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Inhaltsverzeichnis

Abbildungsverzeichnis	IV
Tabellenverzeichnis	V
Listingsverzeichnis	VI
1 erste Gliederungsebene	1
1.1 zweite Gliederungsebene	1
1.1.1 dritte Gliederungsebene	1
1.1.2 dritte Gliederungsebene	1
Selbständigkeitserklärung	4
Anhang A: O'REILLY: Bootstrap	5

Abbildungsverzeichnis

1.1 Bild beschriftung	1
---------------------------------	---

Tabellenverzeichnis

Listingsverzeichnis

1 erste Gliederungsebene

1.1 zweite Gliederungsebene

1.1.1 dritte Gliederungsebene

1.1.2 dritte Gliederungsebene

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- erster Punkt
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Abb. 1.1: Bild beschriftung
(vgl. ?, S. 540)

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BPMs

Abstract State Machine

Abstract State Machines

(vgl. ?)

(vgl. ?, S. 2)

(vgl. ?, S. 13, 46)

?

Referenz auf einen Anhang:

1.1.2 Anhang A: O'REILLY: Bootstrap auf Seite 5

(siehe 1.1.2 dritte Gliederungsebene auf Seite 1)

Abb. 1.1

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Anhang A: O'REILLY: Bootstrap

Responsive Web Development



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Foreword by Dave Winer

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Bootstrap

by Jake Spurlock

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Table of Contents

Foreword.....	vii
Preface.....	ix
1. Bootstrap Scaffolding.....	1
What Is Bootstrap?	1
Bootstrap File Structure	2
Basic HTML Template	2
Global Styles	3
Default Grid System	3
Basic Grid HTML	4
Offsetting Columns	4
Nesting Columns	5
Fluid Grid System	5
Container Layouts	6
Responsive Design	6
What Is Responsive Design?	7
2. Bootstrap CSS.....	9
Typography	9
Headings	9
Lead Body Copy	10
Emphasis	11
Bold	11
Italics	11
Emphasis Classes	11
Lists	15
Code	17
Tables	18
Optional Table Classes	19

Table Row Classes	20
Forms	21
Optional Form Layouts	22
Supported Form Controls	24
Extended Form Controls	27
Form Control Sizing	29
Form Control States	32
Buttons	34
Button Sizes	35
Disabled Button Styling	36
Images	37
Icons	38
GLYPHICONS Attribution	39
Usage	39
3. Bootstrap Layout Components.....	41
Dropdown Menus	41
Options	42
Button Groups	42
Button Groups as Radio Buttons and Checkboxes	44
Buttons with Dropdowns	44
Split Button Dropdowns	45
Dropdown Menus	46
Navigation Elements	46
Tabular Navigation	47
Basic Pills Navigation	47
Stackable Navigation	48
Dropdowns	49
Navigation Lists	50
Tabbable Navigation	51
Navbar	54
Navbar Links	54
Forms	55
Navbar Menu Variations	55
Breadcrumbs	58
Pagination	59
Pager	61
Labels	62
Badges	62
Typographic Elements	63
Hero Unit	63
Page Header	63

Thumbnails	64
Alerts	65
Progress Bars	66
Media Object	68
Miscellaneous	70
Wells	71
Helper Classes	72
4. Bootstrap JavaScript Plugins.....	73
Overview	73
Programmatic API	74
Transitions	74
Modal	74
Usage	76
Options	76
Methods	77
Events	77
Dropdown	78
Usage	78
Dropdown Usage via JavaScript	79
Method	79
Scrollspy	79
Usage	79
.scrollspy('refresh') Method	80
Options	80
Event	81
Toggleable Tabs	81
Usage	82
Events	82
Tooltips	82
Usage	83
Options	83
Methods	83
Popover	84
Usage	85
Options	85
Methods	86
Alerts	86
Usage	87
Close Method	87
Events	87
Buttons	87

Loading State	87
Single Toggle	88
Checkbox Buttons	88
Radio Buttons	89
Usage	89
Methods	89
Collapse	90
Usage	91
Options	91
Methods	92
Events	92
Carousel	93
Usage	94
Options	94
Methods	94
Events	95
Typeahead	95
Usage	95
Options	96
Affix	96
Usage	97
Option	97
5. Using Bootstrap.....	99
GitHub Project	99
Customizing Bootstrap	99
Using LESS	100
Text Snippets	102
Photoshop Templates	103
Themes	104
Built with Bootstrap	104
Conclusion	104
Index.....	105

Foreword

I was a software developer before Mac existed, so I remember how the tech industry reacted to it. For the most part, the community reacted with a fair amount of skepticism. The interesting thing is that the negative things people say about Bootstrap today sound exactly like the negative things people said about the Mac in 1984. And in both cases, the things that people didn't like were what made them important.

