.

*Example 18: Disabling Version Disclosure*

```
config.setSecuritySettings(new SecuritySettings()  
    .setHideVersionInfo(true));
```

All languages (p. 418)

#### Important

The version as well as other system or server information may also be included in the PDFReactor logs which can be embedded in or attached to the resulting PDF using [Development and Debugging Tools](#) (p. 25).

# 4. INPUT FORMATS

PDFreactor can process the following input formats. By default, it automatically tries to identify the right format. The input format of the source document can be overridden using the `documentType` configuration property.

## 4.1 HTML + CSS

HTML is rendered by PDFreactor using a default CSS style sheet for HTML in addition to the document's style.

HTML is parsed by the built-in HTML5 parser which parses the document according to HTML5 rules. This means that elements missing closing tags (such as `<p>` without `</p>`) are handled as demanded by the HTML5 specifications. SVG Elements should be used without having their namespace specified.

### See

See [User Style Sheets \(p. 45\)](#) and [Integration Style Sheets \(p. 45\)](#) on how to load additional CSS that is not originally part of the input document.

You can force HTML processing like this:

```
config.setDocumentType(Doctype.HTML5);
```

All languages (p. 419)

### 4.1.1 Legacy XHTML

It is also possible, albeit discouraged, to enable the legacy XHTML parser and its cleanup processes for HTML documents. You can force this document type like this:

```
config.setDocumentType(Doctype.XHTML);
```

All languages (p. 419)

In legacy XHTML, there are various cleanup tools at your disposal that will attempt to repair non-well-formed XHTML documents:

- CYBERNEKO (default)
- JTIDY
- TAGSOUP
- NONE (no cleanup)

You can set a cleanup tool like this:

```
config.setCleanupTool(Cleanup.TAGSOUP);
```

All languages (p. 419)

### Note

Both JTidy and Tagsoup no longer have advantages over CyberNeko and are deprecated for removal in Q4 2025.

### 4.1.2 HTML + JavaScript

PDFReactor can also process JavaScript contained or linked in the HTML document. See [JavaScript \(p. 60\)](#) for further details.

#### Note

JavaScript processing is only possible when converting HTML, not XML.

#### See

See [User Scripts \(p. 45\)](#) on how to load additional JavaScript that is not originally part of the input document.

## 4.2 XML + CSS

Like HTML, XML documents can be styled via CSS. Because XML does not have a default CSS style sheet, you will have to provide one for your specific XML language.

Alternatively or in addition to directly styling the XML content it can be processed by the built-in XSLT<sup>7</sup> processor, either to modify it or to convert it to HTML.

You can force XML processing like this:

```
config.setDocumentType(Doctype.XML);
```

All languages (p. 419)

### 4.2.1 XML + XSLT

PDFReactor can optionally transform XML documents using XSLT style sheets. This can transform the document into other formats such as HTML. As with the normal input document, PDFReactor attempts to detect the document type of the post-transformation document. This can be overridden by using the `postTransformationDocumentType`.

The configuration property `xsltMode` is used to enable XSLT processing.

*Example 19: Transforming XML to HTML*

```
config.setPostTransformationDocumentType(Doctype.HTML5);
config.setXsltMode(true);
```

All languages (p. 419)

#### See

See [XSLT Style Sheets \(p. 45\)](#) on how to load additional XSLT style sheets that are not originally part of the input document.

<sup>7</sup> Extensible Stylesheet Language Transformations (<https://www.w3.org/TR/xslt>)



## 4.3 Encoding

PDFreactor automatically detects the encoding of the input document, however the encoding can also be forced to a specific value, e.g. like this:

```
config.setEncoding("UTF-8");
```

All languages (p. 419)

## 4.4 CSS Validation

PDFreactor validates CSS, ignoring unknown properties and property values with invalid syntax. The `cssSettings` configuration property is used to adjust PDFreactor's default behavior by constructing a `CssSettings` object. This object has two properties, each one responsible for a different aspect of CSS validation:

### **validationMode**

Adjusts the CSS property validation behavior. This effects how PDFreactor validates CSS property–value combinations when parsing style sheets. The default value is `HTML_THIRD_PARTY`.

### **supportQueryMode**

Adjusts the CSS property support behavior. This effects how PDFreactor interprets the validity of CSS property–value combinations in CSS "@supports" queries or via JavaScript. The default value is `HTML`.

Both of these properties are configured using one of the constants below:

### **ALL**

Indicates that all style declarations are considered valid disregarding the possibility of improper rendering. Valid values may be overwritten by invalid style declarations.

### **HTML**

Indicates that all values set in style declarations will be validated as long as PDFreactor supports the corresponding property.

Style declarations for properties not supported by PDFreactor are taken as invalid.

### **HTML\_THIRD\_PARTY**

Indicates that all values set in style declarations will be validated as long as PDFreactor supports the corresponding property.

Style declarations for properties not supported by PDFreactor but by third party products are taken as valid.

### **HTML\_THIRD\_PARTY\_LENIENT**

Indicates that all values set in style declarations will be taken as valid if a third party product supports the corresponding property.

Style declarations for properties not supported by any third party product but supported by PDFreactor will be validated.

*Example 20: Disabling CSS validation*

All languages (p. 420)

```
config.setCssSettings(new CssSettings()
    .setValidationMode(CssPropertySupport.ALL)
    .setSupportQueryMode(CssPropertySupport.ALL));
```

## 4.5 Quirks Mode

Legacy HTML versions may have different CSS processing or layout rules. To be compatible, PDFReactor offers various quirks settings to adjust its behavior appropriately. This can be done with the `quirksSettings` configuration property. It takes an object with the following properties:

### **caseSensitiveClassSelectors**

By default in HTML CSS class selectors are case sensitive.

In the default `DETECT` mode this behavior is disabled for old HTML doctypes or when there is no doctype.

### **minLineHeightFromContainer**

By default the line-height of text containers, e.g. paragraph elements, is used as the minimum line-height of their lines.

In the default `DETECT` mode this behavior is disabled for old HTML doctypes or when there is no doctype.

Each of these properties is configured with a `QuirksMode` constant to enable or disable it independently of the document:

### **STANDARDS**

Forced no-quirks (i.e. standard compliant) behavior.

### **QUIRKS**

Forced quirks behavior.

### **DETECT**

Doctype dependent behavior.

*Example 21: Using case-insensitive CSS class selectors*

All languages (p. 420)

```
config.setQuirksSettings(new QuirksSettings()
    .setCaseSensitiveClassSelectors(QuirksMode.QUIRKS);
```

## 4.6 Resource Loading

PDFReactor automatically loads linked external resources, e.g. from tags like `<link>`, `<img>` etc. If the respective server does not respond within 60 seconds, loading of the resource will be aborted and it will not be included in the document.

For documents including relative resources, like

```

```

```
<a href="/english/index.html">...</a>
```

```
<link href="../../css/layout.css" rel="stylesheet" type="text/css" />
```

PDFReactor needs a base URL<sup>8</sup> to resolve these resources. If your input document source is a URL, the base URL will be set automatically. In all other cases you have to specify it manually:

```
config.setBaseUrl("https://someServer/public/");
```

All languages (p. 420)

It is also possible to specify file URLs:

```
config.setBaseUrl("file:///directory/");
```

All languages (p. 420)

## 4.6.1 Network Settings

PDFReactor automatically loads resources over the network or the local file system via file URLs. The network settings encapsulate configuration options that affect how PDFReactor connects to a server to access a resource and how it behaves when downloading it.

### **Connect and Read Timeout**

Resource loading timeouts can be customized. Timeouts in milliseconds can be configured via the `connectTimeout` and `readTimeout` network settings.

The connect timeout is the timeout in establishing the initial connection to the resource server, the read timeout is the timeout in downloading the resource from the server (after establishing the connection).

These timeouts can be configured like this:

```
config.setNetworkSettings(new NetworkSettings()
    .setConnectTimeout(1000)
    .setReadTimeout(1000));
```

All languages (p. 420)

### **HTTPS**

PDFReactor supports resource loading from HTTPS and will automatically verify the target SSL certificate. Sometimes this can lead to PDFReactor refusing the connection due to issues with the certificate. For more information please refer to [SSL Certificate Validation \(p. 28\)](#).

<sup>8</sup> Uniform Resource Locator (<https://www.w3.org/Addressing/>)

## Authentication

When resources are behind authentication, PDFReactor can automatically send appropriate HTTP headers to gain access. You can specify the username and the password for the credentials via the `authenticationCredentials` property. This property is a collection of `HttpCredentials` objects that are used to specify various properties of the authentication and the target server. PDFReactor will automatically select the credentials whose properties best match the target server's authentication request.

The following properties can be specified:

- `username` – The username. This property is required.
- `password` – The password. This property is required.
- `authScheme` – The authentication scheme, chosen from a list of constants. If set, PDFReactor only uses these credentials when connection to a server whose authentication scheme matches the specified scheme.
- `host` – The host. If set, PDFReactor only uses these credentials when connecting to the specified host.
- `port` – The port. If set, PDFReactor only uses these credentials when connecting to a server using the specified port.
- `protocol` – The HTTP protocol. If set, PDFReactor only uses these credentials when connecting to a server over the specified protocol.
- `realm` – The authentication realm. If set, PDFReactor only uses these credentials when connecting to a server whose authentication challenge matches the specified realm.

All languages (p. 421)

```
config.setNetworkSettings(new NetworkSettings()
    .setAuthenticationCredentials(new HttpCredentials()
        .setUsername("username")
        .setPassword("password")
        .setAuthScheme(HttpAuthScheme.DIGEST)
        .setRealm("My Realm")));
```

## HTTP Request Headers

Sometimes external resources require additional HTTP headers. PDFReactor will always send all configured headers when requesting resources. HTTP headers can be specified via the `requestHeaders` configuration property of the `networkSettings` object.

### Example 22: Custom user agent header

Resource servers may have a white list of user agents to which they deliver content. While PDFReactor always sends a default user agent header, it can be overridden if necessary.

All languages (p. 421)

```
config.setNetworkSettings(new NetworkSettings()
    .setRequestHeaders(
        new KeyValuePair("User-Agent", "MyApp/2.0"));
```

## Cookies

Some external resources require cookies, especially when trying to access session-specific resources. PDFReactor features RFC 6265-compliant cookie handling and will send and store appropriate cookies with each request and response. The cookie store persists for the duration of the entire conversion. If you want a persistent cookie store that exists beyond the lifetime of conversions, use a [User Agent \(p. 170\)](#). Cookies as well as PDFReactor's cookie policy can be specified via the `cookies` and `cookiePolicy` configuration parameters of the `networkSettings` object, respectively.

Cookies have the following properties:

- `name` – The name of the cookie. This property is required.
- `value` – The value of the cookie. This property is required.
- `domain` – The domain attribute of the cookie. Specifies to which hosts the cookie is sent by PDFReactor. Applies to any domain if not specified. Note that this behavior is an intentional deviation from the RFC standard which does not allow cross-domain cookies. This is to ensure ease of use and backwards compatibility.
- `path` – The path attribute of the cookie. Specifies the path which must exist in the target URI for PDFReactor to send the cookie. Applies to any path if not specified.
- `secure` – The secure attribute of the cookie. Specifies whether this cookie will only be sent over secure connections like HTTPS.

### Example 23: Session cookies

A common use case for a custom cookie are session cookies that need to be sent for each resource request so that PDFReactor has access to a user's session. This is relevant when PDFReactor is integrated into a session-based web application. Usually, you would have to find a way to read the session cookies. The example uses a static example value instead.

```
config.setNetworkSettings(new NetworkSettings()
    .setCookies(new Cookie()
        .setName("JSESSIONID")
        .setValue("123456789")));
```

[All languages \(p. 421\)](#)

## Cookie Policy

The cookie policy defines how PDFReactor handles cookies set by the server.

- `DISABLED` – Disables cookie handling entirely. Cookies specified via the `cookies` configuration property are still sent, but server cookies are automatically rejected and not processed.
- `STRICT` – A strict standard-compliant cookie policy.
- `RELAXED` – Same as `STRICT`, but PDFReactor ignores any date issues in the cookies. This is the default behavior.

A cookie policy can be set like this:

```
config.setNetworkSettings(new NetworkSettings()
    .setCookiePolicy(CookiePolicy.RELAXED));
```

[All languages \(p. 422\)](#)

## 4.6.2 URL Rewrites

PDFReactor can rewrite all URLs before connections to resources are even opened. This is done via the `urlRewriteSettings` configuration property. This object takes one or more rules according to which URLs are rewritten. The new URLs are then used to open the connections.

URL rewrite rules take a regular expression pattern and a substitution. The substitution can include group identifiers and back references.

### Example 24: Rewriting URLs to a certain host

The following sample rewrites all URLs beginning with "http://myOldHost/" to URLs that begin with "https://myNewHost/".

```
config.setUrlRewriteSettings(new UrlRewriteSettings()
    .setRules(
        new UrlRewriteRule()
            .setPattern("^http://myOldHost/(.*)$")
            .setSubstitution("https://myNewHost/$1")
    )
);
```

[All languages \(p. 422\)](#)

All URLs that are called by PDFReactor are matched against all URL rewrite rules. The URLs that are being matched are always absolute and normalized. This means that:

- If the original URL was not absolute, it is resolved against the document's base URL
- All non-URI characters are URL encoded
- Dot segments are resolved or removed

Otherwise the URL is matched as-is, including query parameters and user info.

### Data URLs

Data URLs are also matched, but before the match the data part is removed. This means you can still match the header, but not the actual data.

### Important

Since only the result URLs of the rewrite are used to open connections, [security settings \(p. 28\)](#) only apply to the new URLs and not the original ones.

## 4.7 Additional Resources

In certain cases it is desirable to load additional resources, such as style sheets or scripts, without modifying the contents of the input document. This can be achieved by specifying the resources directly in the PDFReactor integration code instead of the document itself.

All of these resources use the `Resource` model. They are usually specified by a URL or by content. If both `content` and `uri` properties are set, the `uri` is used as a base URL for the resource.

## 4.7.1 User Style Sheets

User style sheets represent CSS that is loaded in addition to the CSS specified in the input document. Generally, user style sheets have higher priority as document style sheets, but lower priority as inline styles.

They can be added like this:

```
config.setUserStyleSheets(
    new Resource().setContent("p { color: red; }"),
    new Resource().setUri("http://myServer/my.css"));
```

[All languages \(p. 422\)](#)

## 4.7.2 Integration Style Sheets

Integration style sheets are similar to user style sheets, but they have a lower priority than document CSS, and thus also a lower priority than user style sheets.

```
config.setIntegrationStyleSheets(
    new Resource().setContent("p { font-family: sans-serif; }"),
    new Resource().setUri("http://myServer/corporate-identity.css"));
```

[All languages \(p. 423\)](#)

## 4.7.3 User Scripts

User scripts represent additional JavaScripts. They are executed after all document JavaScript has finished processing. You can optionally run certain user scripts *before* any document JavaScript by specifying the `beforeDocumentScripts` property. This is useful for e.g. JavaScript-based shims.

User scripts can be added like this:

```
config.setUserScripts(
    new Resource().setContent("console.log('executed first')")
        .setBeforeDocumentScripts(true),
    new Resource().setUri("http://myServer/my.js"));
```

[All languages \(p. 423\)](#)

## 4.7.4 XSLT Style Sheets

When converting XML documents, you can add XSLT style sheets in your integration code to transform the XML into HTML. They can be added like this:

```
config.setXsltStyleSheets(
    new Resource().setUri("http://myServer/my.xsl"));
```

[All languages \(p. 423\)](#)

## 4.8 Colors

### 4.8.1 Color Keywords

Instead of using color functions or the hexadecimal notation a single human readable keyword can be used. For more information which keywords are supported by PDFReactor see the [CSS Color Keywords table \(p. 228\)](#). The keywords are internally converted into the user-set color space. By default, they are converted into RGB colors.

## 4.8.2 RGB Colors

In CSS you can specify RGB<sup>9</sup> colors in the following ways:

- `#` followed by a 6 digit RGB value in hexadecimal notation, e.g. `#00ff00` for perfect green. Adding two more digits defines the alpha channel, with `ff` being opaque.

You can abbreviate this notation by using only 3 digits which will be expanded internally, e.g. `#0f5` equals `#00ff55`. The same can be done with 4 digits to also define the alpha channel.

- Using the function `rgb`. It takes the 3 RGB component values as parameters in decimal or percent notation, e.g. `rgb(0,255,0)` or `rgb(0%,100%,0%)` for perfect green.

## 4.8.3 RGBA Colors

RGBA<sup>10</sup> colors are also supported and can be specified by using the function `rgba`. It takes the 3 RGB component values as well as 1 alpha component value as parameters in decimal or percent notation, e.g. `rgba(0,0,255,0.5)` or `rgba(0%,100%,0%,50%)` for semi-translucent blue.

While it is currently possible to set RGBA colors on any CSS border, complex border settings (e.g. table cells borders) or border styles other than "solid" are not yet supported and may cause unexpected visual outcome.

### Note

The functions `rgb` and `rgba` share the same syntax and can be used interchangeably, so `rgb(0%,100%,0%,50%)` will also result in a semi-translucent blue.

## 4.8.4 CMYK Colors

Besides `rgb` and `rgba` PDFReactor also supports the non-standard function `cmyk`. It takes the 4 CMYK component values as parameters in decimal or percent notation, e.g. `cmyk(0,0,1,0)` or `cmyk(0%,0%,100%,0%)` for perfect yellow. An optional fifth parameter can be used to define the color's alpha value, e.g. `cmyk(0%,0%,100%,0%,10%)` would be a transparent yellow with an alpha of only 10%.

Color keywords can be converted automatically into CMYK using the configuration property `colorSpaceSettings.targetColorSpace`:

```
config.setColorSpaceSettings(new ColorSpaceSettings()
    .setTargetColorSpace(ColorSpace.CMYK);
```

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CMYK colors are also supported in [SVGs \(p. 49\)](#).

<sup>9</sup> Red Green Blue, additive color model, consisting of the color components red, blue and green.

<sup>10</sup> Red Green Blue Alpha, a color model similar to RGB, with extra information about the translucency.



## 4.8.5 HSL Colors

HSL<sup>11</sup> is another representation of the RGB color space. The hue value is in the range of 0 to 360, the saturation and lightness values range between 0 and 1. It is possible to set HSL colors using the function `hsl`. It takes the 3 HSL component values as parameters in decimal or percent notation, e.g. `hsl(240,0,0)` or `hsl(66%,0%,0%)` for blue. As with `rgb`, there is also the function `hsla`, though both functions allow an additional parameter for the alpha value.

## 4.8.6 Spot Colors

Spot or separation colors, e.g. Pantone colors, are special named colors for professional printing. The specific color name is passed as is to the print workflow. As they cannot be displayed on screen (or printed without the correct named color), a fallback color must be specified, e.g. a similar CMYK color. A spot color can be used via the CSS function `-ro-spot` and its synonym `-ro-separation`. The function takes two or three parameters: The spot color name, the color tint (which is optional and defaults to 1.0, which represents maximum "opacity") and the fallback color.

Spot colors are also supported in [SVGs \(p. 49\)](#).

## 4.8.7 Color Conversion

Different colors can be converted into a common color space. See [Color Space Conversion \(p. 77\)](#) for more information.

## 4.9 Compound Formats

In addition to rendering HTML and XML styled with CSS, PDFReactor is also able to render documents with compound formats such as images, SVGs or barcodes, so-called `replaced element`s.

The replaced elements can be mapped to arbitrary elements using styles.

You can use namespaces to include other document formats to integrate XML elements from a different namespace directly within your document.

### 4.9.1 Images

PDFReactor has support for the image formats PNG, JPEG, TIFF, BMP, GIF as well as limited support for WebP (lossy simple VP8).

Images are embedded into the output PDF "as-is", whenever possible, unless the properties `-ro-image-recompression` or `-ro-image-resampling` are used. This means that images are not modified in any way and will be embedded without any re-encoding and without any loss in quality. Possible discrepancies in perceived quality might occur depending on the PDF viewer and the zoom level. Images with the exact same URL are only embedded once.

<sup>11</sup> Hue Saturation Lightness, alternative representation of colors of the RGB color model.

PDFreactor supports the `img` element per default in HTML. For other XML languages, you can use proprietary CSS extensions to define an image element. For example, in an XML vocabulary where an image element is `<image source='test.jpg'>`, the corresponding CSS definition would be:

```
image {
  -ro-replacedelement: image;
  -ro-source: attr(source);
}
```

To define an element as image element, you must specify the replaced element formatter for images for this element, as displayed in the example above. Using the `-ro-source` property and the `attr` function, you can select an attribute of this element. The value of this attribute must always be of the type URI<sup>12</sup> and is used to load the image.

### Note

Corrupted images, embedded "as-is", may lead to corrupted PDF output.

## Save Memory Mode

PDFreactor needs to access image data multiple times during the conversion. It needs to know an image's dimensions during layout, and then the actual binary data to embed it in the PDF during rendering. To avoid having to download the image multiple times and thus slowing down the conversion, PDFreactor keeps downloaded images in memory for quick access. However, in certain scenarios, images can be quite large, e.g. high-resolution TIFFs for print. In this case, it can actually be detrimental to keep the image in memory. You can use the `processingPreferences` configuration object to change the default behavior of PDFreactor. The value `SAVE_MEMORY_IMAGES` prevents PDFreactor from keeping images in memory. Instead, they are downloaded each time PDFreactor requires data.

### Example 25: Processing large high-res images

```
config.setProcessingPreferences(
    ProcessingPreferences.SAVE_MEMORY_IMAGES);
```

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## 4.9.2 SVG

PDFreactor supports the following SVG<sup>13</sup> types: SVG and SVGZ. PDFreactor automatically converts SVG documents referenced via the `img` element. Example:

```

```

Alternatively, you can embed SVG directly into your documents:

```
a circle:<br/>
<svg width="100" height="100">
  <circle cx="50" cy="50" r="45" fill="yellow" stroke="black" />
</svg>
<br/>sometext.....
```

<sup>12</sup> Uniform Resource Identifier (<https://www.w3.org/Addressing/>)

<sup>13</sup> Scalable Vector Graphics (<https://www.w3.org/Graphics/SVG/>)

**Note**

When using non-HTML5 documents, an SVG namespace has to be added and used:

```
<svg:svg xmlns:svg="http://www.w3.org/2000/svg" width="100" height="100">
  <svg:circle cx="50" cy="50" r="45" fill="yellow" stroke="black" />
</svg:svg>
```

**Rasterization**

SVGs are embedded into the PDF as vector graphics, keeping them resolution independent. However, SVGs containing masks, filters or non-default composites<sup>14</sup> have to be rasterized<sup>15</sup>. This behavior can be configured using CSS:

The style `-ro-rasterization: avoid` disables the aforementioned SVG features to avoid having to rasterize the image.

The property `-ro-rasterization-supersampling` configures the resolution of the rasterization. The default value is `2`, meaning twice the default CSS resolution of `96dpi`. Accepted values are all positive integers. Higher resolution factors increase the quality of the image, but also increase the conversion time and the size of the output documents.

**CMYK and Spot Colors in SVG**

PDFreactor supports **CMYK** (p. 46) and **spot** (p. 47) colors in SVGs. Those are passed to the PDF as-is, as long as the SVG is not rasterized.

*Example 26: Setting the stroke color to black*

```
stroke="cmyk(0.0, 0.0, 0.0, 1.0)"
```

**Text Rendering**

When SVGs are converted to PDF vector graphics text can either be embedded as text, using a font, or as shapes. The former allows selecting and copying the text and results in smaller output file size when there is a significant amount of SVG text. It is also the default behavior, which can be overridden via the custom CSS property `-ro-pdf-text-rendering`, specified on the root of the SVG. Specifying a `stroke` color forces rendering as shapes. In certain complex scenarios embedding as text may also be disabled. The supported styles include the common font styles and `letter-spacing`. Supported attributes include `text-anchor`, `textLength` and `lengthAdjust`.

<sup>14</sup> **Default composites** use the `src-over` operator with an opacity of 1. Other compositing operations, especially those with an opacity that is not 0, are considered non-default and will cause the SVG to be rasterized.

<sup>15</sup> **Rasterization** is the task of taking an image described in a vector graphics format and converting it into a raster (pixel) image.

### 4.9.3 MathML

To display MathML<sup>16</sup> in documents we recommend using the JavaScript library MathJax<sup>17</sup> using SVG output.

#### Example 27: Rendering MathML with MathJax

While the combined configuration `MML_SVG` typically works, it is recommended to use the following configuration which is optimized for use in PDFReactor:

```
<script type="text/x-mathjax-config">
  MathJax.Hub.Config({
    showMathMenu: false
    jax: ["input/MathML", "output/SVG"],
    extensions: ["mml2jax.js"],
    MathML: { extensions: ["content-mathml.js"] },
    SVG: { blacker: 0 }
  });
</script>
<script src="url/to/MathJax.js"></script>
```

The configuration above is automatically applied when using [Awesomizr](#) (p. 67) to load MathJax:

```
import { loadMathJax } from 'url/to/awesomizr.js';
loadMathJax('url/to/MathJax.js');
```

To use MathJax without modifying the input documents you can add it as a user script (see [User Scripts](#) (p. 45)), in which case using Awesomizr to load it is recommended.

#### Important

PDFReactor supports MathJax with the following limitations:

**Support for version 2 only.** We recommend using the most recent release of that version to display MathML. MathJax v3 is currently not supported.

**SVG output only.** Other output processors currently don't produce optimal results.

#### See

See [JavaScript](#) (p. 60) for more information on how PDFReactor processes JavaScript.

### 4.9.4 Barcodes

PDFReactor supports displaying numerous linear and 2D barcode symbologies using the following style:

```
.barcode {
  -ro-replacdelement: barcode;
}
```

The resulting replaced element can be customized by applying various CSS properties.

<sup>16</sup> **Mathematical Markup Language** (<https://www.w3.org/Math/>)

<sup>17</sup> **MathJax** (<https://www.mathjax.org/> & <https://github.com/mathjax/MathJax/>) licensed under the Apache License 2.0

The most important one is `-ro-barcode-type`, which can be used to select a specific type (and subtype) of barcode to be rendered. For some types, the last argument of the property is also used to configure a unique characteristic of the barcode (refer to the [appendix \(p. 197\)](#) for more information).

### Important

- The behavior of most of the `-ro-barcode-*` properties depends on the selected barcode type.
- A full list of all supported barcode types, their subtypes and applicable CSS properties can be found in the [appendix \(p. 197\)](#).

## Defining the Content

There are multiple ways to define the content of the barcode. To define it directly, you can use the `-ro-barcode-content` property:

### Example 28: Creating a UPC-E barcode

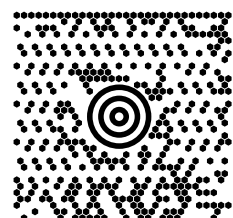
```
.barcode {
  -ro-replacdelement: barcode;
  -ro-barcode-type: upc-e;
  -ro-barcode-content: "123456";
}
```



### Example 29: Creating a Mode 3 MaxiCode

As MaxiCodes require a primary string in mode 2 or 3, the last argument of `-ro-barcode-type` is used to add it.

```
.barcode {
  -ro-replacdelement: barcode;
  -ro-barcode-type: maxicode mode-3 "999999999840012";
  -ro-barcode-content: "1234567894561230";
}
```



If `-ro-barcode-content` is not set, PDFReactor will try to use the value of the element's `href` attribute:

### Example 30: Creating a QR Code from an HTML link

HTML:

```
<a id="qrcode" href="https://www.pdfreactor.com/"></a>
```

CSS:

```
#qrcode {
  -ro-replacdelement: barcode;
  -ro-barcode-type: qrcode;
  -ro-barcode-ecc-level: H;
  -ro-barcode-size: 2;
}
```



If both `-ro-barcode-content` and the `href` attribute are empty, PDFReactor will use the text content of the element. That content is always trimmed, i.e. whitespace characters at its beginning and end are removed. By default other sequences of whitespace characters are collapsed to single spaces. Collapsing can be disabled by changing the value of `white-space` from `normal` to `pre`.

### Automatically resolving relative URLs

If a relative URL is set as the barcode's content using the `url` function, or if it is retrieved from the `href` attribute, PDFReactor will automatically try to resolve it according to the document's `baseUrl`.

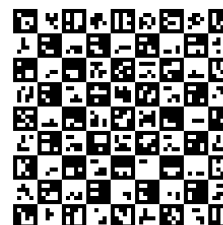
*Example 31: Creating a Grid Matrix containing a resolved URL*

HTML:

```
<a id="gridmatrix" href="#Barcodes"></a>
```

CSS:

```
#gridmatrix {
  -ro-replacedelement: barcode;
  -ro-barcode-type: grid-matrix;
}
```



#### Note

If `links (p. 69)` are enabled, PDFReactor will automatically check whether the content of the barcode is a valid URL and add the respective link.

### Customizing the barcode color

By default, all barcodes will be rendered in black with a transparent background. To change the foreground color, you can use the `-ro-barcode-color` property. If it is set to `currentColor`, the value of the `color` property will be used.

### Adjusting the barcode size

When adjusting the size of the barcode, you should differentiate between two aspects: On the one hand, there is its natural size (also called intrinsic size), which is the size the barcode itself would have without the influence of the layout around it. It depends on factors like the barcode type, its content and certain settings, for example its `ecc level`.

And on the other hand, there is the specific size (also called extrinsic size), which is the size the barcode actually consumes in the layout and the resulting document. It depends on the context and CSS styles of the barcode element.

### Adjusting the specific size

The replaced element will be adjusted automatically to comply with the surrounding document's layout. However, as the aspect ratio is not always preserved, this might result in distorted barcodes, i.e. having an incorrect aspect ratio. This can be prevented by setting the `object-fit` property to `contain`.

### Adjusting the natural size

For some barcode types, the `-ro-barcode-size` property can be used to select a certain sized version. E.g. for a QR code, setting `-ro-barcode-size` to 10 would result in a version 10 QR code, which contains 57 x 57 modules.

For other types, like `databar-expanded` (p. 208), the property adjusts the amount of columns which should be used to store data. Applied to PDF417 codes, the property can additionally be used to adjust how many rows are rendered.

#### Note

The value defined by `-ro-barcode-size` might be ignored in some cases, like when the selected size is not sufficient to store the specified amount of data.

If applied to a one dimensional barcode, the property sets the bar height.

#### See

More detailed descriptions on how `-ro-barcode-size` behaves depending on the used barcode type can be found in the [appendix](#) (p. 197).

### Adjusting human readable text

For all barcode types that possess human readable text, some additional changes can be applied. The used font can be customized using the `-ro-barcode-font-size` and `-ro-barcode-font-family` properties. The position and alignment of the human readable text can be changed using the `-ro-barcode-human-readable-position` property, which can also be used to remove it entirely. The `-ro-barcode-letter-spacing` property can be used to adjust the human readable text's letter-spacing. If the barcode type allows for affixes to be added to the human readable text, they can be configured using the `-ro-barcode-human-readable-affix` property. A detailed list on which barcode types possess affixes can be found in the [appendix \(p. 197\)](#).

*Example 32: Creating a Code 128 without human readable text*

HTML:

```
<a id="code-128-no-human-readable" href="#Barcodes"></a>
```

CSS:

```
#code-128-no-human-readable {
  -ro-replacdelement: barcode;
  -ro-barcode-type: code128;
  -ro-barcode-human-readable-position: none;
  -ro-barcode-content: "123456";
}
```



### Rotating barcodes

Barcodes can be rotated using the `-ro-image-orientation` CSS property. As opposed to using CSS transforms, this affects the surrounding layout. Note that the `from-image` and `none` values default to no rotation and `flip` has no effect.

## 4.9.5 Object and Embed

PDFReactor supports the `object` and `embed` elements of HTML. You can use either element or a combination of both to embed any type of data such as for example a flash animation. The most simple code to do so is:

```
<embed src="myflash.swf" width="256" height="256"
  type="application/x-shockwave-flash"/>
```

### Note

Besides flash you can also embed various other formats, e.g. videos. The data is embedded in the PDF, but whether or not it is displayed depends on the formats supported by your PDF viewer.



## 4.9.6 Form Controls

PDFReactor supports HTML form elements. These form controls are non-interactive by default (but can be made [interactive \(p. 71\)](#)). Their visual appearance may deviate from common web browsers to provide a look and feel that is generally more appropriate for print media.

The default appearance of form elements is also not tied to the operating system like in browsers. In fact, PDFReactor only provides a simple, printer-friendly appearance that is fully stylable via CSS. This means that CSS properties such as `color` and `padding` also influence form controls like checkboxes and radio buttons whereas these styles have usually no effect in browsers unless these form elements are styled with `appearance: none`.

### Enforcing browser-like behavior

Using CSS, the behavior can be made more browser-like if desired. The following example simulates the appearance of checkboxes and radio buttons in web browsers and prevents other styles from interfering with them. It contains CSS properties that are commonly used on form elements and uses values to approximate browser rendering.

*Example 33: Force and approximate browser-like checkboxes and radio buttons*

```
input[type="checkbox"],
input[type="radio"] {
    background: white !important;
    border: 1pt solid lightgray !important;
    color: white !important;
    padding: 0 !important;
}
input[type="checkbox"]:checked,
input[type="radio"]:checked {
    background: cornflowerblue !important;
    border-color: cornflowerblue !important;
}
```

Note that the list of styles is not exhaustive and that the styles used are not necessarily ideal for interactive controls.

#### See

See [Interactive PDF Forms \(p. 71\)](#) for information specifically about interactive form controls.

## 4.9.7 iframes

An iframe allows another document, for example content from other pages, to be embedded inside an existing one.

### The source document

There are two ways to define the inner document of an iframe. The first option is to use the `src` attribute and specifying the URL from which the document should be loaded. The URL might be absolute or relative and should refer to an HTML document.

The second option is useful if the inner document is very short and simple. When using the `srcdoc` attribute, its value is set to be the inner document's source code.

```
<iframe src="https://www.pdfreactor.com" width="600" height="400">
</iframe>

<iframe srcdoc="<p>Hello World</p>">
  <b>This is fallback text in case the user-agent does not support
    iframes.</b>
</iframe>
```

### Note

If both attributes have been set, `srcdoc` has priority over `src`.

### Seamless

If the `seamless` attribute has been set, the iframe's document behaves as it would be in the document that contains the iframe. That means that the width and height of the iframe are ignored and the inner document is shown completely if possible.

Furthermore, the borders of the iframe are removed and most importantly all styles from the outer document are inherited by the inner document.

When generating the PDF, the headings and other bookmark styles inside the iframe are passed through, so they can be found in the bookmark list.

The `seamless` attribute is a boolean attribute, which means that if it is true it exists and false otherwise. The only valid values of `seamless` are an empty string or `"seamless"`. The attribute can also be used without any value:

```
<iframe src="https://www.pdfreactor.com" width="600" height="400"
  seamless>
</iframe>
```

### Note

Generally, `true` and `false` are INVALID values for boolean attributes.

### Customization

Using CSS styles, it is possible to customize the look and functionality of iframes.

The border, padding and margin can be set or removed with the appropriate styles.

```
iframe {
  border: none;
  padding: 0px;
  margin: 0px;
}
```

By default, if `seamless` is false neither style sheets nor inline styles are passed down to the iframe's document. However, by using the property `-ro-passdown-styles`, this behavior can be customized.

When generating a PDF with the bookmarks feature enabled, the headings in the document are added as bookmarks to quickly navigate the document.

Using the property `-ro-bookmarks-enabled` it is possible to enable or disable this feature for iframes, thus allowing the headings of the inner document to be added to the bookmarks list or not. The property can be either set to `true` or `false`. If the iframe is seamless, it is set to true by default.

```
<iframe src="https://www.pdfreactor.com" width="600" height="400"
  seamless="seamless" style="-ro-passdown-styles:stylesheets-only;
  -ro-bookmarks-enabled:false;">
</iframe>
```

## 4.9.8 Canvas Element

PDFReactor has built-in support for the `canvas` element of HTML5. The canvas element is a dynamic image for rendering graphics primitives on the fly. In contrast to other replaced elements the content of the canvas element must be generated dynamically via [JavaScript \(p. 60\)](#), instead of referencing an external resource that contains the content to be displayed (as is the case for example for images).

Below is a simple code fragment which renders shadowed text into a `canvas` element:

```
<head>
  <script type="text/javascript">
    function draw() {
      let ctx = document.getElementById("canvas").getContext('2d');
      ctx.font = "50px 'sans-serif'";
      ctx.shadowBlur = 5;
      ctx.shadowColor = "#aaa";
      ctx.shadowOffsetX = 2;
      ctx.shadowOffsetY = 2;
      ctx.fillStyle = "black";
      ctx.fillText("PDFReactor",0,50);
    }
  </script>
</head>
...
<body onload="draw();">
  <canvas id="canvas" width="400" height="300">
    Canvas element is not supported.
  </canvas>
</body>
```

### Resolution Independence

PDFReactor by default does not use a resolution-dependent bitmap as the core of the canvas. Instead it converts the graphics commands from JavaScript to resolution-independent PDF objects. This avoids resolution-related issues like blurriness or pixelation.

Shadows cannot be convert to PDF objects. So those are added as images. This does not affect other objects in the canvas.

Accessing `ImageData` of a canvas or setting a non-default composite causes that canvas to be rasterized entirely.

This behavior can be configured using CSS:

The style `-ro-rasterization: avoid` disables functionality that causes the rasterization of the canvas.

The style `-ro-rasterization: always` forces the canvas to be rasterized in any case.

The property `-ro-rasterization-supersampling` configures the resolution at which the canvas or shadows are rasterized. The default value is `2`, meaning twice the default CSS resolution of 96dpi. Accepted values are `1` to `4`. Higher resolution factors increase the quality of the image, but also increase the conversion time and the size of the output documents. This does not affect canvas objects that are not rasterized.

#### 4.9.9 PDF Pages as Images

PDFreactor can losslessly embed pages from other PDFs as images in the document to be converted to PDF or draw them into image output. To use a PDF as an image in a document, simply use the `img` element, like you would for any other image. Example:

```

```

In the example above, the PDF image will always display the first page of the PDF. You can select which page should be displayed using the CSS property `-ro-source-page`. The example below shows how to display page 5 of the PDF:

```

```

By default the media box, i.e. the entire sheet, of the PDF page is visible and used for sizing. This can be reduced to any other PDF page box like `"crop"` or `"trim"` via the property `-ro-source-area`. The example below shows how to display only the crop box of the PDF page:

```

```

PDF images expose the page count of their source document to JavaScript via the proprietary property `roPageCount` of the `img` HTML element. If the object is not a PDF image `roPageCount` will return `0`. In the following example, let's assume we have a PDF image with the id "pdfimage":

```
let reportPdf = document.getElementById("pdfimage");
let pageCount = reportPdf.roPageCount;
```

Aside from using image elements, PDFs can be used in most places other images are supported. For example, you can embed PDFs as background images. With the exception of being able to access the page count using JavaScript, the behavior described above also applies to them:

```
.pdfBackground-2 {
  background-image: url("https://resources.myserver.com/backgrounds.pdf");

  /* Apply styles like -ro-source-page or -ro-source-area to the same element as
  background image. */
  -ro-source-page: 2;
}
```

## 4.9.10 Fonts

PDFreactor supports TTF, OTF, TTC, OTC, WOFF and WOFF2 fonts in the formats TrueType or OpenType. Fonts can be specified in documents as web fonts (see [CSS Defined Fonts \(p. 172\)](#)) or in other ways (see [Font Sources \(p. 172\)](#)).

PDFreactor contains fonts that will be used by default when no fonts are specified in the document or when no fonts from other font sources could be matched. See [Core Fonts Pack \(p. 173\)](#) and [Packaged Fonts \(p. 177\)](#).

### Note

Using OpenType fonts with CFF outlines requires Java 9 or higher.

## Color Fonts

PDFreactor supports the following OpenType color font formats:

- CBDT
- SBIX
- OpenType-SVG

### Important

Support for color fonts currently has the following limitations:

**Larger PDF size** when using the OpenType-SVG font format.

**No selection or copying.** (In tagged PDFs the content is still accessible for screen readers.)

## 4.9.11 Emojis

PDFreactor supports color emojis and monochrome emojis. By default color emojis are used.

In cases you want monochrome emojis instead, you can add `-ro-emoji` to the end of your font family list.

```
:root {
  font-family: "My Font", sans-serif, -ro-emoji;
}
```

You can also use color emojis explicitly by using the font family `-ro-color-emoji`.

```
:root {
  font-family: "My Font", sans-serif, -ro-color-emoji;
}
```

Alternatively you can use emoji fonts, either monochrome ones or color emojis (see [Color Fonts \(p. 59\)](#) for supported formats), by retrieving them from different types of sources (see [Font Sources \(p. 172\)](#)).

### Note

Emoji support is limited for Java versions older than 17.

### 4.9.12 Filters and Shadows

Certain effects, like blurring, are not natively supported by the PDF format. In such cases, PDFReactor has to generate an image of the corresponding element, with the effects already applied. The image can always be displayed in the PDF and if necessary an invisible text overlay above the image ensures, that the text inside the element can still be selected, copied and is accessible, e.g. to screen readers.

The CSS properties that require element rasterization are:

- `box-shadow` (only the shadow itself is rastered. The content of the element can be rendered as usual).
- `filter`
- `text-shadow`

#### Note

When creating soft shadows or using blur filters, the blurring itself is a time-consuming task and can, depending on the content to be generate, increase the creation time of the PDF significantly. Thus blurs and shadows should be used with caution if the conversion time of the PDF is important.

The resolution of the resulting image can be customized via the `-ro-rasterization-supersampling` property. The default value is `2`, meaning 192dpi, as a compromise between quality, performance and size.

Please note that increasing the resolution or applying shadows and filters on large or many elements will not only increase the size of the converted PDF but may also slow down PDF readers.

As a safeguard against memory and performance issues, the maximum size of a single rasterized image can be limited. By default an image will be rasterized to have less than 2 megapixels. This is still large enough to cover an A4 page-sized image with the default supersampling. The CSS property `-ro-rasterization-max-size` allows to customize or disable that limit.

#### Note

If the only filter function used is `opacity`, consider using the CSS property `opacity` instead. PDFReactor uses native PDF functionality to render the transparent element, thus avoiding the drawbacks of rasterization.

## 4.10 JavaScript

#### Note

This chapter refers to JavaScript in the input document, processed by PDFReactor like in a browser. There also:

- [Scripts added to the resulting PDFs, processed by the PDF-viewer \(p. 87\)](#)

PDFReactor automatically processes JavaScript that is embedded into or linked from input HTML documents.

It is also possible to manually add scripts:

```
config.setUserScripts(
    new Resource().setContent("console.log('test')");
```

All languages (p. 424)

If desired, this functionality can be disabled as follows:

```
config.setJavaScriptSettings(new JavaScriptSettings()
    .setDisabled(true));
```

All languages (p. 424)

### 4.10.1 Limitations of Browser-Like Behavior

JavaScript processing during PDF conversion works like it does in a browser, with some exceptions:

- The delays of `setTimeout` or `setInterval` are applied only to the virtual time of JavaScript processing and do not actually slow down the conversion.
- Alerts and other dialogs are logged and do not stop script processing.
- There are no browser-like security measures based on the origins of URLs ("cross-site scripting"). However, the [Connection Security \(p. 28\)](#) mechanism of PDFReactor is applied to all connections caused by JavaScript. This has the advantage that XMLHttpRequest and Fetch can access file-URLs, when those are allowed. Module "import" statements also can access any URL, incl. file, that is not prohibited.

JavaScript processing is subject to a few other limitations that will be eliminated in future versions of PDFReactor:

- DOM access to elements inside embedded SVGs may be subject to minor limitations.
- Reading from and manipulating form DOM elements via their specific JS attributes and methods is not fully supported.
- Coordinates (e.g. retrieved via `getDOMRects`) are relative to their pages, which might lead to unexpected results in some situations.
- Redirects (e.g. changing window.location) are not possible.
- Scripting support in iframes is limited.
- When a module is imported from an absolute URL the modules it imports in-turn, directly or transitively, must be specified as relative paths or absolute URLs. Absolute paths will erroneously be resolved against the origin of the root document.
- Support for import maps is limited to the "imports" module specifier map.

Unlike Chrome PDFReactor still supports DOM mutation events. However, like in Firefox, they are deprecated.

### 4.10.2 JavaScript Engines

PDFReactor uses a JavaScript implementation based on the JavaScript engine Oracle GraalJS. Previous versions used Mozilla Rhino as JavaScript engine, which is now deprecated but can still be enabled via a setting. However, we recommend to only use it as a temporary solution for the rare cases when it supports scripts that GraalJS does not yet handle correctly. Please note that Rhino only offers partial support for ECMAScript 2015 (ES6) while GraalJS fully supports ECMAScript 2023 syntax.

*Example 34: Changing the JavaScript engine to Rhino*

```
config.setJavaScriptSettings(new JavaScriptSettings()
    .setJavaScriptEngine(JavaScriptEngine.RHINO));
```

All languages (p. 424)

### 4.10.3 Third-Party JavaScript Libraries and Frameworks

PDFReactor supports various third-party JavaScript libraries and frameworks. See [JavaScript Support \(p. 408\)](#) for details.

### 4.10.4 Proprietary Access to Layout Information

PDFReactor allows JavaScript access to some layout information via the proprietary object [ro.layout \(p. 186\)](#).

#### Descriptions

Many proprietary JavaScript functions return so-called `Description` objects: `PageDescription`, `BoxDescription`, etc. These objects provide layout information on the specific type of document item, such as a document page.

The description objects contain information about the layout of its content. The properties of `PageDescription`, `BoxDescription` and `LineDescription` can be found in the appendix [JavaScript Objects And Types \(p. 186\)](#)

#### Note

Description objects are not live but snapshots of the particular moment they were created. Modifying the document after getting one has no effect on it. Current ones can be retrieved at any time. Doing so after modifying the document will cause a layout.

#### PageDescriptions

Describes the dimensions of a page and its rectangles as well as some further information. The rectangles are described by using `DOMRect`. A `PageDescription` is retrieved via the index of the desired page. The first page has the index 0.

*Example 35: Retrieving the PageDescription of the second page in the document*

```
let pageDesc = ro.layout.getPageDescription(1);
```



## BoxDescriptions

Describes the position and dimensions of the rectangles of a box as well as some further information. The rectangles are described by using `DOMRect`. A `BoxDescription` is retrieved via a DOM element, which may have a box, multiple ones or none.

*Example 36: Retrieving a BoxDescription from an element*

```
let element = document.querySelector("#myElem");
let boxDescriptions = ro.layout.getBoxDescriptions(element);

if (boxDescriptions.length > 0) {
  let boxDescription = boxDescriptions[0];
}
```

## LineDescriptions

Contains information about a line of text. It can be retrieved from a `BoxDescription`.

*Example 37: Retrieving LineDescriptions from a BoxDescription*

```
let lineDescriptions = boxDescription.lineDescriptions;
```

## DOMRects

A `DOMRect` contains the position and dimensions of a rectangle. (see [MDN](#))

To retrieve the `DOMRect` from Page- and BoxDescription use the getter functions that take an optional string parameter. This parameter specifies the length unit of the values of the `DOMRect` and has to be one of the following absolute CSS units: "px", "pt", "pc", "cm", "mm", "in" or "q". By default this value is "px".

*Example 38: Retrieving a DOMRect (with dimensions in centimeters) from a BoxDescription*

```
let marginRect = boxDescription.getMarginRect("cm");
```

## Ranges

A `Range` represents a fragment of a document that can contain nodes and parts of text nodes. (see [MDN](#))

## 4.10.5 PDF Output Options

It is possible to specify portions of the PDFReactor configuration in document JavaScript at runtime during the conversion. This can be useful if you want to create PDF attachments dynamically, specify PDF-specific settings like encryption on the fly, change the page order according to content-specific criteria, etc.

You can access these PDF output options via the proprietary object `ro.pdf` (p. 187). For a full list of supported properties refer to [JavaScript Objects and Types](#) (p. 186). The default value of these properties is taken from their respective configuration setting from your PDFReactor configuration. For example, if you have specified the author to be "John Smith" in your configuration, the value of the `ro.pdf.author` property will also be "John Smith" initially and can be changed as desired.

### Note

This feature is disabled by default and needs to be explicitly enabled by allowing [author API overrides](#) (p. 29). Trying to access the `ro.pdf` object when it is disabled causes an error to be thrown, which can be caught and handled in the surrounding JavaScript.

#### Example 39: Creating dynamic attachments

In some cases it might be desirable to specify PDF attachments not in the PDFReactor API, but dynamically via JavaScript, depending on the document. This example shows how to add a PDF attachment from JavaScript.

```
ro.pdf.attachments.push({
  name: "log.txt",
  data: "My log text.",
  description: "A JavaScript log"
});
```

The data to attach can also be binary, e.g. an image generated by a `canvas`.

```
graphCanvas.toBlob((graphBlob) => {
  ro.pdf.attachments.push({
    name: "graph1975.png",
    data: graphBlob,
    description: "Statistics of 1975"
  });
});
```

#### Example 40: Removing a page

This example uses a custom page order to eliminate the third page from the document.

```
ro.pdf.pageOrder = "1..2,4..-1";
```

#### Example 41: Setting PDF properties

Even if the integration code specifies an author and a title in the configuration, these values can be overridden at runtime.

Original configuration:

```
config.setAuthor("Brian Greene");
config.setTitle("The Elegant Universe");
```

All languages (p. 424)

Override at runtime:

```
ro.pdf.author = "Stephen Hawking";
ro.pdf.title = "The Universe in a Nutshell";
```

## 4.10.6 Exporting Data From JavaScript

Sometimes it can be desirable to make data from JavaScript available to the PDFreactor integration for further processing after the conversion has finished. You can export data from document JavaScript by setting the JavaScript property `ro.exports`. The exported data can then be accessed in the API via the `javascriptExports` property of the `Result` object of the conversion.

You can export any data type with `ro.exports` (p. 186). However, since the property `javascriptExports` returns a string, the data will be converted internally. If the data type is not a string, PDFreactor will try to convert it to JSON. This means that you can conveniently export JavaScript objects or arrays, and then parse the data back from JSON. If the data can't be converted, a generic string representation of it is used or `null` if none is available.

### Note

While it is possible to export strings directly, it is generally recommended to only export JavaScript arrays or objects which will be converted into JSON. If an empty string is exported, it is converted to `null` when accessed through the `Result` object in the PDFreactor integration.

#### Example 42: Exporting data from JavaScript

Export an object:

```
ro.exports = {
  message: "my exported data",
  content: [ 1, 2, 3 ]
};
```

The resulting string is as follows:

```
{"message":"my exported data","content":[1,2,3]}
```

It can be retrieved from the `javascriptExports` property of the `Result` object:

```
String javascriptExports = result.getJavaScriptExports();
```

All languages (p. 424)

This string can then be parsed or processed further.

## 4.10.7 Timeouts and Limits

For various reasons scripts may run unnecessarily long or even endlessly. PDFreactor imposes various limits to avoid long conversion times.

Most limits are intended for scripts that would run for an excessive amount of time because of the script expecting an interactive browser environment. They end JavaScript processing but let the conversion continue on.

## Limits that interrupt JavaScript, but not the conversion

Name	Description	Default Value
<code>maxScriptElements</code>	The maximum number of <code>script</code> elements in the document (including ones generated by JavaScript) to be processed. That amount of elements does not have to be in the document simultaneously.	1,000,000
<code>maxQueuedTasks</code>	The maximum number of tasks to be processed. Tasks include everything that introduces JavaScript to be run, e.g. the callbacks of events, observers and <code>window.setTimeout</code> .	1,000,000
<code>maxTasksWithoutDomChange</code>	The maximum number of tasks to be processed while the DOM is not modified.	1,000
<code>maxTasksRepeated</code>	The maximum number of times the same tasks can be processed. These executions of the task do not have to be consecutive.	1,000
<code>maxVirtualTimeOffset</code>	The maximum number of seconds the virtual time of the JavaScript environment may be forwarded. Virtual time is forwarded when callbacks of <code>window.setTimeout</code> and similar function are executed. It is not related to the wall-clock time in any way.	3,600 (1h)

However, some limits target erroneous or malicious scripts as well as complex scripts that end up running endlessly due to missing functionality. Reaching one of those terminates the conversion with a matching exception.

## Limits that terminate the conversion with an exception

Name	Description	Default Value
<code>statementLimit</code>	The maximum number of JavaScript statements to be executed. Statements include, among other things, method calls, variable assignments and loop iterations.	1,000,000,000 (1 billion)
<code>timeout</code>	The maximum number of seconds (wall-clock time) JavaScript processing may take. This is not related to the virtual time in any way.	3,600 (1h)

*Example 43: Limiting JavaScript processing time*

The following example limits JavaScript processing time to 20 seconds.

```
config.setJavaScriptSettings(new JavaScriptSettings()
    .setTimeout(20));
```

[All languages \(p. 425\)](#)

## 4.10.8 awesomizr.js

The JavaScript library **awesomizr.js** is a collection of helpful functions for the use with PDFReactor. You have to import the JavaScript and in some cases the corresponding CSS. Both the script and the css files are located in the "PDFReactor/samples" directory.

You can add the library by using the PDFReactor configuration property `userScripts`. To add the respective CSS, use the property `userStyleSheets`:

[All languages \(p. 425\)](#)

```
config
    .setUserStyleSheets(new Resource()
        .setUri("awesomizr.css"))
    .setUserScripts(
        new Resource()
            .setContent("import * as Awesomizr from './awesomizr.js';
Awesomizr.createTableOfContents();")
            .setSubtype(ResourceSubtype.JAVASCRIPT_MODULE));
```

### Note

Of course, the library and the style sheet can alternatively be imported by the document itself. However, please note that some functions only work with PDFReactor.

The capabilities of **awesomizr.js** include:

- [Rotating table headers to reduce the table header width \(p. 117\)](#)
- [Fitting wide tables onto narrow pages \(p. 134\)](#)
- [Adaptive Page Break Insertion \(p. 125\)](#)
- [Creating a Table of Contents \(p. 131\)](#)

# 5. OUTPUT FORMATS

## 5.1 PDF Output

PDF is the default output format of PDFReactor.

Generally PDFReactor generates PDFs with the Adobe PDF version 1.5. However, some PDF features may require viewers that support newer versions of PDF.

**PDF/A** (p. 74) and **PDF/X** (p. 76) conformance may force different PDF versions.

### Note

The PDF documents created with PDFReactor may contain additional metadata, which may require a PDF reader that is able to display a later version of Adobe PDF correctly.

Some features of PDFReactor are specific to the PDF output format:

### 5.1.1 Bookmarks

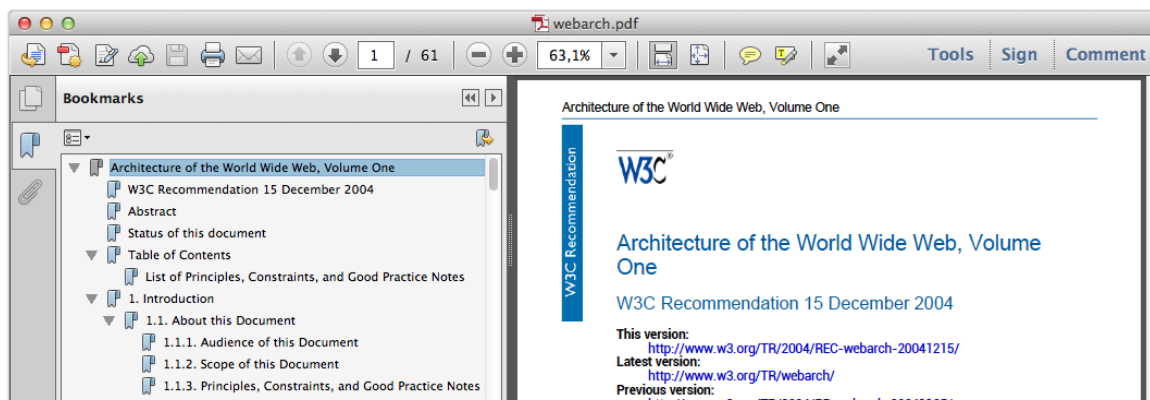


Fig. 1: Bookmarks in the Adobe Reader

PDFReactor adds bookmarks to your document automatically. This can be disabled by using the `disableBookmarks` configuration property like this:

```
config.setDisableBookmarks(true);
```

All languages (p. 425)

When the default HTML mode is enabled, some bookmark levels are applied by default, e.g. the following ones for heading elements:

```
h1 { bookmark-level: 1;}
h2 { bookmark-level: 2;}
h3 { bookmark-level: 3;}
h4 { bookmark-level: 4;}
h5 { bookmark-level: 5;}
h6 { bookmark-level: 6;}
```

Using the `bookmark-level` style you can create bookmarks which link to arbitrary XML elements in your PDF files.

```
element { bookmark-level: 1; }
```

Using this property, one can structure the specified elements within the bookmark view of the PDF viewer. The elements are ordered in ascending order. The element with the lowest bookmark level is on top of the bookmark hierarchy (similar to HTML headlines). Several bookmark levels can be set using the `bookmark-level` style.

The property `bookmark-state` defines whether the entry is initially open, showing its descendants in the bookmark view of the PDF viewer. With the property `bookmark-label` it is possible to define the bookmark title. By default, the element's text content is used.

How the coordinate to scroll to is determined can be changed via the property `-ro-destination-area`, e.g. the scroll target can be offset by 1cm or the page the element is on can be used instead of the element itself.

## 5.1.2 Links

PDFreactor adds links to your documents by default. This can be disabled by using the `disableLinks` configuration property like this:

```
config.setDisableLinks(true);
```

All languages (p. 425)

For HTML documents the following link styles are applied by default, enabling external and internal links:

```
a[href] { -ro-link: attr(href); }
a[name] { -ro-anchor: attr(name); }
[id]    { -ro-anchor: attr(id); }
```

Using the styles `-ro-link` and `-ro-anchor` arbitrary elements can be defined to be links or anchors.

```
linkElement[linkAttribute] { -ro-link: attr(linkAttribute); }
anchorElement[anchorAttribute] { -ro-anchor: attr(anchorAttribute); }
```

### Note

Some PDF viewers recognize URLs written in plain text and convert them to links. This happens independently of PDFreactor and its settings and properties.

Please see [Attachments \(p. 86\)](#) for a way to embed target files into the output PDF instead of linking to them.

### The clickable areas of links

The proprietary property `-ro-link-area` can be used to specify how the 'clickable' areas of links are determined.

This style is not inherited. It has to be set on the same elements as `-ro-link`, when those should deviate from the default value: `all`.

### The scroll coordinate for internal links

How the coordinate to scroll to is determined for internal links can be changed via the property `-ro-destination-area` on the target element, e.g. the scroll target can be offset by 1cm or the page the element is on can be used instead of the element itself.

### Links in Images

When links are enabled the following also create clickable links:

- Links in SVGs. The target is taken from the `a` element itself. The clickable area is the bounding rectangle of all elements contained in that element.
- HTML image map links. The clickable area and target are based on the attributes of the `area`.
- Barcodes containing an absolute URL. Those are clickable in their entirety pointing to that URL.

### 5.1.3 Metadata

The `title` of a generated PDF document, as well as the additional metadata `author`, `subject` and `keywords`, can be specified in multiple ways:

By default the `<title>` tag as well as various `<meta>` tags are read.

The metadata can also be read from other elements using the properties `-ro-title`, `-ro-author`, `-ro-subject` and `-ro-keywords`.

#### Note

When a metadata property applies to multiple elements the values are concatenated. Therefore it is recommended to disable the default set elements when specifying other ones:

*Example 44: Set the document title from first heading*

```
/* Disable setting title from title or meta tags */
head * {
  -ro-title: none;
}
/* Set title from first heading */
body > h1:first-of-type {
  -ro-title: content();
}
```

The metadata of the document can be overridden from the API. The following metadata can be directly set by PDFReactor:

- `author` – The author of the document
- `title` – The document's title
- `subject` – The subject of the document
- `creator` – The content creator



- `keywords` – Usually a comma-separated list of keywords for search engines

```
config
  setAuthor("John Doe")
  setTitle("Architecture of the World Wide Web, Volume One")
  setSubject("Architecture of the world wide web")
  setCreator("John's DoeNuts, Inc.")
  setKeywords("w3c, www");
```

[All languages \(p. 426\)](#)

The code above creates metadata as shown in the screenshot below:

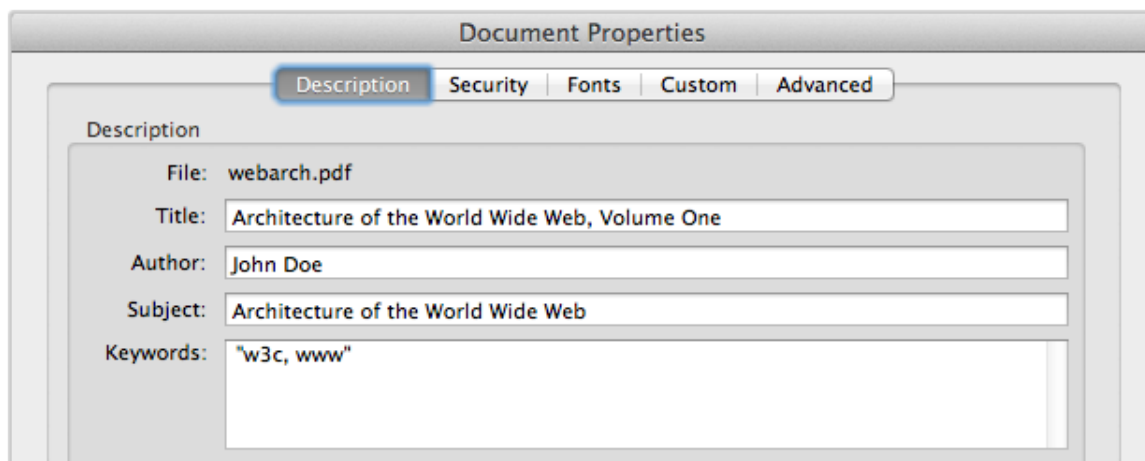


Fig. 2: Document properties dialog of Adobe Reader

### Note

The PDF "producer" property, also known as "encoding software", cannot be overridden. It will always contain PDFReactor's name and version as well as basic information about the used license. For security purposes, the version number can be suppressed. See [Hiding Version Information \(p. 36\)](#) for more details.

### Custom Properties

You can also add custom properties to the documents, for which you can define the name and value, e.g.

```
config.setCustomDocumentProperties(
  new KeyValuePair("feedback address", "peter@miller.com"));
```

[All languages \(p. 426\)](#)

## 5.1.4 Interactive PDF Forms

HTML forms are rendered automatically by PDFReactor. In addition, you can also convert HTML forms to fully functional interactive PDF forms (sometimes referred to as AcroForms) using the proprietary CSS property `-ro-pdf-format`. This property must be specified for the forms you wish to convert to an interactive PDF form.

Example form:

```
<form id="credentials">
  First Name: <input type="text" value="firstname" />
  Last Name: <input type="text" value="lastname" />
  <input type="submit" />
</form>
```

To convert the form with the ID "credentials" to an AcroForm, you can use this style declaration:

```
#credentials, #credentials > input { -ro-pdf-format: pdf; }
```

Using this style declaration, only the form with the ID "credentials" and the input fields contained in this form are converted to an AcroForm when the PDF is rendered. Only the forms and form elements having this CSS style are converted. You can convert all forms and input fields using this CSS code:

```
form, form input { -ro-pdf-format: pdf; }
```

HTML form elements are mapped to interactive PDF forms based on their type and attributes as follows:

Markup	Mapped Form Type
<code>&lt;input type="text"/&gt;</code>	Text Box
<code>&lt;input type="password"/&gt;</code>	Text Box
<code>&lt;input type="checkbox"/&gt;</code>	Check Box
<code>&lt;input type="radio"/&gt;</code>	Radio Button
<code>&lt;input type="submit"/&gt;</code>	Push Button
<code>&lt;input type="reset"/&gt;</code>	Push Button
<code>&lt;input type="file"/&gt;</code>	Text Box
<code>&lt;input type="hidden"/&gt;</code>	None
<code>&lt;input type="image"/&gt;</code>	Push Button
<code>&lt;input type="button" value="Button"/&gt;</code>	Push Button
<code>&lt;input type="color"/&gt;</code>	Text Box
<code>&lt;input type="date"/&gt;</code>	Text Box
<code>&lt;input type="datetime-local"/&gt;</code>	Text Box
<code>&lt;input type="date"/&gt;</code>	Text Box
<code>&lt;input type="email"/&gt;</code>	Text Box
<code>&lt;input type="month"/&gt;</code>	Text Box
<code>&lt;input type="number"/&gt;</code>	Text Box
<code>&lt;input type="range"/&gt;</code>	Text Box

Continued

Continued

Markup	Mapped Form Type
<code>&lt;input type="search"/&gt;</code>	Text Box
<code>&lt;input type="tel"/&gt;</code>	Text Box
<code>&lt;input type="time"/&gt;</code>	Text Box
<code>&lt;input type="url"/&gt;</code>	Text Box
<code>&lt;input type="week"/&gt;</code>	Text Box
<code>&lt;button type="submit"&gt;Submit&lt;/button&gt;</code>	Push Button
<code>&lt;button type="button"&gt;Button&lt;/button&gt;</code>	Push Button
<code>&lt;button type="reset"&gt;Reset&lt;/button&gt;</code>	Push Button
<pre> &lt;select&gt;   &lt;!-- Options --&gt; &lt;/select&gt; </pre>	Combo Box
<pre> &lt;select multiple&gt;   &lt;!-- Options --&gt; &lt;/select&gt; </pre>	List Box
<code>&lt;textarea&gt;&lt;/textarea&gt;</code>	Text Area

## 5.1.5 Tagged PDF

Tagged PDF files contain information about the structure of the document. The information about the structure is transported via so-called "PDF tags". Tagging a PDF makes it accessible to assistive technology like screen readers. Please see the [Accessibility \(p. 155\)](#) chapter for further information. Furthermore, depending on the application, it may improve the results of copy and paste or allow more advanced processing of the PDF.

Using the `addTags` configuration property, you can add PDF tags to the PDF documents generated with PDFReactor. If you are generating a PDF from HTML input, the HTML elements and the resulting layout are automatically mapped to the appropriate PDF tag structures, so all you have to do is set the following configuration property to enable this feature:

```
config.setAddTags(true);
```

All languages (p. 426)

### Note

PDF tagging is automatically enabled when it is required by a PDF conformance, like [PDF/A-1a](#), [PDF/A-3a \(p. 74\)](#) or [PDF/UA \(p. 75\)](#).

**Note**

For documents containing text in [RTL \(p. 139\)](#) direction that have to be accessible the property `-ro-glyph-layout-mode` must not be set to `speed`, as that does only ensure that the text is in the correct order visually, but not logically.

### 5.1.6 PDF/A Conformance

PDFReactor supports the creation of PDF/A-1a or PDF/A-3a conformant files, as well as other PDF/A sub-formats, which, however, will not be covered in detail.

PDF/A is a family of ISO standards ("ISO 19005") for long-term archiving of documents. The goal of these standards is to ensure the reproduction of the visual appearance as well as the inclusion of the document's structure. All information necessary for displaying the document in the same way every time is embedded in the file. Dependencies on external resources are not permitted. PDF/A-1a and PDF/A-3a also require the output PDF documents to be tagged, providing accessible documents. PDFReactor will automatically ensure the requirements are met as far as possible.

Many companies and government organizations worldwide require PDF/A compliant documents.

PDF/A-1a is the strictest PDF/A standard while the newer PDF/A-3a is more lenient, e.g. allowing transparency and attachments.

PDF/A imposes the following restrictions, which PDFReactor automatically enforces (overriding configuration settings), so no manual intervention is required unless noted otherwise:

- All used fonts are embedded.
- All images are embedded.
- Multi-media content is forbidden.
- PDF Script is prohibited. (Does not affect JavaScript in the source HTML document)
- Encryption is prohibited.
- Metadata included in the PDF is required to be standard-based XMP.
- Colors are specified in a device-independent manner. (see below)
- The PDF must be tagged. (PDF/A-1a, PDF/A-2a and PDF/A-3a only)
- Attachments are prohibited. (PDF/A-1 only)
- Transparency is prohibited (PDF/A-1 only), see [image alpha channels in PDF/A-1 \(p. 75\)](#).

PDF/A documents must use either RGB or CMYK colors exclusively (color keywords and gray colors will be converted appropriately). By default RGB colors are expected. Using CMYK requires an output intent including an ICC profile. (It is also possible to specify an RGB profile to replace the default `sRGB`.) Please see [ICC Profiles and Output Intents \(p. 77\)](#). For documents with mixed RGB and CMYK content you can use the [color space conversion \(p. 77\)](#) functionality of PDFReactor to create valid PDF/A documents without the need to modify the input documents.

To create a PDF/A conformant document, the configuration property `conformance` is used in the PDFReactor integration, e.g.:

```
config.setConformance(Conformance.PDFA3A);
```

[All languages \(p. 426\)](#)

The supported PDF/A conformance levels are PDF/A-1a, PDF/A-1b, PDF/A-2a, PDF/A-2b, PDF/A-2u, PDF/A-3a, PDF/A-3b and PDF/A-3u.

### PDF/A-1 alpha channels

Images in PDF/A-1 document may have an alpha channel. However, the values in the channel may only be the minimum and maximum, i.e. fully transparent and fully opaque. For images that violate that requirement PDFReactor applies dithering to the alpha channel to create a valid one that approximates the original.

CSS colors may also not have alpha values. Those are not automatically removed. This can be enabled with the `ignoreAlpha` configuration property, like this:

```
config.setIgnoreAlpha(true);
```

[All languages \(p. 426\)](#)

Please note that ignoring the alpha channel may lead to unexpected results.

### Validation

PDFReactor can optionally validate the generated PDF against specified PDF/A or PDF/UA conformances using the configuration property `validateConformance`. Validation is optional and might take several minutes depending on the size and complexity of the document. It can be enabled like this:

```
config.setValidateConformance(true);
```

[All languages \(p. 427\)](#)

When conformance validation is enabled, PDFReactor will throw an exception and terminate the conversion should the document not validate against all specified conformances. If the PDF validates successfully, the conversion will finish normally. In either case, the [log \(p. 19\)](#) will contain additional information about the document's validation status.

### Recommendation

It is also possible to create documents that are [PDF/UA \(p. 75\)](#) compliant in addition to being PDF/A compliant, combining the benefits of both formats for maximum accessibility and archivability. We highly recommend adding PDF/UA conformance when creating PDF/A documents:

```
config.setConformance(Conformance.PDFA3A_PDFUA1);
```

[All languages \(p. 427\)](#)

## 5.1.7 PDF/UA Conformance

PDF/UA is a standard for accessible PDF documents, which has been adopted as a recommendation or requirement by many organizations worldwide.

It primarily defines correct PDF tagging. The only other restriction that may require manual intervention is that the document must have a title. (If the title is not specified in the input document, it can be set via the configuration property `title`.)

When PDF/UA conformance is enabled PDF tagging is automatically enabled as well. Please see the [Accessibility \(p. 155\)](#) chapter for further information.

To create a PDF/UA conformant document, the configuration property `conformance` can be used in the PDFReactor integration, e.g.:

```
config.setConformance(Conformance.PDFUA1);
```

All languages (p. 427)

### Recommendation

It is also possible to create documents that are [PDF/A \(p. 74\)](#) compliant in addition to being PDF/UA compliant, combining the benefits of both formats for maximum accessibility and archivability. We recommend adding PDF/A-3a conformance when creating PDF/UA documents, as long as the additional restrictions are met by the input document.

```
config.setConformance(Conformance.PDFA3A_PDFUA1);
```

All languages (p. 427)

## 5.1.8 PDF/X Conformance

PDFReactor supports the creation of PDF/X conformant files, specifically PDF/X-1a:2001, PDF/X-3:2002, PDF/X-1a:2003, PDF/X-3:2003, PDF/X-4 and PDF/X-4p. PDF/X restrictions and requirements are enforced as far as possible, which may cause configuration settings to be overridden or conversions to fail with an error message describing non-compliant content or settings that have to be resolved manually. The restrictions and requirements of PDF/X include:

- All Fonts must be embedded.
- Multimedia content and non-printable annotations are prohibited.
- Encryption is prohibited.
- No scripts may be embedded. (This does not affect JavaScript in the input document.)
- Transparency is prohibited (except in PDF/X-4), see [image alpha channels in PDF/A-1 \(p. 75\)](#).
- Colors must be specified as CMYK, gray, keywords or spot. (PDF/X-3 relaxes this restriction to allow RGB. However, this requires ICC profile based conversion, which not every print workflow can handle.) For documents with RGB or mixed content you can use the [color space conversion \(p. 77\)](#) functionality of PDFReactor to create valid PDF/X documents without the need to modify the input documents.
- An output intent is required, consisting of an output condition identifier string and an ICC profile. (Depending on the exact conformance and target environment it may be legal or required to omit the ICC profile, as long as the identifier is known to the target environment. Constants for the default profiles of Adobe Acrobat Pro DC are available for usage with PDF/X-4p. Please note that the availability of these default profiles may vary between different versions of Acrobat Pro.) Please see [ICC Profiles and Output Intents \(p. 77\)](#).

- The title metadata is required. Usually, it is set by the document's title element, but it can also be set by the CSS property `-ro-title`. The third option is to set it via the configuration property `title`. Please see [Metadata \(p. 70\)](#).

To create a PDF/X conformant document, the configuration property `conformance` can be used in the PDFReactor integration, e.g.:

```
config.setConformance(Conformance.PDFX4);
```

[All languages \(p. 427\)](#)

## 5.1.9 ICC Profiles and Output Intents

PDFReactor allows you to set the output intent of the PDF document, consisting of an identifier and an ICC profile. This is required for certain `PDF/A` and `PDF/X` conformance modes, with the ICC profile being optional in some cases. The example below demonstrates how to use the configuration property `outputIntent`:

```
config.setOutputIntent(new OutputIntent()
    .setIdentifier("ICC profile identifier")

    // Use this if you are loading the ICC profile via URL (ignored if data is set)
    .setUrl("URL/to/ICC/profile")

    // Use this if you want to specify the ICC profile's binary data
    .setData(iccProfileByteArray)
);
```

[All languages \(p. 428\)](#)

The property `identifier` sets a string identifying the intended output device or production condition in human- or machine-readable form. The property `url` points to an ICC profile file and the property `data` sets the binary data of such a profile, the latter having priority.

The color space of the output intent profile overrides the target color space.

