

# PDFKit Guide

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# Getting Started with PDFKit

## Installation

Installation uses the [npm](#) package manager. Just type the following command after installing npm.

```
npm install pdfkit
```

## Creating a document

Creating a PDFKit document is quite simple. Just require the **pdfkit** module in your CoffeeScript or JavaScript source file and create an instance of the **PDFDocument** class.

```
PDFDocument = require 'pdfkit'  
doc = new PDFDocument
```

## Adding pages

The first page of a PDFKit document is added for you automatically when you create the document. Subsequent pages must be added by you. Luckily, it is quite simple!

```
doc.addPage()
```

You can also set some options for the page, such as it's size and orientation.

The **layout** property can be either **portrait** (the default) or **landscape**. The **size** property can be either an array specifying **[width, height]** in PDF points (72 per inch), or a string specifying a predefined size. A list of the predefined paper sizes can be seen [here](#). The default is **letter**.

Passing a page options object to the **PDFDocument** constructor will set the default paper size and layout for every page in the document, which is then overridden by individual options passed to the **addPage** method.

You can set the page margins in two ways. The first is by setting the **margin** property (singular) to a number, which applies that margin to all edges. The other way is to set the **margins** property (plural) to an object with **top**, **bottom**, **left**, and **right** values. The default is a 1 inch (72 point) margin on all sides.

For example:

```
# Add a 50 point margin on all sides  
doc.addPage  
  margin: 50  
  
# Add different margins on each side  
doc.addPage  
  margins: { top: 50, bottom: 50, left: 72, right: 72 }
```

## Setting document metadata

PDF documents can have various metadata associated with them, such as the title, or author of the document. You can add that information by adding it to the `doc.info` object, or by passing an info object into the document at creation time.

Here is a list of all of the properties you can add to the document metadata. According to the PDF spec, each property must have it's first letter capitalized.

**Title** – the title of the document

**Author** – the name of the author

**Subject** – the subject of the document

**Keywords** – keywords associated with the document

**CreationDate** – the date the document was created (added automatically by PDFKit)

**ModDate** – the date the document was last modified

## Adding content

Once you've created a `PDFDocument` instance, you can add content to the document. Check out the other sections to the left under "Documentation" to learn about each type of content you can add.

## Saving the document

When you are ready to write the PDF document to a file, just call the `write` method with a filename. If you want to send the document in response to an HTTP request, or just need a string representation of the document, just call the `output` method.

That's the basics! Now let's move on to PDFKit's powerful vector graphics abilities.

# Vector Graphics in PDFKit

## An introduction to vector graphics

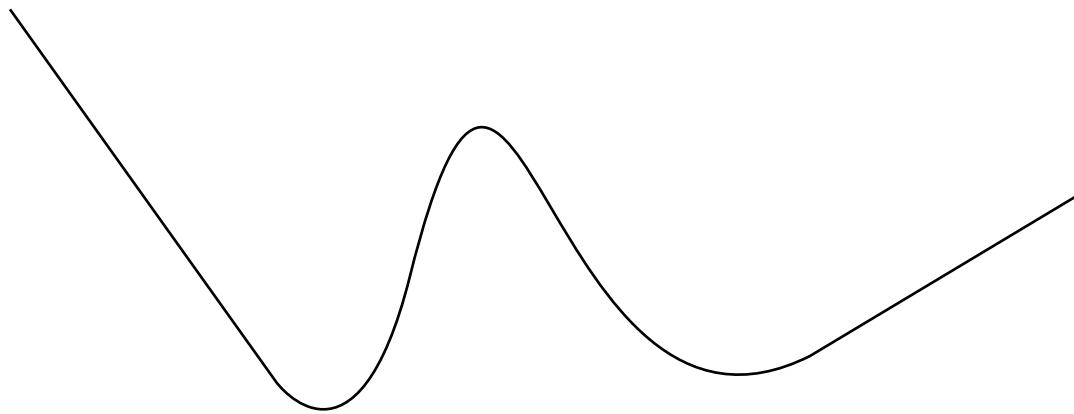
Unlike images which are defined by pixels, vector graphics are defined through a series of drawing commands. This makes vector graphics scalable to any size without a reduction in quality (pixelization). The PDF format was designed with vector graphics in mind, so creating vector drawings is very easy. The PDFKit vector graphics APIs are very similar to that of the HTML5 canvas element, so if you are familiar at all with that API, you will find PDFKit easy to pick up.