Apple realized that there is a set of things that all software has to do, so why shouldn't they all do them the same way? If they did, software would be easier to develop and debug, but more important—it would be easier to use. If there was only one way to create menus, then once a user learned how to use the menus of one app, he would already know how to use the menus of all others. The same is true with scrollbars, windows, the keyboard, the mouse, printing, and sound.

The reason programmers didn't like it, (and I was one of them) was that they took what we did and commoditized it. Further, there were limits to the one-size-fits-all approach. There were some apps that didn't take to the UI standards very well. What to do about them? Well, you adapted, that's what you did.

This is a well-known technical process called factoring. If you see yourself doing something over and over, do it one more time really well, work on the API so it's easy and flexible, and that's it. You never do it again. It's how you build ever-taller buildings out of software. What was the leading edge five years ago is baked into the operating system today. Progress. It's a wonderful thing!

The same patterns are observable in the Web. In fact, it's kind of sad how much of a repeat it is, how backward today's development environment is compared to the one envisioned by the Mac. But at least Bootstrap is out there doing the factoring. If I want to put up a menu, I can just use the code that creates menus. Sure, my menu looks like all the others, but that's a good thing for users. There is no need to learn a second or third way to use a menu.

That this is needed, desperately needed, is indicated by the incredible uptake of Bootstrap. I use it in all the server software I'm working on. And it shows through in the templating language I'm developing, so everyone who uses it will find it's "just there" and works any time you want to do a Bootstrap technique. Nothing to do; no libraries to include. It's as if it were part of the hardware. It's the same approach that Apple took with the Mac OS in 1984.

Like all important technologies, Bootstrap is "good enough" but not too good. In other words, the designers, Mark Otto and Jacob Thornton, could have factored more than they did. However, while they could have created something more compact and perhaps more elegant, it wouldn't have been nearly as approachable. The great thing about Bootstrap for a guy like me, who has been busy building software behind websites, is that it solves a whole bunch of problems that we all have when putting a user interface on those sites.

However, I think that will turn out to be just the beginning. I see the opportunity for Bootstrap to become an integral part of the Web—a toolkit that you can count on being present in every environment you work in. Further, someday, perhaps soon, designers will be able to plug in skins for Bootstrap that transform the appearance of a site without any modification to the code or to its styles or scripts. I don't see any limits to what can be done with Bootstrap. Rather than being a replacement for designers, it creates opportunities for designers to have more power and reach.

These days, part of the maturing process of any new technology is the release of its O'Reilly book. Now Bootstrap has one. The author, Jake Spurlock, a web developer, has been building sites with Bootstrap, has spoken at conferences about it, and he credits me for getting him started with a series of enthusiastic blog posts I wrote as I was discovering its power and elegance. Now, I can happily turn you over to Jake's able hands. He will show you how the Bootstrap magic works, so you too can help move the web development world forward.

—Dave Winer
editor, Scripting News, January 2013, New York

Preface

Bootstrap is a front-end framework for building responsive websites. Whether it is application frameworks, blogs, or other CMS applications, Bootstrap can be a good fit, as it can be as vanilla as you like. Its combination of HTML, CSS, and JavaScript make it easy to build robust sites without adding a lot of code. With a default grid system, layouts come together with ease, and the styling of buttons, navs, and tables make basic markup look great from the get-go. A dozen or so JavaScript plugins catapult you into adding interactive elements to your site.

Who This Book Is For

This book is mostly for people who have a good handle on HTML/CSS and JavaScript, and are curious about building responsive sites, adding the Bootstrap JavaScript plugins, or building sites faster by using this popular open source framework.

Who This Book Is Not For

This book is not for people who get all they need out of the Bootstrap online documentation. Like a lot of people, the online docs are where I got started—building my first site with Bootstrap 1.3 and then upgrading it to Bootstrap 1.4. After that, I built a big project with Bootstrap 2.0, and so on. If you are comfortable writing semantic HTML, then jumping into Bootstrap should be easy for you.

What This Book Will Do For You

If you have some background in writing HTML/CSS and JavaScript, this book will help you get off the ground writing some flexible code for responsive websites. In practical terms, the concepts and code syntax should come easily, as the book follows the patterns for writing semantic HTML and CSS.