### 5.1.10 Color Space Conversion

In cases when output PDF documents must consist only of colors and images of a certain color space, but not all input documents and resources match that, you can enable color space conversion. For example, you can convert all CSS colors and images to CMYK with a specified ICC profile matching the output intent of a `PDF/A` (p. 74) or a `PDF/X` (p. 76) for printing:

```
// The required output intent
config.setOutputIntent(new OutputIntent()
    .setIdentifier("ICC profile identifier")
    .setUrl("URL/to/ICC/profile"));
// Color space conversion settings
config.setColorSpaceSettings(new ColorSpaceSettings()
    // The same profile as the output intent, required for accurate conversion to CMYK
    .setCmykIccProfile(new Resource().setUri("URL/to/ICC/profile"))
    // Not necessary to set in this case (overridden by output intent), but recommended
    .setTargetColorSpace(ColorSpace.CMYK)
    // Enable conversion of RGB colors and images to CMYK
    .setConversionEnabled(true));
```

[All languages \(p. 428\)](#)

You can also create a web version, which is smaller and in RGB:

[All languages \(p. 428\)](#)

```
// (No output intent required)
// Color space conversion settings
config.setColorSpaceSettings(new ColorSpaceSettings()
    // When converting to RGB the profile is used for accurate conversion from CMYK
    .setCmykIccProfile(new Resource().setUri("URL/to/ICC/profile"))
    // Not necessary to set in this case (default), but recommended
    .setTargetColorSpace(ColorSpace.RGB)
    // Enable conversion of CMYK colors and images to RGB
    .setConversionEnabled(true));
// Reduce image sizes by resampling and compression
config.setUserStyleSheets(new Resource().setContent(
    // downsample images that (in the final layout)
    // have a resolution of more than 200dpi
    "* { -ro-image-resampling: 200dpi; "
    // recompress all images to JPEG with a quality of 90%
    + "-ro-image-recompression: jpeg(90%) }"));
```

If `cmykIccProfile` is not set, naive conversion, similar to the one of PDF viewers, is used.

By default, a perceptual conversion is performed. If a relative colorimetric approach is preferred, it can be set using `colorConversionIntent`. Note that relative colorimetric conversions are only supported using Java 20+.

### 5.1.11 Print Dialog Prompt

PDFReactor can be configured to immediately display a print dialog when a PDF file created with PDFReactor is opened. To do so, the `printDialogPrompt` configuration property must be used:

```
config.setPrintDialogPrompt(true);
```

[All languages \(p. 429\)](#)

### 5.1.12 Compression

There are several factors that contribute to a PDFs resulting file size, such as the number of pages and image resources. To achieve a smaller file size, you can use various compression methods which may be more or less effective depending on the exact use case.

#### *Image Compression*

In some cases, the PDF contains many high-resolution images which are appropriate for print PDFs, but may not be ideal for PDFs published on the web. For such a case, you can use CSS to compress and resample images to ensure that their resolution does not exceed a specific value. This can be done with the proprietary CSS property `-ro-image-resampling`, whose value represents the target resolution.

*Example 45: Compressing large images*

This example demonstrates how to convert large images into new images with a target resolution of 72dpi. Images that already have resolution smaller than 72dpi are not converted.

```
* {
    -ro-image-resampling: 72dpi;
}
```



Changing the resolution of an image is generally a lossy compression and will reduce the quality of an image. To specify the compression algorithm and the quality of the resampled image, use the `-ro-image-recompression` proprietary CSS property.

### Structure Optimization

PDFreactor automatically compresses certain PDF data structures such as tag trees to optimize the file size. There may be certain situations where this optimization is undesired, e.g. when PDF version 1.4 is required. In this case, the optimization can be disabled using the `disablePdfStructureOptimization` configuration property.

```
config.setDisablePdfStructureOptimization(true);
```

All languages (p. 429)

## 5.1.13 Encryption and Restrictions

PDFreactor can protect generated PDF documents via 40 or 128 bit encryption.

To encrypt the output PDF, set the encryption strength to a value other than `ENCRYPTION_NONE`:

```
EncryptionSettings encryptionSettings = new EncryptionSettings();
encryptionSettings.setType(Encryption.AES_256);
config.setEncryptionSettings(encryptionSettings);
```

All languages (p. 429)

When the PDF document is opened, the user has to supply the user password in order to view the content. When no user password is set, the PDF can be viewed by any user. In either case, certain restrictions are imposed. These can be suspended by supplying the owner password. You can set the passwords as follows:

```
EncryptionSettings encryptionSettings = new EncryptionSettings();
encryptionSettings.setUserPassword("upasswd");
encryptionSettings.setOwnerPassword("opasswd");
config.setEncryptionSettings(encryptionSettings);
```

All languages (p. 429)

Though not recommended for security reasons, both passwords can be omitted. However, the owner password must be specified for certain postprocessing steps, e.g. for [digital signing \(p. 84\)](#) or [merging \(p. 82\)](#).

By default, all restrictions are imposed on the PDF document. You can, however, exclude selected ones by using the following configuration properties:

#### Note

Encryption as well as restrictions are highly viewer dependent. If a PDF viewer does not implement them, some restrictions may not be taken into account at all.

#### List of configuration properties to disable restrictions

Property name	Allows ...
<code>allowPrinting</code>	printing
<code>allowCopy</code>	copying or otherwise extracting content

Continued

Continued

Property name	Allows ...
<code>allowAnnotations</code>	adding or modifying annotations and interactive form fields
<code>allowModifyContents</code>	modifying the content of the document
<code>allowDegradedPrinting</code>	printing (same as <code>allowPrinting</code> , however, with a limited resolution) (128 bit encryption only)
<code>allowFillIn</code>	filling in form fields (128 bit encryption only)
<code>allowAssembly</code>	inserting, removing and rotating pages and adding bookmarks (128 bit encryption only)
<code>allowScreenReaders</code>	extracting content for use by accessibility devices (128 bit encryption only)

**See**

API docs for further information.

### 5.1.14 Viewer Preferences

You can configure the initial presentation of the document in the viewer by setting viewer preferences. Setting viewer preferences will activate / deactivate certain options of the viewer, for example it allows to hide the viewer's toolbar when the document is opened.

Note that these preferences are not enforced, i.e. if you decide to set the `HIDE_TOOLBAR` preference, the user can still display the toolbar again when viewing this PDF if he decides to do so. Setting this preference only affects the default state of the toolbar when the document is opened, but does not enforce this state.

Some viewer preferences also influence the default settings of the print dialog of the viewer.

You can set viewer preferences by using the configuration property `viewerPreferences`, e.g.:

```
config.setViewerPreferences(ViewerPreferences.PAGE_LAYOUT_SINGLE_PAGE,
    ViewerPreferences.DISPLAY_DOC_TITLE);
```

All languages (p. 429)

PDFReactor supports the following viewer preferences:

**List of Viewer Preferences**

Viewer Preference	Effect
<code>PAGE_LAYOUT_SINGLE_PAGE</code>	Display one page at a time.
<code>PAGE_LAYOUT_ONE_COLUMN</code>	Display the pages in one column.
<code>PAGE_LAYOUT_TWO_COLUMN_LEFT</code>	Display the pages in two columns, with odd numbered pages on the left.

Continued

Continued

Viewer Preference	Effect
PAGE_LAYOUT_TWO_COLUMN_RIGHT	Display the pages in two columns, with odd numbered pages on the right.
PAGE_LAYOUT_TWO_PAGE_LEFT	Display two pages at a time, with odd numbered pages on the left.
PAGE_LAYOUT_TWO_PAGE_RIGHT	Display two pages at a time, with odd numbered pages on the right.
PAGE_MODE_USE_NONE	Show no panel on startup.
PAGE_MODE_USE_OUTLINES	Show bookmarks panel on startup.
PAGE_MODE_USE_THUMBS	Show thumbnail images panel on startup.
PAGE_MODE_FULLSCREEN	Switch to full screen mode on startup.
PAGE_MODE_USE_OC	Show optional content group panel on startup.
PAGE_MODE_USE_ATTACHMENTS	Show attachments panel on startup.
HIDE_TOOLBAR	Hide the viewer application's tool bars when the document is active.
HIDE_MENUBAR	Hide the viewer application's menu bar when the document is active.
HIDE_WINDOW_UI	Hide user interface elements in the document's window.
FIT_WINDOW	Resize the document's window to fit the size of the first displayed page
CENTER_WINDOW	Position the document's window in the center of the screen.
DISPLAY_DOC_TITLE	Display the document's title in the top bar.
NON_FULLSCREEN_PAGE_MODE_USE_NONE	Show no panel on exiting full-screen mode. Has to be combined with PageModeFullScreen.
NON_FULLSCREEN_PAGE_MODE_USE_OUTLINES	Show bookmarks panel on exiting full-screen mode. Has to be combined with PageModeFullScreen.
NON_FULLSCREEN_PAGE_MODE_USE_THUMBS	Show thumbnail images panel on exiting full-screen mode. Has to be combined with PageModeFullScreen.
NON_FULLSCREEN_PAGE_MODE_USE_OC	Show optional content group panel on exiting full-screen mode. Has to be combined with PageModeFullScreen.

Continued

Continued

Viewer Preference	Effect
DIRECTION_L2R	Position pages in ascending order from left to right.
DIRECTION_R2L	Position pages in ascending order from right to left.
PRINTSCALING_NONE	Print dialog default setting: disabled scaling
PRINTSCALING_APPDEFAULT	Print dialog default setting: set scaling to application default value
DUPLEX_SIMPLEX	Print dialog default setting: simplex
DUPLEX_FLIP_SHORT_EDGE	Print dialog default setting: duplex (short edge)
DUPLEX_FLIP_LONG_EDGE	Print dialog default setting: duplex (long edge)
PICKTRAYBYPDFSIZE_FALSE	Print dialog default setting: do not pick tray by PDF size
PICKTRAYBYPDFSIZE_TRUE	Print dialog default setting: pick tray by PDF size

**Note**

The `PAGE_LAYOUT_` preferences are overridden by the `@-ro-preferences` (p. 146) properties `page-layout` and `first-page-side-view`.

### 5.1.15 Merging PDFs

A generated PDF can easily be merged with existing ones. To merge with a single PDF or multiple PDFs use the `mergeDocuments` configuration property that declares either URLs to or binary data of existing PDF files.

```
MergeSettings mergeSettings = new MergeSettings();
mergeSettings.setMergeDocuments(
    new Resource().setUri("https://www.myserver.com/overlaid1.pdf"),
    new Resource().setData(pdfBytes));
config.setMergeSettings(mergeSettings);
```

All languages (p. 430)

Whether the generated PDF is appended or laid over the existing PDFs depends on the general type of merge:

- Concatenation
- Arrange
- Overlay

Concatenation merges append the generated PDF before or after the existing ones. The following sample shows how to append the generated PDF after the existing one:

All languages (p. 430)

```
MergeSettings mergeSettings = new MergeSettings();
mergeSettings
    .setMergeDocuments(
        new Resource().setUri("https://www.myserver.com/appendDoc.pdf"))
    .setMode(MergeMode.APPEND);
config.setMergeSettings(mergeSettings);
```

To append the generated PDF before the existing ones use `MergeMode.PREPEND`.

Arrange inserts specified pages of PDFs into the generated PDF. This merge mode has to be combined with `pageOrder` (see [Page Order \(p. 134\)](#)) in order to specify which page should be inserted where. The following sample shows how to insert the first page of an existing PDF after the second page of the generated one:

All languages (p. 430)

```
MergeSettings mergeSettings = new MergeSettings();
mergeSettings
    .setMergeDocuments(
        new Resource().setUri("https://www.myserver.com/insert1.pdf"),
        new Resource().setUri("https://www.myserver.com/insert2.pdf"))
    .setMode(MergeMode.ARRANGE);
config.setMergeSettings(mergeSettings);
config.setPageOrder("1,1:1,2..-1");
```

More information on the syntax can be found at [Merge Mode Arrange \(p. 135\)](#)

Overlay merges add the generated PDF above or below existing PDFs. The following sample shows how to overlay an existing PDF:

All languages (p. 430)

```
MergeSettings mergeSettings = new MergeSettings();
mergeSettings
    .setMergeDocuments(
        new Resource().setUri("https://www.myserver.com/overlaid.pdf"))
    .setMode(MergeMode.OVERLAY);
config.setMergeSettings(mergeSettings);
```

To add the generated PDF below the existing one use `MergeMode.OVERLAY_BELOW`.

PDFreactor allows to repeat the pages of PDFs with less pages than other PDFs involved in the merger. The configuration property `overlayRepeat` offers different options to do this:

- repeat only the last page
- repeat all pages of the PDF
- do not repeat any pages
- trim to page count of the shorter document

In the following example, all pages are repeated:

All languages (p. 431)

```
MergeSettings mergeSettings = new MergeSettings();
mergeSettings
    .setMergeDocuments(
        new Resource().setUri("https://www.myserver.com/overlaid.pdf"))
    .setMode(MergeMode.OVERLAY)
    .setOverlayRepeat(OverlayRepeat.ALL_PAGES);
config.setMergeSettings(mergeSettings);
```

The default merge behavior of PDFReactor is a concatenation after the pages of the existing PDFs.

When overlaying documents that have differing page sizes, use the `overlayFit` property to configure how overlay pages that have different dimensions from the pages they are overlaying should be resized.

In the following example, the overlaying page keeps its aspect ratio but will be clipped to fit:

[All languages \(p. 431\)](#)

```
MergeSettings mergeSettings = new MergeSettings();
mergeSettings
    .setMergeDocuments(
        new Resource().setUri("https://www.myserver.com/overlaid.pdf"))
    .setMode(MergeMode.OVERLAY)
    .setOverlayFit(OverlayFit.COVER);
config.setMergeSettings(mergeSettings);
```

When overlaying pages, annotations present in the overlay are preserved by default. This behavior can be configured using the property `disableOverlayAnnotations`.

The following example shows how to disable overlay annotations so that they are not embedded:

[All languages \(p. 431\)](#)

```
MergeSettings mergeSettings = new MergeSettings();
mergeSettings
    .setMergeDocuments(
        new Resource().setUri("https://www.myserver.com/overlaid.pdf"))
    .setMode(MergeMode.OVERLAY)
    .setDisableOverlayAnnotations(true);
config.setMergeSettings(mergeSettings);
```

By default, merging documents will if exceptions occur during the merge operation. If you want the merge to proceed and merge documents with errors simply to be omitted if they contain errors, you can enable the error policy `IGNORE_INVALID_MERGE_DOCUMENTS_EXCEPTION` to do so. Please see [Error Policies \(p. 23\)](#) for details.

### 5.1.16 Digital Signing

PDFReactor is able to sign the PDFs it creates. This allows to validate the identity of the creator of the document. A self-signed certificate may be used. A keystore file in which the certificate is included, is required to sign PDFs with PDFReactor.

The keystore type is required to be one of the following formats:

- "pkcs12"
- "jks"

#### Note

To create a keystore from certificate(s) or read information of an existing keystore such as the `keyAlias`, the Oracle Keytool can be used.

PDFReactor supports various certificates types to sign a PDF such as self-signed certificates. Please see the API documentation for details on these modes.

To sign a PDF digitally use the configuration property `signPDF`:

[All languages \(p. 432\)](#)

```
config.setSignPDF(
  new SignPDF()
    .setKeyAlias("keyAlias")
    .setKeystorePassword("keyStorePassword")
    .setKeystoreType(KeystoreType.JKS)
    .setKeystoreURL("http://myServer/Keystore.jks")
    .setSigningMode(SigningMode.SELF_SIGNED));
```

#### Note

To specify the `keystoreURL` as file URL use the following syntax: `file:///path/to/Keystore.jks`

#### Note

If a PDF is signed via the VeriSign signing mode, a plugin for the PDF viewer is required to show the signature.

## 5.1.17 Font Embedding

By default, PDFReactor automatically embeds the required subsets of all fonts used in the document. This can be disabled using the configuration property `disableFontEmbedding`.

[All languages \(p. 432\)](#)

```
config.setDisableFontEmbedding(true);
```

Doing so reduces the file size of the resulting PDF documents. However, these documents are likely to not look the same on all systems. Therefore this property should only be used when necessary.

## 5.1.18 Overprinting

Overprinting means that one color is printed on top of another color. For example, a background is printed completely, before the text is put on top. As this is a feature for printing it should be used with CMYK colors.

PDFReactor can set the values of the PDF graphics state parameters "overprint" and "overprint mode" via CSS. However, before the CSS properties have any effect, overprinting must first be enabled via the configuration property `addOverprint`:

[All languages \(p. 432\)](#)

```
config.setAddOverprint(true);
```

Then using the styles `-ro-pdf-overprint` and `-ro-pdf-overprint-content` you can specify the overprint properties of elements and their content to either `none` (default), `mode0` or `mode1` (nonzero overprint mode).

`-ro-pdf-overprint` affects the entire element, while `-ro-pdf-overprint-content` only affects the content of the element (not its borders and backgrounds). In both cases the children of the element are affected entirely, unless overprint styles are applied to them as well.

The following example sets small text on solid background to overprint, without enabling overprinting for the background of either the paragraphs or the highlighting spans:

```
p.infobox {
  border: 1pt solid black;
  background-color: lightgrey;
  color: black;
  font-size: 8pt;
  -ro-pdf-overprint-content: model;
}
p.infobox span.marked {
  background-color: yellow;
  -ro-pdf-overprint: none;
  -ro-pdf-overprint-content: model;
}
```

### Note

When having small text with a background, overprinting can be very helpful to avoid white lines around the text, if the printing registration is imperfect.

## 5.1.19 Attachments

Alternatively to linking to external URLs (see [Links \(p. 69\)](#)) PDFReactor also allows embedding their content into the PDF.

Attachments can be defined via CSS, which can be enabled by the configuration property `addAttachments`:

```
config.setAddAttachments(true);
```

All languages (p. 432)

The following styles can be used to specify attachments:

- `-ro-pdf-attachment-url`:

A URL pointing to the file to be embedded. This URL can be relative.

- `-ro-pdf-attachment-name`:

The file name associated with the attachment. It is recommended to specify the correct file extension. If this is not specified the name is derived from the URL.

- `-ro-pdf-attachment-description`:

The description of the attachment. If this is not specified the name is used.

- `-ro-pdf-attachment-mime-type`:

The MIME type of the attachment. Specifying this is only required in some specific cases, especially when documents are intended for automatic processing.

- `-ro-pdf-attachment-location`:

- `element` (default): The attachment is related to the area of the element. Viewers may show a marker near that area.
- `document`: The file is attached to the document with no relation to the element.



Attachments can be specified for specific elements as follows:

```
#downloadReport {
  -ro-pdf-attachment-url: "../resources/0412/report.doc";
  -ro-pdf-attachment-name: "report-2012-04.doc";
  -ro-pdf-attachment-description: "Report for April of 2012";
}
```

Strings can be dynamically read from the document using the CSS functions `attr` and `content`, that read specified attributes or the text content of the element respectively. Using those, certain `a`-tags can be changed from links to attachments:

```
.downloadReports a[href] {
  -ro-link: none;
  -ro-pdf-attachment-url: attr(href);
  -ro-pdf-attachment-description: content() " (" attr(href) ")";
}
```

Attachments can also be set via the configuration property `attachments`. This configuration property also allows specifying the content of the attachment as a byte array instead of an URL, so dynamically created data can be attached:

```
config.setAttachments(
  new Attachment()
    .setData("sample attachment text".getBytes())
    .setName("sample.txt")
    .setDescription("a dynamically created attachment containing text"),
  new Attachment()
    .setUrl("../resources/0412/report.doc")
    .setName("report-2012-04.doc")
    .setDescription("Report for April of 2012"));
```

All languages (p. 433)

## Attaching Debug Files

PDFreactor offers a number of debug files containing useful information about the conversion, e.g. logs. These can be attached to the PDF by specifying a special URL for the attachment. Please refer to [Development and Debugging Tools \(p. 25\)](#) for an overview of all available debug files. Note that some debug files might require additional configuration options, such as [Observing Document Content \(p. 21\)](#).

## 5.1.20 PDF Script

### Note

This chapter refers to Scripts added to the resulting PDFs, processed by the PDF-viewer. There also:

- [JavaScript in the input document, processed by PDFreactor like in a browser \(p. 60\)](#)

Some PDF viewers (e.g. Adobe Reader) allow the execution of JavaScript, which has been added to the PDF. This way, the document can be changed and dynamic content can be added long after the conversion is complete. Of course the structure of the PDF is different from the HTML and addressing certain elements with PDF scripts has to be done differently.

Please note, that support for PDF scripts is not wide spread among PDF reader software.

PDFReactor allows to add such scripts using the configuration property `pdfScriptAction`. The parameters are the script as a string and the event which should trigger the script.

The supported events are:

- open: These scripts are triggered when opening the PDF in a viewer.
- close: These scripts are triggered when closing the PDF.
- before save: These events are triggered just before the viewer saves the PDF.
- after save: These events are triggered after the viewer has saved the PDF.
- before print: These events are triggered just before the viewer prints the PDF.
- after print: These events are triggered after the viewer has printed the PDF.

### Note

These PDF scripts must not be confused with the JavaScript that is executed while creating the PDF. PDF scripts basically use the JavaScript syntax, however, they are executed (if this feature is supported and enabled by the viewer application) at a completely different time, e.g. when opening the PDF.

#### Example 46: Adding a PDF script using the API

The following PDF script will display a message prompt when the PDF is opened.

```
config.setPdfScriptAction(new PdfScriptAction()
    .setScript("app.alert('hello');")
    .setTriggerEvent(PdfScriptTriggerEvent.OPEN));
```

All languages (p. 433)

## 5.1.21 Custom XMP

When using conformance such as [PDF/A \(p. 74\)](#), [PDF/X \(p. 76\)](#) or [PDF/UA \(p. 75\)](#) as well as other features, PDFReactor automatically creates and appends an appropriate XMP to the generated PDF.

Custom XMPs can be loaded via `content` or `uri`. You also need to specify a `priority`, which can be `HIGH` (which means that the custom XMP replaces the one generated by PDFReactor) or `LOW` (which means that the custom XMP is only attached if PDFReactor did not generate one).

#### Example 47: Attaching a custom XMP

```
config.setXmp(new Xmp()
    .setPriority(XmpPriority.HIGH)
    .setUri("http://cdn/myXmp.xml"));
```

All languages (p. 433)

### Important

When attaching a custom XMP with high priority (thus overriding the PDFReactor-generated XMP), conformance such as PDF/A cannot be guaranteed.

## 5.2 Image Output

In addition to PDF, PDFReactor, with the optional Raster Image Output, supports the following image output formats:

- PNG (optionally with transparent background)
- JPEG
- GIF (optionally dithered)
- TIFF (supports multi-page images; can use the following compression methods: LZW, PackBits, Uncompressed, CCITT 1D, CCITT Group 3 & CCITT Group 4; CCITT optionally dithered)
- BMP

These can be selected using the configuration property `outputFormat`, e.g.:

```
config.setOutputFormat(new OutputFormat()
    .setType(OutputType.PNG)
    .setWidth(512)
    .setHeight(-1));
```

All languages (p. 434)

The later two parameters set the width and height of the resulting images in pixels. If either of these is set to a value of less than `1` it is computed from the other value and the aspect ratio of the page.

Independent of the image type, the maximum size of any output image that PDFReactor can produce is 500 megapixels.

### See

[Media Features \(p. 141\)](#) for the media feature `-ro-output-format`, which allows setting styles specific for PDF or image output.

### 5.2.1 Selecting a page

All image output formats, except for the TIFF formats, create an image of a single page. By default, this is the first page. A different page can be selected using the configuration property `pageOrder`, e.g.:

```
config.setPageOrder("5");
```

All languages (p. 434)

### 5.2.2 Converting a Document Into Multiple Images

To convert a document into multiple images, you have to set the `multiImage` parameter of your `OutputFormat` to `true` e.g. like this:

```
config.setOutputFormat(new OutputFormat()
    .setType(OutputType.PNG)
    .setWidth(512)
    .setHeight(-1)
    .setMultiImage(true));
```

All languages (p. 434)

The `documentArray` property of the `Result` object then returns an array of byte arrays, each containing an image representing one page of the document.

### 5.2.3 Continuous Output

The configuration property `continuousOutput` sets PDFreactor to continuous mode. In this mode each document is converted into one image. Also screen styles will be used and print styles will be ignored, resulting in a very browser-like look for the output image.

[All languages \(p. 434\)](#)

```
config.setContinuousOutput(new ContinuousOutput()  
    .setWidth(1024)  
    .setHeight(768));
```

The first parameter sets the width of the layout. This has the same effect as the width of a browser window. This only changes the layout. The result will still be scaled to the width specified by `outputFormat`. The second parameter sets the height. This has the same effect as the height of a browser window, i.e. it will cut off the image or increase its height. Values of less than `1` cause the laid out height of the document to be used.

### 5.2.4 Grayscale Image

PDFreactor can optionally output images that are entirely grayscale, i.e. that are composed exclusively of shades of gray via the `forceGrayscaleImage` configuration property.

[All languages \(p. 435\)](#)

```
config.setForceGrayscaleImage(true);
```

### 5.2.5 Color Space Conversion

For JPEG and (non-CCITT) TIFF output the images can be converted to CMYK before encoding. Conversion is done using a specified ICC profile or naively if there is none.

[All languages \(p. 435\)](#)

```
config.setColorSpaceSettings(new ColorSpaceSettings()  
    .setConversionEnabled(true)  
    .setTargetColorSpace(ColorSpace.CMYK)  
    .setCmykIccProfile(new Resource().setUri("URL/to/optional/ICC/profile")));
```

# 6. LAYOUT DOCUMENTS

This chapter provides information on how to lay out documents, while focusing on the differences of the paginated layout of PDFReactor, in contrast to the continuous layout of browsers.

The document layout mostly depends on CSS but there are PDFReactor configuration properties and JavaScript functionality that may also be of use to achieve the desired results. While the common CSS properties known from browsers are supported as well, they are not covered in this chapter. Therefore an understanding of basic CSS is required.

## 6.1 Pagination

PDFReactor renders HTML and XML documents on pages. The rules to achieve that are provided by CSS.

The document content is laid out page by page, whenever there is no more space left on a page, PDFReactor automatically breaks text and boxes to the next.

### Note

Basic page styles are provided for HTML. Page styles for XML documents need to be created based on the documents language.

### 6.1.1 Layout at Breaks

Boxes around or next to breaks are subject to minor adjustments depending on the situation:

#### *Between Blocks*

The top margin of the first block on a page or column is ignored, except for the first page or column and for breaks forced via CSS. This difference can be eliminated by setting the proprietary property `-ro-truncate-margin-after-break` to `always` or `none` to ensure this adjustment is performed in all or no cases, respectively.

### Note

Applying styles to an element that change its formatting context, like `overflow` with a value other than `visible`, may stop margins from being truncated.

A non-proprietary alternative, that also affects the layout of documents in browsers (especially relevant for multi-column) is to explicitly set specific top margins to 0.

*Example 48: Removing certain margins to ensure content starts at the same height for all pages and columns*

```
h1 {
  break-before: page;
  margin-top: 0;
}

div.multiColumn > *:first-child {
  margin-top: 0;
}
```

The bottom margin of the last block on a page or column is always ignored.

### Inside Blocks

When a break occurs inside a block (e.g. between two lines of text in a paragraph) the block is split into two parts. There is no border, margin or padding at the bottom of the first part or the top of the second one. Setting the property `box-decoration-break` to `clone` forces the inclusion of these borders and paddings. This does not affect the margins.

### Images

By default no breaks can occur inside images and other replaced elements. In cases when this is required the proprietary property `-ro-object-slice` can be set to the values `auto` or `avoid` to explicitly allow breaks inside block images. To avoid too small parts of images to be split-off at the beginning or end the `orphans` and `widows` properties, multiplied by the computed `line-height`, are taken into account.

## 6.1.2 Page Selectors

To create an individual page layout pages need to be selected with CSS. In principle it works the same way as selecting an element, but the selector is different.

To select all pages of the document, the `@page` rule is used instead of the usual element selector.

*Example 49: A one inch wide page margin on all pages*

```
@page {
  margin: 1in;
}
```

`:first`, `:left`, `:right` and other [page specific pseudo-classes \(p. 396\)](#) make it possible to style specific pages, like the first ones, e.g. for cover pages or subsets, like left pages.

*Example 50: Definition of larger inside margins for binding*

```
@page {
  margin: 0.5in;
}
@page:left {
  margin-right: 0.75in;
}
@page:right {
  margin-left: 0.75in;
}
```

### Note

Which pages are left or right can be specified via the [@-ro-preferences \(p. 146\)](#) property `first-page-side`

## Nth Page

It is possible to select any page by using the prefixed CSS3 pseudo-class `:-ro-nth()`. This pseudo-class takes a function of the form `An+B`, similar to the pseudo-class `:nth-child()`.

A single page can be selected (e.g. `:-ro-nth(3)` selects the third page) or the function can be used to select multiple pages. For example, `:-ro-nth(2n)` selects every second page (i.e. even pages), while `:-ro-nth(2n+1)` selects the first and every other page (odd pages).

Note that the selected page number is independent of the page counter, which is used to display page numbers and which can be manipulated.

This pseudo-class can also be used in combination with page names. For more information see [Page Groups \(p. 94\)](#).

## Last Page

As the counterpart to `:first`, there is the proprietary selector `:-ro-last`. It allows to select the last page of the document.

Please note that as the content of the last page is only known after its content has been computed, there can be situations where the last page is empty. This can happen if the styles that are applied to the last page influence the layout of the page content, e.g. changing the page margins.

## 6.1.3 Page Size & Orientation

The size and orientation of a page can be set with the `size` property. PDFReactor supports many different page sizes, see Appendix [Supported Page Size Formats \(p. 224\)](#).

*Example 51: All pages in format 'letter' and portrait orientation*

```
@page {
  size: letter portrait;
}
```

To set a page to landscape orientation, "portrait" is replaced by "landscape":

*Example 52: All pages in format 'letter' and landscape orientation*

```
@page {
    size: letter landscape;
}
```

Instead of setting fixed page formats with a specified orientation it is also possible to set two length values. These then define page size and orientation.

*Example 53: A page size of 4.25 inches by 6.75 inches for all pages*

```
@page {
    size: 4.25in 6.75in;
}
```

### 6.1.4 Named Pages

With named pages an element is able to create and appear on a special page that has a name. This name can be used as part of a page selector to attach additional style properties to all pages of that name.

To create a named page, an element receives the `page` property with a page name as identifier.

*Example 54: Using named pages*

All HTML `<table>` elements have to appear on pages with the name `pageName`.

```
table {
    page: pageName;
}
```

A page break will be inserted before an element that has the `page` property set. Another page break will be inserted for the next element that defines a different page name (or none) to ensure the Named Page only contains elements that specify its name.

To attach styles to a named page, the page name is added to the `@page` rule. The page name is not a pseudo-class like `:first` for example. There is a space between `@page` and the page name, not a colon.

*Example 55: A Named Page with 'letter' format and landscape orientation*

```
@page pageName {
    size: letter landscape;
}
```

### Page Groups

When setting a page name, a page group of this name is **created automatically**. Compared to named pages, page groups are more flexible and can be used to select a certain page, e.g. the first page with a name instead of all pages with that name.



While each page can have only one name, it can belong to multiple page groups, thus allowing an author to nest special pages. This means that if an element sets a page name to 'A', that page belongs to a page group of the same name, but can also belong to a group named 'B', if that group was defined by a parent element.

#### Example 56: Nested Named Pages

The following sample applies page orientation and page background color to the same page, by using two page groups.

#### HTML:

```
<section>
  <table class="landscape"> ... </table>
</section>
```

#### CSS:

```
section {
  page: outerGroup;
}
.landscape {
  page: innerGroup;
}
/* Make all pages named 'outerGroup' lightblue */
@page :~ro-nth(n of outerGroup) {
  background-color: lightblue;
}
/* Make all pages named 'innerGroup' landscape */
@page :~ro-nth(n of innerGroup) {
  size: A4 landscape;
}
```

In contrast to named pages, it is possible to create a new group even if the page name did not change. To do so, two adjacent elements, both defining the same page name, have to be divided by a forced page break.

Another advantage of page groups, is the possibility to select certain pages belonging to a group name. This is especially useful, if the first page of a group should have different styles. To select the nth-page of a group, the `~ro-nth(An+B of pageName)` pseudo class is used:

#### Example 57: Selecting Pages in a Group

Select the first page of each page group with the name `pageName`.

```
@page :~ro-nth(1 of pageName) {
  background-color: lightgrey;
}
```

For more information on the syntax of the `~ro-nth()` pseudo class, please see [Nth Page \(p. 93\)](#).

## 6.2 Breaking Text

Text is broken whenever there is not enough space left, e.g. inside the line or on the page.

### 6.2.1 Automatic Hyphenation

Automatic Hyphenation allows breaking words in a way appropriate for the language of the word.

To use Automatic Hyphenation two requirements must be met:

- The text to hyphenate requires a language set in the document.
- The language set for the hyphenated text is supported by PDFReactor (see Appendix [Supported Hyphenation Languages](#) (p. 226) for more information)

The `lang` attribute in HTML or the `xml:lang` attribute in XML allow defining a language for the document and on individual elements, in case they deviate from the document language.

*Example 58: An entire HTML document in English language*

```
<html lang="en">
...
</html>
```

Hyphenation is enabled or disabled via CSS with the `hyphens` property:

*Example 59: Enabling hyphenation except for specific elements*

Hyphenation enabled for an entire document except for paragraphs of the `noHyphenation` class.

```
html {
  hyphens: auto;
}
p.noHyphenation {
  hyphens: none;
}
```

In addition it is possible to specify the minimum word length and the minimum number of letters before or after which text can be broken within a word. This is done with the `hyphenate-limit-chars` property.

The number of successive lines that all end with hyphenated words can be limited with the `-ro-hyphenate-limit-lines` property. Instead of being automatically hyphenated, the word is then moved into the next line, if possible.

### 6.2.2 Widows & Orphans

#### Definition: Widow

If the last line of a paragraph is also the first line of a page it is called a widow.

#### Definition: Orphan

If the first line of a paragraph is also the last line of a page it is called an orphan.

By default, PDFReactor avoids widows and orphans by adding a page break before the paragraph. This behavior can be changed with the CSS properties `widows` and `orphans`.

*Example 60: Widows & Orphans set to an amount of two lines*

```
p {
  orphans: 2;
  widows: 2;
}
```

Changing the value to 1 will allow widows and orphans. Changing it to higher integer values will prevent even multiple line widows and orphans. (e.g.: `orphans: 5` means that if the first 4 lines of a paragraph are the last 4 lines of a page these lines are considered an orphan.)

## 6.2.3 Customizing Line Breaks

By default, the rules for breaking words are defined by the Unicode Standard<sup>18</sup>. In certain situations however, you may want to define specific break opportunities and forbid others. While this can be done using `white-space` and soft-hyphens, PDFReactor provides a more convenient way for general rules. The proprietary property `-ro-line-break-opportunity` allows to precisely define between which characters a break is allowed or forbidden.

Specifying this is done via Regular Expression (Regex), excluding lookaheads or lookbehinds. Though the syntax may look confusing to those that are unfamiliar with Regex, it allows to define any possible break opportunity. The property value is divided in up to three parts:

1. **normal**: This optional identifier specifies that the default rules still apply. Thus the existing rules are only extended instead of being completely overridden.
2. **<whitelist>**: These regex expression describe where break opportunities should be added.
3. **<blacklist>**: The blacklist is separated with a slash and describes where break opportunities should be removed. The blacklist is stronger than the whitelist and overrides it in the case of a conflict.

Both, whitelist and blacklist, describe the character matching using one or two strings. The first string describes the content that must come before, the second what must come after the break opportunity. The second string can be omitted, while the first string can be an empty string if it is not needed. In regex terms, the first string is a lookbehind, the second is a lookahead, hence the slightly reduced syntax.

### Note

As the strings are specified in CSS, each backslash must be escaped. For example an escaped opening parenthesis would require two backslashes. One to escape the parenthesis for regex and one to escape the backslash for CSS:

```
"\\(""
```

Alternatively the character can be placed inside brackets instead of escaping it: `"[ ("`

A common use case of this property is when trying to break a file path or other technical strings where normal breaking rules are not applied.

<sup>18</sup> See Unicode Standard Annex #14 - Unicode Line Breaking Algorithm - <https://www.unicode.org/reports/tr14/>

## Examples

Property Value	Effect
<code>normal "[(]"</code>	Allow breaks after a left parenthesis, in addition to the standard Unicode line breaking rules.
<code>normal / "-"</code>	Standard Unicode line breaking rules are applied, but prevents breaks after a dash.
<code>normal "[.]" "\w"</code>	Allow breaks after a dot followed by a word character, in addition to the standard Unicode line breaking rules.
<code>normal / "-" "\w"</code>	Standard Unicode line breaking rules are applied, but prevents breaks after a dash followed by a word character.
<code>normal "\\w" "[(]" / "\\w" "([)]"</code>	Allow breaks after a word character followed by a left parenthesis, except if a left and a right parenthesis follows, in addition to the standard Unicode line breaking rules.
<code>normal "[(]" / "[(]" "'"</code>	Allow breaks after a left parenthesis, except if it is followed by a quote, in addition to the standard Unicode line breaking rules.
<code>"\s"</code>	Only allow breaks after a whitespace character. Standard Unicode line breaking rules aren't applied.
<code>"\s", "-" / "-" "\\d", "-" "[A-Za-z]"</code>	Only allow breaks after a whitespace character or a dash, except if a dash is followed by a digit or Latin letter. Standard Unicode line breaking rules aren't applied.

## Note

Long and complex rules (especially those that include wildcards) can impact performance, depending on the length of the paragraphs. So it is best practice to apply these styles only to elements that may actually need them.

## 6.3 Generated Content

Generated content does not originate from the document. It is created by CSS during the rendering process and appears in the rendered result as if it was part of the document.

The pseudo-elements `::before` and `::after` are used to generate content before or after an element. The actual content is created with the `content` property.

## 6.3.1 Generated Text

To create generated text, set a String as value of the `content` property.

*Example 61: Generated text on an element*

Generated Text on an HTML `<div>` element.

**HTML:**

```
<div>This is a note.</div>
```

**CSS:**

```
div::before {
  /* Adds the text "Note:" at the start of the element. */
  content: "Note: ";
  padding-right: 0.1in;
  font-weight: bold;
}
div {
  border: 1px solid black;
  background-color: palegoldenrod;
  padding: 0.1in;
}
```

As a result, the `<div>` would look like this:

**Note:** This is a note.

Sometimes it is necessary to add an explicit line break to generated text. To create such a line break, a `"\A "` (an escaped line break character followed by a space) needs to be added to the String and the `white-space` property needs to be set to either `pre`, `pre-wrap` or `pre-line`.

*Example 62: An explicit line break inside Generated Text*

```
div::before {
  content: "RealObjects\A PDFreactor";
  white-space: pre;
}
```

The result would look like this:

RealObjects  
PDFreactor

### 6.3.2 Generated Images

A generated image can be created with the image's URL set as value of the `content` property.

*Example 63: A Generated Image with an SVG image as source*

```
h1::before {
  content: url("https://mydomain/pictures/image.svg");
}
```

### 6.3.3 Counters

Counters can be used to count elements or pages and then add the value of the Counter to generated text.

A Counter needs to be defined either with the `counter-reset` or the `counter-increment` property. Its value is read with the `counter()` function as value of the `content` property.

A common use-case for Counters are numbered headings. The chapter heading of a document is intended to display a number in front of its text that increases with each chapter.

*Example 64: Chapter heading*

A chapter heading for HTML `<h1>` elements using Counters and Generated Text.

```
h1 {
  /* increases the counter "heading1" by 1 on each <h1> element */
  counter-increment: heading1 1;
}
h1::before {
  /* Adds the current value of "heading1" before the <h1> element's
  text as decimal number */
  content: counter(heading1, decimal);
}
```

Subchapter headings, work the same way, with a simple addition. The number of each subchapter is intended to be reset whenever a new chapter begins. To restart numbering, the `counter-reset` property is used.

*Example 65: Subchapter headings with Counters reset every chapter*

```
h1 {
  /* resets the value of counter "heading2" to 0 on every <h1> element */
  counter-reset: heading2 0;
}
h2 {
  counter-increment: heading2 1;
}
h2::before {
  /* Shows the current value of "heading1" and "heading2", separated by a
  generated text ".", the value of "heading2" is shown as lower-case
  letter */
  content: counter(heading1, decimal) "." counter(heading2, lower-alpha);
}
```

To define custom counter representations use the `@counter-style` rule. It is structured like this:

```
@counter-style <counter-style-name> {  
  
  system:          <counter-system>;  
  symbols:         <counter-symbols>;  
  additive-symbols: <additive-symbols>;  
  negative:        <negative-symbol>;  
  prefix:          <prefix>;  
  suffix:          <suffix>;  
  range:           <range>;  
  pad:             <padding>;  
  fallback:        <counter-style-name>;  
  
}
```

To learn more on how to use the `@counter-style` rule, see the [MDN Documentation](#).

## 6.4 Page Header & Footer

### 6.4.1 Header, Footer & Page Side Boxes

It is possible to add Generated Content to a page within the page margin. The page margin is the space between the document content and the edges of a sheet. It is defined on a page using [Page Selectors \(p. 92\)](#) and the `margin` property.

Each page provides sixteen Page Margin Boxes that can display Generated Content much like a pseudo-element. To add Generated Content to a page, add a Page Margin Box declaration to an existing `@page` rule and set the Generated Content to the `content` property as usual.

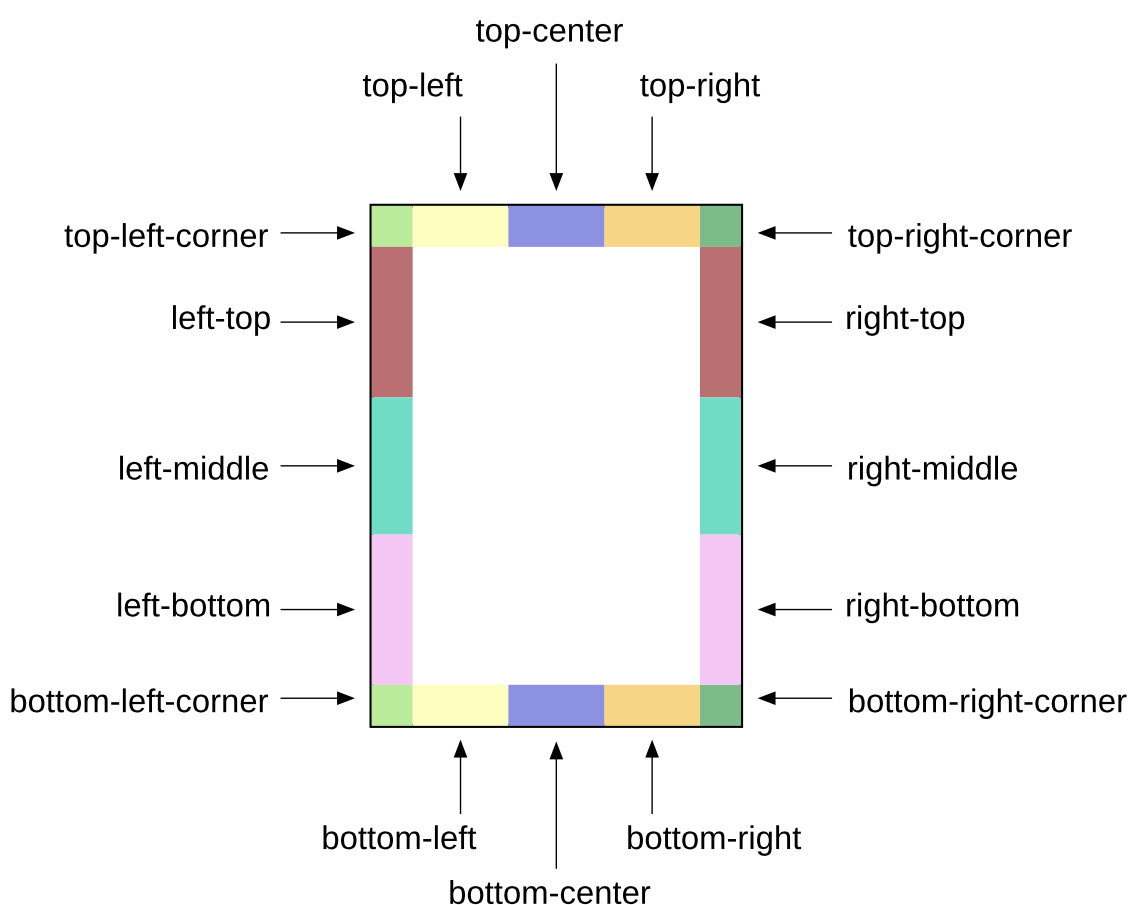


Fig. 3: Page Margin Boxes

A Page Margin Box declaration consists of an `"@"` character followed by the name of the Page Margin Box.

*Example 66: Page Header with Generated Text on the left and right side*

```
@top-left {
  content: "RealObjects PDFReactor(R)";
}
@top-right {
  content: "copyright 2025 by RealObjects";
}
```



## 6.4.2 Running Elements

Running Elements are elements inside the document that are not rendered inside the document content but inside Page Margin Boxes.

They are useful whenever the content of a Page Margin Box needs to be more complex than Generated Content (e.g. a table) or parts of it need to be styled individually.

### Note

In case the document does not provide elements to use Running Elements and Generated Content does not suffice, it is possible to add elements to the document with JavaScript to be able to use Running Elements.

To create a Running Element, an element needs to be positioned as "running", using the `running()` function with an identifier for the element as argument. The function is set as value of the `position` property. This removes the element from the document content.

To display a Running Element inside a Page Margin Box, set the `element()` function as value of the `content` property. The argument of the function is the same identifier used to in the `running()` function of the Running Element.

### Example 67: Creating a Page Footer

An HTML `<footer>` element at the start of the document used as page footer in all pages.

#### HTML:

```
<body>
  <footer>...</footer>
  ...
</body>
```

#### CSS:

```
footer {
  position: running(footerIdentifier);
}
@page {
  @bottom-center {
    content: element(footerIdentifier);
  }
}
```

The `<footer>` needs to be at the beginning of the HTML document to guarantee, that it will appear on every page of the document.

The reason for that is, that running elements stay anchored to the location they would appear in if they were not Running Elements.

The original position of the running element inside the document plays a key role when designing a document, it provides document designers with additional options.

First of all it is possible to have running elements of the same name, which makes it possible to change the content of a Page Margin Box over the course of the document.

#### *Example 68: Multiple Running Elements*

Two Running Elements at the start of the document with the same name. The first appears on page one, the second on every page thereafter because it is the latest Running Element of the name.

#### **HTML:**

```
<body>
  <header id="titlePageHeader">...</header>
  <header id="pageHeader">...</header>
  <!-- first page content -->
  ...
  <!-- second page content -->
  ...
</body>
```

#### **CSS:**

```
#titlePageHeader, #pageHeader {
  position: running(headerIdentifier);
}
@page {
  @top-center {
    content: element(headerIdentifier);
  }
}
```

Second of all it is possible to have running elements appear for the first time later in the document than on the first page.

#### Example 69: Running Elements on later pages

An HTML `<footer>` element at the end of the document is used as Running Element. The page footer displays it in the last page only, as it is not available earlier.

#### HTML:

```
<body>
  ...
  <footer>...</footer>
</body>
```

#### CSS:

```
footer {
  position: running(footerIdentifier);
}
@page {
  @bottom-center {
    content: element(footerIdentifier);
  }
}
```

Notice how the style does not differ from the one used in the first example of this chapter. This shows how much influence the position of a Running Element is inside the document has.

It is possible that more than one Running Element of the same name would anchor on the same page. Sometimes, it may not be the first Running Element on a page that should be used for that page. For that case it is possible to add one of these identifiers as second argument to the `element()` function:

- `start`
  - Retrieves the latest Running Element of the name from previous pages.
  - If there is none, nothing is displayed.
- `first`
  - Retrieves the first Running Element of the name on the page.
  - If there is none, it falls back to the behavior of `start`.
  - This is the default behavior if no argument is given.
- `last`
  - Retrieves the last Running Element of the name on the page.
  - If there is none, it falls back to the behavior of `start`.
  - This keyword is useful in case a Running Element is displayed as footer throughout the document but the last page should receive a different Running Element, which is placed at the end of the document.

- `first-except`
  - If a Running Element of the name is on the page, nothing is displayed.
  - If there is none, it falls back to the behavior of `start`.
  - This keyword is useful on chapter title pages where the chapter name is already displayed.

**Note**

If a Running Element or its contents define Generated Content that contains [Counters \(p. 100\)](#) (or [Named Strings \(p. 107\)](#)) their value will be the same as if they were defined as content of the Page Margin Box the Running Element is used in.

### 6.4.3 Running Documents

In case [Generated Content \(p. 98\)](#) does not suffice and [Running Elements \(p. 103\)](#) are not an option, it is possible to use Running Documents inside Page Margin Boxes.

A Running Document is a String containing an HTML document or document fragment or a URL that references a document as argument of the `xhtml()` function.

**Note**

The `xhtml()` function is a proprietary extension of CSS and will only work for RealObjects products.

*Example 70: Variants of 'xhtml()' function declarations*

```
/* document fragment */
content: xhtml("<table>...</table>");
/* complete document */
content: xhtml("<html><head>...</head><body>...</body></html>");
/* external document */
content: xhtml(url("header.html"));
```

The document is loaded independently inside the Page Margin Box but styles from the document are passed down to it. This can be an advantage as the same style is used throughout all documents. In some cases though this behavior is not desired as this style may break the layout of the document inside the Page Margin Box. To prevent passing down style the `-ro-passdown-styles` property is used.

**Note**

When using the `xhtml()` function in non-HTML5 documents (e.g. XHTML inside the head in a `<style>` element) the entire CSS needs to be wrapped in an XML comment.

```
<!--
@page {
  @top-center {
    content: xhtml("<table>...</table>");
  }
}
-->
```

**Note**

Running Documents have access to [Counters \(p. 100\)](#) and [Named Strings \(p. 107\)](#) from their embedding document and may display them, but cannot influence them.

Counters and Named Strings created inside Running Documents have no effect outside of the Running Document.

## 6.5 Generated Content for Pages

Additional features for [Generated Content \(p. 98\)](#) are available within [Page Margin Boxes \(p. 102\)](#).

### 6.5.1 Page Counters

To add page numbers to documents, Page Counters are used. Page Counters work like regular [counters \(p. 100\)](#), but are defined on [pages \(p. 92\)](#) and accessed in [page margin boxes \(p. 102\)](#).

The default Page Counter is named `page` and automatically defined in HTML documents.

*Example 71: A Page Counter used at the bottom right of the page to display the page number*

```
@page {
  @bottom-right {
    content: counter(page);
  }
}
```

**Note**

For XML documents you can define the Page Counter as follows.

```
@page:first {
  counter-reset: page applicationValue("com/realobjects/pdfreactor/start-page-
number");
}
```

Additionally there is the `pages` counter, which is always defined as the total number of pages of the laid out document.

*Example 72: Using the page counters*

```
content: "Page " counter(page) " of " counter(pages)
```

You can add an offset to the `pages` counter value (e.g. `-1` to ignore the cover page) via the [@-ro-preferences \(p. 146\)](#) property `pages-counter-offset`.

### 6.5.2 Named Strings

Named Strings allow to store the text of an element and its [Generated Content \(p. 98\)](#) as String for use in [Page Margin Boxes \(p. 102\)](#).

A Named String is defined very similar to a [Counter \(p. 100\)](#) and is used in a similar way. To create a Named String the property `string-set` is used, which requires an identifier and a definition of the contents of the String. To read a Named String the `string()` function is used as value of the `content` property.

*Example 73: Using Named Strings in the header*

A Named String `headingString` created from the heading's text with the function `content()` and read with the `string()` function from the page header:

```
h1 {
    string-set: headingString content(text);
}
@page {
    @top-left {
        content: string(headingString);
    }
}
```

The content of a named String is very flexible and can take a combination of Strings, `counter()` functions and Named String keywords.

*Example 74: Variations of Named String declarations*

```
/* Creates a Named String in the form of "Chapter [chapter number]: [chapter title]".
*/
h1 {
    string-set: headingString "Chapter " content(before) ": " content()
}
/* Retrieves the first letter of an address element, useful as part of a page header
   for a sorted list of addresses */
address {
    string-set: addressEntry content(first-letter);
}
```

When a Named String is set multiple times on the current page, the optional 2nd parameter of the function, defaulting to `first`, specifies which one to use:

- `first`: the first one
- `last`: the last one
- `first-except`: none, use empty string
- `start`: the first one, if it is at the beginning of the page

If there is none on the current page (or, in case of `start`, none at its beginning), the last one before is used. If there is none, either, the default is the empty string.

### 6.5.3 Cross-references

A Cross-reference is a piece of text that references another location in the document in order to establish a thematic relationship to that location.

Although it is perfectly possible to add such references by hand, this approach is prone to error when creating and modifying the document. After a change the numbering and page numbers might not match the numbering from when the cross-reference was first defined. The same could happen to the reference text if it includes the chapter title.

To always keep the reference up-to-date with the referenced location, CSS provides the `target-counter()` and `target-text()` functions to retrieve the exact numbering, title or page number of the referenced location.

### Note

PDFReactor only resolves internal links referring to an anchor in the same input document, see the chapter [Links \(p. 69\)](#) for more information.

## Counter Cross-references

The `target-counter()` function is used inside the `content` property the same way a `counter()` function would be used. It receives a URL to the referenced location and the name of the counter as identifier. It may receive an optional third argument to define the output style of the counter, just like the `counter()` function.

### Example 75: Cross-references to numbered headings

Cross-references created from an HTML hyperlink to a chapter heading with a numbering. The Cross-reference is declared with generated text and `target-counter()` functions to retrieve the page and chapter numbers.

#### HTML:

```
...
<p>For more information <a href="#chapter">see</a>.
...
<h1 id="chapter">Cross-references</h1>
...
```

#### CSS:

```
@page {
  @bottom-right {
    content: counter(page);
  }
}
h1 {
  counter-increment: chapterCounter;
}
h1::before {
  content: counter(chapterCounter, upper-roman);
}
a[href]::after {
  content: "Chapter " target-counter(attr(href), chapterCounter, upper-roman)
          " on page " target-counter(attr(href), page);
}
```

Assuming the referenced chapter would render on page 5 as the third chapter, the cross-reference would read:

For more information, [see Chapter III on page 5](#).

## Text Cross-references

The `target-text()` function is used inside the content property in a similar way as the `target-counter()` function is used. It receives a URL to the referenced location and takes one of these four keywords to specify the text to retrieve:

- `content` - Retrieves the textual content of the element. This is the default keyword if no keyword is present.
- `first-letter` - Retrieves the first letter of the element's textual content.
- `before` - Retrieves the before [Generated Content \(p. 98\)](#) of an element.
- `after` - Retrieves the after [Generated Content \(p. 98\)](#) of an element.

The following example shows a cross-reference that references a heading and shows its before Generated Content and text:

*Example 76: Cross-reference showing its target's content and before content*

```
a[href]{
  content: target-text(attr(href), before) " "
          target-text(attr(href), content);
}
```

### Note

`target-text()` makes it easy to retrieve the before Generated Content of an element, which may include its numbering. This method does not require any knowledge about how this before Generated Content is created but it also does not allow to rebuild it into something different.

If the before Generated Content of an element is "2.1" and the page header should be "Chapter 2, Section 1" the `target-counter()` ([p. 109](#)) function provides the necessary means to retrieve all the [Counters \(p. 100\)](#) individually.

## 6.5.4 Footnotes

A footnote is a text note placed on the bottom of a page, a column or a region. It references a specific part of the main content of the document, giving further explanations or information about a citation. A footnote is marked by a defined symbol both in the main content of the page and in the footnote area at the bottom, to show which parts belong together.

For content that is required to have a footnote, the following style can be applied:

```
float: footnote;
```

The text content of the element that the style applied to, will appear in the footnote area at the bottom of the page. The footnote area of pages can be styled via CSS using the `footnote` at-rule.



*Example 77: Defining a footnote for an element and styling the footnote area of the page*

## HTML (snippet)

```
<p>This is a CSS<span class="footnote">Cascading Style Sheet</span> generated footnote.</p>
```

## CSS

```
.footnote {
    float: footnote;
}
@page {
    @footnote {
        border-top: solid black 1px;
    }
}
```

The pseudo-element `::-ro-footnote-area` allows to select the footnote area of multi-column or region elements for styling.

*Example 78: Styling the footnote area of multi-column element*

```
.multiColumn {
    columns: 2;
}
.multiColumn::-ro-footnote-area {
    border-top: solid black 1px;
}
```

By defining a footnote, a footnote call is left behind in the main content. Its content and style can be influenced by the `footnote-call` pseudo-element.

For every footnote element, there is also a `footnote-marker` pseudo-element added. Usually this contains the same number or symbol as the footnote-call it belongs to.

*Example 79: Styling the footnote-call and footnote-marker*

```
.footnote::footnote-call {
    content: counter(footnote, decimal);
}
.footnote::footnote-marker {
    content: counter(footnote, decimal);
}
```

By default, the footnote counter is available and is automatically incremented for every element with the style:

```
float: footnote
```

By default, this counter numbers the footnotes sequentially for the entire document. To number footnotes on a per-page basis, the counter has to be reset on every page, using the following style:

```
@page {
    counter-reset: footnote;
}
```

**Note**

PDFReactor currently does not support nested footnotes.

Normally, footnotes are laid out as block elements, which means that they are stacked on top of each other. When having several short footnotes, it can make sense to place them next to each other, as if they were inline elements. This can be achieved by using the `footnote-display` property, which can either be set to `block` or `inline`:

```
.footnote {
  float: footnote;
  footnote-display: inline;
}
```

### 6.5.5 Sidenotes

Sidenotes, also known as marginalia, are short notes that are put into the left or right page margin. They are similar to footnotes in function and usage, but have no influence on the layout.

In contrast to footnotes, a sidenote can be moved to the left or right. As the preferred side may depend on other factors like whether a page is a left page or the document's text direction (e.g. right-to-left), sidenotes are created by setting a CSS function with a parameter for the direction on the float property of the element that should become a sidenote.

As sidenotes are moved to the page margin, that margin should be increased to give them enough space. This can either be done directly by setting a margin on the page itself, or by setting a width on the sidenote area itself. The second option will be further explained in the [Sidenote Area chapter \(p. 114\)](#) below.

*Example 80: Styling an element as a sidenote and give the page a bigger margin to accommodate it*

HTML (snippet)

```
<p>This is the normal page content.<span class="sidenote">This is the sidenote</span></p>
```

CSS

```
.sidenote {
  float: -ro-sidenote(right);
}
@page {
  margin-right: 5cm;
}
```

By default, the sidenotes will be placed at the same height as the content surrounding it. The CSS property `-ro-sidenote-align` allows to specify a few other vertical positions that depend on the sidenote's context. For example, setting it to `container-start` will align the sidenote with the top of its surrounding paragraph.

```
.sidenote {
  float: -ro-sidenote(right);
  -ro-sidenote-align: container-start;
}
```

#### Note

PDFReactor currently does not support nested sidenotes or footnotes inside sidenotes.

## Modifying Alignment

When sidenotes are too close together, the upper sidenotes will generally push the lower sidenotes down to avoid overlapping. However, a sidenote can be prioritized so that it tries to prevent overlapping by pushing previous sidenotes up, thus maintaining its intended position. This can be done for `baseline`, `container-start` and `container-end` alignments by appending the keyword `strict`.

*Example 81: Making alignment of a sidenote strict*

```
.sidenote {
  float: -ro-sidenote(right);
  -ro-sidenote-align: baseline strict;
}
```

Note that a sidenote with strict alignment may still be moved up or down to prevent overlapping if there is not enough space for all sidenotes.

When aiming for a certain style, it may be useful to offset the position of sidenotes. This can be done for `baseline`, `container-start` and `container-end` alignment by using the CSS property `-ro-sidenote-offset`. It allows to shift a sidenote up or down by a specified length (with negative length shifting up). Percentage values are resolved with the sidenote's border-box height.

*Example 82: Aligning a sidenote to container top and offsetting it down by 5mm*

```
.sidenote {
  float: -ro-sidenote(right);
  -ro-sidenote-align: container-start;
  -ro-sidenote-offset: 5mm;
}
```

It is possible to define an avoid area via an element in the page content by using the CSS property `-ro-sidenote-avoid`. If possible, the placement of sidenotes next to that element is avoided. An additional parameter allows to specify which box is used to determine the avoided area (e.g. the margin or content box). This is useful if the element should overflow into the sidenote area in order to use the maximum available space on the page. However, sidenotes may still end up overlapping if there is not enough space left.

## Calls and Markers

Although it is uncommon, in certain situations it may be useful to have calls and markers, similar to footnotes. They are not used by default, but pseudo-elements are provided to create them. A call is generated in the content where the sidenote originates and a marker is placed just before the sidenote content.

By creating and using a global counter for sidenotes, it is possible to number them, thus showing exactly what each sidenote refers to.

*Example 83: Defining sidenote calls and markers and using a sidenote counter*

HTML (snippet)

```
<p>This is the normal page content.<span class="sidenote">This is the sidenote</span></p>
```

CSS

```
:root {
  /* Declare the sidenote counter for the whole document */
  counter-reset: sidenote;
}
.sidenote {
  float: -ro-sidenote(right);
  counter-increment: sidenote;
}
.sidenote::-ro-sidenote-call {
  content: "[" counter(sidenote) "];";
}
.sidenote::-ro-sidenote-marker {
  content: counter(sidenote) " ";
}
}
@page {
  margin-right: 5cm;
}
```

Note that the numbering of the sidenotes is in DOM order, so depending on the layout (e.g. multi-column) or the vertical alignment, they are not necessarily sorted by that numbering when appearing in the sidenote area.

## The Sidenote Area

The sidenote area is the container in which the sidenotes are positioned. Each page can have a left and a right one. Styles can be applied to sidenote areas by selecting them via the at-rule `@-ro-sidenote` inside a page-rule, similar to how page margin boxes are selected. However, using this at-rule alone will select **both** sidenote areas. To select only one area, a pseudo-class has to be appended:

### Pseudo Classes for Selecting Only One Sidenote Area

Pseudo Class	Description
:left	Selects the sidenote area that is visually on the left or right.
:right	
:verso	Selects a different sidenote area depending on the text direction of the document. Verso is left in left-to-right documents and right in right-to-left documents. Recto is right in left-to-right documents and left in right-to-left documents.
:recto	
:inside	Selects a different sidenote area depending on the side of the page, which is useful when having different styles for left and right pages. Inside is right for left pages and left for right pages. Outside is left for left pages and right for right pages.
:outside	

Note that the styles set on the sidenote area are not inherited to the sidenotes themselves. They still inherit from their parent elements in the DOM. Making the sidenote styles completely independent from the styles of the rest of the document can be achieved by applying `all:initial`:

*Example 84: Resetting all styles on a sidenote*

```
.sidenote {
  /* Prevent style inheritance */
  all: initial;
  float: -ro-sidenote(outside);
}
```

## Sizing the Sidenote Area

When setting the size of a sidenote area, there are several special behaviors that have to be taken into account. Firstly, some properties cannot be applied. The height of the area is always determined via the height of the page content. And as its width is fixed and will not be changed by its content, the minimum and maximum size properties are ignored.

Secondly, the width property is handled a bit differently. A width of `auto` is resolved to a sidenote area with an outer width that is exactly as wide as the page margin of the respective side. This means that the width that is available to the page content remains unchanged.

Percentage widths are relative to that page margin width defined by its page rule:

*Example 85: Percentage width of a sidenote area*

```
@page {
  margin-right: 2cm;
  @-ro-sidenote:right {
    /* Make area content twice as wide as margin-right of the page (4cm). */
    width: 200%;
    /* Add the right margin of the page to the area (2cm). */
    margin-right: 100%;
  }
}
```

If a sidenote area is larger than the respective page margin, the page content width is reduced by that difference, as if the page margin was increased. However, the page margin boxes themselves remain unchanged and still use the margin widths that have been defined in their respective page rule.

Note that when specifying both areas on the same page, then neither of them may occupy more than half of the page width or else they may overlap with the page content.

## Logical Properties on the Sidenote Area

When defining a sidenote area that should always be on the outside of a page, their margin or border styles also have to depend on the page side. This can be achieved by defining different `@-ro-sidenote` rules for each page side:

*Example 86: Defining page side specific sidenote areas*

```
@page {
  margin: 2cm;
  /* Styles that are the same for both page sides */
  @-ro-sidenote:outside {
    width: 3cm;
    background-color: #eee;
  }
}
@page:left {
  @-ro-sidenote:left {
    border-right: 1mm solid grey;
    margin-left: 2cm;
  }
}
@page:right {
  @-ro-sidenote:right {
    border-left: 1mm solid grey;
    margin-right: 2cm;
  }
}
```

The styles above create sidenote areas on the outside of all pages, with a margin to the page edge and a border towards the page content. However, the same can be achieved far easier by the special behavior of logical properties on sidenote areas.

Under normal circumstances logical properties are mapped to their physical counterparts depending on the text direction. However, logical properties set on sidenote areas are resolved depending on whether the area is on the left or the right side of a page. The "inline start" properties are resolved to the outside side (i.e. right on right pages and left on left pages) and "end" properties are resolved to the inside side (i.e. left on right pages and right on left pages). Imagine the area growing from the page edge towards the page content.

*Example 87: Setting logical properties on a sidenote area*

```
@page {
  margin: 2cm;
  @-ro-sidenote:outside {
    width: 3cm;
    background-color: #eee;
    border-inline-end: 1mm solid grey;
    margin-inline-start: 2cm;
  }
}
```

### 6.5.6 Continuation Markers

When content is fragmented it can be helpful to show a hint that it is continued on the next page or a fragment is a continuation from a previous one. PDFReactor allows to specify such continuation markers.

The markers are generated content and as such they are addressed with proprietary pseudo-elements. The pseudo-element `::-ro-before-break` creates markers at the bottom or **before** a break (e.g. "Continued on

next page"), while `::-ro-after-break` creates markers at the top or **after** the break. These continuation markers are only created if there is a next or previous fragment, i.e. the respective element is split.

In the current implementation, the continuation markers can only be applied on block elements (`display: block`). This means that when intending to apply them on a table, they must be used on a container element that wraps the table:

#### Example 88: Continuation Markers for Tables

##### HTML:

```
<div class="table">
  <table> ... </table>
</div>
```

##### CSS:

```
div.table::-ro-before-break {
  content: "Continued on page " -ro-counter-offset(page, 1);
  text-align: center;
  font-weight: bold;
}
div.table::-ro-after-break {
  content: "Continuation from page " -ro-counter-offset(page, -1);
  text-align: center;
  font-weight: bold;
}
```

#### Note

In order to hint to the next page number, the proprietary function `-ro-counter-offset` is used in this sample to modify the current page number by one.

## 6.6 Transforms

PDFReactor is capable of applying two dimensional transformations on elements with the `transform` property, which makes moving, rotating and scaling document content possible.

#### Note

Transforms do not have an impact on the document layout, e.g. content with scaled up size will not push other content away to prevent overlapping.

### 6.6.1 Reduce Table Width with Rotated Table Headers

[awesomizr.js](#) (p. 67) is able to reduce the width of table headers with transforms.

The `rotateTableHeaders()` function transforms and rotates a table header, in order to reduce its width. If there is no table header, the first line is converted to one.

This function takes two parameters:

- `table` : The HTML node of the table
- `params` : An object of **optional** parameters

#### Options

Key	Description	Default
<code>angle</code>	The angle in degrees at which the header will be rotated. Should be between <code>-90</code> and <code>90</code>	<code>45</code>
<code>width</code>	The width that the header cells should have after the transformation, e.g. <code>"20pt"</code> .	<code>"auto"</code>
<code>firstCol</code>	Whether to prevent the first column from being transformed.	<code>false</code>
<code>lastCol</code>	Whether to prevent the last column from being transformed.	<code>false</code>
<code>footer</code>	Whether to create a <code>&lt;tfoot&gt;</code> element from the last row in the table. Has no effect if the table already contains a <code>&lt;tfoot&gt;</code> .	<code>false</code>

## 6.7 Multi-column Layout

The content of a document can be arranged in columns with elements like images or titles spanning through all columns if desired. Elements are laid out in a way similar to pages, text and boxes will break whenever no space is left in a column.

Multi-column layout is often used in print products like newspapers or magazines, it is intended to reduce the line width to make text easier to read.

The following box shows how text flows in a three-column layout. The paragraphs are numbered to better visualize the effect of multi-column layout.

<p><b>[1]</b> Lorem ipsum dolor sit amet, consectetur adipiscing elit. Nulla in libero turpis. Sed sed dolor diam, eu dapibus quam. Quisque ut nulla purus, iaculis sollicitudin erat. Nullam dictum suscipit porttitor.</p>	<p><b>[2]</b> Aliquam aliquam elementum elementum. Donec vel odio nec diam ullamcorper ultricies vel sit amet elit. Cras non aliquet lectus.</p>	<p><b>[3]</b> Donec sollicitudin lorem placerat est condimentum rutrum. Fusce tempor cursus rutrum. Duis mattis mattis sapien. Phasellus tempus iaculis tellus sed vestibulum.</p>
--	--	--



[4] Etiam faucibus consectetur  
augue, sit amet interdum elit  
dapibus at.

To create a multi-column layout inside an element add either the property `column-count` or `column-width` or both. By adding them the element becomes a multi-column element.

The `column-count` property defines the number of columns inside the element. Any number greater than 1 will create a multi-column layout. The `column-count` property is especially useful if the actual width of the columns is not as important as the number of columns.

Alternatively, the `column-width` property can be used to specify a minimum width for the columns. Based on this width the final column count is computed, thus the resulting column widths are likely larger than the specified value.

```
/* define two columns */
div.twoColumns { column-count: 2; }

/* define columns with a width of 2in */
div.twoInchColumns { column-width: 2in; }
```

By default, PDFReactor aims to balance the content of columns so that the content of all individual columns is equally long, if possible. This has the effect of keeping the height of each column at the possible minimum, which automatically determines the height of the multi-column element as a whole if it wasn't defined by a height property or attribute.

This behavior can also be modified to fill columns sequentially. In this case, the columns are filled until no more space is available in one column and the rest of the content needs to be moved to the next column. With this behavior a multi-column element whose height is not restricted will take up all the remaining space inside the multi-column-element, up to the remaining space available on the page until it breaks to another column.

The filling behavior can be controlled with the `column-fill` property:

```
/* sequential filling behavior */
div.sequentialFill { column-fill: auto; }

/* balanced filling behavior */
div.balancedFill { column-fill: balance; }
```

A defined height on the multi-column element will be used for an element, regardless of the filling behavior. If there is less content than there is space inside the multi-column element a balanced filling behavior will create shorter columns, leaving space at the bottom of the multi-column element. Sequential filling behavior may not have enough content to fill all the columns, thus columns may be left empty. If there is more content than there is space inside the multi-column element, the multi-column element will create a page break and continue on the next page, at the first column.

Usually elements inside a multi-column element are laid out one after another in columns as defined by the filling behavior. Some elements, however, may require a certain behavior when inside columns.

There are elements that are required to span all columns inside the multi-column element instead of only one. Headings, pictures or tables are the most common examples. To have an element span all columns the `column-span` property is used.

```
/* a heading that spans all columns */
h1 { column-span: all; }

/* a table in a single column */
table { column-span: none; }
```

To add some visual appeal to the multi-column element borders, backgrounds and padding can be used. Beside these standard styles multi-column elements can also receive additional styles for the space between columns.

To visually separate columns it is possible to define the gap width. Gaps can be considered as padding between columns. To define the gap width for a multi-column element the `column-gap` property is used.

```
/* a gap of 0.25in */
div.multiColumn { column-gap: 0.25in; }
```

In addition to the gap a rule can be added between the columns as additional visual aid for separating columns. To define rules for a multi-column element the property either the `column-rule` shorthand or the individual properties `column-rule-width`, `column-rule-style` or `column-rule-color` can be used.

```
/* a solid black rule with 0.1in width*/
div.multiColumn {
  column-rule-width: 0.1in;
  column-rule-style: solid;
  column-rule-color: black;
}

/* the same definition as shorthand */
div.multiColumn { column-rule: 0.1in solid black; }
```

### Note

A Multi-column layout with justified text looks best when the text is laid out with [Automatic Hyphenation \(p. 96\)](#) enabled.

## 6.8 Line Grids and Snapping

With CSS it is possible to align lines of text to invisible grids in the document. This greatly improves readability of duplex printing or for documents with multi-column layouts. Lines remain at the same position on every page, thus keeping a vertical rhythm which is very beneficial to the reading experience.

The below images show how snapping to the line grid works and how it improves readability in a text with two columns (the line grid is visualized by the dotted lines).

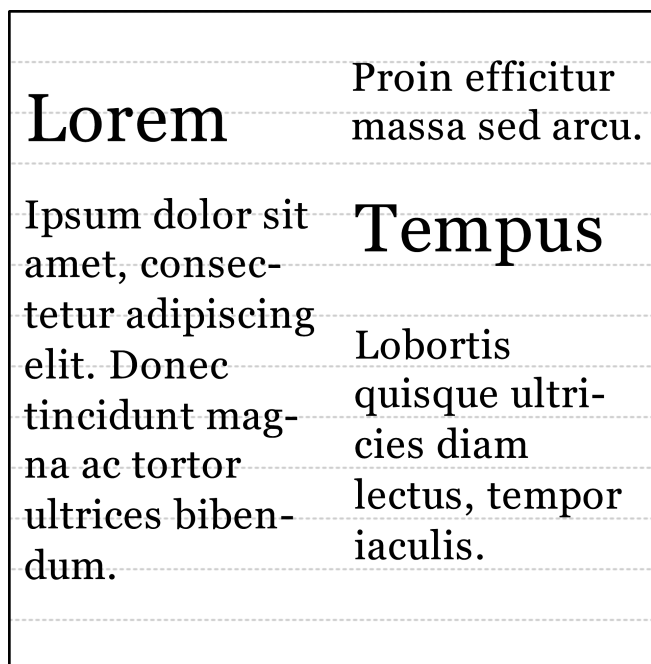


Fig. 4: Lines not snapped

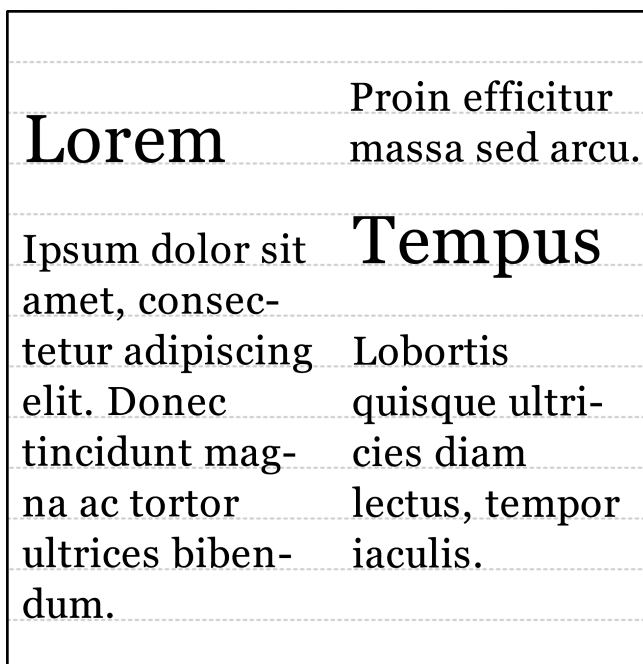


Fig. 5: Lines snapped to grid

Snapping to grid can be enabled by using the CSS property `-ro-line-snap`. In addition to snapping to the baseline of the grid, it is also possible snap line boxes to the center of two of the grid's lines. The latter may be beneficial for text that contains small and large font sizes because the space in the grid is used more efficiently.

```
/* snapping to baseline */
p {
  -ro-line-snap: baseline;
}

/* snapping between grid lines */
p {
  -ro-line-snap: contain;
}
```

Line grids are created automatically. Normally, one line grid is created for the root element on each page and is then used by all its block-level descendants. It is also possible to create a new line grid for a block using its own font and line height settings. This is very useful for multi-column containers as it might be undesirable for such a container to use its parent's grid. A new grid can be created with the following style declaration, using the CSS property `-ro-line-grid`:

```
div {
  -ro-line-grid: create;
}
```

### Note

When using [Page Floats](#) (p. 125) and line grids, make sure that top floated elements are also set to snap to the grid, otherwise they may push the text below them downwards, so that the lines are no longer aligned with the grid.

