REALOBJECTS

PDFreactor®

MANUAL

Version 9.1.9797.9

TABLE OF CONTENTS

1. INSTALLATION

PDFreactor can be deployed in various ways:

- *Java library:* Use this to integrate PDFreactor directly into your Java applications.
- *Web Service:* The PDFreactor Web Service is used by the wrapper APIs (PHP, .NET, Python, Ruby, Perl, Java, JavaScript and Node.js). It is also a RESTful service and thus can be used by any language utilizing the REST API.
- *Command line:* Use the PDFreactor command line web service client for direct integration into shell scripts.

When it is used as a Java library no further installation is required.

However, if the .NET[1], PHP[2], Perl, Python, Ruby, JavaScript, Node.js or Python Command Line APIs are used, the PDFreactor Web Service is required.

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 located in the "PDFreactor/libs" directory:

- pdfreactor.jar
- pdfreactorcore.jar

It is generally recommended to use the "pdfreactor.jar", since it not only contains PDFreactor itself but also all 3rd party libraries required by PDFreactor. This JAR[3] file is a stand-alone PDFreactor library. No other libraries are required.

If some of the 3rd party libraries are already installed on the server or if certain functionality is not required, the "pdfreactorcore.jar" can be used. It only contains PDFreactor, optional 3rd party libraries contained in the "3rdparty" directory 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.

Note

Please refer to the "libs.txt" in the "PDFreactor/libs/3rdparty" directory for more information about the 3rd party libraries.

1.2 The PDFreactor Web Service

If PDFreactor is deployed using the PDFreactor installer, the installation provides an option to automatically install the PDFreactor Web Service with PDFreactor. No further configuration is required in this case.

[1] *pronounced "dot net", a software framework by Microsoft (http://msdn.microsoft.com/en-us/netframework/default.aspx)*
[2] *PHP: **H**ypertext **P**reprocessor, an open-source server-side scripting language (http://www.php.net/)*
[3] *Java **AR**chive, a file container used for Java classes.*

On Unix and Linux platforms the PDFreactor Web Service must be started manually. To do so, after extracting the archive or installing the RPM go to the "bin" subdirectory and use the following command to start the service:

```
./pdfreactorwebservice start
```

To stop the service, use:

```
./pdfreactorwebservice stop
```

To display whether the service is already running, use:

```
./pdfreactorwebservice status
```

Note

The PDFreactor Command Line is a client for the PDFreactor Web Service and such it is subject to the same limitations as the PDFreactor Web Service itself. For example, if the Web Service can't access a file from the file system of the machine it is running on, the Command Line can't access it either.

1.2.1 PDFreactor Web Service Configuration on Windows

On Windows systems the PDFreactor Web Service is started with the `Local Service` account by default.

When the Web Service is started using this account, it can only access files from the local file system that the `Local Service` account is allowed to access. For example, files from the user's home directory cannot be read on most systems. The Web Service may or may not be able to read files from other locations on the disk depending on the system configuration. If you need the Web Service to be able to access a particular file or folder on the disk, add the `Local Service` user to the list of users that can access this file or folder, and enable read permissions for this user.

In production environments, you may wish to start the PDFreactor Web Service with its own distinct user account.

1.2.2 PDFreactor Web Service Configuration on Linux / Unix

On Linux and Unix systems the PDFreactor Web Service has the same permissions as the user that started it.

1.3 Jetty

The PDFreactor service is run on the application server Jetty. It is a requirement for the .NET, PHP, Perl, Python, Ruby, Java, JavaScript, Node.js and Python Command Line wrappers.

By default, Jetty will listen at localhost:9423.

See

Customizing the Server Configuration (p. 23) for information on how to modify this and http://www.eclipse.org/jetty/ for further details about Jetty and ways to configure it.

Note

Java 8 or newer is required to use the packaged Jetty application server.

1.4 PHP Requirements

To use PDFreactor with the PHP API a webserver (e.g. Apache) with a PHP-installation (Version >4.3 or >5.0) is required.

The PDFreactor service must be running within Jetty on the same machine.

1.5 .NET Requirements

The PDFreactor .NET API requires the Microsoft .NET framework 4.0 including the latest patches.

The PDFreactor service must be running within Jetty on the same machine.

Additional Requirements for ASP.NET

The .NET framework 4.0 must be registered at your IIS[4]-server.

See

http://msdn2.microsoft.com/en-us/library/k6h9cz8h(VS.80).aspx

1.6 Perl/Python/Ruby Requirements

The Perl/Python/Ruby API can be used via CGI[5] on your webserver, or by the corresponding modules for the Apache webserver (mod-python, mod-perl, mod-ruby).

The PDFreactor service must be running within Jetty on the same machine.

For specific installation requirements please have a look at the install.txt of the related wrapper.

[4] *Internet **I**nformation **S**ervices (http://www.iis.net/)*
[5] ***C**ommon **G**ateway **I**nterface, a protocol for calling external software via web server (http://www.w3.org/CGI/)*

2. INTEGRATION

You can integrate PDFreactor by directly using it as a Java library, by using its .NET, PHP, Perl, Python, Ruby, JavaScript or Node.js API, or by running it on the command line.

2.1 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 larger amounts of memory.

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.

See

Web Service Configuration (p. 23) for how to increase the memory available to the PDFreactor Web Service.

Note

The memory available to the PDFreactor Preview app is set to 1024m by default.

To increase the amount of memory available to the PDFreactor Preview app, you need to adapt the `-Xmx1024m` parameter in the file "PDFreactor/bin/PDFreactor Preview.vmoptions".

To increase the memory to e.g. 2GB, change the parameter to `-Xmx2048m` and restart the `PDFreactor` Preview app.

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 Using the Java library

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

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

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

import com.realobjects.pdfreactor.PDFreactor;
import com.realobjects.pdfreactor.Configuration;
import com.realobjectd.pdfreactor.Result;

public class FirstStepsWithPDFreactor {
    public static void main(String[] args) {
        try {
            PDFreactor pdfReactor = new PDFreactor();

            // configuration settings
            Configuration config = new Configuration();
            config.setAddLinks(true);
            config.setAddBookmarks(true);

            // the input document
            config.setDocument("http://www.realobjects.com");

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

            OutputStream outputStream = new FileOutputStream("output.pdf");
            outputStream.write(pdf);
            outputStream.close();
        } catch (Exception e) {
            e.printStackTrace();
        }
    }
}
```

See

the API documentation for details.

Important: New API

Since PDFreactor 8, there is a new Java API. To access the new API, use the `PDFreactor` class in the `com.realobjects.pdfreactor` package. This API is now recommended. One major benefit is that it is identical to the new web service client API. The legacy API is still accessible in the `com.realobjects.pdfreactor.legacy` package, however, it may be removed in future versions.

2.2.1 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();
```

2.2.2 Logging

PDFreactor uses the Java Logging API to output information about its progress. A simple console logger can be created like this:

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

See

http://docs.oracle.com/javase/6/docs/technotes/guides/logging/

Additionally, you can append the log to the generated PDF by using the method `setAppendLog` like this:

```
config.setAppendLog(true);
```

Note

To enable logging you have to set an appropriate log level first using the method `setLogLevel`, e.g. like this:

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

2.2.3 OSGi Support

PDFreactor provides support for OSGi out of the box. The Manifest of the self-contained variant of PDFreactor ("pdfreactor.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 ("pdfreactorcore.jar" and associated libraries) does not contain appropriate Manifest entries. Keep in mind that overwriting, removing or modifying the Manifest of "pdfreactor.jar" may break OSGi compatibility.

2.3 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 recommend 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
```

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()
        // ...
    }
}
```

Note

Enabling the headless mode manually is not necessary when using the PDFreactor Web Service.

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
```

2.4 Using the PDFreactor Web Service

If PDFreactor is deployed using the PDFreactor installer, the installation provides an option to automatically install the PDFreactor Web Service with PDFreactor. No further configuration is required in this case.

On Unix and Linux platforms, no installer is available. Therefore, the PDFreactor Web Service must be started manually on these systems. To do so, after unzipping the PDFreactor installation archive go to the "path-to-PDFreactor/bin" directory and use this command to start the service:

```
./pdfreactorwebservice start
```

To stop the service, use:

```
./pdfreactorwebservice stop
```

To display whether the service is already running, use:

```
./pdfreactorwebservice status
```

Install PDFreactor Web Service as system.d service

Alternatively on systems which support `system.d` you can install PDFreactor as system service as follows:

After unzipping the PDFreactor installation archive go to the "path-to-PDFreactor/bin" directory. Then issue the following commands:

```
cp pdfreactor.service /etc/systemd/system
```

```
systemctl start pdfreactor.service
```

```
systemctl enable pdfreactor.service
```

The PDFreactor Web Service can be used by one of the wrapper APIs (PHP, .NET, Python, Ruby, Java, JavaScript, Node.js and Python Command Line) or by using its REST[6] API.

Checking if the Web Service is Operational

You can check if the PDFreactor Web Service is operational (i.e. if it can create PDFs) by using the method `getStatus` in the wrappers or the REST URL `/status`. If the Web Service is not working normally, an appropriate exception is thrown when using a wrapper or the status code 503 is returned when using the REST API. In this case you should restart the PDFreactor Web Service.

Debugging start-up

If you have problems starting the PDFreactor web service, you can try to debug the start-up process using the following command:

```
./pdfreactorwebservice run
```

2.4.1 Asynchronous Conversions

The PDFreactor Web Service can convert documents asynchronously, meaning that the client is not required to keep an open HTTP connection to the server until the conversion is finished. While this is usually negligible when converting small documents, synchronous conversions may be very detrimental to the user experience when converting large or complex documents.

Important: Temporary Document Files

When doing asynchronous conversions, temporary files are created on the server's file system (if not configured otherwise, see Server Parameters (p. 26)). These files are deleted when the document is retrieved by the client (except when the `keepDocument` property is set in the configuration). Should these documents not be retrieved, they will remain on the server until they are automatically deleted after 5 days. It is also save to remove these files via external cleanup mechanics.

Starting an Asynchronous Conversion

Converting synchronously is very simple. You send a request for conversion to the server using the `convert` method and receive the result object in the response. Asynchronous conversions on the other hand have to be managed by the integrating application. You can start an asynchronous conversion by using the `convertAsync` method. The response is a unique ID which references the conversion you just triggered. The ID is important as it is the only way to check on or retrieve the finished document from the server at a later time.

```
// sync
Result result = pdfReactor.convert(config);
// async
String id = pdfReactor.convertAsync(config);
```

[6] ***RE**presentational **S**tate **T**ransfer*

Checking the Progress

Since after the conversion is triggered you do not have any information on whether it is finished or not, your application needs to poll the progress of the conversion. This is done by using the `getProgress` method, which takes the conversion ID as argument. The returned object contains an indicator whether the conversion is finished, the current estimated progress in percent and a partial log, if a log level was configured.

```
Progress progress = pdfReactor.getProgress(id);
```

Retrieving the Document

After the conversion is finished, you can retrieve the document by using the `getDocument` method, which again takes the conversion ID as a parameter. The returned result object is the same as if you had called the `convert` method in the beginning, meaning that it contains the converted document.

```
Result result = pdfReactor.getDocument(id);
```

Important

Retrieving the document causes it to be deleted from the server if not configured otherwise. See Deleting the Document (p. 13) for further information.

Deleting the Document

As already mentioned, asynchronously converted documents are stored on the server to be accessible at a later point. To make managing these stored files as convenient as possible, by default the document is deleted from the server once it is retrieved for the first time, e.g. by using the method `getDocument`. Since this might be undesirable in certain cases, it can be prevented by setting the `keepDocument` property of the `Configuration` object to `true`.

```
config.setKeepDocument(true);
```

Once you want to remove the document from the server, call the `deleteDocument` method with the conversion ID as argument.

```
pdfReactor.deleteDocument(id);
```

2.4.2 Using the REST API

The REST API provides application- and language-neutral access to the PDFreactor Web Service. To use a RESTful resource, your application has to open an HTTP connection to the appropriate URL. While the RESTful URLs are not identical to the appropriate wrapper methods, the names are recognizable (see API Comparison (p. 30) for a comparison).

The RESTful PDFreactor Web Service can be reached via the URL http://localhost:9423/service/rest, unless otherwise deployed or configured. The WADL[7] is available under http://localhost:9423/service/rest?_wadl.

RESTful resources respond with an appropriate HTTP status code. Please see the REST API documentation for detailed information. The following table gives a comprehensive overview of all available RESTful resources:

RESTful Resources

[7] ***W****eb* ***A****pplication* ***D****escription* ***L****anguage*

Resource	HTTP method	Description	Headers
/convert	POST	Converts the specified document into PDF or image	
/convert/async	POST	Converts the specified document into PDF or image asynchronously	Location
/progess/{id}	GET	Checks the progress of the conversion with the given ID.	Location
/document/{id}	GET	Retrieves the converted PDF or image	
/document/{id}/{page}	GET	Retrieves the specified page of a converted multi-page image	
/document/metadata/{id}	GET	Retrieves the metadata of the converted PDF or image	
/document/{id}/show/{fileName}	GET	Displays the converted PDF in the browser with the given file name	
/document/{id}/download/{fileName}	GET	Triggers a download of the converted PDF with the given file name	
/document/{id}	DELETE	Deletes the converted PDF or image from the server	
/status	GET	Checks if the REST service is responsive and able to convert documents	
/version	GET	Retrieves the version of the PDFreactor Web Service	

Example 1: Calling a REST resource

To convert a document using the REST API, the following resource has to be called using the HTTP POST method:

```
http://localhost:9423/service/rest/convert
```

The PDFreactor configuration must be included in the POST data, either as JSON or XML string.

Payload

All POST resources require a payload in XML, JSON or ZIP format. Usually, the payload is the PDFreactor configuration. In case of ZIP, the payload is an asset package and contains all resources required to convert it to PDF (see Asset Packages (p. 16)).

When doing a request, the appropriate `Content-type` header should be set.

Example 2: Simple XML and JSON Payloads

XML:

```
<ns:configuration xml:ns="http://webservice.pdfreactor.realobjects.com/">
    <document>http://www.realobjects.com</document>
</ns:configuration>
```

JSON:

```
{
    "document": "http://www.realobjects.com"
}
```

Headers

The RESTful resources `/convert/async` and `/progess/{id}` both return a `Location` header, which contains the URL that should be called next.

The `Location` header of the `/convert/async` response contains the complete document URL to `/progess/{id}`, including the `id` parameter. This makes it very convenient to get the progress after triggering an async conversion. The `Location` header of the `/progess/{id}` response contains the complete document URL to `/document/{id}`, including the `id` parameter. This header is only present if the conversion is finished, so it can be used to directly access the converted document.

Data Formats

Certain resources like `/convert` or `/progress` return data in XML format by default. However, you can control the data format by either specifying appropriate `Accept` headers or more conveniently by appending a file extension to the REST resource. Not all file extensions are supported for all resources, and some file extensions may behave differently.

- `pdf, png, jpg, bmp, tiff, gif` – Retrieves the binary data of the converted PDF or image directly. Also, the appropriate `Content-Type` headers are included so that you can display the PDF or image directly in the browser. These file extensions are only supported for the `/convert` and `/document` resources
- `bin` – Same as above, however, the data is returned as generic binary data with content type "application/octet-stream".
- `json, xml` – The data is returned in JSON or XML format.
- `txt` – The data is returned as plain text. What exactly is returned depends on the resource:
  - `/progress/{id}.txt` returns the current estimated progress in percent
  - `/version.txt` returns the full version as a string
  - `/convert.txt` or `/document/{id}.txt` return the converted PDF as a base64 encoded string

Example 3: Retrieving a converted PDF

To retrieve an asynchronously converted PDF from the server, use the `/document` resource with the conversion ID "1234" as a URL parameter like this:

```
http://localhost:9423/service/rest/document/1234
```

The resource will return a result object which includes (among other data) the converted PDF as a base64-encoded string. If no file extension is given, the data is returned in XML format. If you prefer the data in JSON format, just add the appropriate file extension to the resource:

```
http://localhost:9423/service/rest/document/1234.json
```

Sometimes it might be desireable to retrieve the PDF directly as binary data or display it in the browser. For this, simply use the "pdf" file extension:

```
http://localhost:9423/service/rest/document/1234.pdf
```

Note

When using the `convert` or `document` resources to retrieve the binary data of the converted document directly, you can specify an image file extension like `jpg` even if you retrieve a PDF (and vice-versa). This is not recommended. While the returned binary data is the same, an inappropriate "Content-Type" header is set which might confuse some user agents. If you do not know whether you retrieve an image or a pdf, use the generic extension `bin`.

2.4.3 Asset Packages

Instead of using a simple configuration to convert an external document, the REST service also accepts an asset package in ZIP format. This package must have a "configuration.xml" or "configuration.json" file in its root directory. The content of this configuration file is a normal configuration in XML or JSON format, except that the document is specified as a URL relative to it. All other resources required by the document can also be placed in the asset package and can be linked relatively to the document.

Example 4: Custom asset package

This is an example asset package structure and configuration.

configuration.json:

```
{
    "document": "input.html",
    "userStyleSheets": [
        {
            "uri": "styles/common.css"
        }
    ]
}
```

The configuration above points to a document that is located in the same directory as the configuration file as well as a style sheet in the "styles" directory. Files and directories are arbitrary, only the configuration file must be in the root directory.

With the configuration above, this is the final package structure:

```
myPackage.zip
|- configuration.json
|- input.html
|- styles
   |- common.css
```

You could then convert this asset package to PDF using e.g. curl:

```
curl -X POST -H "Cache-Control: no-cache" -H "Content-Type: application/zip" --data-binary @myPackage.zip "http://localhost:9423/service/rest/convert.pdf" > result.pdf
```

Limitations and Restrictions

Asset packages are subject to the following limitations and restrictions:

- Asset packages must have a "configuration.json" or "configuration.xml" file in their root directory.
- A document in the asset package must be specified as URL relative to the configuration file.
- All relatively linked resources must be put in the asset package.
- No base URL can be specified in the configuration.
- Relative URLs must not point to locations outside of the asset package.

2.4.4 Using a Wrapper

PDFreactor can also be easily integrated in your web apps using one of the wrappers APIs, i.e. PHP, .NET, Python, Perl, Ruby, Java, JavaScript, Node.js or Python Command Line. This has to be used in conjunction with the PDFreactor Web Service which is run by a Jetty web application server (see chapter Jetty (p. 6)).

See also The PDFreactor Web Service (p. 5) for information on how to start the service.

Using PHP

To use the PDFreactor PHP API simply copy the "PDFreactor.class.php" to a directory of your webserver where PHP is enabled.

Then include the "PDFreactor.class.php" with:

```
include("/path/to/PDFreactor.class.php");
```

With just a few lines you can create and directly show PDFs inside your PHP web application:

```
<?php
include("../PDFreactor.class.php");
$pdfReactor = new PDFreactor();
$config = array("document" => "http://www.pdfreactor.com");

try {
    $result = $pdfReactor->convertAsBinary($config);
    header("Content-Type: application/pdf");
    echo $result;
} catch (Exception $e) {
    print "Content-type: text/html\n\n"
    puts "<h1>Error During Rendering</h1>"
    puts "<h2>.$e->getMessage().</h2>"
}
?>
```

See

PDFreactor methods in the PHP API docs for all available options.

PHP API specific issues

PHP Script timeout: Generally the timeout of PHP scripts is set to 30s within the "php.ini". When rendering large documents this limit may be exceeded.

Using .NET

You can easily access the PDFreactor service from any .NET language. The library assembly "PDFreactor.dll" offers you a large subset of the Java-API and takes care of all communication with the service.

A simple usage in C# would be:

```
PDFreactor pdfReactor = new PDFreactor();
Configuration config = new Configuration();
config.Document = "http://www.pdfreactor.com/";

try
{
    byte[] pdf = pdfReactor.ConvertAsBinary(config);
}
catch (PDFreactorWebserviceException e)
{
    // ...
}
```

See

PDFreactor methods in the .NET API docs for all available options.

Using ASP.NET

To use the .NET API from ASP.NET[8] copy "PDFreactor.dll" from "wrappers\dotnet\bin" in your PDFreactor installation directory to "bin" in the root of your IIS-Application or to the global assembly cache.

An ASP.NET example would be:

```
<%@ Page Language="C#" Debug="false" %>
<%@ import namespace="RealObjects.PDFreactor.Webservice.Client" %>
<%
PDFreactor pdfReactor = new PDFreactor();
RealObjects.PDFreactor.Webservice.Client.Configuration config =
            new RealObjects.PDFreactor.Webservice.Client.Configuration();
config.Document = "http://www.pdfreactor.com/";

try
{
    byte[] result = pdfReactor.ConvertAsBinary(config);

    Response.ContentType = "application/pdf";
    Response.BinaryWrite(result);
}
catch (PDFreactorWebserviceException e)
{
    Result result = e.Result;
    Response.Write("<h1>Error During Rendering</h1>>");
    Response.Write("<h2>"+result.Error+"</h2>");
}
%>
```

Using Python

To use the PDFreactor Python API simply copy the "PDFreactor.py" to a directory of your webserver where Python is enabled (by e.g. CGI or mod-python).

Then include the "PDFreactor.py" with:

```
import sys
sys.path.append("path/to/PDFreactor.py/")
from PDFreactor import *
```

With just a few lines you can create and directly show PDFs inside your Python web application:

```
pdfReactor = PDFreactor()
config = { "document": "http://www.pdfreactor.com" }

try:
    result = pdfReactor.convertAsBinary(config)

    # Used to prevent newlines are converted to Windows newlines (\n --> \r\n)
    # when using Python on Windows systems
    if sys.platform == "win32":
        import os, msvcrt
        msvcrt.setmode(sys.stdout.fileno(), os.O_BINARY)

    print "Content-Type: application/pdf\n"
    sys.stdout.write(result)
except Exception as e:
    print "Content-Type: text/html\n"
    print "<h1>Error During Rendering</h1>"
    print "<h2>"+str(e)+"</h2>"
```

[8] *Active **S**erver **P**ages .NET, a framework by Mircosoft to build dynamic web sites and web applications*

Windows specific issues

To directly output the PDF to the browser please use the following code:

```
if sys.platform == "win32":
    import os, msvcrt
    msvcrt.setmode(sys.stdout.fileno(), os.O_BINARY)
    print "Content-Type: application/pdf\n"
    sys.stdout.write(result.docuent)
```

See

PDFreactor methods in the Python API docs for all available options.

Using Perl

To use the PDFreactor Perl API simply copy the "PDFreactor.pm" to a directory of your webserver where Perl is enabled (by e.g. CGI or mod-perl).

Then include the "PDFreactor.pm" with:

```
require "PDFreactor.pm";
```

With just a few lines you can create and directly show PDFs inside your Perl web application:

```
my $pdfReactor = PDFreactor -> new();
$config = { "document" => "http://www.pdfreactor.com" };

eval {
    $result = $pdfReactor -> convertAsBinary($config);

    print "Content-type: application/pdf\n\n";
    binmode(STDOUT);
    print $result;
} || do {
    my $e = $@;

    print "Content-type: text/html\n\n";
    print "<h1>Error During Rendering</h1>";
    print "<h2>"+$e+"</h2>";
};
```

Windows specific issues

To directly output the PDF to the browser please use the following code before printing the result:

```
binmode(STDOUT);
```

See

PDFreactor methods in the Perl API docs for all available options.

Using Ruby

To use the PDFreactor Ruby API simply copy the "PDFreactor.rb" to a directory of your webserver where Ruby is enabled (by e.g. CGI or mod-ruby).

Then include the "PDFreactor.rb" with:

```
require 'PDFreactor.rb'
```

With just a few lines you can create and directly show PDFs inside your Ruby web application:

```
pdfReactor = PDFreactor.new()
config = { document: "http://www.pdfreactor.com/" }

begin
    result = pdfReactor.convertAsBinary(config);

    print "Content-type: application/pdf\n\n"
    $stdout.binmode
    print result
rescue Exception => e
    print "Content-type: text/html\n\n"
    puts "<h1>Error During Rendering</h1>"
    puts "<h2>#{e}</h2>"
end
```

Windows specific issues

To directly output the PDF to the browser please use the following code before printing the result:

```
$stdout.binmode
```

See

PDFreactor methods in the Ruby API docs for all available options.

Using Java

To use the PDFreactor Java Wrapper API simply add the "pdfreactor-wrapper.jar" to your Java application's class path.

With just a few lines you can create PDFs inside your Java application:

```
PDFreactor pdfReactor = new PDFreactor();
Configuration config = new Configuration();
config.setDocument("http://www.pdfreactor.com/");

try {
    byte[] result = pdfReactor.convertAsBinary(config);

    // handle the pdf
} catch (PDFreactorWebserviceException e) {
    Result result = e.getResult();
    System.out.println(e.getError());
} catch (Exception e) {
}
```

See

PDFreactor methods in the Java API docs for all available options.

Using JavaScript/Node.js

Note

This chapter refers to the JavaScript API that allows using PDFreactor from JavaScript in a browser. There are also:

- JavaScript in the input document, processed by PDFreactor like in a browser (p. 44)
- Scripts added to the resulting PDFs, processed by the PDF-viewer (p. 66)

To use the PDFreactor JavaScript API simply add the "PDFreactor.js" as a JavaScript to your web page or as a module in your Node.js application.

JavaScript

```
<script src="PDFreactor.js" />
```

Node.js

```
const PDFreactor = require('PDFreactor.js');
```

Callbacks

Because the JavaScript and Node.js wrappers use HTTP requests which are asynchronous by nature, the `convert` and all other API methods cannot return anything. Instead, all methods take an additional two parameters: Namely callbacks for a success and error case, respectively.

```
// not possible:
var result = pdfReactor.convert(config);
// correct usage:
pdfReactor.convert(config, successHandler, errorHandler);
```

With just a few lines you can create PDFs inside your web page or application:

```
pdfReactor = new PDFreactor();
config = { document: "http://www.pdfreactor.com/" };
pdfReactor.convert(config, function(result) {
    var pdf = result.document;
    // handle the PDF
}, function(e) {
    console.log(e);
});
```

See

PDFreactor methods in the JavaScript or Node.js API docs for all available options.

Using the Command Line

PDFreactor features a Python based command line web service client. It requires the PDFreactor Web Service to be running.

The Command Line executable is located in the "PDFreactor/bin" directory and can be used like this:

```
python pdfreactor.py -i input.html
```

For Windows systems a compiled version is provided, so no Python installation is required.

```
pdfreactor.exe -i input.html
```

Batch Processing

The Python Command Line wrapper can be used to batch convert files by either specifying a directory on your system or using wildcards in the input file name.

Example 5: Batch Processing

```
python pdfreactor.py -i /directory/documents
```

Here all files in the "/directory/documents" are converted.