How This Book Works

This book builds a site with Bootstrap, starting at the foundation of the project and the file structure, moving up through the grid system and layout types, and into HTML elements and styling like forms, tables, and buttons. Once the walls are up, we move into the aesthetic elements like navbars, breadcrumbs, and media objects. After that, we move on to the JavaScript elements, such as dropdowns, the carousel, and modals, that provide the interaction for a site.

Why I Wrote This Book

I'm not a Bootstrap expert hoping to create more Bootstrap experts to get a lot of work done.

I'm a developer and writer who encountered Bootstrap through a post on Dave Winer's blog, and I thought it would be cool to apply it to a new site that I was working on. I feel compelled to share some of what I've learned. I'm hoping that the path I followed will work for other people, probably with variations, and that a book written from a beginner's perspective (and vetted by experts) will help more people find and enjoy Bootstrap.

Other Resources

This book may not be the best way for you to learn Bootstrap. It all depends on what you want to learn and why.

If your primary interest is to get started building Bootstrap websites, the [online documentation](#) will likely suit you perfectly. The authors, Jacob Thornton and Mark Otto, have been meticulous in providing examples of the codebase, HTML code samples, and more to kickstart your project. It is top notch, and I've used it to gather the structure for this book.

If you want to contribute to the work of the open source project, you can submit pull requests or use the issue tracker on the [GitHub project](#) for updates, downloads, documentation, and more.

Are You Sure You Want Bootstrap?

If you are looking for JavaScript plugins, or a CSS reset, Bootstrap may be overkill. If you aren't in love with some of the default interface elements, they can be overwritten easily or you can just strip out the associated tags. If you are looking for an easy way to build fast, responsive websites, Bootstrap is a great way to get going. I use it on all of my projects, and I'm really happy with it.

Conventions Used in This Book

The following typographical conventions are used in this book:

Italic

Indicates new terms, URLs, email addresses, filenames, and file extensions.

Constant width

Used for program listings, as well as within paragraphs to refer to program elements such as variable or function names, statements, and keywords.

Constant width bold

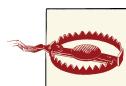
Shows commands or other text that should be typed literally by the user.

Constant width italic

Shows text that should be replaced with user-supplied values or by values determined by context.



This icon signifies a tip, suggestion, or general note.



This icon indicates a warning or caution.

Using Code Examples

The examples in this book are meant to teach basic concepts in small bites. While you may certainly borrow code and reuse it as you see fit, you won't be able to take the code of this book and build a stupendous application instantly (unless perhaps you have an unusual fondness for bacon and cats). You should, however, be able to figure out the steps you need to take to build a great website.

You can download the code from the Examples link on the [book's page](#).

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Help This Book Grow

While I hope that you will enjoy reading this book and will learn from it, I also hope that you can contribute to helping other readers learn to use Bootstrap. You can help your fellow readers in a number of ways:

- If you find specific technical problems, bad explanations, or things that can be improved, please report them through the [errata system](#).
- If you like (or don't like) the book, please leave reviews. The most visible places to do so are on Amazon.com (or its international sites) and at the [O'Reilly page for the book](#). Detailed explanations of what worked and what didn't work for you (and the broader target audience of programmers new to Bootstrap) are helpful to other readers and to me.
- If you find you have much more you want to say about Bootstrap, please consider sharing it, whether on the Web, in a book of your own, in training classes, or in whatever form you find easiest.

I'll update the book for errata and try to address issues raised in reviews. Even once the book is published, I may still add some extra pieces to it. If you purchased it as an ebook, you'll receive these updates for free until it's time for a whole new edition. I don't expect that new edition declaration to come quickly, however, unless the Bootstrap world changes substantially.

Hopefully this book will engage you enough to make you consider sharing.

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Acknowledgments

Many thanks to Dave Winer for introducing me to Bootstrap in the first place, and to Simon St. Laurent for the opportunity to write this book. Detailed feedback from my friends Roseanne Fallin and Tony Quarorolo has made it possible; I hope that this book can get readers started on the right track. I would also like to thank Melissa Morgan for letting me take a few risks and develop the way that I like at *MAKE*.

In particular, thanks to my wonderful wife, Melissa, for putting up with me and encouraging me to finish. And thanks to my son, Rush, for understanding that I needed to “work” and to my daughter, Hailey, for the warm smiles and huge hugs. I love my family, and am so glad for everything they offer me.

CHAPTER 1

Bootstrap Scaffolding

What Is Bootstrap?