Also avoid mixing different line grid settings with page floats, as on each page only the last page float that snaps to a grid can be taken into account, so using different line grids may also lead to misaligned text.

Applying styles to an element that change its formatting context, like `overflow` with a value other than `visible`, may change the position of the grid's baselines.

## 6.9 Region Layout

Regions are containers for document content similar to pages or [columns \(p. 118\)](#), but they can be positioned individually. In contrast to automatically created pages and columns, regions are based on block elements from the document, which presents them with more styling options.

Regions belong to a region chain, that connects them and tells how their contents flows from one to another. The content of a region chain is called the named flow and elements can be added to a named flow to be displayed in regions.

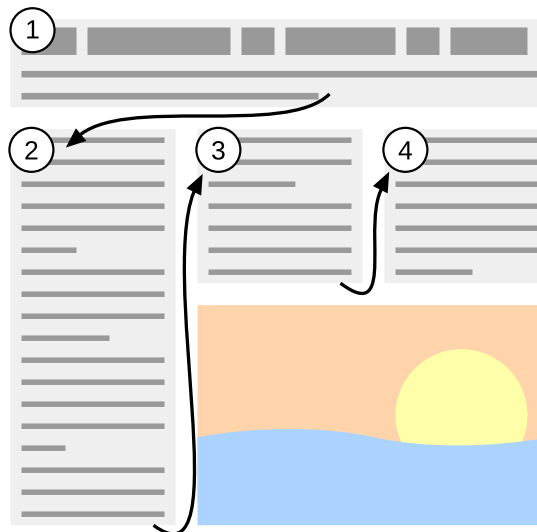


Fig. 6: A named flow flows through a region chain.

### 6.9.1 Adding Regions to Region Chains

Most block elements can be defined as a region. They are not required to be of the same size nor are they required to be the same node name.

To create a region from a block element, the `-ro-flow-from` property is used. It receives an identifier. A region chain contains all regions of the same identifier in document order. The identifier is also the name of the named flow these regions will display.

#### Note

A region element will not have its subtree rendered. It either displays content from a named flow or nothing.

#### Example 89: Region Chain

A chain of two regions defined for two HTML `div` elements with IDs `region1` and `region2`.

```
#region1, #region2 {
  -ro-flow-from: regionChainName;
}
```

PDFreactor lays out content into regions and breaks text and boxes where no space is left. The number of regions inside a region chain is limited by the number of associated Region elements though and it is possible that the content of a named flow occupies more space than is available inside the regions of a region chain. In that case content from the named flow overflows the last region inside the region chain.

### Note

A region does not influence the style of the content it contains. No style is inherited from a region into the displayed named flow and style that would influence the content of an element has no effect on a region's content.

## 6.9.2 Adding Content to a Named Flow

The `-ro-flow-into` property adds document content to a named flow. The content may consist of content from one or more elements. Content assigned to a named flow is not rendered at its position inside the document but inside one of the regions inside the region chain.

The property receives an identifier which is the name of the named flow the content belongs to. An optional keyword defines what part of the styled element should be taken into the named flow:

- `element`
  - Adds the entire element to the named flow.
  - If no keyword is given, this is the default behavior.
- `content`
  - Adds the element's content to the named flow.

### Example 90: Named Flow

Creation of a named flow for two HTML `<article>` elements while an HTML `<section>` element from one of the articles is moved to a different named flow.

#### HTML:

```
<article>...</article>
<article>
  ...
  <section id="info">...</section>
</article>
```

#### CSS:

```
article {
  -ro-flow-into: articleNamedFlowName;
}
section#info {
  -ro-flow-into: infoNamedFlowName;
}
```

**Note**

The content of a named flow may be rendered inside regions, but it still inherits style and computes its style the same way it would as if it did not appear inside a region.

### 6.9.3 Region Generated Content

A region element can have before and after **Generated Content** (p. 98) just like any other element. This generated content is rendered above or below the region's content and is not moved to the next region due to lack of space. Instead the available space inside a region is reduced. If there is not enough space left, the region's content flows over.

## 6.10 Controlling Breaks

Although PDFReactor performs automatic breaks between boxes for **pages** (p. 91), **columns** (p. 118) and **regions** (p. 122), it is often necessary to add explicit breaks in certain situations or breaks should be avoided to keep content together where it belongs together. This chapter explains how both can be achieved.

**Note**

PDFReactor provides styles for HTML that influence the break behavior for certain elements like headings. Break Styles for XML documents need to be created based on the document language.

### 6.10.1 Breaking Around Boxes

To manipulate the break behavior before and after boxes, the **break-before** and **break-after** properties are used. They provide keywords to force or avoid page, column and region breaks.

*Example 91: Start a chapter on a new page*

A manual page break before an HTML `<h1>` element, used to make a chapter start on top of a new page.

```
h1 {
    break-before: page;
}
```

*Example 92: Start a chapter on a new right page*

A manual page break before an HTML `<h1>` element, that makes the chapter start on a right page.

```
h1 {
    break-before: right;
}
```

This style creates a page break before the h1 and moves it to the next page. In case this is a left page another page break is performed, to move it to a right page again.

*Example 93: Avoiding breaks after HTML heading elements*

```
h1, h2, h3, h4, h5, h6 {
    break-after: avoid;
}
```

**Note**

PDFReactor also supports the CSS 2.1 properties `page-break-before` and `page-break-after`. They are resolved as shorthands for `break-before` and `break-after`.

## 6.10.2 Avoid Breaking Inside Boxes

To manipulate the break behavior inside a box, the property `break-inside` is used. It specifies whether breaking should be avoided inside the box or not.

### *Example 94: Avoiding breaks*

Avoid breaks inside an HTML `<div>` element.

```
div {
    break-inside: avoid;
}
```

**Note**

PDFReactor also accepts the CSS 2.1 property `page-break-inside` and resolves it as shorthand for `break-inside`.

## 6.10.3 Adaptive Page Breaks

[awesomizr.js \(p. 67\)](#) is able to automatically add page breaks depending on the amount of space left below an element with the help of the `applyAdaptivePageBreaks()` function.

A possible use case is to prevent a new section from beginning at the bottom of a page.

The function also prevents large whitespaces that occur when in situations where only a couple of sentences from a previous section are followed by a page break as the next section begins.

The function takes two parameters:

- **selector**: (optional) The CSS selector for the elements that may require a new page break. **Default value**: `"h1, h2"`
- **threshold**: (optional) If an element is below this percentage of the page height, a page break is inserted. **Default value**: `67`

## 6.11 Page Floats

Page floats are an extension of regular floats, also called inline floats, as they float in inline direction, i.e. left and right. Page floats on the other hand allow to float up and down, to the top or the bottom of a fragmentation container (page, column or region). If there is not enough space left, the page float is moved to the next fragmentation container, e.g. to the top/bottom of the following page, while the rest of the content continues on the current page.

The current implementation of page floats does come with some limitations:

- The normal content does not flow to the sides of the page float. Basically, the page float area always consumes the complete width of the corresponding fragmentation container, even if a page float itself has a smaller width.
- The page float always flows in the current fragmentation container. For example, a page float originating in a multi-column, will always stay in a column and is not moved to the level of the page.
- The content of a page float cannot be fragmented, meaning that if it becomes larger than a page, it will overflow instead of being split to the next page.

The CSS property `float` has been extended with the values `-ro-top` and `-ro-bottom` to enable page floats. To set the distance between two page floats of the same side or to the corresponding edge of the page, the new property `-ro-float-offset` can be used.

#### Example 95: Specifying a Page Float

With this sample, elements with the class `pageFloatTop` float to the top of their page with a gap of 5 mm to the page margin areas at the top.

#### CSS:

```
.pageFloatTop {
  float: -ro-top;
  -ro-float-offset: 5mm;
}
```

#### Note

When inline floats (left or right floated) precede the page float, the inline float may overflow the page. The same may happen in wrapped column flex items. Basically, when blocks of content are next to each other, problems can arise when the page float does not originate from the first one. This is a known issue that will be addressed in a future version.

## 6.12 Print Specific Page Properties

PDFReactor provides additional means for professional printing that allow to specify oversized pages, a bleed area and marks for cutting sheets to the final page size and color proofing.

### 6.12.1 PDF Page Boxes

Page boxes are used to specify the page geometry, especially in professional printing. PDFReactor supports the TrimBox, MediaBox, BleedBox, CropBox and ArtBox.

#### TrimBox

The TrimBox defines the size of the final print result, the final page. It contains the page content.



The size of the TrimBox is defined equivalent to the page size, as mentioned in chapter [Page Size & Orientation](#) (p. 93), using the `size` property.

*Example 96: Specifying a TrimBox*

The value of the `size` property also automatically specifies the TrimBox.

```
size: A4 portrait;
```

## MediaBox

In prepress, a printed document can contain more information than just the actual content in the TrimBox (e.g. bleed or [Printer Marks](#) (p. 128) ).

As this information does not belong to the print result and instead needs to be printed around it, a print sheet larger than the print result is needed. The MediaBox defines the size of the print sheet.

Special oversize formats are used as print sheet in such cases. For DIN <sup>19</sup> standard-based formats, the matching oversize formats to the A series are the DIN-RA and DIN-SRA formats. An overview of all supported page sizes can be found in the Appendix [Supported Page Size Formats](#) (p. 224)

The property `-ro-media-size` is used to specify the media size.

*Example 97: Specifying a MediaBox*

The document should be printed in DIN-SRA4 and the MediaBox is set to this size

```
-ro-media-size: SRA4;
```

The MediaBox is the largest of all 5 page boxes and contains all others which can be smaller or equal than this box.

## BleedBox

The BleedBox contains the TrimBox and is slightly larger. Content from the TrimBox may "bleed" into the BleedBox where it is still painted.

This is necessary for content that should reach to the edge of the print result. It prevents having unprinted areas due to unprecise trimming of the printed sheet.

The size of the BleedBox is defined as a width that adds to the TrimBox' size on all four sides. Common bleed values are 3-5 mm or 1/8 inch.

Setting the bleed size can be achieved by using the property `bleed`.

*Example 98: Specifying a BleedBox*

A bleed width of 3mm around the print result. The Bleed Box determines it's size from the TrimBox and this width.

```
bleed: 3mm;
```

<sup>19</sup> *Deutsches Institut für Normung, in English: German Institute for Standardization, Germany's ISO member body.*

**Note**

By default, any content is cut off at the end of the bleed box. If you need content to overflow into the media box, you can use the `-ro-page-clip` CSS property to adjust this behavior.

**CropBox**

The CropBox defines the complete area of the document that should be displayed on screen or printed out.

The crop size can be defined using the property `-ro-crop-size`.

The crop size can be set to a specific page size format (like setting the trim size) or to one of the page boxes. It is set to `none` by default.

*Example 99: Specifying a CropBox*

The CropBox is set to match the MediaBox.

```
-ro-crop-size: media;
```

**ArtBox**

The ArtBox is used to define a specific area inside which the page's content is located.

Using the property `-ro-art-size`, the ArtBox can be set to a specific page size or one of the page boxes. It is set to `none` by default.

**Note**

When generating a PDF/A conformant file (see [PDF/A conformance \(p. 74\)](#)), the ArtBox must not to be defined, so the property must be set to `none`.

**6.12.2 Printer Marks**

Printer Marks are special pieces of information located outside of the actual print result. They are used to prove the correctness of the result in prepress printing and are placed outside the [TrimBox \(p. 126\)](#).

Cutting out the print result of the print sheet is done inside the bleed area. Trim and bleed marks indicate where this area starts and ends. Both types of marks are displayed as hairlines in the corner of the print sheet.

Registration marks show whether the printer's colors are aligned properly. They are printed as crosshair-shaped objects located on each side of the print sheet.

Color bars show if the colors of the print result meet the expected result. They consist of a variety of colors that can be checked individually.

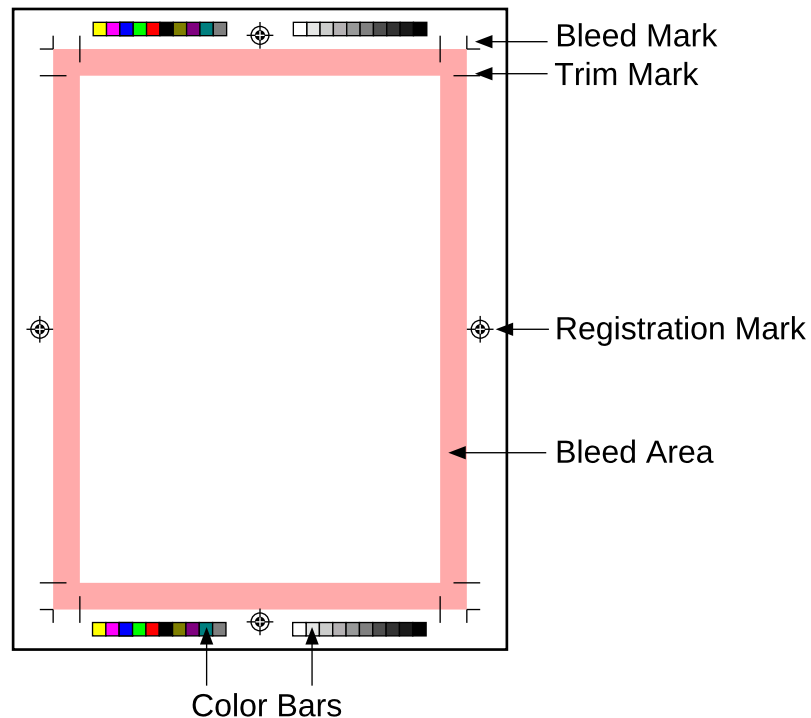


Fig. 7: Printer Marks

The property `marks` is used to add crop, bleed and cross marks. The property `-ro-marks-width` sets the width of the mark lines, `-ro-marks-color` sets their color. The properties `-ro-crop-mark-offset`, `-ro-registration-mark-offset` and `-ro-colorbar-offset` set the offset of the corresponding marks relative to the trim box. The property `-ro-bleed-mark-offset` sets the offset of bleed marks relative to the bleed box. The properties `-ro-crop-mark-length` and `-ro-bleed-mark-length` set the length of the corresponding marks and `-ro-registration-mark-size` sets the size of registration marks.

#### Example 100: Setting printer marks

```
marks: crop -ro-bleed cross;
-ro-marks-width: 1pt;
-ro-marks-color: red;
```

Setting one of the `-ro-colorbar-*` properties defines where a color bar is added to the document.

#### Example 101: Setting color bars at the bottom left and right

```
-ro-colorbar-bottom-left: gradient-tint;
-ro-colorbar-bottom-right: progressive-color;
```

## 6.13 Positioning Content Relative to Page Boxes

Using the proprietary property `-ro-position-origin` allows content with `position: absolute` to be positioned relative to any **page box** (p. 126) of its page. This is especially useful to place decorative content relative to the bleed box, thus making it exceed the trim box so bleed is properly utilized.

*Example 102: Positioning Decorative Page Margin Boxes in Corners of Bleed Boxes of Pages*

```
@page {
  bleed: 3mm;
  -ro-media-size: SRA4 portrait;
  -ro-crop-size: media;
  marks: trim bleed registration;
  @top-right-corner {
    content: counter(page);
    vertical-align: top;
    text-align: right;
    padding: 1cm;
    position: absolute;
    top: 0;
    right: 0;
    width: 5cm;
    height: 5cm;
    background-image: radial-gradient(at 100% 0%, lightblue 0%, white 50%);
    -ro-position-origin: -ro-bleed-box; /* Position in the bleed box of the page */
  }
}
```

## 6.14 Leaders

Leaders are often used to draw a visual connection between an entry in a table of contents or similar structures, and a corresponding value.

In CSS, drawing leaders is accomplished via the use of the `leader()` function. This function accepts the following values:

- `dotted`
- `solid`
- `space`
- `<string>`

A leader may be added using the content property, and can be combined freely with other generated content such as counters.

*Example 103: Adding leaders to the entries in a table of contents*

```
a.toc_ah2::after {
  content: leader(dotted) " " target-counter(attr(href), page);
}
```

This may result in a display such as:

Table of Contents	
1. Introduction.....	2
2. The Cyclone.....	2
3. The Council with the Munchkins.....	4
4. How Dorothy Saved the Scarecrow.....	7

## 6.15 Table of Contents

A table of contents can be inserted into a document to generate a list of the chapters or other important sections in the document.

This feature is usually used together with cross-references to add links to a table of contents. With the addition of counters, it can be complemented with the page numbers of the linked chapters.

The `createTableOfContents()` function provided by [awesomizr.js](#) (p. 67) allows to insert a table of contents that is generated from given elements.

### Note

The table of contents requires certain styles to work properly. These styles are included in the `awesomizr.css` and should be added either to the document or by using the `userStyleSheets` configuration property of the PDFReactor API.

The table of contents is inserted as an HTML `div` element with the class `ro-toc`. Inside this `div` can be two headings (document title and a heading for the table of contents with the class `ro-toc-heading`) and the `div` elements with links to the pages and a class depending on the level of the referenced element (`ro-toc-heading1`, `ro-toc-heading2`, ...)

The level of a TOC entry is determined by the position of its selector in the `elements` array.

```
Awesomizr.createTableOfContents({elements: ["h1", "h2", "h3"]});
```

The function's optional parameter is an object with several options:

### Values of the option object

Key	Type	Description	Default
<code>insertiontarget</code>	string	CSS selector string of the element where the table of contents should be inserted.	"body"
<code>insertiontype</code>	string	Specifies where exactly the table of contents should be inserted: <ul style="list-style-type: none"> <li><code>"beforebegin"</code> : Before the element</li> <li><code>"afterbegin"</code> : As new first-child</li> <li><code>"beforeend"</code> : As new last-child</li> <li><code>"afterend"</code> : After the element</li> </ul>	"afterbegin"

Continued

Continued

Key	Type	Description	Default
elements	array	An array of the CSS selector strings of elements that should be added to the table of contents. Each TOC entry gets a class name based on the index of the corresponding selector in this array, e.g. by default the h2 entries have the class <code>ro-toc-level-2</code> .	<code>["h1", "h2"]</code>
toctitle	string	The title of the table of contents. If an empty string is set, no title is inserted.	"Table of Contents"
disableddocumenttitle	boolean	Whether the document title should NOT be inserted before the table of contents.	false
text	function	By default, the text for the entries of the TOC is the text content of the element matching the specified selector. Alternatively, you can specify a function, the return value of which will be used as text for the respective entry. The element representing the entry is passed as an argument to the function. Returning <code>false</code> will skip the entry entirely and not include it in the TOC.	null

*Example 104: Creating TOC with Awesomizr*

Simple table of contents created with Awesomizr based on HTML `<h2>` elements.

```
<link href="css/awesomizr.css" type="text/css" rel="stylesheet" />
<script type="module">
  import * as Awesomizr from "./awesomizr.js";

  Awesomizr.createTableOfContents({elements: ['h2']});
</script>
...
```

*Example 105: List of figures with custom text content for the entries*

```
Awesomizr.createTableOfContents({
  elements: ['img'],
  text: function(elem) {
    // the entry text should be the image's alt text
    let txt = elem.alt;

    if (txt) {
      return txt;
    }

    // skip images without alt text
    return false;
  }
});
```

**Note**

Alternatively, a table of contents can also be created by using XSLT. Both approaches are demonstrated by the two versions of the "Children's Novel" sample. You can find them in the "PDFreactor/samples/novel" directory.

## 6.16 Shrink-to-Fit

For some documents parts of the content are too wide to fit the pages. In most cases this is caused by HTML documents containing fixed widths intended for screens, e.g. `1024px` for the main container element.

While the best solution is adding a print style sheet to override the critical styles with relative widths, such content can also be shrunk automatically without changing the source document or adding specific styles.

There are two different shrink-to-fit functionalities available in PDFreactor, `pixelsPerInchShrinkToFit` and `-ro-scale-content`. These are non-exclusive and are applied in the aforementioned order.

**Note**

Shrink-to-fit is only recommended when you need to force content into the boundaries of pages. For high-fidelity print output, these modes should not be used.

### 6.16.1 Scaling Pixel Lengths

This configuration property adapts the "pixels per inch" value used for laying out the document, i.e. it only scales lengths set as `px` including such set via HTML attributes.

*Example 106: Shrink-to-fit using the `pixelsPerInchShrinkToFit` property*

```
config.setPixelsPerInchShrinkToFit(true);
```

All languages (p. 435)

The `pixels per inch` (p. 138) can also be specified manually.

### 6.16.2 Scaling Down Page Content

This property must be part of the `@page` rule affecting the first page:

*Example 107: Shrink-to-fit using the `-ro-scale-content` CSS property*

```
@page {
  -ro-scale-content: auto;
}
```

For further details see `-ro-scale-content`.

**Note**

Page content scaling, if used, always applies to all pages equally. It cannot be applied to only a subset pages or page groups.

### 6.16.3 Scaling Down Text

The proprietary value `-ro-scale-down` of the CSS property `text-overflow` allows visually scaling down paragraphs that overflow at the end of lines to automatically make their text fit their width.

Contrary to normal text overflow styles, `-ro-scale-down` also works with multi-line text. It then applies the scaling to all lines, so that the whole text content is scaled down equally. However, only overflow in inline (i.e. horizontal) direction is taken into account to determine whether scaling needs to be applied, not overflow in block (i.e. vertical) direction.

This feature is especially useful if you want to force text whose length you can't control into a pre-defined container, such as forcing user-supplied text into an existing form field.

#### Vertical Position

You can control the vertical position of the scaling effect with the CSS property `align-content` and its usual values: `start`, `end`, `center`, `baseline` (default) and `stretch`.

The value `stretch` won't scale down the text vertically, instead the text is skewed to keep its original height.

*Example 108: Scale down a single line of text horizontally*

```
.scaleDown {
  /* Enable text scale down */
  text-overflow: -ro-scale-down;
  /* Make sure we only have a single line */
  white-space: nowrap;
  /* Don't scale vertically */
  align-content: stretch;
}
```

### 6.16.4 Fit Wide Tables

In cases where an HTML document contains tables that are very wide, usual shrinking strategies may not be appropriate since the table might have to be scaled down so much that it becomes illegible. In these cases you could use [awesomizr.js \(p. 67\)](#) to convert the table into a compact version that displays the table columns as rows. The `compactifyTable()` function takes the following one or two arguments and automatically converts a wide table into a narrow variant.

- `table` — The HTML node of the table.
- `params` — An optional object of parameters. Refer to the Awesomizr API documentation for more information.

This conversion only works on uniform tables without any column or row spans.

## 6.17 Page Order

Usually, the page order of a PDF is only determined by its input document. However, using the configuration property `pageOrder`, the page order can be set by providing a string parameter.



For ease of use the following constants are available for the most common cases of page orders:

- `REVERSE` — The page order is reversed.
- `EVEN` — All even pages are moved before all odd pages.
- `ODD` — All odd pages are moved before all even pages.
- `BOOKLET` — All pages are ordered as in a booklet. To be used with `PagesPerSheetDirection.RIGHT_DOWN`.
- `BOOKLET_RTL` — All pages are in right-to-left booklet order. To be used with `PagesPerSheetDirection.RIGHT_DOWN`.

Instead of using a predefined order the parameter can also provide a custom order as comma-separated list of page numbers and ranges:

- `"x,y,z"` — New page order x, y, z.
- `"x..y"` — All consecutive pages from x to y.
- `"x*n"` — The page x is repeated n times.
- `"-x"` — Negative page numbers count backwards beginning from the last page and can be used in combination with all of the above.
- `"A"` — All pages of the document. Same result as `"1..-1"`.

*Example 109: Setting the page order*

```
config.setPageOrder("2,5,6*2,8..10,-1,-2");
```

All languages (p. 435)

The page order shown above results in a PDF having the following page numbers from the original document, assuming it has 20 pages total: 2, 5, 6, 6, 8, 9, 10, 20, 19.

- `"2"` — Page 2.
- `"5"` — Page 5.
- `"6*2"` — Page 6 two times.
- `"8..10"` — Pages 8 to 10.
- `"-1"` — The last page, here page 20.
- `"-2"` — The second to last page, here page 19.

### Note

On the Python command line instead of `--pageOrder "-1..1"` we recommend using `--pageOrder="-1..1"` to specify the page order.

## 6.17.1 Merge Mode Arrange

The syntax of page order is extended when setting the merge mode to `MERGE_MODE_ARRANGE`.

As usual, when the merge mode is selected PDFReactor requires one or more merge PDFs to be set (see [Merging PDFs \(p. 82\)](#)).

The merge documents specified with the array are numbered, beginning with one for the first PDF (when specifying a single document, it is also addressed with "1").

To select pages from a merge document, first use its number followed by a colon, which then is followed by the page order syntax described above. Note that the converted document can be addressed using `0:`, however, this is not necessary, as it is used by default if no document is specified.

*Example 110: Inserting existing PDFs into converted document*

All languages (p. 435)

```
MergeSettings mergeSettings = new MergeSettings();
mergeSettings
    .setMergeDocuments(
        new Resource().setUri("https://www.myserver.com/insert1.pdf"),
        new Resource().setUri("https://www.myserver.com/insert2.pdf"))
    .setMode(MergeMode.ARRANGE);
config.setMergeSettings(mergeSettings);
config.setPageOrder("1,1:1,2..-1");
```

The order shown above would be:

- `"1"` — Page 1 from the converted PDF.
- `"1:1"` — Page 1 from insert1.pdf.
- `"2:A"` — All Pages from insert2.pdf.
- `"2..-1"` — Pages 2 to the last page from the converted PDF.
- `"1:2"` — Page 2 from insert1.pdf.

## 6.18 Pages Per Sheet

Instead of containing only one page of the input document per PDF page, multiple pages of the input document can be displayed on one sheet.

The pages will be arranged in a grid on the sheet. The number of columns and rows of this grid are user-defined.

To utilize Pages Per Sheet use the configuration property `pagesPerSheetProperties`.

The properties `rows` and `cols` define the corresponding number of pages that get laid out on a single page. Their values are required. The values for `sheetSize`, `sheetMargin` and `spacing` can be set as CSS width values. `direction` defines in which way the single pages are ordered.

There are the following options to set a direction:

- `PagesPerSheetDirection.RIGHT_DOWN` — The single pages are ordered from left to right and top to bottom. This is the default value.
- `PagesPerSheetDirection.RIGHT_UP` — The single pages are ordered from left to right and bottom to top.

- `PagesPerSheetDirection.LEFT_DOWN` — The single pages are ordered from right to left and top to bottom.
- `PagesPerSheetDirection.LEFT_UP` — The single pages are ordered from right to left and bottom to top.
- `PagesPerSheetDirection.UP_RIGHT` — The single pages are ordered from bottom to top and left to right.
- `PagesPerSheetDirection.UP_LEFT` — The single pages are ordered from bottom to top and right to left.
- `PagesPerSheetDirection.DOWN_RIGHT` — The single pages are ordered from top to bottom and left to right.
- `PagesPerSheetDirection.DOWN_LEFT` — The single pages are ordered from top to bottom and right to left.

#### Example 111: Arranging 4 pages per sheet

```
config.setPagesPerSheetProperties(new PagesPerSheetProperties()
    .setCols(2)
    .setRows(2)
    .setSheetSize("A4 landscape")
    .setSheetMargin("2.5cm")
    .setSpacing("2cm")
    .setDirection(PagesPerSheetDirection.RIGHT_UP));
```

[All languages \(p. 436\)](#)

#### Note

**Disabled Features.** [Bookmarks \(p. 68\)](#), [comments \(p. 150\)](#), [links \(p. 69\)](#), and [tags \(p. 73\)](#) will be automatically disabled when using pages-per-sheet mode.

## 6.19 Booklet

A Booklet is a set of folded pages meant to be read like a book. PDFReactor supports creating Booklets by combining the [Pages Per Sheet \(p. 136\)](#) functionality with the [Page Order \(p. 134\)](#) feature.

It orders the pages in booklet or rtl booklet page order and places two of these pages on each sheet, rotated by 90 degrees and side-to-side.

A configuration property allows to configure the page size and margins of the container page as well as to use the default booklet page order or a reversed order:

```
config.setBookletMode(new BookletMode()
    .setSheetSize("A4 landscape")
    .setSheetMargin("1cm")
    .setRtl(false));
```

[All languages \(p. 436\)](#)

## 6.20 Filling in Pages

If you don't want to produce N-up output right away or if you plan duplex printing, it is sometimes desirable to produce a PDF that always has an even page count or a page count which is a multiple of N for the N-up layout you want to achieve down the line. To automatically append pages to the PDF to achieve such a page count, you can use the [Awesomizr \(p. 67\)](#) JavaScript library.

The `autoFillPages()` function dynamically inserts pages until the total page count is a multiple of the indicated number. This function takes one object as optional parameter with the following properties:

### Parameter Properties

Name	Type	Description	Default
<code>multiple</code>	number	Pages will be filled up until the page count is a multiple of this property.	2
<code>target</code>	string	The filler page objects will be inserted as new children of the element matching this selector.	"body"
<code>template</code>	function	A function that must return an <code>HTMLElement</code> which will be used as the filler pages. Returning null or undefined skips the page. If no function is specified, a custom element is inserted. The function receives the following three arguments: The current index of the inserted filler page (starting at 0), the total number of filler pages to be inserted, the total (original) page count of the document.	

The empty pages that are inserted this manner can be styled further. The pages have the `roFillerPage` [name \(p. 94\)](#) and the HTML elements that create them have the `roFillerPage` class.

## 6.21 Pixels per Inch

By default, lengths specified in pixels (i.e. via the CSS unit `px` or HTML attributes) are converted to physical lengths at a rate of 96 pixels per inch. With the configuration property `pixelsPerInch` this can be changed, e.g.:

```
config.setPixelsPerInch(120);
```

[All languages \(p. 436\)](#)

Increasing the pixels per inch can be used to shrink documents that would be too wide for pages due to fixed widths originally intended for screens.

Finding the optimum value can be automated using [shrink to fit \(p. 133\)](#).

## 6.22 Internationalization

### 6.22.1 Languages

PDFReactor supports Unicode and includes default fonts for various non-Latin languages. See [Core Fonts Pack \(p. 173\)](#) for more information on the included fonts and [Font Sources \(p. 172\)](#) on how to add additional fonts.

You can specify a language for the whole document either by using the HTML `lang` attribute or by specifying a default in the API:

```
<html lang="de-DE">
```

```
config.setDocumentDefaultLanguage("de-DE");
```

All languages (p. 436)

The specified language will be used for [automatic hyphenation \(p. 96\)](#) of text and also conveys important information to screen readers when reading [accessible PDFs \(p. 155\)](#). It is required to specify the document language when producing accessible PDFs, otherwise PDFReactor may use `"en-US"` as the default.

Counters and list item markers can also be displayed in numerous languages and writing systems. See [Counter and Ordered List Style Types \(p. 234\)](#) for all supported styles.

`lang` attributes can also be used to change the language for parts of the document.

## 6.22.2 Right-to-Left

PDFReactor analyzes the document to handle both left-to-right and right-to-left text correctly.

The base direction of the document defaults to left-to-right. You can set it to right-to-left by specifying the `dir` attribute on the root element as in the following example:

```
<html dir="rtl">
```

You can also override the base direction specifically for certain elements via the property `direction`:

```
div.hebrew {
  direction: rtl;
}
```

You can override the implicit text direction by combining `direction` with the property `unicode-bidi`:

```
span.forcertl {
  unicode-bidi: bidi-override;
  direction: ltr;
}
```

## 6.22.3 Text Direction Dependent Layouts

Using "logical" properties and values, as opposed to the common "physical" ones, allows layouts based on the text direction, instead of fixed "left" and "right" sides. They are mapped to physical sides based on the value of the `direction` property, which may be `ltr` (left-to-right, default) or `rtl` (right-to-left).

### See

The "International Sample" document in the PDFReactor package demonstrates the usage of these properties and values. It can be found in the "PDFReactor/samples/i18n" directory.

The following tables list the direction dependent logical properties and values as well as the resulting physical ones for both left-to-right and right-to-left direction:

## Logical Properties

Property	LTR	RTL
<code>padding-inline</code>	padding-left padding-right	padding-right padding-left
<code>padding-inline-start</code>	padding-left	padding-right
<code>padding-inline-end</code>	padding-right	padding-left
<code>border-inline-start</code>	border-left	border-right
<code>border-inline-end</code>	border-right	border-left
<code>border-inline-start-color</code>	border-left-color	border-right-color
<code>border-inline-end-color</code>	border-right-color	border-left-color
<code>border-inline-start-style</code>	border-left-style	border-right-style
<code>border-inline-end-style</code>	border-right-style	border-left-style
<code>border-inline-start-width</code>	border-left-width	border-right-width
<code>border-inline-end-width</code>	border-right-width	border-left-width
<code>border-start-start-radius</code>	border-top-left-radius	border-top-right-radius
<code>border-start-end-radius</code>	border-top-right-radius	border-top-left-radius
<code>border-end-start-radius</code>	border-bottom-left-radius	border-bottom-right-radius
<code>border-end-end-radius</code>	border-bottom-right-radius	border-bottom-left-radius
<code>margin-inline</code>	margin-left margin-right	margin-right margin-left
<code>margin-inline-start</code>	margin-left	margin-right
<code>margin-inline-end</code>	margin-right	margin-left
<code>inset-inline</code>	left right	right left
<code>inset-inline-start</code>	left	right
<code>inset-inline-end</code>	right	left

New Logical Values for **float** and **clear**

Property	LTR	RTL
inline-start	left	right
inline-end	right	left

## 6.23 Media Queries

### 6.23.1 Media Types

Media Queries are a CSS3 extension of media types. Media types allow to have styles that are only applied if the device or application displaying the document accepts the specified type. For example the following media rule will only be applied if the device accepts the media type `print` (which PDFReactor does):

```
@media print {
  p {
    background-color: transparent;
  }
}
```

If the styles of a certain media type have to be applied, but that media type is not accepted by PDFReactor (e.g. `@media screen`), the required media types can be set via API:

```
config.setMediaTypes("screen", "projection", "print");
```

[All languages \(p. 437\)](#)

This example sets the three media types `screen`, `projection` and `print`, thereby overriding PDFReactor's default types.

CSS that should only be used by PDFReactor can either be added by using the API or if they depend on the specific document you can use the proprietary media type `-ro-pdfreactor`.

For example the following rule disables the page background color only if the document is used by PDFReactor:

```
@media -ro-pdfreactor {
  @page {
    background-color: transparent;
  }
}
```

### 6.23.2 Media Features

Media Queries allow to make styles dependent on certain device features like width and height of the viewport. As they extend media types they may start with one type which can be followed by media features, each linked with the keyword `and`.

Media features describe certain device properties, are always enclosed by parentheses and resemble CSS properties. Additionally, some features may be prefixed with `min-` or `max-` in order to express "greater or equal to" and "less or equal to" relationships to their value.

```
@media print and (max-device-width: 1024px) {
    ...
}
```

The styles of this media rule are only applied if the device width is `1024px` or less.

The device properties for conversions can be set using the API:

```
config.setMediaFeatureValues(new MediaFeatureValue()
    .setMediaFeature(MediaFeature.DEVICE_WIDTH)
    .setValue("1024px"));
```

All languages (p. 437)

The following table provides an overview of the supported media features. The default values can also be found in the PDFReactor API documentation.

#### Supported media features

Feature Name	Description	min-/max-
<b>Page Characteristics Media Features</b>		
<code>aspect-ratio</code>	Calculated from <code>width</code> and <code>height</code> . The value is a fraction, e.g. <code>16/10</code> . The default value is derived from <code>width</code> and <code>height</code> .	Yes
<code>device-aspect-ratio</code>	Calculated from the <code>device-width</code> and <code>device-height</code> . The value is a fraction, e.g. <code>16/9</code> . The default value is derived from <code>device-width</code> and <code>device-height</code> .	Yes
<code>device-height</code>	The height of the rendering surface. The default value is <code>297mm</code> (i.e. A4 height)	Yes
<code>device-width</code>	The width of the rendering surface. The default value is <code>210mm</code> (i.e. A4 width).	Yes
<code>display-mode</code>	Represents certain aspects of how a web application shows the content. This is not applicable for PDFReactor. The default value is <code>fullscreen</code> .	No
<code>height</code>	The height of the targeted display area. The default value is <code>257mm</code> (i.e. A4 height with 2cm top and bottom margin).	Yes
<code>horizontal-viewport-segments</code>	The number of horizontal segments that the display has. This is not applicable for PDFReactor. The default value is <code>1</code> .	No
<code>orientation</code>	Is <code>portrait</code> if <code>height</code> is greater than or equal to <code>width</code> , or <code>landscape</code> otherwise. The default value is derived from <code>device-width</code> and <code>device-height</code> .	No

Continued



Continued

Feature Name	Description	min-/max-
overflow-block	How overflowing content in block (i.e. vertical) direction is handled when it is larger than the viewport. The default value is <code>paged</code> , except when enabling continuous output (see <a href="#">Continuous Output (p. 90)</a> ), in which case it is set to <code>none</code> .	No
overflow-inline	How overflowing content in inline (i.e. horizontal) direction is handled when it is larger than the viewport. The default value is <code>none</code> .	No
vertical-viewport-segments	The number of vertical segments that the display has. This is not applicable for PDFreactor. The default value is 1.	No
width	The width of the targeted display area. The default value is 170mm (i.e. A4 width with 2cm left and right margin).	Yes
Color Media Features		
color	The number of bits per color component of the output device. The default value is 8, except if the output was set to <code>forceGrayscaleImage</code> (see <a href="#">Grayscale Image (p. 90)</a> ) in which case it is set to 0.	Yes
color-gamut	Describes the approximate range of colors that are supported by the UA and output device. This is not applicable for PDFreactor. The default value is <code>srgb</code> .	No
color-index	The number of entries in the color lookup table. The default value is 0, except if the output format was set to <code>gif</code> in which case it is 256.	Yes
dynamic-range	Combination of brightness, contrast ratio, and color depth that are supported by the user agent and the output device. This is not applicable for PDFreactor. The default value is <code>standard</code> .	No
inverted-colors	Indicates whether the content is displayed normally, or whether colors have been inverted. The default value is <code>none</code> .	No
monochrome	The number of bits per pixel in a monochrome frame buffer. The default value is 0, except if the output was set to <code>forceGrayscaleImage</code> (see <a href="#">Grayscale Image (p. 90)</a> ) or to a monochrome output format (certain <code>tiff</code> variants). In the first case it is set to 8 and in the latter it is set to 1 (which means there is only either black or white, but no grey).	Yes
Display Quality Media Features		
environment-blending	Used to query the characteristics of the user's display so the author can adjust the style of the document. The default value is <code>opaque</code> .	No

Continued

Continued

Feature Name	Description	min-/max-
grid	Whether the device is grid or bitmap based. The default value is 0.	No
resolution	The device resolution in dpi , dpcm or dppx . This also defines the value of the window.devicePixelRatio property available from <a href="#">JavaScript (p. 60)</a> .	Yes
scan	Describes the scanning process of some output devices. This is not applicable for PDFReactor. The default value is progressive.	No
update	Used to query the ability of the output device to modify the appearance of content once it has been rendered. The default value is none.	No
-ro-output-format	(proprietary) The output format of the conversion, either pdf , image or viewer (i.e. PDFReactor Preview app). This value can not be overridden via the API configuration.	No
<b>Interaction Media Features</b>		
any-hover	Whether there is any available input device that allows the user to hover over elements. This is not applicable for PDFReactor. The default value is none.	No
any-pointer	Whether there is any available input mechanism that is a pointing device, and if so, how accurate is it. This is not applicable for PDFReactor. The default value is none.	No
hover	Whether the primary input device allows the user to hover over elements. This is not applicable for PDFReactor. The default value is none.	No
nav-controls	Whether there is a user interfaces that provides navigation controls (e.g. moving back in session history and changing the URL). The default value is none.	No
pointer	Whether the primary input mechanism is a pointing device, and if so, how accurate is it. This is not applicable for PDFReactor. The default value is none.	No
<b>Video Media Features</b>		
video-color-gamut	Describes the approximate range of colors that are supported by the UA and output device's video plane. This is not applicable for PDFReactor. The default value is srgb.	No

Continued

Continued

Feature Name	Description	min-/max-
<code>video-dynamic-range</code>	Represents the combination of max brightness, color depth, and contrast ratio that are supported by the UA and output device's video plane. This is not applicable for PDFReactor. The default value is <code>standard</code> .	No
<b>Scripting Media Features</b>		
<code>scripting</code>	Detects whether JavaScript is available. The default value depends on whether JavaScript is enabled. It is either <code>initial-only</code> or <code>none</code> .	No
<code>-ro-scripting</code>	Is <code>initial-only</code> when JavaScript is explicitly enabled, <code>none</code> otherwise. This value can not be overridden via the API configuration.	No
<b>User Preference Media Features</b>		
<code>forced-colors</code>	Tells whether the user-agent enforces a limited color palette. The default value is <code>none</code> .	No
<code>prefers-color-scheme</code>	Reflects whether the user prefers light or dark color themes. The default value is <code>light</code> .	No
<code>prefers-contrast</code>	Detects if the user has requested more or less contrast in the page. The default value is <code>no-preference</code> .	No
<code>prefers-reduced-data</code>	Detects if the user has a preference for being served alternate content that uses less data for the page to be rendered. The default value is <code>no-preference</code> .	No
<code>prefers-reduced-motion</code>	Detects if the user has requested the system minimize the amount of animation or motion it uses. The default value is <code>reduce</code> .	No
<code>prefers-reduced-transparency</code>	Detects if the user has requested the system minimize the amount of transparent or translucent layer effects it uses. The default value is <code>no-preference</code> .	No

**Note**

PDFReactor does not take account of the values of CSS properties in the document when determining the values of media features. For example, setting the page height to `50mm` will have no effect on a media query that tests the `max-height` of the document. Instead, the media features supported by PDFReactor all have default values (for details see the `Configuration.MediaFeature` class in the PDFReactor API documentation). These default values can be overridden through the PDFReactor API, with some exceptions that are determined automatically.

## 6.24 Document-Specific Preferences

PDFReactor allows setting certain configurations via the CSS of the document that is converted. This is done using the proprietary at-rule `@-ro-preferences`.

Example:

```
@-ro-preferences {
  /* The first page of the document should not be a cover page */
  first-page-side: verso;
}
```

### @-ro-preferences properties

Property Name	Values	Description
<code>first-page-side</code>	<ul style="list-style-type: none"> <li><code>left</code></li> <li><code>right</code></li> <li><code>verso</code></li> <li><code>recto</code></li> <li><code>auto</code> (default)</li> </ul>	Sets on which side the first page of the document should be. By default it is <code>right</code> , unless the document direction is right-to-left.
<code>first-page-side-view</code>	<ul style="list-style-type: none"> <li><code>left</code></li> <li><code>right</code></li> <li><code>verso</code></li> <li><code>recto</code></li> <li><code>auto</code> (default)</li> </ul>	Sets on which side the first page of the document should appear in viewers, without impact on styles or layout. By default it is the same side as set by <code>first-page-side</code> .
<code>page-layout</code>	<ul style="list-style-type: none"> <li><code>1 column</code></li> <li><code>2 column</code></li> <li><code>1 page</code></li> <li><code>2 page</code></li> <li><code>auto</code> (default)</li> </ul>	Sets the initial view mode for the document. Whether two pages should be next to each other and how scrolling between the pages should work.

Continued

Continued

Property Name	Values	Description
<code>initial-zoom</code>	<ul style="list-style-type: none"> <li>• [percentage]</li> <li>• <code>fit-page</code></li> <li>• <code>fit-page-width</code></li> <li>• <code>fit-page-height</code></li> <li>• <code>fit-content</code></li> <li>• <code>fit-content-width</code></li> <li>• <code>fit-content-height</code></li> <li>• <code>auto</code> (default)</li> </ul>	Sets the initial zoom factor when opening the document. Can either be a specific percentage value or the zoom factor can be computed dynamically so that the page (or its content) fits into the window of the viewer application. Please note, that not all fit-values are supported by all viewers. Generally, fit-page support is more common.
<code>initial-page</code>	<ul style="list-style-type: none"> <li>• [number]</li> </ul>	Sets number of the page that should be scrolled to when opening the document. The default value is 1. Values smaller than 1 are invalid.
<code>pages-counter-offset</code>	<ul style="list-style-type: none"> <li>• [number]</li> </ul>	Sets an optional offset to be added to the value of the pages counter. Negative values are valid. The default value is 0.
<code>pdf-shape-optimization</code>	<ul style="list-style-type: none"> <li>• <code>visual</code> (default)</li> <li>• <code>none</code></li> </ul>	Sets whether shapes should be written into the PDF in a way that prevents visualization issues in certain PDF viewers.

## 6.25 Converting Large Documents

In most cases, PDFReactor is able to handle even very large documents, provided that **enough memory is made available** (p. 12). However, if there is not enough memory available or if large tables cause conversions to be too slow, PDFReactor offers specialized functionalities that disable certain resource intensive features to allow processing such documents much more efficiently in regards to memory and time. Those can be used separately or in combination.

### 6.25.1 Segmentation

Enabling segmentation allows PDFReactor to internally split conversions into multiple parts, drastically reducing the amount of memory required for large documents. The minimum document size for this to be noticeable depends on the complexity of the input document, but 5000 pages is a good estimate. This has no visible influence on the resulting PDF document, i.e. the edges of segments are not discernible. However there are some limitations:

- **Regions** (p. 122) are not supported.
- **Shrink-to-Fit** (p. 133) via `pixelsPerInchShrinkToFit` or `-ro-scale-content` is not supported.

- The `pageOrder` (p. 134) setting is not supported.
- The `pages` counter is not supported. This does not affect the "page" counter (p. 107), other counters or named strings.
- Using the `string()` function outside of page margin boxes may cause unpredictable results. When it is absolutely necessary it is highly recommended to use `string-set` on an ancestor element of the ones using the value.
- `tfoot` and `thead` elements must be placed before the `tbody` or `tr` elements of the same `table`. (If the document is not too large this can be corrected via JavaScript.)
- All `style` elements must be in the header.
- Due to the total amount of pages being unknown during the conversion of any segment but the last, log output and progress monitoring cannot estimate the progress of the conversion.
- For the CSS functions `target-counter` (p. 108) and `target-text` (p. 108) to be able to access information from previous segments the property `-ro-target-candidate` must be used. It is also important that `ID` attributes are unique through the entire document.
- `JavaScript` (p. 60), when enabled, is run in a preprocessing step with no access to any layout information and increases memory consumption to some extent.

If these restrictions are acceptable, the feature can be enabled in the PDFReactor configuration:

```
config.setSegmentationSettings(new SegmentationSettings()
    .setEnabled(true));
```

All languages (p. 437)

Some optional functionalities increase the amount of memory required, due to data accumulating over the course of the entire conversion. These include links, bookmarks, tagging and logging at levels more verbose than `info`.

### 6.25.2 Fast Tables

Very large tables have a significant impact on performance. Tables that have simple structures and only basic sets of styles can be declared as fast tables, providing significantly better performance and lower memory requirements at the cost of the following restrictions:

- Cell content is handled as a single line of text with uniform style and no influence on the table layout. If there is too much content, it will overflow.
- Styles applied to the cells of the first two body rows are used for the rest of the table's content. Applying different styles to the second row allows alternating even/odd styles. Styles set on the child nodes of cells or other table body rows are ignored. Vertical borders (i.e. `border-right`) can not be alternated between rows.
- The structure is homogeneous, with all body rows having the same height and the cells of the first row (header or body) defining the widths of their columns. Widths are taken from style only, without measuring content. Column or row spans are not supported. Missing row elements and other incorrect structuring will lead to unexpected results.

- Supported styles on cells are: `width`, `height`, `font-family`, `font-size`, `font-weight`, `font-style`, `font-stretch`, `line-height`, `text-align`, `vertical-align`, `color`, `background-color`, `border-right`, `border-bottom`, `padding` and related shorthands.
  - Supported styles on rows are: `height`, `background-color` and related shorthands.
  - Supported styles on `col` elements are: `width`, `background-color` and related shorthands.
  - The cell borders are created by using the `border-right` and `border-bottom` styles, creating a grid between the cells, similar to the effect of `border-collapse: collapse`. The borders at the table edges are created from the styles of the table element.
- Table footer cells are an exception as they use their `border-top` styles (instead of `border-bottom`) to create the horizontal border between body and footer cells.
- Repeating table header and footer groups are limited to one row each. Those are styled independently from the table body.
  - All lengths must be absolute, except for the widths of columns which also support percentages.
  - Font fallback is done per cell and based on the first character only. Specifying a font with sufficient glyphs is recommended. Characters that are missing from the font are skipped entirely. For the first one, per conversion, a warning is logged. All missing ones are logged at trace level.
  - The `direction` style set on the table element is also used for all cells. The `unicode-bidi` property is not supported. BiDi processing is applied to the text when necessary as usual.
  - The `vertical-align` property only supports the values `top`, `middle` and `bottom`, all others defaulting to `top`. This makes `top` the default behavior, except for HTML based tables, which default to `middle` as usual. `text-align` does not support the values `justify` or `justify-all`.
  - PDF tagging (p. 73) functionality has no access to the content of such tables. By default fast tables are marked as artifacts, making them not accessible (p. 155).

If these restrictions are acceptable, the feature can be enabled by setting the style `display: -ro-fast-table` on table elements. The style can be applied selectively, to affect only specific tables of the document.

### 6.25.3 Recommendation for Large Documents

An `OutputStream` should be passed to the `convert` method, so the document is streamed directly to disk or socket instead of keeping it in memory.

#### Important

Many PDF viewers and processors will not properly handle PDF files that are larger than 2GB.

## 6.26 Annotations

When using PDFs in a review process it is helpful to be able to effectively annotate the document. While HTML already provides elements like `ins` and `del`, PDFreactor also offers more specialized features.

## 6.26.1 Comments

It is possible to add PDF comments to the document using the `addComments` configuration property like this:

All languages (p. 437)

```
config.setAddComments(true);
```

Depending on how the comment information is stored in your HTML source document, there are several style rules that can be applied. The most common use-cases are to either create a comment from an empty element (where any information is stored in its attributes) or to create a comment from a non-empty element (where the content is the text encompassed by the element):

*Example 112: Creating a comment from an empty element*

### HTML

```
<span class="comment" text="My Comment."></span>
```

### CSS

```
span.comment {
  -ro-comment-content: attr(text);
}
```

*Example 113: Creating a comment from a non-empty element*

### HTML

```
<span class="comment">This text is commented</span>
```

### CSS

```
span.comment {
  -ro-comment-content: content();
}
```

There are different styles to visualize a comment in the PDF:

- `note`: Creates a small icon. This is the default style for all comments.
- `invisible`: Does not create any visual effects.
- `highlight`: Highlights the background of a section of text.
- `underline`: Underlines a section of text with a straight line.
- `strikeout`: Strikes out a section of text.
- `squiggly`: Underlines a section of text with a squiggly line.

The comment styles `highlight`, `underline`, `strikeout` and `squiggly` are only applicable to comments that encompass a section of text.



The following example demonstrates how to style a simple comment.

#### Example 114: Styling a comment

##### HTML

```
<span class="comment">This is a styled comment</span>
```

##### CSS

```
span.comment {
  -ro-comment-content: content();
  -ro-comment-style: underline;
}
```

#### Note

The visualization is ultimately dependent on the PDF viewer and may vary across viewers and/or platforms.

Comments can be customized further by using a variety of style rules. Besides content and style, you can also customize the following properties:

- **Title:** The title of the comment. In some cases, this is also used for the author. Use the CSS property `-ro-comment-title` to specify the title.
- **Color:** The color of the comment. The default value for the color depends on the comment style chosen. Use the CSS property `-ro-comment-color` to set a color.
- **Date:** The date of the comment. When no date is specified, the current date is used. Use the CSS property `-ro-comment-date` to set the date.
- **Date Format:** The format of the date you specified. The syntax is identical to Java's SimpleDateFormat<sup>20</sup>. Use the CSS property `-ro-comment-dateformat` to specify a date format for the comment's date.
- **Position:** The position of the comment icon (only applicable for the comment style `note`). Use the CSS property `-ro-comment-position` to specify a position for the comment's note icon.
- **Initial state:** The initial state of the comment, i.e. whether the comment should be open or closed when the PDF is opened in a viewer. Use the CSS property `-ro-comment-state` to specify the initial state of the comment bubbles. The state can be either `open` or `closed` with the latter being the default value.

<sup>20</sup> SimpleDateFormat API documentation: <https://docs.oracle.com/javase/8/docs/api/java/text/SimpleDateFormat.html>

The following sample shows how to customize all of the aforementioned properties.

*Example 115: Creating a customized comment*

```
.comment {
  /* Content: get the content of the comment from the text content of the element */
  -ro-comment-content: content();
  /* Title: get the title from the "author" attribute of the element */
  -ro-comment-title: attr(author);
  /* Style: set the comment style to "note" */
  -ro-comment-style: note;
  /* Color: specify a color for the comment */
  -ro-comment-color: steelblue;
  /* Date: get the date from the "date" attribute of the element */
  -ro-comment-date: attr(date);
  /* Date Format: specify a custom date format */
  -ro-comment-dateformat: "yyyy/dd/MM HH:mm:ss";
  /* Position: shift the comment icon to the right side of the page */
  -ro-comment-position: page-right;
  /* Initial state: open comment bubbles when the PDF is opened */
  -ro-comment-state: open;
  /* additional styles */
}
```

Please see the documentation of the individual CSS properties for more information.

## Advanced Comments

In some cases, comments have a separate start and end tag. In this case the additional style rules `-ro-comment-start` or `-ro-comment-end` have to be set to match the comment's start and end elements.

*Example 116: A comment with different start and end tags*

```
commentstart {
  /* some customizations */
  -ro-comment-content: attr(text);
  -ro-comment-title: attr(author);
  -ro-comment-style: highlight;

  /* define the comment start element */
  -ro-comment-start: attr(uid);
}

commentend {
  /* define the comment end element */
  -ro-comment-end: attr(uid);
}
```

### Note

To actually create a comment, you need to specify at least one of the following CSS properties: `-ro-comment-content`, `-ro-comment-style`, `-ro-comment-start`, or `-ro-comment-end`.

## 6.26.2 Change Bars

Especially when marking only a single word or even less, the usual highlighting styles may not be enough. In such cases, PDFReactor's **Change Bars** can help to draw attention. A change bar is simply a colored line next to the content, on the same height as the element that enabled it.

The proprietary property `-ro-change-bar-color` enables them when set to a color.

*Example 117: Enabling change bars for ins and del elements*

```
ins {
  -ro-change-bar-color: yellowgreen;
}

del {
  -ro-change-bar-color: orangered;
}
```

To prevent different kinds (i.e. colors) of change bars from overlapping, each change bar can be assigned a different offset from the page content edge, by setting `-ro-change-bar-offset`.

Alternatively, it is also possible to move a change bar to the other page side altogether by using `-ro-change-bar-align`. This property defines where the change bars are positioned. By default, the bars are positioned in the left (or right) page margin area. If they come from a multi-column element, however, it makes sense to position them next to the columns.

*Example 118: Change Bar settings for multi-column*

```
.multi-column ins {
  -ro-change-bar-color: yellowgreen;
  -ro-change-bar-width: thick;
  -ro-change-bar-align: outside column;
}
```

In the sample above, the bars will be placed next the respective column, while the side of the column depends on the side of the page. With `outside` meaning right side for right pages and left side for left pages. There is another special setting best used for multi-columns with only two columns. The value `distribute-column` is combined with `page` and distributes the change bars on the left and the right side of the page, depending on which side is closer to the column in which the change bar originates.

*Example 119: Special change bar setting for multi-column*

```
.multi-column ins {
  -ro-change-bar-color: yellowgreen;
  -ro-change-bar-align: outside distribute-column page;
}
```

Lastly, it is also possible to block change bars next to certain elements. This is done via the CSS property `-ro-change-bar-exclusion`. By setting it to `all`, the painting of every change bar on the same vertical position as the respective element is blocked.

By giving change bars specific names via the CSS property `-ro-change-bar-name`, the exclusion can also be applied to selected change bars only.

*Example 120: Excluding a certain change bar*

```
ins {
  -ro-change-bar-color: yellowgreen;
  -ro-change-bar-align: outside distribute-column page;
  -ro-change-bar-name: insertion;
}
.exclude {
  /* Block two named change bars next to elements with this class */
  -ro-change-bar-exclusion: insertion, deletion;
}
```

Note that different change bars may share the same name, which allows to exclude them by groups.

# 7. ACCESSIBILITY

Accessibility describes the possibility of making the content of a document available to the reader in a non-traditional or augmented way. When properly implemented, this grants readers with certain disabilities such as visual impairments or reading disorders access to all the information in the document.

There may also be various legal requirements in your country, such as Section 508 of the Rehabilitation Act in the United States, which demand accessible PDFs. Since this topic is highly complex and depends on your and your customers' countries, we will not go into further detail and this chapter is without any claim to completeness.

Accessible PDF documents require [tagging \(p. 73\)](#). Tagged PDF files contain information about the structure, semantics and reading flow of the document. This information is stored in a tree structure of so-called "PDF tags"<sup>21</sup>.

For accessible documents it is recommended to use [PDF/UA \(p. 75\)](#)<sup>22</sup> conformance. PDF/UA is the informal name for ISO 14289, the international standard for accessible PDF technology. Enabling PDF/UA conformance in PDFReactor automatically enables tagging and adds the required metadata to the PDF so that viewers or readers recognize the document as an accessible PDF/UA document. It can optionally be combined with PDF/A conformance, in which case we recommend PDF/A-3a over PDF/A-1a, as the latter imposes some limitations on the fidelity of tagging.

## 7.1 Automatic PDF Tagging

PDFReactor automatically determines the PDF tags not only from the HTML elements and CSS styles of the input document, but also from the resulting layout. This means that PDFReactor can even correctly tag complex structures automatically, including the following example cases. Block elements that directly contain text are always tagged as paragraphs so that the tag tree of the PDF remains valid. Tables spanning multiple pages with repeating headers and footers don't have those repeated in the tagging structure. Special document areas such as the footnote area are tagged as an "artifact", meaning the area is ignored by screen readers. The footnotes themselves are tagged in such a way that they are read as natural part of the normal text flow, so that the reading experience is not interrupted.

[WAI-ARIA \(p. 157\)](#)<sup>23</sup> attributes in the input document are taken into account and can be used to manually override automatically determined tag types. There are also [custom CSS properties \(p. 163\)](#) that allow overriding the automatic determination or configuring it for best results.

<sup>21</sup> [https://helpx.adobe.com/acrobat/using/editing-document-structure-content-tags.html#standard\\_pdf\\_tags](https://helpx.adobe.com/acrobat/using/editing-document-structure-content-tags.html#standard_pdf_tags)

<sup>22</sup> PDF/Universal Accessibility

<sup>23</sup> Web Accessibility Initiative – Accessible Rich Internet Applications

## 7.2 Authoring Requirements

The quality of [automatic \(p. 155\)](#) tagging depends highly on the quality of the input documents. Authors must ensure the content is properly structured and contains all required metadata. The following are the most important points to consider:

- Use only valid and well-structured HTML
- Specify the document language (see [Languages \(p. 138\)](#))
- For headings use either `h1` to `h6` elements or nested `section` elements in combination with only `h1`
- Provide alternative text for images, e.g. via the `alt` attribute of the `img` element
- Use caption and header elements for tables
- Irrelevant elements, such as ones used exclusively as decorations, must be tagged as artifacts, so they are ignored (See [ARIA \(p. 161\)](#) and [CSS \(p. 163\)](#) examples)
- Use [WAI-ARIA attributes \(p. 157\)](#) or [styles \(p. 163\)](#) to further customize accessibility information if necessary

For example, the following HTML markup is syntactically valid, but produces non-optimal accessibility data:

```
<h1>Document Title</h1>
<h1>Heading</h1>

<table>
  <tr>
    <td>Col 1</td>
    <td>Col 2</td>
  </tr>
  <tr>
    <td>A</td>
    <td>B</td>
  </tr>
</table>
```

Better markup would be the following, which includes additional information such as alternative text for images as well as table captions and column headers:

```
<h1>Document Title</h1>
<section>
  <h1>Heading</h1>
  
  <table>
    <caption>My Table</caption>
    <thead>
      <tr>
        <th>Col 1</th>
        <th>Col 2</th>
      </tr>
    </thead>
    <tbody>
      <tr>
        <td>A</td>
        <td>B</td>
      </tr>
    </tbody>
  </table>
</section>
```

Even without any further information or configuration, PDFReactor will automatically create an appropriate tag tree for the document snippet above. The result can be seen in the following screenshot:

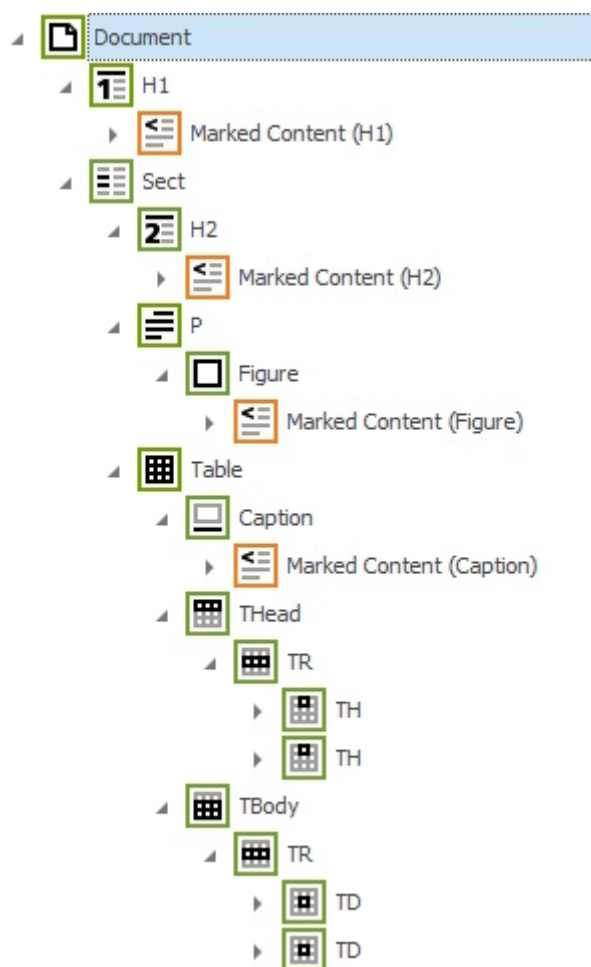


Fig. 8: The tag tree of a PDF/UA document

## 7.3 Controlling Tagging with WAI-ARIA

WAI-ARIA is a technical specification published by the W3C<sup>24</sup>. It specifies how to enhance the accessibility of web content and web applications. PDFReactor supports a subset of version 1.2 of this specification to enhance the accessibility of HTML documents intended for paginated output. It allows overriding the **automatically** (p. 155) determined tag types.

<sup>24</sup> World Wide Web Consortium

### 7.3.1 Roles

The `role` HTML attribute is used to convey semantic meaning of document components to screen readers. Roles are mapped to PDF tag types as follows:

#### Supported Roles

Role	Tag	Notes
<b>Document structure roles</b>		
article	Art	Identical to HTML <code>article</code> element. Note: PDFReactor tags <code>article</code> as "Div" for backwards compatibility.
cell	TD	Identical to HTML <code>td</code> element.
columnheader	TH	Identical to HTML <code>th[scope="column"]</code> . The <code>Scope</code> attribute of the tag is set to <code>Column</code> .
heading	H	
	H1	With <code>aria-level="1"</code> . Then identical to HTML <code>h1</code> element.
	H2	With <code>aria-level="2"</code> . Then identical to HTML <code>h2</code> element.
	H3	With <code>aria-level="3"</code> . Then identical to HTML <code>h3</code> element.
	H4	With <code>aria-level="4"</code> . Then identical to HTML <code>h4</code> element.
	H5	With <code>aria-level="5"</code> . Then identical to HTML <code>h5</code> element.
	H6	With <code>aria-level="6"</code> . Then identical to HTML <code>h6</code> element.
img	Figure	Child elements and content are ignored.
list	L	Identical to HTML <code>ol</code> and <code>ul</code> elements.
listitem	LI	Only inside <code>role="list"</code> . Then identical to HTML <code>li</code> element.
	TOCI	Only inside <code>role="directory"</code> .
directory	TOC	
math	Formula	
row	TR	Identical to HTML <code>tr</code> element.
rowgroup	TBody	Identical to HTML <code>tbody</code> element.

Continued



Continued

Role	Tag	Notes
	THeAd	When first rowgroup and containing more columnheaders than cells. Then identical to HTML thead element.
rowheader	TH	Identical to HTML th[ scope="row" ]. The Scope attribute of the tag is set to Row.
separator	artifact	Ignored, including child elements and content. Identical to HTML hr element.
table	Table	Identical to HTML table element.
caption	Caption	Identical to HTML caption element.
tooltip	artifact	Ignored, including child elements and content.
code	Code	Identical to HTML code element.
paragraph	simple-block	Div or P depending on content.
generic	simple	Results in Div, P or Span depending on context.
<b>Landmark roles</b>		
banner	Part	Identical to HTML header element.
complementary	Part	Identical to HTML aside element.
contentinfo	Part	Identical to HTML footer element.
form	auto	Tagged like a container with no role. See <a href="#">Form widget roles (p. 159)</a> below for details on form elements.
main	Part	Identical to HTML main element.
navigation	Part	Identical to HTML nav element.
region	Sect	Identical to HTML section element.
<b>Form widget roles.</b>		
button	Form	Tagged as button. Supports the ARIA attribute aria-checked.
checkbox		Tagged as checkbox. Supports the ARIA attribute aria-checked.
combobox		Tagged as text field.
listbox		Tagged as text field.

Continued

Continued

Role	Tag	Notes
menuitemcheckbox		Tagged as checkbox. Supports the ARIA attribute <code>aria-checked</code> .
menuitemradio		Tagged as radio button. Supports the ARIA attribute <code>aria-checked</code> .
radio		Tagged as radio button. Supports the ARIA attribute <code>aria-checked</code> .
searchbox		Tagged as text field.
slider		Tagged as text field.
spinbutton		Tagged as text field.
switch		Tagged as checkbox. Supports the ARIA attribute <code>aria-checked</code> .
textbox		Tagged as text field.
Other widget roles.		
grid	Table	
gridcell	TD	
scrollbar	<i>artifact</i>	Ignored, including child elements and content.
tree	L	
treegrid	Table	
treeitem	LI	Only inside <code>role="tree"</code> .
Live region and window roles.		
alert	<i>artifact</i>	Ignored, including child elements and content.
alertdialog		
dialog		
log		
marquee		
status		
timer		

Continued

Continued

Role	Tag	Notes
Presentation roles		
none	none	Ignored by tagging, but child elements are tagged normally. The only exceptions are <code>table</code> and <code>list</code> elements, for which a presentation role affects the whole structure, turning it into a sequence of blocks.
presentation		

## 7.3.2 States and Properties

WAI-ARIA attributes can be used to convey specific states to assistive technology. While most of the states are intended for interactive websites, PDFReactor supports a small subset that can be translated into accessibility information of static PDFs. Supported states and properties are:

- `aria-checked`
- `aria-hidden`
- `aria-describedby`
- `aria-label`
- `aria-labelledby`
- `aria-level`
- `aria-selected`
- `aria-valuenow`
- `aria-valuetext`

## 7.3.3 Accessible Name and Description

The ARIA specification uses certain attributes (such as `aria-describedby`) and HTML elements (such as `label`) to determine an accessible name and description for document components. PDFReactor supports this approach and automatically maps this accessibility information to appropriate PDF data structures, the PDF **tags** (p. 163).

Please refer to the well-documented WAI-ARIA specification<sup>25</sup> on how to properly use ARIA roles, states and properties to provide accessibility information.

## 7.3.4 WAI-ARIA-based Tagging Examples

If your document uses custom elements for headings, you can tag those as proper headings like this:

```
<div aria-role="heading" aria-level="1">My heading</div>
```

### Note

Using ARIA attributes to specify headings also sets the matching PDF **bookmark** (p. 68) level.

<sup>25</sup> <https://www.w3.org/TR/wai-aria-1.2/>

Content such as components that don't work in PDFs and should be ignored by screen readers can be tagged as artifact, eliminating the element and its subtree from being tagged, like this:

```
<div aria-role="dialog">A dialog that cannot be displayed in PDF</div>
```

Similarly elements, and their subtree, can be removed without changing their role, using the attribute `aria-hidden`:

```
<div aria-hidden="true">
  <p>Decorative or otherwise irrelevant content</p>
</div>
```

Artifacts are excluded from tagging, including their entire subtree. You can also exclude a single container element while keeping its content:

```
<div aria-role="presentation"> <!-- Irrelevant container -->
  <p>Relevant text</p>
</div>
```

#### Example 121: Tagging a Pseudo-Table

A structure that is semantically a table, but does not consist of table elements or elements with table display styles, and so is not laid out as a table, just needs table roles for PDFReactor to tag it as a table structure. In cases like the following, the first row group is also automatically tagged as `thead`, when it has more header cells than other cells.

```
<div role="table">
  <div role="rowgroup">
    <div role="row">
      <span role="columnheader">Cell H / 1</span>
      <span role="columnheader">Cell H / 2</span>
    </div>
  </div>
  <div role="rowgroup">
    <div role="row">
      <span role="cell">Cell 1 / 1</span>
      <span role="cell">Cell 1 / 2</span>
    </div>
    <div role="row">
      <span role="cell">Cell 2 / 1</span>
      <span role="cell">Cell 2 / 2</span>
    </div>
    <div role="row">
      <span role="cell">Cell 3 / 1</span>
      <span role="cell">Cell 3 / 2</span>
    </div>
    <div role="row">
      <span role="cell">Cell 4 / 1</span>
      <span role="cell">Cell 4 / 2</span>
    </div>
  </div>
</div>
```

#### Note

When using conflicting ARIA attributes and [CSS \(p. 163\)](#) for tagging, the CSS properties take precedence. Setting `-ro-pdf-tag-type` to `auto` disables the processing of `role` attributes for the affected elements, as that processing is implemented via a user agent style sheet.

## 7.4 Controlling Tagging with CSS

When the [automatic \(p. 155\)](#) determination of PDF tags must be overridden and [WAI-ARIA \(p. 157\)](#) attributes are insufficient or inconvenient, proprietary CSS properties can be used, either in the document or in a user style sheet.

### 7.4.1 Overriding or Configuring Tag Type Determination

The proprietary CSS property `-ro-pdf-tag-type` can be used in various ways to ensure the correct tag types for elements and structures. The initial value is `auto`, which means that PDFReactor will [automatically \(p. 155\)](#) determine the tag type. In most cases this results in correct tagging without the need for manual intervention.

However, there are cases where the structure of the HTML and the resulting layout do not match the intended semantic structure. For example a table could be created from styled `div` and `span` elements. Conversely an HTML `table` could be used just for layout.

If your document uses custom elements for headings, you can tag those as proper headings like this:

```
div.heading1 {
    -ro-pdf-tag-type: h1;
}
```

#### Note

For headings set via CSS it is highly recommended to also set the matching [bookmark \(p. 68\)](#) level.

Content such as components that don't work in PDFs and should be ignored by screen readers can be tagged as artifact like this:

```
div.decoration {
    -ro-pdf-tag-type: artifact;
}
```

Artifacts are excluded from tagging, including their entire subtree. You can also exclude a single container element while keeping its content:

```
div.irrelevantContainer {
    -ro-pdf-tag-type: none;
}
```

It is also possible to ensure the tag type is determined from layout information, ignoring `role` attributes:

```
ol, ul, li {
    -ro-pdf-tag-type: auto;
}
```

### Series of Examples for Safely Overriding Tag Types

The following series of example shows how to correctly and safely tag an `ol` element with the class "nonlist", that is intended to be considered just a sequence of paragraphs instead of a list. It starts with the most simple approach, which is also compatible with older versions of PDFReactor, and then introduces more advanced concepts, which are highly recommended for best results:

#### Example 122: Using Types

With regards to accessibility the `ol` and `li` elements should be treated like the `div` and `p` elements, respectively.

```
<div>
  <p>A paragraph</p>
  <p>A paragraph</p>
</div>
<ol class="nonlist">
  <li>A list item, to be considered a paragraph</li>
  <li>A list item, to be considered a paragraph</li>
</ol>
<div>
  <p>A paragraph</p>
  <p>A paragraph</p>
</div>
```

The most simple style to turn that list into a sequence of paragraphs is to use `-ro-pdf-tag-type` with a `<pdf-standard-structure-type>`.

```
ol.nonlist {
  -ro-pdf-tag-type: div;
}
ol.nonlist > li {
  -ro-pdf-tag-type: p;
}
```

*Example 123: Using Kinds*

The previous sample assumes that every `li` element in such a list only contains inline content, like text. However, the following is also valid HTML:

```
<div>
  <p>A paragraph</p>
  <p>A paragraph</p>
</div>
<ol class="nonlist">
  <li>A list item, to be considered a paragraph</li>
  <li><p>A paragraph inside a list item, to be considered a paragraph inside a
block</p></li>
</ol>
<div>
  <p>A paragraph</p>
  <p>A paragraph</p>
</div>
```

The first `li` requires the type `p`, while the second one requires `div`. To automatically use the right type for a specific scenario you can specify a `<pdf-tag-kind>` instead of a specific type. (See the [table below \(p. 166\)](#) for a list of kinds and their matching types.)

```
ol.nonlist {
  -ro-pdf-tag-type: simple-block-strict;
}
ol.nonlist > li {
  -ro-pdf-tag-type: simple-block;
}
```

*Example 124: Using Conditions*

While the second example will ensure a valid and useful PDF tag tree for most common scenarios, some complex documents require one further step. Consider the following, comparatively artificial, sample HTML:

```
<div style="display: table">
  <ol class="nonlist" style="display: table-row-group">
    <li style="display: table-row">
      <p style="display: table-cell">Content</p>
    </li>
  </ol>
</div>
```

The sample creates a table by using explicit 'display' styles. When no tagging styles are applied the **automatic (p. 155)** tag type determination will correctly tag the `ol` and `li` elements as `TBody` and `TR`, respectively, based on them being laid out as parts of a table.

Using the styles from one of the previous examples would change the tags of those elements, breaking the table structure in the tag tree. To automatically avoid this, but still affect HTML structures like in the previous examples, you can add conditions, that ensure types or kinds are only overridden when the automatic tag type determination had a specific result, which can be specified as a type or kind, in this case `list-struct`.