```
python pdfreactor.py -i /directory/documents/test*.html
```

Here all files in the "/directory/documents" matching the file name are converted.

Note

Contrary to other wrappers, the Python Command Line wrapper can also process file paths as input documents (in addition to URLs and content). When using file paths, the PDFreactor Web Service must be running on the same system. If not, the file paths cannot be accessed.

Note

Asynchronous conversions are not possible using the Python Command Line wrapper.

2.4.5 Custom Headers and Cookies

In certain situations it may be necessary to set custom headers and cookies to the connection from the wrapper to the PDFreactor Web Service. This can be done with the `headers` and `cookies` properties of the PDFreactor object.

Example 6: JavaScript/Node.js

```
pdfReactor.headers['my-header'] = 'my-header-value';
pdfReactor.cookies['my-cookie'] = 'my-cookie-value'; // Node.js only
```

Note: Setting cookies manually is not possible in JavaScript. It is done automatically by the browser.

Example 7: PHP

```
$pdfReactor->headers["my-header"] = "my-header-value";
$pdfReactor->cookies["my-cookie"] = "my-cookie-value";
```

Example 8: Python

```
pdfReactor.headers["my-header"] = "my-header-value"
pdfReactor.cookies["my-cookie"] = "my-cookie-value"
```

Example 9: Ruby

```
pdfReactor.headers["my-header"] = "my-header-value"
pdfReactor.cookies["my-cookie"] = "my-cookie-value"
```

Example 10: Perl

```
$pdfReactor->{headers}->{'my-header'} = 'my-header-value';
$pdfReactor->{cookies}->{'my-cookie'} = 'my-cookie-value';
```

Example 11: Java

```
pdfReactor.getHeaders().put('my-header', 'my-header-value');
pdfReactor.getCookies().put('my-cookie', 'my-cookie-value');
```

Example 12: .NET

```
pdfReactor.Headers.Add('my-header', 'my-header-value');
pdfReactor.Cookies.Add('my-cookie', 'my-cookie-value');
```

2.4.6 Web Service Configuration

The PDFreactor Web Service can be configured in several ways. Most commonly, as described in the chapter Memory (p. 8), you may want to increase the amount of memory available.

Increasing Memory

To increase the amount of memory available to the PDFreactor Web Service, you need to adapt the `-Xmx1024m` parameter in the file "PDFreactor/jetty/start.ini".

To increase the memory to e.g. 2GB, change the parameter to `-Xmx2048m` and restart the web service.

Note

It is recommended to adapt the memory parameter for the PDFreactor Web Service appropriately before going into production.

Increasing Maximum Threads

The number of maximum threads limits the number of parallel conversions. For machines with multiple CPU cores, this value can be increased to allow more parallel conversions. This number is automatically determined by the PDFreactor Web Service. It can also be configured manually (see the parameter `threadPoolSize` in Server Parameters (p. 26)). The Jetty application server also has a configured limit of 200 maximum threads which should only be increased if absolutely necessary.

Keep in mind that more parallel conversions will result in increased memory usage. Please also see the chapter Memory (p. 8) for more information.

Customizing the Server Configuration

Sometimes it may be necessary to change the host or port of the PDFreactor Web Service.

You can change the port in the following of the "PDFreactor/jetty/start.ini":

```
…
jetty.http.port=9423
…
```

Usually it is recommended to run the PDFreactor Web Service on the same machine as the PDFreactor integration. This is not strictly necessary and the host for the service can be changed.

You have to remove the following line from the "PDFreactor/jetty/start.ini":

```
…
jetty.http.host=localhost
…
```

This will enable the PDFreactor Web Service to be accessible from other machines. By default, the service is available under "http://localhost:9423/service".

If either the host or port were changed or if you use a completely custom server for the PDFreactor Web Service, you need to specify the new service URL in the constructor of the PDFreactor instance.

Example 13: Using PHP

```
$pdfReactor = new PDFreactor("http://myServer:9423/service/rest");
```

Example 14: Using .NET

```
PDFreactor pdfReactor = new PDFreactor("http://myServer:9423/service/rest");
```

Example 15: Using Python

```
pdfReactor = PDFreactor("http://myServer:9423/service/rest");
```

Example 16: Using Perl

```
my $pdfReactor = PDFreactor -> new("http://myServer:9423/service/rest");
```

Example 17: Using Ruby

```
pdfReactor = PDFreactor.new("http://myServer:9423/service/rest");
```

Example 18: Using Java

```
PDFreactor pdfReactor = new PDFreactor("http://myServer:9423/service/rest");
```

Example 19: Using JavaScript/Node.js

```
pdfReactor = new PDFreactor("http://myServer:9423/service/rest");
```

Example 20: Using the Python Command Line wrapper

```
python pdfreactor.py -u http://myServer:9423/service/rest -i input.html
```

2.4.7 Logging

The logging mechanism for the APIs that use the web service is different from the logging mechanism of the Java API. Here, the Configuration object of PDFreactor has two additional properties `log` and `error` which are available in the `Result` object after the conversion process to retrieve the log or any errors which may have occurred during the conversion, respectively.

Another way of retrieving the log is using the property `appendLog`. This will append the log to the generated PDF you have both the generated PDF and the log in one document.

Additionally, the entire log output of the Jetty application server is written into log files located in the "PDFreactor/jetty/logs" directory.

Note

To enable logging you have to set an appropriate log level first using the property `logLevel`.

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 21: Using PHP

```
$config = array(
    logLevel => LogLevel::DEBUG,
    appendLog => true
);
```

Example 22: Using .NET

```
Configuration config = new Configuration();
config.LogLevel = LogLevel.DEBUG;
config.AppendLog = true;
```

Example 23: Using Python

```
config = {
    'logLevel': PDFreactor.LogLevel.DEBUG,
    'appendLog': True
}
```

Example 24: Using Perl

```
$config = {
    'logLevel' => PDFreactor::LogLevel -> DEBUG,
    'appendLog' => true
}
```

Example 25: Using Ruby

```
config = {
    logLevel: PDFreactor::LogLevel::DEBUG,
    appendLog: true
}
```

Example 26: Using Java

```
Configuration config = new Configuration();
config.setLogLevel(LogLevel.DEBUG);
config.setAppendLog(true);
```

Example 27: Using JavaScript/Node.js

```
config = {
    logLevel: PDFreactor.LogLevel.DEBUG,
    appendLog: true
}
```

Example 28: Using the Python Command Line wrapper

```
python pdfreactor.py --logLevel DEBUG --appendLog -i input.html
```

2.4.8 Load Balancing

In high availability and high performance environments it is common to run multiple PDFreactor Web Services behind a load balancer.

When doing synchronous conversions, no additional configuration or settings are required since the request to the web service is completely stateless. When doing asynchronous conversions on the other hand, you have to make sure that all relevant requests are routed to the same web service by the load balancer. This can usually be achieved by setting a sticky cookie. Please refer to the manual of the load balancer on how exactly to handle sticky sessions. When using a wrapper, cookies can be set using the `cookies` property of the PDFreactor instance (see Custom Headers and Cookies (p. 22))

2.4.9 Server Parameters

Additional configuration options for the server can be specified for the PDFreactor Web Service. These are either parameters the client should not or cannot influence, and they affect all conversions.

The following parameters can be configured:

- `licenseKeyPath` Specifies a file system path to the directory where the "licensekey.txt" file is located.
- `docTempDir` This parameter specifies the location of the Web Service's temporary folder which is used to store asynchronously converted documents. The pre-configured location is the "pdfreactor/doctemp" directory in the "PDFreactor/jetty" directory.
- `fontCacheDir` This specifies the location of the PDFreactor font cache used by the Web Service. The pre-configured location is the "pdfreactor/fontcache" directory in the "PDFreactor/jetty" directory.
- `disableDocTemp` If set to `true`, the Web Service will not use a temp folder. This also means that asynchronous conversions are not available. Synchronous conversions will be done in-memory, so make sure that the Web Service has sufficient amounts of memory available.
- `disableFontCache` If set to `true`, the Web Service will not use a file-based font cache. Generally, this is not recommended since the font cache will then have to be created for every conversion which is likely to have a significant performance impact. The default value is `false`.
- `disableFontRegistration` If set to `true`, font registration is disabled and any existing font cache will be ignored and the font directories will be scanned for font information. The default value is `false`.
- `disableSystemFonts` If set to `true`, PDFreactor will neither scan for nor use system fonts that are installed on the server. Only fonts specified via CSS and via the server parameter `fontDirs` as well as PDFreactor internal fonts will be used.
- `fontCacheDir` This specifies the directory of the font cache, which will be created by PDFreactor. If no path is specified, the font cache will be created in "PDFreactor/jetty/pdfreactor/fontcache".
- `fontDirs` This parameter takes a colon or semicolon separated list of directories that PDFreactor should scan for fonts.
- `threadPoolSize` This parameter determines the number of parallel conversions that can be performed by the PDFreactor Web Service. Please note that while there is no maximum value for this, only a thread pool size that is lower as or equal to the system's maximum amount of threads will increase performance when converting documents in parallel. The default value is calculated from the system's number of processors.

- `docTempRetentionPeriod` Asynchronous conversions create temporary files on the server, which are automatically deleted when they are read once. If results of asynchronous conversions are not accessed, these files remain on the server and are deleted after a certain amount of days equal to this parameter. The default value is `5` (days).
- `serverLogMode` This parameter configures the log mode of the server. If set to `bulk` (the default value), the entire log output of a PDF conversion is dumped after the conversion is finished. This can also be set to `live` which outputs log entries directly. However if there are multiple conversions in parallel, log entries from other conversions may be written out at the same time, so there is no guarantee that you will receive a coherent log of a single conversion (contrary to `bulk`). The mode `off` disables the server-side logging of all conversions.
- `conversionTimeout` Specifies a timeout in seconds after which conversions automatically terminate. Specifying the value "0" means that there is no timeout. By default, no timeout is configured.
- `callbackTimeout` When clients specify callbacks without a timeout, this value will be used as a default timeout (in seconds) for connections to the callback URL. The default value is 30 (seconds).
- `callbackMaxTimeout` Callback timeouts with a negative or zero value are treated as an infinite timeout. If infinite timeouts are undesirable for your server, you can limit it to this value (in seconds). By default, no maximum timeout is configured.
- `assetPackageMaxSize` Limits the maximum size of the asset package (in bytes). A value of 0 or a negative value indicates that there is no size limit. By default, no maximum size is configured.
- `assetPackageFiles` This parameter limits the maximum number of files that an asset package may contain. A value of 0 or a negative value indicates that there is no file limit. The default value is 1000.
- `apiKeys` This parameter specifies a comma separated list of strings that are used as API keys. See Restricting Client Access (p. 29) for more information.
- `apiKeysPath` Similar to `apiKeys`, but instead of a comma separated list it specifies the path to the file "apikeys.json" containing a JSON object with API keys as keys and a description as value. See Restricting Client Access (p. 29) for more information.
- `adminKey` This parameter specifies a key for privileged access to the service.
- `adminKeyPath` Similar to `adminKey`, but specifies the path to the file "adminkey.txt" which contains the admin key.

These server parameters can be configured in various ways:

Java System Properties

As system properties server parameters have the following form:

```
com.realobjects.pdfreactor.webservice.parameterName=parameterValue
```

To specify system properties for the PDFreactor Web Service, add them to the section "VM Arguments" in the "PDFreactor/jetty/start.ini" file, below the "--exec" line like this:

```
-Dcom.realobjects.pdfreactor.webservice.parameterName=parameterValue
```

Important

The parameter name must be prefixed with `com.realobjects.pdfreactor.webservice.`

Servlet Init Parameters

Init parameters are specified in the "PDFreactor/jetty/contexts/service.xml" file. They appear similar to this:

```
<Call name="setInitParameter">
    <Arg>com.realobjects.pdfreactor.webservice.parameterName</Arg>
    <Arg>parameterValue</Arg>
</Call>
```

Important

The parameter name should be prefixed with `com.realobjects.pdfreactor.webservice.`

Environment Variables

Another way to set server parameters is in form of environment variables. How exactly enviroment variables are set is dependent on your system, however it should be similar to this:

```
export PDFREACTOR_PARAMETERNAME=parameterValue
```

Important

The parameter name is upper cased and must be prefixed with `PDFREACTOR_`

Configuration File

Server parameters can also be configured in a special configuration file. For this, create a new file "pdfreactorwebservice.config" at the same location where the "pdfreactor-webservice.jar" is located, which is usually in the "PDFreactor/jetty/lib/ext" directory. The content of this configuration file is one or more lines, each consisting of the following:

```
parameterName=parameterValue
```

This format is similar to Java's properties file format.

Parameter Priority

Should the same server parameter be specified in multiple ways (e.g. as system property and environment variable), the parameter with the highest priority is chosen. The priority is as follows, with the first item having highest priority:

1. Configuration file
2. System property
3. Environment variable
4. Servlet init parameter

2.4.10 Callbacks

When performing asynchronous conversions, you usually have to regularly poll the progress of these conversions to determine when they are finished. As an alternative, you could also use callbacks which will notify you automatically about certain steps of the conversion by performing an HTTP POST request to a specified URL. The posted data is either in JSON, XML or plain text format, depending on the content type that is specified for the callback. Some callbacks return the same data model as if you had called the appropriate

API methods. If the specified format is plain text, the data consists of a small string containing only a minimum amount of information.

The following callback types are available:

Callbacks

Callback type	Trigger	Model (JSON/XML)	Model (plain text)	Similar API method
`START`	The conversion has started on the server.	Info	Document ID	N/A
`FINISH`	The conversion has finished on the server.	Result	Document ID	`getDocument`
`PROGRESS`	The conversion is in progress.	Progress	Progress percentage	`getProgress`

If you want to be notified once the conversion is done, this example demonstrates how to add a simple "ping" that just posts the document ID of the finished conversion to your serve.

Example 29: Adding a ping

```
config.setCallbacks(new Callback()
    .setUrl("http://myServer/myEndpoint1")
    .setType(CallbackType.FINISH)
    .setContentType(ContentType.TEXT));
```

The next example demonstrates how to add a `PROGRESS` callback that will be called every 2 seconds until the conversion is finished. The posted data will be in JSON format.

Example 30: Adding a progress notifier

```
config.setCallbacks(new Callback()
    .setUrl("http://myServer/myEndpoint2")
    .setType(CallbackType.PROGRESS)
    .setContentType(ContentType.JSON)
    .setInterval(2));
```

2.4.11 Restricting Client Access

When your PDFreactor service is accessible for a large number of clients or is located in a public cloud, it may be desireable to retrict access to it so that only authorized clients can use the API. This can be done with so called "API keys". API keys are arbitrary strings that clients must send with each request, otherwise the request will be rejected.

API keys can be configured via the server parameters (see Server Parameters (p. 26)) `apiKeys` or `apiKeysPath`. The first parameter specifies a comma separated list of API keys. The latter one specifies the path to a file "apikeys.json". That file contains a single JSON object with API keys as keys and a description of the API key as value. This is useful if you use lots of different API keys for different clients and want to have an onverview of which API key is used for which client.

To gain access, clients must always send a valid API key with each request. When usine one of the wrappers, an API key can be conveniently set like this (Java example):

```
pdfReactor.setApiKey("myApiKey");
```

When using the REST API directly, the API key must always be included in the URL as a query parameter:

```
/rest/version?apiKey=myApiKey
```

2.4.12 Monitoring

Server administrators may wish to monitor the PDFreactor Web Service and gain access to conversion statistics or server specifics. This can be done via the monitoring REST API.

RESTful Resources

- `/monitor/server` – Provides information about the server environment, amount of CPU cores, available memory, environment variables, Java system properties and the PDFreactor service. This includes all server parameters (see Server Parameters (p. 26)) except for the admin key parameters.
- `/monitor/conversions` – Provides an overview of all conversions. This includes queued conversion requests, currently running conversions as well as the amount of total conversions and failed conversions.
- `/monitor/conversions/running` – Same as `/monitor/conversions`, but provides only information about running conversions.
- `/monitor/conversions/queued` – Same as `/monitor/conversions`, but provides only information about queued conversion requests.
- `/monitor/conversions/finished` – Shows the number of conversions that have finished since the server started.
- `/monitor/conversions/finished/successful` – Shows the number of conversions that have successfully finished since the server started.
- `/monitor/conversions/finished/failed` – Shows the number of conversions that have failed since the server started.

Note

The monitoring API does not store any conversion information, except for the number of finished and failed conversion. Once the conversion is finished, all information about it is lost.

2.5 API Comparison

The following table shows a comparison between the API methods available in the Java library, in wrappers and as RESTful resources. Please note that depending on the wrapper language, the method signature might be slightly different.

API Comparison

Java library	Wrapper	REST resource (HTTP method)	Description
convert(Configuration)	convert(Configuration)	/convert (POST)	Converts the input document to PDF or image synchronously
convert(Configuration, OutputStream)	*Not available*	*Not available*	Converts the input document to PDF or image synchronously and writes it directly in the OutputStream
Not available	convertAsBinary(Configuration)	/convert.pdf (POST)	Converts the input document to PDF or image synchronously and returns directly the binary data
Not available	convertAsBinary(Configuration, Stream)	/convert.pdf (POST)	Converts the input document to PDF or image synchronously and directly streams the binary data to the given stream

Java library	Wrapper	REST resource (HTTP method)	Description
Not available	convertAsync(Configuration)	/convert/async (POST)	Converts the input document to PDF or image asynchronously
Not available	getProgress(id)	/progress/{id} (GET)	Checks the progress of an asynchronous conversion
Not available	getDocument(id)	/document/{id} (GET)	Retrieves the converted PDF or image
Not available	getDocumentAsBinary(id)	/document/{id}.bin (GET)	Retrieves the converted PDF or image directly as binary data
Not available	getDocumentMetadata(id)	/document/metadata/{id} (GET)	Retrieves the metadata of the converted PDF or image
Not available	*Not available*	/document/{id}/{page} (GET)	Retrieves the specified page of a converted multi-page image directly as binary data
Not available	deleteDocument(id)	/document/{id} (DELETE)	Deletes the converted PDF or image from the server
Not available	getStatus()	/status (GET)	Checks if the PDFreactor Web Service is responsive and able to convert
VERSION	getVersion()	/version (GET)	Gets the version of PDFreactor

The API **`/document/{id}/{page}`** is only available in REST. In the Java library and the wrappers, you can simply access the appropriate entry of the array property `documentArray` of the `Result` object.

Some methods do not directly return anything (e.g. `deleteDocument` and `getStatus`), however, all methods throw appropriate exceptions. RESTful resources respond with appropriate status codes.

The method `getVersion` does not exist in the API of the Java library, here the version is available as the constant `VERSION`.

2.5.1 What API Method Should I Use?

When using PDFreactor Web Service clients, you have several convert API methods (or RESTful resources) at your disposal. Depending on the use case, some API methods are more efficient than others.

Small Documents

Simple Case

Small and simple documents are best converted using the `convertAsBinary` API method. This method is the most efficient since the document is directly returned as binary data without any additional overhead.

Complex Case

For more complex documents you should use the `convert` API method. This returns a result object containing the document as a base64-encoded string, as well as a log, number of pages and exceeding content information. When using this method, the PDF document is converted and stored in-memory. It also has slightly more overhead but the result object contains helpful information about the conversion.

Large Documents

When converting large documents, you should convert asynchronously using the `convertAsync` API method. This has several advantages: Firstly, the connections to the server are closed directly after receiving the conversion request, thus avoiding keeping connections open for extended periods of time which is timeout and error prone. Secondly the client's integration does not block during the conversion and you have more control over when to retrieve the converted document. Lastly the document is stored on the file system of the server, so it does not allocate any memory.

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). 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 `setLicenseKey` method of the `Configuration` class.

Example:

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

Note

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

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

This forces PDFreactor to throw an exception instead of adding notices to PDF documents (see Error Policies (p. 34)).

2.6.4 Setting the License Key in the Web Service

For integrators that use the PDFreactor Web Service with either one of the wrapper APIs or the REST API, it may be useful to not set the license key in their client-side integration. In this case, you can just copy the "licensekey.txt" file to the "PDFreactor/jetty/lib/ext" directory (where the "pdfreactor.jar" and the "pdfreactor-webservice.jar" files are located). PDFreactor will automatically scan for a license key file in that location and use it if one is found.

2.7 Observing Document Content

When converting documents into PDF, it may be desireable to programmatically observe certain parts of the document content to ensure that the PDF result is as excepted. 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-parsable logs which can be retrieved and analyzed after the conversion has finished to verify the result.

A content observer can be configured like this:

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

The second one specifies how to analyze:

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

For example:

```
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 method `getExceedingContents`. Please see the API documentation for details on this class.

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);
```

After the conversion, you can access and analyze a log containing all missing resources using the method `getMissingResources`. 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.

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);
```

A log containing all connections or connection attempts can be accessed after the conversion via the `getConnections` method. 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.

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_RESOURCES` 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. 34)) instead.

Error policies can be set like this:

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

2.9 Debugging Tools

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 debug mode of PDFreactor. This can be done in the configuration like this:

```
config.setEnableDebugMode(true);
```

This causes PDFreactor to do the following:

- Append a log to the generated PDF with the highest log level

- Attach the source document to the PDF in various stages:
  - The original input document ("OriginalSource.txt")
  - The input document after XSLT pre-processing ("FinalSource.txt")
  - The initially parsed input document ("OriginalDocument.txt")
  - A pretty-printed version of the above ("OriginalDocumentPP.txt")
  - The input document after all modifications (JavaScript etc.) are completed ("FinalDocument.txt")
  - A pretty-printed version of the above ("FinalDocumentPP.txt")
- Attach all used external resources like style sheets, scripts, images etc. as a ZIP file ("res.dat")
- The PDFreactor log ("Log.txt")
- A list of the current Java system properties ("SystemProperties.txt")
- A log of all URL connection attempts performed by PDFreactor ("Connections.txt")
- A log of all resources that could not be loaded ("MissingResources.txt")

Important: Important: Exception Handling in Debug Mode

When the debug mode is enabled, PDFreactor will 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.

3. INPUT FORMATS

PDFreactor can process the following input formats. By default, it automatically tries to identify the right format.

3.1 HTML + CSS

HTML is directly 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 and MathML Elements should be used without having their respective namespaces specified.

It is also possible, albeit discouraged, to enable the legacy XHTML parser and its cleanup processes.

Note

Documents with an `<html>` root element are automatically detected as HTML documents. The document type can also be forced to `HTML` or `XML` via the API.

3.2 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[9] processor, either to modify it or to convert it to HTML.

3.3 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. The timeout in milliseconds can be configured via the `resourceRequestTimeout` configuration option:

```
Java: config.setResourceRequestTimeout(10000);
PHP:  $config["resourceRequestTimeout"] = 10000;
.NET: config.ResourceRequestTimeout = 10000;
CLI:  --resourceRequestTimeout 10000
```

[9] ***E****xtensible* ***S****tylesheet* ***L****anguage* ***T****ransformations (http://www.w3.org/TR/xslt)*

For documents including relative resources, like

```
<img src="images/a.png" />
```

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

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

PDFreactor needs a base URL[10] 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:

```
Java: config.setBaseURL("http://someServer/public/");
PHP:  $config["baseURL"] = "http://someServer/public/";
.NET: config.BaseURL = "http://someServer/public/";
CLI:  --baseURL "http://someServer/public/"
```

It is also possible to specify file URLs:

```
Java: config.setBaseURL("file:///directory/")
PHP:  $config["baseURL"] = "file:///directory/";
.NET: config.BaseURL = "file:///directory/";
CLI:  --baseURL "file:///directory/"
```

3.4 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.

3.4.1 Images

PDFreactor has support for the image formats PNG, JPEG, GIF, TIFF, BMP, ICU, CUR, PAM, PBM, PGM, PPM as wells as limited support for PSD, DCX, ICNS and RGBE.

Images are embedded by PDFreactor "as-is", whenever possible, unless the propeties `-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.

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: -ro-attr(source);
}
```

[10] ***U**niform **R**esource **L**ocator (http://www.w3.org/Addressing/)*

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, you can select an attribute of this element. The value of this attribute must always be of the type URI[11] and is used to load the image.

Note

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

3.4.2 SVG

PDFreactor supports the following SVG types: SVG and SVGZ. PDFreactor automatically converts SVG[12] documents referenced via the `img` element. Example:

```
<img src="diagram.svg" />
```

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.......
```

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 have to be rasterized[13]. 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.

[11] *Uniform Resource Identifier (http://www.w3.org/Addressing/)*
[12] *Scalable Vector Graphics (http://www.w3.org/Graphics/SVG/)*
[13] ***Rasterization** is the task of taking an image described in a vector graphics format and converting it into a raster (pixel) image.*

CMYK Colors in SVG

PDFreactor supports CMYK colors in SVGs. Those are passed to the PDF as-is, as long as the SVG is not rasterized.

Example 31: Setting the stroke color to black

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

3.4.3 Barcode

PDFreactor supports displaying barcodes in documents using the Barcode XML format from Barcode4J:

```
<p><b>EAN-13:</b></p>
<barcode:barcode xmlns:barcode="http://barcode4j.krysalis.org/ns"
    message="123456789012">
    <barcode:ean-13/>
</barcode:barcode>
<br>sometext.......
```

For details about Barcode XML see

http://barcode4j.sourceforge.net

3.4.4 MathML

PDFreactor supports displaying MathML[14] in documents using the MathML XML format.

```
<math:math mode="display" xmlns:math="http://www.w3.org/1998/Math/MathML">
  <math:mrow>
    <math:munderover>
      <math:mo>&#x222B;</math:mo>
      <math:mn>1</math:mn>
      <math:mi>x</math:mi>
    </math:munderover>
    <math:mfrac>
      <math:mi>dt</math:mi>
      <math:mi>t</math:mi>
    </math:mfrac>
  </math:mrow>
</math:math>
```

For details about the available MathML elements see

http://jeuclid.sourceforge.net/testsuite/index.html

3.4.5 QR Code

PDFreactor supports displaying QR codes[15] in documents using the following style:

```
.qrcode {
    -ro-replacedelement: qrcode;
}
```

[14] ***Math**ematical **M**arkup **L**anguage (http://www.w3.org/Math/)*
[15] ***Q**uick **R**esponse **Code** (http://www.denso-wave.com/qrcode/index-e.html)*

If the replaced element is applied to an HTML link, the reference URL (resolved against the base URI) is used as the content of the QR code, e.g.:

```
<a href="http://www.pdfreactor.com" class="qrcode"></a>
```

In any other case the text content of the element is used, e.g.:

```
<span class="qrcode">
BEGIN:VCARD
VERSION:2.1
N:Doe
FN:John
TEL:+1-555-123-456
TEL;FAX:+1-555-123-457
EMAIL:johndoe@johndoe.com
URL:http://www.johndoe.com
END:VCARD
</span>
```

QR Codes can be tweaked using the following CSS properties:

- `-ro-qrcode-errorcorrectionlevel` — Sets the error correction level of the QR code. Possible values are `L`(default), `M`, `Q` and `H`.
- `-ro-qrcode-quietzonesize` — Sets the size of the quiet (empty) zone around the QR code in modules (QR code "square" widths). The default value is `1`. Possible values are `0` (no quiet zone) and positive integers.
- `-ro-qrcode-forcedcolors` — By default, QR codes are black on white. When setting this property to `none`, the CSS properties `color` and `background-color` are used instead.
- `-ro-qrcode-quality` — 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. When setting this property to `high` the squares are combined into one object, ensuring a seamless look, at the cost of performance.

3.4.6 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 automatically embedded in the PDF, but whether or not it is displayed depends on the formats supported by your PDF viewer.

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

3.4.8 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. 44), 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() {
            var 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>
```

Note

The creation of shadows is a time-consuming task and can, depending on the content to be generate, considerably increase the creation time of the PDF. Thus shadows should be used with caution if the creation time of the PDF is important.

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.

3.4.9 PDF Pages as Images

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

```
<img src="http://resources.myserver.com/report.pdf" />
```

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:

```
<img src="http://resources.myserver.com/report.pdf" style="-ro-source-page: 5" />
```

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":

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

3.4.10 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`

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 is limited to 2 megapixels. This is still large enough to cover an A4 page-sized image with the default supersampling.

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.

3.5 JavaScript

Note

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

- The JavaScript API that allows using PDFreactor from JavaScript in a browser (p. 21)
- Scripts added to the resulting PDFs, processed by the PDF-viewer (p. 66)

PDFreactor can be configured to process JavaScript that is embedded into or linked from input HTML documents. This functionality can be enabled as follows:

```
config.setJavaScriptMode(JavaScriptMode.ENABLED);
```

It is also possible to manually add scripts:

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

See

The PDFreactor API documentation for details on these API methods.

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

- Alerts and other dialogs are logged and do not stop script processing.
- The delay parameter of `setTimeout` is used only for scheduling, and does not cause actual delays. `setInterval` is treated like `setTimeout`.
- There are no security measures based on the origin of URLs ("cross-site scripting").

JavasScript 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 elements is not fully supported. Specific features of other compound formats, like MathML, are not specifically supported.
- Coordinates (e.g. retrieved via `getClientRects`) are relative to their pages, which might lead to unexpected results in some situations.
- Redirects (e.g. changing window.location) are not possible.
- After setting a CSS short-hand, the long hand values cannot be retrieved.

3.5.1 JavaScript modes

In addition to `disabled` and `enabled` there are additional modes that can improve performance or are required for the correct creation of charts from certain libraries.

No Layout

Same as `enabled`, except that no information about the layout is available to JavaScript, effectively disabling methods like `getClientRects`. This also means that JavaScript cannot cause layouts, which can save time when using complex libraries or frameworks with no need to retrieve layout information.

Time-Lapse

Same as `enabled`, except that `Date.getTime()` returns rapidly increasing values simulating a faster passing of time. This, for example, makes `jQuery` based animations conclude immediately.

Real-Time

Different from the other modes, as is replicates the behavior of browsers closer, at the cost of performance. However, it may break other libraries and should therefore only be used when it is the only mode that supports the required libraries.

3.5.2 JavaScript libraries and frameworks

The following JavaScript libraries and frameworks were tested:

Library	Test result
jQuery	functional, extensively tested
Highcharts	functional, requires `real-time` mode in some cases
MooTools	functional, not supported in `real-time` mode
Prototype	functional, except for event functionality
Modernizr	functional
Flotr2	functional
amCharts	functional, requires `real-time` mode in some cases
D3.js	functional
Underscore	functional
Handlebars	functional
Less.js	functional
Leaflet	functional, not supported in `real-time` mode

3.5.3 Proprietary Access to Layout Information

PDFreactor allows JavaScript access to some layout information via the proprietary object ro.layout (p. 114).

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.

Note

Description objects are snapshots of the particular moment they were created. Changing the document after getting one has no effect on it.

PageDescriptions

Describes the dimensions of a page and its rectangles as well as some further information. The rectangles are described by using `ClientRect` or `DOMRect`. `PageDescription`s can be retrieved by providing the index of the desired page. The first page has the index 0.

Example 32: Retrieving the PageDescription of the second page in the document

```
var 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 `ClientRect` or `DOMRect`.