Bootstrap is an open source product from Mark Otto and Jacob Thornton who, when it was initially released, were both employees at Twitter. There was a need to standardize the frontend toolsets of engineers across the company. In the launch blog post, Mark Otto introduced the project like this:

In the earlier days of Twitter, engineers used almost any library they were familiar with to meet front-end requirements. Inconsistencies among the individual applications made it difficult to scale and maintain them. Bootstrap began as an answer to these challenges and quickly accelerated during Twitter's first Hackweek. By the end of Hackweek, we had reached a stable version that engineers could use across the company.

— Mark Otto
<https://dev.twitter.com/>

Since Bootstrap launched in August 2011, it has taken off in popularity. It has evolved from being an entirely CSS-driven project to include a host of JavaScript plugins and icons that go hand in hand with forms and buttons. At its base, it allows for responsive web design and features a robust 12-column, 940px-wide grid. One of the highlights is the build tool on [Bootstrap's website](#), where you can customize the build to suit your needs, choosing which CSS and JavaScript features you want to include on your site. All of this allows frontend web development to be catapulted forward, building on a stable foundation of forward-looking design and development. Getting started with Bootstrap is as simple as dropping some CSS and JavaScript into the root of your site.

For someone starting a new project, Bootstrap comes with a handful of useful elements. Normally, when I start a project, I start with tools like [Eric Meyer's Reset CSS](#) and get going on my web project. With Bootstrap, you just need to include the `bootstrap.css` CSS

file and, optionally, the *bootstrap.js* JavaScript file into your website and you are ready to go.

Bootstrap File Structure

```
bootstrap/
    ├── css/
    |   ├── bootstrap.css
    |   └── bootstrap.min.css
    ├── js/
    |   ├── bootstrap.js
    |   └── bootstrap.min.js
    ├── img/
    |   ├── glyphicons-halflings.png
    |   └── glyphicons-halflings-white.png
    └── README.md
```

The Bootstrap download includes three folders: css, js, and img. For simplicity, add these to the root of your project. Minified versions of the CSS and JavaScript are also included. It is not necessary to include both the uncompressed and the minified versions. For the sake of brevity, I use the uncompressed version during development and then switch to the compressed version in production.

Basic HTML Template

Normally, a web project looks something like this:

```
<!DOCTYPE html>
<html>
  <head>
    <title>Bootstrap 101 Template</title>
  </head>
  <body>
    <h1>Hello, world!</h1>
  </body>
</html>
```

With Bootstrap, we include the link to the CSS stylesheet and the JavaScript:

```
<!DOCTYPE html>
<html>
  <head>
    <title>Bootstrap 101 Template</title>
    <link href="css/bootstrap.min.css" rel="stylesheet">
  </head>
  <body>
    <h1>Hello, world!</h1>
    <script src="js/bootstrap.min.js"></script>
  </body>
</html>
```



Don't forget the HTML5 Doctype.

By including <!DOCTYPE html>, all modern browsers are put into standards mode.

Global Styles

With Bootstrap, a number of items come prebuilt. Instead of using the old reset block that was part of the Bootstrap 1.0 tree, Bootstrap 2.0 uses [Normalize.css](#), a project from Nicolas Gallagher that is part of the [HTML5 Boilerplate](#). This is included in the *bootstrap.css* file.

In particular, the following default styles give special treatment to typography and links:

- `margin` has been removed from the body, and content will snug up to the edges of the browser window.
- `background-color: white;` is applied to the body.
- Bootstrap is using the `@baseFontFamily`, `@baseFontSize`, and `@baseLineHeight` attributes as our typographic base. This allows the height of headings and other content around the site to maintain a similar line height.
- Bootstrap sets the global link color via `@linkColor` and applies link underlines only on `:hover`.



Remember, if you don't like the colors or want to change a default, this can be done by changing the globals in any of the *.less* files. To do this, update the *scaffolding.less* file or overwrite colors in your own style-sheet.

Default Grid System

The default Bootstrap grid (see [Figure 1-1](#)) system utilizes 12 columns, making for a 940px-wide container without responsive features enabled. With the responsive CSS file added, the grid adapts to be 724px or 1170px wide, depending on your viewport. Below 767px viewports, such as the ones on tablets and smaller devices, the columns become fluid and stack vertically. At the default width, each column is 60 pixels wide and offset 20 pixels to the left. An example of the 12 possible columns is in [Figure 1-1](#).