Each condition is specified as part of a pair, first the condition then the type or kind to use when it is met. Multiple such pairs can be specified, separated by commas. Those are tried in order and the first match is applied. For the case when no condition applies, a single type or kind can be specified after a final comma. When this is omitted the default behavior is `auto`. "type or kind" also includes `auto`, `none` and `artifact`.

```
ol.nonlist {
  -ro-pdf-tag-type: list-struct simple-block-strict;
}
ol.nonlist > li {
  -ro-pdf-tag-type: list-struct simple-block;
}
```

**Full List of PDF Tag Kinds and What Types They Match**

Kind	Div	P	Span	NonStruct, artifact, none	L, LI, Lbl, LBody	Table, TBody, THead, TFoot, TR, TD, TH, Caption
simple	✓	✓	✓	✓		
simple-block	✓	✓		✓		
simple-block-strict	✓			✓		
simple-inline			✓	✓		
list-struct					✓	
table-struct						✓



## 7.4.2 Overriding or Specifying Attributes

In addition to the tag type, PDFReactor also automatically determines some attributes for each tag. As with the type, it may be necessary to override or specify those manually. For that you can use the following CSS properties:

Property	Summary	Description
<code>-ro-pdf-tag-alt</code>	Alternative text	Used to describe content that does not have a textual representation, such as an image.
<code>-ro-pdf-tag-table-summary</code>	Table summary	Used to provide a summary for a table.
<code>-ro-pdf-tag-header-cell-scope</code>	Header cell scope	Used to indicate whether a table header cell (TH) relates to its column or its row.
<code>-ro-pdf-tag-actual-text</code>	Actual text	Used to describe text that is not rendered as it is read, for example as stylized text or in all caps.
<code>-ro-pdf-tag-expanded</code>	Expansion Text	Used to describe an acronym or vernacular.
<code>-ro-formelement-name</code>	Form element name	Used to specify the name for form elements.
<code>-ro-pdf-tag-form</code>	Form type	Used to specify the type of a non-interactive form element.
<code>-ro-pdf-tag-form-checked</code>	Form checked state	Used to specify whether a non-interactive checkbox or radio button is checked.
<code>-ro-radiobuttonelement-group</code>	Radio group	Used to specify the name for a group of radio buttons.

The default value for the `-ro-pdf-tag-*` CSS properties is `auto`, which will automatically populate the matching PDF attributes (or leave them blank if appropriate).

Properties specifying text attribute, like alternative text, optionally take a comma-separated list of items. The first item whose resolved value is non-empty will be used for the resulting value. Each item can consist of multiple space-separated values which are then concatenated. You also have direct access to the ARIA specification's accessible name and description via the CSS values `aria-name` and `aria-description`, respectively.

#### Example 125: Customize image alternative text via CSS

The following style declaration is used to customize the alt text of image elements.

```
img {
  -ro-pdf-tag-alt: attr("data-alt-text"), auto, "Image " counter(images);
}
```

To determine the resulting value, PDFReactor iterates the list items from left to right, using the first item with a non-empty value:

1. The first item in the value list takes the text directly from a custom `data-alt-text` HTML attribute. If the attribute's value is empty or the attribute is not present, the next item is evaluated.
2. The second item's value is `auto`, which means PDFReactor tries to find an alternative text automatically, depending on the element, its styles, attributes and context. If no alternative text can be determined, the next item is evaluated.
3. The third item consists of a concatenation of the string "Image " and the value of the custom counter "images". Assuming that this is the seventh image, this would result in the string "Image 7". Note that such a string this is not considered best practice since it does not convey any meaningful information. It is presented here merely as a technical example.

#### Example 126: Customize tagging using ARIA values

In certain cases it might be useful to use both the ARIA name and description for tagging data.

```
.myAccessibleElements {
  -ro-pdf-tag-alt: aria-name ": " aria-description;
}
```

In this example, a concatenation of the ARIA name and description is used for the alternative text. Since PDF tags don't have attributes for both values, such an approach may only be appropriate for certain use cases.

#### Note

When using conflicting [ARIA \(p. 157\)](#) attributes and CSS for tagging, the CSS properties take precedence. Setting `-ro-pdf-tag-type` to `auto` disables the processing of `role` attributes for the affected elements, as that processing is implemented via a user agent style sheet.

## 7.5 Creating Tagged PDFs from Non-HTML Input Documents

When using XML documents as input, instead of HTML, PDFReactor will still [automatically \(p. 155\)](#) determine tag types and attributes based on the layout. However, [further CSS \(p. 163\)](#) is necessary to cover semantic information.

Most importantly correct **tag types** (p. 163) have to be ensured. In DocBook XML, for example, you can map the "title" elements inside "sect1" elements to the PDF tag type **H2** (heading, level 2):

```
sect1 > title {
  -ro-pdf-tag-type: simple-block h2;
}
```

There are also relevant **tag attributes** (p. 167), especially the alternative text for images. You can use the "desc" attributes of "image" elements for that, like this:

```
image {
  -ro-pdf-tag-type: figure;
}
image[desc] {
  -ro-alt-text: attr(desc);
}
```

For form elements, you can use the CSS property **-ro-formelement-name** to define which elements or attributes in the input document are used as the source for the names of form elements in the generated PDF. When converting HTML, the names are adopted from the **value** attribute of the form element.

Using the **-ro-radiobuttonelement-group** property, the name for radio button groups can be adopted in the same way. By default, it will be adopted from the **name** attribute of the radio button element.

# 8. USER AGENT

The User Agent is an optional object that is created independently from PDFReactor and can be passed to multiple PDFReactor conversions. When a User Agent object is used, all PDFReactor conversions that are configured with this object will share a single HTTP client implementation. This means that these conversions share a common cookie store and (if enabled) a HTTP resource cache.

## Important

Do not use a common User Agent for conversions from different parties! This is considered insecure as conversions may find out information about other conversions by e.g. sniffing the cookie store or the HTTP cache.

## 8.1 Security Settings

The User Agent uses [security settings \(p. 28\)](#) similar to the Configuration object since it is a security critical component. When using a User Agent, its security settings *override any security settings of the Configuration*, even if these are more specific. So it is recommended to not specify any security settings at all on the Configuration object when using a User Agent.

## 8.2 Network Settings

Similar to security settings, the User Agent also uses [network settings \(p. 41\)](#) to specify connection behavior. These also *override any network settings of the Configuration*.

## 8.3 HTTP Cache

Browser-like HTTP caching can be enabled when using a User Agent. This is useful if you convert many documents that use a lot of identical cacheable resources like images. The cache is file system based and persists beyond the lifetime of a single conversion. There are various configuration options to ensure that the cache does not exceed certain limits, as you only have indirect control over its contents.

The HTTP Cache can be configured in several ways:

- `path` — The file system path to a directory where the cached resources will be stored. Please note that the contents of this directory must not be manipulated directly as this can lead to unexpected behavior during conversions.
- `maxEntries` — The maximum number of entries that are allowed in this cache. If the number is exceeded, old entries will be discarded. The default value is 100.
- `maxObjectSize` — The maximum number of bytes a resource may have to be cached. Larger resources won't be cached. The default value is 5,000,000 bytes, i.e. 5MB.

The maximum size of the HTTP Cache can be determined by multiplying `maxEntries` by `maxObjectSize`. So by default, the HTTP cache would not exceed 500MB.

# APPENDIX A: FONTS

## A.1 Font Sources

The font data of PDFReactor may come from different types of sources.

### A.1.1 CSS Defined Fonts

PDFReactor is capable of using fonts defined in CSS via the `@font-face` rule. These fonts are retrieved by PDFReactor along with other resources of the document (e.g. images) and will only be used to render the document they belong to.

*Example 127: Defining a custom font*

```
@font-face {
  font-family: "My Font";
  src: url("https://www.my-server.com/fonts/my-font.ttf");
}
```

### A.1.2 System and JVM Font Directories

PDFReactor can register fonts from the system font folders as well as fonts registered with the Java VM automatically. Java VM fonts are usually located in "JAVA\_HOME/jre/lib/fonts", while the location of system font folders is platform dependent:

#### Windows

- System Root (usually C:\Windows)\fonts
- User Home\AppData\Local\Microsoft\Windows\fonts

#### macOS

- /Library/fonts
- /System/Library/fonts
- User Home/Library/fonts
- /Network/Library/fonts/

#### Linux/Unix

- /usr/share/fonts
- /usr/local/share/fonts
- User Home/.fonts
- User Home/.local/share/fonts

On Linux, not all required system libraries may be installed on the system by default.

To use system fonts on Linux, the `fontconfig` system library and some basic fonts such as `dejavu fonts` must be installed.

For [Image Output \(p. 89\)](#) PDFReactor also requires `X11FontManager`, `libpng`, and `libfreetype`.

These libraries and basic fonts are dependencies of the Fontconfig package, which is available for common Linux distributions.

#### Note

PDFReactor can be configured to ignore all system fonts and only use fonts that either have been specifically added via configuration properties or that are web fonts from style sheets. This is useful if the system either has no fonts or if you want to avoid system-dependent output. See [Controlling the Font Registration and Caching Mechanism \(p. 175\)](#) for examples.

If PDFReactor was unable to retrieve any font data, fonts from the Core Fonts Pack will be used. (see [Core Fonts Pack \(p. 173\)](#)).

## A.1.3 Additional Fonts & Font Directories

PDFReactor allows loading additional fonts from the local file system that are neither system nor JVM fonts.

To register these fonts with PDFReactor via the API, use the following configuration properties:

- `fontDirectories` — The fonts in the specified directories and all their subdirectories will be used by PDFReactor.
- `fonts` — Additional fonts from a specified source URL.

For each directory added by the `fontDirectories` property and for each of their subdirectories, a separate font cache is created. Should the contents of these directories change, please delete the font cache files before running PDFReactor. See the Chapter [The Font Cache Mechanism \(p. 174\)](#) for more information about the font cache.

Font directories can be added like this:

```
config.setFontDirectories("/myFonts1", "/myFonts2/corporate");
```

All languages (p. 437)

Instead of adding entire font directories that PDFReactor will scan, you can also add specific fonts like this:

```
config.setFonts(
    new Font().setFamily("My Font")
        .setBold(true)
        .setItalic(true)
        .setSource("https://url/to/font.ttf"));
```

All languages (p. 438)

## A.1.4 Core Fonts Pack

PDFReactor contains fonts that will be used for the [Default Font Mapping \(p. 176\)](#) when no fonts from other font sources could be matched, e.g. because of insufficient file permissions or because no available font contains a certain glyph.

These fonts are distributed by RealObjects and licensed by their respective authors under the SIL Open Font License<sup>26</sup>, the Apache License<sup>27</sup> or are in the Public Domain.

The packaged core fonts are:

Original Font Name	Type	PDFreactor Font Name	License
Arimo	sans-serif	-ro-sans-serif	Apache License, Version 2.0
Tinos	serif	-ro-serif	Apache License, Version 2.0
Cousine	monospace	-ro-monospace	Apache License, Version 2.0
Dancing Script	cursive	-ro-cursive	SIL Open Font License, Version 1.1
Orbitron	fantasy	-ro-fantasy	SIL Open Font License, Version 1.1

Additionally the core fonts contain fallback fonts for symbols and characters from non-Latin languages. Those are the `Noto` fonts (SIL Open Font License 1.1), `Nanum Gothic` (SIL Open Font License 1.1), and `Droid Sans Fallback` (Apache License 2.0). For more information and a full list of all available core fonts, please refer to the [packaged fonts table \(p. 177\)](#) in the appendix.

## A.2 The Font Cache Mechanism

PDFreactor uses a font cache to store required information about available fonts.

### A.2.1 Font Cache Lifecycle

One of the steps PDFreactor performs on startup is registering fonts. The first time this is done will take some time since every font inside the font directories available to PDFreactor will be identified and registered.

At the end of this step PDFreactor creates a font cache that will be used on subsequent conversions to increase performance. The font cache persists until the Java VM running PDFreactor is terminated.

#### Font Cache Files

If so configured (see [Controlling the Font Registration and Caching Mechanism \(p. 175\)](#)), PDFreactor can write its font cache onto the file system so that it persists between Java VM restarts. This significantly reduces startup time as it ensures the rendering process will start as soon as possible.

If font cache files are present, new fonts put into the font directories available to PDFreactor will be ignored by PDFreactor unless the font cache files have been deleted. Then PDFreactor will create new font cache files on the next startup as it would on its first one.

To delete the font cache files, visit the "user.home/.PDFreactor" directory (or a custom directory if you configured one) and delete all files inside it.

<sup>26</sup> A free and open source license designed for fonts (<https://openfontlicense.org/documents/OFL.txt>)

<sup>27</sup> A permissive free software license written by the Apache Software Foundation (<https://www.apache.org/licenses/LICENSE-2.0>)



## A.2.2 Controlling the Font Registration and Caching Mechanism

It is possible to customize the registration and caching of fonts via the API.

The following configuration properties are used to control the font handling behavior of PDFReactor:

- `cacheFonts` — Activates or deactivates the file system font cache.
- `fontCachePath` — Specifies the location where the font cache files should be stored.
- `disableSystemFonts` — If set to true, PDFReactor will neither register system fonts, nor use the font cache file for them if it exists.
- `disableFontRegistration` — Specifies that parts of the font caching mechanism should be disabled. This is a legacy property. In nearly all cases you should use either `cacheFonts` or `disableSystemFonts`.

To optimize startup time in scenarios where the PDFReactor library's Java VM is frequently restarted, it is recommended to enable a font cache. The PDFReactor Web Service automatically caches fonts.

```
config.setCacheFonts(true);
```

All languages (p. 438)

As mentioned before, the default font cache files are located in the "user.home/.PDFReactor" directory. To customize this location, you can use the configuration property `fontCachePath`.

```
config.setFontCachePath("/myPDFReactor/fontcache");
```

All languages (p. 438)

PDFReactor can be configured to ignore all system fonts and only use fonts that either have been specifically added via configuration properties or that are web fonts from style sheets:

```
config.setDisableSystemFonts(true);
```

All languages (p. 438)

## A.3 Font Matching

### A.3.1 Matching Generic Font Families

Browsers usually match the generic font families with fonts installed on the host system, but PDFReactor consciously matches them with its own specific core fonts. This is done so that documents which use generic font families look consistent across all systems, no matter which fonts (if any) are installed.

Should it be required to match generic font families with other fonts, it is recommended to use [Font Alias Names \(p. 176\)](#) to e.g. map the family name "serif" to the desired font.

The generic font families are mapped as follows:

## Generic Font Mapping

Generic Font Family	Matched Core Font	System Font Example
sans-serif	Arimo	Arial
serif	Tinos	Times New Roman
monospace	Cousine	Courier New
cursive	Dancing Script	Comic Sans MS
fantasy	Orbitron	Impact

## A.3.2 Font Alias Names

It is possible to add a font alias name for a font available in the system font directory or the font directory of the Java VM. The font alias name allows referencing to a font using a different name.

Authors can thus use a font alias name as the font-family value in CSS instead of the actual font name. Exchanging the font in all these documents can be done by changing the actual font behind the alias.

To define a font alias name via the Java API use the following configuration property:

- `fontAliases` — Alias families for registered fonts.

The following example maps the registered font Arial to the name "My Font". So each time you refer to the name "My Font" in CSS, Arial is used internally.

All languages (p. 439)

```
config.setFontAliases(
    new Font().setFamily("My Font")
        .setSource("Arial"));
```

## A.3.3 Automatic Font Fallback

Whenever the current font cannot be used to display a certain character, an automatic font fallback is used to find a replacement font for this character. To do so fonts are iterated according to the following parameters:

1. The font-family property of the current element
2. The configuration property `fontFallback`
3. An internal list of recommended fonts
4. All fonts on the system, starting with those with the most glyphs

A list of fallback fonts can be specified like this:

All languages (p. 439)

```
config.setFontFallback("My Font", "Arial");
```

## A.4 Packaged Fonts

The following table lists the fallback fonts packaged with PDFReactor to display certain scripts when no available font matches a glyph. Instead of using the automatic fallback, each font can also be specified directly by using the listed font family.

### Packaged fonts

Script	Font Family	Mapped Fonts
Adlam	-ro-adlam	Noto Sans Adlam Unjoined Regular Noto Sans Adlam Unjoined Bold Noto Sans Adlam Regular Noto Sans Adlam Bold
Ahom	-ro-ahom	Noto Serif Ahom Regular
Anatolian Hieroglyphs	-ro-anatolian-hieroglyphs	Noto Sans Anatolian Hieroglyphs Regular
Arabic	-ro-arabic	Noto Sans Arabic Regular Noto Sans Arabic Bold
Armenian	-ro-armenian	Noto Sans Armenian Regular Noto Sans Armenian Bold
Avestan	-ro-avestan	Noto Sans Avestan Regular
Balinese	-ro-balinese	Noto Sans Balinese Regular Noto Sans Balinese Bold
Bamum	-ro-bamum	Noto Sans Bamum Regular Noto Sans Bamum Bold
Bassa Vah	-ro-bassa-vah	Noto Sans Bassa Vah Regular Noto Sans Bassa Vah Bold
Batak	-ro-batak	Noto Sans Batak Regular
Bengali	-ro-bengali	Noto Sans Bengali Regular Noto Sans Bengali Bold
Bhaiksuki	-ro-bhaiksuki	Noto Sans Bhaiksuki Regular
Brahmi	-ro-brahmi	Noto Sans Brahmi Regular
Buginese	-ro-buginese	Noto Sans Buginese Regular
Buhid	-ro-buhid	Noto Sans Buhid Regular
Canadian Aboriginal	-ro-canadian-aboriginal	Noto Sans Canadian Aboriginal Regular Noto Sans Canadian Aboriginal Bold
Carian	-ro-carian	Noto Sans Carian Regular

Continued

Continued

Script	Font Family	Mapped Fonts
Caucasian Albanian	-ro-caucasian-albanian	Noto Sans Caucasian Albanian Regular
Chakma	-ro-chakma	Noto Sans Chakma Regular
Cham	-ro-cham	Noto Sans Cham Regular Noto Sans Cham Bold
Cherokee	-ro-cherokee	Noto Sans Cherokee Regular Noto Sans Cherokee Bold
Chinese (Hong Kong)*	-ro-chinese-hong-kong	Noto Sans CJK Regular Noto Sans CJK Bold
Chinese (Simplified)*	-ro-chinese-simplified	Noto Sans CJK Regular Noto Sans CJK Bold
Chinese (Traditional)*	-ro-chinese-traditional	Noto Sans CJK Regular Noto Sans CJK Bold
Chorasmian	-ro-chorasmian	Noto Sans Chorasmian Regular
Coptic	-ro-coptic	Noto Sans Coptic Regular
Cuneiform	-ro-cuneiform	Noto Sans Cuneiform Regular
Cypriot	-ro-cypriot	Noto Sans Cypriot Regular
Cypro Minoan	-ro-cypro-minoan	Noto Sans Cypro Minoan Regular
Deseret	-ro-deseret	Noto Sans Deseret Regular
Devanagari	-ro-devanagari	Noto Sans Devanagari Regular Noto Sans Devanagari Bold
Dives Akuru	-ro-dives-akuru	Noto Serif Dives Akuru Regular
Dogra	-ro-dogra	Noto Serif Dogra Regular
Duployan	-ro-duployan	Noto Sans Duployan Regular Noto Sans Duployan Bold
Egyptian Hieroglyphs	-ro-egyptian-hieroglyphs	Noto Sans Egyptian Hieroglyphs Regular
Elbasan	-ro-elbasan	Noto Sans Elbasan Regular
Elymaic	-ro-elymaic	Noto Sans Elymaic Regular
Emoji	-ro-emoji	Noto Emoji Bold Noto Emoji Regular

Continued

Continued

Script	Font Family	Mapped Fonts
Emoji Color	-ro-color-emoji	Noto Color Emoji
Ethiopic	-ro-ethiopic	Noto Sans Ethiopic Regular Noto Sans Ethiopic Bold
Georgian	-ro-georgian	Noto Sans Georgian Regular Noto Sans Georgian Bold
Glagolitic	-ro-glagolitic	Noto Sans Glagolitic Regular
Gothic	-ro-gothic	Noto Sans Gothic Regular
Grantha	-ro-grantha	Noto Sans Grantha Regular
Gujarati	-ro-gujarati	Noto Sans Gujarati Regular Noto Sans Gujarati Bold
Gunjala Gondi	-ro-gunjala-gondi	Noto Sans Gunjala Gondi Regular Noto Sans Gunjala Gondi Bold
Gurmukhi	-ro-gurmukhi	Noto Sans Gurmukhi Regular Noto Sans Gurmukhi Bold
Hanifi Rohingya	-ro-hanifi-rohingya	Noto Sans Hanifi Rohingya Regular Noto Sans Hanifi Rohingya Bold
Hanunoo	-ro-hanunoo	Noto Sans Hanunoo Regular
Hatran	-ro-hatran	Noto Sans Hatran Regular
Hebrew	-ro-hebrew	Noto Sans Hebrew Regular Noto Sans Hebrew Bold Noto Sans Hebrew Droid Regular
Imperial Aramaic	-ro-imperial-aramaic	Noto Sans Imperial Aramaic Regular
Indic Siyaq Numbers	-ro-indic-siyaq-numbers	Noto Sans Indic Siyaq Numbers Regular
Inscriptional Pahlavi	-ro-inscriptional-pahlavi	Noto Sans Inscriptional Pahlavi Regular
Inscriptional Parthian	-ro-inscriptional-parthian	Noto Sans Inscriptional Parthian Regular
Japanese*	-ro-japanese	Noto Sans CJK Regular Noto Sans CJK Bold
Javanese	-ro-javanese	Noto Sans Javanese Regular Noto Sans Javanese Bold
Kaithi	-ro-kaithi	Noto Sans Kaithi Regular

Continued

Continued

Script	Font Family	Mapped Fonts
Kannada	-ro-kannada	Noto Sans Kannada Regular Noto Sans Kannada Bold
Kawi	-ro-kawi	Noto Sans Kawi Regular Noto Sans Kawi Bold
Kayah Li	-ro-kayah-li	Noto Sans Kayah Li Regular Noto Sans Kayah Li Bold
Kharoshthi	-ro-kharoshthi	Noto Sans Kharoshthi Regular
Khitan Small Script	-ro-khitan-small-script	Noto Serif Khitan Small Script Regular
Khmer	-ro-khmer	Noto Sans Khmer Regular
Khojki	-ro-khojki	Noto Sans Khojki Regular
Khudawadi	-ro-khudawadi	Noto Sans Khudawadi Regular
Korean*	-ro-korean	Noto Sans CJK Regular Noto Sans CJK Bold
Lao	-ro-lao	Noto Sans Lao Regular Noto Sans Lao Bold
Latin	-ro-latin	Noto Sans Regular Noto Sans Bold Noto Sans Italic Noto Sans Bold Italic
Lepcha	-ro-lepcha	Noto Sans Lepcha Regular
Limbu	-ro-limbu	Noto Sans Limbu Regular
Linear A	-ro-linear-a	Noto Sans Linear A Regular
Linear B	-ro-linear-b	Noto Sans Linear B Regular
Lisu	-ro-lisu	Noto Sans Lisu Regular Noto Sans Lisu Bold
Lycian	-ro-lycian	Noto Sans Lycian Regular
Lydian	-ro-lydian	Noto Sans Lydian Regular
Mahajani	-ro-mahajani	Noto Sans Mahajani Regular
Makasar	-ro-makasar	Noto Serif Makasar Regular

Continued

Continued

Script	Font Family	Mapped Fonts
Malayalam	-ro-malayalam	Noto Sans Malayalam Regular Noto Sans Malayalam Bold
Mandaic	-ro-mandaic	Noto Sans Mandaic Regular
Manichaean	-ro-manichaean	Noto Sans Manichaean Regular
Marchen	-ro-marchen	Noto Sans Marchen Regular
Masaram Gondi	-ro-masaram-gondi	Noto Sans Masaram Gondi Regular
Math	-ro-math	Noto Sans Math Regular
Mayan Numerals	-ro-mayan-numerals	Noto Sans Mayan Numerals Regular
Medefaidrin	-ro-medefaidrin	Noto Sans Medefaidrin Regular Noto Sans Medefaidrin Bold
Meetei Mayek	-ro-meetei-mayek	Noto Sans Meetei Mayek Regular Noto Sans Meetei Mayek Bold
Mende Kikakui	-ro-mende-kikakui	Noto Sans Mende Kikakui Regular
Meroitic	-ro-meroitic	Noto Sans Meroitic Regular
Miao	-ro-miao	Noto Sans Miao Regular
Modi	-ro-modi	Noto Sans Modi Regular
Mongolian	-ro-mongolian	Noto Sans Mongolian Regular
Mro	-ro-mro	Noto Sans Mro Regular
Multani	-ro-multani	Noto Sans Multani Regular
Music	-ro-music	Noto Music Regular
Myanmar	-ro-myanmar	Noto Sans Myanmar Regular Noto Sans Myanmar Bold
Nabataean	-ro-nabataean	Noto Sans Nabataean Regular
Nag Mundari	-ro-nag-mundari	Noto Sans Nag Mundari Regular Noto Sans Nag Mundari Bold
Nandinagari	-ro-nandinagari	Noto Sans Nandinagari Regular
Nastaliq Urdu	-ro-nastaliq-urdu	Noto Nastaliq Urdu Regular Noto Nastaliq Urdu Bold

Continued

Continued

Script	Font Family	Mapped Fonts
New Tai Lue	-ro-new-tai-lue	Noto Sans New Tai Lue Regular Noto Sans New Tai Lue Bold
Newa	-ro-newa	Noto Sans Newa Regular
Nko	-ro-nko	Noto Sans Nko Unjoined Regular Noto Sans Nko Unjoined Bold Noto Sans Nko Regular
Nushu	-ro-nushu	Noto Sans Nushu Regular
Nyiakeng Puachue Hmong	-ro-nyiakeng-puachue-hmong	Noto Serif NPHmong Regular Noto Serif NPHmong Bold
Ogham	-ro-ogham	Noto Sans Ogham Regular
OI Chiki	-ro-ol-chiki	Noto Sans OI Chiki Regular Noto Sans OI Chiki Bold
Old Hungarian	-ro-old-hungarian	Noto Sans Old Hungarian Regular
Old Italic	-ro-old-italic	Noto Sans Old Italic Regular
Old North Arabian	-ro-old-north-arabian	Noto Sans Old North Arabian Regular
Old Permic	-ro-old-permic	Noto Sans Old Permic Regular
Old Persian	-ro-old-persian	Noto Sans Old Persian Regular
Old Sogdian	-ro-old-sogdian	Noto Sans Old Sogdian Regular
Old South Arabian	-ro-old-south-arabian	Noto Sans Old South Arabian Regular
Old Turkic	-ro-old-turkic	Noto Sans Old Turkic Regular
Old Uyghur	-ro-old-uyghur	Noto Serif Old Uyghur Regular
Oriya	-ro-oriya	Noto Sans Oriya Regular Noto Sans Oriya Bold
Osage	-ro-osage	Noto Sans Osage Regular
Osmanya	-ro-osmanya	Noto Sans Osmanya Regular
Ottoman Siyaq	-ro-ottoman-siyaq	Noto Serif Ottoman Siyaq Regular
Pahawh Hmong	-ro-pahawh-hmong	Noto Sans Pahawh Hmong Regular
Palmyrene	-ro-palmyrene	Noto Sans Palmyrene Regular

Continued



Continued

Script	Font Family	Mapped Fonts
Pau Cin Hau	-ro-pau-cin-hau	Noto Sans Pau Cin Hau Regular
Phags Pa	-ro-phags-pa	Noto Sans Phags Pa Regular
Phoenician	-ro-phoenician	Noto Sans Phoenician Regular
Psalter Pahlavi	-ro-psalter-pahlavi	Noto Sans Psalter Pahlavi Regular
Rejang	-ro-rejang	Noto Sans Rejang Regular
Runic	-ro-runic	Noto Sans Runic Regular
Samaritan	-ro-samaritan	Noto Sans Samaritan Regular
Saurashtra	-ro-saurashtra	Noto Sans Saurashtra Regular
Sharada	-ro-sharada	Noto Sans Sharada Regular
Shavian	-ro-shavian	Noto Sans Shavian Regular
Siddham	-ro-siddham	Noto Sans Siddham Regular
Sign Writing	-ro-sign-writing	Noto Sans Sign Writing Regular
Sinhala	-ro-sinhala	Noto Sans Sinhala Regular Noto Sans Sinhala Bold
Sogdian	-ro-sogdian	Noto Sans Sogdian Regular
Sora Sompeng	-ro-sora-sompeng	Noto Sans Sora Sompeng Regular Noto Sans Sora Sompeng Bold
Soyombo	-ro-soyombo	Noto Sans Soyombo Regular
Sundanese	-ro-sundanese	Noto Sans Sundanese Regular Noto Sans Sundanese Bold
Syloti Nagri	-ro-syloti-nagri	Noto Sans Syloti Nagri Regular
Symbols	-ro-symbols	Noto Sans Symbols Regular Noto Sans Symbols Bold Noto Sans Symbols2 Regular
Syriac	-ro-syriac	Noto Sans Syriac Regular Noto Sans Syriac Black
Tagalog	-ro-tagalog	Noto Sans Tagalog Regular
Tagbanwa	-ro-tagbanwa	Noto Sans Tagbanwa Regular

Continued

Continued

Script	Font Family	Mapped Fonts
Tai Le	-ro-tai-le	Noto Sans Tai Le Regular
Tai Tham	-ro-tai-tham	Noto Sans Tai Tham Regular Noto Sans Tai Tham Bold
Tai Viet	-ro-tai-viet	Noto Sans Tai Viet Regular
Takri	-ro-takri	Noto Sans Takri Regular
Tamil	-ro-tamil	Noto Sans Tamil Regular Noto Sans Tamil Bold Noto Sans Tamil Supplement Regular
Tangsa	-ro-tangsa	Noto Sans Tangsa Regular Noto Sans Tangsa Bold
Tangut	-ro-tangut	Noto Serif Tangut Regular
Telugu	-ro-telugu	Noto Sans Telugu Regular Noto Sans Telugu Bold
Thaana	-ro-thaana	Noto Sans Thaana Regular Noto Sans Thaana Bold
Thai	-ro-thai	Noto Sans Thai Regular Noto Sans Thai Bold
Tibetan	-ro-tibetan	Noto Serif Tibetan Regular Noto Serif Tibetan Bold
Tifinagh	-ro-tifinagh	Noto Sans Tifinagh Regular
Tirhuta	-ro-tirhuta	Noto Sans Tirhuta Regular
Toto	-ro-toto	Noto Serif Toto Regular Noto Serif Toto Bold
Ugaritic	-ro-ugaritic	Noto Sans Ugaritic Regular
Vai	-ro-vai	Noto Sans Vai Regular
Vithkuqi	-ro-vithkuqi	Noto Sans Vithkuqi Regular Noto Sans Vithkuqi Bold
Wancho	-ro-wancho	Noto Sans Wancho Regular
Warang Citi	-ro-warang-citi	Noto Sans Warang Citi Regular
Yezidi	-ro-yezidi	Noto Serif Yezidi Regular Noto Serif Yezidi Bold

Continued

Continued

Script	Font Family	Mapped Fonts
Yi	-ro-yi	Noto Sans Yi Regular
Zanabazar Square	-ro-zanabazar-square	Noto Sans Zanabazar Square Regular
Znamenny Musical Notation	-ro-znamenny-musical-notation	Noto Znamenny Musical Notation Regular

\* This font is not supported when using Java 8.

# APPENDIX B: JAVASCRIPT OBJECTS AND TYPES

## B.1 Objects

### ro

The `ro` or `window.ro` object provides access to PDFReactor's proprietary JavaScript API.

#### Properties

- **exports** <?>

Data that will be made available to the outside integration API. See [Exporting Data From JavaScript \(p. 65\)](#)

- **layout** <Layout>

Proprietary layout information.

- **pdf** <PDF>

Runtime PDFReactor API

#### Methods

- **terminateConversion (message)**

Terminates the current PDF conversion at the next possible moment, causing PDFReactor to throw an appropriate exception with a message equal to the parameter of this method.

*Parameters:*

**message** <String>

The exception message.

### ro.layout

PDFReactor allows JavaScript access to some layout information via the proprietary object `ro.layout`.

#### Methods

- **<PageDescription> getPageDescription (index)**

Returns a `PageDescription` for the page with the given index. The first page has the index 0. Please note that descriptions are not live.

*Parameters:*

**index** <Number>

The page index.

- **<BoxDescription> getBoxDescriptions (element)**

Returns an array of `BoxDescription` objects for the given element. Note that one element can have several boxes (e.g. when a paragraph is spread over multiple pages). Please note that descriptions are not live.

*Parameters:*

**element** <Element>

The DOM element.

▪ **<String> getContent (element, pseudoElement<sup>optional</sup>)**

Returns a string containing the layout text content of the specified element and its descendants. The layout text can differ from the DOM text content due to processing, including white-space collapsing and the addition of generated content.

*Parameters:*

**element <Element>**

The DOM element.

**pseudoElement <String>**

A string specifying which content to return:

"before" : Retrieves the "before" generated content of the element.

"after" : Retrieves the "after" generated content of the element.

"text" : Retrieves the content of the element, excluding its generated content.

"all" : Retrieves the content of the element.

If omitted "all" will be applied as default.

Both "text" and "all" includes the generated content of all descendants.

▪ **<String> getContent (pageIndex, marginBox)**

Returns a string containing the content of the page margin box of the specified page.

*Parameters:*

**pageIndex <Number>**

The page of the page margin box. The first page has the index 0.

**marginBox <String>**

A string specifying the page margin box, eg. "top-left", see [Page Header & Footer \(p. 102\)](#).

### Properties

▪ **numberOfPages <Number>**

Returns the current total number of pages of the document.

## ro.pdf

It is possible to use certain PDF-specific parts of the PDFReactor API during runtime via the proprietary object `ro.pdf`.

### Properties

▪ **addAttachments <Boolean>**

Enables or disables attachments specified in style sheets.

▪ **addComments <Boolean>**

Enables or disables comments in the PDF document.

▪ **addOverprint <Boolean>**

Enables or disables overprinting.

▪ **addPreviewImages <Boolean>**

Enables or disables embedding of image previews per page in the PDF document.

▪ **addTags <Boolean>**

Enables or disables tagging of the PDF document.

▪ **allowAnnotations <Boolean>**

Enables or disables the 'annotations' restriction in the PDF document.

▪ **allowAssembly <Boolean>**

Enables or disables the 'assembly' restriction in the PDF document.

- **allowCopy** <Boolean>

Enables or disables the 'copy' restriction in the PDF document.

- **allowDegradedPrinting** <Boolean>

Enables or disables the 'degraded printing' restriction in the PDF document.

- **allowFillIn** <Boolean>

Enables or disables the 'fill in' restriction in the PDF document.

- **allowModifyContents** <Boolean>

Enables or disables the 'modify contents' restriction in the PDF document.

- **allowPrinting** <Boolean>

Enables or disables the 'printing' restriction in the PDF document.

- **allowScreenReaders** <Boolean>

Enables or disables the 'screen readers' restriction in the PDF document.

- **attachments** <Array<Attachment>>

Adds a file attachment to PDF document. All attachments that have been set previously in the PDFReactor integration are included as attachments with binary content which will be base64-encoded.

- **author** <String>

Sets the value of the author field of the PDF document.

- **bookletMode** <BookletMode>

Convenience method to set pages-per-sheet properties and page order in one step to create a booklet.

- **creator** <String>

Sets the value of creator field of the PDF document.

- **customDocumentProperties** <Array<KeyValuePair>>

Adds custom properties to the PDF document. An existing property of the same name will be replaced.

- **disableBookmarks** <Boolean>

Disables bookmarks in the PDF document.

- **disableLinks** <Boolean>

Disables links in the PDF document.

- **encryptionSettings** <EncryptionSettings>

A type containing settings related to PDF encryption.

- **keywords** <String>

Sets the value of the keywords field of the PDF document.

- **ownerPassword** <Boolean>

Sets the owner password of the PDF document.

### ▪ **pageOrder** <String>

Sets the page order of the direct result of the conversion.

If the merge mode is set to `ARRANGE` (see [Merging PDFs \(p. 82\)](#)), this property is also used to specify the position of inserted pages from an existing PDF.

A description of the syntax can be found in the [Page Order \(p. 134\)](#) section.

Additionally, the `pageOrder` constants can be used:

`"BOOKLET"` : Page order mode to arrange all pages in booklet order.

`"BOOKLET_RTL"` : Page order mode to arrange all pages in right-to-left booklet order.

`"EVEN"` : Page order mode to keep even pages only.

`"ODD"` : Page order mode to keep odd pages only.

`"REVERSE"` : Page order mode to reverse the page order.

### ▪ **pagesPerSheetProperties** <PagesPerSheetProperties>

Sets the properties of a sheet on which multiple pages are being arranged.

If cols or rows is less than 1, no pages-per-sheet processing is done. This is the case by default.

### ▪ **pdfScriptActions** <Array<PdfScriptAction>>

Sets a pair of trigger event and PDF script. The script is triggered on the specified event.

A PDF script is JavaScript that is executed by a PDF viewer (e.g. Adobe Reader). Note that most viewers do not support this feature.

### ▪ **printDialogPrompt** <Boolean>

Enables or disables a print dialog to be shown upon opening the generated PDF document by a PDF viewer.

### ▪ **subject** <String>

Sets the value of the subject field of the PDF document.

### ▪ **title** <String>

Sets the value of the title field of the PDF document.

### ▪ **userPassword** <String>

Sets the user password of the PDF document.

## B.2 Proprietary Types

### BoxDescription

Describes the position and dimensions of the rectangles of a box as well as some further information. The rectangles are described by using `DOMRect`. Please note that descriptions are not live.

#### Properties

### ▪ **pageIndex** <Number>

The index of the page of this box. The first page has the index 0.

### ▪ **pageLeft** <Boolean>

Whether the page of this box is on the left.

### ▪ **pageDescription** <PageDescription>

The `PageDescription` of the page of this box. It contains the data of the page from the moment when this BoxDescription was created.

- **lineDescriptions** `<Array<LineDescription>>`

Returns an array of `LineDescription`s for this box if the box contains text directly. Please note that descriptions are not live.

- **generatedContentDescriptions** `<Object<String, Array<BoxDescription>>>`

Returns an object providing access to `BoxDescription` arrays for the generated content via type name strings. Available generated content type names are `"before"` and `"after"` (for normal HTML elements) and `"content"` (for page margin boxes). Please note that generated content of inline elements is not yet accessible in this way.

- **columnIndex** `<Number>`

For boxes inside a [multi-column layout](#) (p. 118) this returns the index of the column the box is in. Otherwise it returns -1. The index starts at 0 for the first column of the multi-column container element. It increases by one for each further column or column-span and is not reset on new pages or by column spans.

- **columnIndexLocal** `<Number>`

For boxes inside a [multi-column layout](#) (p. 118) this returns the local index of the column the box is in. Otherwise it returns -1. The local index starts at 0 for the first column of the multi-column container element. It increases by one for each further column and is reset to 0 on new pages as well as on and after column spans.

- **regionIndex** `<Number>`

For boxes inside a [Region](#) (p. 122) this returns the index of that region. Otherwise it returns -1. The index starts at 0 for the first region in its chain. It increases by one for each further region in the same chain and is not reset on new pages.

- **regionIndexLocal** `<Number>`

For boxes inside a [Region](#) (p. 122) this returns the local index of that region. Otherwise it returns -1. The local index starts at 0 for the first region in its chain. It increases by one for each further region in the same chain and is reset to 0 on new pages.

## Methods

- `<DOMRect>` **getMarginRect** (`unit`<sup>optional</sup>)

Returns a `DOMRect` describing the margin rectangle. The point of origin is the upper left corner of the page content rectangle.

Parameters:

**unit** `<String>`

The desired length unit in which the dimensions and coordinates will be returned. (defaults to `"px"`)

- `<DOMRect>` **getBorderRect** (`unit`<sup>optional</sup>)

Returns a `DOMRect` describing the border rectangle. The point of origin is the upper left corner of the page content rectangle.

Parameters:

**unit** `<String>`

The desired length unit in which the dimensions and coordinates will be returned. (defaults to `"px"`)

- `<DOMRect>` **getPaddingRect** (`unit`<sup>optional</sup>)

Returns a `DOMRect` describing the padding rectangle. The point of origin is the upper left corner of the page content rectangle.

Parameters:

**unit** `<String>`

The desired length unit in which the dimensions and coordinates will be returned. (defaults to `"px"`)

- `<DOMRect>` **getContentRect** (`unit`<sup>optional</sup>)

Returns a `DOMRect` describing the content rectangle. The point of origin is the upper left corner of the page content rectangle.

Parameters:

**unit** `<String>`

The desired length unit in which the dimensions and coordinates will be returned. (defaults to `"px"`)



- **<DOMRect> getMarginRectInPage (unit<sup>optional</sup>)**

Returns a `DOMRect` describing the margin rectangle. The point of origin is the upper left corner of the page rectangle.

Parameters:

**unit** `<String>`

The desired length unit in which the dimensions and coordinates will be returned. (defaults to `"px"` )

- **<DOMRect> getBorderRectInPage (unit<sup>optional</sup>)**

Returns a `DOMRect` describing the border rectangle. The point of origin is the upper left corner of the page rectangle.

Parameters:

**unit** `<String>`

The desired length unit in which the dimensions and coordinates will be returned. (defaults to `"px"` )

- **<DOMRect> getPaddingRectInPage (unit<sup>optional</sup>)**

Returns a `DOMRect` describing the padding rectangle. The point of origin is the upper left corner of the page rectangle.

Parameters:

**unit** `<String>`

The desired length unit in which the dimensions and coordinates will be returned. (defaults to `"px"` )

- **<DOMRect> getContentRectInPage (unit<sup>optional</sup>)**

Returns a `DOMRect` describing the content rectangle. The point of origin is the upper left corner of the page rectangle.

Parameters:

**unit** `<String>`

The desired length unit in which the dimensions and coordinates will be returned. (defaults to `"px"` )

- **<DOMRect> getBoundingLineContentRect (unit<sup>optional</sup>)**

Returns a `DOMRect` describing the union of the content rectangles of the `LineDescriptions` contained in this box, i.e. the bounding rectangle of all text content of the box. The coordinates are relative to the box containing this lines.

Parameters:

**unit** `<String>`

The desired length unit in which the dimensions and coordinates will be returned. (defaults to `"px"` )

## PageDescription

Describes the dimensions of a page and its rectangles as well as some further information. The rectangles are described by using `DOMRect`s. Please note that descriptions are not live.

Properties

- **pageIndex** `<Number>`

The index of this page. The first page has the index 0.

- **pageLeft** `<Boolean>`

Whether this page is on the left.

- **pageName** `<String>`

The name of this page, if it is a `named page` (p. 94) and an empty string otherwise.

- **pageGroups** `<Array<String>>`

An array containing all names of this page or an empty array if there are none.

- **range** `<Range>`

The DOM `Range` of the content of this page. The `start-` and `endContainer` are the most deeply nested nodes at the respective page breaks. Returns `null` if the page is empty.

### ▪ rangeShallow <Range>

The DOM `Range` of the content of this page. The start- and endContainer are the least deeply nested nodes at the respective page breaks. Returns `null` if the page is empty.

### ▪ marginBoxDescriptions <Object<String, BoxDescription>>

Returns an object providing access to `BoxDescription` s for the page margin boxes via margin box name strings like `"top-left"`. The `BoxDescriptions` for the content of a margin box are available via the `'content'` key of its `generatedContentDescriptions` object.

#### Methods

### ▪ <DOMRect> getMediaRect (unit<sup>optional</sup>)

Returns a `DOMRect` describing the media box of the page.

The position is relative to the media/trim rectangle, so both values are negative or 0.

Parameters:

**unit** <String>

The desired length unit in which the dimensions and coordinates will be returned. (defaults to `"px"` )

### ▪ <DOMRect> getBleedRect (unit<sup>optional</sup>)

Returns a `DOMRect` describing the bleed box of the page.

The position is relative to the media/trim rectangle, so both values are negative or 0.

Parameters:

**unit** <String>

The desired length unit in which the dimensions and coordinates will be returned. (defaults to `"px"` )

### ▪ <DOMRect> getTrimRect (unit<sup>optional</sup>)

Returns a `DOMRect` describing the trim box of the page. This is a synonym for `getMarginRect` and matches the page size.

The position is relative to the media/trim rectangle itself, so both values are always 0.

Parameters:

**unit** <String>

The desired length unit in which the dimensions and coordinates will be returned. (defaults to `"px"` )

### ▪ <DOMRect> getMarginRect (unit<sup>optional</sup>)

Returns a `DOMRect` describing the margin rectangle of the page. This is a synonym for `getTrimRect` and matches the page size.

The position is relative to the media/trim rectangle itself, so both values are always 0.

Parameters:

**unit** <String>

The desired length unit in which the dimensions and coordinates will be returned. (defaults to `"px"` )

### ▪ <DOMRect> getBorderRect (unit<sup>optional</sup>)

Returns a `DOMRect` describing the border rectangle of the page.

The position is relative to the media/trim rectangle, so both values are positive or 0.

Parameters:

**unit** <String>

The desired length unit in which the dimensions and coordinates will be returned. (defaults to `"px"` )

### ▪ <DOMRect> getPaddingRect (unit<sup>optional</sup>)

Returns a `DOMRect` describing the padding rectangle of the page.

The position is relative to the media/trim rectangle, so both values are positive or 0.

Parameters:

**unit** <String>

The desired length unit in which the dimensions and coordinates will be returned. (defaults to `"px"` )

- **<DOMRect> getContentRect (unit<sup>optional</sup>)**

Returns a DOMRect describing the content rectangle of the page.

The position is relative to the media/trim rectangle, so both values are positive or 0.

Parameters:

**unit <String>**

The desired length unit in which the dimensions and coordinates will be returned. (defaults to "px" )

- **<DOMRect> getCropRect (unit<sup>optional</sup>)**

Returns a DOMRect describing the crop box of the page or null if none is set.

Parameters:

**unit <String>**

The desired length unit in which the dimensions and coordinates will be returned. (defaults to "px" )

- **<DOMRect> getArtRect (unit<sup>optional</sup>)**

Returns a DOMRect describing the art box of the page or null if none is set.

Parameters:

**unit <String>**

The desired length unit in which the dimensions and coordinates will be returned. (defaults to "px" )

## LineDescription

Contains information about a line of text. It can be retrieved from a **BoxDescription**. Please note that descriptions are not live.

### Properties

- **range <Range>**

The DOM **Range** from the beginning to the end of the text of the line or **null** for empty lines.

### Methods

- **<Number> getBaselinePosition (unit<sup>optional</sup>)**

Returns the vertical distance between the baseline position of the line and the top of the content rectangle of the box containing the line.

Parameters:

**unit <String>**

The desired length unit in which the dimensions and coordinates will be returned. (defaults to "px" )

- **<DOMRect> getContentRect (unit<sup>optional</sup>)**

Returns a DOMRect describing the content rectangle of the line, specifically the part of the line actually containing text. The coordinates are relative to the box containing this line.

Parameters:

**unit <String>**

The desired length unit in which the dimensions and coordinates will be returned. (defaults to "px" )

## Attachment

A JavaScript object containing data for **attachments** (p. 188).

### Properties

- **data <String|Blob>**

The content of the attachment. If it is a string the **binary** property specifies whether to treat it as UTF-8 or Base64. May be omitted.

- **url** <String>

If data is not specified, the attachment will be retrieved from this URL. If this is "#" the input document URL is used instead.

- **name** <String>

The file name associated with the attachment. It is recommended to specify the correct file extension. If this is omitted the name is derived from the URL.

- **description** <String>

The description of the attachment. If this is omitted the name is used.

- **mimeType** <String>

The MIME type of the attachment. When unspecified or empty the MIME type is detected or defaults to "application/octet-stream". Specifying this is only required in some specific cases, especially when documents are intended for automatic processing.

- **binary** <Boolean>

This property indicates whether the data property, when it contains a string, is decoded as Base64 binary data or UTF-8 text. If omitted it is treated as `false`, meaning that string content is considered UTF-8 text.

## BookletMode

A JavaScript object containing data for [bookletMode](#) (p. 188).

### Properties

- **sheetSize** <String>

The size of the sheet as CSS value, e.g. "A3", "letter landscape", "15in 20in", "20cm 30cm".

- **sheetMargin** <String>

The sheet size as CSS size, e.g. "A4", "letter landscape", "15in 20in", "20cm 30cm".

- **rtl** <Boolean>

Whether or not the reading order of the booklet should be right-to-left.

## EncryptionSettings

A JavaScript object containing data for [encryptionSettings](#) (p. 188).

### Properties

- **type** <String>

The encryption type to be used. The default is `"NONE"`. Value is one of the following constants:

`"NONE"`: Indicates that the document will not be encrypted. If encryption is disabled, then no user password or owner password can be used.

`"RC_40"`: Indicates that the document will be encrypted using RC4 40 bit encryption.

`"RC_128"`: Indicates that the document will be encrypted using RC4 128 bit encryption.

`"AES_128"`: Indicates that the document will be encrypted using AES 128 bit encryption.

`"AES_256"`: Indicates that the document will be encrypted using AES 256 bit encryption.

- **ownerPassword** <String>

Sets the owner password of the PDF document.

- **userPassword** <String>

Sets the user password of the PDF document.

- **setAllowAnnotations** <Boolean>

Enables or disables the 'annotations' restriction in the PDF document. The default value is `false`.

- **setAllowAssembly** <Boolean>

Enables or disables the 'assembly' restriction in the PDF document. The default value is `false`.

- **setAllowCopy** <Boolean>

Enables or disables the 'copy' restriction in the PDF document. The default value is `false`.

- **setAllowDegradedPrinting** <Boolean>

Enables or disables the 'degraded printing' restriction in the PDF document. The default value is `false`.

- **setAllowFillIn** <Boolean>

Enables or disables the 'fill in' restriction in the PDF document. The default value is `false`.

- **setAllowModifyContents** <Boolean>

Enables or disables the 'modify contents' restriction in the PDF document. The default value is `false`.

- **setAllowPrinting** <Boolean>

Enables or disables the 'printing' restriction in the PDF document. The default value is `false`.

- **setAllowScreenReaders** <Boolean>

Enables or disables the 'screen readers' restriction in the PDF document. The default value is `false`.

## KeyValuePair

A JavaScript object containing data for [customDocumentProperties](#) (p. 188).

### Properties

- **key** <String>

The key.

- **value** <String>

The value.

## PagesPerSheetProperties

A JavaScript object containing data for [pagesPerSheetProperties](#) (p. 189).

### Properties

- **cols** <Number>

The number of columns per sheet.

- **rows** <Number>

The number of rows per sheet.

- **sheetSize** <String>

The sheet size as CSS size, e.g. "A4", "letter landscape", "15in 20in", "20cm 30cm".

- **sheetMargin** <String>

The sheet margin as CSS margin, e.g. "1in", "1cm 1.5cm", "10mm 20mm 10mm 30mm". `null` is interpreted as 0mm.

- **spacing** <String>

The horizontal and vertical space between pages on a sheet as CSS value, for example "0.1in" or "5mm 2mm". null is interpreted as "0mm".

- **direction** <String>

The direction in which the pages are ordered on a sheet. Value is one of the following constants:

"DOWN\_LEFT" : Arranges the pages on a sheet from top to bottom and right to left.

"DOWN\_RIGHT" : Arranges the pages on a sheet from top to bottom and left to right.

"LEFT\_DOWN" : Arranges the pages on a sheet from right to left and top to bottom.

"LEFT\_UP" : Arranges the pages on a sheet from right to left and bottom to top.

"RIGHT\_DOWN" : Arranges the pages on a sheet from left to right and top to bottom.

"RIGHT\_UP" : Arranges the pages on a sheet from left to right and bottom to top.

"UP\_LEFT" : Arranges the pages on a sheet from bottom to top and right to left.

"UP\_RIGHT" : Arranges the pages on a sheet from bottom to top and left to right.

## PdfScriptAction

A JavaScript object containing data for [pdfScriptActions](#) (p. 189).

### Properties

- **triggerEvent** <String>

The event on which the script is executed. Value is one of the following constants:

"AFTER\_PRINT" : This event is triggered after the PDF has been printed by the viewer application.

"AFTER\_SAVE" : This event is triggered after the PDF has been saved by the viewer application.

"BEFORE\_PRINT" : This event is triggered before the PDF is printed by the viewer application.

"BEFORE\_SAVE" : This event is triggered before the PDF is saved by the viewer application.

"CLOSE" : This event is triggered when the PDF is closed by the viewer application.

"OPEN" : This event is triggered when the PDF is opened in the viewer application.

- **script** <String>

The script source that should be executed.

# APPENDIX C: SUPPORTED BARCODE TYPES AND PROPERTIES

PDFreactor supports the following barcode symbologies, each handling some of the `-ro-barcode-*` CSS properties differently.

## Note

These `-ro-barcode-*` properties apply to all barcode types:

- `-ro-barcode-type`
- `-ro-barcode-content`
- `-ro-barcode-color`

These apply to all barcode types with human readable text:

- `-ro-barcode-human-readable-position`
- `-ro-barcode-font-size`
- `-ro-barcode-font-family`

`-ro-barcode-encoding` applies to all barcode types, however they don't necessarily support all 3 available data types.

`-ro-barcode-size` applies to most barcode types. If the property is not explicitly mentioned, it adjusts the bar height.

Please refer to the CSS documentation for more information.

## Important

Some barcode symbologies impose additional restrictions on the input data besides limiting the allowed characters.

## Note

If the `-ro-barcode-type` property is mentioned below, the entry always refers to its optional last argument.

*Example 128: Enabling the optional check digit of a interleaved Code 2 of 5 using `-ro-barcode-type`*

```
.barcode {
  -ro-replacdelement: barcode;
  -ro-barcode-type: code2of5 interleaved enabled;
  -ro-barcode-content: "1234567890";
}
```

## QR Code

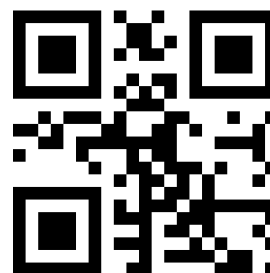
The QR Code bar code symbology according to **ISO/IEC 18004:2015**.

Identifier: `qr`

Default Subtype: `none`

Allowed Characters: The Latin-1 set and Kanji characters which are members of the Shift-JIS encoding scheme.

Supported Data Types: `eci`, `hibc`, `gs1`



### Supported Subtypes

Identifier	Description
<code>none</code>	A regular QR code.
<code>swiss</code>	A specialized type of QR Code symbol used for QR-bill in Switzerland. It is mostly a spec-compliant QR Code, but it must use error correction level M, it cannot hold more than 997 characters, it must always measure 46x46 mm when printed, data must be encoded as UTF-8 without the use of ECI, and it features a Swiss cross logo in the center of the symbol.
<code>upn</code>	A specialized type of QR Code symbol used by the Bank Association of Slovenia for their Universal Payment Order. It is mostly a spec-compliant QR Code, but it must use error correction level M, it must use version 15 (size 77x77), it must use ECI 4 (ISO-8859-2). Data is encoded in byte mode.

### `-ro-barcode-size`

Default Value	Possible Values	Description
<code>auto</code>	1 - 40	Selects a QR code size, refer to the <a href="#">QR code version table (p. 199)</a> for more detailed information.

### `-ro-barcode-ecc-level`

Default Value	Possible Values	Description
<code>auto</code>	L, M, Q, H	Sets the error correction level.



QR Code Version Table

-ro-barcode-size	Symbol Size	-ro-barcode-size	Symbol Size	-ro-barcode-size	Symbol Size
1	21 x 21	15	77 x 77	28	129 x 129
2	25 x 25	16	81 x 81	29	133 x 133
3	29 x 29	17	85 x 85	30	137 x 137
4	33 x 33	18	89 x 89	31	141 x 141
5	37 x 37	19	93 x 93	32	145 x 145
6	41 x 41	20	97 x 97	33	149 x 149
7	45 x 45	21	101 x 101	34	153 x 153
8	49 x 49	22	105 x 105	35	157 x 157
9	53 x 53	23	109 x 109	36	161 x 161
10	57 x 57	24	113 x 113	37	165 x 165
11	61 x 61	25	117 x 117	38	169 x 169
12	65 x 65	26	121 x 121	39	173 x 173
13	69 x 69	27	125 x 125	40	177 x 177
14	73 x 73				

## Code 128

The Code 128 barcode symbology as defined in **ISO/IEC 15417:2007**.

Identifier: `code128`

Allowed Characters: 8-bit ISO 8859-1 (Latin-1) characters.

Supported Data Types: `eci`, `hibc`, `gs1`



**-ro-barcode-type**

Default Value	Possible Values	Description
code-set-abc	code-set-a, code-set-b, code-set-c, code-set-ab, code-set-abc	Determines which code sets are used by this barcode:  A can encode ASCII values 0-95, as well as FNC1, FNC2, FNC3 and FNC4.  B can encode ASCII values 32-127, as well as FNC1, FNC2, FNC3 and FNC4.  C can encode pairs of numbers, as well as FNC1.  AB allows A and B code sets.  ABC allows all three code sets.

**-ro-barcode-reader-initialization**

Default Value	Possible Values	Description
disabled	enabled, disabled	Defines whether reader initialization instructions should be added to the barcode.

## Code 32

Code 32, also known as Italian Pharmacode.

Identifier: `code32`

Allowed Characters: 0-9

Supported Data Types: `eci`, `hibc`



## Code 49

Code 49 according to ANSI/AIM-BC6-2000.

Identifier: `code49`

Allowed Characters: ASCII

Supported Data Types: `eci`, `hibc`, `gs1`



## Code 11

Identifier: `code11`

Allowed Characters: 0-9 and dash (-).

Supported Data Types: `eci`, `hibc`



**-ro-barcode-human-readable-affix**

Default Value	Possible Values	Description
none	One or two strings with a length of 1.	Determines the affix characters at the beginning and the end of the human readable text. The first argument sets the prefix, while the second sets the suffix. If the second is omitted, the first argument sets both.

**-ro-barcode-type**

Default Value	Possible Values	Description
2	1 or 2	Sets the number of checkdigits to be calculated.

## Code 93

Identifier: `code93`Allowed Characters: **ASCII** text.Supported Data Types: `eci`, `hibc`**-ro-barcode-human-readable-affix**

Default Value	Possible Values	Description
none	A string with a length of 1.	Determines the affix characters at the beginning and the end of the human readable text. When applied to a Code 93 barcode, this affix sets both the prefix and suffix.

**-ro-barcode-type**

Default Value	Possible Values	Description
2	1 or 2	Sets the number of checkdigits to be calculated.

## Code16k

Identifier: `code16k`

**-ro-barcode-reader-initialization**

Default Value	Possible Values	Description
disabled	enabled, disabled	Defines whether reader initialization instructions should be added to the barcode.

## DPD Code

A linear barcode based on Code 128. Data is expected to be 27 or 28 characters long and use the format "IPPPPPPTTTTTTTTTTTTTSSCCC", where I is the identification tag (omitted if this is a "relabel" barcode), P is the destination postal code (7 alphanumerics), T is the tracking number (4 alphanumerics followed by 10 digits), S is the service code (3 digits) and C is the ISO country code for the destination country (3 digits). A modulo-36 check character is added automatically to the human-readable text, but not to the data encoded in the symbol.



Identifier: `dpd`

Allowed Characters: alphanumeric

## PDF417

The PDF417/MicroPDF417 bar code symbologies according to **ISO/IEC 15438:2006** and **ISO/IEC 24728:2006**.

Identifier: `pdf417`

Default Subtype: `normal`

Allowed Characters: ASCII

Supported Data Types: `eci`, `hibc`



### Supported Subtypes

Identifier	Description
normal	A typical PDF417 barcode.
truncated	As opposed to a normal PDF417, its truncated version are missing one data codeword and the stop bars from each row.
micro	A smaller version of PDF417 codes.

**-ro-barcode-ecc-level**

Default Value	Possible Values	Description
auto	0-8	Sets the error correction level. Does not apply to MicroPDF417.

**-ro-barcode-size**

Default Value	Possible Values	Description
auto	Columns: 1-30 for (truncated) PDF417, 1-4 for MicroPDF417. Rows: 3-90 for (truncated) PDF417, 4-44 for MicroPDF417.	Sets the number of columns and rows this barcode should contain. The first value defines the columns, the second defines the rows.

**-ro-barcode-structured-append**

Default Value	Possible Values	Description
none	Positive integers	Defines a structured series. The first value sets the total number of barcodes belonging to it, the second value defines the ID of the series, which consists of 3 digits.

**-ro-barcode-structured-append-position**

Default Value	Possible Values	Description
auto	Positive integers	Defines the position of this barcode within a structured series.

**-ro-barcode-reader-initialization**

Default Value	Possible Values	Description
disabled	enabled, disabled	Defines whether reader initialization instructions should be added to the barcode.

## Australia Post

Identifier: `auspost`Supported Data Types: `eci`, `hibc`

## Australia Post Reply Paid

Identifier: `ausreply`Supported Data Types: `eci`, `hibc`

## Australia Post Routing

Identifier: `ausroute`

Supported Data Types: `eci`, `hibc`



## Australia Post Redirect

Identifier: `ausredirect`

Supported Data Types: `eci`, `hibc`



## Code 3 of 9

The code 3 of 9 bar code symbology according to **ISO/IEC 16388:2007**.

Identifier: `code39`

Default Subtype: `normal`

Allowed Characters: 0-9, A-Z, dash (-), full stop (.), space, dollar (\$), slash (/), plus (+) and percent (%). ASCII for Code 3 of 9 extended.

Supported Data Types: `eci`, `hibc`



### Supported Subtypes

Identifier	Description
<code>normal</code>	A standard Code 3 of 9.
<code>extended</code>	An extended version which is able to encode all ASCII characters.

### -ro-barcode-checkdigit-mode

Default Value	Possible Values	Description
<code>none</code>	<code>mod43</code> , <code>none</code>	Sets whether checkdigits should be calculated.

## MSI Plessey

Identifier: `msiplessey`

Allowed Characters: 0-9

Supported Data Types: `eci`, `hibc`



### -ro-barcode-checkdigit-mode

Default Value	Possible Values	Description
<code>none</code>	<code>none</code> , <code>mod10</code> , <code>mod11</code> , <code>mod1010</code> , <code>mod1011</code>	Sets how checkdigits should be calculated.

## UK Plessey

Identifier: `plessey`

Allowed Characters: 0-9, A-F

Supported Data Types: `eci`



### -ro-barcode-checkdigit-mode

Default Value	Possible Values	Description
none	none, crc8	Sets whether checkdigits should be calculated.

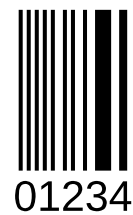
## Channel Code

Channel Code according to **ANSI/AIM BC12-1998**.

Identifier: `channelcode`

Allowed Characters: 0-9

Supported Data Types: `eci`, `hibc`



### -ro-barcode-type

Default Value	Possible Values	Description
auto	3 - 8	Sets the preferred amount of channels used to encode the data.

## Codabar

Codabar barcode symbology according to **BS EN 798:1996**.

Also known as NW-7, Monarch, Code 27, Ames Code, USD-4 and ABC Codabar.

Identifier: `codabar`

Allowed Characters: 0-9, dash (-), dollar (\$), colon (:), slash (/), full stop (.) and plus (+)

Content must start and end with "A", "B", "C", or "D"

Supported Data Types: `eci`, `hibc`



## EAN-8

EAN bar code symbology according to **BS EN 797:1996**

Identifier: `ean-8`

Allowed Characters: 0-9

Supported Data Types: `eci`, `hibc`



**-ro-barcode-type**

Default Value	Possible Values	Description
auto	An absolute length.	Changes the guard length of the barcode.

**EAN-13**

EAN bar code symbology according to **BS EN 797:1996**

Identifier: `ean-13`

Allowed Characters: 0-9

Supported Data Types: `eci`, `hibc`

**-ro-barcode-type**

Default Value	Possible Values	Description
auto	An absolute length.	Changes the guard length of the barcode.

**UPC-A**

UPC bar code symbology according to **BS EN 797:1996**.

Identifier: `upc-a`

Allowed Characters: 0-9

Supported Data Types: `eci`, `hibc`

**-ro-barcode-type**

Default Value	Possible Values	Description
auto	An absolute length.	Changes the guard length of the barcode.

**UPC-E**

UPC bar code symbology according to **BS EN 797:1996**.

Identifier: `upc-e`

Allowed Characters: 0-9

Supported Data Types: `eci`, `hibc`

**-ro-barcode-type**

Default Value	Possible Values	Description
auto	An absolute length.	Changes the guard length of the barcode.



## Ean/UPC Addon

EAN/UPC add-on bar code symbology according to **BS EN 797:1996**.

Identifier: `addon`

Allowed Characters: 0-9

Supported Data Types: `eci`, `hibc`



## Telepen

Also known as Telepen Alpha.

Identifier: `telepen`

Allowed Characters: ASCII

Default Subtype: `normal`

Supported Data Types: `eci`, `hibc`



### Supported Subtypes

Identifier	Description
<code>normal</code>	Allows all ASCII content.
<code>numeric</code>	Only allows numeric content.

## GS1 Databar / Databar 14

GS1 DataBar according to **ISO/IEC 24724:2011**

Identifier: `databar`

Default Subtype: `normal`

Allowed Characters: 0-9

Supported Data Types: `gs1`, but with an omitted Application Identifier and check digit. Thus not considered GS1 format data.



### Supported Subtypes

Identifier	Description
<code>normal</code>	Standard linear Databar.
<code>stacked</code>	A stacked version, which is smaller than a linear databar, but not omnidirectional.
<code>omnidirectional</code>	A stacked omnidirectional Databar.

**-ro-barcode-type**

Default Value	Possible Values	Description
auto	An absolute length	Changes the separator length for stacked and omnidirectional databars.

## GS1 Databar Expanded / Databar 14 Expanded

GS1 DataBar Expanded according to **ISO/IEC 24724:2011**

Identifier: `databar-expanded`

Default Subtype: `normal`

Allowed Characters: 0-9

Supported Data Types: `gs1`



(01)01234567890128

### Supported Subtypes

Identifier	Description
normal	Standard GS1 Databar Expanded.
stacked	A stacked version of the GS1 Databar Expanded.

**-ro-barcode-size**

Default Value	Possible Values	Description
auto	An integer between 1 and 10 to set the column count, a length to set the bar length or both.	Sets the bar length and the number of columns/symbol segments this barcode should contain.

## GS1 Databar Limited

GS1 DataBar Limited according to **ISO/IEC 24724:2011**

Identifier: `databar-limited`

Allowed Characters: 0-9

Supported Data Types: `gs1`, but with an omitted Application Identifier and check digit. Thus not considered GS1 format data.



(01)00001234567895

## Dutch Post Kix Code

Dutch Post KIX Code as used by Royal Dutch TPG Post (Netherlands).

Identifier: `kixcode`

Allowed Characters: 0-9, A-Z

Supported Data Types: `eci`, `hibc`



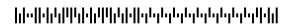
## Japan Post

The Japanese Postal Code symbology

Identifier: `japan-post`

Allowed Characters: 0-9, A-Z and the dash (-) character

Supported Data Types: `eci`, `hibc`



## Royal Mail

Royal Mail 4-State Country Code

Identifier: `royal-mail`

Allowed Characters: 0-9, A-Z

Supported Data Types: `eci`, `hibc`



## Korea Post

Identifier: `korea-post`

Allowed Characters: 0-9

Supported Data Types: `eci`, `hibc`



## USPS OneCode (Intelligent Mail)

USPS OneCode (Intelligent Mail Barcode) according to **USPS-B-3200F**

Identifier: `usps-onecode`

Allowed Characters: 0-9, dash (-)

Supported Data Types: `eci`, `hibc`



## USPS Package

USPS Intelligent Mail Package Barcode (IMpb), a linear barcode based on GS1-128.

Identifier: `usps-package`

Allowed Characters: 0-9

Supported Data Types: `gs1`



## POSTNET (Postal Numeric Encoding Technique)

The POSTNET (Postal Numeric Encoding Technique) barcode symbology used by the United States Postal Service.

Identifier: `postnet`

Default Subtype: `normal`

Allowed Characters: 0-9

Supported Data Types: `eci`, `hibc`



### Supported Subtypes

Identifier	Description
<code>normal</code>	A standard POSTNET code.
<code>planet</code>	A Postal Alpha Numeric Encoding Technique (PLANET) barcode.

## Pharmazentralnummer (PZN-8)

A Code 39 based symbology used by the pharmaceutical industry in Germany.

Identifier: `pzn8`

Allowed Characters: 0-9

Supported Data Types: `eci`, `hibc`



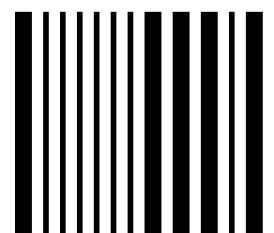
## Pharmacode

Identifier: `pharmacode`

Default Subtype: `onetrack`

Allowed Characters: 0-9

Supported Data Types: `eci`, `hibc`



### Supported Subtypes

Identifier	Description
<code>onetrack</code>	A Pharmacode consisting of one track.
<code>twotrack</code>	A Pharmacode consisting of two tracks.

## Codablock-F

Symbology according to AIM Europe "Uniform Symbology Specification - Codablock F", 1995.

Identifier: `codablockf`

Allowed Characters: 8-bit ISO 8859-1 (Latin-1)

Supported Data Types: `eci`, `hibc`



## Logmars

The LOGMARS (Logistics Applications of Automated Marking and Reading Symbols) standard used by the US Department of Defense.

Identifier: `logmars`

Allowed Characters: 0-9, A-Z, dash (-), full stop (.), space, dollar (\$), slash (/), plus (+) and percent (%).

Supported Data Types: `eci`, `hibc`



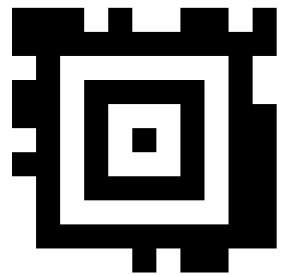
## Aztec Runes

Aztec Runes bar code symbology according to **ISO/IEC 24778:2008** Annex A.

Identifier: `aztec-runes`

Allowed Characters: 0-9

Supported Data Types: `eci`, `hibc`



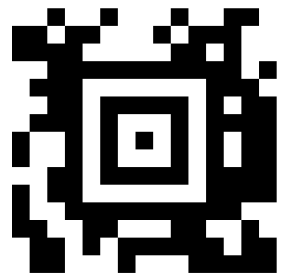
## Aztec Code

Aztec Code bar code symbology According to **ISO/IEC 24778:2008**.

Identifier: `aztec-code`

Allowed Characters: 8-bit ISO 8859-1 (Latin-1)

Supported Data Types: `eci`, `hibc`, `gs1`



### -ro-barcode-reader-initialization

Default Value	Possible Values	Description
disabled	enabled, disabled	Defines whether reader initialization instructions should be added to the barcode.

**-ro-barcode-ecc-level**

Default Value	Possible Values	Description
auto	Value      Error Correction Capacity	Sets the error correction level.
	1            > 10% + 3 codewords	
	2            > 23% + 3 codewords	
	3            > 36% + 3 codewords	
	4            > 50% + 3 codewords	

**-ro-barcode-size**

Default Value	Possible Values	Description
auto	1 - 4 for "compact" Aztec code symbols, 5 - 36 for "full-range" Aztec code symbols.	Selects a Aztec code size, refer to the <a href="#">Aztec code version table (p. 213)</a> for more detailed information.

**-ro-barcode-structured-append**

Default Value	Possible Values	Description
none	An integer for the total number of barcodes, a string for the id.	Defines a structured series. The first value sets the total number of barcodes belonging to it, the second value defines the ID of the series.

**-ro-barcode-structured-append-position**

Default Value	Possible Values	Description
auto	Positive integers.	Defines the position of this barcode within a structured series.

Aztec Code Version Table

-ro-barcode-size	Symbol Size	-ro-barcode-size	Symbol Size	-ro-barcode-size	Symbol Size
1	15 x 15	13	53 x 53	25	105 x 105
2	19 x 19	14	57 x 57	26	109 x 109
3	23 x 23	15	61 x 61	27	113 x 113
4	27 x 27	16	67 x 67	28	117 x 117
5	19 x 19	17	71 x 71	29	121 x 121
6	23 x 23	18	75 x 75	30	125 x 125
7	27 x 27	19	79 x 79	31	131 x 131
8	31 x 31	20	83 x 83	32	135 x 135
9	37 x 37	21	87 x 87	33	139 x 139
10	41 x 41	22	91 x 91	34	143 x 143
11	45 x 45	23	95 x 95	35	147 x 147
12	49 x 49	24	101 x 101	36	151 x 151

## Data Matrix

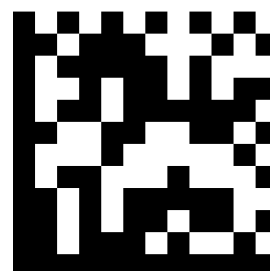
Data Matrix ECC 200 bar code symbology According to **ISO/IEC 16022:2006**

Identifier: `data-matrix`

Default Subtype: `square`

Allowed Characters: ISO/IEC 8859-1 (Latin-1)

Supported Data Types: `eci`, `hibc`, `gs1`



### Supported Subtypes

Identifier	Description
<code>square</code>	A square shaped data matrix.
<code>rectangle</code>	A rectangular data matrix

**-ro-barcode-reader-initialization**

Default Value	Possible Values	Description
disabled	enabled, disabled	Defines whether reader initialization instructions should be added to the barcode.

**-ro-barcode-size**

Default Value	Possible Values	Description
auto	1 - 30	Selects a Data Matrix size, refer to the <a href="#">Data Matrix version table (p. 215)</a> for more detailed information.

**-ro-barcode-structured-append**

Default Value	Possible Values	Description
none	Two integers.	Defines a structured series. The first value sets the total number of barcodes belonging to it, the second value defines the ID of the series.

**-ro-barcode-structured-append-position**

Default Value	Possible Values	Description
auto	Positive integers.	Defines the position of this barcode within a structured series.



Data Matrix Version Table

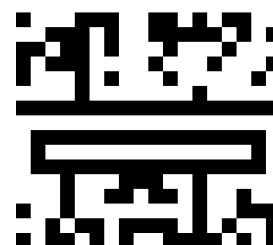
-ro-barcode-size	Symbol Size	-ro-barcode-size	Symbol Size	-ro-barcode-size	Symbol Size
1	10 x 10	11	36 x 36	21	104 x 104
2	12 x 12	12	40 x 40	22	120 x 120
3	14 x 14	13	44 x 44	23	132 x 132
4	16 x 16	14	48 x 48	24	144 x 144
5	18 x 18	15	52 x 52	25	8 x 18
6	20 x 20	16	64 x 64	26	8 x 32
7	22 x 22	17	72 x 72	27	12 x 26
8	24 x 24	18	80 x 80	28	12 x 36
9	26 x 26	19	88 x 88	29	16 x 36
10	32 x 32	20	96 x 96	30	16 x 48

## Code One

Identifier: `code-one`

Allowed Characters: ISO 8859-1 (Latin-1)

Supported Data Types: `eci`, `hibc`, `gs1`



-ro-barcode-size		
Default Value	Possible Values	Description
auto	1-10	Selects a Code One version, refer to the <a href="#">Code One version table (p. 216)</a> for more detailed information.