## Creating basic shapes

Shapes are defined by a series of lines and curves. **lineTo**, **bezierCurveTo** and **quadraticCurveTo** all draw from the current point (which you can set with **moveTo**) to the specified point (always the last two arguments). Bezier curves use two control points and quadratic curves use just one. Here is an example that illustrates defining a path.

```
doc.moveTo(0, 20)                      # set the current point
    .lineTo(100, 160)                    # draw a line
    .quadraticCurveTo(130, 200, 150, 120) # draw a quadratic curve
    .bezierCurveTo(190, -40, 200, 200, 300, 150) # draw a bezier curve
    .lineTo(400, 90)                    # draw another line
    .stroke()                           # stroke the path
```

The output of this example looks like this:

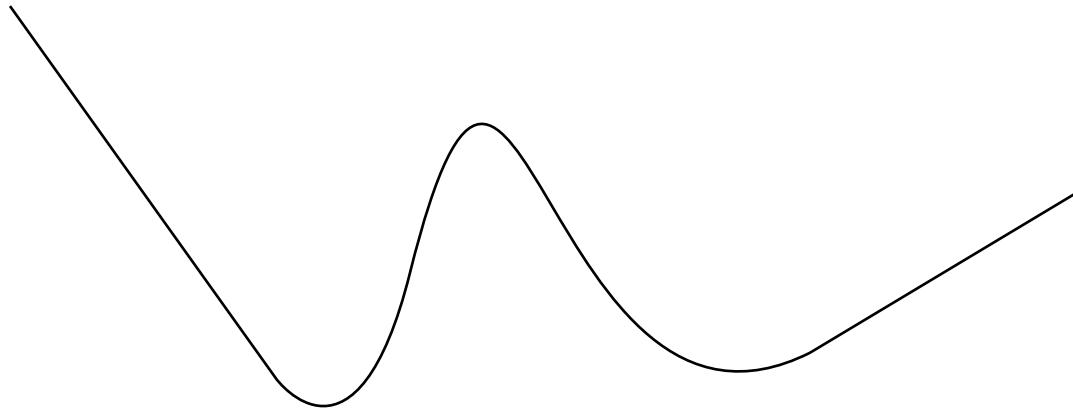


One thing to notice about this example is the use of method chaining. All methods in PDFKit are chainable, meaning that you can call one method right after the other without referencing the **doc** variable again. Of course, this is an option, so if you don't like how the code looks when chained, you don't have to write it that way.

## SVG paths

PDFKit includes an SVG path parser, so you can include paths written in the SVG path syntax in your PDF documents. This makes it simple to include vector graphics elements produced in many popular editors such as Inkscape or Adobe Illustrator. The previous example could also be written using the SVG path syntax like this.

```
doc.path('M 0,20 L 100,160 Q 130,200 150,120 C 190,-40 200,200 300,150 L 400,90')
  .stroke()
```



The PDFKit SVG parser supports all of the command types supported by SVG, so any valid SVG path you throw at it should work as expected.

## Shape helpers

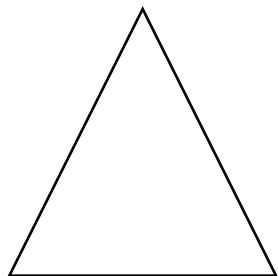
PDFKit also includes some helpers that make defining common shapes much easier. Here is a list of the helpers.

```
rect(x, y, width, height)
roundedRect(x, y, width, height, cornerRadius)
ellipse(centerX, centerY, radiusX, radiusY = radiusX)
circle(centerX, centerY, radius)
polygon(points...)
```

The last one, **polygon**, allows you to pass in a list of points (arrays of x,y pairs), and it will create the shape by moving to the first point, and then drawing lines to each consecutive point. Here is how you'd draw a triangle with the polygon helper.

```
doc.polygon [100, 0], [50, 100], [150, 100]
doc.stroke()
```

The output of this example looks like this:



## Fill and stroke styles

So far we have only been stroking our paths, but you can also fill them with the **fill** method, and both fill and stroke the same path with the **fillAndStroke** method. Note that calling **fill** and then **stroke** consecutively will not work because of a limitation in the PDF spec. Use the **fillAndStroke** method if you want to accomplish both operations on the same path.

In order to make our drawings interesting, we really need to give them some style. PDFKit has many methods designed to do just that.

```
lineWidth
lineCap
lineJoin
miterLimit
dash
fillColor
strokeColor
opacity
fillOpacity
strokeOpacity
```

Some of these are pretty self explanatory, but let's go through a few of them.