Example 33: Retrieving a BoxDescription from an element

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

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

LineDescriptions

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

Example 34: Retrieving LineDescriptions from a BoxDescription

```
var lineDescriptions = boxDescription.lineDescriptions;
```

ClientRects and DOMRects

A `ClientRect` or `DOMRect` contains the position and dimensions of a rectangle. While `ClientRect` consists of *integer* values, `DOMRect` consists of *float* values. So it is generally recomended to get `DOMRect`, because it is more precise.

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". `ClientRect` values are always in "px".

Example 35: Retrieving a ClientRect from a BoxDescription

```
var marginRect = boxDescription.marginRect;
```

Example 36: Retrieving a DOMRect (with dimensions in centimeters) from a BoxDescription

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

3.5.4 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 dynamically create PDF attachments, 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. 115). For a full list of supported properties refer to JavaScript Objects and Types (p. 114). 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.

Example 37: Adding an attachment

This example adds a text file to the generated PDF.

```
ro.pdf.attachments.push({
    name: 'myAttachment.txt'
    data: 'This is a text attachment'
});
```

Example 38: 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 39: 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");
```

Override at runtime:

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

Example 40: 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"
});
```

3.5.5 Exporting Data From JavaScript

Sometimes it can be desirable to make data from JavaScript available to the PDFreactor integration for processing after the conversion has finished. You can export data from document JavaScript via the `ro.exports` JavaScript property. The exported data can then be accessed on the `Result` object via the `getJavaScriptExports()` API method.

You can export any data type with ro.exports (p. 114). However, since the method `getJavaScriptExports()` 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. If the data can't be converted, a generic string representation of it is used or `null` if none is available. This means that you can conveniently export JavaScript objects or arrays, and then parse the data back from JSON.

Example 41: Exporting data from JavaScript

Export an object:

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

`result.getJavaScriptExports()` will return the following string:

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

This string can then be parsed or processed further.

3.5.6 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 same cases the corresponding CSS.

You can add the library by using the PDFreactor API method `setUserScripts()`. To add the respective CSS, use the method `setUserStyleSheets()`:

```
config
    .setUserStyleSheets(new Resource().setUri("awesomizr.css"))
    .setUserScripts(
        new Resource().setUri("awesomizr.js"),
        new Resource().setContent("Awesomizr.createTableOfContents();"));
```

Note

Of course, the library and the stylesheet 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. 83)
- Adaptive Page Break Insertion (p. 90)
- Creating a Table of Contents (p. 93)

4. OUTPUT FORMATS

PDFreactor supports multiple output formats, including PDF and various image formats:

4.1 PDF Output

PDF is the default output Format of PDFreactor.

Generally PDFreactor generates PDFs with the Adobe PDF version 1.4. However, some PDF features may require viewers that support newer versions of PDF.

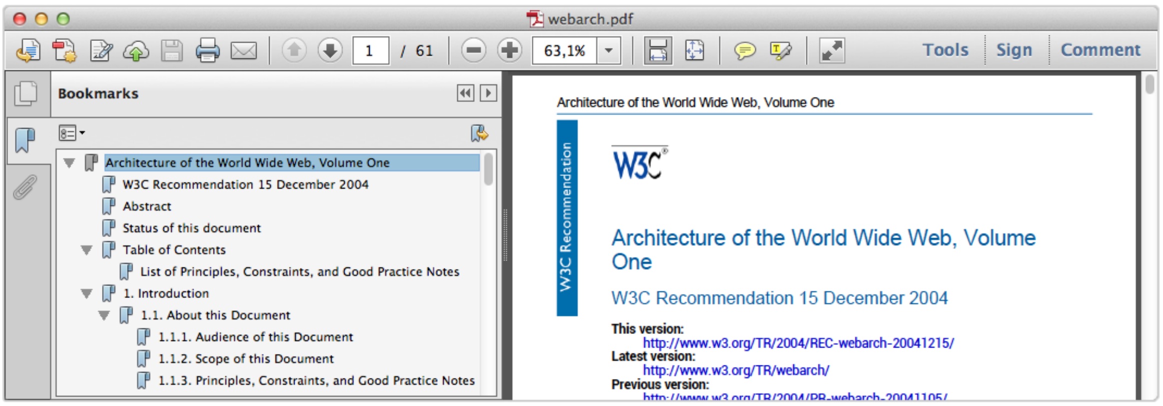
PDF/A (p. 57) and PDF/X (p. 58) conformance may force different PDF versions.

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 this output format:

4.1.1 Bookmarks



- Architecture of the World Wide Web, Volume One
  - W3C Recommendation 15 December 2004
  - Abstract
  - Status of this document
  - Table of Contents
    - List of Principles, Constraints, and Good Practice Notes
  - 1. Introduction
    - 1.1. About this Document
      - 1.1.1. Audience of this Document
      - 1.1.2. Scope of this Document
      - 1.1.3. Principles, Constraints, and Good Practice Notes

Architecture of the World Wide Web, Volume One

W3C Recommendation

W3C

Architecture of the World Wide Web, Volume One

W3C Recommendation 15 December 2004

This version:
http://www.w3.org/TR/2004/REC-webarch-20041215/
Latest version:
http://www.w3.org/TR/webarch/
Previous version:

Fig. 1: Bookmarks in the Adobe Reader

PDFreactor adds bookmarks to your document by using the following API method:

```
config.setAddBookmarks(true);
```

When the default HTML mode is enabled, the following bookmark levels are applied by default:

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

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

```
element { -ro-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 -ro-bookmark-level style.

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

4.1.2 Links

PDFreactor can add links to your documents when using the following API method:

```
config.setAddLinks(true);
```

When the default HTML mode is enabled, the following link styles are applied by default:

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

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

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

Please also see Attachments (p. 64).

The clickable areas of links

The style -ro-link-area can be used to specify how the 'clickable' areas of a link are determined:

The effects of the values of `-ro-link-area` on block and split inline elements

Value	Clickable areas for block elements	Clickable areas for split inline elements[16]
`content`	one for each piece of content[17]	one for each part
`block`	one for the whole block	the bounding rectangle of all parts
`content-block`	the bounding rectangle of the content	the bounding rectangle of all parts

This style is not inherited. It has to be set on the same element as -ro-link.

4.1.3 Comments

It is possible to add PDF comments to the document using the following API method:

```
config.setAddComments(true);
```

[16] *split inline: inline element (e.g. `span`) spread over multiple lines and therefore split into at least two parts*
[17] *In this case a "piece of content" can be text, an image or an empty block*

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 42: Creating a comment from an empty element

HTML

```
<span class="comment" text="My Comment."></span>
```

CSS

```
span.comment {
    -ro-comment-content: -ro-attr(text);
}
```

Example 43: 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 44: 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[18]. 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.

[18] *SimpleDateFormat API documentation: http://docs.oracle.com/javase/7/docs/api/java/text/SimpleDateFormat.html*

The following sample shows how to customize all of the aforementioned properties.

Example 45: 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: -ro-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: -ro-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 46: A comment with different start and end tags

```
commentstart {
    /* some customizations */
    -ro-comment-content: -ro-attr(text);
    -ro-comment-title: -ro-attr(author);
    -ro-comment-style: highlight;

    /* define the comment start element */
    -ro-comment-start: -ro-attr(uid)
}

commentend {
    /* define the comment end element */
    -ro-comment-end: -ro-attr(uid);
}
```

4.1.4 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:

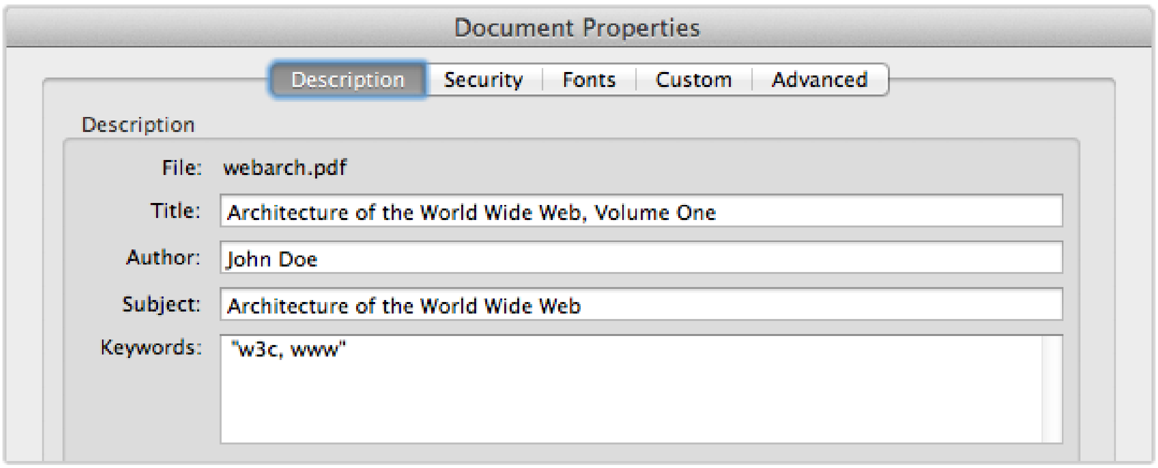
Example 47: Set the document title from first heading

```
/* 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:

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

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



File:	webarch.pdf
Title:	Architecture of the World Wide Web, Volume One
Author:	John Doe
Subject:	Architecture of the World Wide Web
Keywords:	"w3c, www"

Fig. 2: Document properties dialog of Adobe Reader

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"));
```

4.1.5 Interactive PDF Forms

HTML forms are automatically rendered 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; }
```

4.1.6 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 assitive technology like screen readers. Furthermore, it can improve the results of copy and paste and enable advanced export from the PDF, allowing destinations to replicate the document structure and to reflow text.

Using the `setAddTags` API method, 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 property to enable this feature:

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

Note

PDF tagging is automatically enabled when it is required by a PDF conformance, like PDF/A-1a, PDF/A-3a (p. 57) or PDF/UA (p. 58).

Creating tagged PDFs from non-HTML input documents

When generating PDFs from XML dialects, like DocBook, the elements of this XML language cannot be mapped to PDF tag types automatically. Most of the tag structure is still generated from the information available from the layout of paragraphs, lists, tables and so on. It is, however, necessary to manually mark elements with semantic or structural properties, especially headings.

To do so you can map XML elements to PDF tag types using proprietary CSS. The relevant properties are `-ro-pdf-tag-type` and `-ro-alt-text`, as well as to some extend `-ro-pdf-tag-table-summary` and `-ro-pdf-tag-actual-text`.

"`-ro-pdf-tag-type`" is used to map an element of the XML language you are using to a PDF tag, for example:

```
sect1 > title {
    -ro-pdf-tag-type: "H2";
}
```

If you were using DocBook, this would map the "title" elements inside "sect1" elements to the PDF tag "H2" (heading, level 2).

The property "`-ro-alt-text`" is used to specify an alternative description for an XML element. Example:

```
img {
    -ro-pdf-tag-type: "Figure";
}
img[alt] {
    -ro-alt-text: -ro-attr(alt);
}
```

The example above maps the HTML element `<img>` to the PDF tag "Figure", and the content of its `alt` attribute to an alternative description for this tag.

You can use the 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. By default, the names are adopted from the `value` attribute of the form element.

Using the `-ro-radiobuttonelement-group`, 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.

4.1.7 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 conformant 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 disallowed.
- The PDF must be tagged.
- Metadata included in the PDF is required to be standard-based XMP.
- Colors are specified in a device-independent manner. (see below)
- Transparency is disallowed. (PDF/A-1 only)
- Attachments are disallowed. (PDF/A-1 only)

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. 59).

To create a PDF/A conformant document, the method `setConformance` can be used in the PDFreactor integration, e.g.:

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

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.

Recommendation

It is also possible to create documents that are `PDF/UA (p. 58)` 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_PDFUA);
```

4.1.8 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 API method `setTitle`.)

PDFreactor can create PDF/UA compliant documents. Tagging is done by a sophisticated algorithm. For most documents it does not require any manual tweaking to produce results that pass accessibility checks with no errors and little to no warnings.

To create a PDF/UA conformant document, the method `setConformance` can be used in the PDFreactor integration, e.g.:

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

Recommendation

It is also possible to create documents that are PDF/A (p. 57) 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_PDFUA);
```

4.1.9 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).
- 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 ever print workflow can handle.)
- 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. 59).
- If the title is not specified in the input document, it can be set via the API method `setTitle`.)

To create a PDF/X conformant document, the method `setConformance` can be used in the PDFreactor integration, e.g.:

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

4.1.10 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 API method `setOutputIntent()`:

```
Configuration config = new Configuration();

OutputIntent outputIntent = 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);

config.setOutputIntent(outputIntent);
```

The method `setIdentifier()` sets a string identifying the intended output device or production condition in human- or machine-readable form. The method `setUrl` points to an ICC profile file and the method `setData` sets the binary data of such a profile, the latter having priority.

4.1.11 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 setPrintDialogPrompt method of the PDFreactor class must be used. Example:

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

4.1.12 PDF Compression

Using the API method setFullCompression, PDF files can be generated with full compression, thus reducing the file size of the resulting PDF document.

Example usage:

```
config.setFullCompression(true);
```

Note

Your PDF reader needs to support Adobe PDF version 1.5 in order to be able to display PDF documents created with full compression enabled.

Note

This lossless compression generally has little impact on the size of images. However, it is possible to use proprietary CSS properties to significantly reduce the resolution and quality of images and thus the file size of the PDF. See `-ro-image-recompression` and `-ro-image-resampling` for more information.

4.1.13 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`:

```
config.setEncryption(Encryption.TYPE_128);
```

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:

```
config.setUserPassword("upasswd");
config.setOwnerPassword("opasswd");
```

Both passwords are optional, but recommended for security reasons.

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

List of methods to disable restrictions

Method name	Allows ...
`setAllowPrinting`	printing
`setAllowCopy`	copying or otherwise extracting content
`setAllowAnnotations`	adding or modifying annotations and interactive form fields
`setAllowModifyContents`	modifying the content of the document
`setAllowDegradedPrinting`	printing (same as `setAllowPrinting`, however, with a limited resolution) (128 bit encryption only)
`setAllowFillIn`	filling in form fields (128 bit encryption only)
`setAllowAssembly`	inserting, removing and rotating pages and adding bookmarks (128 bit encryption only)
`setAllowScreenReaders`	extracting content for use by accessibility devices (128 bit encryption only)

See

API docs for further information.

4.1.14 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 method `setViewerPreferences`, e.g.:

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

PDFreactor supports the following viewer preferences:

List of Viewer Preferences

Viewer Preference	Effect
`PAGE_LAYOUT_SINGLE_PAGE`	Display one page at a time. (default)
`PAGE_LAYOUT_ONE_COLUMN`	Display the pages in one column.
`PAGE_LAYOUT_TWO_COLUMN_LEFT`	Display the pages in two columns, with odd numbered pages on the left.
`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.

Viewer Preference	Effect
`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.
`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_SHORT_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. 100) properties `page-layout` and `first-page-side-view`.

4.1.15 Merging PDFs

A generated PDF can easily be merged with existing ones. To merge with a single PDF or multiple PDFs use the `setMergeDocuments(Resource...)` method that declares either URLs to or binary data of existing PDF files.

```
config.setMergeDocuments(
    new Resource().setUri("http://www.myserver.com/overlaid1.pdf"),
    new Resource().setData(pdfBytes));
```

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:

```
config.setMergeDocuments(new Resource().setUri("http://www.myserver.com/appendDoc.pdf"));
config.setMergeMode(MergeMode.APPEND);
```

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 `setPageOrder` (see Page Order (p. 96)) 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:

```
config.setMergeDocuments(
    new Resource().setUri("http://www.myserver.com/insertionDoc.pdf"));
config.setMergeMode(MergeMode.ARRANGE);
config.setPageOrder("1,1:1,2..-1");
```

More information on the syntax can be found at Merge Mode Arrange (p. 97)

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

```
config.setMergeDocuments(new Resource().setUri(("http://www.myserver.com/overlaid.pdf"));
config.setMergeMode(MergeMode.OVERLAY);
```

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 API method `setOverlayRepeat` 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:

```
config.setOverlayRepeat(Overlay.REPEAT_ALL_PAGES);
```

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

4.1.16 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.

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

- "pkcs12"
- "jks"

PDFreactor supports the following three modes to sign a PDF:

- Self-signed
- Windows certificate
- VeriSign

To sign a PDF digitally use the API method `setSignPDF`.

Note

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

4.1.17 Font Embedding

By default, PDFreactor automatically embeds the required subsets of all fonts used in the document. This can be disable using the method `setDisableFontEmbedding`.

```
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 method should only be used when necessary.

4.1.18 Overprinting

Overprinting means that one color is printed on top of another color. 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. This can be enabled using the API method `setAddOverprint`:

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

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: mode1;
}
p.infobox span.marked {
    background-color: yellow;
    -ro-pdf-overprint: none;
    -ro-pdf-overprint-content: mode1;
}
```

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.

4.1.19 Attachments

Alternatively to linking to external URLs (see Links (p. 51)) PDFreactor also allows embedding their content into the PDF.

Attachments can be defined via CSS, which can be enabled by the API method `setAddAttachments`:

```
config.setAddAttachments(true);
```

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. Specifying "#" will embed the source document.

- `-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-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 `-ro-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: -ro-attr(href);
    -ro-pdf-attachment-description: content() " (" -ro-attr(href) ")";
}
```

Attachments can also be set via the API method `setAttachments`. This method 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"));
```

4.1.20 PDF Script

Note

This chapter refers to Scripts added to the resulting PDFs, processed by the PDF-viewer. There are also:

- JavaScript in the input document, processed by PDFreactor like in a browser (p. 44)
- The JavaScript API that allows using PDFreactor from JavaScript in a browser (p. 21)

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 scrips has to be done differently.

Please note, that support for PDF scripts is not wide spread among PDF reader software.

PDFreactor allows two ways to add such scripts to the converted PDF. The scripts can be added using the API method `addPdfScriptAction`. The parameters are the script as a string and the event which should trigger the script.

The known 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.

The second way to set scripts is by using the proprietary CSS property `pdf-script-action`. By using this property, one can define the PDF scripts in the original document. For more information on this property, please see Document-Specific Preferences (p. 100).

Please note, that the PDF scripts set via the CSS property have a higher priority than those defined via API.

For each trigger event there can be only one script. When setting scripts several times on the same event, only the last one set will be added to the PDF.

4.2 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
- TIFF (supports multi-page images; can use the following compression methods: LZW, PackBits, Uncompressed, CCITT 1D, CCITT Group 3 & CCITT Group 4)

- BMP

These can be selected using the method `setOutputFormat`, e.g.:

```
config.setOutputFormat(new OutputFormat()
    .setType(OutputType.PNG)
    .setWidth(512)
    .setHeight(-1));
```

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.

See

Media Features (p. 99) for the media feature `-ro-output-format`, which allows setting styles specific for PDF or image output.

4.2.1 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 method `setPageOrder`, e.g.:

```
config.setPageOrder("5");
```

4.2.2 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));
```

The `getDocumentArray()` method of the `Result` object then returns an array of byte arrays, each containing an image representing one page of the document.

4.2.3 Continuous Output

The method `setContinuousOutput` 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.

```
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 `setOutputFormat`

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 full height of the laid out document to be used.

5. LAYOUT DOCUMENTS

This chapter provides information on how to lay out a document.

The document layout mostly depends on CSS but there are PDFreactor API methods and JavaScript functionality that may be of use too to achieve the desired results.

Basic knowledge about CSS is recommended.

5.1 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 style for XML documents need to be created based on the document language.

5.1.1 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.

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 insides images and other replaced elements. For the rare cases when this is required the propriatery property `-ro-object-slice` can be set to the value `auto` to explicitly allow such breaks.

5.1.2 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. 238) 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. 100) 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 the a function of the form `An+B`, similar to the pseudo-class `:nth-child()`.

A single page can be selected (`:-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.

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.

5.1.3 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. 125).

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
}
```

5.1.4 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 style to a named page, the page name is added to the `@page` rule. The page name is not a pseudo-class as `:first` is. 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
}
```

5.2 Breaking Text

Text is broken whenever there is not enough space left, e.g. inside the line or on the page.

5.2.1 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 Hyphenation Dictionaries (p. 126) 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 56: An entire HTML document in English language

```
<html lang="en">
    ...
</html>
```

Hyphenation is enabled or disabled via CSS with the `hyphens` property:

Example 57: 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 number of minimum letters before or after which text can be broken within a word. This is done with the `hyphenate-before` and `hyphenate-after` properties.

5.2.2 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 58: 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.)

5.3 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.

5.3.1 Generated Text

To create generated text, set a String as value of the `content` property.

Example 59: 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"` 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 60: An explicit line break inside Generated Text

```
div::before{
    content: "RealObjects\APDFreactor";
    white-space: pre
}
```

The result would look like this:

```
RealObjects
PDFreactor
```

If the first character after the line break is an HTML entity, add an additional space between the `"\A"` and the entity.

5.3.2 Generated Images

A generated image can be created with the image's URL set as value of the `content` property.

Example 61: A Generated Image with an SVG image as source

```
h1::before{
    content: url("http://mydomain/pictures/image.svg")
}
```

5.3.3 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 62: 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 63: 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)
}
```

5.4 Page Header & Footer

5.4.1 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. 69) 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.

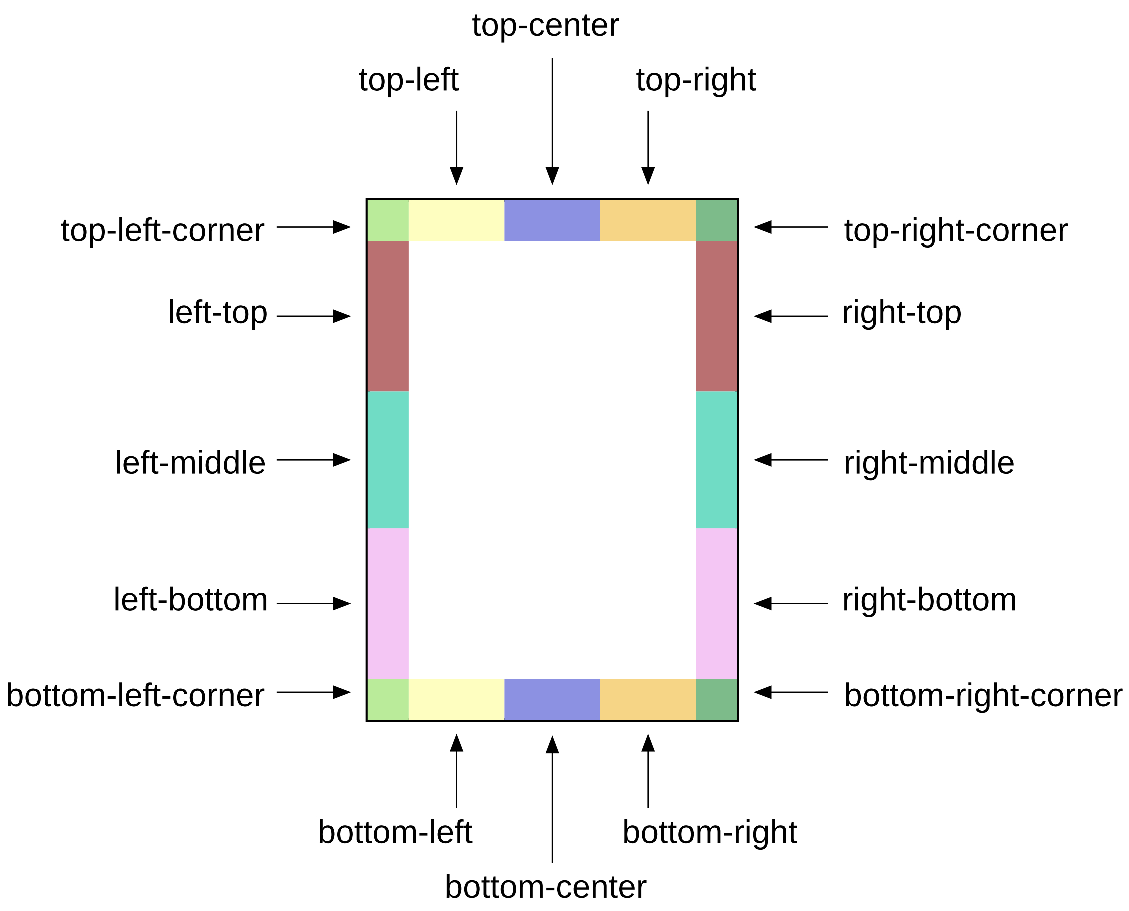


Fig. 3: Page Margin Boxes

A Page Margin Box declaration consists of an `"@"` character followed by the name of the Page Margin Box.

Example 64: Page Header with Generated Text on the left and right side

```
@top-left{
    content: "RealObjects PDFreactor(R)";
}
@top-right{
    content: "copyright 2018 by RealObjects";
}
```

5.4.2 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 65: 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 66: 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 67: 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. 73) (or Named Strings (p. 79)) their value will be the same as if they were defined as content of the Page Margin Box the Running Element is used in.

5.4.3 Running Documents

In case Generated Content (p. 72) does not suffice and Running Elements (p. 74) 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 68: 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. 73) and Named Strings (p. 79) 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.

5.5 Generated Content for Pages

Additional features for Generated Content (p. 72) are available within Page Margin Boxes (p. 74).

5.5.1 Page Counters

To add page numbers to documents, Page Counters are used. Page Counters work like regular counters (p. 73), but are defined on pages (p. 69) and accessed in page margin boxes (p. 74).

The default Page Counter is named "`page`" and automatically defined in HTML documents.

Example 69: 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 70: 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. 100) property `pages-counter-offset`.

5.5.2 Named Strings

Named Strings allow to store the text of an element and its Generated Content (p. 72) as String for use in Page Margin Boxes (p. 74).

A Named String is defined very similar to a Counter (p. 73) 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 71: 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 72: 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);
}
```

Named Strings are similar to Running Elements (p. 74) in that they can occur multiple times on the same page and are accessed from Page Margin Boxes. Similar to the `element()` function, the `string()` function allows to add a second argument to specify which Named String inside a page should be used:

- `start`
  - Retrieves the latest Named String of the name from previous pages.
  - If there is none, nothing is displayed.
- `first`
  - Retrieves the first Named String 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 Named String of the name on the page.
  - If there is none, it falls back to the behavior of `start`.
- `last-except`
  - If a Named String of the name is on the page, nothing is displayed.
  - If there is none, it falls back to the behavior of `start`.