Code One Version Table

-ro-barcode-size	Version (Size)	-ro-barcode-size	Version (Size)
1	A: 18 x 16	6	F: 76 x 70
2	B: 22 x 22	7	G: 98 x 104
3	C: 32 x 28	8	H: 134 x 148
4	D: 42 x 40	9	S: ? x 9
5	E: 54 x 52	10	T: ? x 17

**Note**

The width of the Code One versions **S** and **T** is determined by the amount of encoded data. For version **S** it is either 13, 23 or 33, for version **T** it is either 19, 35 or 51.

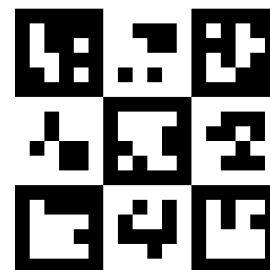
## Grid Matrix

Grid Matrix bar code symbology according to **AIMD014**

Identifier: `grid-matrix`

Allowed Characters: ISO/IEC 8859-1 (Latin-1) and GB-2312

Supported Data Types: `eci`, `hibc`

**-ro-barcode-reader-initialization**

Default Value	Possible Values	Description
disabled	enabled, disabled	Defines whether reader initialization instructions should be added to the barcode.

**-ro-barcode-ecc-level**

Default Value	Possible Values	Description
auto	Value      Error Correction Capacity	Sets the error correction level.
	1            ~10%	
	2            ~20%	
	3            ~30%	
	4            ~40%	
	5            ~50%	

**-ro-barcode-size**

Default Value	Possible Values	Description
auto	1 - 13	Selects a Grid Matrix size, refer to the <a href="#">Grid Matrix version table (p. 217)</a> for more detailed information.

**Grid Matrix Version Table**

-ro-barcode-size	Symbol Size	-ro-barcode-size	Symbol Size
1	18 x 18	8	102 x 102
2	30 x 30	9	114 x 114
3	42 x 42	10	126 x 126
4	54 x 54	11	138 x 138
5	66 x 66	12	150 x 150
6	78 x 78	13	162 x 162
7	90 x 90		

## Maxicode

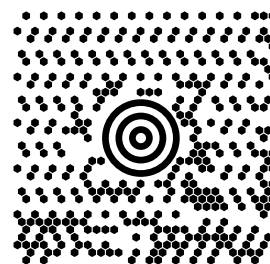
MaxiCode barcode symbology according to **ISO 16023:2000**

Identifier: `maxicode`

Default Subtype: `mode-4`

Allowed Characters: ISO 8859-1 (Latin-1)

Supported Data Types: `eci`, `hibc`



### Note

The size of MaxiCodes is defined as 1 in. × 1 in. (25,4 mm × 25,4 mm). Because of this, `-ro-barcode-symbol-width` does not apply to them.

### Supported Subtypes

Identifier	Description
<code>mode-2</code>	Formatted data containing a structured Carrier Message with a numeric postal code.
<code>mode-3</code>	Formatted data containing a structured Carrier Message with an alphanumeric postal code.
<code>mode-4</code>	Unformatted data with Standard Error Correction.
<code>mode-5</code>	Unformatted data with Enhanced Error Correction.
<code>mode-6</code>	Used for programming hardware devices.

### `-ro-barcode-structured-append`

Default Value	Possible Values	Description
<code>none</code>	Positive integers.	Defines a structured series. The first value sets the total number of barcodes belonging to it. Structured MaxiCode series do not have an ID.

### `-ro-barcode-structured-append-position`

Default Value	Possible Values	Description
<code>auto</code>	Positive integers.	Defines the position of this barcode within a structured series.

**-ro-barcode-type**

Default Value	Possible Values	Description
auto	<p>A string whose characters should conform with the following requirements:</p> <ul style="list-style-type: none"> <li>• 1-9 - Postal code data consisting of up to 9 digits (mode 2) or up to 6 alphanumeric characters (mode 3). The remaining characters should be filled with spaces.</li> <li>• 10-12 - Three-digit country code according to ISO-3166.</li> <li>• 13-15 - Three digit service code. This depends on your parcel courier.</li> </ul>	Sets the primary data and should only be used with Maxicode mode 2 or 3.

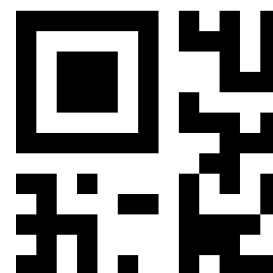
## Micro QR

Micro QR Code according to **ISO/IEC 18004:2006**

Identifier: `microqr`

Allowed Characters: The Latin-1 set and Kanji characters which are members of the Shift-JIS encoding scheme.

Supported Data Types: `eci`, `hibc`

**-ro-barcode-size**

Default Value	Possible Values	Description
auto	1 - 4, maps to M1 to M4.	Selects a Micro QR code size.

**-ro-barcode-ecc-level**

Default Value	Possible Values	Description
auto	L, M, Q	Sets the error correction level.

## Code 2 of 5

The Code 2 of 5 family of barcode standards.

Identifier: `code2of5`

Default Subtype: `matrix`

Allowed Characters: 0-9

Supported Data Types: `eci`, `hibc`



0123456789

## Supported Subtypes

Identifier	Description
matrix	Standard Code 2 of 5 mode, also known as Code 2 of 5 Matrix.
industrial	Industrial Code 2 of 5.
iata	International Air Transport Agency variation of Code 2 of 5.
data-logic	Code 2 of 5 Data Logic.
interleaved	Interleaved Code 2 of 5.
itf14	ITF-14, also known as UPC Shipping Container Symbol or Case Code. Requires a 13-digit numeric input.
dp-leitcode	Deutsche Post Leitcode. Requires a 13-digit numerical input.
dp-identcode	Deutsche Post Identcode. Requires an 11-digit numerical input.

**-ro-barcode-type**

Default Value	Possible Values	Description
disabled	enabled, disabled	Defines whether a checkdigit should be added, only applicable to Code 2 of 5 interleaved.

## ITF-14 (UPC Shipping Container Symbol or Case Code)

Identifier: `itf14`

Allowed Characters: 0-9

Supported Data Types: `eci`, `hibc`

00001234567895

## Deutsche Post Leitcode

Identifier: `dp-leitcode`

Allowed Characters: 0-9

Supported Data Types: `eci`, `hibc`

00001234567890

## Deutsche Post Identcode

Identifier: `dp-identcode`

Allowed Characters: 0-9

Supported Data Types: `eci`, `hibc`

001234567890

## Nummer der Versandeinheit / Serial Shipping Container Code

Identifier: `nve18` or `sscc18`

Allowed Content: 0-9

Supported Data Types: `gs1`



## GS1 Composite

GS1 Composite symbology according to **ISO/IEC 24723:2010**.

Identifier: `composite`

Consists of a linear and 2 dimensional part. The subtypes refer to the 2D one.

Default Subtype: `cc-a`

Allowed Content: ASCII

Supported Data Types: `gs1`



### Supported Subtypes

Identifier	Description
<code>cc-a</code>	MicroPDF417 symbol variant, encodes up to 56 alphanumeric digits.
<code>cc-b</code>	MicroPDF417 symbol variant, encodes up to 338 alphanumeric digits.
<code>cc-c</code>	PDF417 symbol variant, encodes up to 2361 alphanumeric digits.

### -ro-barcode-type

Default Value	Possible Values	Description
<code>auto</code>	An absolute length	Changes the separator length.

**-ro-barcode-composite-type**

Default Value	Possible Values	Description
code128	Behaves like <b>-ro-barcode-type</b> , but is restricted to the following types/subtypes: <ul style="list-style-type: none"> <li>• code128</li> <li>• databar</li> <li>• databar stacked</li> <li>• databar omnidirectional-stacked</li> <li>• databar-expanded</li> <li>• databar-expanded stacked</li> <li>• databar-limited</li> <li>• ean-8</li> <li>• upc-a</li> <li>• upc-e</li> </ul>	Defines the barcode type of the linear part of a GS1 Composite barcode.

**-ro-barcode-composite-content**

Default Value	Possible Values	Description
auto	Depends on the selected barcode type.	Sets the content to be encoded in the linear part of a GS1 composite barcode.



# APPENDIX D: CSS SUPPORT

## D.1 Default Style Rules

The element's default styles are described in the **user agent style sheet**. While most of these styles are adapted from the specifications<sup>28</sup> and match the styles of browsers, PDFReactor adds some sets of style rules, for example those related to pagination:

### Special PDFReactor Default Style Rules

Selector	Declarations
@page	size: A4; margin: 2cm; white-space: pre-line; counter-increment: page;
h1, h2, h3, h4, h5, h6	break-after: avoid;
@footnote	padding-top: 6pt; border-top: solid black thin; -ro-border-length: 30%; margin-top: 6pt;
::footnote-call	counter-increment: footnote 1; content: counter(footnote); line-height: 100%; font-size: 65%; vertical-align: super;
::footnote-marker	content: counter(footnote) ". ";

## D.2 CSS Attribute Selector

PDFReactor supports the following CSS selectors which select elements that have certain attributes:

### Supported attribute selectors

Attribute selector	Meaning	CSS Level
Elem[attr]	An Elem element with a attr attribute.	CSS 2.1
Elem[attr="val"]	An Elem element whose attr attribute value is exactly equal to "val" .	CSS 2.1

Continued

<sup>28</sup> see <https://html.spec.whatwg.org/multipage/rendering.html>

Continued

Attribute selector	Meaning	CSS Level
Elem[attr~="val"]	An Elem element whose attr attribute value is a list of whitespace-separated values, one of which is exactly equal to "val" .	CSS 2.1
Elem[attr^="val"]	An Elem element whose attr attribute value begins exactly with the string "val" .	CSS 3
Elem[attr\$="val"]	An Elem element whose attr attribute value ends exactly with the string "val" .	CSS 3
Elem[attr*="val"]	An Elem element whose attr attribute value contains the substring "val" .	CSS 3

## D.3 Supported Page Size Formats

Keywords for the supported A series formats, based on DIN 476/ISO 216, and their corresponding oversize formats

A series	Size [mm]	RA oversizes	Size [mm]	SRA oversizes	Size [mm]
A0	841 x 1189	RA0	860 x 1220	SRA0	900 x 1280
A1	594 x 841	RA1	610 x 860	SRA1	640 x 900
A2	420 x 594	RA2	430 x 610	SRA2	450 x 640
A3	297 x 420	RA3	305 x 430	SRA3	320 x 450
A4	210 x 297	RA4	215 x 305	SRA4	225 x 320
A5	148 x 210	RA5	152 x 215	SRA5	160 x 225
A6	105 x 148	RA6	107 x 152	SRA6	112 x 160
A7	74 x 105	RA7	76 x 107	SRA7	80 x 112
A8	52 x 74	RA8	53 x 76	SRA8	56 x 80
A9	37 x 52				
A10	26 x 37				

**CSS Keywords for the supported B series formats**

B series	Size [mm]
B1	707 x 1000
B2	500 x 707
B3	353 x 500
B4	250 x 353
B5	176 x 250
B6	125 x 176
B7	88 x 125
B8	62 x 88
B9	44 x 62
B10	31 x 44

**Keywords for the supported C series formats**

C series	Size [mm]
C1	648 x 917
C2	458 x 648
C3	324 x 458
C4	229 x 324
C5	162 x 229
C6	114 x 162
C7	81 x 114
C8	57 x 81
C9	40 x 57
C10	28 x 40

**Keywords for supported international page formats**

Page format	Size [in]
Letter	8.5 x 11
Legal	8.5 x 14
Ledger	11 x 17
Invoice	5.5 x 8
Executive	7.25 x 10.5
Broadsheet	17 x 22

## D.4 Supported Hyphenation Languages

Hyphenation languages (a-f)

ISO 639-1	Language
af	Afrikaans
as	Assamese
bg	Bulgarian
bn	Bangla
ca	Catalan
cy	Welsh
da	Danish
de	German
de-1901	German (traditional)
de-CH	German (Switzerland)
el	Greek
el-Polyton	Greek (polytonic)
en	English (US)
en-GB	English (UK)
eo	Esperanto
es	Spanish
et	Estonian
eu	Basque
fi	Finnish
fr	French
fur	Friulian

Hyphenation languages (g-n)

ISO 639-1	Language
gl	Galician
grc	Ancient Greek
gu	Gujarati
hi	Hindi
hr	Croatian
hsb	Upper Sorbian
ia	Interlingua
is	Icelandic
it	Italian
ka	Georgian
kmr	Kurdish
kn	Kannada
la	Latin
la-CL	Latin (classical)
lt	Lithuanian
ml	Malayalam
mn	Mongolian
mr	Marathi
mul-ET	Ethiopic (multilingual)
nb	Norwegian Bokmål
nl	Dutch
nn	Norwegian Nynorsk

Hyphenation languages (o-z)

ISO 639-1	Language
oc	Occitan
or	Odia
pa	Punjabi
pl	Polish
pms	Piedmontese
pt	Portuguese
rm	Romansh
ro	Romanian
ru	Russian
sa	Sanskrit
sl	Slovenian
sr	Serbian (Cyrillic)
sr-Latn	Serbian (Latin)
sv	Swedish
ta	Tamil
te	Telugu
th	Thai
tk	Turkmen
tr	Turkish
uk	Ukrainian

## D.5 Supported length units

### Absolute length units

Unit	Description
mm	millimeters
cm	centimeters
q	quarter-millimeters
in	inches
pt	points
px	pixels
pc	pica

### Proprietary length units

Unit	Description
-ro-pw -ro-pi	Equal to 1% of the width of the first page, including its margins.
-ro-ph -ro-pb	Equal to 1% of the height of the first page, including its margins.
-ro-pmin	Equal to the smaller of '-ro-pw' and '-ro-ph'.
-ro-pmax	Equal to the larger of '-ro-pw' and '-ro-ph'.
-ro-bw -ro-bi	Equal to 1% of the width of the page bleed box of the first page.
-ro-bh -ro-bb	Equal to 1% of the height of the page bleed box of the first page.
-ro-bmin	Equal to the smaller of '-ro-bw' and '-ro-bh'.
-ro-bmax	Equal to the larger of '-ro-bw' and '-ro-bh'.

### Relative length units

Unit	Description
%	percent
em	Relative to the font size of the element.
rem	Relative to the font size of the root element.
ex	Equal to the used x-height of the first available font.
ch	Equal to the width of the "0" glyph in the font of the element.
vw vi	Equal to 1% of the width of the content area of the first page.
vh vb	Equal to 1% of the height of the content area of the first page.
vmin	Equal to the smaller of 'vw' and 'vh'.
vmax	Equal to the larger of 'vw' and 'vh'.
cap	Equal the capital letter height of the font.
ic	Equal to the width of the glyph "水" (U+6C34) in the font of the element.
lh	Equal to the line height of the element.
rlh	Equal to the line height of the root element.

### Viewport-relative lengths that are aliases in PDFReactor

Units	Synonymous Units
vw vi	lvw, lvi, svw, svi, dvw, dvi
vh vb	lvh, lvb, svh, svb, dvh, dvb
vmin	lvmin, svmin, dvmin
vmax	lvmax, svmax, dvmax






















## D.6 CSS Color Keywords

### Supported Color Keywords

Color name	Color	hex RGB	Decimal
aliceblue		#F0F8FF	240,248,255
antiquewhite		#FAEBD7	250,235,215
aqua		#00FFFF	0,255,255
aquamarine		#7FFFD4	127,255,212
azure		#F0FFFF	240,255,255
beige		#F5F5DC	245,245,220
bisque		#FFE4C4	255,228,196
black		#000000	0,0,0
blanchedalmond		#FFEBCD	255,235,205
blue		#0000FF	0,0,255
blueviolet		#8A2BE2	138,43,226
brown		#A52A2A	165,42,42
burlywood		#DEB887	222,184,135
cadetblue		#5F9EA0	95,158,160
chartreuse		#7FFF00	127,255,0
chocolate		#D2691E	210,105,30
coral		#FF7F50	255,127,80
cornflowerblue		#6495ED	100,149,237
cornsilk		#FFF8DC	255,248,220
crimson		#DC143C	220,20,60
cyan		#00FFFF	0,255,255
darkblue		#00008B	0,0,139
darkcyan		#008B8B	0,139,139




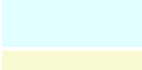


Continued

Continued

Color name	Color	hex RGB	Decimal
darkgoldenrod		#B8860B	184,134,11
darkgray/darkgrey		#A9A9A9	169,169,169
darkgreen		#006400	0,100,0
darkkhaki		#BDB76B	189,183,107
darkmagenta		#8B008B	139,0,139
darkolivegreen		#556B2F	85,107,47
darkorange		#FF8C00	255,140,0
darkorchid		#9932CC	153,50,204
darkred		#8B0000	139,0,0
darksalmon		#E9967A	233,150,122
darkseagreen		#8FBC8F	143,188,143
darkslateblue		#483D8B	72,61,139
darkslategray/darkslategrey		#2F4F4F	47,79,79
darkturquoise		#00CED1	0,206,209
darkviolet		#9400D3	148,0,211
deeppink		#FF1493	255,20,147
deepskyblue		#00BFFF	0,191,255
dimgray/dimgrey		#696969	105,105,105
dodgerblue		#1E90FF	30,144,255
firebrick		#B22222	178,34,34
floralwhite		#FFFAF0	255,250,240
forestgreen		#228B22	34,139,34
fuchsia		#FF00FF	255,0,255
gainsboro		#DCDCDC	220,220,220
ghostwhite		#F8F8FF	248,248,255

Continued






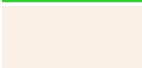













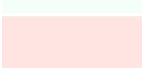
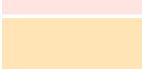




Continued

Color name	Color	hex RGB	Decimal
gold		#FFD700	255,215,0
goldenrod		#DAA520	218,165,32
gray/grey		#808080	128,128,128
green		#008000	0,128,0
greenyellow		#ADFF2F	173,255,47
honeydew		#F0FFF0	240,255,240
hotpink		#FF69B4	255,105,180
indianred		#CD5C5C	205,92,92
indigo		#4B0082	75,0,130
ivory		#FFFFFF	255,255,240
khaki		#F0E68C	240,230,140
lavender		#E6E6FA	230,230,250
lavenderblush		#FFF0F5	255,240,245
lawngreen		#7CFC00	124,252,0
lemonchiffon		#FFFACD	255,250,205
lightblue		#ADD8E6	173,216,230
lightcoral		#F08080	240,128,128
lightcyan		#E0FFFF	224,255,255
lightgoldenrodyellow		#FAFAD2	250,250,210
lightgray/lightgrey		#D3D3D3	211,211,211
lightgreen		#90EE90	144,238,144
lightpink		#FFB6C1	255,182,193
lightsalmon		#FFA07A	255,160,122
lightseagreen		#20B2AA	32,178,170
lightskyblue		#87CEFA	135,206,250

Continued





Continued

Color name	Color	hex RGB	Decimal
lightslategray/lightslategrey		#778899	119,136,153
lightsteelblue		#B0C4DE	176,196,222
lightyellow		#FFFFE0	255,255,224
lime		#00FF00	0,255,0
limegreen		#32CD32	50,205,50
linen		#FAF0E6	250,240,230
magenta		#FF00FF	255,0,255
maroon		#800000	128,0,0
mediumaquamarine		#66CDAA	102,205,170
mediumblue		#0000CD	0,0,205
mediumorchid		#BA55D3	186,85,211
mediumpurple		#9370DB	147,112,219
mediumseagreen		#3CB371	60,179,113
mediumslateblue		#7B68EE	123,104,238
mediumspringgreen		#00FA9A	0,250,154
mediumturquoise		#48D1CC	72,209,204
mediumvioletred		#C71585	199,21,133
midnightblue		#191970	25,25,112
mintcream		#F5FFFA	245,255,250
mistyrose		#FFE4E1	255,228,225
moccasin		#FFE4B5	255,228,181
navajowhite		#FFDEAD	255,222,173
navy		#000080	0,0,128
oldlace		#FDF5E6	253,245,230
olive		#808000	128,128,0

Continued

Continued

Color name	Color	hex RGB	Decimal
olivedrab		#6B8E23	107,142,35
orange		#FFA500	255,165,0
orangered		#FF4500	255,69,0
orchid		#DA70D6	218,112,214
palegoldenrod		#EEE8AA	238,232,170
palegreen		#98FB98	152,251,152
paleturquoise		#AFEEEE	175,238,238
palevioletred		#DB7093	219,112,147
papayawhip		#FFEFD5	255,239,213
peachpuff		#FFDAB9	255,218,185
peru		#CD853F	205,133,63
pink		#FFC0CB	255,192,203
plum		#DDA0DD	221,160,221
powderblue		#B0E0E6	176,224,230
purple		#800080	128,0,128
rebeccapurple		#663399	102,51,153
red		#FF0000	255,0,0
rosybrown		#BC8F8F	188,143,143
royalblue		#4169E1	65,105,225
saddlebrown		#8B4513	139,69,19
salmon		#FA8072	250,128,114
sandybrown		#F4A460	244,164,96
seagreen		#2E8B57	46,139,87
seashell		#FFF5EE	255,245,238
sienna		#A0522D	160,82,45

Continued

Continued

Color name	Color	hex RGB	Decimal
silver		#C0C0C0	192,192,192
skyblue		#87CEEB	135,206,235
slateblue		#6A5ACD	106,90,205
slategray/slategrey		#708090	112,128,144
snow		#FFFAFA	255,250,250
springgreen		#00FF7F	0,255,127
steelblue		#4682B4	70,130,180
tan		#D2B48C	210,180,140
teal		#008080	0,128,128
thistle		#D8BFD8	216,191,216
tomato		#FF6347	255,99,71
turquoise		#40E0D0	64,224,208
violet		#EE82EE	238,130,238
wheat		#F5DEB3	245,222,179
white		#FFFFFF	255,255,255
whitesmoke		#F5F5F5	245,245,245
yellow		#FFFF00	255,255,0
yellowgreen		#9ACD32	154,205,50
-ro-comment-highlight		#FFFF0B	255,255,11
-ro-comment-underline		#23FF06	35,255,6
-ro-comment-strikeout		#FB0007	251,0,7

## D.7 Counter and Ordered List Style Types

Supported counter and ordered list style types

Counter style name	1	12	123	1234
decimal	1.	12.	123.	1234.
decimal-leading-zero	01.	12.	123.	1234.
super-decimal	1.	12.	123.	1234.
upper-hexadecimal	1.	C.	7B.	4D2.
lower-hexadecimal	1.	c.	7b.	4d2.
octal	1.	14.	173.	2322.
binary	1.	1100.	1111011.	10011010010.
upper-roman	I.	XII.	CXXIII.	MCCXXXIV.
lower-roman	i.	xii.	cxxiii.	mccxxxiv.
upper-alpha	A.	L.	DS.	AUL.
lower-alpha	a.	l.	ds.	aul.
arabic-indic	١.	١٢.	١٣.	١٣٤.
armenian	Ա.	ԺԲ.	ՃԻԳ.	ՌՄԼԴ.
upper-armenian	Ա.	ԺԲ.	ՃԻԳ.	ՌՄԼԴ.
lower-armenian	ա.	ժբ.	ճիգ.	ռմլդ.
bengali	১.	১২.	১২৩.	১২৩৪.

Continued

Continued

Counter style name	1	12	123	1234
cambodian	១.	១២.	១២៣.	១២៣៤.
devanagari	१.	१२.	१२३.	१२३४.
georgian	ა.	ბ.	გ.	დ.
upper-greek	A.	Μ.	ΕΓ.	ΒΓΚ.
lower-greek	α.	μ.	εγ.	βγκ.
gujarati	૧.	૧૨.	૧૨૩.	૧૨૩૪.
gurmukhi	੧.	੧੨.	੧੨੩.	੧੨੩੪.
hebrew	א.	ב.	אב.	אב'ג.
hiragana	あ、	し、	いひ、	のめ、
hiragana-iroha	い、	を、	ろや、	のを、
japanese-formal	壱、	壱拾貳、	壱百貳拾参、	壱仟貳百参拾四、
japanese-informal	一、	十二、	百二十三、	千二百三十四、
kannada	೧.	೧೨.	೧೨೩.	೧೨೩೪.
katakana	ア、	シ、	イヒ、	ノメ、
katakana-iroha	イ、	ヲ、	ロヤ、	ノヲ、
khmer	១.	១២.	១២៣.	១២៣៤.
lao	໑.	໑໒.	໑໒໓.	໑໒໓໔.

Continued

Continued

Continued

Counter style name	1	12	123	1234
-ro-spelled-out-fr	un	douze	cent vingt-trois	mille deux cent trente-quatre

## D.8 Supported Values for Transliteration

The following lists all valid input/output value pairs for the `transliterate` option of `-ro-text-replace`, according to the underlying ICU4J implementation.

"Accents"	"Any"	"Any" "Ethi/IES_JES_1964"	"Any" "Latin/Aethiopic"	"Any"	"Thaa"	"ch"	"fa"
"am"	"am_FONIPA"	"Any" "Ethi/Lambdin"	"Any" "Latin/Aethiopic_Geminate"	"Any"	"Thaana"	"chr"	"chr_FONIPA"
"am"	"am_Latn/BGN"	"Any" "Ethi/SERA"	"Any" "Latin/ALALOC"	"Any"	"Thai"	"cs"	"am"
"am"	"ar"	"Any" "Ethi/Williamson"	"Any" "Latin/ALALOC_Geminate"	"Any"	"Title"	"cs"	"ar"
"am"	"chr"	"Any" "Ethiopic"	"Any" "Latin/Beta_Metsehaf"	"Any"	"tk/BGN"	"cs"	"chr"
"am"	"fa"	"Any" "Ethiopic/Aethiopic"	"Any" "Latin/Beta_Metsehaf_Geminate"	"Any"	"ug_FONIPA"	"cs"	"cs_FONIPA"
"am_Brai"	"am_Ethi"	"Any" "Ethiopic/ALALOC"	"Any" "Latin/BGN"	"Any"	"uk_Latn/BGN"	"cs"	"fa"
"am_Ethi"	"am_Brai"	"Any" "Ethiopic/Amharic"	"Any" "Latin/ES3842"	"Any"	"und_FONIPA"	"cs"	"ja"
"am_Ethi" "am_Ethi/Geminate"		"Any" "Ethiopic/Beta_Metsehaf"	"Any" "Latin/IES_JES_1964"	"Any"	"und_FONXSAMP"	"cs"	"ko"
"am_Ethi" "d0_Morse"		"Any" "Ethiopic/Gurage"	"Any" "Latin/IES_JES_1964_Geminate"	"Any"	"Upper"	"cs_FONIPA"	"ja"
"am_FONIPA"	"am"	"Any" "Ethiopic/Gutgarts"	"Any" "Latin/Lambdin"	"Any"	"ur"	"cs_FONIPA"	"ko"
"Amharic" "Amharic/Geminate"		"Any" "Ethiopic/IES_JES_1964"	"Any" "Latin/Names"	"Any"	"uz/BGN"	"cy"	"cy_FONIPA"
"Amharic" "Latin/BGN"		"Any" "Ethiopic/Lambdin"	"Any" "Latin/SERA"	"Any"	"uz_Cyrl"	"Cyrillic" "Ethiopic/Gutgarts"	
"Any" "Accents"		"Any" "Ethiopic/SERA"	"Any" "Latin/Tekie_Alibekit"	"Any"	"uz_Latn"	"Cyrillic" "Latin"	
"Any"	"am"	"Any" "Ethiopic/Tekie_Alibekit"	"Any" "Latin/UNGEGN"	"Any"	"vec_FONIPA"	"Cyrl" "Ethi/Gutgarts"	
"Any"	"am_Brai"	"Any" "Ethiopic/Williamson"	"Any" "Latin/Williamson"	"Any"	"xh_FONIPA"	"Cyrl"	"Latn"
"Any"	"am_Ethi"	"Any" "Ethiopic/Xalaget"	"Any" "Latin/Xaleget"	"Any"	"yo_BJ"	"d0_Morse" "am_Ethi"	
"Any" "am_Ethi/Geminate"		"Any" "fa"	"Any" "Latn"	"Any"	"zh"	"de"	"ASCII"
"Any" "am_FONIPA"		"Any" "fa_FONIPA"	"Any" "Latn/Aethiopi"	"Any"	"zu_FONIPA"	"Deva"	"Arab"
"Any" "am_Latn/BGN"		"Any" "fa_Latn/BGN"	"Any" "Latn/Aethiopi_Geminate"	"ar"	"ar_Latn/BGN"	"Deva"	"Beng"
"Any" "Any"		"Any" "FCC"	"Any" "Latn/ALALOC"	"Arab"	"Latn"	"Deva"	"Gujr"
"Any"	"Any/C"	"Any" "FCD"	"Any" "Latn/ALALOC_Geminate"	"Arabic"	"Latin"	"Deva"	"Guru"
"Any"	"Any/Java"	"Any" "Geor"	"Any" "Latn/Beta_Metsehaf"	"Arabic" "Latin/BGN"	"Latin/BGN"	"Deva"	"Knda"
"Any"	"Any/Perl"	"Any" "Georgian"	"Any" "Latn/Beta_Metsehaf_Geminate"	"Armenian" "Latin"	"Latin"	"Deva"	"Latn"
"Any" "Any/Unicode"		"Any" "Greek"	"Any" "Latn/ES3842"	"Armenian" "Latin/BGN"	"Latin/BGN"	"Deva"	"Mlym"
"Any" "Any/XML"		"Any" "Greek/UNGEGN"	"Any" "Latn/IES_JES_1964"	"Armn"	"Latn"	"Deva"	"Orya"
"Any" "Any/XML10"		"Any" "Grek"	"Any" "Latn/IES_JES_1964_Geminate"	"ASCII"	"Latin"	"Deva"	"Taml"
"Any"	"ar"	"Any" "Grek/UNGEGN"	"Any" "Latn/Lambdin"	"az"	"Lower"	"Deva"	"Telu"
"Any" "ar_Latn/BGN"		"Any" "Gujarati"	"Any" "Latn/SERA"	"az"	"Title"	"Deva"	"ur"
"Any" "Arab"		"Any" "Gujr"	"Any" "Latn/UNGEGN"	"az"	"Upper"	"Devanagari"	"Arabic"
"Any" "Arabic"		"Any" "Gurmukhi"	"Any" "Latn/Williamson"	"az_Cyrl"	"az/BGN"	"Devanagari" "Bengali"	
"Any" "Armenian"		"Any" "Guru"	"Any" "Lower"	"Azerbaijani" "Latin/BGN"	"Latin/BGN"	"Devanagari" "Gujarati"	
"Any"	"az/Armn"	"Any" "gz_Ethi"	"Any" "Malayalam"	"be"	"be_Latn/BGN"	"Devanagari" "Gurmukhi"	
"Any" "az/BGN"		"Any" "ha_NE"	"Any" "mk_Latn/BGN"	"Belarusian" "Latin/BGN"	"Latin/BGN"	"Devanagari" "Kannada"	
"Any" "be_Latn/BGN"		"Any" "Hang"	"Any" "Mlym"	"Beng"	"Arab"	"Devanagari" "Latin"	
"Any"	"Beng"	"Any" "Hangul"	"Any" "mn_Latn/BGN"	"Beng"	"Deva"	"Devanagari" "Malayalam"	
"Any" "Bengali"		"Any" "Hans"	"Any" "mn_Latn/MNS"	"Beng"	"Gujr"	"Devanagari" "Oriya"	
"Any" "bg_Latn/BGN"		"Any" "Hant"	"Any" "my"	"Beng"	"Guru"	"Devanagari" "Tamil"	
"Any" "blt_FONIPA"		"Any" "he_Latn/BGN"	"Any" "my_FONIPA"	"Beng"	"Knda"	"Devanagari" "Telugu"	
"Any" "Bopo"		"Any" "Hebr"	"Any" "my_Latn"	"Beng"	"Latn"	"Digit"	"Tone"
"Any" "Bopomofo"		"Any" "Hebrew"	"Any" "Name"	"Beng"	"Mlym"	"dsb"	"dsb_FONIPA"
"Any" "Braille/Amharic"		"Any" "Hex"	"Any" "NFC"	"Beng"	"Orya"	"dv"	"dv_Latn/BGN"
"Any" "byn_Ethi/Tekie_Alibekit"		"Any" "Hex/C"	"Any" "NFD"	"Beng"	"Taml"	"el"	"el_Latn/BGN"
"Any" "byn_Ethi/Xaleget"		"Any" "Hex/Java"	"Any" "NFKC"	"Beng"	"Telu"	"el"	"Lower"
"Any" "byn_Latn/Tekie_Alibekit"		"Any" "Hex/Perl"	"Any" "NFKD"	"Beng"	"ur"	"el"	"Title"
"Any" "byn_Latn/Xaleget"		"Any" "Hex/Plain"	"Any" "Null"	"Bengali"	"Arabic"	"el"	"Upper"
"Any" "CanadianAboriginal"		"Any" "Hex/Unicode"	"Any" "nv_FONIPA"	"Bengali" "Devanagari"	"Devanagari"	"eo"	"am"
"Any" "Cans"		"Any" "Hex/XML"	"Any" "Oriya"	"Bengali" "Gujarati"	"Gujarati"	"eo"	"ar"
"Any" "CaseFold"		"Any" "Hex/XML10"	"Any" "Orya"	"Bengali" "Gurmukhi"	"Gurmukhi"	"eo"	"chr"
"Any" "ch_FONIPA"		"Any" "Hira"	"Any" "pl_FONIPA"	"Bengali" "Kannada"	"Kannada"	"eo"	"eo_FONIPA"
"Any"	"chr"	"Any" "Hiragana"	"Any" "ps_Latn/BGN"	"Bengali" "Latin"	"Latin"	"eo"	"fa"
"Any" "chr_FONIPA"		"Any" "hy_AREVMFA_FONIPA"	"Any" "Publishing"	"Bengali" "Malayalam"	"Malayalam"	"es"	"am"
"Any" "cs_FONIPA"		"Any" "hy_FONIPA"	"Any" "Remove"	"Bengali" "Oriya"	"Oriya"	"es"	"ar"
"Any" "cy_FONIPA"		"Any" "hy_Latn/BGN"	"Any" "rm_FONIPA_SURSILV"	"Bengali" "Tamil"	"Tamil"	"es"	"chr"
"Any" "Cyrillic"		"Any" "ia_FONIPA"	"Any" "ro_FONIPA"	"Bengali" "Telugu"	"Telugu"	"es"	"es_FONIPA"
"Any" "Cyrillic/Gutgarts"		"Any" "ja"	"Any" "ru"	"bg"	"bg_Latn/BGN"	"es"	"fa"
"Any" "Cyrl"		"Any" "ja_Latn/BGN"	"Any" "ru/BGN"	"blt"	"blt_FONIPA"	"es"	"ja"
"Any" "Cyrl/Gutgarts"		"Any" "Jamo"	"Any" "ru_Latn/BGN"	"Bopo"	"Latn"	"es"	"zh"
"Any" "Deva"		"Any" "ka_Latn/BGN"	"Any" "Sarh"	"Bopomofo"	"Latin"	"es_419"	"am"
"Any" "Devanagari"		"Any" "ka_Latn/BGN_1981"	"Any" "sat_FONIPA"	"Braille" "Ethiopic/Amharic"		"es_419"	"ar"
"Any" "dsb_FONIPA"		"Any" "Kana"	"Any" "sgw_Ethi/Gurage_2013"	"Bulgarian" "Latin/BGN"	"Latin/BGN"	"es_419"	"chr"
"Any" "dv_Latn/BGN"		"Any" "Kannada"	"Any" "si_FONIPA"	"Burmese" "Latin"		"es_419"	"fa"
"Any" "el_Latn/BGN"		"Any" "Katakana"	"Any" "si_Latn"	"byn_Ethi" "byn_Latn/Tekie_Alibekit"		"es_419"	"ja"
"Any" "eo_FONIPA"		"Any" "kk_FONIPA"	"Any" "sk_FONIPA"	"byn_Ethi" "byn_Latn/Xaleget"		"es_419"	"zh"
"Any" "es_419_FONIPA"		"Any" "kk_Latn/BGN"	"Any" "sr_Latn/BGN"	"byn_Latn" "byn_Ethi/Tekie_Alibekit"		"es_FONIPA"	"am"
"Any" "es_FONIPA"		"Any" "Knda"	"Any" "Sycr"	"byn_Latn" "byn_Ethi/Xaleget"		"es_FONIPA" "es_419_FONIPA"	
"Any" "Ethi"		"Any" "ko"	"Any" "Syriac"	"CanadianAboriginal" "Latin"	"Latin"	"es_FONIPA"	"ja"
"Any" "Ethi/Aethiopi"		"Any" "ko_Latn/BGN"	"Any" "ta_FONIPA"	"Cans"	"Latn"	"es_FONIPA"	"zh"
"Any" "Ethi/ALALOC"		"Any" "ky_FONIPA"	"Any" "Tamil"	"ch"	"am"	"Ethi" "Cyrl/Gutgarts"	
"Any" "Ethi/Beta_Metsehaf"		"Any" "ky_Latn/BGN"	"Any" "Taml"	"ch"	"ar"	"Ethi" "Latn"	
"Any" "Ethi/Gurage_2013"		"Any" "la_FONIPA"	"Any" "Telu"	"ch"	"ch_FONIPA"	"Ethi" "Latn/Aethiopi"	
"Any" "Ethi/Gutgarts"		"Any" "Latin"	"Any" "Telugu"	"ch"	"chr"	"Ethi" "Latn/Aethiopi_Geminate"	



"Ethi"	"Latn/ALALOC"	"Guru"	"Telu"	"Knda"	"Latn"	"Latn"	"Telu"	"rm_SURSILV"	"rm_FONIPA_SURSILV"
"Ethi"	"Latn/ALALOC_Geminate"	"Guru"	"ur"	"Knda"	"Mlym"	"Latn"	"Thaa"	"ro"	"am"
"Ethi"	"Latn/Beta_Metsehafe"	"gz_Ethi"	"Sarab"	"Knda"	"Orya"	"Latn"	"Thai"	"ro"	"ar"
"Ethi"	"Latn/Beta_Metsehafe_Geminate"	"ha"	"ha_NE"	"Knda"	"Taml"	"lt"	"Lower"	"ro"	"chr"
"Ethi"	"Latn/ES3842"	"Halfwidth"	"Fullwidth"	"Knda"	"Telu"	"lt"	"Title"	"ro"	"fa"
"Ethi"	"Latn/IES_JES_1964"	"Han"	"Latin"	"Knda"	"ur"	"lt"	"Upper"	"ro"	"ja"
"Ethi"	"Latn/IES_JES_1964_Geminate"	"Han"	"Latin/Names"	"ko"	"ko_Latn/BGN"	"Macedonian"	"Latin/BGN"	"ro"	"ro_FONIPA"
"Ethi"	"Latn/Lambdin"	"Hang"	"Latn"	"Korean"	"Latin/BGN"	"Malayalam"	"Arabic"	"ro_FONIPA"	"ja"
"Ethi"	"Latn/SERA"	"Hangul"	"Latin"	"ky"	"am"	"Malayalam"	"Kannada"	"ru"	"ja"
"Ethi"	"Latn/Williamson"	"Hani"	"Latn"	"ky"	"ar"	"Malayalam"	"Devanagari"	"ru"	"ru_Latn/BGN"
"Ethi"	"sgw_Ethi/Gurage_2013"	"Hans"	"Hant"	"ky"	"chr"	"Malayalam"	"Gujarati"	"ru"	"zh"
"Ethiopic"	"Braille/Amharic"	"Hans"	"Latn"	"ky"	"fa"	"Malayalam"	"Gurmukhi"	"ru_Latn"	"ru/BGN"
"Ethiopic"	"Cyrillic/Gutgarts"	"Hant"	"Hans"	"ky"	"ky_FONIPA"	"Malayalam"	"Kannada"	"Russian"	"Latin/BGN"
"Ethiopic"	"Ethiopic/Gurage"	"Hant"	"Latn"	"ky"	"ky_Latn/BGN"	"Malayalam"	"Latin"	"Sarab"	"gz_Ethi"
"Ethiopic"	"Latin"	"he"	"he_Latn/BGN"	"la"	"la_FONIPA"	"Malayalam"	"Oriya"	"sat"	"am"
"Ethiopic"	"Latin/Aethiopic"	"Hebr"	"Latn"	"Latin"	"Arabic"	"Malayalam"	"Tamil"	"sat"	"ar"
"Ethiopic"	"Latin/Aethiopic_Geminate"	"Hebrew"	"Latin"	"Latin"	"Armenian"	"Malayalam"	"Telugu"	"sat"	"chr"
"Ethiopic"	"Latin/ALALOC"	"Hebrew"	"Latin/BGN"	"Latin"	"ASCII"	"Maldivian"	"Latin/BGN"	"sat"	"fa"
"Ethiopic"	"Latin/ALALOC_Geminate"	"Hex"	"Any"	"Latin"	"Bengali"	"mk"	"mk_Latn/BGN"	"sat_Olck"	"sat_FONIPA"
"Ethiopic"	"Latin/Beta_Metsehafe"	"Hex"	"Any/C"	"Latin"	"Bopomofo"	"Mlym"	"Arab"	"Serbian"	"Latin/BGN"
"Ethiopic"	"Latin/Beta_Metsehafe_Geminate"	"Hex"	"Any/Java"	"Latin"	"CanadianAboriginal"	"Mlym"	"Beng"	"sgw_Ethi"	"Ethi/Gurage_2013"
"Ethiopic"	"Latin/ES3842"	"Hex"	"Any/Perl"	"Latin"	"Cyrillic"	"Mlym"	"Deva"	"si"	"am"
"Ethiopic"	"Latin/IES_JES_1964"	"Hex"	"Any/Unicode"	"Latin"	"Devanagari"	"Mlym"	"Gujr"	"si"	"ar"
"Ethiopic"	"Latin/IES_JES_1964_Geminate"	"Hex"	"Any/XML"	"Latin"	"Ethiopic"	"Mlym"	"Guru"	"si"	"chr"
"Ethiopic"	"Latin/Lambdin"	"Hex"	"Any/XML10"	"Latin"	"Ethiopic/Aethiopic"	"Mlym"	"Knda"	"si"	"fa"
"Ethiopic"	"Latin/SERA"	"Hira"	"Kana"	"Latin"	"Ethiopic/ALALOC"	"Mlym"	"Latn"	"si"	"si_FONIPA"
"Ethiopic"	"Latin/Tekie_Alibekit"	"Hira"	"Latn"	"Latin"	"Ethiopic/Beta_Metsehafe"	"Mlym"	"Orya"	"si"	"si_Latn"
"Ethiopic"	"Latin/Williamson"	"Hiragana"	"Katakana"	"Latin"	"Ethiopic/IES_JES_1964"	"Mlym"	"Taml"	"Simplified"	"Traditional"
"Ethiopic"	"Latin/Xaleget"	"Hiragana"	"Latin"	"Latin"	"Ethiopic/Lambdin"	"Mlym"	"Telu"	"sk"	"am"
"fa"	"fa_FONIPA"	"hy"	"am"	"Latin"	"Ethiopic/SERA"	"Mlym"	"ur"	"sk"	"ar"
"fa"	"fa_Latn/BGN"	"hy"	"ar"	"Latin"	"Ethiopic/Tekie_Alibekit"	"mn"	"mn_Latn/BGN"	"sk"	"chr"
"Fullwidth"	"Halfwidth"	"hy"	"chr"	"Latin"	"Ethiopic/Williamson"	"mn"	"mn_Latn/MNS"	"sk"	"fa"
"Geez"	"Ethiopic"	"hy"	"fa"	"Latin"	"Ethiopic/Xaleget"	"Mongolian"	"Latin/BGN"	"sk"	"ja"
"Geez"	"Musnad"	"hy"	"hy_FONIPA"	"Latin"	"Georgian"	"my"	"am"	"sk"	"sk_FONIPA"
"Geor"	"Latn"	"hy"	"hy_Latn/BGN"	"Latin"	"Greek"	"my"	"ar"	"sk_FONIPA"	"ja"
"Georgian"	"Latin"	"hy_AREVMMDA"	"am"	"Latin"	"Greek/UNGEGN"	"my"	"chr"	"sr"	"sr_Latn/BGN"
"Georgian"	"Latin/BGN"	"hy_AREVMMDA"	"ar"	"Latin"	"Gujarati"	"my"	"fa"	"Syr"	"Latin"
"Greek"	"Latin"	"hy_AREVMMDA"	"chr"	"Latin"	"Gurmukhi"	"my"	"my_FONIPA"	"Syriac"	"Latin"
"Greek"	"Latin/BGN"	"hy_AREVMMDA"	"fa"	"Latin"	"Hangul"	"my"	"my_Latn"	"ta"	"ta_FONIPA"
"Greek"	"Latin/UNGEGN"	"hy_AREVMMDA"	"hy_AREVMMDA_FONIPA"	"Latin"	"Hebrew"	"my"	"Zawgyi"	"Tamil"	"Arabic"
"Grek"	"Latn"	"ia"	"am"	"Latin"	"Hiragana"	"Myanmar"	"Latin"	"Tamil"	"Bengali"
"Grek"	"Latn/UNGEGN"	"ia"	"ar"	"Latin"	"Jamo"	"Name"	"Any"	"Tamil"	"Devanagari"
"Gujarati"	"Arabic"	"ia"	"chr"	"Latin"	"Kannada"	"nl"	"Title"	"Tamil"	"Gujarati"
"Gujarati"	"Bengali"	"ia"	"fa"	"Latin"	"Katakana"	"NumericPinyin"	"Latin"	"Tamil"	"Gurmukhi"
"Gujarati"	"Devanagari"	"ia"	"ia_FONIPA"	"Latin"	"Malayalam"	"NumericPinyin"	"Pinyin"	"Tamil"	"Kannada"
"Gujarati"	"Gurmukhi"	"IPA"	"XSampa"	"Latin"	"NumericPinyin"	"nv"	"nv_FONIPA"	"Tamil"	"Latin"
"Gujarati"	"Kannada"	"it"	"am"	"Latin"	"Oriya"	"Oriya"	"Arabic"	"Tamil"	"Malayalam"
"Gujarati"	"Latin"	"it"	"ja"	"Latin"	"Russian/BGN"	"Oriya"	"Bengali"	"Tamil"	"Oriya"
"Gujarati"	"Malayalam"	"ja_Hrkt"	"ja_Latn/BGN"	"Latin"	"Syriac"	"Oriya"	"Devanagari"	"Tamil"	"Telugu"
"Gujarati"	"Oriya"	"ja_Latn"	"ko"	"Latin"	"Tamil"	"Oriya"	"Gujarati"	"Taml"	"Arab"
"Gujarati"	"Tamil"	"ja_Latn"	"ru"	"Latin"	"Telugu"	"Oriya"	"Gurmukhi"	"Taml"	"Beng"
"Gujarati"	"Telugu"	"Jamo"	"Latin"	"Latin"	"Thaana"	"Oriya"	"Kannada"	"Taml"	"Deva"
"Gujr"	"Arab"	"Jamo"	"Latn"	"Latin"	"Thai"	"Oriya"	"Latin"	"Taml"	"Gujr"
"Gujr"	"Beng"	"ka"	"ka_Latn/BGN"	"Latn"	"Arab"	"Oriya"	"Malayalam"	"Taml"	"Guru"
"Gujr"	"Deva"	"ka"	"ka_Latn/BGN_1981"	"Latn"	"Armn"	"Oriya"	"Tamil"	"Taml"	"Knda"
"Gujr"	"Guru"	"Kana"	"Hira"	"Latn"	"Beng"	"Oriya"	"Telugu"	"Taml"	"Latn"
"Gujr"	"Knda"	"Kana"	"Latn"	"Latn"	"Bopo"	"Oriya"	"Arab"	"Taml"	"Mlym"
"Gujr"	"Latn"	"Kannada"	"Arabic"	"Latn"	"Cans"	"Orya"	"Beng"	"Taml"	"Orya"
"Gujr"	"Mlym"	"Kannada"	"Bengali"	"Latn"	"Cyril"	"Orya"	"Deva"	"Taml"	"Telu"
"Gujr"	"Orya"	"Kannada"	"Devanagari"	"Latn"	"Deva"	"Orya"	"Gujr"	"Taml"	"ur"
"Gujr"	"Taml"	"Kannada"	"Gujarati"	"Latn"	"Ethi"	"Orya"	"Guru"	"Telu"	"Arab"
"Gujr"	"Telu"	"Kannada"	"Gurmukhi"	"Latn"	"Ethi/Aethiopi"	"Orya"	"Knda"	"Telu"	"Beng"
"Gujr"	"ur"	"Kannada"	"Latin"	"Latn"	"Ethi/ALALOC"	"Orya"	"Latn"	"Telu"	"Deva"
"Gurage"	"Ethiopic"	"Kannada"	"Malayalam"	"Latn"	"Ethi/Beta_Metsehafe"	"Orya"	"Mlym"	"Telu"	"Gujr"
"Gurmukhi"	"Arabic"	"Kannada"	"Oriya"	"Latn"	"Ethi/IES_JES_1964"	"Orya"	"Taml"	"Telu"	"Guru"
"Gurmukhi"	"Bengali"	"Kannada"	"Tamil"	"Latn"	"Ethi/Lambdin"	"Orya"	"Telu"	"Telu"	"Knda"
"Gurmukhi"	"Devanagari"	"Kannada"	"Telugu"	"Latn"	"Ethi/SERA"	"Orya"	"ur"	"Telu"	"Latn"
"Gurmukhi"	"Gujarati"	"Katakana"	"Hiragana"	"Latn"	"Ethi/Williamson"	"Pashto"	"Latin/BGN"	"Telu"	"Mlym"
"Gurmukhi"	"Kannada"	"Katakana"	"Latin"	"Latn"	"Geor"	"Persian"	"Latin/BGN"	"Telu"	"Orya"
"Gurmukhi"	"Latin"	"Katakana"	"Latin/BGN"	"Latn"	"Grek"	"Pinyin"	"NumericPinyin"	"Telu"	"Taml"
"Gurmukhi"	"Malayalam"	"Kazakh"	"Latin/BGN"	"Latn"	"Grek/UNGEGN"	"pl"	"am"	"Telu"	"ur"
"Gurmukhi"	"Oriya"	"Kirghiz"	"Latin/BGN"	"Latn"	"Gujr"	"pl"	"ar"	"Telugu"	"Arabic"
"Gurmukhi"	"Tamil"	"kk"	"am"	"Latn"	"Guru"	"pl"	"chr"	"Telugu"	"Bengali"
"Gurmukhi"	"Telugu"	"kk"	"ar"	"Latn"	"Hang"	"pl"	"fa"	"Telugu"	"Devanagari"
"Guru"	"Arab"	"kk"	"chr"	"Latn"	"Hebr"	"pl"	"ja"	"Telugu"	"Gujarati"
"Guru"	"Beng"	"kk"	"fa"	"Latn"	"Hira"	"pl"	"pl_FONIPA"	"Telugu"	"Gurmukhi"
"Guru"	"Deva"	"kk"	"kk_FONIPA"	"Latn"	"Jamo"	"pl_FONIPA"	"ja"	"Telugu"	"Kannada"
"Guru"	"Gujr"	"kk"	"kk_Latn/BGN"	"Latn"	"Kana"	"ps"	"ps_Latn/BGN"	"Telugu"	"Latin"
"Guru"	"Knda"	"Knda"	"Arab"	"Latn"	"Knda"	"Publishing"	"Any"	"Telugu"	"Malayalam"
"Guru"	"Latn"	"Knda"	"Beng"	"Latn"	"Mlym"	"rm_SURSILV"	"am"	"Telugu"	"Oriya"
"Guru"	"Mlym"	"Knda"	"Deva"	"Latn"	"Orya"	"rm_SURSILV"	"ar"	"Telugu"	"Tamil"
"Guru"	"Orya"	"Knda"	"Gujr"	"Latn"	"Syr"	"rm_SURSILV"	"chr"	"Thaa"	"Latn"
"Guru"	"Taml"	"Knda"	"Guru"	"Latn"	"Taml"	"rm_SURSILV"	"fa"	"Thaana"	"Latin"

"Thai"	"Latin"	"tr"	"Lower"	"und_FONIPA"	"chr"	"xh"	"am"	"zu"	"am"
"Thai"	"Latn"	"tr"	"Title"	"und_FONIPA"	"fa"	"xh"	"ar"	"zu"	"ar"
"tk_Cyrl"	"tk/BGN"	"tr"	"Upper"	"und_FONIPA" "und_FONXSAMP"		"xh"	"chr"	"zu"	"chr"
"tlh"	"am"	"Traditional"	"Simplified"	"und_FONXSAMP" "und_FONIPA"		"xh"	"fa"	"zu"	"fa"
"tlh"	"ar"	"Turkmen"	"Latin/BGN"	"uz_Cyrl" "uz/BGN"		"xh"	"xh_FONIPA"	"zu"	"zu_FONIPA"
"tlh"	"chr"	"ug"	"ug_FONIPA"	"uz_Cyrl" "uz_Latn"		"XSampa"	"IPA"		
"tlh"	"fa"	"uk"	"uk_Latn/BGN"	"uz_Latn" "uz_Cyrl"		"yo"	"yo_BJ"		
"tlh"	"tlh_FONIPA"	"Ukrainian"	"Latin/BGN"	"Uzbek" "Latin/BGN"		"Zawgyi"	"my"		
"Tone"	"Digit"	"und_FONIPA"	"ar"	"vec" "vec_FONIPA"		"zh_Latn_PINYIN"	"ru"		

## D.9 CSS Documentation

PDFreactor supports the following CSS properties and functions.

### D.9.1 Properties

#### **additive-symbols**

The additive-symbols descriptor lets you specify symbols when the value of a counter system descriptor is additive.

<b>Value:</b>	[ <integer> && [<string>   <identifier>] ]#
<b>Initial:</b>	0 ""
<b>Applies To:</b>	@counter-style
<b>Inherited:</b>	No

▪ *MDN documentation:* [additive-symbols](#)

#### **align-content**

Sets how the space of a box is distributed among its content items along the cross-axis of a flex container or in block-direction for block containers. Note that some values only work for flex containers or block containers.

<b>Value:</b>	normal   [first   last]? baseline   stretch   space-between   space-around   space-evenly   [safe   unsafe]? [start   center   end   flex-start   flex-end]
<b>Initial:</b>	normal
<b>Applies To:</b>	block containers, flex containers and grid containers
<b>Inherited:</b>	No

▪ *MDN documentation:* [align-content](#)

## align-items

This property specifies the default align-self for all of the child boxes participating in this box's formatting context.

<b>Value:</b>	<b>normal   stretch   [first   last]? baseline   [safe   unsafe]? [center   start   end   self-start   self-end   flex-start   flex-end]</b>
Initial:	normal
Inherited:	No

- *MDN documentation:* [align-items](#)
- *See also:* [align-self](#)

## align-self

Aligns the box within its containing block along the block/column/cross axis of the alignment container. This property can override the behavior that was set for them via their parent's 'align-items' property.

<b>Value:</b>	<b>auto   normal   stretch   [first   last]? baseline   [safe   unsafe]? [center   start   end   self-start   self-end   flex-start   flex-end]</b>
Initial:	auto
Applies To:	flex items, grid items and absolutely-positioned boxes
Inherited:	No

- *MDN documentation:* [align-self](#)
- *See also:* [align-items](#)

## all

The all property is a shorthand that resets all CSS properties except 'direction' and 'unicode-bidi'. It does not reset custom properties or prefixed properties.

<b>Value:</b>	<b>initial   inherit   unset</b>
Initial:	
Inherited:	No

- *MDN documentation:* [all](#)

## **-ro-alt-text**

The property `-ro-alt-text` is used to specify the alternative description for elements for PDF tagging. Other properties that support the values `aria-name` and `aria-description` may use the specified string as well.

<b>Value:</b>	<b>auto   none   &lt;string&gt;</b>
Initial:	auto
Inherited:	No

### **auto**

The alternate text is not specified and will be determined by other means, if necessary.

### **none**

Deprecated synonym of auto.

### **<string>**

Specific alternate text for the element. Often specified via the `attr` function, e.g. `attr(src)`

- See also: `-ro-pdf-tag-alt`
- More information: [Accessibility \(p. 155\)](#)

## **-ro-anchor**

This property allows to define an anchor via style.

Note: an element defined as an anchor automatically also is assigned a PDF ID ("named destination") equal to the given identifier.

<b>Value:</b>	<b>none   &lt;string&gt;+</b>
Initial:	none
Inherited:	No

### **none**

The element is not an anchor.

### **<string>**

The element is an anchor with the given name.

- More information: [Links \(p. 69\)](#)

**-ro-art-size**

Specifies the size of the ArtBox, one of the PDF page boxes.

<b>Value:</b>	<b>none   &lt;length&gt;{1,2}   [ &lt;page-size&gt;    [ portrait   landscape ] ]   media   trim   crop</b>
Initial:	none
Applies To:	@page
Inherited:	No

**none**

The element does not specify an ArtBox.

**media**

The ArtBox is specified with the same dimensions as the MediaBox.

**trim**

The ArtBox is specified with the same dimensions as the TrimBox.

**crop**

The ArtBox is specified with the same dimensions as the CropBox.

- *More information:* [PDF Page Boxes \(p. 126\)](#)

**-ro-author**

Sets the author in the metadata of the PDF document. Multiple values are concatenated to one string. (When applied to multiple elements the values are concatenated, separated by a comma.)

<b>Value:</b>	<b>none   [ &lt;string&gt;   content() ]+</b>
Initial:	none
Applies To:	all elements
Inherited:	No

**none**

Does not set a author.

**<string>**

Sets the specified string as author.

**content()**

Sets the author from the content of the element.

- *See also:* `-ro-keywords` , `-ro-subject` , `-ro-title`
- *More information:* [Metadata \(p. 70\)](#)

## background

This property is a shorthand property for setting most background properties at the same place in the style sheet. Note that only the final background layer may have a background-color.

<b>Value:</b>	[ <bg-layer>, ]* <final-bg-layer>
<b>Initial:</b>	see individual properties
<b>Inherited:</b>	No

▪ *MDN documentation:* [background](#)

▪ *See also:* [background-attachment](#), [background-clip](#), [background-color](#), [background-image](#), [background-origin](#), [background-position](#), [background-repeat](#), [background-size](#)

## background-attachment

If background images are specified, this property specifies whether they are fixed with regard to the viewport ('fixed') or scroll along with the element ('scroll').

<attachment> = scroll | fixed

<b>Value:</b>	<attachment>#
<b>Initial:</b>	scroll
<b>Inherited:</b>	No

### scroll

The background is fixed with regard to the element itself and does not scroll with its contents. (It is effectively attached to the element's border.)

### fixed

The background is fixed with regard to the viewport. For pages this means that the background is repeated on every page.

▪ *MDN documentation:* [background-attachment](#)

## background-clip

Determines the background painting area, which determines the area within which the background is painted.

<b>Value:</b>	[ border-box   padding-box   content-box ]#
<b>Initial:</b>	border-box
<b>Inherited:</b>	No

▪ *MDN documentation:* [background-clip](#)

## background-color

This property sets the background color of an element. The color is drawn behind any background images.

<b>Value:</b>	<b>&lt;color&gt;</b>
Initial:	transparent
Inherited:	No

- *MDN documentation:* [background-color](#)
- *More information:* [CSS Color Keywords](#) (p. 228)

## background-image

This property sets the background image of an element. When setting a background image, authors should also specify a background color that will be used when the image is unavailable. When the image is available, it is rendered on top of the background color. (Thus, the color is visible in the transparent parts of the image).

<b>Value:</b>	<b>&lt;bg-image&gt;#</b>
Initial:	none
Inherited:	No

- *MDN documentation:* [background-image](#)

## background-origin

For elements rendered as a single box, specifies the background positioning area. For elements rendered as multiple boxes (e.g. boxes on several pages), specifies which boxes 'box-decoration-break' operates on to determine the background positioning area(s).

<b>Value:</b>	<b>&lt;box&gt;#</b>
Initial:	padding-box
Inherited:	No

### <box>

border-box | padding-box | content-box | -ro-page-box | -ro-bleed-box

### -ro-page-box

Only valid for background-images of pages. The background is positioned relative to the page box (including the page margins)

### -ro-bleed-box

Only valid for background-images of pages. The background is positioned relative to the bleed box.

- *MDN documentation:* [background-origin](#)
- *See also:* [box-decoration-break](#)



## background-position

If a background image has been specified, this property specifies its initial position.

<b>Value:</b>	<b>&lt;position&gt;#</b>
Initial:	0% 0%
Inherited:	No

▪ MDN documentation: [background-position](#)

## background-repeat

If a background image is specified, this property specifies whether the image is repeated (tiled), and how.

<b>Value:</b>	<b>&lt;repeat-style&gt;#</b>
Initial:	repeat
Inherited:	No

▪ MDN documentation: [background-repeat](#)

## background-size

Specifies the size of the background images.

<b>Value:</b>	<b>&lt;bg-size&gt;#</b>
Initial:	auto
Inherited:	No

▪ MDN documentation: [background-size](#)

## **-ro-barcode**

This shorthand sets "-ro-barcode-content" and "-ro-barcode-type" as well as -ro-replacdelement, which is set to 'barcode' implicitly.

<b>Value:</b>	<b>&lt;'ro-barcode-content'&gt; &amp;&amp; &lt;'ro-barcode-type'&gt;</b>
<b>Initial:</b>	auto qrcode
<b>Inherited:</b>	No

## **-ro-barcode-checkdigit-mode**

Defines how checkdigits are calculated. This property only applies to certain barcode types.

<b>Value:</b>	<b>none   mod10   mod1010   mod11   mod1110   mod43   crc8</b>
<b>Initial:</b>	none
<b>Inherited:</b>	No

## **-ro-barcode-color**

Defines the color in which the barcode is rendered.

<b>Value:</b>	<b>&lt;color&gt;</b>
<b>Initial:</b>	black
<b>Inherited:</b>	No

## **-ro-barcode-composite-content**

Sets the content to be encoded in the linear part of a GS1 composite barcode. If no composite content is defined, the barcode content is used.

<b>Value:</b>	<b>auto   &lt;string&gt;</b>
<b>Initial:</b>	auto
<b>Inherited:</b>	No

## **-ro-barcode-composite-type**

Defines the barcode type of the linear part of a GS1 Composite barcode.  
Only certain barcode types are allowed.

<b>Value:</b>	<b>code128   [databar [stacked   omnidirectional-stacked   expanded   expanded-stacked   limited]?]   [databar-expanded stacked?]   databar-limited   ean-8   upc-a   upc-e</b>
<b>Initial:</b>	code128
<b>Inherited:</b>	No

## **-ro-barcode-content**

Defines the data which will be encoded within the barcode.

<b>Value:</b>	<b>auto   &lt;string&gt;   &lt;url&gt;</b>
<b>Initial:</b>	auto
<b>Inherited:</b>	No

### **auto**

Encodes the value of the href attribute of the replaced element and resolves its URL when possible. If the href attribute is not set, the text content of the element is used.

### **string**

Encodes the passed string as is.

### **url**

Encodes the URL, relative URLs are resolved according to the documents base URL.

## **-ro-barcode-ecc-level**

Defines how much of a barcode's capacity is used to store error correction data.

Whether this property is applied and its allowed values depend on the used barcode type.

<b>Value:</b>	<b>auto   &lt;integer&gt;   L   M   Q   H</b>
<b>Initial:</b>	auto
<b>Inherited:</b>	No

### **auto**

Use the default ecc level.

**-ro-barcode-encoding**

Defines how the data contained within a barcode should be encoded. This property might be ignored, depending on the barcode type.

<b>Value:</b>	<b>auto   eci   hiba   gs1</b>
Initial:	auto
Inherited:	No

**-ro-barcode-font-family**

Defines the font family to be used in the human readable text of a barcode.

<b>Value:</b>	<b>&lt;'font-family'&gt;</b>
Initial:	sans-serif
Inherited:	No

**-ro-barcode-font-size**

Sets the default font size for the human readable text.

<b>Value:</b>	<b>&lt;'font-size'&gt;</b>
Initial:	8pt
Inherited:	No

**-ro-barcode-human-readable-affix**

Defines the affixes at the beginning and end of the human readable text.

One value sets both affixes.

Whether this property is applied and its behavior depends on the used barcode type.

<b>Value:</b>	<b>none   [&lt;string&gt; &lt;string&gt;?]</b>
Initial:	none
Inherited:	No

**-ro-barcode-human-readable-position**

Defines the position and alignment of the human readable text or removes it.

This property only applies to certain barcode types.

<b>Value:</b>	<b>[[top   bottom]    [left   center   right]]   none</b>
Initial:	bottom center
Inherited:	No

### **-ro-barcode-letter-spacing**

This property specifies spacing behavior between characters in human readable text of barcodes

<b>Value:</b>	<b>normal   &lt;length&gt;</b>
Initial:	normal
Inherited:	No

### **-ro-barcode-reader-initialization**

Defines whether reader initialization instructions should be added to the barcode. This property only applies to certain barcode types.

<b>Value:</b>	<b>enabled   disabled</b>
Initial:	disabled
Inherited:	No

### **-ro-barcode-size**

Defines the size of a barcode. Which values are allowed depends on the used barcode type. The second integer only applies to PDF417 barcodes, setting their columns and rows.

<b>Value:</b>	<b>auto   [&lt;integer&gt;{1,2}    [&lt;length&gt;   &lt;percentage&gt;]]</b>
Initial:	auto
Inherited:	No

#### **<integer>**

Size value of the barcode.

#### **auto**

Use the default size.

#### **<length-percentage>**

Sets the bar length of 1D barcodes.

**-ro-barcode-structured-append**

Defines a structured series, the first value sets the total number of barcodes belonging to the series, the second value defines the ID of the series. This property only applies to certain barcode types.

<b>Value:</b>	<b>none   [&lt;integer&gt; [&lt;string&gt;   &lt;integer&gt;]?]</b>
Initial:	none
Inherited:	No

**-ro-barcode-structured-append-position**

Defines the position of a barcode within a structured series. This property only applies to certain barcode types.

<b>Value:</b>	<b>none   &lt;integer&gt;</b>
Initial:	none
Inherited:	No

**-ro-barcode-symbol-width**

Defines the module size or bar width of a barcode depending on its type.

<b>Value:</b>	<b>auto   &lt;length&gt;</b>
Initial:	auto
Inherited:	No

**<length>**

The module size or bar width.

**auto**

Use the default size of the respective barcode type

## -ro-barcode-type

Defines the type of barcode to be drawn. The second identifier selects the subtype.

<b>Value:</b>	<b>&lt;barcode-type&gt;</b>
Initial:	qrcode
Inherited:	No

## bleed

Specifies the width of the bleed area around the TrimBox. This implicitly defines the size of the BleedBox. Twice the bleed width added up on the width and height of the TrimBox' (twice for both sides of the TrimBox).

<b>Value:</b>	<b>auto   &lt;length&gt;</b>
Initial:	auto
Applies To:	@page
Inherited:	No

### auto

There is no bleed area round the TrimBox, except when crop marks are enabled, which causes a bleed width of 6pt.

### <length>

The length of the bleed area on each side of the TrimBox.

- See also: [size](#)
- More information: [PDF Page Boxes \(p. 126\)](#)

## -ro-bleed-mark-length

Sets the length of the bleed mark.

<b>Value:</b>	<b>auto   &lt;length&gt;</b>
Initial:	auto
Applies To:	@page
Inherited:	No

### auto

Computes the length automatically and lets the bleed mark always end at the media box.

### <length>

The absolute length of the bleed mark. Negative values are not allowed. A length of zero disables the bleed mark.

**-ro-bleed-mark-offset**

Specifies the gap between the bleed box and the bleed mark. Negative values are not allowed.

<b>Value:</b>	<b>&lt;length&gt;</b>
Initial:	0
Applies To:	@page
Inherited:	No

**<length>**

Specifies the gap as an absolute length.

**block-size  
inline-size**

These properties set width and height based on the logical directions (depending on text direction).

The property 'block-size' set the height, while 'inline-size' sets the width.

<b>Value:</b>	<b>&lt;'width'&gt;</b>
Initial:	auto
Applies To:	Same as 'width', 'height'
Inherited:	No

- MDN documentation: [block-size](#), [inline-size](#)
- See also: [height](#), [width](#)

**bookmark-label**

Defines the text content of a bookmark, i.e. the title as it appears in a PDF reader's outline. For more details on the values, please see the documentation of 'string-set'.

<b>Value:</b>	<b>[ &lt;string&gt;   &lt;named-string&gt;   &lt;quote&gt;   counter()   counters()   content()   target-text()   target-counters()   target-counter() ]+</b>
Initial:	content(text)
Inherited:	No

- See also: [string-set](#)



## bookmark-level

Using this property, one can structure the specified elements within the bookmark view of the PDF viewer. The elements are ordered in ascending order. The element with the lowest bookmark level is on top of the bookmark hierarchy (similar to HTML headlines).

<b>Value:</b>	<b>none   &lt;integer&gt;</b>
Initial:	none
Inherited:	No

### none

Do not create a bookmark.

### <integer>

An integer greater than 0, that indicates the level of the bookmark.

- See also: `-ro-destination-area`

## bookmark-state

This property defines whether a bookmark should be opened, thus showing the next level of bookmarks. If set to closed, the bookmark's descendants are initially hidden.

<b>Value:</b>	<b>open   closed</b>
Initial:	open
Applies To:	block-level elements
Inherited:	No

### open

The bookmark is opened by default, showing the bookmarks of the next level.

### closed

The bookmark is closed by default, hiding the bookmarks of the next level.

## **-ro-bookmarks-enabled**

This property allows to enable or disable PDF bookmarks for the content inside an iframe. If the iframe is seamless, this property is set to true by default.

<b>Value:</b>	<b>true   false</b>
Initial:	false
Applies To:	iframe
Inherited:	No

▪ *More information:* [iframes \(p. 55\)](#)

## **border**

This property is a shorthand property for setting the same width, color, and style for all four borders of a box.

<b>Value:</b>	<b>&lt;line-width&gt;    &lt;line-style&gt;    &lt;color&gt;</b>
Initial:	see individual properties
Inherited:	No

▪ *MDN documentation:* [border](#)

▪ *See also:* [border-color](#), [border-style](#), [border-width](#)

## **border-block border-inline**

These properties set borders based on the logical directions (depending on text direction). Block direction is top and bottom, inline direction is left and right.

<b>Value:</b>	<b>&lt;border-width&gt;    &lt;border-style&gt;    &lt;color&gt;</b>
Initial:	
Inherited:	No

▪ *MDN documentation:* [border-block](#), [border-inline](#)

## **border-block-color**

## **border-inline-color**

These properties set border colors based on the logical directions (depending on text direction).

The first value of `border-block-color` represents the top edge style, and the second value represents the bottom edge style.

The values of `border-inline-color` represent the left and right edge style in BiDi-dependent order. If only one value is given, it applies to both the start and end edges.

<b>Value:</b>	<b>&lt;color&gt;{1,2}</b>
Initial:	
Inherited:	No

- *MDN documentation:* [border-block-color](#), [border-inline-color](#)
- *More information:* [Text Direction Dependent Layouts \(p. 139\)](#)

## **border-block-style**

## **border-inline-style**

These properties set border styles based on the logical directions (depending on text direction). The first value of `border-block-style` represents the top edge style, and the second value represents the bottom edge style. The values of `border-inline-style` represent the left and right edge style in BiDi-dependent order. If only one value is given, it applies to both the start and end edges.

<b>Value:</b>	<b>&lt;border-style&gt;{1,2}</b>
Initial:	see individual properties
Inherited:	No

- *MDN documentation:* [border-block-style](#), [border-inline-style](#)
- *More information:* [Text Direction Dependent Layouts \(p. 139\)](#)

## **border-block-width**

## **border-inline-width**

These properties set border widths based on the logical directions (depending on text direction). The first value of `-width` represents the top edge style, the second value represents the bottom edge style. The values of `border-inline-width` represent the left and right edge style in BiDi-dependent order. If only one value is given, it applies to both the start and end edges.

<b>Value:</b>	<code>&lt;border-width&gt;{1,2}</code>
<b>Initial:</b>	
<b>Inherited:</b>	No

- *MDN documentation:* [border-block-width](#), [border-inline-width](#)
- *More information:* [Text Direction Dependent Layouts](#) (p. 139)

## **border-bottom-left-radius**

## **border-bottom-right-radius**

## **border-top-left-radius**

## **border-top-right-radius**

The two length or percentage values of the 'border-\*-radius' properties define the radii of a quarter ellipse that defines the shape of the corner of the outer border edge.

<b>Value:</b>	<code>[&lt;length&gt;   &lt;percentage&gt;]{1,2}</code>
<b>Initial:</b>	0
<b>Applies To:</b>	all elements (but see prose)
<b>Inherited:</b>	No

- *MDN documentation:* [border-bottom-left-radius](#), [border-bottom-right-radius](#), [border-top-left-radius](#), [border-top-right-radius](#)
- *See also:* [border-radius](#)

## border-collapse

This property selects a table's border model.

<b>Value:</b>	<b>collapse   separate</b>
Initial:	separate
Applies To:	'table' and 'inline-table' elements
Inherited:	Yes

- MDN documentation: [border-collapse](#)

## border-color

The 'border-color' property sets the color of the four borders.

<b>Value:</b>	<b>[ &lt;color&gt; ]{1,4}</b>
Initial:	see individual properties
Inherited:	No

- MDN documentation: [border-color](#)
- See also: [border-\\*-color](#)
- More information: [CSS Color Keywords \(p. 228\)](#)

## border-inline-start border-inline-end border-block-start border-block-end

These properties set borders based on the logical directions (depending on text direction). Block start and end correspond to top and bottom. Inline start and end correspond to left and right or right and left, depending on the BiDi text direction.

<b>Value:</b>	<b>&lt;border-width&gt;    &lt;border-style&gt;    &lt;color&gt;</b>
Initial:	see individual properties
Inherited:	No

- MDN documentation: [border-inline-start](#), [border-inline-end](#), [border-block-start](#), [border-block-end](#)
- See also: [border-top](#), [border-right](#), [border-bottom](#), [border-left](#)
- More information: [Text Direction Dependent Layouts \(p. 139\)](#)

**border-inline-start-color**  
**border-inline-end-color**  
**border-block-start-color**  
**border-block-end-color**

These properties set border colors based on the logical directions (depending on text direction).

Block start and end correspond to top and bottom. Inline start and end correspond to left and right or right and left, depending on the BiDi text direction.

<b>Value:</b>	<b>&lt;color&gt;</b>
Initial:	currentColor
Inherited:	No

- *MDN documentation:* [border-inline-start-color](#), [border-inline-end-color](#), [border-block-start-color](#), [border-block-end-color](#)
- *See also:* [border-\\*-color](#)
- *More information:* [Text Direction Dependent Layouts \(p. 139\)](#)

**border-inline-start-style**  
**border-inline-end-style**  
**border-block-start-style**  
**border-block-end-style**

These properties set border styles based on the logical directions (depending on text direction).

Block start and end correspond to top and bottom. Inline start and end correspond to left and right or right and left, depending on the BiDi text direction.