## Line cap and line join

The `lineCap` and `lineJoin` properties accept constants describing what they should do. This is best illustrated by an example.

```
# these examples are easier to see with a large line width
doc.lineWidth(25)

# line cap settings
doc.lineCap('butt')
  .moveTo(50, 20)
  .lineTo(100, 20)
  .stroke()

doc.lineCap('round')
  .moveTo(150, 20)
  .lineTo(200, 20)
  .stroke()

# square line cap shown with a circle instead of a line so you can see it
doc.lineCap('square')
  .moveTo(250, 20)
  .circle(275, 30, 15)
  .stroke()

# line join settings
doc.lineJoin('miter')
  .rect(50, 100, 50, 50)
  .stroke()

doc.lineJoin('round')
  .rect(150, 100, 50, 50)
  .stroke()

doc.lineJoin('bevel')
  .rect(250, 100, 50, 50)
  .stroke()
```

The output of this example looks like this.



## Dashed lines

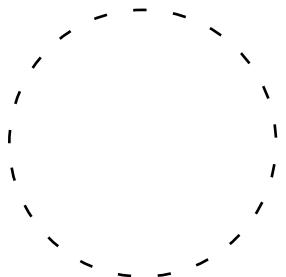
The **dash** method allows you to create non-continuous dashed lines. It takes a length specifying how long each dash should be, as well as an optional hash describing the additional properties **space** and **phase**.

The **space** option defines the length of the space between each dash, and the **phase** option defines the starting point of the sequence of dashes. By default the **space** attribute is equal to the **length** and the **phase** attribute is set to **0**. You can use the **undash** method to make the line solid again.

The following example draws a circle with a dashed line where the space between the dashes is double the length of each dash.

```
doc.circle(100, 50, 50)
  .dash(5, space: 10)
  .stroke()
```

The output of this example looks like this:



## Color

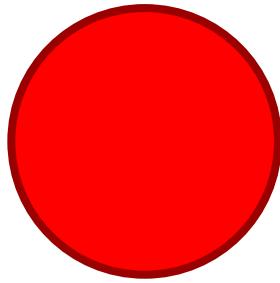
What is a drawing without color? PDFKit makes it simple to set the fill and stroke color and opacity. You can pass an array specifying an RGB or CMYK color, a hex color string, or use any of the named CSS colors.

The **fillColor** and **strokeColor** methods accept an optional second argument as a shortcut for setting the **fillOpacity** and **strokeOpacity**. Finally, the **opacity** method is a convenience method that sets both the fill and stroke opacity to the same value.

The **fill** and **stroke** methods also accept a color as an argument so that you don't have to call **fillColor** or **strokeColor** beforehand. The **fillAndStroke** method accepts both fill and stroke colors as arguments.

```
doc.circle(100, 50, 50)
  .lineWidth(3)
  .fillOpacity(0.8)
  .fillAndStroke("red", "#900")
```

This example produces the following output:



## Gradients

PDFKit also supports gradient fills. Gradients can be used just like color fills, and are applied with the same methods (e.g. `fillColor`, or just `fill`). Before you can apply a gradient with these methods, however, you must create a gradient object.

There are two types of gradients: linear and radial. They are created by the `linearGradient` and `radialGradient` methods. Their function signatures are listed below:

```
linearGradient(x1, y1, x2, y2) - x1,y1 is the start point, x2,y2 is the end point  
radialGradient(x1, y2, r1, x2, y2, r2) - r1 is the inner radius, r2 is the outer radius
```

Once you have a gradient object, you need to create color stops at points along that gradient. Stops are defined at percentage values (0 to 1), and take a color value (any usable by the `fillColor` method), and an optional opacity.

You can see both linear and radial gradients in the following example:

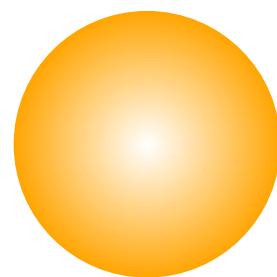
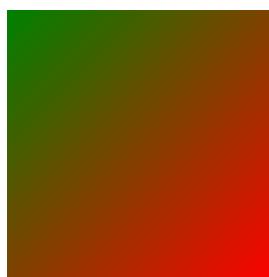
```
# Create a linear gradient
grad = doc.linearGradient(50, 0, 150, 100)
grad.stop(0, 'green')
    .stop(1, 'red')

doc.rect 50, 0, 100, 100
doc.fill grad

# Create a radial gradient
grad = doc.radialGradient(300, 50, 0, 300, 50, 50)
grad.stop(0, 'orange', 0)
    .stop(1, 'orange', 1)

doc.circle 300, 50, 50
doc.fill grad
```