5.5.3 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 automatically keep the reference up-to-date with the referenced location, CSS provides the `target-counter()` and `target-text()` functions to automatically 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. 51) 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 73: 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{
    counter-increment: pageCounter;
    @bottom-right{
        content: counter(pageCounter);
    }
}
h1{
    counter-increment: chapterCounter;
}
h1::before{
    content: counter(chapterCounter, upper-roman);
}
a[href]::after{
    content: "Chapter " target-counter(-ro-attr(href url), chapterCounter, upper-roman)
                " on page " target-counter(-ro-attr(href url), pageCounter);
}
```

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() (p. 237) 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. 72) of an element.
- `after` - Retrieves the after Generated Content (p. 72) of an element.

The following example shows a cross-reference that references a heading and shows its before Generated Content and text:

Example 74: A Cross-reference that references a heading and shows the heading's before Generated Content and text

```
a[href]{
    content: target-text(-ro-attr(href url), before) " "
        target-text(-ro-attr(href url), 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. 81) function provides the necessary means to retrieve all the Counters (p. 73) individually.

5.5.4 Footnotes

A footnote is a text note placed on the bottom of a page. 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 of the page, 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. Content in the footnote area can be styled via CSS using the `footnote` rule.

Example 75: Defining a footnote for an element and styling the footnote area

```
.footnote {
    float: footnote;
}
@page {
    @footnote {
        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 76: 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 Footnotes inside Multi-column layouts (p. 84).

5.6 Transforms

5.6.1 2D Transforms

PDFreactor is capable of transforming elements with the `transform` property, which makes moving, rotating and scaling document content possible.

Note

2D 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.

Reduce Table Width with Rotated Table Headers

awesomizr.js (p. 48) is able to automatically reduce the width of table headers with 2D 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

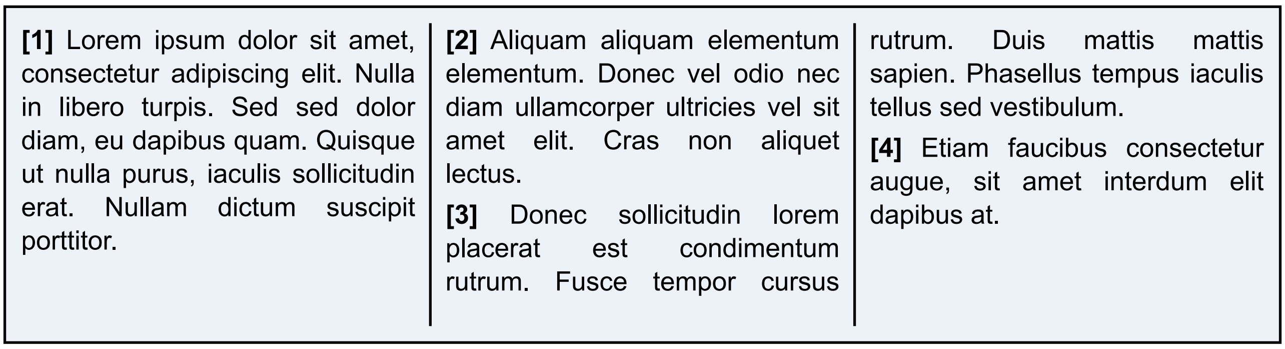
Key	Description	Default
`angle`	The angle in degrees at which the header will be rotated. Should be between `-90` and `90`	`45`
`width`	The width that the header cells should have after the transformation, e.g. `"20pt"`.	`"auto"`
`firstCol`	Whether to prevent the first column from being transformed.	`false`
`lastCol`	Whether to prevent the last column from being transformed.	`false`
`footer`	Whether to automatically create a `<tfoot>` element from the last row in the table. Has no effect if the table already contains a `<tfoot>`.	`false`

5.7 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.



[1] 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.

[2] Aliquam aliquam elementum elementum. Donec vel odio nec diam ullamcorper ultricies vel sit amet elit. Cras non aliquet lectus.

[3] Donec sollicitudin lorem placerat est condimentum rutrum. Fusce tempor cursus rutrum. Duis mattis mattis sapien. Phasellus tempus iaculis tellus sed vestibulum.

[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.

The `column-width` property is used to control how wide columns inside the element should be. The number of columns is computed from that value. Therefore the actual width of the columns may be wider or narrower than the specified width. This property is useful if the general width of the columns is more important than the number of columns.

If both properties are used the resulting layout tries to honor both values. `column-count` will provide the maximum number of columns in most cases.

```
/* define two columns */
div.twoColumns{ column-count: 2 }

/* define columns with a width of 2in */
div.twoInchColumns { column-width: 2in }
```

Note

PDFreactor currently does not support Footnotes (p. 82) inside Multi-column layouts.

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 smaller columns, leaving space at the bottom of the multi-column element. Sequential filling behavior may not have enough content to fill all the columns. 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 automatically 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. 71) enabled.

5.8 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).

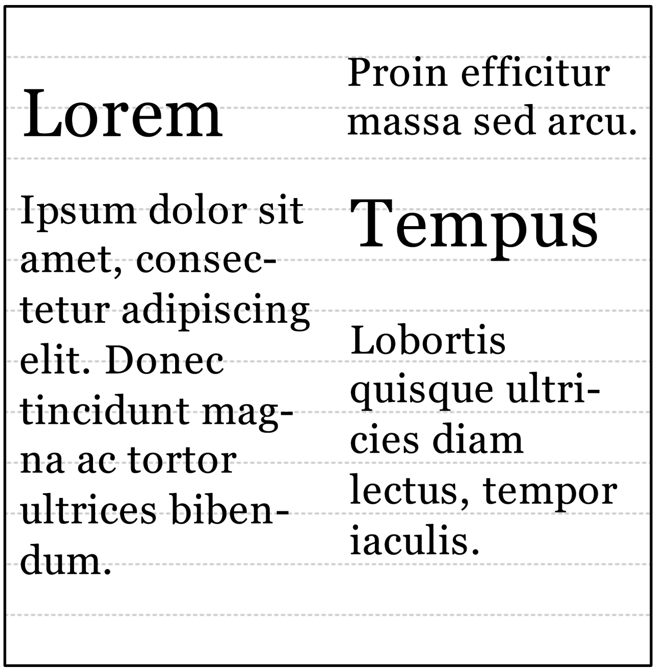

Lorem
Proin efficitur massa sed arcu.
Ipsum dolor sit amet, consec-tetur adipiscing elit. Donec tincidunt mag-na ac tortor ultrices biben-dum.
Tempus
Lobortis quisque ultri-cies diam lectus, tempor iaculis.

Fig. 4: Lines not snapped

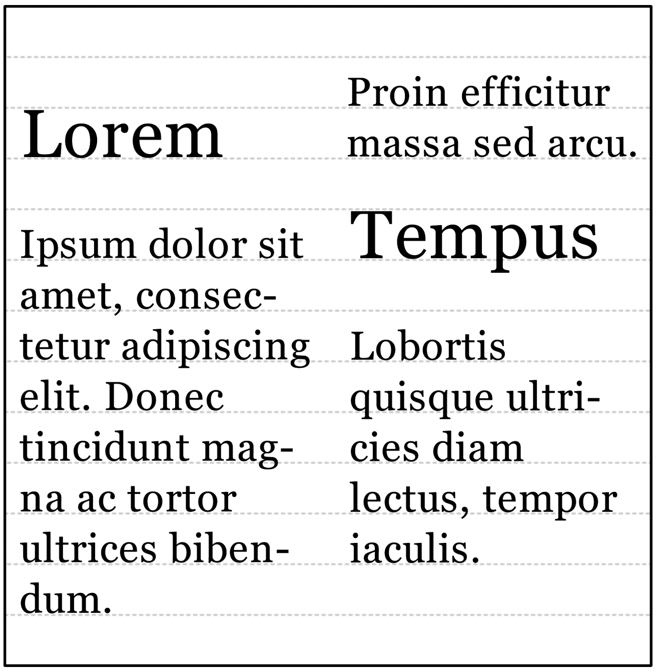

Lorem
Proin efficitur massa sed arcu.
Ipsum dolor sit amet, consec-tetur adipiscing elit. Donec tincidunt mag-na ac tortor ultrices biben-dum.
Tempus
Lobortis quisque ultri-cies diam lectus, tempor iaculis.

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
}
```

5.9 Region Layout

Regions are containers for document content similar to pages or columns (p. 84), 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.

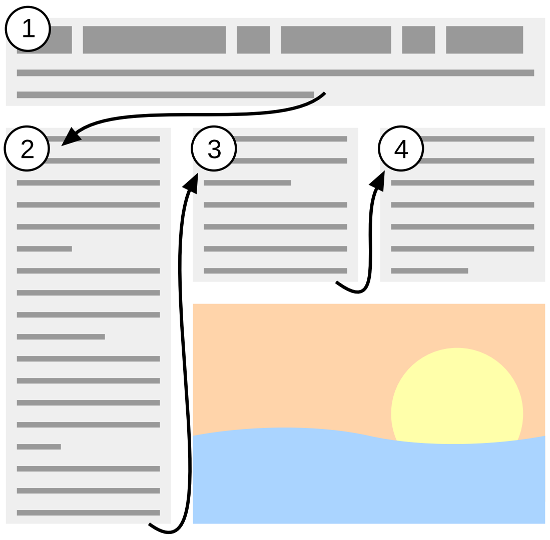


Fig. 6: A named flow flows through a region chain.

5.9.1 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 77: 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 automatically lays out content inside 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.

5.9.2 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 78: 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.

5.9.3 Region Generated Content

A region element can have before and after Generated Content (p. 72) 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 still not enough space left, the region's content flows over.

5.10 Controlling Breaks

Although PDFreactor performs automatic breaks between boxes for pages (p. 68), columns (p. 84) and regions (p. 86), 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 style for HTML that influences the break behavior for certain elements like headings and lists. Break Styles for XML documents need to be created based on the document language.

5.10.1 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 79: 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: always;
}
```

Example 80: 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 81: 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`.

5.10.2 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 82: 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`.

5.10.3 Adaptive Page Breaks

awesomizr.js (p. 48) 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`

5.11 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.

5.11.1 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. 70), using the `size` property.

Example 83: 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. 92)).

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 [19] 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. 125)

The property `-ro-media-size` is used to specify the media size.

Example 84: 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 (Europe) or 1/8 inch (USA/UK).

Setting the bleed size can be achieved by using the property `-ro-bleed-width`.

Example 85: 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.

```
-ro-bleed-width: 3mm;
```

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 not set by default.

Example 86: 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.

[19] ***D**eutsches **I**nstitut für **N**ormung, in English: German Institute for Standardization, Germany's ISO member body.*

Using the property -ro-art-size, the ArtBox can be set to a specific page size or one of the page boxes. It is not set by default.

Note

When generating a PDF/A conformant file (see PDF/A conformance (p. 57)), the ArtBox is required not to be defined.

5.11.2 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. 90).

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.

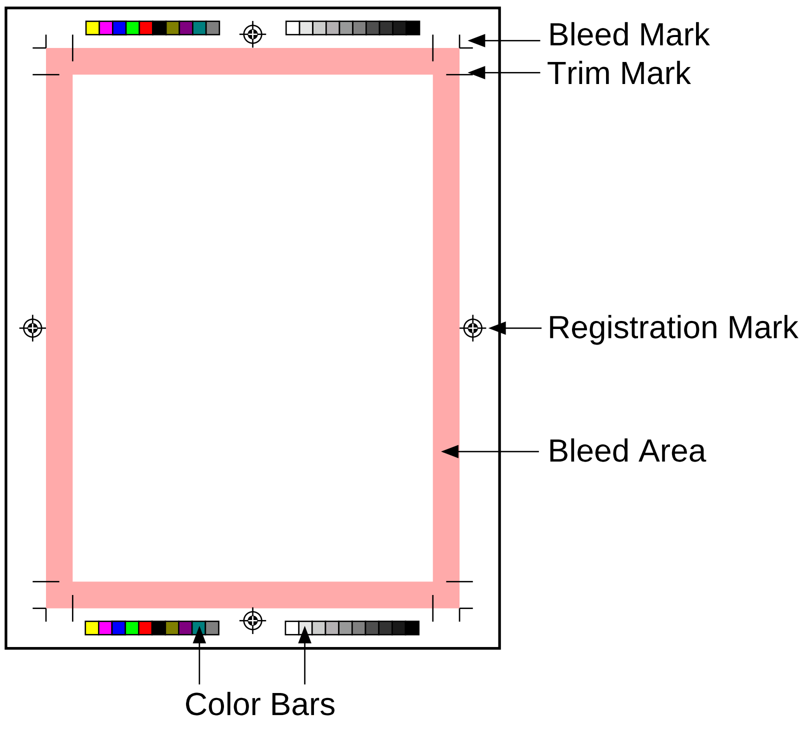


Fig. 7: Printer Marks

The property -ro-marks is used to add trim, bleed and registration marks. The property -ro-marks-width sets the width of the mark lines, -ro-marks-color sets their color.

Example 87: Setting printer marks

```
-ro-marks: trim bleed registration;
-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 88: Setting color bars at the bottom left and right

```
-ro-colorbar-bottom-left: gradient-tint;
-ro-colorbar-bottom-right: progressive-color;
```

5.12 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 freely combined with other generated content such as counters.

Example 89: Adding leaders to the entries in a table of contents

```
a.toc_ah2::after{
         content: leader(dotted) " " target-counter(-ro-attr(href url), page);
}
```

This may result in a display such as:

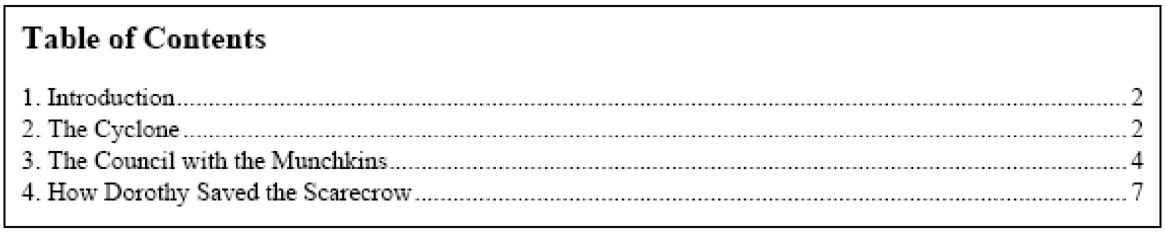


Table of Contents

1. Introduction..2
2. The Cyclone..2
3. The Council with the Munchkins..4
4. How Dorothy Saved the Scarecrow..7

5.13 Table of Contents

A table of contents can be automatically 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. 48) 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 `setUserStyleSheets()` method 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
`insertiontarget`	`string`	CSS selector string of the element where the table of contents should be inserted.	`"body"`
`insertiontype`	`string`	Specifies where exactly the table of contents should be inserted: • `"beforebegin"`: Before the element • `"afterbegin"`:As new first-child • `"beforeend"`:As new last-child • `"afterend"`:After the element	`"afterbegin"`
`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 `ro-toc-level-2`.	`["h1", "h2"]`
`toctitle`	`string`	The title of the table of contents. If an empty string is set, no title is inserted.	`"Table of Contents"`
`disabledocumenttitle`	`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 `false` will skip the entry entirely and not include it in the TOC.	`null`

Example 90: 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="text/javascript" src="awesomizr.js"></script>
...
<body onload="Awesomizr.createTableOfContents({elements:['h2']});">
```

Example 91: 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
        var 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. The two samples for table of contents demonstrate both approaches.

5.14 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, `setPixelsPerInchShrinkToFit` 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 boundraries of pages. For high-fidelity print output, these modes should not be used.

5.14.1 The method `setPixelsPerInchShrinkToFit`

This method 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 92: Shrink-to-fit using the setPixelsPerInchShrinkToFit API method

```
config.setPixelsPerInchShrinkToFit(true);
```

The pixels per inch (p. 98) can also be specified manually.

5.14.2 The property `-ro-scale-content`

This property must be part of the `@page` rule and allows the following values:

- A percent value which is treated as a scaling factor for the content.
- The value `none` causes no scaling.
- The value `auto` enables the automatic scaling of the content to fit the size of the page.

Example 93: Shrink-to-fit using the -ro-scale-content CSS property

```
@page {
    -ro-scale-content: auto;
}
```

5.15 Page Order

Usually, the page order of a PDF is only determined by its input document. However, using the API method "setPageOrder", 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 even pages are moved before all even pages.
- `BOOKLET` — All pages are ordered as in a booklet.
- `BOOKLET_RTL` — All pages are in right-to-left booklet order.

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 94: Setting the page order

```
config.setPageOrder("2,5,6*2,8..10,-1,-2");
```

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.

5.15.1 Merge Mode Arrange

The syntax of page order is extended when setting the merge mode to `MERGE_MODE_ARRANGE`.

With the merge mode selected, PDFreactor requires as usual one or more merge PDFs to be set (see Merging PDFs (p. 62)).

The merge documents specified with the array are numbered, beginning with one for the first PDF (when using a method to specify 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 95: Inserting existing PDFs into converted document

```
config.setMergeMode(MergeMode.ARRANGE);
config.setMergeDocuments(
    new Resource().setUri("http://www.myserver.com/insert1.pdf"),
    new Resource().setUri("http://www.myserver.com/insert2.pdf"));
config.setPageOrder("1, 1:1, 2:A, 2..-1, 1:2");
```

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.

5.16 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 API method `setPagesPerSheetProperties`.

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 left to right 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 96: 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));
```

5.17 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. 97) functionality with the Page Order (p. 96) 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.

An API method 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));
```

5.18 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 method `setPixelsPerInch` this can be changed, e.g.:

```
config.setPixelsPerInch(120);
```

Increasing the pixels per inch can be used to shrink documents that would be to wide for pages due to fixed widths originally intended for screens.

Finding the optimum value can be automated using shrink to fit (p. 95).

5.19 Media Queries

5.19.1 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");
```

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;
    }
}
```

5.19.2 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, most 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"));
```

The following table provides an overview of the supported media features. The default values can be found in the PDFreactor API documentation.

Supported media features

Feature Name	Description	min-/ max-
`width`	The width of the targeted display area.	Yes
`height`	The height of the targeted display area.	Yes
`device-width`	The width of the rendering surface.	Yes
`device-height`	The height of the rendering surface.	Yes
`orientation`	Is `portrait` if `height` is greater than or equal to `width`, or `landscape` otherwise.	No
`aspect-ratio`	Calculated from `width` and `height`. The value is a fraction, e.g. `16/10`.	Yes
`device-aspect-ratio`	Calculated from the `device-width` and `device-height`. The value is a fraction, e.g. `16/9`.	Yes
`color`	The number of bits per color component of the output device.	Yes
`color-index`	The number of entries in the color lookup table.	Yes
`monochrome`	The number of bits per pixel in a monochrome frame buffer.	Yes
`resolution`	The device resolution in `dpi`, `dpcm` or `dppx`. This also defines the value of the `window.devicePixelRatio` property available from JavaScript (p. 44).	Yes
`grid`	Whether the device is grid or bitmap based.	No
`-ro-output-format`	(proprietary) The output format of the conversion, either `pdf` or `image`.	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.

5.20 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
`first-page-side`	• `left` • `right` • `verso` • `recto` • `auto` (default)	Sets on which side the first page of the document should be. By default it is `right`, unless the document direction is right-to-left
`first-page-side-view`	• `left` • `right` • `verso` • `recto` • `auto` (default)	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 `first-page-side`.
`page-layout`	• `1 column` • `2 column` • `1 page` • `2 page`	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.
`initial-zoom`	• [percentage] • `fit-page` • `fit-page-width` • `fit-page-height` • `fit-content` • `fit-content-width` • `fit-content-height`	Sets the initial zoom factor when opening the document. Can either be 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.
`initial-page`	• [number]	Sets number of the page that should be scrolled to when opening the document. The default value is `1`.
`pdf-script-action`	• [String] • [String] [event] ... • none	Sets a PDF script that is executed when the PDF is opened by a viewer application, that supports PDF scripts and the corresponding event is triggered (e.g. on opening the PDF). This can also be set via the PDFreactor API. If set by both, the scripts set via API are overridden by those set via the CSS property (only if both are registered on the same event). The property allows a comma separated list of action and event pairs. More information can be found in the `property description`
`pages-counter-offset`	• [number]	Sets an optional offset to be added to the value of the `pages` counter. Negative values are valid. The default value is `0`.
`pdf-shape-optimization`	• `visual` (default) • `none`	Sets whether shapes should be written into the PDF in a way that prevents visualization issues in certain PDF viewers.

5.21 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.

The following tables list the 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
`-ro-padding-inline-start`	padding-left	padding-right
`-ro-padding-inline-end`	padding-right	padding-left
`-ro-border-inline-start`	border-left	border-right
`-ro-border-inline-end`	border-right	border-left
`-ro-border-inline-start-color`	border-left-color	border-right-color
`-ro-border-inline-end-color`	border-right-color	border-left-color
`-ro-border-inline-start-style`	border-left-style	border-right-style
`-ro-border-inline-end-style`	border-right-style	border-left-style
`-ro-border-inline-start-width`	border-left-width	border-right-width
`-ro-border-inline-end-width`	border-right-width	border-left-width
`-ro-margin-inline-start`	margin-left	margin-right
`-ro-margin-inline-end`	margin-right	margin-left
`-ro-offset-inline-start`	left	right
`-ro-offset-inline-end`	right	left

New Logical Values for `float` and `clear`

Property	LTR	RTL
-ro-inline-start	left	right
-ro-inline-end	right	left

6. PDFREACTOR COOKBOOK

This chapter will guide you through some of the topics that will most frequently arise when using PDFreactor, and will give you hands-on advice in each case.

6.1 How Do I Create Running Table Headers?

If a page break occurs in a table with running table headers, the table headers are repeated for each page the table runs over. To ensure that the table headers are repeated, all you have to do is using the corresponding page markup.

Example:

```
<table>
    <thead>
        <tr>
            <td>A Simple Heading</td>
        </tr>
    </thead>
    <tr>
        <td>Row 1</td>
    </tr>
    <tr>
        <td>Row 2</td>
    </tr>
</table>
```

6.2 How Do I Set CSS & XSLT Stylesheets?

You can set CSS style sheets either by referencing them in your document, setting or adding them using an API method, or inline in your document.

Defining a CSS style sheet in the "style" Section of the Document:

```
<head><style type="text/css">p { color: red }</style></head>
```

Referencing an external CSS style sheet using the `<link>` Element:

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

Defining CSS Styles Inline:

```
<table style="color: red">...</table>
```

Adding a CSS style sheet Using an API Method:

```
Java: config.setUserStyleSheets(new Resource().setUri("http://server/layout.css"));
PHP:  $config["userStyleSheets"] = array(array("uri" => "http://server/layout.css"));
.NET: config.UserStyleSheets.Add(new Resource { Uri = "http://server/layout.css" });
CLI:  --userStyleSheets "" "http://server/layout.css"
```

```
Java: config.setUserStyleSheets(new Resource().setContent("p { color: red }"));
PHP:  $config["userStyleSheet"] = array(array("content" => "p { color: red }"));
.NET: config.UserStyleSheets.Add(new Resource { Content = "p { color: red }" });
CLI:  --userStyleSheets "p { color: red }" ""
```

XSLT style sheets can be set either using an API method, or by referencing them in the document. They cannot be specified directly inline as CSS style sheets can be.

Note

XSLT style sheets are applied in a pre-processing step, before the document is laid out and CSS or JavaScript is processed.

Adding an XSLT style sheet using an API method:

```
Java: config.setXsltStyleSheets(new Resource().setUri("style.xsl"));
PHP:  $config["xsltStyleSheets"] = array(array("uri" => "style.xsl"));
.Net: config.XsltStyleSheets.Add(new Resource { Content = "style.xsl" });
CLI:  --xsltStyleSheets "" "file:///C:/xsl-style.xsl"
```

Referencing an external XSLT style sheet via the `<link>` element:

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

6.3 How Do I Set Styles for Print or Screen Only?

All styles inside this block will only affect print media:

```
@media print{...}
```

All styles inside this block will only affect screen media:

```
@media screen{...}
```

6.4 Automatic Resizing of Form Controls

When HTML form controls such as input fields and text areas are rendered on screen, they usually have a fixed size determined by their attributes or by the browser. If the content of the form control is larger than the form control itself, the browser usually adds scroll bars to the control or allows navigation using a caret.

This, of course, is not possible on print or in a paged environment. To overcome this, PDFreactor supports some style properties which allow the automatic resizing of form controls according to their content. If these properties are set, the form controls' size automatically adjusts according to its content.

These properties are: `-ro-width` and `-ro-height`.

`-ro-width` automatically adjusts the width of a form control if the width of the content exceeds the width defined for the form control.

`-ro-height` automatically adjusts the height of a form control if the height of the content exceeds the height defined for the form control.

Example usage of these properties:

```
input[type="text"] {
    -ro-width: auto;
}
textarea {
    -ro-height: auto;
}
```

6.5 How Do I Set Colors in CSS?

How do I set RGB colors?

In CSS you can specify RGB[20] colors in the following ways:

- `#` followed by a 6 digit RGB value in hexadecimal notation, e.g. `#00ff00` for perfect green.

  You can abbreviate this notation by using only 3 digits which will be expanded internally, e.g. `#0f5` equals `#00ff55`.

- Using the function rgb (p. 235). 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.

How do I set RGBA colors?

RGBA[21] colors are also supported and can be specified by using the function rgba (p. 235). 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.

How do I set CMYK colors?

Besides `rgb` and `rgba` PDFreactor also supports the non-standard function cmyk (p. 229). 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 key words can be converted automatically into CMYK using the `setDefaultColorSpace` API method:

```
config.setDefaultColorSpace(ColorSpace.CMYK);
```

CMYK colors are also supported in SVGs (p. 39).

How do I set HSL colors?

HSL[22] is another representation of the RGB colorspace. 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 (p. 232). It

[20] ***R**ed **G**reen **B**lue, additive color model, consisting of the color components red, blue and green.*
[21] ***R**ed **G**reen **B**lue **A**lpha, a color model similar to RGB, with extra information about the translucency.*
[22] ***H**ue **S**aturation **L**ightness, alternative representation of colors of the RGB color model.*

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 (p. 232) with an additional parameter for the alpha value.

How do I use color key words?

Instead of using color functions or the hexadecimal notation a single human readable key word can be used. For more information which key words are supported by PDFreactor see the CSS Color Keywords table (p. 130). The key words are internally converted into the user-set color space. By default, they are converted into RGB colors.

How do I use 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 functions -ro-spot and -ro-separation (p. 236). The functions take three parameters: The spot color name, the color tint (with 1.0 representing maximum "opacity") and the fallback color.

6.6 How Do I Resize Background Images?

You can use the property `background-size` to resize background images:

```
background-size: 100px 50px /* set size to 100 x 50 pixels */
background-size: 100% 100% /* set size to 100% of the size
                              of the containing element */
background-size: 50% /* set width to 50% of the width of
                        the containing element and keeps
                        the aspect ratio of the image */
background-size: auto 80px /* set height to 80 pixels and keeps
                              the aspect ratio of the image */
background-size: cover /* set size so that image completely
                          covers the area */
background-size: contain /* set size so that image completely
                            fits the area */
```

6.7 How Do I Create Rounded Corners?

To create rounded corners for borders, you can use the property `border-radius`, e.g.:

```
border-radius: 0.2cm;
```

6.8 How Do I Place an Image in the Header?

Adding images as generated content is explained in Generated Images (p. 73). This also works for the content of Page Margin Boxes (p. 74).

Example 97: An image as content of a Page Margin Box

```
@page{
    @top-left{
        content: url("http://mydomain/pictures/image.svg")
    }
}
```

6.9 How Do I Use HTML in Headers and Footers?

There are two options to add HTML to header and footer boxes, either Running Elements (p. 74) or Running Documents (p. 77).

6.10 How Do I Create a Document With a Text Direction of Right-to-Left?

PDFreactor automatically 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 of 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.english {
  direction: rtl;
}
```

You can override the automatically selected text direction by combining `direction` with the property `unicode-bidi`:

```
span.forcertl {
  unicode-bidi: bidi-override;
  direction: ltr;
}
```

6.11 How Do I Save Memory if a Document Refers to Many or Very Large Image Files?

To reduce the memory consumption caused by converting documents referencing many or large images, set the processing preference `PROCESSING_PREFERENCES_SAVE_MEMORY_IMAGES`:

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

This setting will have an impact on the performance and should therefore only be used when necessary.

6.12 How Can I Retrieve the Number of Pages of a Converted Document Programmatically?

After converting a document you can use the methods `getNumberOfPagesLiteral` and `getNumberOfPages` of the `result` object to retrieve the number of pages of the final PDF or of the laid out input document without any postprocessing.