<b>Value:</b>	<b>&lt;border-style&gt;</b>
Initial:	none
Inherited:	No

- *MDN documentation:* [border-inline-start-style](#), [border-inline-end-style](#), [border-block-start-style](#), [border-block-end-style](#)
- *See also:* [border-\\*-style](#)
- *More information:* [Text Direction Dependent Layouts \(p. 139\)](#)

## border-inline-start-width

## border-inline-end-width

## border-block-start-width

## border-block-end-width

These properties set border widths based on the logical directions (depending on text direction).

Block start and end correspond to top and bottom. Inline start and end correspond to left and right or right and left, depending on the BiDi text direction.

<b>Value:</b>	<b>&lt;border-width&gt;</b>
Initial:	medium
Inherited:	No

- *MDN documentation:* [border-inline-start-width](#), [border-inline-end-width](#), [border-block-start-width](#), [border-block-end-width](#)
- *See also:* [border-\\*-width](#)
- *More information:* [Text Direction Dependent Layouts \(p. 139\)](#)

## -ro-border-length

Defines the length of a top border starting from the left (or the right if direction is right-to-left).

<b>Value:</b>	<b>&lt;percentage&gt;   &lt;length&gt;   auto</b>
Initial:	auto
Inherited:	No

## border-radius

The 'border-radius' shorthand sets all four 'border-\*-radius' properties.

<b>Value:</b>	<b>[ &lt;length&gt;   &lt;percentage&gt; ]{1,4} [ / [ &lt;length&gt;   &lt;percentage&gt; ]{1,4} ]?</b>
Initial:	see individual properties
Applies To:	all elements (but see prose)
Inherited:	No

- *MDN documentation:* [border-radius](#)
- *See also:* [border-\\*-radius](#)

## border-spacing

The lengths specify the distance that separates adjoining cell borders.

<b>Value:</b>	<code>&lt;length&gt; &lt;length&gt;?</code>
Initial:	0
Applies To:	'table' and 'inline-table' elements
Inherited:	Yes

■ *MDN documentation:* [border-spacing](#)

## border-start-start-radius

## border-start-end-radius

## border-end-start-radius

## border-end-end-radius

These properties set border radii based on the logical directions (depending on text direction).

The mapping depends on the BiDi text direction of the element. The properties `border-start-start-radius` and `border-start-end-radius` always map to the styles for the top, `border-end-start-radius` and `border-end-end-radius` always to the styles for the bottom of the element.

<b>Value:</b>	<code>[&lt;length&gt;   &lt;percentage&gt;]{1,2}</code>
Initial:	0
Inherited:	No

■ *See also:* `border-*-radius`

■ *More information:* [Text Direction Dependent Layouts \(p. 139\)](#)

## border-style

The 'border-style' property sets the style of the four borders. It can have from one to four component values, and the values are set on the different sides as for 'border-width'.

<b>Value:</b>	<code>&lt;border-style&gt;{1,4}</code>
Initial:	see individual properties
Inherited:	No

■ *MDN documentation:* [border-style](#)

■ *See also:* `border-*-style`



## border-top

## border-right

## border-bottom

## border-left

This is a shorthand property for setting the width, style, and color of the top, right, bottom, and left border of a box.

Value:	<border-width>    <border-style>    <color>
Initial:	see individual properties
Inherited:	No

- MDN documentation: [border-top](#), [border-right](#), [border-bottom](#), [border-left](#)
- See also: [border-\\*-\\*](#), [border-\\*-color](#), [border-\\*-style](#), [border-\\*-width](#)

## border-top-color

## border-right-color

## border-bottom-color

## border-left-color

The 'border-\*-color' properties set the color of the specified border.

Value:	<color>
Initial:	currentColor
Inherited:	No

- MDN documentation: [border-top-color](#), [border-right-color](#), [border-bottom-color](#), [border-left-color](#)
- See also: [border-\\*-\\*-color](#)
- More information: [CSS Color Keywords](#) (p. 228)

## border-top-style

## border-right-style

## border-bottom-style

## border-left-style

The border style properties specify the line style of a box's border (solid, double, dashed, etc.). The properties defined in this section refer to the <border-style> value type, which may take one of the following values:

Value:	<border-style>
Initial:	none
Inherited:	No

- MDN documentation: [border-top-style](#), [border-right-style](#), [border-bottom-style](#), [border-left-style](#)
- See also: [border-\\*-\\*-style](#)

## border-top-width

## border-right-width

## border-bottom-width

## border-left-width

The border width properties specify the width of the border area.

<b>Value:</b>	<b>&lt;border-width&gt;</b>
Initial:	medium
Inherited:	No

- *MDN documentation:* [border-top-width](#), [border-right-width](#), [border-bottom-width](#), [border-left-width](#)
- *See also:* [border-\\*-\\*-width](#)

## border-width

This property is a shorthand property for setting 'border-top-width', 'border-right-width', 'border-bottom-width', and 'border-left-width' at the same place in the style sheet.

<b>Value:</b>	<b>&lt;border-width&gt;{1,4}</b>
Initial:	see individual properties
Inherited:	No

- *MDN documentation:* [border-width](#)
- *See also:* [border-\\*-\\*-width](#)

## bottom

Like 'top', but specifies how far a box's bottom margin edge is offset above the bottom of the box's containing block. For relatively positioned boxes, the offset is with respect to the bottom edge of the box itself.

<b>Value:</b>	<b>&lt;length&gt;   &lt;percentage&gt;   auto</b>
Initial:	auto
Applies To:	positioned elements
Inherited:	No

- *MDN documentation:* [bottom](#)
- *See also:* [inset-\\*](#)

## box-decoration-break

When a block is split, this property determines whether margins, borders and paddings wrap the edges of the split box or if they should be "sliced".

If a block has a background, this property determines whether the background is "sliced".

<b>Value:</b>	<b>slice   clone</b>
Initial:	slice
Applies To:	all elements
Inherited:	No

▪ MDN documentation: [box-decoration-break](#)

## box-shadow

Applies one or more rectangular shadows to a box.

<b>Value:</b>	<b>none   [inset? &amp;&amp; &lt;length&gt;{2,4} &amp;&amp; &lt;color&gt;?]*</b>
Initial:	none
Inherited:	No

▪ MDN documentation: [box-shadow](#)

## box-sizing

Defines which box is used to calculate the widths and heights of elements.

<b>Value:</b>	<b>content-box   border-box</b>
Initial:	content-box
Applies To:	all elements that accept width or height
Inherited:	No

▪ MDN documentation: [box-sizing](#)

## break-before break-after

These properties describe page/column/region break behavior before/after the element's box.

<b>Value:</b>	<b>auto   always   avoid   left   right   verso   recto   page   column   region   avoid-page   avoid-column   avoid-region</b>
Initial:	auto
Applies To:	block-level elements
Inherited:	No

- *MDN documentation:* [break-before](#), [break-after](#)
- *More information:* [Controlling Breaks \(p. 124\)](#)

## break-inside

This property describes the page/column/region break behavior inside the element's box.

<b>Value:</b>	<b>auto   avoid   avoid-page   avoid-column   avoid-region</b>
Initial:	auto
Applies To:	block-level elements
Inherited:	No

- *MDN documentation:* [break-inside](#)
- *More information:* [Controlling Breaks \(p. 124\)](#)

## caption-side

This property specifies the position of the caption box with respect to the table box. In order to ensure that top caption is on the first page, it should be the table's first child. If the caption should be on the last page, place the caption as the table's last child.

<b>Value:</b>	<b>top   bottom</b>
Initial:	top
Applies To:	'table-caption' elements
Inherited:	Yes

- *MDN documentation:* [caption-side](#)

## **-ro-change-bar**

Shorthand property to set all change bar properties.

Value:	<code>none</code>   [ <code>&lt;color&gt;</code>    <code>&lt;'ro-change-bar-align'&gt;</code>    [ <code>&lt;'ro-change-bar-offset'&gt;</code> <code>&lt;'ro-change-bar-width'&gt;?</code> ] ] [ / <code>&lt;'ro-change-bar-name'&gt;</code> ]?
Initial:	
Inherited:	No

▪ *More information:* [Change Bars \(p. 152\)](#)

## **-ro-change-bar-align**

Specifies at which horizontal base position a change bar should appear, e.g. on which side of a page.

Value:	[ <code>start</code>   <code>end</code>   <code>left</code>   <code>right</code>   <code>inside</code>   <code>outside</code> ]    [ [ <code>page</code>    <code>distribute-column</code> ]   <code>column</code> ]
Initial:	start page
Inherited:	No

### **start**

The change bar is positioned to the left for left-to-right documents or to the right for right-to-left documents. This is the default direction.

### **end**

The change bar is positioned to the right for left-to-right documents or to the left for right-to-left documents.

### **left**

The change bar is positioned to the left.

### **right**

The change bar is positioned to the right.

### **inside**

The change bar is positioned on the side that would be the inside of a book, i.e. on the right for left pages and on the left for right pages.

### **outside**

The change bar is positioned on the side that would be the outside of a book, i.e. on the left for left pages and on the right for right pages.

### **distribute-column**

This only works if the change bars are set to be placed on the page. Optional setting that enables a special behavior of change bars for elements in multi-column contexts, where they are placed on the page side that is closer to its respective column. If the distance is equal, the specified direction is used.

### **page**

Sets that the base position of the change bars should always be the page margin. This is default behavior.

**column**

If set and the change bar creating element is inside a multi-column context, the change bar is rendered next to the column instead of inside the page margin.

- See also: `-ro-change-bar-color`
- More information: [Change Bars \(p. 152\)](#)

**-ro-change-bar-color**

Enables a change bar of the specified color that appears next to the matching elements (usually in the page margin). For other settings like width or position of the change bar, see the respective change bar properties.

<b>Value:</b>	<b>none   &lt;color&gt;</b>
Initial:	none
Inherited:	No

**none**

There is no change bar for this element.

**<color>**

A change bar of the specified color is created for this element.

- See also: `-ro-change-bar-align`, `-ro-change-bar-offset`, `-ro-change-bar-width`
- More information: [Change Bars \(p. 152\)](#)

**-ro-change-bar-exclusion**

Specifies the names of change bars that may not be painted on the height of this element. Multiple names may be specified to block change bars of different names. Setting the value 'all' blocks all change bars, including those without names.

<b>Value:</b>	<b>none   all   &lt;identifier&gt;#</b>
Initial:	none
Inherited:	No

- More information: [Change Bars \(p. 152\)](#)

## **-ro-change-bar-name**

Defines a name for the change bar that is described on this element so that it can be addressed by the `-ro-change-bar-exclusion` property. Different change bars may share the same name.

<b>Value:</b>	<b>none   &lt;identifier&gt;</b>
Initial:	none
Inherited:	No

- See also: `-ro-change-bar-exclusion`
- More information: [Change Bars \(p. 152\)](#)

## **-ro-change-bar-offset**

Specifies the horizontal gap between a change bar and the respective container's edge. Percentages are resolved against either the margin width of the corresponding side or, in the case of change bars in multi-column elements, against the column gap width. The offset is directed outwards (i.e. away from the content creating it), but negative values are allowed.

<b>Value:</b>	<b>&lt;length&gt;   &lt;percentage&gt;</b>
Initial:	25%
Inherited:	No

- See also: `-ro-change-bar-color`
- More information: [Change Bars \(p. 152\)](#)

## **-ro-change-bar-width**

Specifies the width of the change bar if one is created via setting a change bar color on the matching element.

<b>Value:</b>	<b>&lt;border-width&gt;</b>
Initial:	medium
Inherited:	No

- See also: `-ro-change-bar-color`
- More information: [Change Bars \(p. 152\)](#)

## clear

This property indicates which sides of an element's box(es) may not be adjacent to an earlier floating box. The 'clear' property does not consider floats inside the element itself or in other block formatting contexts.

<b>Value:</b>	<b>none   left   right   inline-start   inline-end   both</b>
<b>Initial:</b>	none
<b>Inherited:</b>	No

■ *MDN documentation:* [clear](#)

## clip

A clipping region defines what portion of an element's border box is visible. By default, the element is not clipped. However, the clipping region may be explicitly set with the 'clip' property.

<b>Value:</b>	<b>&lt;shape&gt;   auto</b>
<b>Initial:</b>	auto
<b>Applies To:</b>	absolutely positioned elements
<b>Inherited:</b>	No

### auto

The element does not clip.

### <shape>

In CSS 2.1, the only valid <shape> value is: rect(<top>, <right>, <bottom>, <left>) where <top> and <bottom> specify offsets from the top border edge of the box, and <right>, and <left> specify offsets from the left border edge of the box. Authors should separate offset values with commas. <top>, <right>, <bottom>, and <left> may either have a <length> value or 'auto'. Negative lengths are permitted. The value 'auto' means that a given edge of the clipping region will be the same as the edge of the element's generated border box (i.e., 'auto' means the same as '0' for <top> and <left>, the same as the used value of the height plus the sum of vertical padding and border widths for <bottom>, and the same as the used value of the width plus the sum of the horizontal padding and border widths for <right>, such that four 'auto' values result in the clipping region being the same as the element's border box).

■ *MDN documentation:* [clip](#)



## clip-path

This property creates a clipping region that sets what part of an element should be shown. Parts that are inside the region are shown, while those outside are hidden.

<b>Value:</b>	<code>&lt;clip-source&gt;   [ [ &lt;basic-shape&gt;    &lt;geometry-box&gt; ]   none</code>
<b>Initial:</b>	none
<b>Inherited:</b>	No

### clip-source

An URL to the `<clipPath>` element within an SVG which outlines the shape to be clipped.

### basic shape

A CSS function describing a shape as defined in the CSS Shapes module. This can be `inset()`, `circle()`, `ellipse()`, or `polygon()`.

### geometry box

If used in combination with a basic shape, it provides the reference box according to which the shape is drawn. If used by itself, the edges of the specified box are used, including any corner shaping. Valid values are: `border-box`, `padding-box`, `content-box`, `margin-box`, `fill-box`, `stroke-box` and `view-box`. For elements with associated CSS layout box, the used value for `fill-box` is `content-box` and for `stroke-box` and `view-box` is `border-box`.

- *MDN documentation:* [clip-path](#)

## color

This property describes the foreground color of an element's text content.

<b>Value:</b>	<code>&lt;color&gt;</code>
<b>Initial:</b>	black
<b>Inherited:</b>	Yes

- *MDN documentation:* [color](#)
- *More information:* [CSS Color Keywords \(p. 228\)](#)

**-ro-colorbar-offset**

Specifies the gap between the trim box and the color bars. Negative values are not allowed.

<b>Value:</b>	<b>&lt;length&gt;   &lt;percentage&gt;</b>
Initial:	100%
Applies To:	@page
Inherited:	No

**<length>**

Specifies the gap as an absolute length.

**<percentage>**

Specifies the gap as a percentage value relative to the bleed. A value of 100% positions the inner side of the color bar exactly at the outer edge of the bleed.

**-ro-colorbar-top-left**  
**-ro-colorbar-top-right**  
**-ro-colorbar-bottom-left**  
**-ro-colorbar-bottom-right**  
**-ro-colorbar-left-top**  
**-ro-colorbar-left-bottom**  
**-ro-colorbar-right-top**  
**-ro-colorbar-right-bottom**

Color bars for print layout in oversized pages.

<b>Value:</b>	<b>gradient-tint   progressive-color   [&lt;color&gt;]+   none</b>
Initial:	none
Applies To:	@page
Inherited:	No

**gradient-tint**

Defines a set of 11 grayscale colors, starting with a CMYK value of 0% each and raising the cyan, magenta and yellow values by 10% on every step.

**progressive-color**

Defines a set including solid process colors (cyan, magenta, yellow, black), solid overprint colors (cyan & magenta, cyan & yellow, magenta & yellow) and a 50% tint of each of the process colors.

**[<color>]+**

One or more colors which will be sequentially painted from left to right or from top to bottom respectively.

- *More information:* [Printer Marks \(p. 128\)](#), [CSS Color Keywords \(p. 228\)](#)

## **-ro-column-clip**

Allows to restore the legacy behavior that clipped content inside a multi-column element at the middle of its column-gap, so that it would not overflow into the next column.

<b>Value:</b>	<b>none   auto</b>
Initial:	none
Applies To:	multicol containers
Inherited:	No

### **none**

The browser behavior, as described by the CSS specifications. Content inside a column may overflow into the next column.

### **auto**

The legacy behavior, as it was described in earlier versions of the CSS specifications. Content inside the columns is clipped horizontally, if it would overflow into the next column.

## **column-count**

This property specifies the number of columns of a multi-column element. Numbers below 1 are invalid. If the property column-width is also set to a non-auto value, the property that leads to fewer columns takes precedence.

<b>Value:</b>	<b>&lt;integer&gt;   auto</b>
Initial:	auto
Applies To:	block containers
Inherited:	No

- *MDN documentation:* [column-count](#)
- *See also:* [column-width](#)
- *More information:* [Multi-column Layout \(p. 118\)](#)

## column-fill

In continuous media, this property will only be consulted if the length of columns has been constrained. Otherwise, columns will automatically be balanced.

<b>Value:</b>	<b>balance   balance-all   auto</b>
Initial:	balance
Applies To:	multicol elements
Inherited:	No

- *MDN documentation:* [column-fill](#)
- *More information:* [Multi-column Layout \(p. 118\)](#)

## column-gap grid-column-gap

The 'column-gap' property sets the gap between columns. If there is a column rule between columns, it will appear in the middle of the gap.

<b>Value:</b>	<b>&lt;length&gt;   &lt;percentage&gt;   normal</b>
Initial:	normal
Applies To:	multi-column containers and grid containers
Inherited:	No

- *MDN documentation:* [column-gap](#)
- *More information:* [Multi-column Layout \(p. 118\)](#)

## column-rule

This property is a shorthand for setting 'column-rule-width', 'column-rule-style', and 'column-rule-color' at the same place in the style sheet. Omitted values are set to their initial values.

Value:	<'column-rule-width'>    <'column-rule-style'>    [ <'column-rule-color'> ]
Initial:	see individual properties
Applies To:	multicol elements
Inherited:	No

- MDN documentation: [column-rule](#)
- See also: [column-rule-color](#) , [column-rule-style](#) , [column-rule-width](#)
- More information: [Multi-column Layout \(p. 118\)](#)

## column-rule-color

This property sets the color of the column rule.

Value:	<color>   none
Initial:	currentColor
Applies To:	multicol elements
Inherited:	No

- MDN documentation: [column-rule-color](#)
- More information: [Multi-column Layout \(p. 118\)](#), [CSS Color Keywords \(p. 228\)](#)

## column-rule-style

The 'column-rule-style' property sets the style of the rule between columns of an element. The <border-style> values are defined in CSS2.1 and the values are interpreted as in the collapsing border model.

Value:	<border-style>   none
Initial:	none
Applies To:	multicol elements
Inherited:	No

- MDN documentation: [column-rule-style](#)
- See also: [border-style](#)
- More information: [Multi-column Layout \(p. 118\)](#)

## column-rule-width

This property sets the width of the rule between columns. Negative values are not allowed.

<b>Value:</b>	<b>&lt;border-width&gt;   &lt;percentage&gt;   none</b>
Initial:	medium
Applies To:	multicol elements
Inherited:	No

- *MDN documentation:* [column-rule-width](#)
- *See also:* [border-width](#)
- *More information:* [Multi-column Layout \(p. 118\)](#)

## column-span

This property describes how many columns an element spans across.

<b>Value:</b>	<b>none   all</b>
Initial:	none
Applies To:	block-level elements, except floating and absolutely positioned elements
Inherited:	No

- *MDN documentation:* [column-span](#)
- *More information:* [Multi-column Layout \(p. 118\)](#)

## column-width

This property specifies the width of columns in multi-column elements. Negative lengths are invalid. Lengths below 1px are treated as 1px. If the property column-count is also set to a non-auto value, the property that leads to fewer columns takes precedence.

<b>Value:</b>	<b>&lt;length&gt;   auto</b>
Initial:	auto
Applies To:	block containers
Inherited:	No

- *MDN documentation:* [column-width](#)
- *See also:* [column-count](#)
- *More information:* [Multi-column Layout \(p. 118\)](#)

## columns

This is a shorthand property for setting 'column-width' and 'column-count'. Omitted values are set to their initial values.

<b>Value:</b>	[ <length>   auto ]    [ <integer>   auto ]
Initial:	see individual properties
Applies To:	block containers
Inherited:	No

- *MDN documentation:* [columns](#)
- *See also:* [column-count](#), [column-width](#)
- *More information:* [Multi-column Layout \(p. 118\)](#)

## -ro-comment-color

Specifies the color of the comment.

<b>Value:</b>	auto   <color>
Initial:	auto
Inherited:	No

### auto

The color depends on the value of the '-ro-comment-style' property: '-ro-comment-highlight' for 'note' and 'highlight', '-ro-comment-underline' for 'underline' and 'squiggly', '-ro-comment-strikeout' for 'strikeout'

### <color>

The color of the comment.

- *More information:* [Comments \(p. 150\)](#), [CSS Color Keywords \(p. 228\)](#)

## -ro-comment-content

Specifies the content of a comment.

<b>Value:</b>	none   [ <string>   content() ]+
Initial:	none
Inherited:	No

### none

The comment receives no content.

### <string>

Defines the content of the comment.

**content()**

Defines the content of the comment from the content of the element.

- *More information:* [Comments \(p. 150\)](#)

**-ro-comment-date**

Specifies the date of the comment.

<b>Value:</b>	<b>auto   &lt;string&gt;</b>
<b>Initial:</b>	auto
<b>Inherited:</b>	No

**auto**

The date of the comment is the current date.

**<string>**

The date of the comment, formatted according to the value of the "-ro-comment-dateformat" property.

- *More information:* [Comments \(p. 150\)](#)

**-ro-comment-dateformat**

The format which is applied to the string value of the "-ro-comment-date" property. The format of this value is similar to the Java SimpleDateFormat class.

The initial value is the ISO date format.

<b>Value:</b>	<b>&lt;string&gt;</b>
<b>Initial:</b>	"yyyy-MM-dd'T'kk:mm:ss"
<b>Inherited:</b>	No

**<string>**

The date format for the comment.

- *More information:* [Comments \(p. 150\)](#)



**-ro-comment-position**

The position of the note icon of the comment. This property is only applicable when the value of the property "-ro-comment-style" is set to note.

Value:	auto   page-left   page-right
Initial:	auto
Inherited:	No

**page-left**

Shifts the note icon to the left side of the page.

**page-right**

Shifts the note icon to the right side of the page.

**auto**

The note icon is placed next to the commented text.

▪ *More information:* [Comments \(p. 150\)](#)

**-ro-comment-start****-ro-comment-end**

Specifies the start or end elements which encompass commented text. Both properties have to be specified on the respective element to link the start element of the comment with the end element.

Value:	none   [<string> [<string>]?]
Initial:	none
Inherited:	No

**none**

The element is not a comment start or end element.

**<string>**

A unique identifier which links start and end element.

**[<string>]**

An optional second identifier to link start and end properties. This should only be used if the unique identifier is not unique for all elements but only for certain elements.

▪ *More information:* [Comments \(p. 150\)](#)

## **-ro-comment-state**

The initial state of the comment bubbles displayed by the viewer. This property only affects certain PDF viewers.

<b>Value:</b>	<b>open   closed</b>
Initial:	closed
Inherited:	No

### **open**

All comment bubbles will be opened and displayed when the document is opened in the PDF viewer.

### **closed**

All comment bubbles will be closed when the document is opened in the PDF viewer.

- *More information:* [Comments \(p. 150\)](#)

## **-ro-comment-style**

Specifies the style of the comment.

<b>Value:</b>	<b>note   highlight   underline   strikeout   squiggly   invisible</b>
Initial:	note
Inherited:	No

### **note**

Displays the comment as a note icon.

### **highlight**

Highlights the background of the comment area in a certain color.

### **underline**

Underlines the text of the comment area with a straight line.

### **strikeout**

Strikes out the text of the comment area.

### **squiggly**

Underlines the text of the comment area with a squiggly line.

### **invisible**

Does not visualize the comment in any way.

- *More information:* [Comments \(p. 150\)](#)

## **-ro-comment-title**

Specifies the title or author of the comment.

<b>Value:</b>	<b>none   &lt;string&gt;</b>
<b>Initial:</b>	none
<b>Inherited:</b>	No

### **none**

The comment receives no title.

### **<string>**

Defines the title of the comment.

- *More information:* [Comments \(p. 150\)](#)

## **content**

This property is used with the :before and :after pseudo-elements to generate content in a document.

<b>Value:</b>	<b>normal   none   [ &lt;string&gt;   &lt;named-string&gt;   &lt;uri&gt;   &lt;gradient&gt;   &lt;quote&gt;   counter()   -ro-counter-offset()   counters()   content()   target-text()   target-counters()   target-counter()   -ro-target-counter-offset()   leader() ]+   &lt;running-element&gt;   &lt;running-document&gt;</b>
<b>Initial:</b>	normal
<b>Applies To:</b>	:before and :after pseudo-elements as well as page-margin boxes
<b>Inherited:</b>	No

### **<named-string>** 📌

Named strings may be specified with the function: 'string()'. The string function has two arguments. The name of the named string as identifier and the location on the page (which is optional).

### **<running-element>** 📌

Running Elements may be specified with the function: 'element()' from a position property. The element function has two arguments. The name of the running element as identifier and the location on the page (which is optional).

### **<running-document>** 📌

Running documents may be specified with the proprietary function 'xhtml()', which takes an HTML string or a URL function.

- *MDN documentation:* [content](#)
- *See also:* `-ro-counter-offset`, `-ro-target-counter-offset`
- *More information:* [Generated Content \(p. 98\)](#), [Page Header & Footer \(p. 102\)](#), [Generated Content for Pages \(p. 107\)](#)

## counter-increment

The 'counter-increment' property increases or decreases the value of counters.

Value:	none   [ <identifier> <integer>? ]+
Initial:	none
Inherited:	No

- MDN documentation: [counter-increment](#)
- More information: [Counters \(p. 100\)](#), [Page Counters \(p. 107\)](#)

## counter-reset

The 'counter-reset' property sets a list of counters to a certain value.

Value:	none   [ <identifier> <integer>? ]+
Initial:	none
Inherited:	No

- MDN documentation: [counter-reset](#)
- More information: [Counters \(p. 100\)](#), [Page Counters \(p. 107\)](#)

## -ro-counter-set

The '-ro-counter-set' property contains a list of one or more names of counters, each one optionally followed by an integer.

The integer gives the value that the counter is set to on each occurrence of the element. The default is 0.

The difference to the 'counter-reset' property is, that '-ro-counter-set' does not create a new instance of a counter if an existing counter is present. This allows '-ro-counter-set' to reset an existing counter from anywhere inside the document.

In contrast to 'counter-set', the value of '-ro-counter-set' is still modified by a 'counter-increment' set on the same element.

Value:	none   [ <identifier> <integer>? ]+
Initial:	none
Inherited:	No

- More information: [Page Counters \(p. 107\)](#)

## counter-set

The 'counter-set' property sets the value of an existing counter. In contrast to counter-reset, it will only create a new counter scope, if it is used outside an existing one of the specified name.

Value:	none   [ <identifier> <integer>? ]+
Initial:	none
Inherited:	No

■ MDN documentation: [counter-set](#)

## -ro-crop-mark-length

Sets the length of the crop mark.

Value:	auto   <length>
Initial:	auto
Applies To:	@page
Inherited:	No

### auto

Computes the length automatically and lets the crop mark always end at the media box.

### <length>

The absolute length of the crop mark. Negative values are not allowed. A length of zero disables the crop mark.

## -ro-crop-mark-offset

Specifies the gap between the trim box and the crop mark. Negative values are not allowed.

Value:	<length>   <percentage>
Initial:	100%
Applies To:	@page
Inherited:	No

### <length>

Specifies the gap as an absolute length.

### <percentage>

Specifies the gap as a percentage value relative to the bleed. A value of 100% positions the inner end point of the crop mark exactly at the outer edge of the bleed.

## **-ro-crop-size**

Specifies the size of the CropBox, one of the PDF page boxes.

<b>Value:</b>	<b>none   &lt;length&gt;{1,2}   [ &lt;page-size&gt;    [ portrait   landscape ] ]   media   trim   art</b>
Initial:	none
Applies To:	@page
Inherited:	No

### **none**

The element does not specify a CropBox.

### **media**

The CropBox is specified with the same dimensions as the MediaBox.

### **trim**

The CropBox is specified with the same dimensions as the TrimBox.

### **art**

The CropBox is specified with the same dimensions as the ArtBox.

- *More information:* [PDF Page Boxes \(p. 126\)](#)

## **-ro-destination-area**

For elements targeted by bookmarks or internal links allows specifying how the coordinate to scroll to is determined.

<b>Value:</b>	<b>[self   expand   page]    [content-box   padding-box   border-box   margin-box   -ro-page-box   -ro-bleed-box   auto]    [&lt;length&gt; &lt;length&gt;?]</b>
Initial:	auto
Inherited:	No

### **self**

The element itself is the target.

### **expand**

A parent of the element, determined based on the structure, is the target. (default)

### **page**

The page the element is on is the target.

### **content-box | padding-box | border-box | margin-box**

The layout box of the target to get the top left coordinate from.

### **-ro-page-box | -ro-bleed-box**

The page box of the target to get the top left coordinate from. Matches margin-box for non-page targets, unless the target is a direct descendant of the page.

### **auto**

Matches -ro-page-box for page targets and border-box otherwise. (default)

**<length>**

Additional offset for the coordinate. May be negative. Using 2 lengths specifies x and y offsets separately. Defaults to 6pt.

- See also: `bookmark-level`, `-ro-link`
- More information: [Bookmarks \(p. 68\)](#), [Links \(p. 69\)](#)

**direction**

This property specifies the base writing direction. Also effects horizontally arranged boxes, e.g. tables and flex, as well as logical properties and values.

<b>Value:</b>	<code>ltr</code>   <code>rtl</code>
Initial:	<code>ltr</code>
Applies To:	all elements
Inherited:	Yes

- MDN documentation: [direction](#)
- See also: `unicode-bidi`
- More information: [Right-to-Left \(p. 139\)](#), [Text Direction Dependent Layouts \(p. 139\)](#)

**display**

The computed value is the same as the specified value, except for positioned and floating elements (see Relationships between 'display', 'position', and 'float') and for the root element.

Note that although the initial value of 'display' is 'inline', rules in the user agent's default style sheet may override this value.

<b>Value:</b>	<code>inline</code>   <code>block</code>   <code>list-item</code>   <code>inline-block</code>   <code>table</code>   <code>inline-table</code>   <code>table-row-group</code>   <code>table-column</code>   <code>table-column-group</code>   <code>table-header-group</code>   <code>table-footer-group</code>   <code>table-row</code>   <code>table-cell</code>   <code>table-caption</code>   <code>flex</code>   <code>inline-flex</code>   <code>grid</code>   <code>inline-grid</code>   <code>-ro-fast-table</code>   <code>none</code>
Initial:	<code>inline</code>
Applies To:	all elements
Inherited:	No

**-ro-fast-table**

This proprietary value is used to create very simple and fast tables. While these tables support only very basic styles and require all rows to have the same height, they can be extremely large without having a significantly impact on performance or memory consumption.

- MDN documentation: [display](#)
- More information: [Fast Tables \(p. 148\)](#)

## empty-cells

In the separated borders model, this property controls the rendering of borders and backgrounds around cells that have no visible content.

<b>Value:</b>	<b>show   hide</b>
Initial:	show
Applies To:	'table-cell' elements
Inherited:	Yes

▪ MDN documentation: [empty-cells](#)

## fallback

The fallback descriptor can be used to specify a counter style to fall back to if the current counter style cannot create a marker representation for a particular counter value.

<b>Value:</b>	<b>&lt;identifier&gt;</b>
Initial:	decimal
Applies To:	@counter-style
Inherited:	No

▪ MDN documentation: [fallback](#)

## filter

Allows to apply one or more graphical effects on an element. When doing so, the element is rasterized. The quality of the resulting image can be customized via the proprietary property "-ro-rasterization-supersampling". Note that a higher quality has a negative impact on performance and memory.

<b>Value:</b>	<b>[ &lt;filter-function&gt; ]+   none</b>
Initial:	none
Inherited:	No

▪ MDN documentation: [filter](#)

▪ See also: [-ro-rasterization-supersampling](#)



## first-page-side

Defines whether the first page of the document is a left or right page.

<b>Value:</b>	<b>left   right   verso   recto   auto</b>
Initial:	auto
Applies To:	@-ro-preferences
Inherited:	No

### left

The first page is a left page.

### right

The first page is a right page.

### verso

Same as 'left', unless the document direction is right-to-left, i.e. the root or body element has a 'direction' value of 'rtl', in which case it is the same as 'right'. This means that the first page is not a cover page.

### recto

Same as 'right', unless the document direction is right-to-left, i.e. the root or body element has a 'direction' value of 'rtl', in which case it is the same as 'left'. This means that the first page is a cover page.

### auto

Same as 'recto', unless the root or body element has a 'break-before' value of 'left', 'right' or 'verso', in which case it is the same as that value.

- See also: [break-before](#), [break-after](#), [direction](#), [first-page-side-view](#)
- More information: [Document-Specific Preferences \(p. 146\)](#)

## first-page-side-view

Defines whether the first page should appear to be left or a right page. In contrast to first-page-side, this property does not influence the layout, only on which side the page is shown in the viewer application.

<b>Value:</b>	<b>left   right   verso   recto   auto</b>
Initial:	auto
Applies To:	@-ro-preferences
Inherited:	No

### left

The first page is displayed left.

### right

The first page is displayed right.

**verso**

Same as 'left', unless the document direction is right-to-left, i.e. the root or body element has a 'direction' value of 'rtl', in which case it is the same as 'right'. This means that the first page is not displayed as a cover page.

**recto**

Same as 'right', unless the document direction is right-to-left, i.e. the root or body element has a 'direction' value of 'rtl', in which case it is the same as 'left'. This means that the first page is displayed as a cover page.

**auto**

Same as the used value of 'first-page-side'.

- See also: [direction](#), [first-page-side](#)
- More information: [Document-Specific Preferences](#) (p. 146)

**flex**

Specifies the components of a flexible length: The grow factor, the shrink factor and the basis.

<b>Value:</b>	<b>none   [ &lt;'flex-grow'&gt; &lt;'flex-shrink'&gt;?    &lt;'flex-basis'&gt; ]</b>
Initial:	1 0 auto
Applies To:	flex items
Inherited:	No

- MDN documentation: [flex](#)
- See also: [flex-basis](#), [flex-grow](#), [flex-shrink](#)

**flex-basis**

Sets the flex basis, which is used to determine the size of flex items (before growing or shrinking them).

<b>Value:</b>	<b>content   &lt;'width'&gt;</b>
Initial:	auto
Applies To:	flex items
Inherited:	No

- MDN documentation: [flex-basis](#)

## flex-direction

Specifies in which direction flex items are placed in the flex container.

<b>Value:</b>	<b>row   row-reverse   column   column-reverse</b>
Initial:	row
Applies To:	flex containers
Inherited:	No

▪ *MDN documentation:* [flex-direction](#)

## flex-flow

Shorthand property for flex-direction and flex-wrap.

<b>Value:</b>	<b>&lt;'flex-direction'&gt;    &lt;'flex-wrap'&gt;</b>
Initial:	row nowrap
Applies To:	flex containers
Inherited:	No

▪ *MDN documentation:* [flex-flow](#)

▪ *See also:* [flex-direction](#), [flex-wrap](#)

## flex-grow

Sets the flex grow factor, which specifies in what ratio items grow to fill remaining space in a line.

<b>Value:</b>	<b>&lt;number&gt;</b>
Initial:	0
Applies To:	flex items
Inherited:	No

▪ *MDN documentation:* [flex-grow](#)

## flex-shrink

Sets the flex shrink factor, which specifies in what ratio the item shrinks when there is not enough space for all items in a line.

<b>Value:</b>	<b>&lt;number&gt;</b>
Initial:	1
Applies To:	flex items
Inherited:	No

▪ *MDN documentation:* [flex-shrink](#)

## flex-wrap

Specifies if and how a flex line is broken, if an item does not fit in the line anymore.

<b>Value:</b>	<b>nowrap   wrap   wrap-reverse</b>
Initial:	nowrap
Applies To:	flex containers
Inherited:	No

▪ *MDN documentation:* [flex-wrap](#)

## float

This property specifies whether a box should float to the left, right, or not at all. It also allows to float it to the top or bottom as a page float.

<b>Value:</b>	<b>none   left   right   inline-start   inline-end   -ro-top   -ro-bottom   footnote   -ro-sidenote()</b>
Initial:	none
Applies To:	all elements
Inherited:	No

### **-ro-sidenote()** 📌

The element is taken out of flow and moved into a respective sidenote area, with its parameter defining whether that is the left or right sidenote area. This value can not be applied to generated content.

▪ *MDN documentation:* [float](#)

▪ *See also:* [position](#)

▪ *More information:* [Footnotes \(p. 110\)](#), [Page Floats \(p. 125\)](#), [Sidenotes \(p. 112\)](#)

## **-ro-float-offset**

Defines a gap above top floats and below bottom floats respectively. Percentages are relative to the vertical space minus the float's height. This means that 50% positions the float to the middle and 100% positions it at the other side (and thus leaving no space for actual content).

The property is only applicable for page floats.

<b>Value:</b>	<b>&lt;length&gt;   &lt;percentage&gt;</b>
Initial:	0
Applies To:	page floats
Inherited:	No

## **-ro-float-reference**

Specifies on which fragmentainer (page, column or region) a footnote is placed. By default footnotes are placed on pages.

<b>Value:</b>	<b>auto   column   region   page</b>
Initial:	auto
Applies To:	Footnote calls
Inherited:	No

### **auto**

On which fragmentainer (page, column or region) a footnote is placed is determined automatically. The current implementation always places footnotes on pages.

### **column**

If the footnote call is located inside a multi-column element then the footnote is placed on the innermost column. If the footnote call it is not located inside a multi-column element then the footnote is placed on a page.

### **region**

If the footnote call is located inside a region element then the footnote is placed on the innermost region. If the footnote call it is not located inside a region element then the footnote is placed on a page.

### **page**

The footnote is placed on a page.

**-ro-flow-from**

The 'flow-from' property makes a block container a region and associates it with a named flow.

<b>Value:</b>	<b>none   &lt;identifier&gt;</b>
Initial:	none
Applies To:	Non-replaced block containers.
Inherited:	No

**none**

The block container is not a CSS Region.

**<identifier>**

The block container becomes a CSS Region, and is ordered in a region chain according to its document order.

- *More information:* [Region Layout \(p. 122\)](#)

**-ro-flow-into**

The 'flow-into' property can place an element or its contents into a named flow.

Content that belongs to the same flow is laid out in regions associated with that flow.

The 'flow-into' property neither affects the CSS cascade and inheritance nor the DOM position of an element or its contents.

A named flow needs to be associated with one or more regions to be displayed.

<b>Value:</b>	<b>none   &lt;identifier&gt; [element content]?</b>
Initial:	none
Applies To:	All elements, but not pseudo-elements such as ::first-line, ::first-letter, ::before or ::after.
Inherited:	No

**none**

The element is not moved to a named flow and normal CSS processing takes place.

**<identifier>**

If the keyword 'element' or neither keyword is present, the element is taken out of its parent's flow and placed into the named flow '<identifier>'. If the keyword 'content' is present, then only the element's contents is placed into the named flow. The values 'none', 'inherit', 'default', 'auto' and 'initial' are invalid flow names.

- *More information:* [Region Layout \(p. 122\)](#)

## font

The 'font' property is a shorthand property for setting 'font-style', 'font-variant', 'font-weight', 'font-stretch', 'font-size', 'line-height' and 'font-family' at the same place in the style sheet.

<b>Value:</b>	<code>[ 'font-style'    'font-variant'    'font-weight'    'font-stretch' ]? 'font-size' [ / 'line-height' ]? 'font-family'</code>
<b>Initial:</b>	see individual properties
<b>Applies To:</b>	all elements and text
<b>Inherited:</b>	No

■ *MDN documentation:* [font](#)

■ See also: [font-family](#), [font-size](#), [font-stretch](#), [font-style](#), [font-variant](#), [font-weight](#), [line-height](#)

## -ro-font-embedding-type

This property specifies how a font configured through a "@font-face" rule should be embedded in the resulting PDF. If the font includes multiple subsets, PDFReactor can either only embed the subset from which glyphs are being used in the document, the entire font incl. all subsets even if the document does not use glyphs from all subsets, or prevent the font from being embedded at all.

<b>Value:</b>	<code>subset   all   none</code>
<b>Initial:</b>	subset
<b>Applies To:</b>	@font-face
<b>Inherited:</b>	No

### subset

Only the subset or subsets that have glyphs being used in this document are embedded in the resulting PDF.

### all

All subsets of this font are embedded, regardless of whether or not glyphs from these subsets are actually being used.

### none

The font is not embedded in the document at all, even if glyphs from this font are being used.

## font-family

The property value is a prioritized list of font family names and/or generic family names. Unlike most other CSS properties, component values are separated by a comma to indicate that they are alternatives.

Value:	[ <family-name>   <generic-family> ]#
Initial:	serif
Applies To:	all elements and text
Inherited:	Yes

▪ MDN documentation: [font-family](#)

## font-size

The font size corresponds to the em square, a concept used in typography. Note that certain glyphs may bleed outside their em squares.

Value:	<absolute-size>   <relative-size>   <length>   <percentage>
Initial:	medium
Applies To:	all elements and text
Inherited:	Yes

▪ Types: [<absolute-size>](#), [<relative-size>](#)

▪ MDN documentation: [font-size](#)

## font-size-adjust

The font-size-adjust CSS property sets how the font size should be adjusted based on the proportions of lowercase letters.

Value:	<number>   none   -ro-from-font
Initial:	none
Applies To:	all elements and text
Inherited:	Yes

### -ro-from-font

Computes the x-height to font-size ratio of a particular font and sets it as the font-size-adjust value. This value will be inherited. Improves readability by ensuring that lowercase letters of text with a different font or text with a font fallback have the same height.

▪ MDN documentation: [font-size-adjust](#)



## font-stretch

If a font-family offers additional faces with narrower (condensed) or wider (expanded) characters, this property can be used to select the best matching font face.

<b>Value:</b>	<b>normal   ultra-condensed   extra-condensed   condensed   semi-condensed   semi-expanded   expanded   extra-expanded   ultra-expanded</b>
Initial:	normal
Applies To:	all elements and text
Inherited:	Yes

▪ *MDN documentation:* [font-stretch](#)

## font-style

The 'font-style' property selects between normal (sometimes referred to as "roman" or "upright"), italic and oblique faces within a font family.

<b>Value:</b>	<b>normal   italic   oblique</b>
Initial:	normal
Applies To:	all elements and text
Inherited:	Yes

▪ *MDN documentation:* [font-style](#)

## font-synthesis

This shorthand CSS property allows to set whether or not PDFReactor may synthesize the bold and/or italic typefaces when they are missing in the specified font-family.

<b>Value:</b>	<b>none   [ weight    style ]</b>
Initial:	weight style
Applies To:	All elements and text
Inherited:	Yes

▪ *MDN documentation:* [font-synthesis](#)

## font-synthesis-style

This property defines whether oblique font faces are synthesized when a font family lacks oblique faces.

<b>Value:</b>	<b>auto   none</b>
Initial:	auto
Applies To:	All elements and text
Inherited:	Yes

■ MDN documentation: [font-synthesis-style](#)

## font-synthesis-weight

This property specifies whether or not the bold typeface may be synthesized when it is missing in a font family.

<b>Value:</b>	<b>auto   none</b>
Initial:	auto
Applies To:	all elements and text
Inherited:	Yes

■ MDN documentation: [font-synthesis-weight](#)

## font-variant

Another type of variation within a font family is the small-caps. In a small-caps font the lower case letters look similar to the uppercase ones, but in a smaller size and with slightly different proportions. The 'font-variant' property selects that font.

<b>Value:</b>	<b>normal   small-caps</b>
Initial:	normal
Applies To:	all elements and text
Inherited:	Yes

■ MDN documentation: [font-variant](#)

## font-weight

The 'font-weight' property specifies the weight of a font. If the font-family has a matching font face, the best match is selected. Otherwise, a bold font is synthesized.

<b>Value:</b>	<b>normal   bold   bolder   lighter   &lt;numerical-font-weight&gt;</b>
<b>Initial:</b>	normal
<b>Applies To:</b>	all elements and text
<b>Inherited:</b>	Yes

### <numerical-font-weight>

A number greater or equals to 1 and less or equal to 1000, where values of 400 or smaller are mapped to 'normal' and values of 500 or larger are mapped to 'bold'.

■ *MDN documentation:* [font-weight](#)

## footnote-display

Determines whether a footnote is displayed as a block element or inline element.

<b>Value:</b>	<b>block   inline</b>
<b>Initial:</b>	block
<b>Applies To:</b>	footnotes
<b>Inherited:</b>	No

### block

The footnote element is placed in the footnote area as a block element. This is the default value.

### inline

The footnote element is placed in the footnote area as an inline element.

## **-ro-footnote-fragmentation**

This property can be used to disable the fragmentation of footnotes. By default the fragmentation of footnotes is automatically managed by the layout engine. If fragmentation of footnotes is disabled then footnote bodies are not paginated anymore (no distribution over multiple pages) and footnote bodies are always placed on the same page as their corresponding footnote call (call and marker are always on the same page). To disable the fragmentation of footnotes for the entire document this property can be set on the root element. To disable the fragmentation of footnotes for a multi column element or a region flow then the property can be set on the multi column element or the first region element of the region flow. The property is an inherited property. If it is set on an element then it affects the entire subtree of this element.

<b>Value:</b>	<b>auto   none</b>
Initial:	auto
Applies To:	root element, multi column elements and region elements
Inherited:	Yes

## **-ro-formelement-name**

Defines from which element or attribute in the document the names of the form elements are adopted to a generated PDF.

<b>Value:</b>	<b>none   &lt;string&gt;</b>
Initial:	none
Applies To:	Form elements
Inherited:	No

▪ *More information:* [Accessibility \(p. 155\)](#)

## **gap grid-gap**

This property is a shorthand that sets row-gap and column-gap in one declaration.

<b>Value:</b>	<b>&lt;'row-gap'&gt; &lt;'column-gap'&gt;?</b>
Initial:	
Applies To:	multi-column containers, flex containers and grid containers
Inherited:	No

▪ *MDN documentation:* [gap](#)

## **-ro-glyph-layout-mode**

This property allows to render text using more Open Type Font information at the cost of performance.

<b>Value:</b>	<b>auto   speed   quality</b>
Initial:	auto
Inherited:	Yes

### **auto**

Same as 'quality' except for pieces of text that are estimated not to require it, incl. most Latin text. (ligatures are not considered a requirement) or for Java versions older than 13.

### **speed**

Prioritizes performance, applying True Type Font kerning, but no more complex font features.

### **quality**

Enables Open Type Font kerning/positioning (required e.g. for Cambodian) and ligatures. It also causes characters in right-to-left text to be stored in PDF output in the correct order for accessibility. This impacts performance and both performance and result depend on the Java version used. Not using the latest Java version is discouraged.

- *More information:* [Accessibility \(p. 155\)](#), [Right-to-Left \(p. 139\)](#)

## **grid**

Sets all grid properties in a single declaration.

<b>Value:</b>	<b>&lt;grid-template&gt;   &lt;grid-template-rows&gt; / [ auto-flow &amp;&amp; dense? ] &lt;grid-auto-columns&gt;?   [ auto-flow &amp;&amp; dense? ] &lt;grid-auto-rows&gt;? / &lt;grid-template-columns&gt;</b>
Initial:	none
Applies To:	grid containers
Inherited:	No

- *MDN documentation:* [grid](#)

## **grid-area**

Set all four grid placement properties in a single declaration.

<b>Value:</b>	<b>&lt;grid-line&gt; [ / &lt;grid-line&gt; ]{0,3}</b>
Initial:	auto
Applies To:	grid items and absolutely-positioned boxes whose containing block is a grid container
Inherited:	No

- *MDN documentation:* [grid-area](#)

## grid-auto-columns

Sets the size of auto generated column tracks.

<b>Value:</b>	<b>&lt;track-size&gt;+</b>
Initial:	auto
Applies To:	grid containers
Inherited:	No

▪ MDN documentation: [grid-auto-columns](#)

## grid-auto-flow

Specifies how the position of items without explicit grid placement properties is determined. Dense is slower than sparse (no dense) and should only be used if necessary.

<b>Value:</b>	<b>[ row   column ]    dense</b>
Initial:	row
Applies To:	grid containers
Inherited:	No

▪ MDN documentation: [grid-auto-flow](#)

## grid-auto-rows

Sets the size of auto generated row tracks.

<b>Value:</b>	<b>&lt;track-size&gt;+</b>
Initial:	auto
Applies To:	grid containers
Inherited:	No

▪ MDN documentation: [grid-auto-rows](#)

## grid-column

Sets the start and end column of an element inside the grid.

<b>Value:</b>	<code>&lt;grid-line&gt; [ / &lt;grid-line&gt; ]?</code>
Initial:	auto
Applies To:	grid items and absolutely-positioned boxes whose containing block is a grid container
Inherited:	No

▪ MDN documentation: [grid-column](#)

## grid-column-end

Sets the end column of an element inside the grid.

<b>Value:</b>	<code>&lt;grid-line&gt;</code>
Initial:	auto
Applies To:	grid items and absolutely-positioned boxes whose containing block is a grid container
Inherited:	No

▪ MDN documentation: [grid-column-end](#)

## grid-column-start

Sets the start column of an element inside the grid.

<b>Value:</b>	<code>&lt;grid-line&gt;</code>
Initial:	auto
Applies To:	grid items and absolutely-positioned boxes whose containing block is a grid container
Inherited:	No

▪ MDN documentation: [grid-column-start](#)

## grid-row

Sets the start and end row of an element inside the grid.

<b>Value:</b>	<b>&lt;grid-line&gt; [ / &lt;grid-line&gt; ]?</b>
Initial:	auto
Applies To:	grid items and absolutely-positioned boxes whose containing block is a grid container
Inherited:	No

▪ *MDN documentation:* [grid-row](#)

## grid-row-end

Sets the end row of an element inside the grid.

<b>Value:</b>	<b>&lt;grid-line&gt;</b>
Initial:	auto
Applies To:	grid items and absolutely-positioned boxes whose containing block is a grid container
Inherited:	No

▪ *MDN documentation:* [grid-row-end](#)

## grid-row-start

Sets the start row of an element inside the grid.

<b>Value:</b>	<b>&lt;grid-line&gt;</b>
Initial:	auto
Applies To:	grid items and absolutely-positioned boxes whose containing block is a grid container
Inherited:	No

▪ *MDN documentation:* [grid-row-start](#)



## grid-template

Sets all three grid-template properties in a single declaration.

<b>Value:</b>	<b>none</b>   [ <'grid-template-rows'> / <'grid-template-columns'> ]   [ <line-names>? <string> <track-size>? <line-names>? ]+ [ / <explicit-track-list> ]?
Initial:	none
Applies To:	grid containers
Inherited:	No

▪ MDN documentation: [grid-template](#)

## grid-template-areas

Specifies named grid areas. They can be used in conjunction with the grid placement properties to position items in the grid.

<b>Value:</b>	<b>none</b>   <string>+
Initial:	none
Applies To:	grid containers
Inherited:	No

▪ MDN documentation: [grid-template-areas](#)

## grid-template-columns

Specifies the line names and track sizing functions of column tracks.

<b>Value:</b>	<b>none</b>   <track-list>   <auto-track-list>
Initial:	none
Applies To:	grid containers
Inherited:	No

▪ MDN documentation: [grid-template-columns](#)

## grid-template-rows

Specifies the line names and track sizing functions of row tracks.

<b>Value:</b>	<b>none   &lt;track-list&gt;   &lt;auto-track-list&gt;</b>
Initial:	none
Applies To:	grid containers
Inherited:	No

■ MDN documentation: [grid-template-rows](#)

## height

This property specifies the content height of boxes.

This property does not apply to non-replaced inline elements.

Negative values for 'height' are illegal.

<b>Value:</b>	<b>auto   &lt;length&gt;   &lt;percentage&gt;   min-content   max-content</b>
Initial:	auto
Applies To:	all elements but non-replaced inline elements, table columns, and column groups
Inherited:	No

■ MDN documentation: [height](#)

## -ro-height

This property allows the automatic resizing of form controls according to their content. If this property is set to auto, the form controls' height automatically adjusts according to its content.

<b>Value:</b>	<b>auto   none</b>
Initial:	none
Applies To:	Form elements
Inherited:	No

### auto

Automatically adjusts the height of a form control if the contents' height exceeds the height defined for the form control.

## hyphenate-after

This property specifies the minimum number of characters in a hyphenated word after the hyphenation character.

<b>Value:</b>	<b>&lt;integer&gt;   auto</b>
Initial:	auto
Inherited:	Yes

### auto

The default value of the language is used. For most languages that means 2, but for some it is 1 or 3.

### <integer>

The number is specified as a positive integer. While values as low as 1 are valid, most languages enforce a minimum of 2 or 3.

- *More information:* [Automatic Hyphenation \(p. 96\)](#)
- *Deprecated!* Use `hyphenate-limit-chars` instead.

## hyphenate-before

This property specifies the minimum number of characters in a hyphenated word before the hyphenation character.

<b>Value:</b>	<b>&lt;integer&gt;   auto</b>
Initial:	auto
Inherited:	Yes

### auto

The default value of the language is used. For most languages that means 2, but for some it is 1.

### <integer>

The number is specified as a positive integer. While values as low as 1 are valid, most languages enforce a minimum of 2.

- *More information:* [Automatic Hyphenation \(p. 96\)](#)
- *Deprecated!* Use `hyphenate-limit-chars` instead.

## hyphenate-character

This property specifies a string that is shown when hyphenation occurs. The 'auto' value means that the "hyphen-minus"(2D) character is used. If it is not supported by the font a list further characters is tried, starting with "hyphen"(2010). If the specified string contains soft-hyphens it is treated as 'auto'.

<b>Value:</b>	<b>&lt;string&gt;   auto</b>
Initial:	auto
Inherited:	Yes

▪ *More information:* [Automatic Hyphenation \(p. 96\)](#)

## hyphenate-limit-chars

This property specifies the minimum word length to allow hyphenation of words and the minimum number of characters before and after the hyphenation character.

For backwards compatibility with hyphenate-before and hyphenate-after, this property is a shorthand in our implementation.

<b>Value:</b>	<b>[ auto   &lt;integer&gt; ]{1,3}</b>
Initial:	auto
Applies To:	text
Inherited:	Yes

▪ *MDN documentation:* [hyphenate-limit-chars](#)

▪ *More information:* [Automatic Hyphenation \(p. 96\)](#)

## -ro-hyphenate-limit-lines

Indicates the maximum number of successive hyphenated lines in an element. The no-limit value means that there is no limit. This property is ignored for the first word in a line, so it will not cause text to overflow.

<b>Value:</b>	<b>no-limit   &lt;integer&gt;</b>
Initial:	no-limit
Applies To:	block containers
Inherited:	Yes

▪ *More information:* [Automatic Hyphenation \(p. 96\)](#)

## **-ro-hyphenate-word-length**

This property defines the minimum number of characters a word must have so that it is allowed to be hyphenated. It is recommended that you use the CSS property `hyphenate-limit-chars` instead.

<b>Value:</b>	<b>auto   &lt;integer&gt;</b>
Initial:	auto
Applies To:	text
Inherited:	Yes

### **auto**

The default value of the language is used. For most languages that means 5, but for some it is 1.

### **<integer>**

The minimum word length before words may be hyphenated.

- See also: `hyphenate-limit-chars`
- *Deprecated!* Use `hyphenate-limit-chars` instead.

## **hyphens**

This property controls whether hyphenation is allowed to create more soft wrap opportunities within a line of text.

<b>Value:</b>	<b>none   manual   auto</b>
Initial:	manual
Inherited:	Yes

- MDN documentation: [hyphens](#)
- More information: [Automatic Hyphenation \(p. 96\)](#)

## **-ro-image-clip-path**

Specifies whether clip path metadata of images is read and applied.

<b>Value:</b>	<b>none   auto   from-image</b>
Initial:	none
Inherited:	Yes

### **none**

Ignore clip path in image metadata.

### **auto**

Automatically decide whether to read and apply clip path from image metadata based on the type of the image.

**from-image**

Read and apply clip path from image metadata.

**-ro-image-interactivity**

Determines whether links in SVGs and PDFs used as images are clickable in the resulting PDF.

<b>Value:</b>	<b>auto   none</b>
Initial:	auto
Applies To:	images (SVG and PDF) and SVG roots
Inherited:	Yes

**auto**

Links in the image are clickable. (default)

**none**

Links in the image are not clickable.

**-ro-image-orientation**

Enables or disables the image orientation being read from the image data or overrides that orientation. Based on the orientation the image will be rotated in 90 degree increments and possibly flipped. Rotation can cause the layout width and height to be swapped.

<b>Value:</b>	<b>from-image   none   &lt;angle&gt;   [ &lt;angle&gt;? flip ]</b>
Initial:	from-image
Applies To:	images and barcodes
Inherited:	Yes

**none**

Ignore orientation data.

**from-image**

Read orientation data from image.

**<angle>**

Angle (rounded to 90 degree increments) overriding orientation data.

**flip**

When specified in addition to <angle> additional flip the image.

## -ro-image-recompression

Specifies whether raster graphics should be recompressed when embedded into PDFs. Applies to image elements and background images.

If the same image is used multiple times in the same document, the data is only embedded once. In this case when recompression is enabled the best quality setting is used. This means that if there is one occurrence of an image where this property is not set, the data of that image will not be recompressed.

Note: Using this feature may have an impact on the conversion time of large documents.

<b>Value:</b>	<b>auto   [&lt;compression-function&gt; conditional?]</b>
Initial:	auto
Inherited:	No

### auto

Same as "jpeg() conditional".

### <compression-function>

Defines which compression algorithm should be used, either lossless or jpeg with an optional quality parameter.

### conditional

If specified, the compression is only applied when -ro-image-resampling is used and the image is actually resampled, else the image is embedded without forced recompression.

■ See also: `-ro-image-resampling`, `jpeg`, `lossless`

## image-rendering

Specifies whether images should be scaled with interpolation (smooth, soft) or without (crisp, pixelated).

For image output this means switching between nearest neighbor and bilinear, bicubic and Lanczos scaling.

For PDFs, which embed the images as-is and let the viewer scale them, it decides the value of the interpolate flag for images which is a hint for the PDF viewer how to scale the images.

Please note that PDF conformances, like PDF/A, may forbid setting this flag, which will automatically be respected by PDFreactor.

Please also note that in PDFs multiple instances of the same image (i.e. from the same URL) cannot have different values for this property. For mixed values that would lead to different flag values interpolation will be set to true and a warning will be logged. If you require the same image with different interpolations you can suffix the URLs, e.g. with `&quot;#a1&quot;`, `&quot;#a2&quot;`, ...

This property also affects image resampling due to -ro-image-resampling.

<b>Value:</b>	<b>auto   smooth   high-quality   pixelated   crisp-edges</b>
Initial:	auto
Inherited:	Yes

### auto

Image output: use bicubic interpolation, PDF output: enable interpolation flag if allowed

### smooth

Image output: use bilinear interpolation, PDF output: enable interpolation flag if allowed

**high-quality**

Image output: use bicubic interpolation, PDF output: enable interpolation flag if allowed

**pixelated**

Image output: use nearest neighbor interpolation, PDF output: disable interpolation flag

**crisp-edges**

Image output: use nearest neighbor interpolation, PDF output: disable interpolation flag

■ *MDN documentation:* [image-rendering](#)

■ *See also:* [-ro-image-resampling](#)

**-ro-image-resampling**

Specifies an optional maximum resolution for raster graphics in the result PDF. If an image exceeds the resolution, it is resampled to match it. Applies to image elements and background images.

If the same image is used multiple times in the same document, the data is only embedded once.

In this case when resampling is enabled the highest resolution is used. This means that if there is one occurrence of an image where this property is not set, the data of that image will not be resampled.

To specify the compression algorithm and the quality of the resampled image, see [-ro-image-recompression](#) (and its "conditional" flag).

To specify whether the image is resampled with interpolation or without, see [image-rendering](#).

Note: Using this feature may have an impact on the conversion time of large documents.

<b>Value:</b>	<b>none   &lt;resolution&gt;</b>
Initial:	none
Inherited:	No

**none**

No resampling is applied to the image.

**<resolution>**

The maximum resolution of the image in the PDF. Allowed units are dpi, dpcm and dppx.

■ *See also:* [-ro-image-recompression](#), [image-rendering](#)

**-ro-image-resolution**

Specifies the resolution of the image and whether the resolution should be read from the image data. A resolution different from 1dppx or 96dpi will change the inherent/natural size of the image.

<b>Value:</b>	<b>from-image    &lt;resolution&gt;</b>
Initial:	1dppx
Inherited:	Yes

**from-image**

When specified the resolution is read from image metadata (allowing different resolutions for each dimension). If none is found falls back to the specified resolution or the default of 1dppx.



## initial-page

This defines to which page a viewer application should scroll when opening this document.

<b>Value:</b>	<b>&lt;integer&gt;</b>
Initial:	1
Applies To:	@-ro-preferences
Inherited:	No

- *More information:* [Document-Specific Preferences \(p. 146\)](#)

## initial-zoom

Defines the initial zoom factor when opening the document in a viewer application.

<b>Value:</b>	<b>auto   &lt;percentage&gt;   fit-page   fit-page-height   fit-page-width   fit-content   fit-content-height   fit-content-width</b>
Initial:	auto
Applies To:	@-ro-preferences
Inherited:	No

### fit-page

The entire page is visible. In 2 column or 2 page mode this includes the width of both pages (see 'page-layout').

### fit-page-height

The page fills the view port height.

### fit-page-width

The page fills the view port width. In 2 column or 2 page mode this includes the width of both pages (see 'page-layout').

### fit-content

The content fills the complete view port.

### fit-content-height

The content fills the view port height.

### fit-content-width

The content fills the view port width.

- *See also:* [page-layout](#)
- *More information:* [Document-Specific Preferences \(p. 146\)](#)

## **inset-block**

## **inset-inline**

These properties set position properties (top, bottom, left, right) based on the logical directions (depending on text direction). While the 'inset-block' values are computed to top and bottom, the 'inset-inline' values are computed to 'left' and 'right' for ltr directions or 'right' and 'left' for rtl directions.

<b>Value:</b>	<b>[&lt;length&gt;   &lt;percentage&gt;   auto]{1,2}</b>
Initial:	see individual properties
Inherited:	No

- *MDN documentation:* [inset-block](#), [inset-inline](#)
- *More information:* [Text Direction Dependent Layouts](#) (p. 139)

## **isolation**

<b>Value:</b>	<b>auto   isolate</b>
Initial:	auto
Inherited:	No

- *MDN documentation:* [isolation](#)

## **justify-content**

Specifies how the space between flex items along the main axis is distributed.

<b>Value:</b>	<b>normal   stretch   space-between   space-around   space-evenly   [safe   unsafe]? [start   center   end   flex-start   flex-end   left   right]</b>
Initial:	normal
Applies To:	flex containers and grid containers
Inherited:	No

- *MDN documentation:* [justify-content](#)

## justify-items

This property specifies the default justify-self for all of the child boxes participating in this box's formatting context.

Value:	normal   stretch   [first   last]? baseline   [safe   unsafe]? [center   start   end   self-start   self-end   flex-start   flex-end   left   right]   legacy   legacy && [ left   right   center ]
Initial:	legacy
Inherited:	No

■ MDN documentation: [justify-items](#)

## justify-self

Justifies the box within its containing block along the inline/row/main axis of the alignment container.

Value:	auto   normal   stretch   [first   last]? baseline   [safe   unsafe]? [center   start   end   self-start   self-end   flex-start   flex-end   left   right]
Initial:	auto
Applies To:	block-level boxes, absolutely-positioned boxes and grid items
Inherited:	No

■ MDN documentation: [justify-self](#)

## -ro-keywords

Sets the keywords in the metadata of the PDF document. Multiple values are concatenated to one string. (When applied to multiple elements the values are concatenated, separated by a comma.)

Value:	none   [ <string>   content() ]+
Initial:	none
Applies To:	all elements
Inherited:	No

### none

Does not set a keywords.

### <string>

Sets the specified string as keywords.

**content()**

Sets the keywords from the content of the element.

- See also: `-ro-author` , `-ro-subject` , `-ro-title`
- More information: [Metadata \(p. 70\)](#)

**left**

Like 'top', but specifies how far a box's left margin edge is offset to the right of the left edge of the box's containing block. For relatively positioned boxes, the offset is with respect to the left edge of the box itself.

<b>Value:</b>	<code>&lt;length&gt;   &lt;percentage&gt;   auto</code>
Initial:	auto
Applies To:	positioned elements
Inherited:	No

- MDN documentation: [left](#)
- See also: `inset-*`

**letter-spacing**

This property specifies spacing behavior between text characters.

<b>Value:</b>	<code>normal   &lt;length&gt;</code>
Initial:	normal
Inherited:	Yes

- MDN documentation: [letter-spacing](#)

## **-ro-line-break-opportunity**

Proprietary property used to customize where line breaks are allowed. Rules for break opportunities can be added to the default ones or replace them entirely. Each rule consists of two strings with regex syntax (without lookbehind and lookahead) defining the content surrounding the break opportunity. The second string, describing the following content, can be omitted.

Please note that backslashes in the strings must be escaped with a second backslash, e.g. "\\s" instead of "\s".

<b>Value:</b>	<b>normal    [ &lt;whitelist&gt;#? [ / &lt;blacklist&gt;# ]? ]</b>
<b>Initial:</b>	normal
<b>Inherited:</b>	Yes

### **normal**

Use the line break opportunities defined by unicode specifications. This is the default value. If used together with whitelist/blacklist, both the unicode rules and the custom rules apply. If omitted only the custom rules apply.

### **<whitelist>**

One or two space separated regex strings that specify what content must surround a text position in order to make that position a line break opportunity. The first string describes the content before the break position, the second describes the content after it. The second string can be omitted, while the first string can be an empty string if it is not needed.

### **<blacklist>**

One or two space separated regex strings that specify what content must surround a break opportunity candidate in order to prevent it from becoming an actual line break opportunity. The first string describes the content before the position, the second describes the content after it. The second string can be omitted, while the first string can be an empty string if it is not needed. The blacklist takes precedence over the whitelist.

■ *More information:* [Customizing Line Breaks \(p. 97\)](#)

## **-ro-line-grid**

Specifies whether this box creates a new baseline grid for its descendants or uses the same baseline grid as its parent.

<b>Value:</b>	<b>match-parent   create</b>
<b>Initial:</b>	match-parent
<b>Applies To:</b>	block containers
<b>Inherited:</b>	No

### **match-parent**

Box assumes the line grid of its parent.

### **create**

Box creates a new line grid using its own font and line layout settings.

■ *More information:* [Line Grids and Snapping \(p. 120\)](#)

## line-height

On a block container element whose content is composed of inline-level elements, 'line-height' specifies the minimal height of line boxes within the element.

<b>Value:</b>	<b>normal   &lt;number&gt;   &lt;length&gt;   &lt;percentage&gt;</b>
<b>Initial:</b>	normal
<b>Inherited:</b>	Yes

▪ *MDN documentation:* [line-height](#)

## -ro-line-snap

This property applies to all the line boxes directly contained by the element, and, when not none, causes each line box to shift until it snaps to the line grid specified by line-grid.

<b>Value:</b>	<b>none   baseline   contain</b>
<b>Initial:</b>	none
<b>Inherited:</b>	Yes

### none

Line boxes do not snap to the grid; they stack normally.

### baseline

The baseline snaps to the line grid applied to the element.

### contain

Two baselines are used to align the line box: the line box is snapped so that its central baseline is centered between two of the line grid's baselines.

▪ *More information:* [Line Grids and Snapping \(p. 120\)](#)

## -ro-link

This property allows to define hyperlinks via style. Multiple values are concatenated to one URL.

<b>Value:</b>	<b>auto   none   [ &lt;string&gt; ]+</b>
<b>Initial:</b>	auto
<b>Applies To:</b>	all elements
<b>Inherited:</b>	No

### none

The element is not a hyperlink.

**<string>**

The element is a hyperlink to the URL the <string> contains.

**auto**

The element is not a hyperlink, unless it is a QRcode, video or audio element.

- See also: `-ro-destination-area` , `-ro-link-area`
- More information: [Links \(p. 69\)](#)

**-ro-link-area**

This property can be used to specify how the clickable areas of links are determined.

<b>Value:</b>	<b>all   all-block   content   content-block   block</b>
Initial:	all
Inherited:	No

**all**

Makes the border-areas of all elements in the subtree of the link clickable.

**all-block**

Like 'all', but merges the bounds of all areas into one clickable rectangle.

**content**

Makes the border-areas of all content elements (text, images and empty inlines) in the subtree of the link clickable.

**content-block**

Like 'content', but merges the bounds of all areas into one clickable rectangle.

**block**

Makes only the border-area of the link element itself clickable.

- See also: `-ro-link`
- More information: [Links \(p. 69\)](#)

**list-style**

The 'list-style' property is a shorthand notation for setting the three properties 'list-style-type', 'list-style-image', and 'list-style-position' at the same place in the style sheet.

<b>Value:</b>	<b>&lt;'list-style-position'&gt;    &lt;'list-style-image'&gt;    &lt;'list-style-type'&gt;</b>
Initial:	see individual properties
Applies To:	elements with 'display: list-item'
Inherited:	Yes

- MDN documentation: [list-style](#)
- See also: `list-style-image` , `list-style-position` , `list-style-type`

## list-style-image

This property sets the image that will be used as the list item marker. When the image is available, it will replace the marker set with the 'list-style-type' marker.

<b>Value:</b>	<code>&lt;uri&gt;   &lt;gradient&gt;   none</code>
<b>Initial:</b>	none
<b>Applies To:</b>	elements with 'display: list-item'
<b>Inherited:</b>	Yes

▪ *MDN documentation:* [list-style-image](#)

## list-style-position

This property specifies the position of the marker box with respect to the principal block box.

<b>Value:</b>	<code>inside   outside</code>
<b>Initial:</b>	outside
<b>Applies To:</b>	elements with 'display: list-item'
<b>Inherited:</b>	Yes

▪ *MDN documentation:* [list-style-position](#)

## list-style-type

This property specifies appearance of the list item marker if 'list-style-image' has the value 'none' or if the image pointed to by the URI cannot be displayed. The value 'none' specifies no marker, otherwise there are three types of marker: glyphs, numbering systems, and alphabetic systems.

Glyphs are specified with `disc`, `circle`, and `square`.

<b>Value:</b>	<code>&lt;counter-style&gt;   &lt;string&gt;   none</code>
<b>Initial:</b>	disc
<b>Applies To:</b>	elements with 'display: list-item'
<b>Inherited:</b>	Yes

▪ *MDN documentation:* [list-style-type](#)

▪ *More information:* [Counter and Ordered List Style Types \(p. 234\)](#)



## **-ro-listitem-value**

Determine the number of an ordered list item.

<b>Value:</b>	<b>&lt;integer&gt;   auto</b>
Initial:	auto
Applies To:	list-item
Inherited:	No

### **<integer>**

The number used for an ordered list item.

### **auto**

The number is the number of the previous item plus one (or one if it is the first item).

- *Deprecated!* Use `counter-set` instead.

## **margin**

The 'margin' property is a shorthand property for setting 'margin-top', 'margin-right', 'margin-bottom', and 'margin-left' at the same place in the style sheet.

<b>Value:</b>	<b>[ &lt;length&gt;   &lt;percentage&gt;   auto ]{1,4}</b>
Initial:	see individual properties
Applies To:	all elements except elements with table display types other than table-caption, table and inline-table
Inherited:	No

- *MDN documentation:* [margin](#)
- *See also:* `margin-*-*`, `margin-*`

## margin-block

## margin-inline

These properties set margins based on the logical directions (depending on text direction).

The first value of 'margin-block' sets the margin-top, the second the 'margin-bottom'. The values of margin-inline sets 'margin-left' and 'margin-right' in BiDi-dependent order.

If only one value is given, it applies to both the start and end edges.

Value:	[ <length>   <percentage>   auto ]{1,2}
Initial:	
Inherited:	No

- MDN documentation: [margin-block](#), [margin-inline](#)

## margin-inline-start

## margin-inline-end

## margin-block-start

## margin-block-end

These properties set margins based on the logical directions (depending on text direction).

Block start and end correspond to top and bottom. Inline start and end correspond to left and right or right and left, depending on the BiDi text direction.

Value:	<length>   <percentage>   auto
Initial:	0
Inherited:	No

- MDN documentation: [margin-inline-start](#), [margin-inline-end](#), [margin-block-start](#), [margin-block-end](#)
- See also: [margin-\\*](#)
- More information: [Text Direction Dependent Layouts](#) (p. 139)

## margin-top margin-right margin-bottom margin-left

These properties set the top, right, bottom, and left margin of a box.

Value:	<length>   <percentage>   auto
Initial:	0
Applies To:	all elements except elements with table display types other than table-caption, table and inline-table
Inherited:	No

- *MDN documentation:* [margin-top](#), [margin-right](#), [margin-bottom](#), [margin-left](#)
- *See also:* [margin-\\*-\\*](#)

## -ro-marker-side

Value:	match-self   match-parent
Initial:	match-self
Applies To:	list items
Inherited:	Yes

## -ro-marks

Adds the specified printer marks inside the page's MediaBox.

Value:	none   [ trim    bleed    registration ]
Initial:	none
Applies To:	@page
Inherited:	No

### none

No marks are added to the page.

### trim

Adds trim line marks to the four corners of the page.

### bleed

Adds bleed line marks to the four corners of the page.

**registration**

Adds registration marks to the four sides of the page.

- See also: `-ro-marks-color`, `-ro-marks-width`, `-ro-media-size`
- More information: [Printer Marks \(p. 128\)](#)
- *Deprecated!* Use `marks` instead.

**marks**

Adds the specified printer marks inside the page's MediaBox.

<b>Value:</b>	<b>none   [ crop    cross    -ro-bleed]</b>
Initial:	none
Applies To:	@page
Inherited:	No

**none**

No marks are added to the page.

**crop**

Adds trim line marks to the four corners of the page.

**-ro-bleed**

Adds bleed line marks to the four corners of the page.

**cross**

Adds registration marks to the four sides of the page.

- More information: [Printer Marks \(p. 128\)](#)

**-ro-marks-color**

Sets the color of crop and bleed marks.

<b>Value:</b>	<b>&lt;color&gt;</b>
Initial:	cmyk(0%, 0%, 0%, 100%)
Applies To:	@page
Inherited:	No

- See also: `marks`
- More information: [Printer Marks \(p. 128\)](#)

## **-ro-marks-offset**

Sets the offset of crop marks, registration marks and color bars. The offset of bleed marks is not affected by this property and must be set separately.

<b>Value:</b>	<b>&lt;length&gt;   &lt;percentage&gt;</b>
Initial:	100%
Applies To:	@page
Inherited:	No

## **-ro-marks-width**

Sets the line width of crop, bleed and registration marks.