Here is the output from this example:



## Winding rules

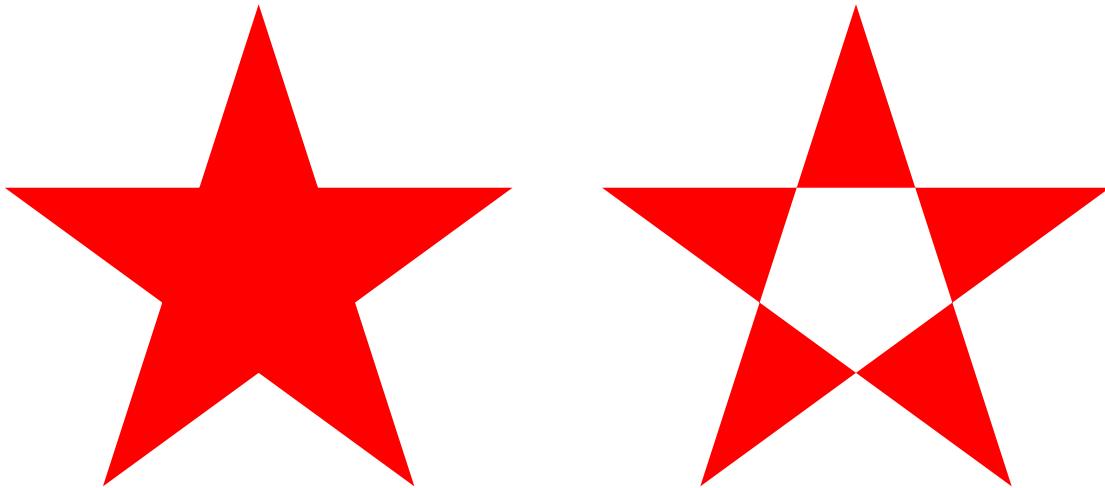
Winding rules define how a path is filled and are best illustrated by an example. The winding rule is an optional attribute to the **fill** and **fillAndStroke** methods, and there are two values to choose from: **non-zero** and **even-odd**.

```
# Initial setup
doc.fillColor('red')
    .translate(-100, -50)
    .scale(0.8)

# Draw the path with the non-zero winding rule
doc.path('M 250,75 L 323,301 131,161 369,161 177,301 z')
    .fill('non-zero')

# Draw the path with the even-odd winding rule
doc.translate(280, 0)
    .path('M 250,75 L 323,301 131,161 369,161 177,301 z')
    .fill('even-odd')
```

You'll notice that I used the **scale** and **translate** transformations in this example. We'll cover those in a minute. The output of this example, with some added labels, is below.



# Saving and restoring the graphics stack

Once you start producing more complex vector drawings, you will want to be able to save and restore the state of the graphics context. The graphics state is basically a snapshot of all the styles and transformations (see below) that have been applied, and many states can be created and stored on a stack. Every time the **save** method is called, the current graphics state is pushed onto the stack, and when you call **restore**, the last state on the stack is applied to the context again. This way, you can save the state, change some styles, and then restore it to how it was before you made those changes.

## Transformations

Transformations allow you to modify the look of a drawing without modifying the drawing itself. There are three types of transformations available, as well as a method for setting the transformation matrix yourself. They are **translate**, **rotate** and **scale**.

The **translate** transformation takes two arguments, x and y, and effectively moves the origin of the document which is (0, 0) by default, to the left and right x and y units.

The **rotate** transformation takes an angle and optionally, an object with an **origin** property. It rotates the document **angle** degrees around the passed **origin** or by default, the center of the page.

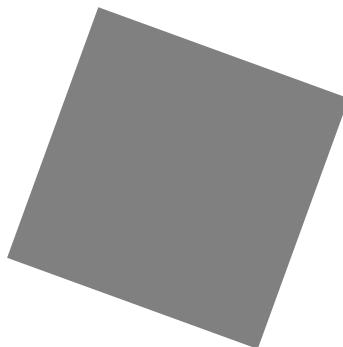
The **scale** transformation takes a scale factor and an optional **origin** passed in an options hash as with the **rotate** transformation. It is used to increase or decrease the size of the units in the drawing, or change it's size. For example, applying a scale of **0.5** would make the drawing appear at half size, and a scale of **2** would make it appear twice as large.

If you are feeling particularly smart, you can modify the transformation matrix yourself using the **transform** method.