```
Result result = pdfReactor.convert(config);
int numberOfPages = result.getNumberOfPagesLiteral();
```

6.13 How Do I Access Resources That Are Secured Via Basic or Digest Authentication?

Documents or other resources that are secured via Basic or Digest authentication can be accessed by setting authentication credentials for PDFreactor using the `setAuthenticationCredentials` API method:

```
config.setAuthenticationCredentials(new KeyValuePair("user", "password");
```

The credentials are set for all outgoing HTTP connections.

6.14 How Can I Set Request Headers And Cookies For The Outgoing Connections of PDFreactor?

Using the method `setRequestHeader`, you can set request headers for all outgoing HTTP connections of PDFreactor, used to load the document and its resources like images and style sheets. Similarly you can set cookies using the method `setCookie`.

Both expect a key-value-pair as parameters and can be called multiple times to set multiple headers or cookies. Existing keys will be overwritten.

```
config.setRequestHeaders(new KeyValuePair("User-Agent", "PDFreactor"));
config.setCookies(new KeyValuePair("name", "Peter"));
```

This functionality can be used to pass a session ID from the integration to PDFreactor.

6.15 How Can I Add a Smooth Color Transition to the Background of an Element?

A color transition of two and more colors can be added to elements using CSS gradients. CSS gradients are dynamically generated images used as `backgrounds`. Following an example that generates a background with a fine blue gradient.

```
background-image: linear-gradient(skyblue, cornflowerblue);
```

6.16 How Can I Rotate Text by 90 Degrees?

Text can be rotated and transformed via Transforms (p. 83).

Example 98: Rotating elements

An element with the `label` class is rotated by -90 degrees and moved to the left side.

```
.label {
    transform-origin: 0px;
    transform: rotate(-90deg) translateY(-100%);
}
```

6.17 How Can I Style The First N Pages?

This can be archived by using `:-ro-nth(An+B)` pseudo-class with `A` being -1 and `B` being the number of pages that should be selected.

Example 99: Select the first four pages and remove their page margin

```
@page :-ro-nth(-1n+4) {
    margin: 0;
}
```

6.18 How Can I Remove the First Page From the Generated PDF?

Manipulating the page order or removing pages from the generated PDF can be done by using the `setPageOrder` API method with an appropriate page order expression.

Example 100: Removing the first page

```
config.setPageOrder("2..-1");
```

6.19 How Can the Log Output Be Matched to a Specific Application or Document?

The API method `setConversionName(String)` can be used to specify a user-defined name for the conversion. The name can be an arbitrary string such as an application name, document title, website URL, etc. The conversion name will be logged if set, which means that the log output can then be clearly matched to the producing application, document or website later. This is especially useful if you have multiple documents or applications using PDFreactor and want to identify the source of certain log outputs.

6.20 How Can I Use the REST API With cURL or Wget?

The PDFreactor Web Service features a REST API (see Using the REST API (p. 13)) that can be used by practically any client that can perform HTTP requests. The two examples below show how to use the REST API via cURL and Wget to convert the configuration "config.json" and save the result to "result.pdf".

Example 101: cURL

```
curl -v -X POST --header "Content-Type: text/json" --data-binary @config.json http://
localhost:9423/service/rest/convert.pdf -o result.pdf
```

Please note that you should use `--data-binary` instead of `-d` to set the POST payload as `-d` removes all line breaks which is oftentimes undesirable.

Example 102: Wget

```
>wget --header="Content-Type: text/json" --post-file=config.json http://localhost:9423/
service/rest/convert.pdf -O result.pdf
```

6.21 How Can I Set a Time Limit For Conversions?

Conversions can be terminated on arbitrary conditions like timeouts. For this, you have to implement a `ProgressEventListener` and set it on the PDFreactor configuration. With the `ProgressEvent`, which is passed as an argument to the listener's only method, you can terminate the conversion by calling the event's method `terminateConversion()`.

Since a timeout is one of the most common conditions for terminating a conversion, PDFreactor includes an implementation of a `ProgressEventListener` that does exactly that. This implementing class is `TimeoutListener` and its constructor takes the timeout in seconds as single argument.

Example 103: Setting a Timeout of 15 Seconds

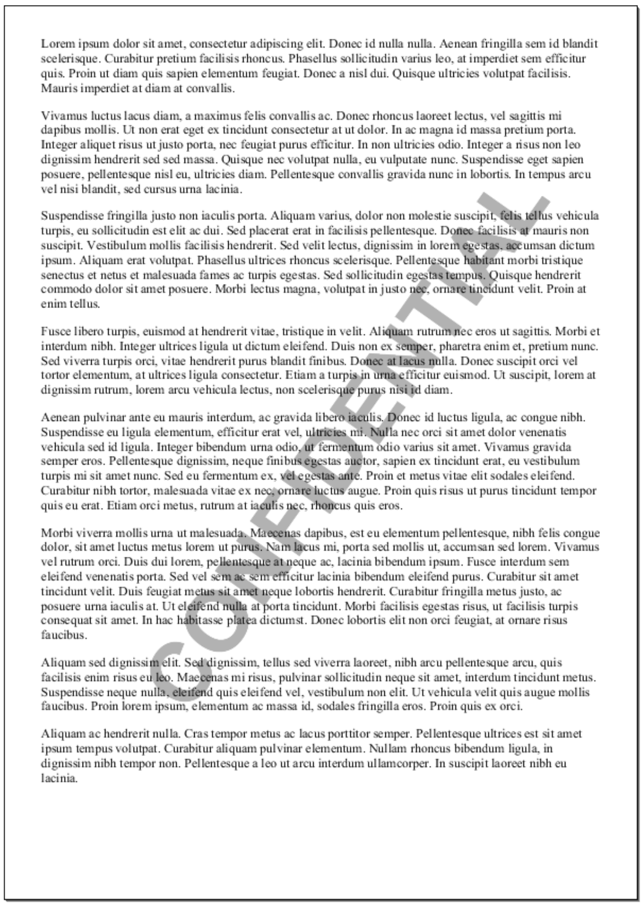
```
Configuration config = new Configuration();
// Conversions will terminate after 15 seconds
config.addProgressEventListener(new TimeoutListener(15));
```

This functionality is only available in the Java API of the PDFreactor library. When using the Web Service, you can use the parameter `conversionTimeout` to set a timeout for all conversions.

6.22 How Can I Add a Watermark to the PDF?

Watermarks can be added in various ways. If you already have an existing watermark in form of a PDF, you could just use the overlay functionality (see Merging PDFs (p. 62)). Alternatively, a watermark can be added via CSS. The following sample CSS uses a page margin box to add the semi-transparent text "CONFIDENTIAL" above each page:

```
@page {
  @left-middle {
    content: "Confidential";
    z-index: 100;
    font-family: sans-serif;
    font-size: 80pt;
    font-weight: bold;
    color: gray(0, 0.3);
    text-align: center;
    text-transform: uppercase;
    transform: rotate(-54.7deg);
    position: absolute;
    left: 0;
    top: 0;
    width: 100%;
    height: 100%;
  }
}
```



Lorem ipsum dolor sit amet, consectetur adipiscing elit. Donec id nulla nulla. Aenean fringilla sem id blandit scelerisque. Curabitur pretium facilisis rhoncus. Phasellus sollicitudin varius leo, at imperdiet sem efficitur quis. Proin ut diam quis sapien elementum feugiat. Donec a nisl dui. Quisque ultricies volutpat facilisis. Mauris imperdiet at diam at convallis.

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Suspendisse fringilla justo non iaculis porta. Aliquam varius, dolor non molestie suscipit, felis tellus vehicula turpis, eu sollicitudin est elit ac dui. Sed placerat erat in facilisis pellentesque. Donec facilisis at mauris non suscipit. Vestibulum mollis facilisis hendrerit. Sed velit lectus, dignissim in lorem egestas, accumsan dictum ipsum. Aliquam erat volutpat. Phasellus ultrices rhoncus scelerisque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Sed sollicitudin egestas tempus. Quisque hendrerit commodo dolor sit amet posuere. Morbi lectus magna, volutpat in justo nec, ornare tincidunt velit. Proin at enim tellus.

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Morbi viverra mollis urna ut malesuada. Maecenas dapibus, est eu elementum pellentesque, nibh felis congue dolor, sit amet luctus metus lorem ut purus. Nam lacus mi, porta sed mollis ut, accumsan sed lorem. Vivamus vel rutrum orci. Duis dui lorem, pellentesque at neque ac, lacinia bibendum ipsum. Fusce interdum sem eleifend venenatis porta. Sed vel sem ac sem efficitur lacinia bibendum eleifend purus. Curabitur sit amet tincidunt velit. Duis feugiat metus sit amet neque lobortis hendrerit. Curabitur fringilla metus justo, ac posuere urna iaculis at. Ut eleifend nulla at porta tincidunt. Morbi facilisis egestas risus, ut facilisis turpis consequat sit amet. In hac habitasse platea dictumst. Donec lobortis elit non orci feugiat, at ornare risus faucibus.

Aliquam sed dignissim elit. Sed dignissim, tellus sed viverra laoreet, nibh arcu pellentesque arcu, quis facilisis enim risus eu leo. Maecenas mi risus, pulvinar sollicitudin neque sit amet, interdum tincidunt metus. Suspendisse neque nulla, eleifend quis eleifend vel, vestibulum non elit. Ut vehicula velit quis augue mollis faucibus. Proin lorem ipsum, elementum ac massa id, sodales fringilla eros. Proin quis ex orci.

Aliquam ac hendrerit nulla. Cras tempor metus ac lacus porttitor semper. Pellentesque ultrices est sit amet ipsum tempus volutpat. Curabitur aliquam pulvinar elementum. Nullam rhoncus bibendum ligula, in dignissim nibh tempor non. Pellentesque a leo ut arcu interdum ullamcorper. In suscipit laoreet nibh eu lacinia.

Fig. 8: A watermarked PDF

APPENDIX A: FONTS

To be able to display text PDFreactor requires font data. This font data must be in TTF[23] or in OTF[24] format and may come from different types of sources (see Font Sources (p. 111)).

Note

Using OpenType fonts requires Oracle Java SE 7 or higher.

A.1 Font Sources

The font data of PDFreactor may come from different types of sources.

A.1.1 Core Fonts Pack

PDFreactor contains fonts that will be used for the Default Font Mapping (p. 113) when no other fonts could be registered on the system, e.g. because of insufficient file permissions or due to the fact that there are no fonts available.

These fonts are distributed by RealObjects and licensed by their respective authors under the SIL Open Font License[25], the Apache License or a custom license.

The packaged core fonts are:

Original Font Name	Type	PDFreactor Font Name	License
`Arimo`	sans-serif	`RealObjects core sans-serif`	Apache License, Version 2.0
`Tinos`	serif	`RealObjects core serif`	Apache License, Version 2.0
`Cousine`	monospace	`RealObjects core monospace`	Apache License, Version 2.0
`Quivira`	symbol	`RealObjects core symbol`	Custom License (http://en.quivira-font.com/notes.php)

Additionally the core fonts contain fallback fonts for symbols and characters from non-Latin languages. Those are `Droid Sans Fallback` (Apache License), `Nanum Gothic` (SIL Open Font License), the `Noto` fonts (Apache License) and `Noto Emoji` (SIL Open Font License).

A.1.2 System and JVM Font Directories

The main sources PDFreactor uses to retrieve font data are:

- fonts registered with the Java VM
- fonts located in the system font folder

Both provide fonts physically available to PDFreactor.

[23] *True Type Font*
[24] *Open Type Font*
[25] *A free and open source license designed for fonts (http://scripts.sil.org/cms/scripts/page.php?id=OFL_web)*

Java VM fonts are usually located in "JAVA_HOME/jre/lib/fonts". The location of the system font folder is platform dependent. PDFreactor registers fonts from these sources automatically.

If PDFreactor was unable to retrieve any font data, fonts from the Core Fonts Pack will be used. (see Core Fonts Pack (p. 111)).

Note

PDFreactor can be configured to ignore all system fonts and only use fonts that either have been specifically added via API method or that are webfonts from the document:

```
config.setDisableSystemFonts(true);
```

A.1.3 Additional Fonts & Font Directories

PDFreactor allows setting additional fonts that are neither located in the system font directory nor the font directory of the Java VM. These fonts still need to be physically available to PDFreactor.

To register these fonts with PDFreactor via the Java API, use the following methods:

- `addFontDirectory` — The fonts in the specified directory and all its subdirectories will be used by PDFreactor.
- `addFont` — Adds an additional font from a specified source URL.

For each directory added by the `addFontDirectory` method and for each of their subdirectories, a 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. 112) for more information about the font cache.

A.1.4 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 (i.e. images) and will only be used to render the document they belong to.

Example 104: Defining a custom font