<b>Value:</b>	<b>none   &lt;length&gt;</b>
Initial:	0.5pt
Applies To:	@page
Inherited:	No

- See also: [marks](#)
- More information: [Printer Marks \(p. 128\)](#)

## **max-block-size** **max-inline-size**

These properties set max-height and max-width based on the logical directions (depending on text direction). The property 'max-block-size' sets 'max-height', while 'max-inline-size' sets 'max-width'

<b>Value:</b>	<b>&lt;'max-width'&gt;</b>
Initial:	none
Applies To:	same as width and height
Inherited:	No

- MDN documentation: [max-block-size](#), [max-inline-size](#)
- See also: [max-height](#), [max-width](#)

## max-height

This property allows authors to limit box heights.

<b>Value:</b>	<b>none   &lt;length&gt;   &lt;percentage&gt;   min-content   max-content</b>
<b>Initial:</b>	none
<b>Applies To:</b>	all elements but non-replaced inline elements, table columns, and column groups
<b>Inherited:</b>	No

### <length>

Specifies a fixed maximum computed height.

### <percentage>

Specifies a percentage for determining the used value. The percentage is calculated with respect to the height of the generated box's containing block. If the height of the containing block is not specified explicitly (i.e., it depends on content height), and this element is not absolutely positioned, the percentage value is treated as 'none'.

### none

No limit on the height of the box.

### min-content

Behaves like 'none'.

### max-content

Behaves like 'none'

- *MDN documentation:* [max-height](#)
- *See also:* [min-height](#)

## max-width

This property allows authors to constrain content widths to a maximum.

<b>Value:</b>	<b>none   &lt;length&gt;   &lt;percentage&gt;   min-content   max-content</b>
<b>Initial:</b>	none
<b>Applies To:</b>	all elements but non-replaced inline elements, table rows, and row groups
<b>Inherited:</b>	No

- *MDN documentation:* [max-width](#)
- *See also:* [min-width](#)

## **-ro-media-size**

Specifies the size of the MediaBox, one of the PDF page boxes.

The MediaBox defines an oversized paper sheet that allows to add a bleed area, marks and color bars around the normal page content.

This property works the same way as the size property does.

<b>Value:</b>	<b>none   &lt;length&gt;{1,2}   auto   [ &lt;page-size&gt;    [ portrait   landscape ] ]</b>
Initial:	none
Applies To:	@page
Inherited:	No

- See also: [bleed](#), [-ro-colorbar-\\*](#), [marks](#), [size](#)
- More information: [PDF Page Boxes \(p. 126\)](#)

## **min-block-size** **min-inline-size**

These properties set min-height and min-width based on the logical directions (depending on text direction).

The property 'min-block-size' sets the 'min-height', while 'min-inline-size' sets 'min-width'.

<b>Value:</b>	<b>&lt;'min-width'&gt;</b>
Initial:	auto
Applies To:	same as width and height
Inherited:	No

- MDN documentation: [min-block-size](#), [min-inline-size](#)
- See also: [min-height](#), [min-width](#)

## **min-height**

This property allows authors to set a minimum box height.

<b>Value:</b>	<b>auto   &lt;length&gt;   &lt;percentage&gt;   min-content   max-content</b>
Initial:	auto
Applies To:	all elements but non-replaced inline elements, table columns, and column groups
Inherited:	No

- MDN documentation: [min-height](#)
- See also: [max-height](#)

## min-width

This property allows authors to constrain content widths to a minimum value.

<b>Value:</b>	<b>auto   &lt;length&gt;   &lt;percentage&gt;   min-content   max-content</b>
Initial:	auto
Applies To:	all elements but non-replaced inline elements, table rows, and row groups
Inherited:	No

- *MDN documentation:* [min-width](#)
- *See also:* [max-width](#)

## mix-blend-mode

<b>Value:</b>	<b>normal   multiply   screen   overlay   darken   lighten   color-dodge   color-burn   hard-light   soft-light   difference   exclusion   hue   saturation   color   luminosity</b>
Initial:	normal
Inherited:	No

- *MDN documentation:* [mix-blend-mode](#)

## negative

When defining custom counter styles, the negative descriptor lets you alter the representations of negative counter values, by providing a way to specify symbols to be appended or prepended to the counter representation when the value is negative.

<b>Value:</b>	<b>[&lt;string&gt;   &lt;identifier&gt;] [&lt;string&gt;   &lt;identifier&gt;]?</b>
Initial:	"_"
Applies To:	@counter-style
Inherited:	No

- *MDN documentation:* [negative](#)



## object-fit

Defines how the content of a replaced element, e.g. an image, fits into its box.

<b>Value:</b>	<b>fill   contain   cover   none   scale-down</b>
Initial:	fill
Applies To:	Replaced Elements
Inherited:	No

- *MDN documentation:* [object-fit](#)
- *See also:* [object-position](#)

## object-position

Determines the alignment of a replaced element, e.g. an image, inside its box.

Note: This property has no effect unless "object-fit" is set to a non-default value.

<b>Value:</b>	<b>&lt;position&gt;</b>
Initial:	50% 50%
Applies To:	replaced elements
Inherited:	No

- *MDN documentation:* [object-position](#)
- *See also:* [object-fit](#)

## -ro-object-slice

Allows block images to be split at page breaks.

<b>Value:</b>	<b>none   auto   avoid</b>
Initial:	none
Applies To:	Block replaced-elements
Inherited:	No

### none

Default. Images are not split.

### auto

Images are split at page breaks.

**avoid**

Images are split at page breaks, unless they fit on the next page.

- *More information:* [Pagination of Images \(p. 92\)](#)

**inset-inline-start**  
**inset-inline-end**  
**inset-block-start**  
**inset-block-end**

These properties set the position properties (top, bottom, left, right) based on the logical directions (depending on text direction).

Block start and end correspond to top and bottom. Inline start and end correspond to left and right or right and left, depending on the BiDi text direction.

<b>Value:</b>	<length>   <percentage>   auto
Initial:	auto
Applies To:	positioned elements
Inherited:	No

- *MDN documentation:* [inset-inline-start](#), [inset-inline-end](#), [inset-block-start](#), [inset-block-end](#)
- *See also:* [bottom](#), [left](#), [right](#), [top](#)
- *More information:* [Text Direction Dependent Layouts \(p. 139\)](#)

**opacity**

Specifies the transparency of an element.

<b>Value:</b>	<alphavalue>
Initial:	1
Inherited:	No

- *MDN documentation:* [opacity](#)

## order

Specifies in which order the flex/grid items are laid out in their container.

<b>Value:</b>	<b>&lt;integer&gt;</b>
Initial:	0
Applies To:	flex items and grid items
Inherited:	No

▪ *MDN documentation:* [order](#)

## orphans

The 'orphans' property specifies the minimum number of lines in a block container that must be left at the bottom of a page, region, or column.

Only positive values are allowed.

<b>Value:</b>	<b>&lt;integer&gt;</b>
Initial:	2
Applies To:	block container elements
Inherited:	Yes

▪ *MDN documentation:* [orphans](#)

▪ *More information:* [Widows & Orphans \(p. 96\)](#)

## outline

The 'outline' property is a shorthand property, and sets all three of 'outline-style', 'outline-width', and 'outline-color'.

<b>Value:</b>	<b>[ 'outline-color'    'outline-style'    'outline-width' ]</b>
Initial:	see individual properties
Inherited:	No

▪ *MDN documentation:* [outline](#)

▪ *See also:* [border](#), [outline-color](#), [outline-style](#), [outline-width](#)

## outline-color

The 'outline-color' sets the color of an outline. The value 'invert' is not supported.

<b>Value:</b>	<b>&lt;color&gt;</b>
Initial:	currentColor
Inherited:	No

- *MDN documentation:* [outline-color](#)
- *See also:* [border-color](#)
- *More information:* [CSS Color Keywords \(p. 228\)](#)

## outline-offset

Specifies the offset between the outline and the border edge. May be negative.

<b>Value:</b>	<b>&lt;length&gt;</b>
Initial:	0
Inherited:	No

- *MDN documentation:* [outline-offset](#)
- *See also:* [outline](#)

## outline-style

The 'outline-style' property accepts the same values as 'border-style', except that 'hidden' is not a legal outline style.

<b>Value:</b>	<b>&lt;border-style&gt;</b>
Initial:	none
Inherited:	No

- *MDN documentation:* [outline-style](#)
- *See also:* [border-style](#)

## outline-width

The 'outline-width' property accepts the same values as 'border-width'.

<b>Value:</b>	<b>&lt;border-width&gt;</b>
Initial:	medium
Inherited:	No

- *MDN documentation:* [outline-width](#)
- *See also:* [border-width](#)

## overflow

Shorthand for overflow-x and overflow-y

<b>Value:</b>	<b>visible   hidden   clip   scroll   auto</b>
Initial:	visible
Applies To:	block containers
Inherited:	No

- *MDN documentation:* [overflow](#)
- *See also:* [-ro-overflow-clip-margin](#), [overflow-x](#), [overflow-y](#)

## -ro-overflow-clip-margin

When "overflow: clip" is set for an element this property specifies how the clipping area is determined, starting with one of three boxes and adding an offset. The area is affected by border-radius.

<b>Value:</b>	<b>[content-box   padding-box   border-box]    &lt;length&gt;</b>
Initial:	0px
Inherited:	No

### content-box | padding-box | border-box

Specifies the box of the element to use as the basis of the clip area. The default is padding-box.

### <length>

Optionally increases the size of the clipping area in all directions. The value may not be negative. The default is 0.

- *MDN documentation:* [overflow-clip-margin](#)
- *See also:* [overflow](#)

## overflow-wrap

This property specifies whether the UA may arbitrarily break within a word to prevent overflow when an otherwise unbreakable string is too long to fit within the line box. It only has an effect when 'white-space' allows wrapping. The difference between 'break-word' and 'anywhere' is that only the latter influences layouts that depend on the minimum sizes of elements.

<b>Value:</b>	<b>normal   break-word   anywhere</b>
Initial:	normal
Inherited:	Yes

- MDN documentation: [overflow-wrap](#)

## overflow-x overflow-y

Specify whether overflowing content of the box is visible or clipped. Additionally, setting values other than the default 'visible' makes the box a block formatting context, which changes layout behaviors like margin collapsing and baseline alignment. If the two values differ the box is treated as 'auto'. Using the 'overflow' shorthand is recommended.

<b>Value:</b>	<b>visible   hidden   clip   auto   scroll</b>
Initial:	visible
Applies To:	block containers
Inherited:	No

### visible

Overflowing content is visible and the box is not made a block formatting context.

### hidden

Overflowing content is clipped and the box is made a block formatting context.

### clip

Overflowing content is clipped and the box is made a block formatting context. In contrast to 'hidden' (and 'auto'), setting this value still allows the box to be aligned by its baseline.

### auto

Overflowing content is clipped and the box is made a block formatting context.

### scroll

Overflowing content is visible in paged layouts and clipped otherwise, however the box is made a block formatting context in any case.

- MDN documentation: [overflow-x](#), [overflow-y](#)
- See also: [overflow](#)

## pad

The `pad` descriptor can be used with custom counter style definitions when you need the marker representations to have a minimum length.

Value:	<code>&lt;integer&gt; &amp;&amp; [&lt;string&gt;   &lt;identifier&gt;]</code>
Initial:	0 ""
Applies To:	@counter-style
Inherited:	No

▪ MDN documentation: [pad](#)

## padding

The `'padding'` property is a shorthand property for setting `'padding-top'`, `'padding-right'`, `'padding-bottom'`, and `'padding-left'` at the same place in the style sheet.

Value:	<code>&lt;padding-width&gt;{1,4}</code>
Initial:	see individual properties
Applies To:	all elements except <code>table-row-group</code> , <code>table-header-group</code> , <code>table-footer-group</code> , <code>table-row</code> , <code>table-column-group</code> and <code>table-column</code>
Inherited:	No

▪ MDN documentation: [padding](#)

▪ See also: [padding-\\*-\\*](#), [padding-\\*](#)

## padding-block padding-inline

These properties set paddings based on the logical directions (depending on text direction).

The first value of `padding-block` sets `padding-top`, and the second value set `padding-bottom`. The values of `padding-inline` set `padding-left` and `padding-right` in BiDi-dependent order.

If only one value is given, it applies to both the start and end edges.

Value:	<code>&lt;padding-width&gt;{1,2}</code>
Initial:	0
Inherited:	No

▪ MDN documentation: [padding-block](#), [padding-inline](#)

▪ More information: [Text Direction Dependent Layouts](#) (p. 139)

**padding-inline-start**  
**padding-inline-end**  
**padding-block-start**  
**padding-block-end**

These properties set paddings based on the logical directions (depending on text direction).

Block start and end correspond to top and bottom. Inline start and end correspond to left and right or right and left, depending on the BiDi text direction.

<b>Value:</b>	<b>&lt;padding-width&gt;</b>
Initial:	0
Inherited:	No

- *MDN documentation:* [padding-inline-start](#), [padding-inline-end](#), [padding-block-start](#), [padding-block-end](#)
- *See also:* [padding-\\*](#)
- *More information:* [Text Direction Dependent Layouts \(p. 139\)](#)

**padding-top**  
**padding-right**  
**padding-bottom**  
**padding-left**

These properties set the top, right, bottom, and left padding of a box.

<b>Value:</b>	<b>&lt;padding-width&gt;</b>
Initial:	0
Applies To:	all elements except table-row-group, table-header-group, table-footer-group, table-row, table-column-group and table-column
Inherited:	No

- *MDN documentation:* [padding-top](#), [padding-right](#), [padding-bottom](#), [padding-left](#)
- *See also:* [padding-\\*\\*\\*](#)



## page

This property is used to specify a particular type of page (called a named page) on which an element must be displayed. If necessary, a forced page break is introduced and a new page generated of the specified type.

<b>Value:</b>	<b>auto   &lt;identifier&gt;</b>
Initial:	auto
Applies To:	boxes that create class 1 break points
Inherited:	No

### <identifier>

The name of a particular page type. Page type names are case-sensitive identifiers.

- *More information:* [Named Pages \(p. 94\)](#), [Page Groups \(p. 94\)](#)

## page-break-before page-break-after

Shorthand for the 'break-before' and 'break-after' properties.

<b>Value:</b>	<b>auto   always   avoid   left   right</b>
Initial:	auto
Applies To:	block-level elements
Inherited:	No

- *MDN documentation:* [page-break-before](#), [page-break-after](#)
- *See also:* [break-before](#), [break-after](#)

## page-break-inside

Shorthand for the 'break-inside' property.

<b>Value:</b>	<b>avoid   auto</b>
Initial:	auto
Applies To:	block-level elements
Inherited:	No

- *MDN documentation:* [page-break-inside](#)
- *See also:* [break-inside](#)

## **-ro-page-clip**

Determines which PDF page box content is clipped at.

<b>Value:</b>	<b>bleed   media</b>
Initial:	bleed
Applies To:	@page
Inherited:	No

▪ *More information:* [PDF Page Boxes \(p. 126\)](#)

## **page-layout**

Defines the view mode that is initially used to view the document.

The property values have some deprecated synonyms: Instead of "1" and "2", "single", "one" and "two" can be used. Page and column are also valid in their plural forms. However, usage of these variants is discouraged.

<b>Value:</b>	<b>auto   1 column   2 column   1 page   2 page</b>
Initial:	auto
Applies To:	@-ro-preferences
Inherited:	No

▪ *More information:* [Document-Specific Preferences \(p. 146\)](#)

## **pages-counter-offset**

An optional offset to the value of the "pages" counter, e.g. "-1" to not count the cover page.

<b>Value:</b>	<b>&lt;integer&gt;</b>
Initial:	0
Applies To:	@-ro-preferences
Inherited:	No

▪ *More information:* [Document-Specific Preferences \(p. 146\)](#), [Page Counters \(p. 107\)](#)

## **-ro-paint-reordering**

This property can be used to change the paint order of floated, positioned and transformed elements inside a single stacking context by changing the layers to which the elements are assigned. This functionality can be used to fix strange text selections or wrong text extractions of PDF viewers and tools which are caused by the default CSS paint order rules.

<b>Value:</b>	<b>normal   avoid</b>
Initial:	normal
Applies To:	floated, positioned and transformed elements
Inherited:	No

### **normal**

The stacking context layer to which an element is assigned is determined by default CSS rules. Floated elements without stacking context influencing styles (e.g. position or transform) are assigned to layer 4 (between block and inline). Transformed and positioned elements with stack level 0 (z-index 0 or auto) are assigned to layer 6 (after inline).

### **avoid**

Disables the assignment to layer 4 for floated elements and layer 6 for positioned and transformed elements. Instead they are assigned to layer 3 (non-inline parts) or layer 5 (inline parts). This assignment is identical to the assignment they would have if the corresponding styles would not be present. This behavior is only applied if no other stacking context influencing styles with a higher priority are present, e.g. explicit z-index values or CSS filter functions.

## **-ro-passdown-styles**

The -ro-passdown-styles property controls how style is passed down from an embedding document to an embedded document.

Counters or Named Strings from the embedding document will remain available to the embedded document, independent of the value set

<b>Value:</b>	<b>auto   all   stylesheets-only   none</b>
Initial:	auto
Applies To:	iframe, @page
Inherited:	No

### **all**

Default value, all inheritable inline styles and all style sheets passed down to the embedded document.

### **stylesheets-only**

Styles that have been set via the style-attribute (inline styles) are ignored, but the style sheets of the embedding document are passed down.

### **none**

Styles are not passed down to the embedded document.

**auto**

Whether the styles are passed down or not depends on the element (e.g. the styles are only passed down if the iframe is set to be seamless).

- *More information:* [iframes \(p. 55\)](#), [Running Documents \(p. 106\)](#)

**-ro-pdf-attachment-description**

The description of the attachment. If this is not specified the name is used.

<b>Value:</b>	<b>none   &lt;string&gt;</b>
Initial:	none
Inherited:	No

- *More information:* [Attachments \(p. 86\)](#)

**-ro-pdf-attachment-location**

Specifies whether the attachment is related to the area of the element.

<b>Value:</b>	<b>element   document</b>
Initial:	element
Inherited:	No

**element**

The attachment is related to the area of the element. Viewers may show a marker near that area.

**document**

The file is attached to the document with no relation to the element.

- *More information:* [Attachments \(p. 86\)](#)

**-ro-pdf-attachment-mime-type**

The MIME type of the attachment, either explicitly specified or detected. Please note that viewers generally ignore the MIME type in favor of the file extension. However, automatic processing of PDF documents may require attachments to have specific MIME types.

<b>Value:</b>	<b>auto   &lt;string&gt;</b>
Initial:	auto
Inherited:	No

**auto**

The MIME type is detected or defaults to "application/octet-stream".

**<string>**

A string explicitly specifying the MIME type. This string is not modified or validated in any way.

**-ro-pdf-attachment-name**

The file name associated with the attachment. It is recommended to specify the correct file extension. If this is not specified the name is derived from the URL.

Value:	none   <string>
Initial:	none
Inherited:	No

▪ More information: [Attachments \(p. 86\)](#)

**-ro-pdf-attachment-url**

A URL pointing to the file to be embedded. This URL can be relative and may be specified via a URL function or as a string. A string value of "#" will embed the source document.

Value:	none   <url>   <string>
Initial:	none
Inherited:	No

▪ More information: [Attachments \(p. 86\)](#)

**-ro-pdf-form-field-flags**

For PDF form and signature fields allows specifying the flags read-only, required and no-export. For text fields allows specifying multi-line, no-scroll and rich-text.

Value:	none   [multi-line    no-export    no-scroll    read-only    required    rich-text]
Initial:	none
Applies To:	Form elements
Inherited:	No

**multi-line**

Allows text field content to occupy multiple lines. This is enabled by default for "textarea" elements.

**no-export**

Prevents the contents of the form field to be exported.

**no-scroll**

Disables horizontal scrolling inside a text field. This will also limit how much text content can be input in the field.

**read-only**

Prevents the form field from being filled or changed by user input.

**required**

Marks the form field as "required" which might be evaluated by PDF viewers or third party applications.

**rich-text**

Allows the user to apply rich text formatting to the text field's contents.

- See also: `-ro-pdf-format` , `-ro-pdf-signature-field-name`
- More information: [Interactive PDF Forms \(p. 71\)](#)

**-ro-pdf-form-field-maxlength**

Limits the amount of content that can be input in a PDF form field.

Value:	<code>none</code>   <code>&lt;integer&gt;</code>
Initial:	<code>none</code>
Applies To:	Form elements
Inherited:	No

**<integer>**

Specifies the maximum number of characters that the user can input.

- More information: [Interactive PDF Forms \(p. 71\)](#)

**-ro-pdf-format**

This property converts form elements to interactive PDF forms.

Value:	<code>none</code>   <code>pdf</code>
Initial:	<code>none</code>
Applies To:	Form elements
Inherited:	No

**none**

The form element is not converted.

**pdf**

The form element is converted to an AcroForm.

- See also: `-ro-pdf-form-field-flags`
- More information: [Interactive PDF Forms \(p. 71\)](#)

## **-ro-pdf-overprint**

### **-ro-pdf-overprint-content**

Using the properties `-ro-pdf-overprint` and `-ro-pdf-overprint-content` you can specify the overprint properties of elements and their content as either `none`, `mode0` or `mode1` (zero overprint mode). The default of `auto` does not change the mode for this element.

`-ro-pdf-overprint` affects the entire element, while `-ro-pdf-overprint-content` only affects the content of the element (not its decorations, like borders and backgrounds). In both cases the children of the element are affected entirely, unless overprint styles are applied to them as well via a non-`auto` value.

<b>Value:</b>	<b>auto   none   mode0   mode1</b>
Initial:	auto
Inherited:	No

#### **auto**

No overprinting mode is specified. In general this means the mode is not changed compared to the parent.

#### **none**

Disables overprinting. Painting a new color, no matter in which color space, causes unspecified colorants to be erased at the corresponding positions. This means that in any area, only the color that was painted last is visible.

#### **mode0**

Standard overprint mode, also known as "OPM 0". In this mode source color component values replace values that have been previously painted for the corresponding device colorants, regardless what the new values are.

#### **mode1**

Illustrator overprint mode, also known as "OPM 1" or "nonzero overprint mode". When the overprint mode is 1, tint values of 0.0 for source color components do not change the corresponding components of previously painted colors.

- *More information:* [Overprinting \(p. 85\)](#)

## **-ro-pdf-page-rotation**

When set to a value other than 'none' flags the page to be rotated by the viewer. This rotation only support 90° increments. The value represents the side that the original top side should be on after rotation. 'start' and 'end' are based on the reading 'direction', 'inside' and 'outside' on whether the page is left or right. When two values are set the first is used for landscape pages and the second for portrait ones.

<b>Value:</b>	<b>[none   left   right   start   end   inside   outside   bottom]{1,2}</b>
Initial:	none
Applies To:	@page
Inherited:	No

## **pdf-shape-optimization**

Sets whether shapes in the converted PDF should be optimized for certain behavior.

<b>Value:</b>	<b>none   visual</b>
Initial:	visual
Applies To:	@-ro-preferences
Inherited:	No

### **visual**

Enable visual optimization. Shapes are written to the PDF in a way to ensure a consistent look in certain PDF viewers. Without these modifications there may be different anti-aliasing for certain shapes.

### **none**

Disable all shape optimizations.

## **-ro-pdf-signature-field-lock**

Specifies whether a signature field will lock form elements as well as which ones.

<b>Value:</b>	<b>[ none   all ] [ except &lt;string&gt;# ]?</b>
Initial:	none
Applies To:	Elements with a PDF signature field
Inherited:	No

### **none**

Signing the field does not lock any form elements.

### **all**

Signing the field locks all form elements in the document.



**except**

When followed by a list of strings, those are exceptions from 'none' or 'all', locking those fields or excluding them from locking respectively.

- See also: `-ro-pdf-signature-field-name`

**-ro-pdf-signature-field-name**

Specifies whether PDF signature field will be created for this elements as well as its name.

<b>Value:</b>	<b>none   &lt;string&gt;</b>
Initial:	none
Inherited:	No

**none**

No PDF signature field is created.

**<string>**

A PDF signature field with the specified name is created. (names should be unique)

- See also: `-ro-pdf-form-field-flags`, `-ro-pdf-signature-field-lock`

**-ro-pdf-tag-actual-text**

For the purpose of PDF tagging specifies the "actual text", i.e. the machine readable version of text that is not machine readable by itself, e.g. due to stylizing. E.g. the actual text for "|-||=-|\_[] VV[]?|\_)" should be "hello world".

When not none, the value is a comma separated list, each item of which is resolved to a string. The first non-empty string (i.e. not containing only spaces) is the result. Each item can consist of multiple parts delimited only by spaces, which are concatenated to the string.

If there is no result the element has no "actual text", which is the default, as it has to be specified explicitly.

<b>Value:</b>	<b>[ [ auto   aria-name   aria-description   &lt;string&gt; ]+ ]#   none</b>
Initial:	auto
Inherited:	No

**auto**

Same as 'none'. "actual text" has to be specified explicitly.

**aria-name**

The ARIA name of the element or the empty string if none can be determined

**aria-description**

The ARIA description of the element or the empty string if none can be determined

**<string>**

A specific string or an attr function like attr(alt)

**none**

The element explicitly has no "actual text".

- *More information:* [Accessibility \(p. 155\)](#)

**-ro-pdf-tag-alt**

For the purpose of PDF tagging specifies the alternative text for elements with no machine readable text, especially images and other replaced elements like barcodes.

When not none, the value is a comma separated list, each item of which is resolved to a string. The first non-empty string (i.e. not containing only spaces) is the result. Each item can consist of multiple parts delimited only by spaces, which are concatenated to the string.

As a last resort, when no result was found for a replaced element, information from it is used to generate an alternative text. However, this should be avoided as the results will not be helpful. A warning is logged if the information is minimal.

<b>Value:</b>	<b>[ [ auto   aria-name   aria-description   &lt;string&gt; ]+ ]#   none</b>
<b>Initial:</b>	auto
<b>Inherited:</b>	No

**auto**

First evaluates the property "-ro-alt-text". If that doesn't provide a result and the element is a replaced element, e.g. an image or barcode, the ARIA name and ARIA description are tried.

**aria-name**

The ARIA name of the element or the empty string if none can be determined

**aria-description**

The ARIA description of the element or the empty string if none can be determined

**<string>**

A specific string or an attr function like attr(alt)

**none**

The element explicitly has no alternative text. Also no last resort methods will be used to determine one.

- *See also:* [-ro-alt-text](#)
- *More information:* [Accessibility \(p. 155\)](#)

## **-ro-pdf-tag-expanded**

For the purpose of PDF tagging specifies text that is the expanded form of the acronym or abbreviation that is the text content element. This is important for screen readers to pronounce abbreviations correctly (see sample).

When not none, the value is a comma separated list, each item of which is resolved to a string. The first non-empty string (i.e. not containing only spaces) is the result. Each item can consist of multiple parts delimited only by spaces, which are concatenated to the string.

If there is no result the element has no expanded text, which is the default, as it has to be specified explicitly.

<b>Value:</b>	<b>[ [ auto   aria-name   aria-description   &lt;string&gt; ]+ ]#   none</b>
Initial:	auto
Inherited:	No

### **auto**

Same as 'none'. Expanded text has to be specified explicitly.

### **aria-name**

The ARIA name of the element or the empty string if none can be determined

### **aria-description**

The ARIA description of the element or the empty string if none can be determined

### **<string>**

A specific string or an attr function like attr(alt)

### **none**

The element explicitly has no expanded text.

▪ *More information:* [Accessibility \(p. 155\)](#)

## **-ro-pdf-tag-form**

For the purpose of PDF tagging specifies the type of non-interactive form fields.

<b>Value:</b>	<b>text   button   radiobutton   checkbox</b>
Initial:	text
Applies To:	Non-interactive form elements
Inherited:	No

### **text**

The static form element is a text field.

### **button**

The static form element is a button.

### **radiobutton**

The static form element is a radio button.

**checkbox**

The static form element is a checkbox.

- *More information:* [Accessibility \(p. 155\)](#)

**-ro-pdf-tag-form-checked**

For the purpose of PDF tagging specifies whether non-interactive checkbox or radio button form elements are checked.

<b>Value:</b>	<b>off   on   neutral</b>
Initial:	off
Applies To:	Non-interactive form elements
Inherited:	No

**off**

The element is unchecked.

**on**

The element is checked.

**neutral**

The element is half-checked.

- *More information:* [Accessibility \(p. 155\)](#)

**-ro-pdf-tag-form-name**

For the purpose of PDF tagging specifies the descriptive name of a form element (interactive or non-interactive), which is used by screen readers and other interfaces.

When not none, the value is a comma separated list, each item of which is resolved to a string. The first non-empty string (i.e. not containing only spaces) is the result. Each item can consist of multiple parts delimited only by spaces, which are concatenated to the string.

If there is no result the form element has no descriptive name, which should be avoided.

<b>Value:</b>	<b>[ [ auto   aria-name   aria-description   &lt;string&gt; ]+ ]#   none</b>
Initial:	auto
Applies To:	Form elements
Inherited:	No

**auto**

Tries the ARIA name and the ARIA description

**aria-name**

The ARIA name of the element or the empty string if none can be determined

**aria-description**

The ARIA description of the element or the empty string if none can be determined

**<string>**

A specific string or an attr function like attr(alt)

**none**

The element explicitly has no descriptive name. Also no last resort methods will be used to determine one.

- *More information:* [Accessibility \(p. 155\)](#)

**-ro-pdf-tag-header-cell-scope**

For the purpose of PDF tagging specifies what a table header cell (TH) relates to, its column or its row. The initial value of 'auto' means that the scope is estimated .

<b>Value:</b>	<b>auto   column   row</b>
Initial:	auto
Inherited:	No

- *More information:* [Accessibility \(p. 155\)](#)

**-ro-pdf-tag-table-summary**

For the purpose of PDF tagging specifies a summary for a table.

When not none, the value is a comma separated list, each item of which is resolved to a string. The first non-empty string (i.e. not containing only spaces) is the result. Each item can consist of multiple parts delimited only by spaces, which are concatenated to the string.

If the table is directly preceded by a heading element the text content of that is used as a last resort.

<b>Value:</b>	<b>[ [ auto   aria-name   aria-description   &lt;string&gt; ]+ ]#   none</b>
Initial:	auto
Applies To:	Tables
Inherited:	No

**auto**

Tries the ARIA name and the ARIA description

**aria-name**

The ARIA name of the element or the empty string if none can be determined

**aria-description**

The ARIA description of the element or the empty string if none can be determined

**<string>**

A specific string or an attr function like attr(alt)

**none**

The element explicitly has no summary. Also no last resort methods will be used to determine one.

- *More information:* [Accessibility \(p. 155\)](#)

## **-ro-pdf-tag-type**

Used for PDF tagging. Allows overriding the automatic determination of the tag type for this element. Supports explicit overrides, semi-automatic ones and conditional ones. Please see the linked chapter for details.

<b>Value:</b>	<code>&lt;pdf-tag-type&gt;{2}#? , [ auto   &lt;pdf-tag-type&gt; ]?</code>
<b>Initial:</b>	auto
<b>Inherited:</b>	No

- **Types:** `<pdf-tag-type>`
- **More information:** [Controlling Tagging with CSS \(p. 163\)](#), [Tagged PDF \(p. 73\)](#), [Accessibility \(p. 155\)](#)

## **-ro-pdf-text-rendering**

This property allows to render text content as vector graphics. Since in this case PDF viewers do not need a font to render the text content, no font is embedded in the document. The affected text is not selectable in PDF viewers and not available to screen readers.

This also applies for text content in internal and external SVGs. In this case this property has to be set on the root element of the SVG and affects all contained text.

<b>Value:</b>	<code>auto   visual-only</code>
<b>Initial:</b>	auto
<b>Inherited:</b>	Yes

### **auto**

Text is embedded using fonts.

### **visual-only**

Text is rendered as vector graphics.

## **place-content**

The shorthand property for 'align-content' and 'justify-content'. If the second value is omitted, the first value is used for 'justify-content'. If that value would be invalid, 'start' is used instead.

<b>Value:</b>	<code>&lt;'align-content'&gt; &lt;'justify-content'&gt;?</code>
<b>Initial:</b>	normal
<b>Applies To:</b>	multi-line flex containers
<b>Inherited:</b>	No

- **MDN documentation:** [place-content](#)

## place-items

The shorthand property for 'align-items' and 'justify-items'. If the second value is omitted, the first is used for justify-items.

<b>Value:</b>	<b>&lt;'align-items'&gt; &lt;'justify-items'&gt;?</b>
Initial:	
Inherited:	No

- MDN documentation: [place-items](#)

## place-self

The shorthand property for 'align-self' and 'justify-self'. If the second value is omitted, the first value is used for 'justify-self'.

<b>Value:</b>	<b>&lt;'align-self'&gt; &lt;'justify-self'&gt;?</b>
Initial:	auto
Inherited:	No

- MDN documentation: [place-self](#)

## position

The 'position' and 'float' properties determine which of the positioning algorithms is used to calculate the position of a box.

<b>Value:</b>	<b>static   relative   absolute   fixed   running(&lt;identifier&gt;)</b>
Initial:	static
Applies To:	all elements except table-column-group and table-column
Inherited:	No

### running(<identifier>) 🚧

Moves the element out of the normal flow and into a page margin box as a running header or footer. The page margin box needs to specify the element function with the same <identifier> used for the running element to display it.

- MDN documentation: [position](#)
- See also: [float](#)
- More information: [Running Elements \(p. 103\)](#)

## **-ro-position-origin**

For positioned elements within a page, optionally changes the containing block to a specified box of the page: content-box, padding-box, border-box, -ro-page-box (this is the margin or trim box), -ro-bleed-box. It also allows to position an element within the column of a multi-column element.

This affects the inset properties (top, right, bottom, left) as well as percentage widths and heights.

<b>Value:</b>	<b>normal   [ [ page   column ]    &lt;box&gt; ]</b>
Initial:	normal
Applies To:	positioned elements
Inherited:	No

### **page**

The element is positioned relative to its page. This value is used when only a <box> was specified.

### **column**

When inside a multi-column element, the absolute positioned element is placed relative to the column. If the element is not inside a multi-column, it behaves like 'normal'.

### **<box>**

Valid values are content-box, padding-box, border-box, -ro-page-box (this is the margin or trim box), -ro-bleed-box.

The latter two are only valid for placing the element within the page.

- *More information:* [Positioning Content Relative to Page Boxes \(p. 130\)](#)

## **prefix**

The prefix descriptor of the @counter-style rule specifies content that will be prepended to the marker representation.

<b>Value:</b>	<b>[&lt;string&gt;   &lt;identifier&gt;]</b>
Initial:	""
Applies To:	@counter-style
Inherited:	No

- *MDN documentation:* [prefix](#)



## **-ro-qr-code-errorcorrectionlevel**

Deprecated in favor of new barcode functionality. Sets the error correction level of the QR code.

<b>Value:</b>	<b>L   M   Q   H</b>
Initial:	L
Applies To:	QR Code elements
Inherited:	No

### **L**

Low level error correction. Up to 7% damaged data can be restored.

### **M**

Medium level error correction. Up to 15% damaged data can be restored.

### **Q**

Quartile level error correction. Up to 25% damaged data can be restored.

### **H**

High level error correction. Up to 30% damaged data can be restored.

▪ *Deprecated!* Use `-ro-barcode` instead.

## **-ro-qr-code-forcedcolors**

Deprecated in favor of new barcode functionality. Defines whether the colors of the QR code are black and white or based on the text color and the background.

<b>Value:</b>	<b>normal   none</b>
Initial:	normal
Applies To:	QR Code elements
Inherited:	No

### **normal**

QR code is black on white.

### **none**

Instead of black, the value of the CSS property color is used to paint the squares. The background is visible instead of the white squares.

▪ *Deprecated!* Use `-ro-barcode` instead.

## **-ro-qr-code-quality**

Deprecated in favor of new barcode functionality. By default, The QR code is built from multiple squares. This method is fast and looks correct in print. However, in PDF viewers on screen the edges of neighboring squares may be visible.

<b>Value:</b>	<b>normal   high</b>
Initial:	normal
Applies To:	QR Code elements
Inherited:	No

### **normal**

The QR code is built from multiple squares.

### **high**

The squares are combined into one object, ensuring a seamless look, at the cost of performance.

- *Deprecated!* Use `-ro-barcode` instead.

## **-ro-qr-code-quietzone-size**

Deprecated in favor of new barcode functionality. Sets the size of the quiet (empty) zone around the QR code in modules (QR code "square" widths).

<b>Value:</b>	<b>&lt;integer&gt;</b>
Initial:	1
Applies To:	QR Code elements
Inherited:	No

### **<integer>**

Possible values are 0 (no quiet zone) and positive integers.

- *Deprecated!* Use `-ro-barcode` instead.

## **-ro-radiobuttonelement-group**

Defines the group name of radio buttons. In most cases, it is used with the attr-function. This is done automatically in HTML documents.

<b>Value:</b>	<b>none   &lt;string&gt;</b>
Initial:	none
Applies To:	Form elements
Inherited:	No

▪ *More information:* [Accessibility \(p. 155\)](#)

## **range**

When defining custom counter styles, the range descriptor lets the author specify a range of counter values over which the style is applied.

<b>Value:</b>	<b>[ [ &lt;integer&gt;   infinite ]{2} ]#   auto</b>
Initial:	auto
Applies To:	@counter-style
Inherited:	No

▪ *MDN documentation:* [range](#)

## **-ro-rasterization**

This property configures in which cases SVGs and Canvas elements should be rasterized. It may disable some functionalities of those elements to avoid that. (Canvas shadows are converted into separate images, not affecting other parts of the Canvas, for both 'fallback' and 'avoid')

<b>Value:</b>	<b>fallback   avoid   always</b>
Initial:	fallback
Applies To:	SVG and Canvas elements
Inherited:	Yes

### **fallback**

The SVG or Canvas is only rasterized when it uses features that are not supported by PDF vector graphics: masks, filters or non-default composites for SVG; non-default composites and ImageData access for Canvas.

### **avoid**

Avoids rasterization of the entire SVG or Canvas by disabling functionality that is not supported by PDF vector graphics.

**always**

Rasterizes the Canvas in any case. (does not apply to SVG)

- *More information:* [SVG \(p. 48\)](#), [Canvas Element \(p. 57\)](#)

**-ro-rasterization-max-size**

Defines a maximum amount of pixels a rasterization image may have. If the limit would be exceeded, the image resolution is reduced. This property can be used to reduce the required memory for rasterized content.

<b>Value:</b>	<b>auto   none   &lt;number&gt;</b>
<b>Initial:</b>	auto
<b>Inherited:</b>	Yes

**auto**

The default limit. Behaves the same as if the value was 2.

**none**

Disables the limit. This should be used with caution, especially if it is combined with "-ro-rasterization-supersampling", as large images have a significant impact on the required memory.

**<number>**

A number greater than zero which represents the maximum amount of pixels in millions (megapixels).

- *See also:* [box-shadow](#), [filter](#), [-ro-rasterization-supersampling](#), [text-shadow](#)

**-ro-rasterization-supersampling**

This property configures the resolution of the rasterization of SVGs and Canvas elements or elements with a CSS filter, box-shadows or text-shadows set. Higher resolution factors increase the quality of the image, but also increase the conversion time and the size of the output documents.

<b>Value:</b>	<b>&lt;integer&gt;</b>
<b>Initial:</b>	2
<b>Applies To:</b>	Rasterized elements (see description)
<b>Inherited:</b>	Yes

**<integer>**

The resolution of the rasterization is 96dpi multiplied by this factor. For example, a value of 2 means 192dpi. Accepted values are all positive integers, however, canvas will clip values larger than 4.

- *More information:* [SVG \(p. 48\)](#), [Canvas Element \(p. 57\)](#)

## **-ro-registration-mark-offset**

Specifies the gap between the trim box and the registration mark. Negative values are not allowed.

<b>Value:</b>	<b>&lt;length&gt;   &lt;percentage&gt;</b>
Initial:	100%
Applies To:	@page
Inherited:	No

### **<length>**

Specifies the gap as an absolute length.

### **<percentage>**

Specifies the gap as a percentage value relative to the bleed. A value of 100% positions the inner side of the registration mark exactly at the outer edge of the bleed.

## **-ro-registration-mark-size**

This property can be used to set the size of the registration mark. Negative values are not allowed. A value of zero disables the registration mark.

<b>Value:</b>	<b>&lt;length&gt;</b>
Initial:	0.5cm
Applies To:	@page
Inherited:	No

## **-ro-replacedelement**

Turns an element into a so-called 'replaced element' that displays an image or other external or embedded content.

<b>Value:</b>	<b>none   image   barcode   qrcode   embedded-svg</b>
Initial:	none
Inherited:	No

### **image**

Creates an image replaced element. Used in combination with -ro-source.

### **barcode**

Creates a barcode replaced element. Used in combination with -ro-barcode-type.

### **qrcode**

Creates a legacy QR code replaced element. The QR code is read from an existing "href" attribute or the text content of the element.

**embedded-svg**

Creates an SVG replaced element from embedded SVG content.

- See also: `-ro-source`
- More information: [Compound Formats \(p. 47\)](#)

**right**

Like 'top', but specifies how far a box's right margin edge is offset to the left of the right edge of the box's containing block. For relatively positioned boxes, the offset is with respect to the right edge of the box itself.

<b>Value:</b>	<code>&lt;length&gt;   &lt;percentage&gt;   auto</code>
Initial:	auto
Applies To:	positioned elements
Inherited:	No

- MDN documentation: [right](#)
- See also: `inset-*`

**row-gap**  
**grid-row-gap**

Sets the gap between rows.

<b>Value:</b>	<code>&lt;length&gt;   &lt;percentage&gt;   normal</code>
Initial:	normal
Applies To:	grid containers
Inherited:	No

- MDN documentation: [row-gap](#)

## **-ro-rowspan**

The property to determine the row span of a cell. The content contains the number of rows spanned by this cell.

<b>Value:</b>	<b>&lt;integer&gt;</b>
Initial:	1
Applies To:	table-cell elements
Inherited:	No

## **-ro-scale-content**

This property sets an optional scaling factor for the content. Please note that the value is taken from the first page and applied uniformly to the entire document.

<b>Value:</b>	<b>none   auto   &lt;percentage&gt;</b>
Initial:	none
Applies To:	@page (first page only)
Inherited:	No

### **<percentage>**

A percent value which is treated as a scaling factor for the content.

### **auto**

The scale factor is determined based on the content of the document, for the purpose of shrink-to-fit. It is ensured that no block overflows its respective page content width or height. (The entire document is analyzed to determine the required factor.)

▪ *More information:* [Shrink-to-Fit \(p. 133\)](#)

## **shape-image-threshold**

Defines the alpha channel threshold above text must wrap around the respective pixel of an image, with 0 being completely transparent and 1 being completely opaque.

<b>Value:</b>	<b>&lt;alphavalue&gt;</b>
Initial:	0
Applies To:	floats
Inherited:	No

▪ *MDN documentation:* [shape-image-threshold](#)

## shape-margin

Sets a margin for the shape created by the CSS property shape-outside.

<b>Value:</b>	<b>&lt;length&gt;   &lt;percentage&gt;</b>
Initial:	0
Applies To:	floats
Inherited:	No

■ MDN documentation: [shape-margin](#)

## shape-outside

Defines a shape for floated box around which adjacent inline content should wrap.

<b>Value:</b>	<b>none   [ &lt;basic-shape&gt;    &lt;shape-box&gt; ]   &lt;image&gt;   -ro-self</b>
Initial:	none
Applies To:	floats
Inherited:	No

### -ro-self

Similar to specifying an image, but the shape is derived from the float element's content, e.g. text is wrapped around a large letter. Also uses the value of shape-image-threshold.

■ MDN documentation: [shape-outside](#)

## -ro-sidenote-align

Defines the vertical alignment of a sidenote in its sidenote area. The actual final vertical position of the sidenote depends on whether it has enough space and will be moved up or down if necessary.

<b>Value:</b>	<b>[start   end   stack ]   [[baseline   container-start   container-end] strict?]</b>
Initial:	baseline
Applies To:	Sidenotes
Inherited:	No

### baseline

The baselines of the sidenote and its origin line should be at the same vertical position.

### container-start

The sidenote's top should be placed at the same height as the block container element's top from which it originates. The border rectangles are used for this alignment.



**container-end**

The sidenote's bottom should be placed at the same height as the block container element's bottom from which it originates. The border rectangles are used for this alignment. Note that the sidenote may still be pushed down to avoid overlapping with a previous sidenote, so consider also setting 'strict' when using this alignment.

**stack**

The sidenote will be placed directly under the previous sidenote (or at top if it is the first one). They are basically stacked on top of each other.

**start**

The sidenote will be placed at the top of the sidenote area or directly below of previous start-aligned sidenotes. Note that start-aligned sidenotes will always be above sidenotes with any other alignment, no matter their DOM order.

**end**

The sidenote will be placed at the bottom of the sidenote area or directly above of previous end-aligned sidenotes. Note that end-aligned sidenotes will always be below sidenotes with any other alignment, no matter their DOM order.

**strict**

This value can only apply for alignments that depend on the sidenote's origin (e.g. 'baseline', but not 'start'). As long as there is enough space in the sidenote area, the sidenote will not be pushed away from its intended position. Overlapping is avoided by moving previous sidenotes up.

- *More information:* [Sidenotes \(p. 112\)](#)

**-ro-sidenote-avoid**

Defines whether sidenotes should avoid positions that are next to the element. In that case they will be moved up or down, if there is enough space left. This is useful for elements that should be wider than other content, overflowing into the sidenote area.

<b>Value:</b>	<b>none   [ &lt;box&gt;    [ &lt;sidenote-side&gt;   both ] ]</b>
Initial:	none
Inherited:	No

**<box>**

The element's box that determines the vertical position and height that is considered as overlapping with sidenotes.

Allowed values are 'border-box', 'padding-box', 'content-box' and 'margin-box'. If omitted, 'border-box' is used.

**<sidenote-side>**

Accepts the same values as the `-ro-sidenote()` function.

- *See also:* `-ro-sidenote`

## **-ro-sidenote-offset**

This allows to offset the base position of a sidenote by a certain distance. Positive lengths shift down, negative lengths shift up. This property has only effect on alignments that depend on the position of the origin, i.e. 'baseline', 'container-start' and 'container-end'.

<b>Value:</b>	<b>&lt;length&gt;   &lt;percentage&gt;</b>
Initial:	0
Applies To:	sidenotes
Inherited:	No

▪ *More information:* [Sidenotes \(p. 112\)](#)

## **size**

Specifies the dimensions of pages, i.e. their CSS margin area size which is equivalent to their PDF TrimBox size. Possible values are lengths, for width and height, or named sizes, like A4 or letter.

<b>Value:</b>	<b>auto   &lt;length&gt;{1,2}   [ &lt;page-size&gt;    [ portrait   landscape ] ]</b>
Initial:	auto
Applies To:	@page
Inherited:	No

### **<length>**

The page size is set to the given absolute dimensions. If only one length value is specified, it sets both the width and height of the page (i.e. it is a square). If two length values are specified, the first establishes the width, and the second one the height. Negative lengths are invalid.

### **<page-size>**

The page size is set to a named one, like A4, A5, letter or legal. See the linked chapter for a full list of valid values. When no orientation is specified the default one is portrait.

### **landscape**

Specifies that the named page size is oriented in landscape, i.e. the longer sides of the page are horizontal. If no '<page-size>' is specified, the default size A4 is used.

### **portrait**

Specifies that the named page size is oriented in portrait, i.e. the shorter sides of the page are horizontal. If no '<page-size>' is specified, the default size A4 is used.

### **auto**

Equivalent to specifying A4.

▪ *More information:* [Supported Page Size Formats \(p. 224\)](#), [PDF Page Boxes \(p. 126\)](#)

**-ro-source**

Specifies the URL of an image. Used in combination with `-ro-replacedelement`. This is done automatically in HTML documents.

Value:	<code>none</code>   <code>&lt;url&gt;</code>   [ <code>&lt;string&gt;</code> ]+
Initial:	<code>none</code>
Inherited:	No

- See also: [-ro-replacedelement](#)
- More information: [Images \(p. 47\)](#)

**-ro-source-area**

Specifies which area of a PDF page should be embedded as an image. Used in combination with `-ro-source`. Possible values are 'auto' as well as the strings "trim", "crop", "art", "bleed" and "media". The strings set the area to the specified PDF page box. 'auto' has the same effect as "media". The fallback behavior when the specified page box does not exist is 'auto'.

Value:	<code>auto</code>   <code>&lt;string&gt;</code>
Initial:	<code>auto</code>
Inherited:	No

- More information: [PDF Pages as Images \(p. 58\)](#)

**-ro-source-page**

Specifies which page of a PDF should be embedded as an image. Used in combination with `-ro-source`.

Value:	<code>&lt;integer&gt;</code>
Initial:	<code>1</code>
Inherited:	No

**`<integer>`**

The number of the page that is shown, with 1 being the first page. Negative numbers count from the document end, with -1 being the last page. A value of 0 is treated like the default value, which is 1.

- More information: [PDF Pages as Images \(p. 58\)](#)

## string-set

The 'string-set' property accepts a comma-separated list of named strings. Each named string is followed by a content list that specifies which text to copy into the named string. Whenever an element with value of 'string-set' different from 'none' is encountered, the named strings are assigned their respective value.

Value:	[ <identifier> [ <string>   <named-string>   <quote>   counter()   counters()   content()   target-text()   target-counters()   target-counter() ]+ ]#   none
Initial:	none
Inherited:	No

### <string>

a string, e.g. "foo"

### <counter>

counter() or counters() function

### <content> 🐞

the 'content()' function returns the content of elements and pseudo-elements.

- More information: [Named Strings \(p. 107\)](#)

## -ro-subject

Sets the subject in the metadata of the PDF document. Multiple values are concatenated to one string. (When applied to multiple elements the values are concatenated, separated by a comma.)

Value:	none   [ <string>   content() ]+
Initial:	none
Applies To:	all elements
Inherited:	No

### none

Does not set a subject.

### <string>

Sets the specified string as subject.

### content()

Sets the subject from the content of the element.

- See also: `-ro-author`, `-ro-keywords`, `-ro-title`

- More information: [Metadata \(p. 70\)](#)

## suffix

<b>Value:</b>	[<string>   <identifier>]
Initial:	""
Applies To:	@counter-style
Inherited:	No

■ *MDN documentation:* [suffix](#)

## symbols

The symbols CSS descriptor is used to specify the symbols that the specified counter system will use to construct counter representations.

<b>Value:</b>	[<string>   <identifier>]+
Initial:	""
Applies To:	@counter-style
Inherited:	No

■ *MDN documentation:* [symbols](#)

## system

The system descriptor specifies the algorithm to be used for converting the integer value of a counter to a string representation. Used in the counter-style at-rule.

<b>Value:</b>	cyclic   numeric   alphabetic   symbolic   additive   [ fixed <integer>? ]   [ extends <identifier> ]
Initial:	symbolic
Applies To:	@counter-style
Inherited:	No

■ *MDN documentation:* [system](#)

**-ro-tab-size**

This property determines the tab size used to render preserved tab characters (U+0009). Integers represent the measure as multiples of the space character's advance width (U+0020). Negative values are not allowed.

<b>Value:</b>	<b>&lt;integer&gt;</b>
Initial:	8
Applies To:	block containers
Inherited:	Yes

**table-layout**

The 'table-layout' property controls which algorithm is used to lay out tables, including their rows and cells. For performance reasons, excessively nested HTML table elements are set to 'fixed' instead of the initial value 'auto' unless 'auto' is explicitly set.

<b>Value:</b>	<b>auto   fixed</b>
Initial:	auto
Applies To:	'table' and 'inline-table' elements
Inherited:	No

■ MDN documentation: [table-layout](#)

**-ro-target-candidate**

Only has any affect when segmentation is enabled and there are "target-counter(s)" or "target-text" functions using "attr" or "-ro-attr" functions to determine their targets.

For cross-references to be able to access targets in previous segments, the data of these targets must be kept in memory, which is enabled using this property on the target elements.

Please note that using the values "text" or "all" on an excessive amount of elements or on elements with a lot of text content can drastically increase memory consumption.

<b>Value:</b>	<b>none   all   counter   text</b>
Initial:	none
Inherited:	No

**none**

The text and counter data of the element can not be accessed from later segments.

**all**

The text and counter data of the element can be accessed from later segments.

**counter**

The counter data of the element can be accessed from later segments.

**text**

The text of the element can be accessed from later segments.

- *More information:* [Segmentation \(p. 147\)](#)

**text-align**

This property describes how the inline-level content of a block is aligned along the inline axis if the content does not completely fill the line box.

<b>Value:</b>	<b>start   end   left   right   center   justify   match-parent   justify-all</b>
Initial:	start
Applies To:	block containers
Inherited:	Yes

- *MDN documentation:* [text-align](#)
- *See also:* [text-align-all](#) , [text-align-last](#)

**text-align-all**

This longhand property of 'text-align' specifies the text alignment of all lines inside the block container, except for the last line, if 'text-align-last' is set to a non-auto value. Generally, it is recommended to use the shorthand 'text-align' instead of this property.

<b>Value:</b>	<b>start   end   left   right   center   justify   match-parent</b>
Initial:	start
Applies To:	block containers
Inherited:	Yes

- *See also:* [text-align](#) , [text-align-last](#)

## text-align-last

This property describes how the last line of a block or a line right before a forced line break is aligned. If a line is also the first line of the block or the first line after a forced line break, then 'text-align-last' takes precedence over 'text-align-all'.

For the individual values, see their corresponding description for 'text-align'.

<b>Value:</b>	<b>auto   start   end   left   right   center   justify</b>
Initial:	auto
Applies To:	block containers
Inherited:	Yes

■ MDN documentation: [text-align-last](#)

■ See also: [text-align](#), [text-align-all](#)

## text-decoration

This property is a shorthand property for setting the text decoration type, style, color and thickness of a box.

<b>Value:</b>	<b>&lt;'text-decoration-line'&gt;    &lt;'text-decoration-thickness'&gt;    &lt;'text-decoration-style'&gt;    &lt;'text-decoration-color'&gt;</b>
Initial:	see individual properties
Applies To:	all elements
Inherited:	No

■ MDN documentation: [text-decoration](#)

## text-decoration-color

<b>Value:</b>	<b>&lt;color&gt;</b>
Initial:	currentColor
Applies To:	all elements
Inherited:	No

■ MDN documentation: [text-decoration-color](#)



**text-decoration-line**

Value:	none   [ underline    overline    line-through    blink ]
Initial:	none
Applies To:	all elements
Inherited:	No

■ MDN documentation: [text-decoration-line](#)

**text-decoration-style**

Value:	solid   double   dotted   dashed
Initial:	solid
Applies To:	all elements
Inherited:	No

■ MDN documentation: [text-decoration-style](#)

**text-decoration-thickness**

Value:	auto   from-font   <length>   <percentage>
Initial:	auto
Applies To:	all elements
Inherited:	No

■ MDN documentation: [text-decoration-thickness](#)

## text-indent

This property specifies the indentation of the first line of text in a block container.

<b>Value:</b>	<length>   <percentage>
Initial:	0
Applies To:	block containers
Inherited:	Yes

■ *MDN documentation:* [text-indent](#)

## text-overflow

Determines how content that overflows its line is rendered, when overflow of its paragraph has a other value than visible.

<b>Value:</b>	clip   ellipsis   -ro-scale-down
Initial:	clip
Applies To:	block containers
Inherited:	No

### -ro-scale-down

Visually reduces the size of the text until there is no more overflow. The origin of that scale transform depends on two other properties, 'direction' for its horizontal position, which is always on the start side, and 'align-content' for the vertical position, which can be 'start', 'end', 'center', 'baseline' (default) and 'stretch'. While the scale factor is based only on horizontal overflow, both directions are scaled by the same amount, except for a 'align-content' value of 'stretch', in which case there is only horizontal scaling.

■ *MDN documentation:* [text-overflow](#)

■ *See also:* [overflow](#)

## -ro-text-replace

Replaces instances of text in layout. The first string is the pattern to be replaced and must be non-empty. The second string is the replacement text. Optionally the replacement point and method can be changed from their defaults of "white-space" and "strict" respectively. The latter two are changed individually for every replacement in a list.

Value:	<b>none</b>   [<string> <string> [[source   white-space   text-transform   shaped   hybrid-layout]    [strict   ignore-case   ignore-variants   regex   transliterate]]? ]#
Initial:	none
Inherited:	Yes

### source

replacement point: before any other processing.

### white-space

replacement point: after the "white-space" property was applied (default).

### text-transform

replacement point: after the "white-space" and "text-transform" properties were applied.

### shaped

replacement point: after the "white-space" and "text-transform" properties as well as shaping (e.g. for Arabic) was applied.

### hybrid-layout

replacement point: during inline layout, using the original character for logical and the replacement for visual parts of the layout. The replacement must have the same length as the original.

### strict

replacement method: simple case-sensitive (default).

### ignore-case

replacement method: ignoring case as well as form (e.g. of Arabic characters due to shaping).

### ignore-variants

replacement method: ignoring variants of any kind, including case, form, accents and diaereses.

### regex

replacement method: using regular expression pattern.

### transliterate

replacement method: transliteration. Use scripts as input and output, e.g.: "any" "latin" transliterate

- *More information:* [List of transliterate input/output values \(p. 238\)](#)

## text-shadow

Adds shadows to text.

<b>Value:</b>	<b>none   [ &lt;length&gt;{2,3} &amp;&amp; &lt;color&gt;? ]#</b>
Initial:	none
Applies To:	text
Inherited:	Yes

■ *MDN documentation:* [text-shadow](#)

## text-transform

This property controls capitalization effects of an element's text.

<b>Value:</b>	<b>capitalize   uppercase   lowercase   none</b>
Initial:	none
Applies To:	text
Inherited:	Yes

■ *MDN documentation:* [text-transform](#)

## text-underline-offset

<b>Value:</b>	<b>auto   &lt;length&gt;   &lt;percentage&gt;</b>
Initial:	auto
Applies To:	all elements
Inherited:	Yes

■ *MDN documentation:* [text-underline-offset](#)

**text-underline-position**

<b>Value:</b>	<b>auto   [ from-font   under ]</b>
Initial:	auto
Applies To:	all elements
Inherited:	Yes

- *MDN documentation:* [text-underline-position](#)

**-ro-title**

Sets the title in the metadata of the PDF document. Multiple values are concatenated to one string. (When applied to multiple elements the values are concatenated, separated by a comma.)

<b>Value:</b>	<b>none   [ &lt;string&gt;   content() ]+</b>
Initial:	none
Applies To:	all elements
Inherited:	No

**none**

Does not set a title.

**<string>**

Sets the specified string as title.

**content()**

Sets the title from the content of the element.

- *See also:* `-ro-author`, `-ro-keywords`, `-ro-subject`
- *More information:* [Metadata \(p. 70\)](#)

## top

This property specifies how far an absolutely positioned box's top margin edge is offset below the top edge of the box's containing block. For relatively positioned boxes, the offset is with respect to the top edges of the box itself (i.e., the box is given a position in the normal flow, then offset from that position according to these properties).

<b>Value:</b>	<b>&lt;length&gt;   &lt;percentage&gt;   auto</b>
Initial:	auto
Applies To:	positioned elements
Inherited:	No

▪ *MDN documentation:* [top](#)

▪ *See also:* [inset-\\*](#)

## transform

This property contains a list of transform functions. The final transformation value for a coordinate system is obtained by converting each function in the list to its corresponding matrix, then multiplying the matrices.

Note that only 2D transforms are supported.

<b>Value:</b>	<b>none   &lt;transform-function&gt;+</b>
Initial:	none
Applies To:	transformable elements
Inherited:	No

▪ *MDN documentation:* [transform](#)

## transform-origin

This property defines the point of origin of transformations.

If only one value is specified, the second value is assumed to be center. A third value for setting the Z offset is not supported.

<b>Value:</b>	<b>[ left   center   right   top   bottom   &lt;percentage&gt;   &lt;length&gt; ]   [ left   center   right   &lt;percentage&gt;   &lt;length&gt; ] [ top   center   bottom   &lt;percentage&gt;   &lt;length&gt; ]   [[ center   left   right ] &amp;&amp; [ center   top   bottom ]]</b>
Initial:	50% 50%
Applies To:	transformable elements
Inherited:	No

▪ *MDN documentation:* [transform-origin](#)

## **-ro-truncate-margin-after-break**

Defines the rules by which the margins of blocks at the beginning of a page, column or similar should be truncated to zero.

<b>Value:</b>	<b>none   auto   always</b>
Initial:	auto
Applies To:	pages, multi-column containers, regions, root elements of iframes
Inherited:	Yes

### **none**

The margins are never truncated to zero.

### **auto**

The behavior defined by the CSS specifications. The margins are truncated to zero if the page break has not been forced. The margin on the first page and after a forced break is preserved.

### **always**

The margins of blocks at the top of a page are always truncated to zero. This is the behavior of PDFReactor prior to version 9.

## **unicode-bidi**

This property relates to the handling of bidirectional text in a document.

<b>Value:</b>	<b>normal   embed   isolate   bidi-override   isolate-override   plaintext</b>
Initial:	normal
Applies To:	all elements
Inherited:	No

### **normal**

The element does not open an additional level of embedding with respect to the bidirectional algorithm. For inline elements, implicit reordering works across element boundaries.

### **embed**

If the element is inline, this value opens an additional level of embedding with respect to the bidirectional algorithm. The direction of this embedding level is given by the 'direction' property. Inside the element, reordering is done implicitly. This corresponds to adding a LRE (U+202A; for 'direction: ltr') or RLE (U+202B; for 'direction: rtl') at the start of the element and a PDF (U+202C) at the end of the element.

### **bidi-override**

For inline elements this creates an override. For block container elements this creates an override for inline-level descendants not within another block container element. This means that inside the element, reordering is strictly in sequence according to the 'direction' property; the implicit part of the bidirectional algorithm is ignored. This corresponds to adding a LRO (U+202D; for 'direction: ltr') or RLO (U+202E; for 'direction: rtl') at the start of the element or at the start of each anonymous child block box, if any, and a PDF (U+202C) at the end of the element.

**isolate-override**

This combines the isolation behavior of `isolate` with the directional override behavior of `bidi-override`: to surrounding content, it is equivalent to `isolate`, but within the box content is ordered as if `bidi-override` were specified. It effectively nests a directional override inside an isolated sequence.

**plaintext**

This value behaves as `isolate` except that for the purposes of the Unicode bidirectional algorithm, the base directionality of each of the box's bidi paragraphs (if a block container) or isolated sequences (if an inline) is determined by following the heuristic in rules P2 and P3 of the Unicode bidirectional algorithm (rather than by using the `direction` property of the box).

- MDN documentation: [unicode-bidi](#)
- See also: `direction`
- More information: [Right-to-Left \(p. 139\)](#)

**vertical-align**

This property affects the vertical positioning inside a line box of the boxes generated by an inline-level element.

<b>Value:</b>	<b>baseline   sub   super   top   text-top   middle   bottom   text-bottom   &lt;percentage&gt;   &lt;length&gt;</b>
Initial:	baseline
Applies To:	inline-level and 'table-cell' elements
Inherited:	No

- MDN documentation: [vertical-align](#)

**visibility**

The 'visibility' property specifies whether the boxes generated by an element are rendered. Invisible boxes still affect layout (set the 'display' property to 'none' to suppress box generation altogether). The value 'collapse' is not supported for flex items.

<b>Value:</b>	<b>visible   hidden   collapse</b>
Initial:	visible
Applies To:	all elements
Inherited:	Yes

- MDN documentation: [visibility](#)



## white-space

This property declares how white space inside the element is handled.

<b>Value:</b>	<b>normal   pre   nowrap   pre-wrap   pre-line</b>
Initial:	normal
Applies To:	text
Inherited:	Yes

▪ *MDN documentation:* [white-space](#)

## widows

The 'widows' property sets the minimum number of lines in a block container that must be shown at the top of a page, region, or column.

<b>Value:</b>	<b>&lt;integer&gt;</b>
Initial:	2
Applies To:	block container elements
Inherited:	Yes

▪ *MDN documentation:* [widows](#)

▪ *More information:* [Widows & Orphans \(p. 96\)](#)

## width

This property specifies the content width of boxes.

<b>Value:</b>	<b>auto   &lt;length&gt;   &lt;percentage&gt;   min-content   max-content   fit-content</b>
Initial:	auto
Applies To:	all elements but non-replaced inline elements, table rows, and row groups
Inherited:	No

▪ *MDN documentation:* [width](#)

## **-ro-width**

This property allows the automatic resizing of form controls according to their content. If this property is set to auto, the form controls' width automatically adjusts according to its content.

<b>Value:</b>	<b>auto   none</b>
Initial:	none
Applies To:	Form elements
Inherited:	No

### **auto**

Automatically adjusts the width of a form control if the contents' width exceeds the width defined for the form control.

## **word-spacing**

Allows to modify the spacing between words.

<b>Value:</b>	<b>normal   &lt;length&gt;   &lt;percentage&gt;</b>
Initial:	normal
Inherited:	Yes

■ *MDN documentation:* [word-spacing](#)

## **word-wrap**

This property specifies whether the UA may arbitrarily break within a word to prevent overflow when an otherwise unbreakable string is too long to fit within the line box. It only has an effect when 'white-space' allows wrapping. The difference between 'break-word' and 'anywhere' is that only the latter influences layouts that depend on the minimum sizes of elements.

Note that this property is identical to 'overflow-wrap' and for legacy reasons it is handled as a shorthand for that property.

<b>Value:</b>	<b>&lt;'overflow-wrap'&gt;</b>
Initial:	normal
Inherited:	Yes

■ *See also:* [overflow-wrap](#)

## z-index

For a positioned box, the 'z-index' property specifies:

1. The stack level of the box in the current stacking context.
2. Whether the box establishes a stacking context.

<b>Value:</b>	<b>&lt;integer&gt;   auto</b>
Initial:	auto
Applies To:	positioned elements and grid items
Inherited:	No

■ *MDN documentation:* [z-index](#)

## D.9.2 Functions

### attr()

#### -ro-attr()

Creates a reference to the attribute of an element with the specified name.

■ *Parameters*

```
attr(<attr-name> <type-or-unit>? [ , <attr-fallback> ]?)
```

#### <attr-name>

The attribute name

#### <type-or-unit><sup>optional</sup>

Specifies how the attribute should be interpreted. Default is 'string'.

#### <attr-fallback><sup>optional</sup>

If the attribute could not be found, this value is used instead.

■ *MDN documentation:* [attr](#)

### -ro-attr-ancestor()

Allows to retrieve an attribute value as a string from the closest ancestor (including self) in the parent chain matching the specified node name. If no name was specified or no matching ancestor was found, the attribute value of the original element is retrieved (if it exists).

■ *Parameters*

```
-ro-attr-ancestor(<attr-name> [ , <element-name> ]?)
```

#### attr-name

The name of the attribute. Its value will be returned as a string. If it is not found, an empty string is returned.

#### element-name<sup>optional</sup>

If specified, the attribute value is retrieved from the closest ancestor element (or self) with that name or from the element itself if element-name matches. If no element is found, the original element itself is used.

**blur()**

Applies a Gaussian blur.

- *Parameters*

```
blur(radius)
```

**radius** <length>

The radius of the blur. The blur can differ in x and y axis, by specifying a second length for the y axis. Negative values are not allowed.

- *MDN documentation:* [blur](#)

**brightness()**

Applies a multiplier to the brightness of an element.

- *Parameters*

```
brightness(factor)
```

**factor** <Number | Percentage>

- *MDN documentation:* [brightness](#)

**calc()**

Computes mathematical expressions with addition (+), subtraction (-), multiplication (\*), and division (/). The result can then be used for a wide range of properties.

It can be used by any property that expects a length, frequency, angle, time, number or integer value.

NOTE: The + and - operators must be surrounded with spaces.

- *Parameters*

```
calc(expression)
```

**expression**

The mathematical expression. A whitespace is required on both sides of + and - operators. Several terms can be chained (e.g. calc(50% - 2cm + 8px); ).

- *MDN documentation:* [calc](#)

**circle()**

Defines a circle

- *Parameters*

```
circle([<shape-radius>]? [at <position>]?)
```

**shape-radius**<sup>optional</sup> <Length | Percentage | Identifier>

Defines the radius of the circle, closest-side if omitted. Valid identifiers are closest-side (uses the closest distance from the center of the circle to a border of the reference box) and farthest-side (uses the farthest distance to a border of the reference box). Negative values are invalid.

**position**<sup>optional</sup>

Determines the center of the circle. Uses the same syntax as the 'background-position' property. Default value is 'center'.

- *MDN documentation:* [basic-shape: circle\(\)](#)

**cmyk()**

CMYK colors for printing.

- *Parameters*

```
cmyk(cyan, magenta, yellow, key[, alpha]?)
```

**cyan** <Number | Percentage>

Cyan color component. Number between 0 and 1 or percentage.

**magenta** <Number | Percentage>

Magenta color component. Number between 0 and 1 or percentage.

**yellow** <Number | Percentage>

Yellow color component. Number between 0 and 1 or percentage.

**key** <Number | Percentage>

Key (usually black) color component. Number between 0 and 1 or percentage.

**alpha**<sup>optional</sup> <Number | Percentage>

Alpha value of the color. Number between 0 and 1 or percentage.

- *More information:* [Colors \(p. 45\)](#)

**content()**

Allows to get the content of an element or pseudo-element.

- *Parameters*

```
content(text, before, after, first-letter)
```

**text**

The text content of the element. This is the default value.

**before**

The content of the ::before pseudo-element.

**after**

The content of the ::after pseudo-element.

**first-letter**

The first-letter of the element's content text.

- *More information:* [Named Strings \(p. 107\)](#)

**contrast()**

Adjusts the contrast of the element.

- *Parameters*

```
contrast(factor)
```

**factor** <Number | Percentage>

- *MDN documentation:* [contrast](#)

**counter()**

Refers to the value of a counter.

- *Parameters*

```
counter(<identifier> [, <counter-style> ]?)
```

**identifier**

The name of the counter

**identifier**<sup>optional</sup>

Specifies the style of the number. Default is 'decimal'.

- *More information:* [Counters](#) (p. 100)

**-ro-counter-offset()**

Works like the counter function, but additionally modifies the result by the specified offset.

- *Parameters*

```
-ro-counter-offset(<identifier>, <integer> [, <counter-style> ]?)
```

**counter** <Identifier>

The name of the counter

**offset**<sup>optional</sup> <Integer>

The integer by which the counter value is modified.

**counter-style**<sup>optional</sup>

Used to format the result, see the property 'list-style-type' for more information on the keywords. Default is 'decimal'.

**counters()**

Retrieves the values of all counters of the specified name in scope of this element, from outermost to innermost with the specified string inserted between them.

- *Parameters*

```
counters(<identifier>, <string> [, <counter-style> ]?)
```

**drop-shadow()**

Applies a drop-shadow to the element.

- *Parameters*

```
drop-shadow(<color>? && <length>{2,3})
```

- *MDN documentation:* [drop-shadow](#)

**element()**

This function places an element with a name specified via the `running()` function, in a page margin box.

- *Parameters*

```
element(<identifier> [ , [ first | start | last | first-except ] ]?)
```

**custom-ident**

The name of the running element as identifier, which is specified using the position property with the `running()` function.

**first | start | last | first-except** <sup>optional</sup>

Keywords that, in a case where there are multiple assignments on a page, specify which one should be used.

- *More information:* [Running Elements \(p. 103\)](#)

**ellipse()**

Defines an ellipse

- *Parameters*

```
ellipse([<shape-radius>{2}]? [at <position>]?)
```

**shape-radius** <sup>optional</sup> **<Length | Percentage | Identifier>**

Define the horizontal and vertical radius of the ellipse, in this order. They default to closest-side if omitted, negative values are invalid. Valid identifiers are closest-side (uses the distance from the ellipses center to the closest border of the reference box which is orthogonal to the respective radius) and farthest-side (uses the farthest distance to the respective border of the reference box).

**position** <sup>optional</sup>

Determines the center of the ellipse. Uses the same syntax as the 'background-position' property. Default value is 'center'.

- *MDN documentation:* [basic-shape: ellipse\(\)](#)

**fit-content()**

- *Parameters*

```
fit-content(<length> | <percentage>)
```

- *MDN documentation:* [fit-content](#)

**gray()****grey()**

Allows to specify a gray color

- *Parameters*

```
gray(gray[, alpha]?)
```

**gray** <Number | Percentage>

The shade of gray. A number between 0 and 1 or percentage.

**alpha**<sup>optional</sup> <Number | Percentage>

The alpha channel. A number between 0 and 1 or percentage.

- *More information:* [Colors \(p. 45\)](#)

**grayscale()**

Reduces the contrast of the element, until it is completely gray.

- *Parameters*

```
grayscale(factor)
```

**factor** <Number | Percentage>

With a value of 1 or 100%, the element is in grayscale.

- *MDN documentation:* [grayscale](#)

**hsl()**

Specifies a color using hue, saturation and lightness. The alpha channel can be specified optionally.

- *Parameters*

```
hsl(hue, saturation, lightness[, alpha]?)
```

**hue** <Number | Angle>

The hue of the color. Set using an angle of the color circle. Number are interpreted as a number of degrees.

**saturation** <Percentage>

The saturation of the color.

**lightness** <Percentage>

The lightness of the color.

**alpha**<sup>optional</sup> <Number | Percentage>

Alpha color component. Number between 0 and 1 or percentage.

- *MDN documentation:* [color value: HSL colors](#)

- *More information:* [Colors \(p. 45\)](#)



## hsla()

Specifies a transparent color using hue, saturation, lightness and optionally alpha.

### ■ Parameters

```
hsla(hue, saturation, lightness[, alpha]?)
```

#### hue <Number | Angle>

The hue of the color. Set using an angle of the color circle. Number are interpreted as a number of degrees.

#### saturation <Percentage>

The saturation of the color.

#### lightness <Percentage>

The lightness of the color.

#### alpha<sup>optional</sup> <Percentage>

The alpha channel.

■ *MDN documentation:* [color value: HSL colors](#)

■ *More information:* [Colors \(p. 45\)](#)

## hue-rotate()

Rotates the hue of the elements colors.

### ■ Parameters

```
hue-rotate(angle)
```

#### angle <Angle>

The color shift as an angle.

## hwb()

The hwb() functional notation expresses a color in the sRGB color space according to its hue, whiteness, and blackness. An optional alpha component represents the color's transparency.

### ■ Parameters

```
hwb([<number> | <angle> | none] [<percentage> | <number> | none] [<percentage> | <number> | none] [ / [<alphavalue> | none] ]?)
```

#### alpha<sup>optional</sup> <<alphavalue>>

An <alphavalue> representing the alpha channel value of the color, where the number 0 corresponds to 0% (fully transparent) and 1 corresponds to 100% (fully opaque). Additionally, the keyword none can be used to explicitly specify no alpha channel. If the A channel value is not explicitly specified, it defaults to 100%. If included, the value is preceded by a slash (/).