We used the **scale** and **translate** transformations above, so here is an example of using the **rotate** transformation. We'll set the origin of the rotation to the center of the rectangle.

```
doc.rotate(20, origin: [150, 70])
  .rect(100, 20, 100, 100)
  .fill('gray')
```

This example produces the following effect.



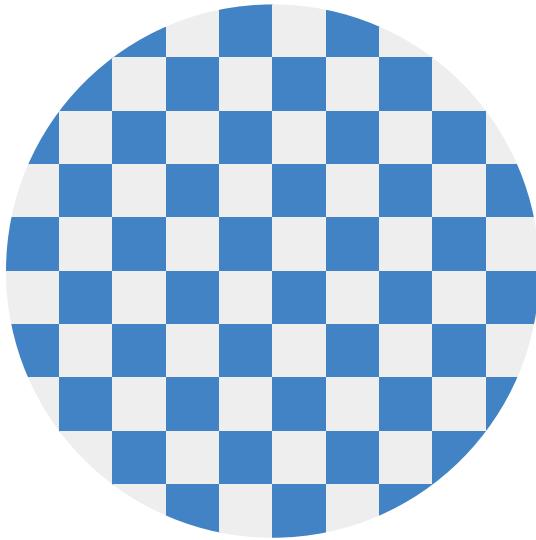
# Clipping

A clipping path is a path defined using the normal path creation methods, but instead of being filled or stroked, it becomes a mask that hides unwanted parts of the drawing. Everything falling inside the clipping path after it is created is visible, and everything outside the path is invisible. Here is an example that clips a checkerboard pattern to the shape of a circle.

```
# Create a clipping path
doc.circle(100, 100, 100)
    .clip()

# Draw a checkerboard pattern
for row in [0...10]
    for col in [0...10]
        color = if (col % 2) - (row % 2) then '#eee' else '#4183C4'
        doc.rect(row * 20, col * 20, 20, 20)
            .fill(color)
```

The result of this example is the following:



That's it for vector graphics in PDFKit. Now let's move on to learning about PDFKit's text support!

# Text in PDFKit

## The basics

PDFKit makes adding text to documents quite simple, and includes many options to customize the display of the output. Adding text to a document is as simple as calling the **text** method.

```
doc.text 'Hello world!'
```

Internally, PDFKit keeps track of the current X and Y position of text as it is added to the document. This way, subsequent calls to the **text** method will automatically appear as new lines below the previous line. However, you can modify the position of text by passing X and Y coordinates to the **text** method after the text itself.

```
doc.text 'Hello world!', 100, 100
```

If you want to move down or up by lines, just call the **moveDown** or **moveUp** method with the number of lines you'd like to move (1 by default).

# Line wrapping and justification

PDFKit includes support for line wrapping out of the box! If no options are given, text is automatically wrapped within the page margins and placed in the document flow below any previous text, or at the top of the page. PDFKit automatically inserts new pages as necessary so you don't have to worry about doing that for long pieces of text. PDFKit can also automatically wrap text into multiple columns.

If you pass a specific X and Y position for the text, it will not wrap unless you also pass the **width** option, setting the width the text should be wrapped to. If you set the **height** option, the text will be clipped to the number of lines that can fit in that height.

When line wrapping is enabled, you can choose a text justification. There are four options: **left** (the default), **center**, **right**, and **justify**. They work just as they do in your favorite word processor, but here is an example showing their use in a text box.

```
lorem = 'Lorem ipsum dolor sit amet, consectetur adipiscing elit. Etiam in suscipit  
purus. Vestibulum ante ipsum primis in faucibus orci luctus et ultrices posuere  
cubilia Curae; Vivamus nec hendrerit felis. Morbi aliquam facilisis risus eu lacinia.  
Sed eu leo in turpis fringilla hendrerit. Ut nec accumsan nisl.'
```

```
doc.fontSize 8  
doc.text 'This text is left aligned. ' + lorem,  
  width: 410  
  align: 'left'  
  
doc.moveDown()  
doc.text 'This text is centered. ' + lorem,  
  width: 410  
  align: 'center'  
  
doc.moveDown()  
doc.text 'This text is right aligned. ' + lorem,  
  width: 410  
  align: 'right'  
  
doc.moveDown()  
doc.text 'This text is justified. ' + lorem,  
  width: 410  
  align: 'justify'  
  
# draw bounding rectangle  
doc.rect(doc.x, 0, 410, doc.y).stroke()
```

The output of this example, looks like this:

This text is left aligned. Lorem ipsum dolor sit amet, consectetur adipiscing elit. Etiam in suscipit purus. Vestibulum ante ipsum primis in faucibus orci luctus et ultrices posuere cubilia Curae; Vivamus nec hendrerit felis. Morbi aliquam facilisis risus eu lacinia. Sed eu leo in turpis fringilla hendrerit. Ut nec accumsan nisl.