```
@font-face {
    font-family: "My Font";
    src: url("http://www.my-server.com/fonts/my-font.ttf");
}
```

A.2 The Font Cache Mechanism

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 font cache files that will be used on subsequent starts to significantly reduce its startup time. The font caching ensures the rendering process will start as soon as possible.

If a font cache file is present, new fonts put into the font directories available to PDFreactor will be ignored by PDFreactor unless the font cache file has been deleted. Then PDFreactor will create a new font cache file on startup as it would on its first startup.

To delete the font cache file, visit the "user.home/.PDFreactor" directory and delete all files inside it.

When using the PDFreactor Web Service, the font cache is located in the "jetty/pdfreactor/fontcache" directory of your PDFreactor installation instead (unless otherwise configured, see Customizing the Server Configuration (p. 23))

A.2.1 Controlling the Font Registration and Caching Mechanism

It is possible to customize the registration and caching of fonts via the Java API:

- `setFontCachePath` — Specifies the location where the font cache file should be stored.
- `setCacheFonts` — Activates or deactivates the font cache.
- `setDisableFontRegistration` — Specifies whether fonts are registered with PDFreactor
- `setDisableSystemFonts` — If set to true, PDFreactor will neither register system fonts, nor use the respective font cache.

A.3 Font Matching

A.3.1 Matching CSS Font Families

The default CSS font families are mapped as follows:

Default Font Mapping

CSS Font Family	Used Font	Core Font[26]
sans-serif	Arial	Arimo
serif	Times New Roman	Tinos
monospace	Courier New	Cousine

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 method:

- `addFontAlias` — Adds an alias family for a registered font.

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:

- The font-family property of the current element
- The method setFontFallback
- An internal list of recommended fonts
- All fonts on the system, starting with those with the most glyphs

[26] *Used in cases where PDFreactor could not register any other fonts (see Core Fonts Pack (p. 111)).*

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. 48)

- **layout** **`<Layout>`**

  Proprietary layout information.

- **pdf** **`<PDF>`**

  Runtime PDFreactor API

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.

  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).

  Parameters:

  element **`<Element>`**

  The DOM element.

- **`<String>`** **getContent (element, pseudoElement^{optional})**

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 ommited `"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. 74).

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.

- **addBookmarks `<Boolean>`**

Enables or disables bookmarks in the PDF document.

- **addComments `<Boolean>`**

Enables or disables comments in the PDF document.

- **addLinks `<Boolean>`**

Enables or disables links 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.

- **encryption** `<String>`

  Use one of the `encryption` constants to specify the encryption:

  `"none"`: Indicates that the document will not be encrypted. If encryption is disabled then no user password and no owner password can be used.

  `"type_128"`: Indicates that the document will be encrypted using RC4 128 bit encryption. For normal purposes this value should be used.

  `"type_40"`: Indicates that the document will be encrypted using RC4 40 bit 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. 62)), 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. 96) 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.

  PDF Scripts can also be set by using the proprietary CSS property pdf-script-action. More information on this property can be found here `pdf-script-action`.

  Please note, that scripts set via CSS have a higher priority. If two scripts are registered on the same event, but one via API and the other via the CSS property, the script set in the CSS will override the other one.

- **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 Types

ClientRect

A `ClientRect` contains the position and dimensions of a rectangle. While `ClientRect` consists of *integer* values, `DOMRect` consists of *float* values. So it is generally recomended to get `DOMRect`, because it is more precise.

Properties

- **left `<Number>`**

  The x-coordinate.

- **right `<Number>`**

  The x-coordinate plus the width.

- **top** `<Number>`

  The y-coordinate.

- **bottom** `<Number>`

  The y-coordinate plus the height.

- **width** `<Number>`

  The width.

- **height** `<Number>`

  The height.

DOMRect

A `DOMRect` contains the position and dimensions of a rectangle. While `ClientRect` consists of *integer* values, `DOMRect` consists of *float* values. So it is generally recomended to get `DOMRect`, because it is more precise.

Properties

- **left** `<Number>`

  The x-coordinate.

- **right** `<Number>`

  The x-coordinate plus the width.

- **top** `<Number>`

  The y-coordinate.

- **bottom** `<Number>`

  The y-coordinate plus the height.

- **width** `<Number>`

  The width.

- **height** `<Number>`

  The height.

Range

Contains information about a fragment of a document that can contain nodes and parts of text nodes.

Properties

- **startContainer** `<Node>`

  Returns the DOM `Node` within which the range starts.

- **startOffset** `<Number>`

  Returns the offset in the startContainer at which the range starts.

- **endContainer** `<Node>`

  Returns the DOM `Node` within which the range ends.

- **endOffset** `<Number>`

  Returns the offset in the endContainer at which the range ends.

B.3 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 `ClientRect` and `DOMRect`.

Properties

- **marginRect** **`<ClientRect>`**

  Returns a `ClientRect` describing the margin rectangle. The point of origin is the upper left corner of the page content rectangle.

- **borderRect** **`<ClientRect>`**

  Returns a `ClientRect` describing the border rectangle. This is the rectangle that is required in most cases. The point of origin is the upper left corner of the page content rectangle.

- **paddingRect** **`<ClientRect>`**

  Returns a `ClientRect` describing the padding rectangle. The point of origin is the upper left corner of the page content rectangle.

- **contentRect** **`<ClientRect>`**

  Returns a `ClientRect` describing the content rectangle. The point of origin is the upper left corner of the page content rectangle.

- **marginRectInPage** **`<ClientRect>`**

  Returns a `ClientRect` describing the margin rectangle. The point of origin is the upper left corner of the page rectangle.

- **borderRectInPage** **`<ClientRect>`**

  Returns a `ClientRect` describing the border rectangle. The point of origin is the upper left corner of the page rectangle.

- **paddingRectInPage** **`<ClientRect>`**

  Returns a `ClientRect` describing the padding rectangle. The point of origin is the upper left corner of the page rectangle.

- **contentRectInPage** **`<ClientRect>`**

  Returns a `ClientRect` describing the content rectangle. The point of origin is the upper left corner of the page rectangle.

- **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.

Methods

- **`<DOMRect>`** **getMarginRectFloat (unit$^{\text{optional}}$)**

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 absolute CSS unit in which the dimensions and coordinates will be converted. If this parameter is omitted, values are in "px".

- `<DOMRect>` **getBorderRectFloat (unit^{optional})**

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 absolute CSS unit in which the dimensions and coordinates will be converted. If this parameter is omitted, values are in "px".

- `<DOMRect>` **getPaddingRectFloat (unit^{optional})**

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 absolute CSS unit in which the dimensions and coordinates will be converted. If this parameter is omitted, values are in "px".

- `<DOMRect>` **getContentRectFloat (unit^{optional})**

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 absolute CSS unit in which the dimensions and coordinates will be converted. If this parameter is omitted, values are in "px".

- `<DOMRect>` **getMarginRectInPageFloat (unit^{optional})**

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 absolute CSS unit in which the dimensions and coordinates will be converted. If this parameter is omitted, values are in "px".

- `<DOMRect>` **getBorderRectInPageFloat (unit^{optional})**

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 absolute CSS unit in which the dimensions and coordinates will be converted. If this parameter is omitted, values are in "px".

- `<DOMRect>` **getPaddingRectInPageFloat (unit^{optional})**

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 absolute CSS unit in which the dimensions and coordinates will be converted. If this parameter is omitted, values are in "px".

- `<DOMRect>` **getContentRectInPageFloat (unit^{optional})**

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 absolute CSS unit in which the dimensions and coordinates will be converted. If this parameter is omitted, values are in "px".

- `<DOMRect>` **getBoundingLineContentRect (unit^{optional})**

Returns a `DOMRect` describing the union of the content rectangles of the `LineDescription`s contained in this box, i.e. the bounding rectangle of all text content of the box. The coordinates are relative to the box contaning this lines.

Parameters:

unit **`<String>`**

The desired absolute CSS unit in which the dimensions and coordinates will be converted. If this parameter is omitted, values are in "px".

PageDescription

Describes the dimensions of a page and its rectangles as well as some further information. The rectangles are described by using `ClientRect`s.

Properties

- **marginRect** **`<ClientRect>`**

  Returns a `ClientRect` describing the margin rectangle. The position of this rectangle is always 0,0.

- **borderRect** **`<ClientRect>`**

  Returns a `ClientRect` describing the border rectangle.

- **paddingRect** **`<ClientRect>`**

  Returns a `ClientRect` describing the padding rectangle.

- **contentRect** **`<ClientRect>`**

  Returns a `ClientRect` describing the content rectangle.

- **pageIndex** **`<Number>`**

  The index of this page. The first page has the index 0.

- **pageLeft** **`<Boolean>`**

  Whether this page is on the left.

- **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.

- **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.

Methods

- **<DOMRect> getMarginRectFloat (unit^{optional})**

  Returns a `DOMRect` describing the margin rectangle. The position of this rectangle is always 0,0.

  Parameters:

  unit **<String>**

  The desired absolute CSS unit in which the dimensions and coordinates will be converted. If this parameter is omitted, values are in "px".

- **<DOMRect> getBorderRectFloat (unit^{optional})**

  Returns a `DOMRect` describing the border rectangle.

  Parameters:

  unit **<String>**

  The desired absolute CSS unit in which the dimensions and coordinates will be converted. If this parameter is omitted, values are in "px".

- **<DOMRect> getPaddingRectFloat (unit^{optional})**

  Returns a `DOMRect` describing the padding rectangle.

  Parameters:

  unit **<String>**

  The desired absolute CSS unit in which the dimensions and coordinates will be converted. If this parameter is omitted, values are in "px".

- **<DOMRect> getContentRectFloat (unit^{optional})**

  Returns a `DOMRect` describing the margin rectangle. An element with absolute position and top:0, left:0 would be in the upper left corner of this rectangle.

  Parameters:

  unit **<String>**

  The desired absolute CSS unit in which the dimensions and coordinates will be converted. If this parameter is omitted, values are in "px".

LineDescription

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

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^{optional})**

  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 absolute CSS unit in which the distance value will be converted. If this parameter is omitted, values are in "px".

- **<DOMRect> getContentRect (unit^{optional})**

  Returns a `DOMRect` describing the content rectangle of the line, specificaly the part of the line actually containing text. The coordinates are relative to the box contaning this line.

  Parameters:

  unit **<String>**

  The desired absolute CSS unit in which the dimensions and coordinates will be converted. If this parameter is omitted, values are in "px".

Attachment

A JavaScript object containing data for attachments (p. 116). Unlike the attachments in the normal PDFreactor configuration, these attachments contain text by default, not binary data. It is still possible to attach binary data, however you have to base64-encode the data and set the `binary` property to `true`.

Properties

- **data** `<String>`

  The textual or base64-encoded binary content of the attachment. 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.

- **binary** `<Boolean>`

  This property indicates whether the data property contains base64-encoded binary data or not. If omitted it is treated as `false`, meaning that the attachment content is treated as UTF-8 encoded text.

BookletMode

A JavaScript object containing data for bookletMode (p. 116).

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.

KeyValuePair

A JavaScript object containing data for customDocumentProperties (p. 116).

Properties

- **key** `<String>`

  The key.

- **value** `<String>`

  The value.

PagesPerSheetProperties

A JavaScript object containing data for pagesPerSheetProperties (p. 117).

Properties

- **cols** `<Number>`

  The number of columns per sheet.

- **rows** `<Number>`

  The number of rows per sheet.

- **sheetSize** `<String>`

  The number of rows per sheet.

- **sheetMargin** `<String>`

  The sheet size as CSS size, e.g. "A4", "letter landscape", "15in 20in", "20cm 30cm".

- **spacing** `<String>`

  The sheet margin as CSS margin, e.g. "1in", "1cm 1.5cm", "10mm 20mm 10mm 30mm". `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. 117).

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: CSS SUPPORT

C.1 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
`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

C.2 Supported Page Size Formats

Key words 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 Key words 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

Key words 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

Key words 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

C.3 Hyphenation Dictionaries

Supported hyphenation dictionaries

ISO 639-1 Language code	Language name
`af`	Afrikaans
`as`	Assamese
`bg`	Bulgarian
`bn`	Bengali, Bangla
`ca`	Catalan
`cy`	Welsh
`da`	Danish
`de`	New German
`de-1901`	German traditional
`de-CH`	German, Switzerland
`el`	Greek, Modern
`el_Polyton.hyp`	Greek, Polyton
`en`	English (US)
`en-GB`	English (GB)
`eo`	Esperanto

ISO 639-1 Language code	Language name
es	Spanish
et	Estonian
eu	Basque
fi	Finnish
fr	French
fur	Friulian
gl	Galician
grc	Greek, Ancient
gu	Gujarati
hi	Hindi
hr	Croatian
hsb	Upper Sorbian
ia	Interlingua
id	Indonesian (Bahasa Indonesia)
is	Icelandic
it	Italian
ka	Georgian
kmr	Kurmanji (Northern Kurdish)
kn	Kannada
la	Latin
la	Latin
la-CL	Latin
lt	Lithuanian
ml	Malayalam
mn	Mongolian
mr	Marathi
mul	Multiple languages
nb	Norwegian Bokmål
nl	Dutch
nn	Norwegian Nynorsk
oc	Occitan

ISO 639-1 Language code	Language name
`or`	Oriya
`pa`	Panjabi
`pl`	Polish
`pms`	Piemontese
`pt`	Portuguese
`rm`	Romansh
`ro`	Romanian
`ru`	Russian
`sa`	Sanskrit
`sl`	Slovenian
`sr-Cyrl`	Serbian, Cyrillic
`sr-Latn`	Serbian, Latin
`sv`	Swedish
`ta`	Tamil
`te`	Telugu
`th`	Thai
`tk`	Turkmen
`tr`	Turkish
`uk`	Ukrainian

C.4 Supported length units

Supported length units

Length unit	Description
`mm`	millimeters
`cm`	centimeters
`q`	quarter-millimeters
`in`	inches
`pt`	points
`px`	pixels
`pc`	pica
`%`	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`	Equal to 1% of the width of the content area of the first page.
`vh`	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'.
`-ro-pw`	Equal to 1% of the width of the first page.
`-ro-ph`	Equal to 1% of the height of the first page.
`-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`	Equal to 1% of the width of the page bleed box of the first page.
`-ro-bh`	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'.

C.5 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
`darkgoldenrod`	🟨	#B8860B	184,134,11

Color name	Color	hex RGB	Decimal
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
gold	🟨	#FFD700	255,215,0
goldenrod	🟨	#DAA520	218,165,32
gray/grey	⬛	#808080	128,128,128

Color name	Color	hex RGB	Decimal
`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`	⬜	#FFFFF0	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
`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

Color name	Color	hex RGB	Decimal
`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
`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

Color name	Color	hex RGB	Decimal
`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
`rebeccapruple`	🟪	#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
`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

Color name	Color	hex RGB	Decimal
`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

C.6 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.	١٢٣.	١٢٣٤.
`armenian`	Ա	ԺԲ	ՃԻԳ	ՌՄԼԴ
`upper-armenian`	Ա	ԺԲ	ՃԻԳ	ՌՄԼԴ
`lower-armenian`	ա	ժբ	ճիգ	ռմլդ
`bengali`	১.	১২.	১২৩.	১২৩৪.
`cambodian`	១.	១២.	១២៣.	១២៣៤.
`devanagari`	१.	१२.	१२३.	१२३४.
`georgian`	ა	იბ	რკგ	ჩსლდ
`upper-greek`	Α.	Μ.	ΖΙ.	ΓΗΣ.
`lower-greek`	α.	μ.	εθ.	βηο.
`gujarati`	૧.	૧૨.	૧૨૩.	૧૨૩૪.
`gurmukhi`	੧.	੧੨.	੧੨੩.	੧੨੩੪.
`hiragana`	あ.	し.	いひ.	のめ.
`hiragana-iroha`	い.	を.	ろや.	のを.

Counter style name	1	12	123	1234
japanese-formal	壹	拾貳	壹佰貳拾參	壹仟貳佰參拾肆
japanese-informal	一	十二	一百二十三	一千二百三十四
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.
upper-latin	A.	L.	DS.	AUL.
lower-latin	a.	l.	ds.	aul.
malayalam	൧.	൧൨.	൧൨൩.	൧൨൩൪.
mongolian	᠑	᠑᠒	᠑᠒᠓	᠑᠒᠓᠔
myanmar	၁	၁၂	၁၂၃	၁၂၃၄
oriya	୧.	୧୨.	୧୨୩.	୧୨୩୪.
persian	۱.	۱۲.	۱۲۳.	۱۲۳۴.
simp-chinese-formal	壹	拾貳	壹佰貳拾參	壹仟貳佰參拾肆
simp-chinese-informal	一	十二	一百二十三	一千二百三十四
telugu	౧.	౧౨.	౧౨౩.	౧౨౩౪.
thai	๑	๑๒	๑๒๓	๑๒๓๔
tibetan	༡	༡༢	༡༢༣	༡༢༣༤
urdu	۱.	۱۲.	۱۲۳.	۱۲۳۴.
-ro-spelled-out-en	one	twelve	one hundred twenty-three	one thousand two hundred thirty-four
-ro-spelled-out-en-ordinal	first	twelfth	one hundred twenty-third	one thousand two hundred thirty-fourth
-ro-spelled-out-de	eins	zwölf	einhundertdreiundzwanzig	eintausendzweihundertvierunddreißig
-ro-spelled-out-fr	un	douze	cent vingt-trois	mille deux cent trente-quatre

C.7 CSS Documentation

PDFreactor supports the following CSS properties and functions.

C.7.1 Properties

`-ro-align-content`

Aligns the content of a block-level element inside the element. The property has no effect if the height of the content is larger than the block element's height.

Value:	**auto | start | center | end**
Initial:	auto
Applies To:	block-level elements
Inherited:	No

auto

The content is positioned as usual inside the block.

start

Content is positioned at the top of the block.

center

Content is vertically centered inside the block.

end

Content is positioned at the bottom of the block.

align-content

Defines how the space between and around flex content items is distributed.

Value:	**flex-start | flex-end | center | space-between | space-around | stretch**
Initial:	stretch
Applies To:	multi-line flex containers
Inherited:	No

align-items

Defines how the space between and around flex items along the cross-axis is distributed.

Value:	**flex-start | flex-end | center | baseline | stretch**
Initial:	stretch
Applies To:	flex containers
Inherited:	No

align-self

Overrides the alignment defined by the align-items property.

Value:	**auto | flex-start | flex-end | center | baseline | stretch**
Initial:	auto
Applies To:	flex items
Inherited:	No

- *See also:* `align-items`

-ro-alt-text

The property -ro-alt-text is used to specify an alternative description for an element for use in PDF tags.

Value:	**auto | none | <string>**
Initial:	auto
Inherited:	No

auto

The alternate text is determined from the document, if possible.

none

The element receives no alternate text.

<string>

Specific alternate text for the element.

■ *More information:* Tagged PDF (p. 56)

-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.

Value:	**none | <string>**
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. 51)

-ro-art-size

Specifies the size of the ArtBox, one of the PDF page boxes.

Value:	**none | <length>{1,2} | [<page-size> || [portrait | landscape]] | media | trim | crop**
Initial:	none
Applies To:	page context
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. 90)

`-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.)

Value:	**none | [<string> | content()]+**
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. 54)

`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.

Value:	**[<bg-layer>,]* <final-bg-layer>**
Initial:	see individual properties
Inherited:	No

bg-layer

<bg-image> || <position> [/ <bg-size>]? || <repeat-style> || <attachment> || <box> || <box>

final-bg-layer

<bg-image> || <position> [/ <bg-size>]? || <repeat-style> || <attachment> || <box> || <box> || <'background-color'>

- *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

Value:	**<attachment>#**
Initial:	scroll
Inherited:	No

scroll

This keyword means that 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

This keyword means that the background is fixed with regard to the viewport. Even if an element has a scrolling mechanism, a 'fixed' background doesn't move with the element.

background-clip

Determines the background painting area, which determines the area within which the background is painted.

Value:	**[border-box | padding-box | content-box]#**
Initial:	border-box
Inherited:	No

border-box

The background is painted within (clipped to) the border box.

padding-box

The background is painted within (clipped to) the padding box.

content-box

The background is painted within (clipped to) the content box.

background-color

This property sets the background color of an element. The color is drawn behind any background images.

Value:	**<color>**
Initial:	transparent
Inherited:	No

<color>

Is a CSS <color> that describes the uniform color of the background. Even if one or several background-image are defined, this color can be affect the rendering, by transparency if the images aren't opaque.

■ *More information:* CSS Color Keywords (p. 130)

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).

Value:	**<bg-image>#**
Initial:	none
Inherited:	No

<bg-image>

<bg-image> can either be a <uri> to an image or the identifier "none". A value of ‘none’ counts as an image layer but draws nothing. An image that is empty (zero width or zero height), that fails to download, or that cannot be displayed (e.g., because it is not in a supported image format) likewise counts as a layer but draws nothing.

<uri>

The format of a URI value is 'url(' followed by optional white space followed by an optional single quote (') or double quote (") character followed by the URI itself, followed by an optional single quote (') or double quote (") character followed by optional white space followed by ')'. The two quote characters must be the same.

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).

Value:	**<box>#**
Initial:	padding-box
Inherited:	No

<box>

border-box | padding-box | content-box | -ro-page-box | -ro-bleed-box

padding-box

The position is relative to the padding box. (For single boxes '0 0' is the upper left corner of the padding edge, '100% 100%' is the lower right corner.)

border-box

The position is relative to the border box.

content-box

The position is relative to the content 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.

■ *See also:* `box-decoration-break`

background-position

If a background image has been specified, this property specifies its initial position. If only one value is specified, the second value is assumed to be 'center'. If at least one value is not a keyword, then the first value represents the horizontal position and the second represents the vertical position. Negative <percentage> and <length> values are allowed.
<position> = [
[left | center | right | top | bottom | <percentage> | <length>]
|
[left | center | right | <percentage> | <length>]
[top | center | bottom | <percentage> | <length>]
|
[center | [left | right] [<percentage> | <length>]?] &&
[center | [top | bottom] [<percentage> | <length>]?]
]

Value:	**<position>#**
Initial:	0% 0%
Inherited:	No

<percentage>

A percentage X aligns the point X% across (for horizontal) or down (for vertical) the image with the point X% across (for horizontal) or down (for vertical) the element's padding box. For example, with a value pair of '0% 0%',the upper left corner of the image is aligned with the upper left corner of the padding box. A value pair of '100% 100%' places the lower right corner of the image in the lower right corner of the padding box. With a value pair of '14% 84%', the point 14% across and 84% down the image is to be placed at the point 14% across and 84% down the padding box.

<length>

A length L aligns the top left corner of the image a distance L to the right of (for horizontal) or below (for vertical) the top left corner of the element's padding box. For example, with a value pair of '2cm 1cm', the upper left corner of the image is placed 2cm to the right and 1cm below the upper left corner of the padding box.

top

Equivalent to '0%' for the vertical position.

right

Equivalent to '100%' for the horizontal position.

bottom

Equivalent to '100%' for the vertical position.

left

Equivalent to '0%' for the horizontal position.

center

Equivalent to '50%' for the horizontal position if it is not otherwise given, or '50%' for the vertical position if it is.

background-repeat

If a background image is specified, this property specifies whether the image is repeated (tiled), and how. All tiling covers the content, padding and border areas of a box.
<repeat-style> = repeat-x | repeat-y | [repeat | space | round | no-repeat]{1,2}
If two keywords are used, the first defines the horizontal repeat style, the second the vertical one.

Value:	**<repeat-style>#**
Initial:	repeat
Inherited:	No

repeat

The image is repeated both horizontally and vertically. Or for one direction if used together with another keyword.

repeat-x

The image is repeated horizontally only.

repeat-y

The image is repeated vertically only.

no-repeat

The image is not repeated: only one copy of the image is drawn.

space

The image is repeated as often as possible without clipping. The remaining space is then distributed between the images.

round

The image is repeated as often as possible without clipping. Then the remaining space is filled by scaling the images until they fit.

background-size

Specifies the size of the background images.
<bg-size> = [<length> | <percentage> | auto]{1,2} | cover | contain

Value:	**<bg-size>#**
Initial:	auto
Inherited:	No

[<length> | <percentage> | auto]{1,2}

The first value gives the width of the corresponding image, the second value its height. If only one value is given the second is assumed to be 'auto'. A percentage is relative to the background positioning area. An 'auto' value for one dimension is resolved by using the image's intrinsic ratio and the size of the other dimension, or failing that, using the image's intrinsic size, or failing that, treating it as 100%. If both values are 'auto' then the intrinsic width and/or height of the image should be used, if any, the missing dimension (if any) behaving as 'auto' as described above. If the image has neither an intrinsic width nor an intrinsic height, its size is determined as for 'contain'. Negative values are not allowed.

cover

Scales the image so that it completely covers the area, without changing its aspect ratio.

contain

Scales the image so that it completely fits in the area, without changing its aspect ratio.

`-ro-bleed-width`

Specifies the width of the bleed area around the TrimBox. This implicitly defines the size of the BleedBox. Twice the bleed widthadded up on the width and height of the TrimBox' (twice for both sides of the TrimBox).

Value:	**none | <length>**
Initial:	none
Applies To:	page context
Inherited:	No

none

There is no bleed area round the TrimBox.

<length>

The length of the bleed area on each side of the TrimBox.

- *See also:* `size`
- *More information:* PDF Page Boxes (p. 90)

-ro-bookmark-label

Defines the text content of a bookmark, i.e. the title as it appears in a PDF reader's outline.

Value:	**[<string> | <named-string> | <quote> | counter() | counters() | content() | target-text() | target-counters() | target-counter()]+**
Initial:	content(text)
Inherited:	No

-ro-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).

Value:	**none | <integer>**
Initial:	none
Inherited:	No

-ro-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.

Value:	**open | closed**
Initial:	open
Applies To:	block-level elements
Inherited:	No

-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.

Value:	**true | false**
Initial:	false
Applies To:	iframe
Inherited:	No

- *More information:* iframes (p. 40)

border

This property is a shorthand property for setting the same width, color, and style for all four borders of a box.

Value:	**<line-width> || <line-style> || <color>**
Initial:	see individual properties
Inherited:	No

■ *See also:* `border-color`, `border-style`, `border-width`

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. The first value is the horizontal radius, the second the vertical radius. If the second value is omitted it is copied from the first. If either length is zero, the corner is square, not rounded. Percentages for the horizontal radius refer to the width of the border box, whereas percentages for the vertical radius refer to the height of the border box. Negative values are not allowed.

Value:	**[<length> | <percentage>]{1,2}**
Initial:	0
Applies To:	all elements (but see prose)
Inherited:	No

■ *See also:* `border-radius`

border-collapse

This property selects a table's border model. The value 'separate' selects the separated borders border model. The value 'collapse' selects the collapsing borders model.

Value:	**collapse | separate**
Initial:	separate
Applies To:	'table' and 'inline-table' elements
Inherited:	Yes

border-color

The 'border-color' property sets the color of the four borders.
The 'border-color' property can have from one to four component values, and the values are set on the different sides as for 'border-width'.

Value:	**[<color>]{1,4}**
Initial:	see individual properties
Inherited:	No

<color>

Specifies a color value.

transparent

The border is transparent (though it may have width).

- *See also:* `border-*-color`
- *More information:* CSS Color Keywords (p. 130)

-ro-border-inline-start
-ro-border-inline-end
-ro-border-block-start
-ro-border-block-end

BiDi text direction dependent alternatives for border-left, border-right, border-top and border-bottom.

Value:	**<border-width> || <border-style> || <'border-top-color'>**
Initial:	see individual properties
Inherited:	No

- *See also:* `border-top, border-right, border-bottom, border-left`
- *More information:* Text Direction Dependent Layouts (p. 101)

-ro-border-inline-start-color
-ro-border-inline-end-color
-ro-border-block-start-color
-ro-border-block-end-color

BiDi text direction dependent alternatives for border-left-color, border-right-color, border-top-color and border-bottom-color.

Value:	**<color>**
Initial:	currentColor
Inherited:	No

- *See also:* `border-*-color`
- *More information:* Text Direction Dependent Layouts (p. 101)

-ro-border-inline-start-style
-ro-border-inline-end-style
-ro-border-block-start-style
-ro-border-block-end-style

BiDi text direction dependent alternatives for border-left-style, border-right-style, border-top-style and border-bottom-style.

Value:	**<border-style>**
Initial:	none
Inherited:	No

- *See also:* `border-*-style`
- *More information:* Text Direction Dependent Layouts (p. 101)

-ro-border-inline-start-width
-ro-border-inline-end-width
-ro-border-block-start-width
-ro-border-block-end-width

BiDi text direction dependent alternatives for border-left-width, border-right-width, border-top-width and border-bottom-width.

Value:	**<border-width>**
Initial:	medium
Inherited:	No

- *See also:* `border-*-width`
- *More information:* Text Direction Dependent Layouts (p. 101)

-ro-border-length

Defines the length of a top border starting from the left (or the right if direction is right-to-left).

Value:	**<percentage> | <length> | auto**
Initial:	100%
Inherited:	No

border-radius

The 'border-radius' shorthand sets all four 'border-*-radius' properties. If values are given before and after the slash, then the values before the slash set the horizontal radius and the values after the slash set the vertical radius. If there is no slash, then the values set both radii equally. The four values for each radii are given in the order top-left, top-right, bottom-right, bottom-left. If bottom-left is omitted it is the same as top-right. If bottom-right is omitted it is the same as top-left. If top-right is omitted it is the same as top-left.

Value:	**[<length> | <percentage>]{1,4} [/ [<length> | <percentage>]{1,4}]?**
Initial:	see individual properties
Applies To:	all elements (but see prose)
Inherited:	No

- *See also:* `border-*-radius`

border-spacing

The lengths specify the distance that separates adjoining cell borders. If one length is specified, it gives both the horizontal and vertical spacing. If two are specified, the first gives the horizontal spacing and the second the vertical spacing. Lengths may not be negative.
The distance between the table border and the borders of the cells on the edge of the table is the table's padding for that side, plus the relevant border spacing distance. For example, on the right hand side, the distance is padding-right + horizontal border-spacing.

Value:	**<length> <length>?**
Initial:	0
Applies To:	'table' and 'inline-table' elements
Inherited:	Yes

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'.

Value:	**<border-style>{1,4}**
Initial:	see individual properties
Inherited:	No

<border-style>

see individual properties

- *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> || <'border-top-color'>**
Initial:	see individual properties
Inherited:	No

- *See also:* `-ro-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

<color>

Specifies a color value.

- *See also:* `-ro-border-*-color`
- *More information:* CSS Color Keywords (p. 130)

`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

none

No border; the computed border width is zero.

hidden

Same as 'none', except in terms of border conflict resolution for table elements.

dotted

The border is a series of dots.

dashed

The border is a series of short line segments.

solid

The border is a single line segment.

double

The border is two solid lines. The sum of the two lines and the space between them equals the value of 'border-width'.

groove

The border looks as though it were carved into the canvas.

ridge

The opposite of 'groove': the border looks as though it were coming out of the canvas.

inset

The border makes the box look as though it were embedded in the canvas.

outset

The opposite of 'inset': the border makes the box look as though it were coming out of the canvas.

- *See also:* `-ro-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. The properties defined in this section refer to the <border-width> value type, which may take one of the following values:

Value:	**<border-width>**
Initial:	medium
Inherited:	No

thin

A thin border.

medium

A medium border.

thick

A thick border.

<length>

The border's thickness has an explicit value. Explicit border widths cannot be negative.

- *See also:* `-ro-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.
If there is only one component value, it applies to all sides. If there are two values, the top and bottom borders are set to the first value and the right and left are set to the second. If there are three values, the top is set to the first value, the left and right are set to the second, and the bottom is set to the third. If there are four values, they apply to the top, right, bottom, and left, respectively.

Value:	**<border-width>{1,4}**
Initial:	see individual properties
Inherited:	No

- *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.

Value:	**<length> | <percentage> | auto**
Initial:	auto
Applies To:	positioned elements
Inherited:	No

<length>

The offset is a fixed distance from the reference edge. Negative values are allowed.

<percentage>

The offset is a percentage of the containing block's height. Negative values are allowed.

auto

For non-replaced elements, the effect of this value depends on which of related properties have the value 'auto' as well. For replaced elements, the effect of this value depends on the intrinsic dimensions of the replaced content.

- *See also:* `-ro-offset-*`

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".

Value:	**slice | clone**
Initial:	clone
Inherited:	No

clone

Each box fragment is rendered individually. Margins, borders, and paddings wrap around all edges of the box. Backgrounds are restart in each fragment.

slice

The box fragments are rendered as if they were sliced. Background images are continued in the next fragment, margins, border and paddings are removed "between" the fragments.

box-shadow

Applies one or more rectangular shadows to a box.

Value:	**none | [inset? && <length>{2,4} && <color>?]#**
Initial:	none
Inherited:	No

inset

If specified, the box-shadow is applied on the inside of the element.

<offset-x> <offset-y>

The first two <length> values specify the position of the shadow.

<blur-radius>

The third <length> value defines the radius of the shadow's blur.

<spread-radius>

The fourth <length> value defines by what length the shadow should be expanded, before the blur is applied.

<color>

The color of the shadow. If omitted, the current value of the color property is used.

box-sizing

Defines which box is used to calculate the widths and heights of elements.

Value:	**content-box | border-box**
Initial:	content-box
Inherited:	No

content-box

This is the behavior as specified by CSS2.1. The width and height properties apply to the width and height of the content box of the element. The padding and border of the element are laid out and drawn outside the specified width and height.

border-box

Width and height properties on this element determine the border box of the element. That means that any padding or border specified on the element is laid out and drawn inside this specified width and height.

`break-before`
`break-after`

These properties describe page/column/region break behavior before/after the element's box.

Value:	**auto | always | avoid | left | right | verso | recto | page | column | region | avoid-page | avoid-column | avoid-region**
Initial:	auto
Applies To:	block-level elements
Inherited:	No

auto

Neither force nor forbid a page/column/region break before/after the box.

always

Always force a page break before/after the box.

avoid

Avoid a page/column/region break before/after the box.

left

Force one or two page breaks before/after the box so that the next page is formatted as a left page, inserting a blank page if necessary.

right

Force one or two page breaks before/after the box so that the next page is formatted as a right page, inserting a blank page if necessary.

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'.

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'.

page

Always force a page break before (after) the box.

column

Always force a column break before/after the box.

region

Always force a region break before/after the box.

avoid-page

Avoid a page break before/after the box.

avoid-column

Avoid a column break before/after the box.

avoid-region

Avoid a region break before/after the box.

■ *More information:* Controlling Breaks (p. 89)

break-inside

This property describes the page/column/region break behavior inside the element's box.

Value:	**auto | avoid | avoid-page | avoid-column | avoid-region**
Initial:	auto
Applies To:	block-level elements
Inherited:	No

auto

Neither force nor forbid a page break inside the generated box.

avoid

Avoid any break inside the generated box.

avoid-page

Avoid a page/column/region break inside the generated box.

avoid-column

Avoid a column break inside the generated box.

avoid-region

Avoid a region break inside the generated box.

■ *More information:* Controlling Breaks (p. 89)

caption-side

This property specifies the position of the caption box with respect to the table box.

Value:	**top | bottom**
Initial:	top
Applies To:	'table-caption' elements
Inherited:	Yes

top

Positions the caption box above the table box.

bottom

Positions the caption box below the table box.

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.

Value:	**none | left | right | -ro-inline-start | -ro-inline-end | both**
Initial:	none
Inherited:	No

left

Requires that the top border edge of the box be below the bottom outer edge of any left-floating boxes that resulted from elements earlier in the source document.

right

Requires that the top border edge of the box be below the bottom outer edge of any right-floating boxes that resulted from elements earlier in the source document.

-ro-inline-start

BiDi text direction dependent alternative for 'left' or 'right'.

-ro-inline-end

BiDi text direction dependent alternative for 'right' or 'left'.

both

Requires that the top border edge of the box be below the bottom outer edge of any right-floating and left-floating boxes that resulted from elements earlier in the source document.

none

No constraint on the box's position with respect to floats.

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.

Value:	**<shape> | auto**
Initial:	auto
Applies To:	absolutely positioned elements
Inherited:	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).

color

This property describes the foreground color of an element's text content.

Value:	**<color>**
Initial:	black
Inherited:	Yes

<color>

Specifies the foreground color.

■ *More information:* CSS Color Keywords (p. 130)

-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.

Value:	**gradient-tint | progressive-color | [<color>]+ | none**
Initial:	none
Applies To:	page context
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. 92), CSS Color Keywords (p. 130)

-ro-column-break-before
-ro-column-break-after

These properties describe column break behavior before/after the element's box.

Value:	**auto | always | avoid**
Initial:	auto
Applies To:	block-level elements
Inherited:	No

■ *Deprecated!* Use `break-before, break-after` instead.

column-count

This property describes the number of columns of a multicol element.

Value:	**<integer> | auto**
Initial:	auto
Applies To:	non-replaced block-level elements (except table elements), table cells, and inline-block elements
Inherited:	No

auto

means that the number of columns will be determined by other properties (e.g., 'column-width', if it has a non-auto value).

<integer>

describes the optimal number of columns into which the content of the element will be flowed. Values must be greater than 0. If both 'column-width' and 'column-count' have non-auto values, the integer value describes the maximum number of columns.

■ *More information:* Multi-column Layout (p. 84)

-ro-column-count

This property describes the number of columns of a multicol element.

Value:	**<integer> | auto**
Initial:	auto
Inherited:	No

■ *Deprecated!* Use `column-count` instead.

`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.

Value:	**balance | auto**
Initial:	balance
Applies To:	multicol elements
Inherited:	No

balance

Balance content equally between columns, if possible.

auto

Fills columns sequentially.

■ *More information:* Multi-column Layout (p. 84)

`-ro-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.

Value:	**balance | auto**
Initial:	balance
Inherited:	No

■ *Deprecated!* Use `column-fill` instead.

`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.

Value:	**<length> | <percentage> | normal**
Initial:	normal
Applies To:	multicol elements
Inherited:	No

normal

The 'normal' value is interpreted as 1em.

<length>

Specifies the width of the gap. Column gaps cannot be negative.

■ *More information:* Multi-column Layout (p. 84)

-ro-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.

Value:	**<length> | normal**
Initial:	normal
Inherited:	No

- *Deprecated!* Use `column-gap` instead.

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

- *See also:* `column-rule-color`, `column-rule-style`, `column-rule-width`
- *More information:* Multi-column Layout (p. 84)

-ro-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
Inherited:	No

- *Deprecated!* Use `column-rule` instead.

column-rule-color

This property sets the color of the column rule.

Value:	**<color> | none**
Initial:	currentColor
Applies To:	multicol elements
Inherited:	No

- *More information:* Multi-column Layout (p. 84), CSS Color Keywords (p. 130)

-ro-column-rule-color

This property sets the color of the column rule.

Value:	**<color> | none**
Initial:	currentColor
Inherited:	No

- *Deprecated!* Use `column-rule-color` instead.

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

- *See also:* `border-style`
- *More information:* Multi-column Layout (p. 84)

-ro-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
Inherited:	No

- *Deprecated!* Use `column-rule-style` instead.

column-rule-width

This property sets the width of the rule between columns. Negative values are not allowed.

Value:	**<border-width> | <percentage> | none**
Initial:	medium
Applies To:	multicol elements
Inherited:	No

- *See also:* `border-width`
- *More information:* Multi-column Layout (p. 84)

`-ro-column-rule-width`

Value:	**<border-width> | <percentage> | none**
Initial:	medium
Inherited:	No

■ *Deprecated!* Use `column-rule-width` instead.

`column-span`

This property describes how many columns an element spans across.

Value:	**none | all**
Initial:	none
Applies To:	block-level elements, except floating and absolutely positioned elements
Inherited:	No

none

The element does not span multiple columns.

all

The element spans across all columns. Content in the normal flow that appears before the element is automatically balanced across all columns before the element appears. The element establishes a new block formatting context.

■ *More information:* Multi-column Layout (p. 84)

`-ro-column-span`

This property describes how many columns an element spans across.

Value:	**none | all**
Initial:	none
Inherited:	No

■ *Deprecated!* Use `column-span` instead.

`column-width`

This property describes the width of columns in multicol elements.

Value:	**<length> | <percentage> | auto**
Initial:	auto
Applies To:	non-replaced block-level elements (except table elements), table cells, and inline-block elements
Inherited:	No

auto

means that the column width will be determined by other properties (e.g., 'column-count', if it has a non-auto value).

<length>

describes the optimal column width. The actual column width may be wider (to fill the available space), or narrower (only if the available space is smaller than the specified column width). Specified values must be greater than 0.

■ *More information:* Multi-column Layout (p. 84)

`-ro-column-width`

This property describes the width of columns in multicol elements.

Value:	**<length> | auto**
Initial:	auto
Inherited:	No

■ *Deprecated!* Use `-ro-column-width` instead.

`columns`

This is a shorthand property for setting 'column-width' and 'column-count'. Omitted values are set to their initial values.

Value:	**<integer> | <length> | auto**
Initial:	see individual properties
Applies To:	non-replaced block-level elements (except table elements), table cells, and inline-block elements
Inherited:	No

■ *See also:* `column-count`, `column-width`
■ *More information:* Multi-column Layout (p. 84)

-ro-columns

This is a shorthand property for setting 'column-width' and 'column-count'. Omitted values are set to their initial values.

Value:	**<integer> | <length> | auto**
Initial:	see individual properties
Inherited:	No

■ *Deprecated!* Use `columns` instead.

-ro-comment-color

Specifies the color of the comment.

Value:	**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. 51), CSS Color Keywords (p. 130)

-ro-comment-content

Specifies the content of a comment.

Value:	**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. 51)

-ro-comment-date

Specifies the date of the comment.

Value:	**auto | <string>**
Initial:	auto
Inherited:	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. 51)

-ro-comment-dateformat

The format wich 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.

Value:	**<string>**
Initial:	"yyyy-MM-dd'T'kk:mm:ss"
Inherited:	No

<string>

The date format for the comment.

■ *More information:* Comments (p. 51)

-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.

■ *More information:* Comments (p. 51)

-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. 51)

-ro-comment-state

The initial state of the comment bubbles displayed by the viewer. This property only affects certain PDF viewers.

Value:	**open | closed**
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. 51)

-ro-comment-style

Specifies the style of the comment.

Value:	**note | highlight | underline | strikeout | squiggly | invisible**
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. 51)

-ro-comment-title

Specifies the title or author of the comment.

Value:	**none | <string>**
Initial:	none
Inherited:	No

none

The comment receives no title.

<string>

Defines the title of the comment.

■ *More information:* Comments (p. 51)

content

This property is used with the :before and :after pseudo-elements to generate content in a document.

Value:	**normal | none | [<string> | <named-string> | <uri> | <quote> | counter() | counters() | content() | target-text() | target-counters() | target-counter() | leader()]+ | <running-element> | <running-document>**
Initial:	normal
Applies To:	:before and :after pseudo-elements as well as page-margin boxes
Inherited:	No

none

The pseudo-element is not generated.

normal

Computes to 'none' for the :before and :after pseudo-elements.

<string> ☛ **(p. 237)**

Text content.

<counter> ☛ **(p. 230)**

Counters may be specified with two different functions: 'counter()' or 'counters()'.

<target-counter> ☛ (p. 237)

Target counters may be specified with two different functions: 'target-counter()' or 'target-counters()'.

<target-text> ☛ (p. 237)

Target text may be specified with the function: 'target-text()'.

<named-string> ☛ (p. 237)

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).

<leader> ☛ (p. 233)

Leaders may be specified with the function: 'leader()'.

<running-element> ☛ (p. 231)

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).

■ *More information:* Generated Content (p. 72), Page Header & Footer (p. 74), Generated Content for Pages (p. 78)

counter-increment

The 'counter-increment' property accepts one or more names of counters (identifiers), each one optionally followed by an integer. The integer indicates by how much the counter is incremented for every occurrence of the element. The default increment is 1. Zero and negative integers are allowed.

Value:	**none | [<identifier> <integer>?]+**
Initial:	none
Inherited:	No

■ *More information:* Counters (p. 73), Page Counters (p. 78)

counter-reset

The 'counter-reset' 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.

Value:	**none | [<identifier> <integer>?]+**
Initial:	none
Inherited:	No

■ *More information:* Counters (p. 73), Page Counters (p. 78)

-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.

Value:	**none | [<identifier> <integer>?]+**
Initial:	none
Inherited:	No

■ *More information:* Page Counters (p. 78)

-ro-crop-size

Specifies the size of the CropBox, one of the PDF page boxes.

Value:	**none | <length>{1,2} | [<page-size> || [portrait | landscape]] | media | trim | art**
Initial:	none
Applies To:	page context
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. 90)

cursor

This property specifies the type of cursor to be displayed for the pointing device.

Value:	**[<uri>,]* [auto | crosshair | default | pointer | move | e-resize | ne-resize | nw-resize | n-resize | se-resize | sw-resize | s-resize | w-resize | text | wait | help | progress]**
Initial:	auto
Inherited:	Yes

auto

The UA determines the cursor to display based on the current context.

crosshair

A simple crosshair (e.g., short line segments resembling a "+" sign).

default

The platform-dependent default cursor. Often rendered as an arrow.

pointer

The cursor is a pointer that indicates a link.

move

Indicates something is to be moved.

e-resize, ne-resize, nw-resize, n-resize, se-resize, sw-resize, s-resize, w-resize

Indicate that some edge is to be moved. For example, the 'se-resize' cursor is used when the movement starts from the south-east corner of the box.

text

Indicates text that may be selected. Often rendered as an I-beam.

wait

Indicates that the program is busy and the user should wait. Often rendered as a watch or hourglass.

progress

A progress indicator. The program is performing some processing, but is different from 'wait' in that the user may still interact with the program. Often rendered as a spinning beach ball, or an arrow with a watch or hourglass.

help

Help is available for the object under the cursor. Often rendered as a question mark or a balloon.

<uri>

The user agent retrieves the cursor from the resource designated by the URI. If the user agent cannot handle the first cursor of a list of cursors, it should attempt to handle the second, etc. If the user agent cannot handle any user-defined cursor, it must use the generic cursor at the end of the list. Intrinsic sizes for cursors are calculated as for background images, except that a UA-defined rectangle is used in place of the rectangle that establishes the coordinate system for the 'background-image' property. This UA-defined rectangle should be based on the size of a typical cursor on the UA's operating system. If the resulting cursor size does not fit within this rectangle, the UA may proportionally scale the resulting cursor down until it fits within the rectangle.

direction

This property specifies the base writing direction of blocks and the direction of embeddings and overrides (see 'unicode-bidi') for the Unicode bidirectional algorithm. In addition, it specifies such things as the direction of table column layout, the direction of horizontal overflow, the position of an incomplete last line in a block in case of 'text-align: justify'.

Value:	**ltr | rtl**
Initial:	ltr
Applies To:	all elements (but see prose)
Inherited:	Yes

ltr

Left-to-right direction.

rtl

Right-to-left direction.

- *See also:* `unicode-bidi`
- *More information:* How Do I Create a Document With a Text Direction of Right-to-Left? (p. 107)