#### blackness <<percentage> | <number> | none>

A <percentage> or number representing the color's blackness or the keyword none (equivalent to 0% in this case) to mix in. 0% represents no blackness. 100% represents full blackness if whiteness is 0, otherwise both the whiteness and blackness values are normalized.

**hue** <<number> | <angle> | none>

A <number>, an <angle>, or the keyword none (equivalent to 0deg in this case) representing the color's <hue> angle.

**whiteness** <<percentage> | <number> | none>

A <percentage> or number representing the color's whiteness or the keyword none (equivalent to 0% in this case) to mix in. 0% represents no whiteness. 100% represents full whiteness if blackness is 0, otherwise both the whiteness and blackness values are normalized.

- *MDN documentation:* [hwb](#)

## inset()

Defines an inset rectangle.

- *Parameters*

```
inset(<shape-arg>{1,4} [round <border-radius>]?)
```

**shape-arg** <Length | Percentage>

Defines the top, right, bottom and left offsets from the reference box. These arguments follow the syntax of the margin shorthand.

**border-radius** *optional*

Defines rounded corners for the inset rectangle, using the border-radius shorthand syntax. Negative values are invalid.

- *MDN documentation:* [basic-shape: inset\(\)](#)

## invert()

Inverts the colors of the element.

- *Parameters*

```
invert(factor)
```

**factor** <Number | Percentage>

How strong the inversion should be. 50% makes the image gray, 100% completely inverts all colors.

- *MDN documentation:* [invert](#)

## jpeg()

Indicates that an image should be embedded into the PDF, using a JPEG compression.

- *Parameters*

```
jpeg([quality]?)
```

**quality** *optional* <Number | Percentage>

Defines the quality of the compressed image. Either a number between 0 and 1 or a percentage value between 0% and 100%. If omitted, the quality defaults to 80%.

## lab()

The lab() functional notation expresses a given color in the CIE L\*a\*b\* color space.

Lab represents the entire range of colors that humans can see by specifying the color's lightness, a red/green axis value, a blue/yellow axis value, and an optional alpha transparency value.

### ■ Parameters

```
lab([<percentage> | <number> | none] [ <percentage> | <number> | none] [ <percentage> | <number> | none] [ / [<alphavalue> | none] ]?)
```

#### **a** <<percentage> | <number> | none>

A <number> between -125 and 125, a <percentage> between -100% and 100%, or the keyword none (equivalent to 0% in this case). This value specifies the color's distance along the a axis, which defines how green (moving towards -125) or red (moving towards +125) the color is. Note that these values are signed (allowing both positive and negative values) and theoretically unbounded, meaning that you can set values outside the  $\pm 125$  ( $\pm 100\%$ ) limits. In practice, values cannot exceed  $\pm 160$ .

#### **alpha** <<alphavalue>>

An <alphavalue> representing the alpha channel value of the color, where the number 0 corresponds to 0% (fully transparent) and 1 corresponds to 100% (fully opaque). Additionally, the keyword none can be used to explicitly specify no alpha channel. If the A channel value is not explicitly specified, it defaults to 100%. If included, the value is preceded by a slash (/).

#### **b** <<percentage> | <number> | none>

A <number> between -125 and 125, a <percentage> between -100% and 100%, or the keyword none (equivalent to 0% in this case). This value specifies the color's distance along the b axis, which defines how blue (moving towards -125) or yellow (moving towards +125) the color is. Note that these values are signed (allowing both positive and negative values) and theoretically unbounded, meaning that you can set values outside the  $\pm 125$  ( $\pm 100\%$ ) limits. In practice, values cannot exceed  $\pm 160$ .

#### **lightness** <<percentage> | <number> | none>

A <number> between 0 and 100, a <percentage> between 0% and 100%, or the keyword none (equivalent to 0% in this case). This value specifies the color's lightness. Here the number 0 corresponds to 0% (black) and the number 100 corresponds to 100% (white).

### ■ MDN documentation: [lab](#)

## lch()

The lch() functional notation expresses a given color using the LCH color space, which represents lightness, chroma, and hue. It uses the same L axis as the lab() color function of the CIE Lab color space, but it uses the polar coordinates C (Chroma) and H (Hue).

### ■ Parameters

```
lch([<percentage> | <number> | none] [<percentage> | <number> | none] [<percentage> | <number> | <angle> | none] [ / [<alphavalue> | none] ]?)
```

#### **alpha**<sup>optional</sup> <<alphavalue>>

An <alphavalue> representing the alpha channel value of the color, where the number 0 corresponds to 0% (fully transparent) and 1 corresponds to 100% (fully opaque). Additionally, the keyword none can be used to explicitly specify no alpha channel. If the alpha channel value is not explicitly specified, it defaults to 100%. If included, the value is preceded by a slash (/).

**chroma** <<percentage> | <number> | none>

A <number>, a <percentage>, or the keyword none (equivalent to 0% in this case). This value is a measure of the color's chroma (roughly representing the "amount of color"). Its minimum useful value is 0%, or 0, while its maximum is theoretically unbounded (but in practice does not exceed 230), with 100% being equivalent to 150.

**hue** <<percentage> | <number> | <angle> | none>

A <number>, an <angle>, or the keyword none (equivalent to 0deg) representing the color's <hue> angle.

**lightness** <<percentage> | <number> | none>

A <number> between 0 and 100, a <percentage> between 0% and 100%, or the keyword none (equivalent to 0%). The number 0 corresponds to 0% (black), and the number 100 corresponds to 100% (white). This value specifies the color's brightness in the CIELab color space.

- MDN documentation: [lch](#)

## leader()

Creates a repeating pattern to connect content across horizontal spaces (for example the dots in a table of contents, which connect the chapter names with the page numbers).

The function takes the pattern that should be repeated. Either one of the keywords dotted, solid, space or a custom string.

- Parameters

```
leader([dotted | solid | space] | <string>)
```

- More information: [Leaders \(p. 130\)](#)

## linear-gradient()

Creates a color gradient which for instance can be used as a background.

- Parameters

```
linear-gradient([ [ <angle> | to <side-or-corner> ] , ]? <color-stop>[, <color-stop>]+)
```

### angle

The angle of direction for the gradient.

### side-or-corner

The direction of the gradient, using keywords. Syntax is [ left | right ] || [ top | bottom ].

### color-stop

Defines the colors of the gradient. Syntax is "<color> [ <percentage> | <length>]?".

- MDN documentation: [linear-gradient](#)

## lossless()

Indicates that an image should be embedded into the PDF using lossless compression.

- Parameters

```
lossless()
```

**matrix()**■ *Parameters*

```
matrix()
```

■ *MDN documentation:* [matrix](#)**minmax()**■ *Parameters*

```
minmax([ <fixed-breadth> , <track-breadth> ] | [ <inflexible-breadth> , <fixed-breadth> ] | [ <inflexible-breadth> , <track-breadth> ])
```

■ *MDN documentation:* [minmax](#)**oklab()**

The oklab() functional notation expresses a given color in the Oklab color space, which attempts to mimic how color is perceived by the human eye.

■ *Parameters*

```
oklab([<percentage> | <number> | none] [ <percentage> | <number> | none] [<percentage> | <number> | none] [ / [<alphavalue> | none] ]?)
```

**a <<percentage> | <number> | none>**

A <number> between -0.4 and 0.4, a <percentage> between -100% and 100%, or the keyword none (equivalent to 0% in this case). This value specifies the color's distance along the a axis in the Oklab color space, which defines how green (moving towards -0.4) or red (moving towards +0.4) the color is. Note that these values are signed (allowing both positive and negative values) and theoretically unbounded, meaning that you can set values outside the  $\pm 0.4$  ( $\pm 100\%$ ) limits. In practice, values cannot exceed  $\pm 0.5$ .

**alpha<sup>optional</sup> <<alphavalue>>**

An <alphavalue> representing the alpha channel value of the color, where the number 0 corresponds to 0% (fully transparent) and 1 corresponds to 100% (fully opaque). Additionally, the keyword none can be used to explicitly specify no alpha channel. If the A channel value is not explicitly specified, it defaults to 100%. If included, the value is preceded by a slash (/).

**b <<percentage> | <number> | none>**

A <number> between -0.4 and 0.4, a <percentage> between -100% and 100%, or the keyword none (equivalent to 0% in this case). This value specifies the color's distance along the b axis in the Oklab color space, which defines how blue (moving towards -0.4) or yellow (moving towards +0.4) the color is. Note that these values are signed (allowing both positive and negative values) and theoretically unbounded, meaning that you can set values outside the  $\pm 0.4$  ( $\pm 100\%$ ) limits. In practice, values cannot exceed  $\pm 0.5$ .

**lightness <<percentage> | <number> | none>**

A <number> between 0 and 1, a <percentage> between 0% and 100%, or the keyword none (equivalent to 0% in this case). This value specifies the color's perceived lightness. The number 0 corresponds to 0% (black) and the number 1 corresponds to 100% (white).

■ *MDN documentation:* [oklab](#)

## oklch()

The oklch() functional notation expresses a given color in the Oklab color space. oklch() is the cylindrical form of oklab(), using the same L axis, but with polar Chroma (C) and Hue (h) coordinates.

- **Parameters**

```
oklch([<percentage> | <number> | none] [<percentage> | <number> | none] [<percentage> | <number> | <angle> | none] [ / [<alphavalue> | none] ]?)
```

**alpha**<sup>optional</sup> <<alphavalue>>

An <alphavalue> representing the alpha channel value of the color, where the number 0 corresponds to 0% (fully transparent) and 1 corresponds to 100% (fully opaque). Additionally, the keyword none can be used to explicitly specify no alpha channel. If the A channel value is not explicitly specified, it defaults to 100%. If included, the value is preceded by a slash (/).

**chroma** <<percentage> | <number> | none>

A <number>, a <percentage>, or the keyword none (equivalent to 0% in this case). This value is a measure of the color's chroma (roughly representing the "amount of color"). Its minimum useful value is 0, while the maximum is theoretically unbounded (but in practice does not exceed 0.5). In this case, 0% is 0 and 100% is the number 0.4.

**hue** <<percentage> | <number> | <angle> | none>

A <number>, an <angle>, or the keyword none (equivalent to 0deg in this case) representing the color's <hue> angle.

**lightness** <<percentage> | <number> | none>

A <number> between 0 and 1, a <percentage> between 0% and 100%, or the keyword none (equivalent to 0% in this case). In this case, the number 0 corresponds to 0% (black) and the number 1 corresponds to 100% (white). This value specifies the color's perceived lightness, or "brightness".

- **MDN documentation:** [oklch](#)

## opacity()

Applies transparency to the element.

- **Parameters**

```
opacity(factor)
```

**factor** <Number | Percentage>

A value of 0% makes the element invisible.

- **MDN documentation:** [opacity](#)

## polygon()

Defines a polygon.

- **Parameters**

```
polygon([<fill-rule>, ]? [<shape-arg> <shape-arg>]#)
```

**fill-rule**<sup>optional</sup> <Identifier>

The filling rule used to determine the interior of the polygon. Possible values are nonzero and evenodd. Defaults to nonzero if omitted.

**shape-arg <Length | Percentage>**

Each pair defines a horizontal and vertical coordinate of a vertex of the polygon.

- MDN documentation: [basic-shape: polygon\(\)](#)

**radial-gradient()**

Creates round color gradients which can be used as a background, for instance.

- **Parameters**

```
radial-gradient([ [ <shape> || <size> ] [ at <position> ]?,
| at <position>, ]? <color-stop> [, <color-stop> ]+)
```

**position**

Determines the center of the gradient. Uses the same syntax as the 'background-position' property. Default value is 'center'

**shape**

Can be either 'circle' or 'ellipse'. Default is 'ellipse'.

**size**

Determines the size of the gradient. Values can be lengths and percentages (if the gradient is an ellipse, two values define width and height) or keywords, which are 'closest-side', 'closest-corner', 'farthest-side' and 'farthest-corner'.

**color-stop**

Defines the colors of the gradient. Syntax is "<color> [ <percentage> | <length>]?".

- MDN documentation: [radial-gradient](#)

**rect()**

- **Parameters**

```
rect()
```

- MDN documentation: [shape: rect\(\)](#)

**repeat()**

- **Parameters**

```
repeat([ <integer> , [ <line-names>? <track-size> ]+ <line-names>? ] | [ [ auto-fill |
auto-fit ] , [ <line-names>? <fixed-size> ]+ <line-names>? ] | [ <integer> , [ <line-
names>? <fixed-size> ]+ <line-names>? ] )
```

- MDN documentation: [repeat](#)

**repeating-linear-gradient()**

Creates a color gradient which is repeated infinitely. It has the same syntax as linear-gradient.

■ *Parameters*

```
repeating-linear-gradient([ [ <angle> | to <side-or-corner> ] ,]?
    <color-stop> [, <color-stop>]+)
```

**angle**

The angle of direction for the gradient.

**side-or-corner**

The direction of the gradient, using keywords. Syntax is [ left | right ] || [ top | bottom ].

**color-stop**

Defines the colors of the gradient. Syntax is "<color> [ <percentage> | <length>]?".

■ *MDN documentation:* [repeating-linear-gradient](#)

**repeating-radial-gradient()**

Creates round color gradients which is repeated infinitely. Uses the same syntax as radial-gradient.

■ *Parameters*

```
repeating-radial-gradient([ [ <shape> || <size> ] [ at <position> ]# ]? <color-stop> [,
    <color-stop> ]+)
```

**position**

Determines the center of the gradient. Uses the same syntax as the 'background-position' property. Default value is 'center'

**shape**

Can be either 'circle' or 'ellipse'. Default is 'ellipse'.

**size**

Determines the size of the gradient. Values can be lengths and percentages (if the gradient is an ellipse, two values define width and height) or keywords, which are 'closest-side', 'closest-corner', 'farthest-side' and 'farthest-corner'.

**color-stop**

Defines the colors of the gradient. Syntax is "<color> [ <percentage> | <length>]?".

**rgb()**

Defines an RGB color by specifying the red, green, and blue channels. The alpha channel can be specified optionally.

■ *Parameters*

```
rgb(red, green, blue[, alpha]?)
```

**red <Number | Percentage>**

Red color component. Number between 0 and 255 or percentage.

**green <Number | Percentage>**

Green color component. Number between 0 and 255 or percentage.



**blue** <Number | Percentage>

Blue color component. Number between 0 and 255 or percentage.

**alpha**<sup>optional</sup> <Number | Percentage>

Alpha color component. Number between 0 and 1 or percentage.

- *MDN documentation:* [color value: RGB colors](#)
- *More information:* [Colors \(p. 45\)](#)

**rgba()**

Defines an RGB color by specifying the red, green, and blue components and optionally the alpha channel.

▪ *Parameters*

```
rgba(red, green, blue[, alpha]?)
```

**red** <Number | Percentage>

Red color component. Number between 0 and 255 or percentage.

**green** <Number | Percentage>

Green color component. Number between 0 and 255 or percentage.

**blue** <Number | Percentage>

Blue color component. Number between 0 and 255 or percentage.

**alpha**<sup>optional</sup> <Number | Percentage>

Alpha color component. Number between 0 and 1 or percentage.

- *MDN documentation:* [color value: RGB colors](#)
- *More information:* [Colors \(p. 45\)](#)

**rotate()**▪ *Parameters*

```
rotate()
```

- *MDN documentation:* [rotate](#)

**running()**

Moves the element out of the normal flow and into a page margin box as a running header or footer. The page margin box needs to specify the element function with the same <identifier> used for the running element to display it.

▪ *Parameters*

```
running(custom-ident)
```

**custom-ident**

Defines the name of the running element, which then is referenced by the element() function.

- *More information:* [Running Elements \(p. 103\)](#)

**saturate()**

Changes the saturation of the element.

- *Parameters*

```
saturate(factor)
```

**factor** <Number | Percentage>

A value of 0 completely desaturates the colors, 1 or 100% leaves them unchanged and greater values increase the saturation.

- *MDN documentation:* [saturate](#)

**scale()**

- *Parameters*

```
scale()
```

- *MDN documentation:* [scale](#)

**scaleX()**

- *Parameters*

```
scaleX()
```

- *MDN documentation:* [scaleX](#)

**scaleY()**

- *Parameters*

```
scaleY()
```

- *MDN documentation:* [scaleY](#)

**-ro-separation()****-ro-spot()**

This function is used to make a printer use one specific print color (i.e. not a mixture of colors from multiple runs). The functionality of the function -ro-spot is identical to this one.

- *Parameters*

```
-ro-separation([[ <string> | <identifier> ] <tint>?, <color>])
```

**name** <String>

The name of the pantone.

**tint**<sup>optional</sup> <Number | Percentage>

The tint of the color. Number between 0 and 1 or percentage. Defaults to 1.

**alternative <Color>**

A CMYK or RGB version of the color for the case that the pantone is unknown (e.g. the color on a screen).

- *More information:* [Colors \(p. 45\)](#)

**sepia()**

Convert the elements colors to sepia.

- *Parameters*

```
sepia(factor)
```

**factor** <Number | Percentage>

0 or 0% leaves the element's colors unchanged.

- *MDN documentation:* [sepia](#)

**-ro-sidenote()**

Declares an element to be a sidenote. The parameter defines the side on which it will be placed.

- *Parameters*

```
-ro-sidenote([ <side> || closest ]?)
```

**side**<sup>optional</sup> <Identifier>

One of the following values: left, right, start, end, inside, outside, recto or verso. Start and end are based on the sidenote's container text direction. Inside and outside are based on whether the sidenote's page is left or right. Recto and verso are based on the document's text direction, with recto being right in a left-to-right document. If omitted, the side is resolved to 'recto'.

**closest**<sup>optional</sup> <Identifier>

If the sidenote element originates in a multi-column element, it is moved to the left side for all left columns or to the right for all right columns. If it is in the middle column, the side determined via the <side> argument. Has no effect if the sidenote element is not inside a multi-column context. Note that this argument is separated with a space from <side>, not a comma.

**skew()**

- *Parameters*

```
skew()
```

- *MDN documentation:* [skew](#)

**skewX()**

- *Parameters*

```
skewX()
```

- *MDN documentation:* [skewX](#)

**skewY()**■ *Parameters*

```
skewY()
```

■ *MDN documentation:* [skewY](#)**string()**

Copies the value of a named string to the document, using the content property.

■ *Parameters*

```
string(<custom-ident> [ , [ first | start | last | first-except ] ]?)
```

**custom-ident**

The name of the named string which is set via the property string-set.

**first | start | last | first-except**<sup>optional</sup>

If there are multiple assignments on a page, this keyword specifies which one should be used.

■ *More information:* [Named Strings \(p. 107\)](#)**target-counter()**

Retrieves the value of the counter with the given name.

■ *Parameters*

```
target-counter([ <string> | <url> ] , <custom-ident> [ , <counter-style> ]?)
```

**url**

The url of the target.

**custom-ident**

Name of the counter.

**counter-style**<sup>optional</sup>

Used to format the result, see the property 'list-style-type' for more information on the keywords.

■ *More information:* [Counters \(p. 100\)](#), [Cross-references \(p. 108\)](#)**-ro-target-counter-offset()**

Retrieves the value of the counter with the given name at the specified point and modifies the result by an offset.

■ *Parameters*

```
-ro-target-counter-offset([ <string> | <url> ] , <custom-ident>, <integer> [ , <counter-style> ]?)
```

**url <String | URL>**

The url of the target.

**counter-name <Identifier>**

Name of the counter.

**offset <Integer>**

The offset by which the counter value is modified.

**counter-style**<sup>optional</sup>

Used to format the result, see the property 'list-style-type' for more information on the keywords. Default is 'decimal'.

**target-counters()**

Retrieves and formats the values of the counters of the given name by inserting the specified string between the value of each nested counter.

■ *Parameters*

```
target-counters([ <string> | <url> ] , <custom-ident> , <string> [ , <counter-style> ]?)
```

**target-text()**

Retrieves the text value of the element referred to by the URL.

■ *Parameters*

```
target-text([ <string> | <url> ] [ , [ content | before | after | first-letter ] ]?)
```

**url**

The element whose content should be retrieved.

**content | before | after | first-letter**<sup>optional</sup>

Specifies what content is retrieved, using the same values as the 'string-set' property.

■ *More information:* [Cross-references](#) (p. 108)**translate()**■ *Parameters*

```
translate()
```

■ *MDN documentation:* [translate](#)**translateX()**■ *Parameters*

```
translateX()
```

■ *MDN documentation:* [translateX](#)

**translateY()**■ *Parameters*

```
translateY()
```

■ *MDN documentation:* [translateY](#)**url()**■ *Parameters*

```
url()
```

■ *MDN documentation:* [url: The url\(\) functional notation](#)**var()**

Used to insert the value of a CSS variable instead of any part of a value of another property.

■ *Parameters*

```
var(<custom-property-name> [ , <declaration-value> ]?)
```

**custom-property-name**

The variable name

**declaration-value**

The fallback value, which is used in case the variable is invalid in the used context

**xhtml()**

A proprietary function that allows to reference a document which then is embedded.

■ *Parameters*

```
xhtml(document)
```

**document <String | URL>**

An HTML document string or a URL pointing to an HTML document

■ *More information:* [Running Elements \(p. 103\)](#)**D.9.3 Pseudo Classes*****For @page rules*****:blank**

Matches pages without content that appear as a result of forced page breaks.

**:first**

The first page of the document.

- *More information:* [Page Selectors \(p. 92\)](#)

**:-ro-last**

The last page of the document.

- *More information:* [Last Page \(p. 93\)](#)

**:left**

A left page of the document.

- *MDN documentation:* [:left](#)
- *More information:* [Page Selectors \(p. 92\)](#)

**:-ro-nth(An+B | even | odd)**

This pseudo class matches a page with a page number that matches the given equation.

- *Parameters*

```
:-ro-nth(An+B | even | odd)
```

**An+B | even | odd**

Describes on which page numbers this selector should match. A and B are integers, while n is the non-negative variable (counting from 1 to the total number of pages). The selector matches if the number of previous pages is a solution of the expression.

- *More information:* [Nth Page \(p. 93\)](#), [Page Groups \(p. 94\)](#)

**:recto**

Same as 'right', unless the document direction is right-to-left, i.e. the root or body element has a 'direction' value of 'rtl', in which case it is the same as 'left'.

- *More information:* [Page Selectors \(p. 92\)](#)

**:right**

A right page of the document.

- *MDN documentation:* [:right](#)
- *More information:* [Page Selectors \(p. 92\)](#)

**:verso**

Same as 'left', unless the document direction is right-to-left, i.e. the root or body element has a 'direction' value of 'rtl', in which case it is the same as 'right'.

- *More information:* [Page Selectors \(p. 92\)](#)

**For elements****:checked**

A checked checkbox or radio button.

- *MDN documentation:* [:checked](#)

**:disabled**

A disabled form field.

- *MDN documentation:* [:disabled](#)

**:empty**

An element without children (including text nodes)

- *MDN documentation:* [:empty](#)

**:enabled**

An enabled form field.

- *MDN documentation:* [:enabled](#)

**:first-child**

An element, first child of its parent

- *MDN documentation:* [:first-child](#)

**:first-of-type**

An element, first sibling of its type.

- *MDN documentation:* [:first-of-type](#)



**:is(s)**

An element that matches the specified selector.

The specificity of this pseudo class is the highest specificity of its list of selectors.

- *Parameters*

```
:is(s)
```

**s**

A single or a list of selectors.

- *MDN documentation:* [:is](#)

**:lang(languagecode)**

Selects every element with a lang attribute value starting with the languagecode specified as parameter

- *Parameters*

```
:lang(languagecode)
```

**languagecode <String>**

The language code to match, e.g. "de", "en", "it", etc.

- *MDN documentation:* [:lang](#)

**:last-child**

An element, last child of its parent

- *MDN documentation:* [:last-child](#)

**:last-of-type**

An element, last sibling of its type.

- *MDN documentation:* [:last-of-type](#)

**:link**

Selects all unvisited links.

- *MDN documentation:* [:link](#)

**:-ro-matches(s)**

An element that matches selector s.

For the standard compliant version of this pseudo-class see :is.

- *Parameters*

```
:-ro-matches(s)
```

**s** <String>

The selector to match.

## **: -ro-no-content**

Matches on an element without textual content, with certain character like whitespaces being ignored. Textual content is any character that does not match to the following Unicode Character Categories: Control (Cc), Format (Cf), Line Separator (Zl), Paragraph Separator (Zp), Space Separator (Zs).

## **:not(s)**

An element that does not match selector s.

### ■ Parameters

```
:not(s)
```

**s** <String>

The single selector or selector list to match.

### ■ MDN documentation: [:not](#)

## **:nth-child(An+B | even | odd)**

An element, nth child of its parent.

The selector matches, if the element's index (with 1 being the index of the first child) is a solution of the equation  $a \cdot n + b$ , with a and b being integers and n being a non-negative variable integer.

The keyword even is the same as "2n" and odd is the same as "2n+1".

### ■ Parameters

```
:nth-child(An+B | even | odd)
```

**An+B | even | odd**

### ■ MDN documentation: [:nth-child](#)

## **:nth-last-child(An+B | even | odd)**

An element, nth last child of its parent.

The selector matches, if the element's index counting from its parent's last child (with 1 being the index of the last child) is a solution of the equation  $a \cdot n + b$ , with a and b being integers and n being a non-negative variable integer.

The keyword even is the same as "2n" and odd is the same as "2n+1".

### ■ Parameters

```
:nth-last-child(An+B | even | odd)
```

**An+B | even | odd**

### ■ MDN documentation: [:nth-last-child](#)

**:nth-last-of-type( $An+B$  | even | odd)**

An element, nth last sibling of its type.

The element's siblings of the same type are counted, beginning with the last one. If the found number is a solution of the equation  $a*n + b$ , with a and b being integers and n being a non-negative variable integer, the selector matches.

The keyword even is the same as " $2n$ " and odd is the same as " $2n+1$ ".

- Parameters

```
:nth-last-of-type( $An+B$  | even | odd)
```

$An+B$  | even | odd

- MDN documentation: [:nth-last-of-type](#)

**:nth-of-type( $An+B$  | even | odd)**

An element, nth sibling of its type.

The element's siblings of the same type are counted. If the found number is a solution of the equation  $a*n + b$ , with a and b being integers and n being a non-negative variable integer, the selector matches.

The keyword even is the same as " $2n$ " and odd is the same as " $2n+1$ ".

- Parameters

```
:nth-of-type( $An+B$  | even | odd)
```

$An+B$  | even | odd

- MDN documentation: [:nth-of-type](#)

**:only-child**

Selects every element that is the only child of its parent.

- MDN documentation: [:only-child](#)

**:only-of-type**

An element, only sibling of its type.

- MDN documentation: [:only-of-type](#)

**:root**

Selects the document's root element.

- MDN documentation: [:root](#)

**:where(s)**

An element that matches the specified selector. Similar to :is, but the specificity of this pseudo class is always zero.

- *Parameters*

```
:where(s)
```

**s**

A single or a list of selectors.

- *MDN documentation:* [:where](#)

**D.9.4 Pseudo Elements****::after**

Generated content after an element.

- *MDN documentation:* [::after](#)

**::-ro-after-break**

Creates generated content at the top of a fragment after a break.

- *More information:* [Continuation Markers \(p. 116\)](#)

**::before**

Generated content before an element.

- *MDN documentation:* [::before](#)

**::-ro-before-break**

Creates generated content at the bottom of a fragment before a break.

- *More information:* [Continuation Markers \(p. 116\)](#)

**::first-letter**

Selects the first letter of each element.

- *MDN documentation:* [::first-letter](#)

**::-ro-footnote-area**

Specified on a multi-column container or a region flow box, this pseudo-element allows to set styles on the respective footnote area.

**::footnote-call**

Generated content replacing elements that are moved to the footnote area.

**::footnote-marker**

Generated content preceding footnotes.

**::-ro-sidenote-call**

Generated content replacing elements that are moved to a sidenote area.

**::-ro-sidenote-marker**

Generated content preceding sidenotes.

## D.9.5 At-Rules

**@charset**

The character encoding that is used. The at-rule `@charset` does not work for a style sheet that is imported via `@import`.

- **Syntax**

```
@charset <string>;
```

- *MDN documentation:* [@charset](#)

**@counter-style**

A custom counter-style.

- **Syntax**

```
@counter-style <identifier> { ... }
```

- *MDN documentation:* [@counter-style](#)

- *More information:* [Counters](#) (p. 100)

**@font-face**

A custom font.

- **Syntax**

```
@font-face { ... }
```

- *MDN documentation:* [@font-face](#)

- *More information:* [CSS Defined Fonts](#) (p. 172)

## @footnote

Allows to style the page's footnote area. It is used inside a page-rule.

### ■ Syntax

```
@footnote { ... }
```

### ■ More information: [Footnotes \(p. 110\)](#)

## @import

Imports another style sheet into this one.

### ■ Syntax

```
@import <url> <media-type>#?;
```

### ■ MDN documentation: [@import](#)

## @media

Allows making parts of the style sheet conditionally on the media type (e.g.: "print" or "screen") or media condition (e.g: "width" or "scripting"). This is useful when documents are intended for both PDFReactor and browsers.

### ■ Syntax

```
@media <media-condition> || [[only | not]? <media-type>? [and <media-condition>]??]
```

### ■ MDN documentation: [@media](#)

### ■ More information: [Media Queries \(p. 141\)](#)

## @namespace

Declares an XML namespace, usually with a prefix.

### ■ Syntax

```
@namespace <identifier> <url>
```

### ■ MDN documentation: [@namespace](#)

## @page

Selector for specific pages.

### ■ Syntax

```
@page <identifier>? [ :first | :blank | :left | :right | :recto | :verso | :ro-last | :ro-nth(An+B [of name]?) ]? { ... }
```

### ■ MDN documentation: [@page](#)

### ■ More information: [Page Selectors \(p. 92\)](#)

## @-ro-preferences

Sets document specific preferences. It overwrites settings specified via the PDFReactor API.

- **Syntax**

```
@-ro-preferences {...}
```

- *More information:* [Document-Specific Preferences \(p. 146\)](#)

## @-ro-sidenote

Selects up to two sidenote areas, depending on the appended pseudo-class. If no pseudo-class is specified, both sidenote areas are selected.

- **Syntax**

```
@-ro-sidenote [:left | :right | :verso | :recto | :inside | :outside]?
```

- *More information:* [Sidenotes \(p. 112\)](#), [The Sidenote Area \(p. 114\)](#)

## @supports

Allows making parts of the style sheet conditionally on whether certain CSS properties or values are supported. This is useful when documents are intended for both PDFReactor and browsers and functionality is used that is not supported in all of them.

- **Syntax**

```
@supports <supports-condition> { ... }
```

- *MDN documentation:* [@supports](#)

```

@top-left
@top-center
@top-right
@top-right-corner
@right-top
@right-middle
@right-bottom
@right-bottom-corner
@bottom-right
@bottom-center
@bottom-left
@bottom-left-corner
@left-bottom
@left-middle
@left-top
@top-left-corner

```

These rules allow generating content in the page margins.

- **Syntax**

```
@top-left { ... }
```

- *More information:* [Page Header & Footer \(p. 102\)](#)

## D.9.6 Types

### <absolute-size>

A set of absolute font sizes: xx-small: 9px, x-small: 10px, small: 13px, medium: 16px, large: 18px, x-large: 24px, xx-large: 32px

- **Syntax**

```
xx-small | x-small | small | medium | large | x-large | xx-large
```

### <pdf-standard-structure-type>

The set of standard types for PDF tagging.

It is highly recommended to only use these types (as other ones can be specified as case-sensitive strings, but will likely break conformances like PDF/UA or PDF/A) or kinds (see <pdf-tag-kind> below).

- **Syntax**

```

part | art | sect | div | blockquote | caption | toc | toci | index | nonstruct |
private | h | h1 | h2 | h3 | h4 | h5 | h6 | p | l | li | lbl | lbody | table | tr | th |
td | thead | tbody | tfoot | span | quote | note | reference | bibentry | code | link |
annot | ruby | rb | rt | rp | warichu | wt | wp | figure | formula | form

```



## **<pdf-tag-kind>**

The set of keywords to describe groups of PDF tagging types that can be addressed or inserted semi-automatically.

### ■ *Syntax*

```
simple | simple-block | simple-block-strict | simple-inline | table-struct | list-struct
```

## **<pdf-tag-type>**

The set of keywords to describe PDF tagging types as well as the alternatives "none" (no tag for the element, but normal ones for its subtree and content) and "artifact" (no tags for the element and its entire subtree or content).

### ■ *Syntax*

```
<pdf-standard-structure-type> | <pdf-tag-kind> | artifact | none | <string>
```

## **<relative-size>**

A set of font-sizes that are relative to the parent font-size: 'smaller' means the parent font-size divided by 1.2., while 'larger' results in 1.2 times the parent font-size.

### ■ *Syntax*

```
larger | smaller
```

# APPENDIX E: JAVASCRIPT SUPPORT

The following table lists the JavaScript libraries and frameworks tested with PDFReactor. These tests were done using GraalJS as JavaScript engine. Please refer to [the JavaScript chapter \(p. 60\)](#) for more information. Other libraries and frameworks or other minor versions of the listed ones may still be functional, they are merely untested. Frameworks with only a check mark passed all of our internal tests, while the others are subject to known limitations. Please refer to the respective column for further details.

Library	Successfully tested Versions	Support	Known Limitations
amCharts	5.11.1, 3.21.15	✓	
Angular	19.2.0, 18.2.13, 17.3.12, 16.2.12	✓	
Angular.js	1.8.3	✓	
bignumber.js	9.1.2	✓	
Bootstrap	5.3.3	(✓)	<p>Toogle buttons are overlayed with a checkmark, to remove them, add the following style:</p> <pre> *.form-check-input[type="checkbox"] { color: transparent; } </pre>
Chart.js	2.9.4	✓	When an array with colors is passed instead of a string where only one color is expected, this may cause a fallback to gray. In most cases, browsers use the first value instead.
Flotr2	0.1.0	✓	
Handlebars	4.7.8	✓	
Highcharts	12.1.2, 11.4.8, 10.3.3	✓	
jQuery	3.7.1	✓	

Continued

Continued

Library	Successfully tested Versions	Support	Known Limitations
JSZip	3.10.1	✓	
KaTeX	0.16.21	✓	
Leaflet	1.9.4	✓	
Less	4.2.2, 3.13.1, 2.7.3	✓	
Lodash	4.17.21	✓	
Math.js	14.3.0, 13.2.3	✓	
MathJax	2.7.9	(✓)	<ul style="list-style-type: none"> <li>• SVG output preferred, see <a href="#">MathML (p. 50)</a>.</li> <li>• There are known issues when using the <a href="#">combined configurations</a> provided by the CDN. They should be added manually instead.</li> </ul>
Modernizr	3.13.1	✓	
MooTools	1.6.0	✓	
Plotly.js	3.0.1	(✓)	Shadows applied on text are not rendered, which may result in labels being hard to read.
Prototype	1.7.3	✓	
Raphaël	2.3.0	✓	
React	18.3.1, 17.0.2	✓	
RequireJS	2.3.6	✓	
Underscore.js	1.13.7	✓	
Vue.js	2.7.16	✓	

# APPENDIX F: CODE SAMPLES FOR OTHER LANGUAGES

## F.1 Creating a PDFReactor instance

[Back to main chapter \(p. 8\)](#)

```
PDFReactor pdfReactor = new PDFReactor();
```

Java

See [Using the Java library \(p. 13\)](#) for a more extensive sample.

Does not apply.

CLI

## F.2 Configuration properties

[Back to main chapter \(p. 9\)](#)

```
Configuration config = new Configuration();
```

Java

Use `-` or `--` for command line arguments. The `-h` command shows a list of available arguments. More complex options can be passed with `-C config.json`, where `config.json` is a file containing a configuration in JSON format.

## F.3 Source document use case: local document

[Back to main chapter \(p. 10\)](#)

```
config.setDocument("file:///local-folder/document.html"); // Linux/Mac
config.setDocument("file:///c:/local-folder/document.html"); // Windows
```

Java

Linux/Mac:

CLI

```
-i "file:///local-folder/document.html"
```

Windows

```
-i "file:///c:/local-folder/document.html"
```

## F.4 Source document use case: remote document

[Back to main chapter \(p. 10\)](#)

```
config.setDocument("https://some-server.com/document.html");
```

Java

```
-i "https://some-server.com/document.html"
```

CLI

## F.5 Source document use case: rendered template

[Back to main chapter \(p. 10\)](#)

```
String renderedTemplate = renderMyTemplate();
config.setDocument(renderedTemplate);
```

Java

```
-i "<html><body><p>My rendered template</p></body></html>"
```

CLI

## F.6 Retrieving the converted document from a result object

[Back to main chapter \(p. 11\)](#)

```
byte[] pdfOrImage = result.getDocument();
byte[][] imagePages = result.getDocumentArray();
```

Java

Use the `-o` argument to specify the output document path.

CLI

## F.7 Setting the log level

[Back to main chapter \(p. 19\)](#)

```
config.setLogLevel(LogLevel.WARN);
```

Java

```
--log-level WARN
```

CLI

## F.8 Retrieving the logs of a conversion

[Back to main chapter \(p. 20\)](#)

```
Log log = result.getLog();
if (log != null) {
    Record[] mainLog = log.getRecords();
    Record[] cssLog = log.getRecordsCss();
    Record[] jsLog = log.getRecordsJavaScript();
}
```

Java

The main log is written to the terminal during the conversion. The CSS and JavaScript logs are not available. CLI

## F.9 Enable logging

[Back to main chapter \(p. 20\)](#)

```
Configuration config = new Configuration();
config.setLogLevel(LogLevel.DEBUG);
config.setDebugSettings(new DebugSettings()
    .setAppendLogs(true));
```

Java

`-d`

CLI

## F.10 Setting the log capacity

[Back to main chapter \(p. 21\)](#)`config.setLogMaxLines(100);`

Java

`--log-max-lines 100`

CLI

## F.11 Setting the license key

[Back to main chapter \(p. 21\)](#)`String licensekey = "<license>... your license ...</license>";  
config.setLicenseKey(licensekey);`

Java

`--license-key "<license>... your license ...</license>"`

CLI

## F.12 Ensure PDF has no eval notices

[Back to main chapter \(p. 21\)](#)`config.setErrorPolicies(ErrorPolicy.LICENSE);`

Java

`--error-policies LICENSE`

CLI

## F.13 Content observer

[Back to main chapter \(p. 22\)](#)`ContentObserver contentObserver = new ContentObserver();  
// set up contentObserver, see below...  
config.setContentObserver(contentObserver);`

Java

`-C config.json`

CLI

With the following config.json:

`{ "contentObserver": {set up contentObserver, see below...} }`

## F.14 Observe overflowing boxes

[Back to main chapter \(p. 22\)](#)`contentObserver  
 .setExceedingContentAnalyze(ExceedingContentAnalyze.CONTENT_AND_STATIC_BOXES)  
 .setExceedingContentAgainst(ExceedingContentAgainst.PAGE_CONTENT);`

Java

```
--content-observer-exceeding-content-analyze CONTENT_AND_STATIC_BOXES \
--content-observer-exceeding-content-against PAGE_CONTENT
```

CLI

## F.15 Retrieving the exceeding contents from a result object

[Back to main chapter \(p. 23\)](#)

```
ExceedingContent[] exceedingContents = result.getExceedingContents();
```

Java

Use [debug settings \(p. 25\)](#) to attach the exceeding contents log to the PDF.

CLI

## F.16 Observe missing resources

[Back to main chapter \(p. 23\)](#)

```
contentObserver.setMissingResources(true);
```

Java

```
--content-observer-missing-resources
```

CLI

## F.17 Retrieving the missing resources from a result object

[Back to main chapter \(p. 23\)](#)

```
MissingResource[] missingResources = result.getMissingResources();
```

Java

Use [debug settings \(p. 25\)](#) to attach the missing resources log to the PDF.

CLI

## F.18 Observe connections

[Back to main chapter \(p. 23\)](#)

```
contentObserver.setConnections(true);
```

Java

```
--content-observer-connections
```

CLI

## F.19 Retrieving the connections from a result object

[Back to main chapter \(p. 23\)](#)

```
Connection[] connections = result.getConnections();
```

Java

Use [debug settings \(p. 25\)](#) to attach the connections log to the PDF.

CLI

## F.20 Error policies

[Back to main chapter \(p. 24\)](#)

```
config.setErrorPolicies(
    ErrorPolicy.LICENSE,
    ErrorPolicy.MISSING_RESOURCE);
```

Java

```
--error-policies LICENSE MISSING_RESOURCE
```

CLI

## F.21 Setting the log level

[Back to main chapter \(p. 24\)](#)

```
config.setConversionTimeout(30);
```

Java

```
--conversion-timeout 30
```

CLI

## F.22 Debug settings

[Back to main chapter \(p. 25\)](#)

```
config.setDebugSettings(new DebugSettings().setAll(true));
```

Java

```
-d
```

CLI

## F.23 Debug file dump

[Back to main chapter \(p. 27\)](#)

```
config.setDebugSettings(new DebugSettings()
    .setAll(true)
    .setLocalDirectory(Paths.get("c:\\debug")));
```

Java

```
-d c:\\debug
```

CLI

## F.24 Inspectable Documents

[Back to main chapter \(p. 27\)](#)

```
config.setInspectableSettings(new InspectableSettings()
    .setEnabled(true));
```

Java

```
-I
```

CLI



## F.25 Lenient HTTPS resource loading

[Back to main chapter \(p. 28\)](#)

```
config.setSecuritySettings(new SecuritySettings()
    .setTrustAllConnectionCertificates(true));
```

Java

```
-k or --insecure
```

CLI

## F.26 Untrusted API context

[Back to main chapter \(p. 29\)](#)

```
config.setSecuritySettings(new SecuritySettings()
    .setUntrustedApi(true));
```

Java

```
--security-untrusted-api
```

CLI

## F.27 Allow author API overrides

[Back to main chapter \(p. 29\)](#)

```
config.setSecuritySettings(new SecuritySettings()
    .setAllowAuthorApiOverrides(true));
```

Java

```
--security-allow-author-api-overrides
```

CLI

## F.28 Automatic redirects

[Back to main chapter \(p. 29\)](#)

```
config.setSecuritySettings(new SecuritySettings()
    .setAllowRedirects(false));
```

Java

```
--security-allow-redirects
```

CLI

## F.29 Allowing or denying connections

[Back to main chapter \(p. 31\)](#)

```
config.setSecuritySettings(new SecuritySettings()
    .setConnectionRules(
        new ConnectionRule()
            .setAction(ConnectionRuleAction.ALLOW)
            .setName("Allow internal company CMS")
            .setHost("company-cms"),
        new ConnectionRule()
            .setAction(ConnectionRuleAction.ALLOW)
            .setName("Allow public company CDN")
            .setProtocol("https")
            .setHost("cdn.company.com"),
            .setPath("/public%20assets/**") // Encode invalid URI characters
        new ConnectionRule()
            .setAction(ConnectionRuleAction.DENY)
            .setName("Deny all")
            .setPath("/**")
            .setPriority(-1) // Make sure this rule is evaluated last
    )
);
```

Java

```
-C config.json
```

CLI

With the following config.json:

```
{ "securitySettings": {
  "connectionRules": [{
    "action": "ALLOW",
    "name": "Allow internal company CMS",
    "host": "company-cms"
  }, {
    "action": "ALLOW",
    "name": "Allow public company CDN",
    "protocol": "https",
    "host": "cdn.company.com",
    "path": "/public%20assets/**"
  }, {
    "action": "DENY",
    "name": "Deny all",
    "path": "/**",
    "priority": -1
  }
]}
}
```

## F.30 Content from untrusted sources

[Back to main chapter \(p. 32\)](#)

```
config.setSecuritySettings(new SecuritySettings()
    .setConnectionRules(
        new ConnectionRule()
            .setAction(ConnectionRuleAction.DENY)
            .setName("Deny all")
            .setPath("/**")
            .setPriority(-1)
    )
);
```

Java

```
-C config.json
```

CLI

With the following config.json:

```
{ "securitySettings": {
  "connectionRules": [{
    "action": "DENY",
    "name": "Deny all",
    "path": "/*",
    "priority": -1
  }]
}}
```

## F.31 Content from untrusted sources

[Back to main chapter \(p. 32\)](#)

```
config.setSecuritySettings(new SecuritySettings()
    .setConnectionRules(
        new ConnectionRule()
            .setAction(ConnectionRuleAction.ALLOW)
            .setName("Allow access to resources inside a JAR")
            .setProtocol("file")
            .setPath("/path/to/my.jar")
            .setEntry("/resources/*")
    )
);
```

Java

-C config.json

CLI

With the following config.json:

```
{ "securitySettings": {
  "connectionRules": [{
    "action": "ALLOW",
    "name": "Allow access to resources inside a JAR",
    "protocol": "file",
    "path": "/path/to/my.jar",
    "entry": "/resources/*"
  }]
}}
```

## F.32 Allowing file system access

[Back to main chapter \(p. 34\)](#)

```
config.setSecuritySettings(new SecuritySettings()
    .setDefaults(new SecurityDefaults()
        .setAllowFileSystemAccess(true)));
```

Java

The CLI allows file system access by default.

CLI

## F.33 Register a handler for file URLs

[Back to main chapter \(p. 35\)](#)

```
config.setCustomUrlStreamHandlers(
    new CustomUrlStreamHandler()
        .setProtocol("file")
        .setHandler(new URLStreamHandler() {
            // your implementation
        })
);
```

Java

## F.34 Register a handler for any URL

[Back to main chapter \(p. 35\)](#)

```
config.setCustomUrlStreamHandlers(
    new CustomUrlStreamHandler()
        .setProtocol("*")
        .setHandler(new URLStreamHandler() {
            // your implementation
        })
);
```

Java

## F.35 Allowing non-local file URLs

[Back to main chapter \(p. 35\)](#)

```
config.setSecuritySettings(new SecuritySettings()
    .setAllowNonLocalFileUrls(true));
```

Java

```
--security-allow-remote-file-urls
```

CLI

## F.36 Enable loading of external XML parser resources

[Back to main chapter \(p. 36\)](#)

```
config.setSecuritySettings(new SecuritySettings()
    .setAllowExternalXmlParserResources(true));
```

Java

```
--security-allow-external-xml-parser-resources
```

CLI

## F.37 Disabling Version Disclosure

[Back to main chapter \(p. 36\)](#)

```
config.setSecuritySettings(new SecuritySettings()
    .setHideVersionInfo(true));
```

Java

```
--security-hide-version-info
```

CLI

## F.38 Forcing HTML document processing

[Back to main chapter \(p. 37\)](#)

```
config.setDocumentType(Doctype.HTML5);
```

Java

```
--document-type HTML5
```

CLI

## F.39 Forcing legacy XHTML document processing

[Back to main chapter \(p. 37\)](#)

```
config.setDocumentType(Doctype.XHTML);
```

Java

```
--document-type XHTML
```

CLI

## F.40 Using TagSoup cleanup

[Back to main chapter \(p. 37\)](#)

```
config.setCleanupTool(Cleanup.TAGSOUP);
```

Java

```
--cleanup-tool TAGSOUP
```

CLI

## F.41 Forcing XML document processing

[Back to main chapter \(p. 38\)](#)

```
config.setDocumentType(Doctype.XML);
```

Java

```
--document-type XML
```

CLI

## F.42 Transforming XML to HTML

[Back to main chapter \(p. 38\)](#)

```
config.setPostTransformationDocumentType(Doctype.HTML5);  
config.setXsltMode(true);
```

Java

```
--post-transformation-document-type HTML5 --xslt-mode
```

CLI

## F.43 Using UTF-8 encoding

[Back to main chapter \(p. 39\)](#)

```
config.setEncoding("UTF-8");
```

Java

```
--encoding "UTF-8"
```

CLI

## F.44 Disabling CSS validation

[Back to main chapter \(p. 40\)](#)

```
config.setCssSettings(new CssSettings()
    .setValidationMode(CssPropertySupport.ALL)
    .setSupportQueryMode(CssPropertySupport.ALL));
```

Java

```
--css-validation-mode ALL \
--css-support-query-mode ALL
```

CLI

## F.45 Using case-insensitive CSS class selectors

[Back to main chapter \(p. 40\)](#)

```
config.setQuirksSettings(new QuirksSettings()
    .setCaseSensitiveClassSelectors(QuirksMode.QUIRKS);
```

Java

```
quirks--case-sensitive-class-selectors QUIRKS
```

CLI

## F.46 Base URL

[Back to main chapter \(p. 41\)](#)

```
config.setBaseUrl("https://someServer/public/");
```

Java

```
--base-url "https://someServer/public/"
```

CLI

## F.47 File URL as base URL

[Back to main chapter \(p. 41\)](#)

```
config.setBaseUrl("file:///directory/");
```

Java

```
--base-url "file:///directory/"
```

CLI

## F.48 Resource request timeout

[Back to main chapter \(p. 41\)](#)

```
config.setNetworkSettings(new NetworkSettings()
    .setConnectTimeout(1000)
    .setReadTimeout(1000));
```

Java

```
--network-connect-timeout 1000 \
--network-read-timeout 1000
```

CLI

## F.49 Authentication credentials

[Back to main chapter \(p. 42\)](#)

```
config.setNetworkSettings(new NetworkSettings()
    .setAuthenticationCredentials(new HttpCredentials()
        .setUsername("username")
        .setPassword("password")
        .setAuthScheme(HttpAuthScheme.DIGEST)
        .setRealm("My Realm")));
```

Java

```
-C config.json
```

CLI

With the following config.json:

```
{ "networkSettings": {
  "authenticationCredentials": [
    "username": "username",
    "password": "password",
    "authScheme": "DIGEST",
    "realm": "My Realm"
  ]
}}
```

## F.50 Custom user agent header

[Back to main chapter \(p. 42\)](#)

```
config.setNetworkSettings(new NetworkSettings()
    .setRequestHeaders(
        new KeyValuePair("User-Agent", "MyApp/2.0"));
```

Java

```
-C config.json
```

CLI

With the following config.json:

```
{ "networkSettings": {
  "requestHeaders": [
    { "key": "User-Agent", "value": "MyApp/2.0" }
  ]
}}
```

## F.51 Session cookies

[Back to main chapter \(p. 43\)](#)

```
config.setNetworkSettings(new NetworkSettings()
    .setCookies(new Cookie()
        .setName("JSESSIONID")
        .setValue("123456789")));
```

Java

```
-C config.json
```

CLI

With the following config.json:

```
{ "networkSettings": {
  "cookies": [
    "name": "JSESSIONID",
    "value": "123456789"
  ]
}}
```

## F.52 Authentication credentials

[Back to main chapter \(p. 43\)](#)

```
config.setNetworkSettings(new NetworkSettings()
    .setCookiePolicy(CookiePolicy.RELAXED));
```

Java

```
--network-cookie-policy RELAXED
```

CLI

## F.53 Authentication credentials

[Back to main chapter \(p. 44\)](#)

```
config.setUrlRewriteSettings(new UrlRewriteSettings()
    .setRules(
        new UrlRewriteRule()
            .setPattern("^http://myOldHost/(.*)$")
            .setSubstitution("https://myNewHost/$1")
    )
);
```

Java

```
-C config.json
```

CLI

With the following config.json:

```
{ "urlRewriteSettings": {
  "rules": [{
    "pattern": "^http://myOldHost/(.*)$",
    "substitution": "https://myNewHost/$1"
  }]
}}
```

## F.54 User style sheets

[Back to main chapter \(p. 45\)](#)

```
config.setUserStyleSheets(
    new Resource().setContent("p { color: red; }"),
    new Resource().setUri("http://myServer/my.css"));
```

Java

```
-c "p { color: red; }" http://myServer/my.css
```

CLI



## F.55 Integration style sheets

[Back to main chapter \(p. 45\)](#)

```
config.setIntegrationStyleSheets(
    new Resource().setContent("p { font-family: sans-serif }"),
    new Resource().setUri("http://myServer/corporate-identity.css"));
```

Java

```
--integration-style-sheets "p { font-family: sans-serif }" http://myServer/corporate-identity.css
```

CLI

## F.56 User scripts

[Back to main chapter \(p. 45\)](#)

```
config.setUserScripts(
    new Resource().setContent("console.log('executed first')")
        .setBeforeDocumentScripts(true),
    new Resource().setUri("http://myServer/my.js"));
```

Java

```
-j "console.log('executed first')" http://myServer/my.js
```

CLI

## F.57 XSLT style sheets

[Back to main chapter \(p. 45\)](#)

```
config.setXsltStyleSheets(
    new Resource().setUri("http://myServer/my.xsl"));
```

Java

```
--xslt-style-sheets http://myServer/my.xsl
```

CLI

## F.58 Color spaces

[Back to main chapter \(p. 46\)](#)

```
config.setColorSpaceSettings(new ColorSpaceSettings()
    .setTargetColorSpace(ColorSpace.CMYK));
```

Java

```
--color-space-target-color-space CMYK
```

CLI

## F.59 Processing large high-res images

[Back to main chapter \(p. 48\)](#)

```
config.setProcessingPreferences(
    ProcessingPreferences.SAVE_MEMORY_IMAGES);
```

Java

```
--processing-preferences SAVE_MEMORY_IMAGES
```

CLI

## F.60 Add scripts manually

[Back to main chapter \(p. 60\)](#)

```
config.setUserScripts(
    new Resource().setContent("console.log('test')"));
```

Java

```
-j "console.log('test')"
```

CLI

## F.61 Disable JavaScript processing

[Back to main chapter \(p. 61\)](#)

```
config.setJavaScriptSettings(new JavaScriptSettings()
    .setDisabled(true));
```

Java

```
-javascript-disabled
```

CLI

## F.62 Changing the JavaScript engine to Rhino

[Back to main chapter \(p. 62\)](#)

```
config.setJavaScriptSettings(new JavaScriptSettings()
    .setJavaScriptEngine(JavaScriptEngine.RHINO));
```

Java

```
--javascript-javascript-engine RHINO
```

CLI

## F.63 PDF metadata

[Back to main chapter \(p. 64\)](#)

```
config.setAuthor("Brian Greene");
config.setTitle("The Elegant Universe");
```

Java

```
--author "Brian Greene" --title: "The Elegant Universe"
```

CLI

## F.64 Retrieving the JavaScript export from a result object

[Back to main chapter \(p. 65\)](#)

```
String javascriptExports = result.getJavaScriptExports();
```

Java

Not possible.

CLI

## F.65 Limiting JavaScript processing time

[Back to main chapter \(p. 66\)](#)

```
config.setJavaScriptSettings(new JavaScriptSettings()
    .setTimeout(20));
```

Java

```
--java-script-timeout
```

CLI

## F.66 Create ToC with Awesomizr

[Back to main chapter \(p. 67\)](#)

```
config
    .setUserStyleSheets(new Resource()
        .setUri("awesomizr.css"))
    .setUserScripts(
        new Resource()
            .setContent("import * as Awesomizr from './awesomizr.js';
Awesomizr.createTableOfContents();")
        .setSubtype(ResourceSubtype.JAVASCRIPT_MODULE));
```

Java

```
-c awesomizr.css
-j module "import * as Awesomizr from './awesomizr.js';
Awesomizr.createTableOfContents();"
```

CLI

## F.67 Adding bookmarks

[Back to main chapter \(p. 68\)](#)

```
config.setDisableBookmarks(true);
```

Java

```
--disable-bookmarks
```

CLI

## F.68 Adding links

[Back to main chapter \(p. 69\)](#)

```
config.setDisableLinks(true);
```

Java

```
--disable-links
```

CLI

## F.69 Override metadata

[Back to main chapter \(p. 71\)](#)

```
config
    setAuthor("John Doe")
    setTitle("Architecture of the World Wide Web, Volume One")
    setSubject("Architecture of the world wide web")
    setCreator("John's DoeNuts, Inc.")
    setKeywords("w3c, www");
```

Java

```
--author "John Doe" \
--title "Architecture of the World Wide Web, Volume One" \
--subject "Architecture of the world wide web" \
--creator "John's DoeNuts, Inc." \
--keywords "w3c, www"
```

CLI

## F.70 Custom document properties

[Back to main chapter \(p. 71\)](#)

```
config.setCustomDocumentProperties(
    new KeyValuePair("feedback address", "peter@milller.com"));
```

Java

```
--customDocumentProperties "feedback address" "peter@milller.com"
```

CLI

## F.71 Adding tags

[Back to main chapter \(p. 73\)](#)

```
config.setAddTags(true);
```

Java

```
--add-tags
```

CLI

## F.72 PDF/A3-a conformance

[Back to main chapter \(p. 75\)](#)

```
config.setConformance(Conformance.PDFA3A);
```

Java

```
--conformance "PDFA3A"
```

CLI

## F.73 Ignoring image alpha channels

[Back to main chapter \(p. 75\)](#)

```
config.setIgnoreAlpha(true);
```

Java

```
--ignore-alpha
```

CLI

## F.74 Validating conformance

[Back to main chapter \(p. 75\)](#)

```
config.setValidateConformance(true);
```

Java

```
--validate-conformance
```

CLI

## F.75 PDF/A + PDF/UA conformance

[Back to main chapter \(p. 75\)](#)

```
config.setConformance(Conformance.PDFA3A_PDFUA1);
```

Java

```
--conformance "PDFA3A_PDFUA1"
```

CLI

## F.76 PDF/UA conformance

[Back to main chapter \(p. 76\)](#)

```
config.setConformance(Conformance.PDFUA1);
```

Java

```
--conformance "PDFUA1"
```

CLI

## F.77 PDF/A3-a + PDF/UA conformance

[Back to main chapter \(p. 76\)](#)

```
config.setConformance(Conformance.PDFA3A_PDFUA1);
```

Java

```
--conformance "PDFA3A_PDFUA1"
```

CLI

## F.78 PDF/X4 conformance

[Back to main chapter \(p. 77\)](#)

```
config.setConformance(Conformance.PDFX4);
```

Java

```
--conformance "PDFX4"
```

CLI

## F.79 Output intent

[Back to main chapter \(p. 77\)](#)

```
config.setOutputIntent(new OutputIntent()
    .setIdentifier("ICC profile identifier")

    // Use this if you are loading the ICC profile via URL (ignored if data is set)
    .setUrl("URL/to/ICC/profile")

    // Use this if you want to specify the ICC profile's binary data
    .setData(iccProfileByteArray)
);
```

Java

```
--output-intent-identifier "ICC profile identifier" \
--output-intent-url URL/to/ICC/profile
```

CLI

## F.80 Color space conversion to CMYK

[Back to main chapter \(p. 77\)](#)

```
// The required output intent
config.setOutputIntent(new OutputIntent()
    .setIdentifier("ICC profile identifier")
    .setUrl("URL/to/ICC/profile"));
// Color space conversion settings
config.setColorSpaceSettings(new ColorSpaceSettings()
    // The same profile as the output intent, required for accurate conversion to CMYK
    .setCmykIccProfile(new Resource().setUri("URL/to/ICC/profile"))
    // Not necessary to set in this case (overridden by output intent), but recommended
    .setTargetColorSpace(ColorSpace.CMYK)
    // Enable conversion of RGB colors and images to CMYK
    .setConversionEnabled(true));
```

Java

## F.81 Creating web version

[Back to main chapter \(p. 78\)](#)

```
// (No output intent required)
// Color space conversion settings
config.setColorSpaceSettings(new ColorSpaceSettings()
    // When converting to RGB the profile is used for accurate conversion from CMYK
    .setCmykIccProfile(new Resource().setUri("URL/to/ICC/profile"))
    // Not necessary to set in this case (default), but recommended
    .setTargetColorSpace(ColorSpace.RGB)
    // Enable conversion of CMYK colors and images to RGB
    .setConversionEnabled(true));
// Reduce image sizes by resampling and compression
config.setUserStyleSheets(new Resource().setContent(
    // downsample images that (in the final layout)
    // have a resolution of more than 200dpi
    "* { -ro-image-resampling: 200dpi; "
    // recompress all images to JPEG with a quality of 90%
    + "-ro-image-recompression: jpeg(90%) }"));
```

Java

```
--color-space-cmyk-icc-profile URL/to/ICC/profile \
--color-space-target-color-space RGB \
--color-space-conversion-enabled
```

CLI

## F.82 Print dialog prompt

[Back to main chapter \(p. 78\)](#)

```
config.setPrintDialogPrompt(true);
```

Java

```
--print-dialog-prompt
```

CLI

## F.83 Disabling automatic structural optimization

[Back to main chapter \(p. 79\)](#)

```
config.setDisablePdfStructureOptimization(true);
```

Java

```
--disable-pdf-structure-optimization
```

CLI

## F.84 Encryption

[Back to main chapter \(p. 79\)](#)

```
EncryptionSettings encryptionSettings = new EncryptionSettings();
encryptionSettings.setType(Encryption.AES_256);
config.setEncryptionSettings(encryptionSettings);
```

Java

```
encryption-type AES_256
```

CLI

## F.85 User and owner passwords

[Back to main chapter \(p. 79\)](#)

```
EncryptionSettings encryptionSettings = new EncryptionSettings();
encryptionSettings.setUserPassword("upasswd");
encryptionSettings.setOwnerPassword("opasswd");
config.setEncryptionSettings(encryptionSettings);
```

Java

```
--encryption-user-password "upasswd" \
--encryption-owner-password "opasswd"
```

CLI

## F.86 Viewer preferences

[Back to main chapter \(p. 80\)](#)

```
config.setViewerPreferences(ViewerPreferences.PAGE_LAYOUT_SINGLE_PAGE,
    ViewerPreferences.DISPLAY_DOC_TITLE);
```

Java

```
--viewer-preferences PAGE_LAYOUT_SINGLE_PAGE DISPLAY_DOC_TITLE
```

CLI

## F.87 Merging documents

[Back to main chapter \(p. 82\)](#)

```
MergeSettings mergeSettings = new MergeSettings();
mergeSettings.setMergeDocuments(
    new Resource().setUri("https://www.myserver.com/overlaid1.pdf"),
    new Resource().setData(pdfBytes));
config.setMergeSettings(mergeSettings);
```

Java

```
--merge-documents https://www.myserver.com/overlaid1.pdf
```

CLI

## F.88 Appending documents

[Back to main chapter \(p. 83\)](#)

```
MergeSettings mergeSettings = new MergeSettings();
mergeSettings
    .setMergeDocuments(
        new Resource().setUri("https://www.myserver.com/appendDoc.pdf"))
    .setMode(MergeMode.APPEND);
config.setMergeSettings(mergeSettings);
```

Java

```
--merge-documents https://www.myserver.com/appendDoc.pdf \
--merge-mode APPEND
```

CLI

## F.89 Arranging merged documents

[Back to main chapter \(p. 83\)](#)

```
MergeSettings mergeSettings = new MergeSettings();
mergeSettings
    .setMergeDocuments(
        new Resource().setUri("https://www.myserver.com/insert1.pdf"),
        new Resource().setUri("https://www.myserver.com/insert2.pdf"))
    .setMode(MergeMode.ARRANGE);
config.setMergeSettings(mergeSettings);
config.setPageOrder("1,1:1,2..-1");
```

Java

```
--merge-documents https://www.myserver.com/insert1.pdf https://www.myserver.com/
insert2.pdf \
--merge-mode ARRANGE \
--page-order "1,1:1,2..-1"
```

CLI

## F.90 Overlaying documents

[Back to main chapter \(p. 83\)](#)

```
MergeSettings mergeSettings = new MergeSettings();
mergeSettings
    .setMergeDocuments(
        new Resource().setUri("https://www.myserver.com/overlaid.pdf"))
    .setMode(MergeMode.OVERLAY);
config.setMergeSettings(mergeSettings);
```

Java



```
--merge-documents https://www.myserver.com/overlaid.pdf \
--merge-mode OVERLAY
```

CLI

## F.91 Repeating merged documents

[Back to main chapter \(p. 83\)](#)

```
MergeSettings mergeSettings = new MergeSettings();
mergeSettings
    .setMergeDocuments(
        new Resource().setUri("https://www.myserver.com/overlaid.pdf"))
    .setMode(MergeMode.OVERLAY)
    .setOverlayRepeat(OverlayRepeat.ALL_PAGES);
config.setMergeSettings(mergeSettings);
```

Java

```
--merge-documents https://www.myserver.com/overlaid.pdf \
--merge-mode OVERLAY \
--merge-overlay-repeat ALL_PAGES
```

CLI

## F.92 Configuring the aspect ratio for overlay pages

[Back to main chapter \(p. 84\)](#)

```
MergeSettings mergeSettings = new MergeSettings();
mergeSettings
    .setMergeDocuments(
        new Resource().setUri("https://www.myserver.com/overlaid.pdf"))
    .setMode(MergeMode.OVERLAY)
    .setOverlayFit(OverlayFit.COVER);
config.setMergeSettings(mergeSettings);
```

Java

```
--merge-documents https://www.myserver.com/overlaid.pdf \
--merge-mode OVERLAY \
--merge-overlay-fit COVER
```

CLI

## F.93 Configuring the aspect ratio for overlay pages

[Back to main chapter \(p. 84\)](#)

```
MergeSettings mergeSettings = new MergeSettings();
mergeSettings
    .setMergeDocuments(
        new Resource().setUri("https://www.myserver.com/overlaid.pdf"))
    .setMode(MergeMode.OVERLAY)
    .setDisableOverlayAnnotations(true);
config.setMergeSettings(mergeSettings);
```

Java

```
--merge-documents https://www.myserver.com/overlaid.pdf \
--merge-mode OVERLAY \
--merge-disable-overlay-annotations
```

CLI

## F.94 Signing PDFs

[Back to main chapter \(p. 85\)](#)

```
config.setSignPDF(
new SignPDF()
    .setKeyAlias("keyAlias")
    .setKeystorePassword("keyStorePassword")
    .setKeystoreType(KeystoreType.JKS)
    .setKeystoreURL("http://myServer/Keystore.jks")
    .setSigningMode(SigningMode.SELF_SIGNED));
```

Java

```
--sign-pdf-key-alias "keyAlias" \
--sign-pdf-keystore-password "keyStorePassword" \
--sign-pdf-keystore-type JKS \
--sign-pdf-keystore-url http://myServer/Keystore.jks \
--sign-pdf-signing-mode SELF_SIGNED
```

CLI

## F.95 Disabling font embedding

[Back to main chapter \(p. 85\)](#)

```
config.setDisableFontEmbedding(true);
```

Java

```
--disable-font-embedding
```

CLI

## F.96 Overprint

[Back to main chapter \(p. 85\)](#)

```
config.setAddOverprint(true);
```

Java

```
--add-overprint
```

CLI

## F.97 Adding attachments

[Back to main chapter \(p. 86\)](#)

```
config.setAddAttachments(true);
```

Java

```
--add-attachments
```

CLI

## F.98 Attachments

[Back to main chapter \(p. 87\)](#)

```
config.setAttachments(
    new Attachment()
        .setData("sample attachment text".getBytes())
        .setName("sample.txt")
        .setDescription("a dynamically created attachment containing text"),
    new Attachment()
        .setUrl("../resources/0412/report.doc")
        .setName("report-2012-04.doc")
        .setDescription("Report for April of 2012"));
```

Java

```
-C config.json
```

CLI

With the following config.json:

```
{ "attachments": [
  {
    data: sampleAttachmentTextBytesAsBase64
    name: "sample.txt"
    description: "a dynamically created attachment containing text"
  },
  {
    url: "../resources/0412/report.doc",
    name: "report-2012-04.doc",
    description: "Report for April of 2012"
  }
]}
```

## F.99 PDF script actions

[Back to main chapter \(p. 88\)](#)

```
config.setPdfScriptAction(new PdfScriptAction()
    .setScript("app.alert('hello');")
    .setTriggerEvent(PdfScriptTriggerEvent.OPEN));
```

Java

```
-C config.json
```

CLI

With the following config.json:

```
{ "pdfScriptAction": {
  "script": "app.alert('hello');",
  "triggerEvent": "OPEN"
}}
```

## F.100 Attaching a custom XMP

[Back to main chapter \(p. 88\)](#)

```
config.setXmp(new Xmp()
    .setPriority(XmpPriority.HIGH)
    .setUri("http://cdn/myXmp.xml"));
```

Java

```
--xmp-priority HIGH \
--xmp-uri http://cdn/myXmp.xml
```

CLI

## F.101 Image output

[Back to main chapter \(p. 89\)](#)

```
config.setOutputFormat(new OutputFormat()
    .setType(OutputType.PNG)
    .setWidth(512)
    .setHeight(-1));
```

Java

```
--output-format-type PNG \
--output-format-width 512 \
--output-format-height -1
```

CLI

## F.102 Page order

[Back to main chapter \(p. 89\)](#)

```
config.setPageOrder("5");
```

Java

```
--page-order "5"
```

CLI

## F.103 Multi-image output

[Back to main chapter \(p. 89\)](#)

```
config.setOutputFormat(new OutputFormat()
    .setType(OutputType.PNG)
    .setWidth(512)
    .setHeight(-1)
    .setMultiImage(true));
```

Java

```
--output-format-type PNG \
--output-format-width 512 \
--output-format-height -1 \
--output-format-multi-image
```

CLI

## F.104 Continuous output

[Back to main chapter \(p. 90\)](#)

```
config.setContinuousOutput(new ContinuousOutput()
    .setWidth(1024)
    .setHeight(768));
```

Java

```
--continuous-output-width 1024 \
--continuous-output-height 768
```

CLI

## F.105 Forcing grayscale image output

[Back to main chapter \(p. 90\)](#)

```
config.setForceGrayscaleImage(true);
```

Java

```
--force-grayscale-image
```

CLI

## F.106 Color space conversion of output images to CMYK

[Back to main chapter \(p. 90\)](#)

```
config.setColorSpaceSettings(new ColorSpaceSettings()
    .setConversionEnabled(true)
    .setTargetColorSpace(ColorSpace.CMYK)
    .setCmykIccProfile(new Resource().setUri("URL/to/optional/ICC/profile")));
```

Java

## F.107 Shrink-to-fit

[Back to main chapter \(p. 133\)](#)

```
config.setPixelsPerInchShrinkToFit(true);
```

Java

```
--pixels-per-inch-shrink-to-fit
```

CLI

## F.108 Custom page order

[Back to main chapter \(p. 135\)](#)

```
config.setPageOrder("2,5,6*2,8..10,-1,-2");
```

Java

```
--page-order "2,5,6*2,8..10,-1,-2"
```

CLI

## F.109 Arranging documents

[Back to main chapter \(p. 136\)](#)

```
MergeSettings mergeSettings = new MergeSettings();
mergeSettings
    .setMergeDocuments(
        new Resource().setUri("https://www.myserver.com/insert1.pdf"),
        new Resource().setUri("https://www.myserver.com/insert2.pdf"))
    .setMode(MergeMode.ARRANGE);
config.setMergeSettings(mergeSettings);
config.setPageOrder("1,1:1,2..-1");
```

Java

```
--merge-documents https://www.myserver.com/insert1.pdf https://www.myserver.com/
insert2.pdf \
--merge-mode ARRANGE \
--page-order "1,1:1,2..-1"
```

CLI

## F.110 Pages per sheet

[Back to main chapter \(p. 137\)](#)

```
config.setPagesPerSheetProperties(new PagesPerSheetProperties()
    .setCols(2)
    .setRows(2)
    .setSheetSize("A4 landscape")
    .setSheetMargin("2.5cm")
    .setSpacing("2cm")
    .setDirection(PagesPerSheetDirection.RIGHT_UP));
```

Java

```
--pages-per-sheet-properties-cols 2 \
--pages-per-sheet-properties-rows 2 \
--pages-per-sheet-properties-sheet-size "A4 landscape" \
--pages-per-sheet-properties-sheet-margin "2,5cm" \
--pages-per-sheet-properties-spacing "2cm" \
--pages-per-sheet-properties-direction RIGHT_UP
```

CLI

## F.111 Booklet

[Back to main chapter \(p. 137\)](#)

```
config.setBookletMode(new BookletMode()
    .setSheetSize("A4 landscape")
    .setSheetMargin("1cm")
    .setRtl(false));
```

Java

```
--booklet-mode-sheet-size "A4 landscape" \
--booklet-mode-sheet-margin "1cm"
```

CLI

## F.112 Custom pixels per inch

[Back to main chapter \(p. 138\)](#)

```
config.setPixelsPerInch(120);
```

Java

```
--pixels-per-inch 120
```

CLI

## F.113 Document language

[Back to main chapter \(p. 139\)](#)

```
config.setDocumentDefaultLanguage("de-DE");
```

Java

```
--document-default-language "de-DE"
```

CLI

## F.114 Media types

[Back to main chapter \(p. 141\)](#)

```
config.setMediaTypes("screen", "projection", "print");
```

Java

```
--media-types "screen" "projection" "print"
```

CLI

## F.115 Media feature values

[Back to main chapter \(p. 142\)](#)

```
config.setMediaFeatureValues(new MediaFeatureValue()
    .setMediaFeature(MediaFeature.DEVICE_WIDTH)
    .setValue("1024px"));
```

Java

```
-C config.json
```

CLI

With the following config.json:

```
{ "mediaFeatureValues": [{
  "mediaFeature": "DEVICE_WIDTH",
  "value": "1024px"
}]}
```

## F.116 Enabling Segmentation

[Back to main chapter \(p. 148\)](#)

```
config.setSegmentationSettings(new SegmentationSettings()
    .setEnabled(true));
```

Java

```
--segmentation-enabled
```

CLI

## F.117 Adding comments

[Back to main chapter \(p. 150\)](#)

```
config.setAddComments(true);
```

Java

```
--add-comments
```

CLI

## F.118 Custom font directories

[Back to main chapter \(p. 173\)](#)

```
config.setFontDirectories("/myFonts1", "/myFonts2/corporate");
```

Java

```
--font-directories "/myFonts1" "/myFonts2/corporate"
```

CLI

## F.119 Custom fonts

[Back to main chapter \(p. 173\)](#)

```
config.setFonts(
    new Font().setFamily("My Font")
        .setBold(true)
        .setItalic(true)
        .setSource("https://url/to/font.ttf"));
```

Java

```
-C config.json
```

CLI

With the following config.json:

```
{ "fonts": [
  {
    "family": "My Font",
    "bold": true,
    "italic": true,
    "source": "https://url/to/font.ttf"
  }
]}
```

## F.120 Enabling file system font cache

[Back to main chapter \(p. 175\)](#)

```
config.setCacheFonts(true);
```

Java

```
--cache-fonts
```

CLI

## F.121 Configuring font cache location

[Back to main chapter \(p. 175\)](#)

```
config.setFontCachePath("/myPDFreactor/fontcache");
```

Java

```
--font-cache-path "/myPDFreactor/fontcache/cache.dat"
```

CLI

## F.122 Disabling system fonts

[Back to main chapter \(p. 175\)](#)

```
config.setDisableSystemFonts(true);
```

Java

```
--disable-system-fonts
```

CLI



## F.123 Font aliases

[Back to main chapter \(p. 176\)](#)

```
config.setFontAliases(  
    new Font().setFamily("My Font")  
        .setSource("Arial"));
```

Java

```
-C config.json
```

CLI

With the following config.json:

```
{ "fontAliases": [  
  {  
    "family": "My Font",  
    "source": "Arial"  
  }  
]}
```

## F.124 Fallback fonts

[Back to main chapter \(p. 176\)](#)

```
config.setFontFallback("My Font", "Arial");
```

Java

```
--font-fallback "My Font" "Arial"
```

CLI