This text is centered. Lorem ipsum dolor sit amet, consectetur adipiscing elit. Etiam in suscipit purus. Vestibulum ante ipsum primis in faucibus orci luctus et ultrices posuere cubilia Curae; Vivamus nec hendrerit felis. Morbi aliquam facilisis risus eu lacinia. Sed eu leo in turpis fringilla hendrerit. Ut nec accumsan nisl.

This text is right aligned. Lorem ipsum dolor sit amet, consectetur adipiscing elit. Etiam in suscipit purus. Vestibulum ante ipsum primis in faucibus orci luctus et ultrices posuere cubilia Curae; Vivamus nec hendrerit felis. Morbi aliquam facilisis risus eu lacinia. Sed eu leo in turpis fringilla hendrerit. Ut nec accumsan nisl.

This text is justified. Lorem ipsum dolor sit amet, consectetur adipiscing elit. Etiam in suscipit purus. Vestibulum ante ipsum primis in faucibus orci luctus et ultrices posuere cubilia Curae; Vivamus nec hendrerit felis. Morbi aliquam facilisis risus eu lacinia. Sed eu leo in turpis fringilla hendrerit. Ut nec accumsan nisl.

## Text styling

PDFKit has many options for controlling the look of text added to PDF documents, which can be passed to the `text` method. They are enumerated below.

**lineBreak** – set to `false` to disable line wrapping all together

**width** – the width that text should be wrapped to (by default, the page width minus the left and right margin)

**height** – the maximum height that text should be clipped to

**ellipsis** – the character to display at the end of the text when it is too long. Set to `true` to use the default character.

**columns** – the number of columns to flow the text into

**columnGap** – the amount of space between each column (1/4 inch by default)

**indent** – the amount in PDF points (72 per inch) to indent each paragraph of text

**paragraphGap** – the amount of space between each paragraph of text

**lineGap** – the amount of space between each line of text

**wordSpacing** – the amount of space between each word in the text

**characterSpacing** – the amount of space between each character in the text

**fill** – whether to fill the text (`true` by default)

**stroke** – whether to stroke the text

**link** – a URL to link this text to (shortcut to create an annotation)

**underline** – whether to underline the text

**strike** – whether to strike out the text

**continued** – whether the text segment will be followed immediately by another segment. Useful for changing styling in the middle of a paragraph.

Additionally, the fill and stroke color and opacity methods described in the [vector graphics section](#) are applied to text content as well.

Here is an example combining some of the options above, wrapping a piece of text into three columns, in a specified width and height.

```
lorem = 'Lorem ipsum dolor sit amet, consectetur adipiscing elit. Etiam in suscipit  
purus. Vestibulum ante ipsum primis in faucibus orci luctus et ultrices posuere  
cubilia Curae; Vivamus nec hendrerit felis. Morbi aliquam facilisis risus eu lacinia.  
Sed eu leo in turpis fringilla hendrerit. Ut nec accumsan nisl. Suspendisse rhoncus  
nisl posuere tortor tempus et dapibus elit porta. Cras leo neque, elementum a rhoncus  
ut, vestibulum non nibh. Phasellus pretium justo turpis. Etiam vulputate, odio vitae  
tincidunt ultricies, eros odio dapibus nisi, ut tincidunt lacus arcu eu elit. Aenean  
velit erat, vehicula eget lacinia ut, dignissim non tellus. Aliquam nec lacus mi, sed  
vestibulum nunc. Suspendisse potenti. Curabitur vitae sem turpis. Vestibulum sed  
neque eget dolor dapibus porttitor at sit amet sem. Fusce a turpis lorem. Vestibulum  
ante ipsum primis in faucibus orci luctus et ultrices posuere cubilia Curae;'
```

```
doc.text lorem,  
  columns: 3  
  columnGap: 15  
  height: 100  
  width: 465  
  align: 'justify'
```

The output looks like this:

  Lorem ipsum dolor sit amet,  
  consectetur adipiscing elit. Etiam in  
  suscipit purus. Vestibulum ante  
  ipsum primis in faucibus orci luctus  
  et ultrices posuere cubilia Curae;  
  Vivamus nec hendrerit felis. Morbi  
  aliquam facilisis risus eu lacinia.  
  Sed eu leo in turpis fringilla  
  hendrerit. Ut nec accumsan nisl.