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. For the root element, the computed value is changed as described in the section on the relationships between 'display', 'position', and 'float'.
Note that although the initial value of 'display' is 'inline', rules in the user agent's default style sheet may override this value. See the sample style sheet for HTML 4 in the appendix.

Value:	**inline | block | list-item | inline-block | table | inline-table | table-row-group | table-column | table-column-group | table-header-group | table-footer-group | table-row | table-cell | table-caption | flex | inline-flex | none**
Initial:	inline
Inherited:	No

block

This value causes an element to generate a block box.

inline-block

This value causes an element to generate an inline-level block container. The inside of an inline-block is formatted as a block box, and the element itself is formatted as an atomic inline-level box.

inline

This value causes an element to generate one or more inline boxes.

list-item

This value causes an element (e.g., LI in HTML) to generate a principal block box and a marker box. For information about lists and examples of list formatting, please consult the section on lists.

table, inline-table, table-row-group, table-column, table-column-group, table-header-group, table-footer-group, table-row, table-cell, and table-caption

These values cause an element to behave like a table element (subject to restrictions described in the chapter on tables).

flex

This value cause an element to behave the same like a block element and lays out its content according to the flexible box model.

inline-flex

The value cause an element to behave like an inline element and lays out its content according to the flexible box model.

none

This value causes an element to not appear in the formatting structure (i.e., in visual media the element generates no boxes and has no effect on layout). Descendant elements do not generate any boxes either; the element and its content are removed from the formatting structure entirely. This behavior cannot be overridden by setting the 'display' property on the descendants. Please note that a display of 'none' does not create an invisible box; it creates no box at all. CSS includes mechanisms that enable an element to generate boxes in the formatting structure that affect formatting but are not visible themselves. Please consult the section on visibility for details.

`empty-cells`

In the separated borders model, this property controls the rendering of borders and backgrounds around cells that have no visible content. Empty cells and cells with the 'visibility' property set to 'hidden' are considered to have no visible content.

Value:	**show | hide**
Initial:	show
Applies To:	'table-cell' elements
Inherited:	Yes

show

When this property has the value 'show', borders and backgrounds are drawn around/behind empty cells (like normal cells).

hide

A value of 'hide' means that no borders or backgrounds are drawn around/behind empty cells. Furthermore, if all the cells in a row have a value of 'hide' and have no visible content, then the row has zero height and there is vertical border-spacing on only one side of the row.

`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.

Value:	**[<filter-function>]+ | none**
Initial:	none
Inherited:	No

■ *See also:* blur (p. 229), brightness (p. 229), contrast (p. 230), drop-shadow (p. 231), grayscale (p. 231), hue-rotate (p. 232), invert (p. 233), opacity (p. 234), `-ro-rasterization-supersampling`, saturate (p. 236), sepia (p. 237)

`first-page-side`

Defines whether the first page of the document is a left or right page.

Value:	**left | right | verso | recto | auto**
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. 100)

`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.

Value:	**left | right | verso | recto | auto**
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. 100)

flex

Specifies the components of a flexible length: The grow factor, the shrink factor and the basis.

Value:	**none | [<'flex-grow'> <'flex-shrink'>? || <'flex-basis'>]**
Initial:	1 0 auto
Applies To:	flex items
Inherited:	No

- *See also:* `flex-basis`, `flex-grow`, `flex-shrink`

flex-basis

Sets the flex basis.

Value:	**content | <'width'>**
Initial:	auto
Applies To:	flex items
Inherited:	No

flex-direction

Specifies in which direction flex items are placed in the flex container.

Value:	**row | row-reverse | column | column-reverse**
Initial:	row
Applies To:	flex containers
Inherited:	No

flex-flow

Shorthand property for flex-direction and flex-wrap.

Value:	**<'flex-direction'> || <'flex-wrap'>**
Initial:	row nowrap
Applies To:	flex containers
Inherited:	Yes

- *See also:* `flex-direction`, `flex-wrap`

flex-grow

Sets the flex grow factor.

Value:	**<number>**
Initial:	0
Applies To:	flex items
Inherited:	No

flex-shrink

Sets the flex shrink factor.

Value:	**<number>**
Initial:	1
Applies To:	flex items
Inherited:	No

flex-wrap

Specifies if and how a flex line is broken, if an item does not fit in the line anymore.

Value:	**nowrap | wrap | wrap-reverse**
Initial:	nowrap
Applies To:	flex containers
Inherited:	No

float

This property specifies whether a box should float to the left, right, or not at all. It may be set for any element, but only applies to elements that generate boxes that are not absolutely positioned.

Value:	**left | right | -ro-inline-start | -ro-inline-end | footnote | none**
Initial:	none
Inherited:	No

left

The element generates a block box that is floated to the left. Content flows on the right side of the box, starting at the top (subject to the 'clear' property).

right

Similar to 'left', except the box is floated to the right, and content flows on the left side of the box, starting at the top.

-ro-inline-start

BiDi text direction dependent alternative for 'left' or 'right'.

-ro-inline-end

BiDi text direction dependent alternative for 'right' or 'left'.

none

The box is not floated.

- *See also:* `position`
- *More information:* Footnotes (p. 82)

-ro-flow-from

The 'flow-from' property makes a block container a region and associates it with a named flow.

Value:	**none | <identifier>**
Initial:	nona
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. 86)

-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.

Value:	**none | <identifier> [element|content]?**
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. 86)

font

The 'font' property is, except as described below, a shorthand property for setting 'font-style', 'font-variant', 'font-weight', 'font-size', 'line-height' and 'font-family' at the same place in the style sheet. The syntax of this property is based on a traditional typographical shorthand notation to set multiple properties related to fonts.
All font-related properties are first reset to their initial values, including those listed in the preceding paragraph. Then, those properties that are given explicit values in the 'font' shorthand are set to those values.

Value:	**['font-style' || 'font-weight' || 'font-variant']? 'font-size' [/ 'line-height']? 'font-family'**
Initial:	see individual properties
Inherited:	No

- *See also:* `font-family`, `font-size`, `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.

Value:	**subset | all | none**
Initial:	subset
Applies To:	@font-face
Inherited:	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:	depends on user agent
Inherited:	Yes

<family-name>

The name of a font family of choice.

<generic-family>

The following generic families are defined: 'serif' (e.g., Times) 'sans-serif' (e.g., Helvetica) 'cursive' (e.g., Zapf-Chancery) 'fantasy' (e.g., Western) 'monospace' (e.g., Courier) Style sheet designers are encouraged to offer a generic font family as a last alternative. Generic font family names are keywords and must NOT be quoted.

`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
Inherited:	Yes

<absolute-size>

An <absolute-size> keyword is an index to a table of font sizes computed and kept by the UA. Possible values are: [xx-small | x-small | small | medium | large | x-large | xx-large]

<relative-size>

A <relative-size> keyword is interpreted relative to the table of font sizes and the font size of the parent element. Possible values are: [larger | smaller]. For example, if the parent element has a font size of 'medium', a value of 'larger' will make the font size of the current element be 'large'.

font-style

The 'font-style' property selects between normal (sometimes referred to as "roman" or "upright"), italic and oblique faces within a font family.

Value:	**normal | italic | oblique**
Initial:	normal
Inherited:	Yes

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.

Value:	**normal | small-caps**
Initial:	normal
Inherited:	Yes

font-weight

The 'font-weight' property specifies the weight of a font.

Value:	**normal | bold | bolder | lighter | <numerical-font-weight>**
Initial:	normal
Inherited:	Yes

<numerical-font-weight>

One of the values '100', '200', '300', '400', '500', '600', '700', '800' or '900', where values of 400 or smaller are mapped to 'normal' and values of 500 or larger are mapped to 'bold'.

-ro-formelement-name

Defines from which element or attribute in the document the names of the form elements are adopted to a generated PDF.

Value:	**none | <string>**
Initial:	none
Applies To:	Form elements
Inherited:	No

- *More information:* Tagged PDF (p. 56)

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.

Value:	**<length> | <percentage> | auto**
Initial:	auto
Applies To:	all elements but non-replaced inline elements, table columns, and column groups
Inherited:	No

<length>

Specifies the height of the content area using a length value.

<percentage>

Specifies a percentage height. 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 value computes to 'auto'. A percentage height on the root element is relative to the initial containing block.

auto

The height depends on the values of other properties.

-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.

Value:	**auto | none**
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.

■ *More information:* Automatic Resizing of Form Controls (p. 104)

hyphenate-after

This property specifies the minimum number of characters in a hyphenated word after the hyphenation character. The 'auto' value means that the UA chooses a value that adapts to the current layout.

Value:	**<integer> | auto**
Initial:	auto
Inherited:	Yes

■ *More information:* Automatic Hyphenation (p. 71)

hyphenate-before

This property specifies the minimum number of characters in a hyphenated word before the hyphenation character. The 'auto' value means that the UA chooses a value that adapts to the current layout.

Value:	**<integer> | auto**
Initial:	auto
Inherited:	Yes

■ *More information:* Automatic Hyphenation (p. 71)

hyphenate-character

This property specifies a string that is shown when a hyphenate-break occurs. The 'auto' value means that the user agent should find an appropriate value.

Value:	**<string> | auto**
Initial:	auto
Inherited:	Yes

■ *More information:* Automatic Hyphenation (p. 71)

hyphens

This property controls whether hyphenation is allowed to create more soft wrap opportunities within a line of text.

Value:	**none | manual | auto**
Initial:	manual
Inherited:	Yes

none

Words are not hyphenated, even if characters inside the word explicitly define hyphenation opportunities.

manual

Words are only hyphenated where there are characters inside the word that explicitly suggest hyphenation opportunities.

auto

Words may be broken at appropriate hyphenation points either as determined by hyphenation characters inside the word or as determined automatically by a language-appropriate hyphenation resource. Conditional hyphenation characters inside a word, if present, take priority over automatic resources when determining hyphenation opportunities within the word.

■ *More information:* Automatic Hyphenation (p. 71)

-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.

Value:	**auto | [<compression-function> conditional?]**
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 (p. 233), lossless (p. 234)

-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).
Note: Using this feature may have an impact on the conversion time of large documents.

Value:	**none | <resolution>**
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`

initial-page

This defines to which page a viewer application should scroll when opening this document.

Value:	**<integer>**
Initial:	1
Applies To:	@-ro-preferences
Inherited:	No

■ *More information:* Document-Specific Preferences (p. 100)

initial-zoom

Defines the initial zoom factor when opening the document in a viewer application.

Value:	**auto | <percentage> | fit-page | fit-page-height | fit-page-width | fit-content | fit-content-height | fit-content-width**
Initial:	auto
Applies To:	@-ro-preferences
Inherited:	No

fit-page

The entire page is visible.

fit-page-height

The page fills the view port height.

fit-page-width

The page fills the view port width.

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.

■ *More information:* Document-Specific Preferences (p. 100)

justify-content

Specifies how the space between flex items along the main axis is distributed.

Value:	**flex-start | flex-end | center | space-between | space-around**
Initial:	flex-start
Applies To:	flex containers
Inherited:	No

-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. 54)

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.

Value:	**<length> | <percentage> | auto**
Initial:	auto
Applies To:	positioned elements
Inherited:	No

<length>

The offset is a fixed distance from the reference edge. Negative values are allowed.

<percentage>

The offset is a percentage of the containing block's width. Negative values are allowed.

auto

For non-replaced elements, the effect of this value depends on which of related properties have the value 'auto' as well. For replaced elements, the effect of this value depends on the intrinsic dimensions of the replaced content.

■ *See also:* `-ro-offset-*`

`letter-spacing`

This property specifies spacing behavior between text characters.

Value:	**normal | <length>**
Initial:	normal
Inherited:	Yes

normal

The spacing is the normal spacing for the current font. This value allows the user agent to alter the space between characters in order to justify text.

<length>

This value indicates inter-character space in addition to the default space between characters.

`-ro-line-grid`

Specifies whether this box creates a new baseline grid for its descendants or uses the same baseline grid as its parent.

Value:	**match-parent | create**
Initial:	match-parent
Applies To:	block containers
Inherited:	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. 85)

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. The minimum height consists of a minimum height above the baseline and a minimum depth below it, exactly as if each line box starts with a zero-width inline box with the element's font and line height properties.

Value:	**normal | <number> | <length> | <percentage>**
Initial:	normal
Inherited:	Yes

normal

Tells user agents to set the used value to a "reasonable" value based on the font of the element. The value has the same meaning as <number>. The computed value is 'normal'.

<length>

The specified length is used in the calculation of the line box height. Negative values are illegal.

<number>

The used value of the property is this number multiplied by the element's font size. Negative values are illegal. The computed value is the same as the specified value.

<percentage>

The computed value of the property is this percentage multiplied by the element's computed font size. Negative values are illegal.

-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.

Value:	**none | baseline | contain**
Initial:	none
Inherited:	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. 85)

`-ro-link`

This property allows to define hyperlinks via style. Multiple values are concatenated to one URL.

Value:	**none | [<string>]+**
Initial:	none
Applies To:	all elements
Inherited:	No

none

The element is not a hyperlink.

<string>

The element is a hyperlink to the URL the <string> contains.

- *See also:* `-ro-link-area`
- *More information:* Links (p. 51)

`-ro-link-area`

This property can be used to specify how the 'clickable' areas of a link are determined.

Value:	**content | block | content-block**
Initial:	content
Inherited:	No

content

For block elements there is one clickable area for each piece of content (text, image or empty block). For inline elements there is one clickable area for each part.

block

For block elements there is one clickable area for the whole block. For inline elements there is one clickable area for the bounding rectangle of all parts.

content-block

For block elements there is one clickable area for the bounding rectangle of the content. For inline elements there is one clickable area for the bounding rectangle of all parts.

- *See also:* `-ro-link`
- *More information:* Links (p. 51)

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.

Value:	**<'list-style-type'> || <'list-style-position'> || <'list-style-image'>**
Initial:	see individual properties
Applies To:	elements with 'display: list-item'
Inherited:	Yes

- *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.

Value:	**<uri> | none**
Initial:	none
Applies To:	elements with 'display: list-item'
Inherited:	Yes

list-style-position

This property specifies the position of the marker box with respect to the principal block box.

Value:	**inside | outside**
Initial:	outside
Applies To:	elements with 'display: list-item'
Inherited:	Yes

outside

The marker box is outside the principal block box. The position of the list-item marker adjacent to floats is undefined in CSS 2.1. CSS 2.1 does not specify the precise location of the marker box or its position in the painting order, but does require that for list items whose 'direction' property is 'ltr' the marker box be on the left side of the content and for elements whose 'direction' property is 'rtl' the marker box be on the right side of the content. The marker box is fixed with respect to the principal block box's border and does not scroll with the principal block box's content.

inside

The marker box is placed as the first inline box in the principal block box, before the element's content and before any :before pseudo-elements.

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.

Value:	**<counter-style> | none**
Initial:	disc
Applies To:	elements with 'display: list-item'
Inherited:	Yes

<counter-style>

The list item marker is formatted according to the given counter style. Unordered types are: box, check, circle, diamond, disc, dash, square. Ordered types are for example lower-alpha, lower-greek or upper-roman.

■ *More information:* Counter and Ordered List Style Types (p. 136)

-ro-listitem-value

The name of the property to determine the start number of a list item. The content contains the number a numbered itemized list starts width.

Value:	**<integer>**
Initial:	1
Applies To:	list-item
Inherited:	No

<integer>

The starting number of the current list item.

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.
If there is only one component value, it applies to all sides. If there are two values, the top and bottom margins are set to the first value and the right and left margins are set to the second. If there are three values, the top is set to the first value, the left and right are set to the second, and the bottom is set to the third. If there are four values, they apply to the top, right, bottom, and left, respectively.

Value:	**[<length> | <percentage> | auto]{1,4}**
Initial:	see individual properties
Applies To:	all elements except elements with table display types other than table-caption, table and inline-table
Inherited:	No

■ *See also:* `-ro-margin-*`, `margin-*`

-ro-margin-inline-start
-ro-margin-inline-end
-ro-margin-block-start
-ro-margin-block-end

BiDi text direction dependent alternatives for margin-left, margin-right, margin-top and margin-bottom.

Value:	**<length> | <percentage> | auto**
Initial:	0
Inherited:	No

- *See also:* `margin-*`
- *More information:* Text Direction Dependent Layouts (p. 101)

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

- *See also:* `-ro-margin-*`

-ro-marks

Adds the specified printer marks inside the page's MediaBox.

Value:	**none | [trim || bleed || registration]**
Initial:	none
Applies To:	page context
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. 92)

-ro-marks-color

Sets the color of the printer marks.

Value:	**<color>**
Initial:	black
Applies To:	page context
Inherited:	Yes

- *See also:* `-ro-marks`
- *More information:* Printer Marks (p. 92)

-ro-marks-width

Sets the width of the printer marks.

Value:	**none | <length>**
Initial:	0.5pt
Applies To:	page context
Inherited:	No

- *See also:* `-ro-marks`
- *More information:* Printer Marks (p. 92)

max-height

This property allows authors to limit box heights.

Value:	**<length> | <percentage> | none**
Initial:	none
Applies To:	all elements but non-replaced inline elements, table columns, and column groups
Inherited:	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.

- *See also:* min-height

max-width

This property allows authors to constrain content widths to a maximum.

Value:	**<length> | <percentage> | none**
Initial:	none
Applies To:	all elements but non-replaced inline elements, table rows, and row groups
Inherited:	No

<length>

Specifies a fixed maximum used width.

<percentage>

Specifies a percentage for determining the used value. The percentage is calculated with respect to the width of the generated box's containing block. If the containing block's width is negative, the used value is zero. If the containing block's width depends on this element's width, then the resulting layout is undefined in CSS 2.1.

none

No limit on the width of the box.

- *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.

Value:	**none | <length>{1,2} | auto | [<page-size> || [portrait | landscape]]**
Initial:	none
Applies To:	page context
Inherited:	No

- *See also:* -ro-bleed-width, -ro-colorbar-*, -ro-marks, size
- *More information:* PDF Page Boxes (p. 90)

min-height

This property allows authors to set a minimum box height.

Value:	**<length> | <percentage>**
Initial:	0
Applies To:	all elements but non-replaced inline elements, table columns, and column groups
Inherited:	No

<length>

Specifies a fixed minimum 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 '0'.

- *See also:* `max-height`

min-width

This property allows authors to constrain content widths to a minimum value.

Value:	**<length> | <percentage>**
Initial:	0
Applies To:	all elements but non-replaced inline elements, table rows, and row groups
Inherited:	No

<length>

Specifies a fixed minimum used width.

<percentage>

Specifies a percentage for determining the used value. The percentage is calculated with respect to the width of the generated box's containing block. If the containing block's width is negative, the used value is zero. If the containing block's width depends on this element's width, then the resulting layout is undefined in CSS 2.1.

- *See also:* `max-width`

object-fit

Defines how the content of a replaced element, e.g. an image, fits into its box.

Value:	**fill | contain | cover | none | scale-down**
Initial:	fill
Applies To:	Replaced Elements
Inherited:	No

fill

The content fills the complete element. The aspect ratio of images may be lost.

contain

The size of the content is adjusted so that it fits in the element (scaling up or down). The aspect ratio is preserved.

cover

The size of the content is adjusted so that it completely covers in element (scaling up or down). The aspect ratio is preserved.

none

The size of the content is not adjusted in any way.

scale-down

If the size of the content is too large, it is adjusted so that it fits in the element (as if "contain" was set). If it is smaller than the element, it keeps its size (as if "none" was set).

■ *See also:* `object-position`

object-position

Determines the alignment of a replaced element, e.g. an image, inside its box. <position> consists of the same possible values as supported by "background-position".
Note: This property has no effect unless "object-fit" is set to a non-default value.

Value:	**<position>**
Initial:	50% 50%
Applies To:	replaced elements
Inherited:	No

■ *See also:* `background-position`, `object-fit`

-ro-object-slice

When set to auto allows a block image to be split at page breaks.

Value:	**none | auto**
Initial:	none
Applies To:	Block replaced-elements
Inherited:	No

none

Default. Images are not split.

auto

Images are split at page breaks.

-ro-offset-inline-start
-ro-offset-inline-end
-ro-offset-block-start
-ro-offset-block-end

BiDi text direction dependent alternatives for left, right, top and bottom.

Value:	**<length> | <percentage> | auto**
Initial:	auto
Applies To:	positioned elements
Inherited:	No

- *See also:* `bottom`, `left`, `right`, `top`
- *More information:* Text Direction Dependent Layouts (p. 101)

opacity

Specifies the transparency of an element.

Value:	**<alphavalue>**
Initial:	1
Inherited:	No

<alphavalue>

A number between 0.0 (fully transparent) and 1.0 (fully opaque).

order

Specifies in which order the flex items are laid out in their container.

Value:	**<integer>**
Initial:	0
Applies To:	flex items and absolutely-positioned children of flex containers
Inherited:	No

orphans

The 'orphans' property specifies the minimum number of lines in a block container that must be left at the bottom of a page. Only positive values are allowed.

Value:	**<integer>**
Initial:	2
Applies To:	block container elements
Inherited:	Yes

- *More information:* Widows & Orphans (p. 71)

outline

The 'outline' property is a shorthand property, and sets all three of 'outline-style', 'outline-width', and 'outline-color'.

Value:	**['outline-color' || 'outline-style' || 'outline-width']**
Initial:	see individual properties
Inherited:	No

- *See also:* `border`, `outline-color`, `outline-style`, `outline-width`

outline-color

The 'outline-color' accepts all colors, as well as the keyword 'invert'. 'Invert' is expected to perform a color inversion on the pixels on the screen. This is a common trick to ensure the focus border is visible, regardless of color background.

Value:	**<color>**
Initial:	currentColor
Inherited:	No

- *See also:* `border-color`
- *More information:* CSS Color Keywords (p. 130)

outline-style

The 'outline-style' property accepts the same values as 'border-style', except that 'hidden' is not a legal outline style.

Value:	**<border-style>**
Initial:	none
Inherited:	No

- *See also:* `border-style`

outline-width

The 'outline-width' property accepts the same values as 'border-width'.

Value:	**<border-width>**
Initial:	medium
Inherited:	No

- *See also:* `border-width`

overflow

This property specifies whether content of a block container element is clipped when it overflows the element's box. It affects the clipping of all of the element's content except any descendant elements (and their respective content and descendants) whose containing block is the viewport or an ancestor of the element.

Value:	**visible | hidden | scroll | auto**
Initial:	visible
Applies To:	block containers
Inherited:	No

visible

This value indicates that content is not clipped, i.e., it may be rendered outside the block box.

hidden

This value indicates that the content is clipped and that no scrolling user interface should be provided to view the content outside the clipping region.

scroll

Same as hidden.

auto

Same as hidden.

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.

Value:	**normal | break-word**
Initial:	normal
Inherited:	Yes

normal

Lines may break only at allowed break points.

break-word

An unbreakable "word" may be broken at an arbitrary point if there are no otherwise acceptable break points in the line. Shaping characters are still shaped as if the word were not broken, and grapheme clusters must together stay as one unit. No hyphenation character is inserted at the break point.

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:	**<padding-width>{1,4}**
Initial:	see individual properties
Applies To:	all elements except table-row-group, table-header-group, table-footer-group, table-row, table-column-group and table-column
Inherited:	No

- *See also:* `-ro-padding-*`, `padding-*`

-ro-padding-inline-start
-ro-padding-inline-end
-ro-padding-block-start
-ro-padding-block-end

BiDi text direction dependent alternatives for padding-left, padding-right, padding-top and padding-bottom.

Value:	**<padding-width>**
Initial:	0
Inherited:	No

- *See also:* `padding-*`
- *More information:* Text Direction Dependent Layouts (p. 101)

padding-top
padding-right
padding-bottom
padding-left

These properties set the top, right, bottom, and left padding of a box.

Value:	**<padding-width>**
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

- *See also:* `-ro-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.

Value:	**auto | <identifier>**
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. 70)

page-break-before
page-break-after

Shorthand for the 'break-before' and 'break-after' properties.

Value:	**auto | always | avoid | left | right**
Initial:	auto
Applies To:	block-level elements
Inherited:	No

auto

Neither force nor forbid a page break before (after) the generated box.

always

Always force a page break before (after) the generated box.

avoid

Avoid a page break before (after) the generated box.

left

Force one or two page breaks before (after) the generated box so that the next page is formatted as a left page.

right

Force one or two page breaks before (after) the generated box so that the next page is formatted as a right page.

■ *See also:* `break-before`, `break-after`

`page-break-inside`

Shorthand for the 'break-inside' property.

Value:	**avoid | auto**
Initial:	auto
Applies To:	block-level elements
Inherited:	No

auto

Neither force nor forbid a page break inside the generated box.

avoid

Avoid a page break inside the generated box.

■ *See also:* `break-inside`

`page-layout`

Defines the view mode that is initially used to view the document.
The property values have some synonyms: Instead of "1" and "2", "single", "one" and "two" can be used. Page and column are also valid in their plural forms.

Value:	**auto | 1 column | 2 column | 1 page | 2 page**
Initial:	auto
Applies To:	@-ro-preferences
Inherited:	No

■ *More information:* Document-Specific Preferences (p. 100)

pages-counter-offset

An optional offset to the value of the "pages" counter, e.g. "-1" to not count the cover page.

Value:	**<integer>**
Initial:	0
Applies To:	@-ro-preferences
Inherited:	No

■ *More information:* Document-Specific Preferences (p. 100), Page Counters (p. 78)

-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

Value:	**all | stylesheets-only | none**
Initial:	all
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.

■ *More information:* iframes (p. 40), Running Documents (p. 77)

-ro-pdf-attachment-description

The description of the attachment. If this is not specified the name is used.

Value:	**none | <string>**
Initial:	none
Inherited:	No

■ *More information:* Attachments (p. 64)

-ro-pdf-attachment-location

Specifies whether the attachment is related to the area of the element.

Value:	**element | document**
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. 64)

-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. 64)

-ro-pdf-attachment-url

A URL pointing to the file to be embedded. This URL can be relative. Specifying "#" will embed the source document.

Value:	**none | <url>**
Initial:	none
Inherited:	No

■ *More information:* Attachments (p. 64)

-ro-pdf-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).

Value:	**none | <integer>**
Initial:	none
Inherited:	No

■ *More information:* Bookmarks (p. 50)

■ *Deprecated!* Use `-ro-bookmark-level` instead.

-ro-pdf-format

This property converts form elements to interactive PDF forms.

Value:	**none | pdf**
Initial:	none
Applies To:	Form elements
Inherited:	No

none

The form element is not converted.

pdf

The form element is converted to an AcroForm.

■ *More information:* Interactive PDF Forms (p. 55)

-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 to either none (default), mode0 or mode1 (zero 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.

Value:	**none | mode0 | mode1**
Initial:	none
Inherited:	No

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. 64)

pdf-script-action

Sets a PDF script that is executed when the PDF is opened by a viewer application, that supports PDF scripts (e.g. Adobe Reader) and it triggers the specified event.
The CSS property has a higher priority than the API method. This means, that the values set with this property will override scripts which are registered on the same event, but were set via the PDFreactor API method setPdfScriptAction().

Value:	**none | <string> [<event>] [, <string> [<event>]]***
Initial:	none
Applies To:	@-ro-preferences
Inherited:	No

<string>

A JavaScript source string that should be executed by the PDF viewer application, after the PDF has been opened.

<event>

The trigger event on which the specified script is executed. Possible values are: open, close, before-save, after-save, before-print and after-print. Default value is open.

- *More information:* PDF Script (p. 66)

pdf-shape-optimization

Sets whether shapes in the converted PDF should be optimized for certain behavior.

Value:	**none | visual**
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-tag-actual-text

Used for PDF tagging. The text to be used for PDF tagging instead of the text content of the element. Useful for example to allow assistive technology to properly process stylized names.

Value:	**none | <string>**
Initial:	none
Inherited:	No

none

Does not add an actualText entry to the PDF tag.

<string>

Adds an actualText entry to the PDF tag using the specified string as value.

- *More information:* Tagged PDF (p. 56)

-ro-pdf-tag-table-summary

Used for PDF tagging. Summary for a table. Highly recommended for tables without a caption.

Value:	**none | <string>**
Initial:	none
Inherited:	No

none

The summary for the table is determined automatically, looking for a caption or a directly preceding heading.

<string>

Adds a summary to the PDF tag of the table using the string as value.

- *More information:* Tagged PDF (p. 56)

-ro-pdf-tag-type

Used for PDF tagging. Allows overriding the automatic determination of the PDF tag for this element.

Value:	**auto | none | artifact | <string>**
Initial:	auto
Inherited:	No

auto

The PDF tag is determined from the layout information.

none

No PDF tag is created for this element. This does not affect its child elements.

artifact

Instead of a PDF tag an artifact is created for the element. It and its child elements are not considered content of the document.

<string>

The name of the PDF tag to create for the element.

- *More information:* Tagged PDF (p. 56)

position

The 'position' and 'float' properties determine which of the positioning algorithms is used to calculate the position of a box.

Value:	**static | relative | absolute | fixed | running(<identifier>)**
Initial:	static
Inherited:	No

running(<identifier>) ☛ (p. 236)

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.

- *See also:* `float`
- *More information:* Running Elements (p. 74)

-ro-qrcode-errorcorrectionlevel

Sets the error correction level of the QR code.

Value:	**L | M | Q | H**
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.

- *More information:* QR Code (p. 39)

-ro-qrcode-forcedcolors

Defines whether the colors of the QR code are black and white or based on the text color and the background.

Value:	**normal | none**
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.

■ *More information:* QR Code (p. 39)

-ro-qrcode-quality

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.

Value:	**normal | high**
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.

■ *More information:* QR Code (p. 39)

-ro-qrcode-quietzonesize

Sets the size of the quiet (empty) zone around the QR code in modules (QR
code "square" widths).

Value:	**<integer>**
Initial:	1
Applies To:	QR Code elements
Inherited:	No

<integer>

Possible values are 0 (no quiet zone) and positive integers.

■ *More information:* QR Code (p. 39)

`-ro-radiobuttonelement-group`

Defines from which element or attribute in the document the names of the radio button groups are adopted to a generated PDF.

Value:	**none | <string>**
Initial:	none
Applies To:	Form elements
Inherited:	No

■ *More information:* Tagged PDF (p. 56)

`-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')

Value:	**fallback | avoid | always**
Initial:	fallback
Applies To:	SVG and Canvas elements
Inherited:	No

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. 38), Canvas Element (p. 42)

-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.

Value:	**<integer>**
Initial:	2
Applies To:	Rasterized elements (see description)
Inherited:	No

<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. 38), Canvas Element (p. 42)

-ro-replacedelement

Turns an element into a so called 'replaced element' that displays an image or other external or embedded content.

Value:	**none | image | barcode | qrcode | embedded-svg | embedded-mathml**
Initial:	none
Inherited:	No

image

Creates an image replaced element. Used in combination with -ro-source.

barcode

Creates a barcode replaced element from embedded Barcode XML content.

qrcode

Creates a 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.

embedded-mathml

Creates a MathML replaced element from embedded MathML content.

- *See also:* `-ro-source`
- *More information:* Compound Formats (p. 37)

`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.

Value:	**<length> | <percentage> | auto**
Initial:	auto
Applies To:	positioned elements
Inherited:	No

<length>

The offset is a fixed distance from the reference edge. Negative values are allowed.

<percentage>

The offset is a percentage of the containing block's width. Negative values are allowed.

auto

For non-replaced elements, the effect of this value depends on which of related properties have the value 'auto' as well. For replaced elements, the effect of this value depends on the intrinsic dimensions of the replaced content.

- *See also:* `-ro-offset-*`

`-ro-rounding-mode`

Specifies the method that is used for rounding lengths to full pixels.

Value:	**round | floor**
Initial:	floor
Applies To:	root element
Inherited:	No

round

Use normal rounding function: if the value is smaller than .5 it is rounded down else it is rounded up.

floor

Always round down.

-ro-rowspan

The property to determine the row span of a cell. The content contains the number of rows spanned by this cell.

Value:	**<integer>**
Initial:	1
Applies To:	table-cell elements
Inherited:	No

-ro-scale-content

This property enables shrink-to-fit functionality.
This functionality scales down entire pages.

Value:	**<percentage> | auto | none**
Initial:	none
Applies To:	page context
Inherited:	No

<percentage>

A percent value which is treated as a scaling factor for the content.

auto

Enables the automatic scaling of the content to fit the size of the page.

- *More information:* Shrink-to-Fit (p. 95)

size

This property specifies the target size and orientation of the page box's containing block. In the general case, where one page box is rendered onto one page sheet, the 'size' property also indicates the size of the destination page sheet.

Value:	**auto | <length>{1,2} | [<page-size> || [portrait | landscape]]**
Initial:	auto
Applies To:	page context
Inherited:	No

auto

The page box will be set to a size and orientation chosen by the UA. In the usual case, the page box size and orientation is chosen to match the target media sheet.

landscape

Specifies that the page's content be printed in landscape orientation. The longer sides of the page box are horizontal. If a '<page-size>' is not specified, the size of the page sheet is chosen by the UA.

portrait

Specifies that the page's content be printed in portrait orientation. The shorter sides of the page box are horizontal. If a '<page-size>' is not specified, the size of the page sheet is chosen by the UA.

<length>

The page box will be set to the given absolute dimension(s). If only one length value is specified, it sets both the width and height of the page box (i.e., the box is a square). If two length values are specified, the first establishes the page box width, and the second the page box height. Values in units of 'em' and 'ex' refer to the page context's font. Negative lengths are illegal.

<page-size>

A page size can be specified using one of the following media names. This is the equivalent of specifying the '<page-size>' using length values. The definition of the media names comes from Media Standardized Names. A5, A4, A3, B5, B4, letter, legal, ledger

- *More information:* Supported Page Size Formats (p. 125), PDF Page Boxes (p. 90)

`-ro-source`

Specifies the URL of an image. Used in combination with -ro-replacedelement.

Value:	**none | <url> | [<string>]+**
Initial:	none
Inherited:	No

- *See also:* `-ro-replacedelement`
- *More information:* Images (p. 37)

`-ro-source-page`

Specifies which page of a PDF should be embedded as an image. Used in combination with -ro-source.

Value:	**<integer>**
Initial:	1
Inherited:	No

- *More information:* PDF Pages as Images (p. 43)

`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> ☛ **(p. 230)**

the 'content()' function returns the content of elements and pseudo-elements.

■ *More information:* Named Strings (p. 79)

`-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. 54)

-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.

Value:	**<integer>**
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.

Value:	**auto | fixed**
Initial:	auto (fixed for excessively nested HTML table elements)
Applies To:	'table' and 'inline-table' elements
Inherited:	No

fixed

Use the fixed table layout algorithm

auto

Use an automatic table layout algorithm

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.

Value:	**start | end | left | right | center | justify**
Initial:	start
Applies To:	block containers
Inherited:	Yes

start

Inline-level content is aligned to the start edge of the line box.

end

Inline-level content is aligned to the end edge of the line box.

left

Inline-level content is aligned to the line left edge of the line box.

right

Inline-level content is aligned to the line right edge of the line box.

center

Inline-level content is centered within the line box.

justify

Inline-level content is justified within the line box, except the last one.

- *See also:* `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 when 'text-align' is 'justify'. 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'.

Value:	**auto | start | end | left | right | center | justify**
Initial:	auto
Applies To:	block containers
Inherited:	Yes

- *See also:* `text-align`

`text-decoration`

This property describes decorations that are added to the text of an element using the element's color.

Value:	**none | [underline || line-through]**
Initial:	none
Inherited:	No

none

Produces no text decoration.

underline

Each line of text is underlined.

line-through

Each line of text has a line through the middle.

`text-indent`

This property specifies the indentation of the first line of text in a block container.

Value:	**<length> | <percentage>**
Initial:	0
Applies To:	block containers
Inherited:	Yes

<length>

The indentation is a fixed length.

<percentage>

The indentation is a percentage of the containing block width.

`text-overflow`

Determines how content that overflows its line is rendered, when overflow of its paragraph has a other value than visible.

Value:	**clip | ellipsis**
Initial:	clip
Applies To:	block containers
Inherited:	No

clip

Inline content that overflows its block container element is clipped.

ellipsis

Clipped inline content is represented by an ellipsis character (U+2026).

- *See also:* `overflow`

`text-shadow`

Adds shadows to text.

Value:	**none | [<length>{2,3} && <color>?]#**
Initial:	none
Inherited:	Yes

<offset-x> <offset-y>

The offset of the shadow as lengths. These values are required.

<blur-radius>

The optional third length is the blur radius of the shadow.

<color>

The color of the shadow. If no color is specified, the current value of the color property is used.

`text-transform`

This property controls capitalization effects of an element's text.

Value:	**capitalize | uppercase | lowercase | none**
Initial:	none
Inherited:	Yes

capitalize

Puts the first character of each word in uppercase; other characters are unaffected.

uppercase

Puts all characters of each word in uppercase.

lowercase

Puts all characters of each word in lowercase.

none

No capitalization effects.

`-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.)

Value:	**none | [<string> | content()]+**
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. 54)

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).

Value:	**<length> | <percentage> | auto**
Initial:	auto
Applies To:	positioned elements
Inherited:	No

<length>

The offset is a fixed distance from the reference edge. Negative values are allowed.

The offset is a fixed distance from the reference edge. Negative values are allowed. <percentage>

The offset is a percentage of the containing block's height. Negative values are allowed.

auto

For non-replaced elements, the effect of this value depends on which of related properties have the value 'auto' as well. For replaced elements, the effect of this value depends on the intrinsic dimensions of the replaced content.

- *See also:* `-ro-offset-*`

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.
A list of supported <transform-functions> can be found below.

Value:	**none | <transform-function>+**
Initial:	none
Applies To:	transformable elements
Inherited:	No

matrix(<number>[, <number>]{5,5})

specifies a 2D transformation in the form of a transformation matrix of the six values a-f.

translate(<translation-value> [, <translation-value>]?)

specifies a 2D translation by the vector [tx, ty], where tx is the first translation-value parameter and ty is the optional second translation-value parameter. If <ty> is not provided, ty has zero as a value.

translateX(<translation-value>)

specifies a translation by the given amount in the X direction.

translateY(<translation-value>)

specifies a translation by the given amount in the Y direction.

scale(<number> [, <number>]?)

specifies a 2D scale operation by the [sx,sy] scaling vector described by the 2 parameters. If the second parameter is not provided, it takes a value equal to the first. For example, scale(1, 1) would leave an element unchanged, while scale(2, 2) would cause it to appear twice as long in both the X and Y axes, or four times its typical geometric size.

scaleX(<number>)

specifies a 2D scale operation using the [sx,1] scaling vector, where sx is given as the parameter.

scaleY(<number>)

specifies a 2D scale operation using the [1,sy] scaling vector, where sy is given as the parameter.

rotate(<angle>)

specifies a 2D rotation by the angle specified in the parameter about the origin of the element, as defined by the transform-origin property. For example, rotate(90deg) would cause elements to appear rotated one-quarter of a turn in the clockwise direction.

skew(<angle> [, <angle>]?)

specifies a 2D skew by [ax,ay] for X and Y. If the second parameter is not provided, it has a zero value.

skewX(<angle>)

specifies a 2D skew transformation along the X axis by the given angle.

skewY(<angle>)

specifies a 2D skew transformation along the Y axis by the given angle.

-ro-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.

Value:	**none | <transform-function>+**
Initial:	none
Inherited:	No

■ *Deprecated!* Use `transform` instead.

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.

Value:	**[[<percentage> | <length> | left | center | right] && [<percentage> | <length> | top | center | bottom]] | [<percentage> | <length> | left | center | right | top | bottom]**
Initial:	50% 50%
Applies To:	transformable elements
Inherited:	No

<percentage>

A percentage for the horizontal offset is relative to the width of the bounding box. A percentage for the vertical offset is relative to height of the bounding box. The value for the horizontal and vertical offset represent an offset from the top left corner of the bounding box.

<length>

A length value gives a fixed length as the offset. The value for the horizontal and vertical offset represent an offset from the top left corner of the bounding box.

top

Computes to 0% for the vertical position.

right

Computes to 100% for the horizontal position.

bottom

Computes to 100% for the vertical position.

left

Computes to 0% for the horizontal position.

center

Computes to 50% (left 50%) for the horizontal position if the horizontal position is not otherwise specified, or 50% (top 50%) for the vertical position if it is.

-ro-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.

Value:	**[[<percentage> | <length> | left | center | right] [<percentage> | <length> | top | center | bottom]] | [<percentage> | <length> | left | center | right | top | bottom]**
Initial:	50% 50%
Inherited:	No

■ *Deprecated!* Use `transform-origin` instead.

-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.

Value:	**none | auto | always**
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.

Value:	**normal | embed | isolate | bidi-override | isolate-override | plaintext**
Initial:	normal
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).

- *See also:* `direction`
- *More information:* How Do I Create a Document With a Text Direction of Right-to-Left? (p. 107)

vertical-align

This property affects the vertical positioning inside a line box of the boxes generated by an inline-level element.

Value:	**baseline | sub | super | top | text-top | middle | bottom | text-bottom | <percentage> | <length>**
Initial:	baseline
Applies To:	inline-level and 'table-cell' elements
Inherited:	No

baseline

Align the baseline of the box with the baseline of the parent box. If the box does not have a baseline, align the bottom margin edge with the parent's baseline.

middle

Align the vertical midpoint of the box with the baseline of the parent box plus half the x-height of the parent.

sub

Lower the baseline of the box to the proper position for subscripts of the parent's box. (This value has no effect on the font size of the element's text.)

super

Raise the baseline of the box to the proper position for superscripts of the parent's box. (This value has no effect on the font size of the element's text.)

text-top

Align the top of the box with the top of the parent's content area.

text-bottom

Align the bottom of the box with the bottom of the parent's content area.

<percentage>

Raise (positive value) or lower (negative value) the box by this distance (a percentage of the 'line-height' value). The value '0%' means the same as 'baseline'.

<length>

Raise (positive value) or lower (negative value) the box by this distance. The value '0cm' means the same as 'baseline'.

top

Align the top of the aligned subtree with the top of the line box.

bottom

Align the bottom of the aligned subtree with the bottom of the line box.

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).

Value:	visible | hidden | collapse
Initial:	visible
Inherited:	Yes

visible

The generated box is visible.

hidden

The generated box is invisible (fully transparent, nothing is drawn), but still affects layout. Furthermore, descendants of the element will be visible if they have 'visibility: visible'.

collapse

For table rows, columns, column groups, and row groups the rows or columns are hidden and do not occupy space, as if display: none were applied to them. If used on elements other than rows, row groups, columns, or column groups, 'collapse' has the same meaning as 'hidden'.

white-space

This property declares how white space inside the element is handled.

Value:	**normal | pre | nowrap | pre-wrap | pre-line**
Initial:	normal
Inherited:	Yes

normal

This value directs user agents to collapse sequences of white space, and break lines as necessary to fill line boxes.

pre

This value prevents user agents from collapsing sequences of white space. Lines are only broken at preserved newline characters.

nowrap

This value collapses white space as for 'normal', but suppresses line breaks within text.

pre-wrap

This value prevents user agents from collapsing sequences of white space. Lines are broken at preserved newline characters, and as necessary to fill line boxes.

pre-line

This value directs user agents to collapse sequences of white space. Lines are broken at preserved newline characters, and as necessary to fill line boxes.

widows

The 'widows' property specifies the minimum number of lines in a block container that must be left at the top of a page.

Value:	**<integer>**
Initial:	2
Applies To:	block container elements
Inherited:	Yes

- *More information:* Widows & Orphans (p. 71)

width

This property specifies the content width of boxes.

Value:	**<length> | <percentage> | auto**
Initial:	auto
Applies To:	all elements but non-replaced inline elements, table rows, and row groups
Inherited:	No

<length>

Specifies the width of the content area using a length unit.

<percentage>

Specifies a percentage width. The percentage is calculated with respect to the width of the generated box's containing block.

auto

The width depends on the values of other properties.

-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.

Value:	**auto | none**
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.

- *More information:* Automatic Resizing of Form Controls (p. 104)

word-spacing

Allows to modify the spacing between words.

Value:	**normal | <length> | <percentage>**
Initial:	normal
Inherited:	Yes

normal

Spacing is not modified. Has the same effect as zero.

<length>

A positive length increases the spacing between words, a negative decreases it.

<percentage>

Modifies the spacing relatively to the width of a space (100% would double the space between words).

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.
Note that this property is identical to 'overflow-wrap' and for legacy reasons it is handled as a shorthand for that property.

Value:	**normal | break-word**
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.

Value:	**<integer> | auto**
Initial:	auto
Applies To:	positioned elements
Inherited:	No

<integer>

This integer is the stack level of the generated box in the current stacking context. The box also establishes a new stacking context.

auto

The stack level of the generated box in the current stacking context is 0. The box does not establish a new stacking context unless it is the root element.

C.7.2 Functions

-ro-attr()

Creates a reference to the attribute of an element with the specified name.
This function has the same functionality as the attr() function specified by CSS.

- *Parameters*