  Suspendisse rhoncus nisl posuere  
  tortor tempus et dapibus elit porta.  
  Cras leo neque, elementum a  
  rhoncus ut, vestibulum non nibh.  
  Phasellus pretium justo turpis.  
  Etiam vulputate, odio vitae tincidunt  
  ultricies, eros odio dapibus nisi, ut  
  tincidunt lacus arcu eu elit. Aenean  
  velit erat, vehicula eget lacinia ut,

  dignissim non tellus. Aliquam nec  
  lacus mi, sed vestibulum nunc.  
  Suspendisse potenti. Curabitur  
  vitae sem turpis. Vestibulum sed  
  neque eget dolor dapibus porttitor  
  at sit amet sem. Fusce a turpis  
  lorem. Vestibulum ante ipsum  
  primis in faucibus orci luctus et  
  ultrices posuere cubilia Curae;

## Rich Text

As mentioned above, PDFKit supports a simple form of rich text via the **continued** option. When set to true, PDFKit will retain the text wrapping state between **text** calls. This way, when you call text again after changing the text styles, the wrapping will continue right where it left off.

The options given to the first **text** call are also retained for subsequent calls after a **continued** one, but of course you can override them. In the following example, the **width** option from the first **text** call is retained by the second call.

```
doc.fillColor 'green'  
  .text lorem.slice(0, 500),  
    width: 465  
    continued: yes  
  .fillColor 'red'  
  .text lorem.slice(500)
```

Here is the output:

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Etiam in suscipit purus. Vestibulum ante ipsum primis in faucibus orci luctus et ultrices posuere cubilia Curae; Vivamus nec hendrerit felis. Morbi aliquam facilisis risus eu lacinia. Sed eu leo in turpis fringilla hendrerit. Ut nec accumsan nisl. Suspendisse rhoncus nisl posuere tortor tempus et dapibus elit porta. Cras leo neque, elementum a rhoncus ut, vestibulum non nibh. Phasellus pretium justo turpis. Etiam vulputate, odio vitae tincidunt ultricies, eros odio dapibus nisi, ut tincidunt lacus arcu eu elit. Aenean velit erat, vehicula eget lacinia ut, dignissim non tellus. Aliquam nec lacus mi, sed vestibulum nunc. Suspendisse potenti. Curabitur vitae sem turpis. Vestibulum sed neque eget dolor dapibus porttitor at sit amet sem. Fusce a turpis lorem. Vestibulum ante ipsum primis in faucibus orci luctus et ultrices posuere cubilia Curae;

## Fonts

The PDF format defines 14 standard fonts that can be used in PDF documents (4 styles of Helvetica, Courier, and Times, as well as Symbol and Zapf Dingbats), but also allows fonts to be embedded right in the document. PDFKit supports embedding font files in the TrueType (**.ttf**), TrueType Collection (**.ttc**), and Datafork TrueType (**.dfont**) formats.

To change the font used to render text, just call the **font** method. If you are using a standard PDF font, just pass the name to the **font** method. Otherwise, pass the path to the font file, and if the font is a collection font (**.ttc** and **.dfont** files), meaning that they contain multiple styles in the same file, you should pass the name of the style to be extracted from the collection.

Here is an example showing how to set the font in each case.

```
# Set the font size
doc.fontSize(18)

# Using a standard PDF font
doc.font('Times-Roman')
  .text('Hello from Times Roman!')
  .moveDown(0.5)

# Using a TrueType font (.ttf)
doc.font('fonts/GoodDog.ttf')
  .text('This is Good Dog!')
  .moveDown(0.5)

# Using a collection font (.ttc or .dfont)
doc.font('fonts/Chalkboard.ttc', 'Chalkboard-Bold')
  .text('This is Chalkboard, not Comic Sans.')
```

The output of this example looks like this:

Hello from Times Roman!

This is Good Dog!

**This is Chalkboard, not Comic Sans.**

Another nice feature of the PDFKit font support, is the ability to register a font file under a name for use later rather than entering the path to the font every time you want to use it.

```
# Register a font
doc.registerFont('Heading Font', 'fonts/Chalkboard.ttf', 'Chalkboard-Bold')

# Use the font later
doc.font('Heading Font')
  .text('This is a heading.')
```

That's about all there is too it for text in PDFKit. Let's move on now to images.

# Images in PDFKit

Adding images to PDFKit documents is an easy task. Just pass an image path to the `image` method along with some optional arguments. PDFKit supports the JPEG and PNG formats. If an X and Y position are not provided, the image is rendered at the current point in the text flow (below the last line of text). Otherwise, it is positioned absolutely at the specified point. The image will be scaled according to the following options.

Neither `width` or `height` provided - image is rendered at full size

`width` provided but not `height` - image is scaled proportionally to fit in the provided `width`

`height` provided but not `width` - image is scaled proportionally to fit in the provided `height`

Both `width` and `height` provided - image is stretched to the dimensions provided

`scale` factor provided - image is scaled proportionally by the provided scale factor

`fit` array provided - image is scaled proportionally to fit within the passed width and height

Here is an example showing some of these options.

```
# Scale proportionally to the specified width
doc.image('images/test.jpeg', 0, 15, width: 300)
  .text('Proportional to width', 0, 0)

# Fit the image within the dimensions
doc.image('images/test.jpeg', 320, 15, fit: [100, 100])
  .rect(320, 15, 100, 100)
  .stroke()
  .text('Fit', 320, 0)

# Stretch the image
doc.image('images/test.jpeg', 320, 145, width: 200, height: 100)
  .text('Stretch', 320, 130)

# Scale the image
doc.image('images/test.jpeg', 320, 280, scale: 0.25)
  .text('Scale', 320, 265)
```

This example produces the following output:

Proportional to width



Fit



Stretch



Scale



That is all there is to adding images to your PDF documents with PDFKit. Now let's look at adding annotations.

# Annotations in PDFKit

Annotations are interactive features of the PDF format, and they make it possible to include things like links and attached notes, or to highlight, underline or strikeout portions of text. Annotations are added using the various helper methods, and each type of annotation is defined by a rectangle and some other properties. Here is a list of the available annotation methods:

```
note(x, y, width, height, contents, options)
link(x, y, width, height, url, options)
highlight(x, y, width, height, options)
underline(x, y, width, height, options)
strike(x, y, width, height, options)
lineAnnotation(x1, y1, x2, y2, options)
rectAnnotation(x, y, width, height, options)
ellipseAnnotation(x, y, width, height, options)
textAnnotation(x, y, width, height, text, options)
```

Many of the annotations have a **color** option that you can specify. You can use an array of RGB values, a hex color, or a named CSS color value for that option.

If you are adding an annotation to a piece of text, such as a link or underline, you will need to know the width and height of the text in order to create the required rectangle for the annotation. There are two methods that you can use to do that. To get the width of any piece of text in the current font, just call the **widthOfString** method with the string you want to measure. To get the line height in the current font, just call the **currentLineHeight** method.

You must remember that annotations have a stacking order. If you are putting more than one annotation on a single area and one of those annotations is a link, make sure that the link is the last one you add, otherwise it will be covered by another annotation and the user won't be able to click it.

Here is an example that uses a few of the annotation types.

```
# Add the link text
doc.fontSize(25)
  .fillColor('blue')
  .text('This is a link!', 20, 0)

# Measure the text
width = doc.widthOfString('This is a link!')
height = doc.currentLineHeight()

# Add the underline and link annotations
doc.underline(20, 0, width, height, color: 'blue')
  .link(20, 0, width, height, 'http://google.com/')

# Create the highlighted text
doc.moveDown()
  .fillColor('black')
  .highlight(20, doc.y, doc.widthOfString('This text is highlighted!'), height)
  .text('This text is highlighted!')

# Create the crossed out text
doc.moveDown()
  .strike(20, doc.y, doc.widthOfString('STRIKE!'), height)
  .text('STRIKE!')
```

The output of this example looks like this.

This is a link!

This text is highlighted!

~~STRIKE!~~

Annotations are currently not the easiest things to add to PDF documents, but that is the fault of the PDF spec itself. Calculating a rectangle manually isn't fun, but PDFKit makes it easier for a few common annotations applied to text, including links, underlines, and strikes. Here's an example showing two of them:

```
doc.fontSize 20
  .fillColor 'red'
  .text 'Another link!', 20, 0,
    link: 'http://apple.com/',
    underline: true
```

The output is as you'd expect:

Another link!

# You made it!

That's all there is to creating PDF documents in PDFKit. It's really quite simple to create beautiful multi-page printable documents using Node.js!

This guide was actually generated from Markdown/Literate CoffeeScript files using a PDFKit generation script. The examples are actually run to generate the output shown inline. The script generates both the website and the PDF guide, and can be found [on Github](#). Check it out if you want to see an example of a slightly more complicated renderer using a parser for Markdown and a syntax highlighter.

If you have any questions about what you've learned in this guide, please don't hesitate to [ask the author](#) or post an issue on [Github](#). Enjoy!