```
-ro-attr(<attr-name> <type-or-unit>? [ , <attr-fallback> ]?)
```

<attr-name>

The attribute name

<type-or-unit>optional

Specifies how the attribute should be interpreted. Default is 'string'.

<attr-fallback>optional

If the attribute could not found, this value is used instead.

`blur()`

Applies a Gaussian blur.

- *Parameters*

```
blur(radius)
```

radius **`<length>`**

The radius of the blur.

`brightness()`

Applies a multiplier to the brightness of an element.

- *Parameters*

```
brightness(factor)
```

factor **`<Number | Percentage>`**

`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);).

`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.

alphaoptional **`<Number | Percentage>`**

Alpha value of the color. Number between 0 and 1 or percentage.

■ *More information:* How Do I Set Colors in CSS? (p. 105)

`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. 79)

`contrast()`

Adjusts the contrast of the element.
■ *Parameters*

```
contrast(factor)
```

factor **`<Number | Percentage>`**

`counter()`

Refers to the value of a counter.
■ *Parameters*

```
counter(identifier[, list-style-type]?)
```

identifier

The name of the counter

list-style-typeoptional

Specifies the style of the number. Default is 'decimal'.

■ *More information:* Counters (p. 73)

`drop-shadow()`

Applies a drop-shadow to the element.

■ *Parameters*

```
drop-shadow(<offset-x> <offset-y> [<blur-radius>] [<spread-radius>] [<color>])
```

`element()`

This function places an element with a name specified via the running() function, in a page margin box.

■ *Parameters*

```
element(<custom-ident> [ , [ 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-exceptoptional

Keywords that, in a case where there are multiple assignments on a page, specify which one should be used.

■ *More information:* Running Elements (p. 74)

`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.

alphaoptional **`<Number | Percentage>`**

The alpha channel. A number between 0 and 1 or percentage.

■ *More information:* How Do I Set Colors in CSS? (p. 105)

`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.

`hsl()`

Specifies a color using hue, saturation and lightness.
■ *Parameters*

```
hsl(hue, saturation, lightness)
```

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.

■ *More information:* How Do I Set Colors in CSS? (p. 105)

`hsla()`

Specifies a transparent color using hue, saturation, lightness and 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 **`<Percentage>`**

The alpha channel.

■ *More information:* How Do I Set Colors in CSS? (p. 105)

`hue-rotate()`

Rotates the hue of the elements colors.
■ *Parameters*

```
hue-rotate(angle)
```

angle **`<Angle>`**

The color shift as an angle.

`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.

`jpeg()`

Indicates that an image should be embedded into the PDF, using a JPEG compression.

■ *Parameters*

```
jpeg([quality]?)
```

qualityoptional **`<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%.

`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. 93)

`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>]?".

`lossless()`

Indicates that an image should be embedded into the PDF using lossless compression.

■ *Parameters*

```
lossless()
```

`opacity()`

Applies transparency to the element.

■ *Parameters*

```
opacity(factor)
```

factor **`<Number | Percentage>`**

A value of 0% makes the element invisible.

`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>]?".

`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>]?".

`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> ]?,
             | 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.

■ *Parameters*

```
rgb(red, green, blue)
```

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.

■ *More information:* How Do I Set Colors in CSS? (p. 105)

`rgba()`

Defines an RGB color by specifying the red, green, and blue components and 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 `<Number | Percentage>`

Alpha color component. Number between 0 and 1 or percentage.

- *More information:* How Do I Set Colors in CSS? (p. 105)

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. 74)

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.

-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(name, tint, alternative)
```

name `<Identifier>`

The name of the pantone.

tint `<Number>`

The tint of the color. The number between 0 and 1 defines the opacity of the color.

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:* How Do I Set Colors in CSS? (p. 105)

`sepia()`

Convert the elements colors to sepia.

■ *Parameters*

```
sepia(factor)
```

factor **`<Number | Percentage>`**

0 or 0% leaves the element's colors unchanged.

`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-exceptoptional

If there are multiple assignments on a page, this keyword specifies which one should be used.

■ *More information:* Named Strings (p. 79)

`target-counter()`

Retrieves the value of the counter with the given name.

■ *Parameters*

```
target-counter(<url> , <custom-ident> [ , <counter-style> ]?)
```

url

The url of the target.

custom-ident

Name of the counter.

counter-styleoptional

Used to format the result, see the property 'list-style-type' for more information on the keywords.

■ *More information:* Counters (p. 73), Cross-references (p. 80)

`target-text()`

Retrieves the text value of the element referred to by the URL.

■ *Parameters*

```
target-text(<url> [ , [ content | before | after | first-letter] ]?)
```

url

The element whose content should be retrieved.

content | before | after | first-letteroptional

Specifies what content is retrieved, using the same values as the 'string-set' property.

■ *More information:* Cross-references (p. 80)

`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. 74)

C.7.3 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.

`:-ro-last`

The last page of the document.

`:left`

A left page of the document.

`:-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 non-negative numbers, while n is the variable (counting from 1 to the total number of pages).

`: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'.

`:right`

A right page of the document.

`: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'.

For elements

`:checked`

A checked checkbox or radio button.

`:disabled`

A disabled form field.

`:empty`

An element without children (including text nodes)

`:enabled`

An enabled form field.

`:first-child`

An element, first child of its parent

`:first-of-type`

An element, first sibling of its type.

`: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.

`:last-child`

An element, last child of its parent

`:last-of-type`

An element, last sibling of its type.

`:link`

Selects all unvisited links.

`:-ro-matches(s)`

An element that matches selector s.

■ *Parameters*

```
:-ro-matches(s)
```

s **`<String>`**

The selector to match.

`:-ro-no-content`

An element without textual content.

`:not(s)`

An element that does not match selector s.

■ *Parameters*

```
:not(s)
```

s **`<String>`**

The selector to match.

`:nth-child(An+B | even | odd)`

An element, nth child of its parent.
The selector matches, if the element's index (first element is 1) is a solution of the equation a*n + b, with a and b being non-negative numbers.
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

`:nth-last-child(An+B | even | odd)`

An element, nth last child of its parent.
The selector matches, if the element's index (last element is 1) is a solution of the equation a*n + b, with a and b being non-negative numbers.
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

`: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 non-negative numbers, 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

`: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 non-negative numbers, 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

`:only-child`

Selects every element that is the only child of its parent.

`:only-of-type`

An element, only sibling of its type.

`:root`

Selects the document's root element.

C.7.4 Pseudo Elements

`::after`

Generated content after an element.

`::before`

Generated content before an element.

`::first-letter`

Selects the first letter of each element.

`::footnote-call`

Generated content replacing elements that are moved to the footnote area.

`::footnote-marker`

Generated content preceding footnotes.

C.7.5 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 "encoding"
```

@font-face

A custom font.

■ *Syntax*

```
@font-face {
                font descriptors
            }
```

■ *More information:* CSS Defined Fonts (p. 112)

@import

Imports another style sheet into this one.

■ *Syntax*

```
@import {url} [media type,…];
```

@media

The specific media types to which this style sheet will apply.

■ *Syntax*

```
@media media type,… {
                ruleset
            }
```

■ *More information:* How Do I Set Styles for Print or Screen Only? (p. 104)

@namespace

Declares an XML namespace, usually with a prefix.

■ *Syntax*

```
@namespace [prefix] uri
```

@page

Selector for specific pages.

■ *Syntax*

```
@page  [name][:first  | :blank  | :left  | :right  | :recto  | :verso  | :-ro-last  | :-ro-
nth(An+B)] {
                page ruleset
            }
```

■ *More information:* Page Selectors (p. 69)