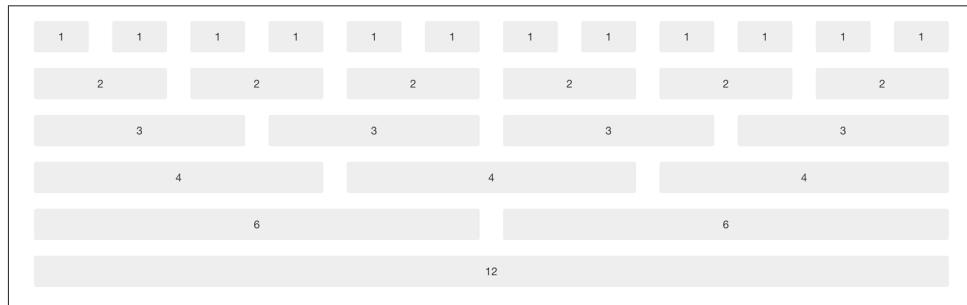


Figure 1-1. Default grid

Basic Grid HTML

To create a simple layout, create a container with a `<div>` that has a class of `.row` and add the appropriate amount of `.span*` columns. Since we have a 12-column grid, we just need the amount of `.span*` columns to equal 12. We could use a 3-6-3 layout, 4-8, 3-5-4, 2-8-2... we could go on and on, but I think you get the gist.

The following code shows `.span8` and `.span4`, which adds up to 12:

```
<div class="row">
  <div class="span8">...</div>
  <div class="span4">...</div>
</div>
```

Offsetting Columns

You can move columns to the right using the `.offset*` class. Each class moves the span over that width. So an `.offset2` would move a `.span7` over two columns (see Figure 1-2):

```
<div class="row">
  <div class="span2">...</div>
  <div class="span7 offset2">...</div>
</div>
```

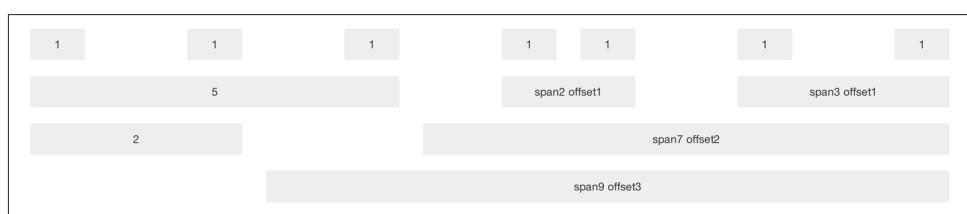


Figure 1-2. Offset grid

Nesting Columns

To nest your content with the default grid, inside of a `.span*`, simply add a new `.row` with enough `.span*` that it equals the number of spans of the parent container (see [Figure 1-3](#)):

```
<div class="row">
  <div class="span9">
    Level 1 of column
    <div class="row">
      <div class="span6">Level 2</div>
      <div class="span3">Level 2</div>
    </div>
  </div>
</div>
```

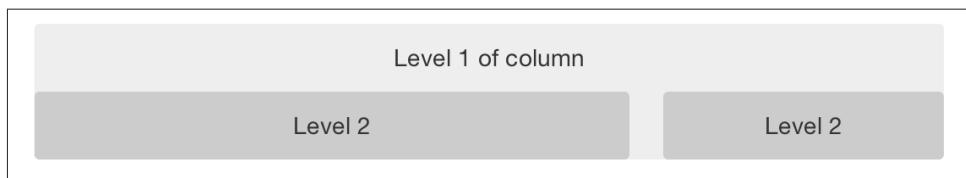


Figure 1-3. Nesting grid

Fluid Grid System

The fluid grid system uses percentages instead of pixels for column widths. It has the same responsive capabilities as our fixed grid system, ensuring proper proportions for key screen resolutions and devices. You can make any row “fluid” by changing `.row` to `.row-fluid`. The column classes stay exactly the same, making it easy to flip between fixed and fluid grids. To offset, you operate in the same way as the fixed grid system—add `.offset*` to any column to shift by your desired number of columns:

```
<div class="row-fluid">
  <div class="span4">...</div>
  <div class="span8">...</div>
</div>

<div class="row-fluid">
  <div class="span4">...</div>
  <div class="span4 offset2">...</div>
</div>
```

Nesting a fluid grid is a little different. Since we are using percentages, each `.row` resets the column count to 12. For example, if you were inside a `.span8`, instead of two `.span4` elements to divide the content in half, you would use two `.span6` divs (see

Figure 1-4). This is the case for responsive content, as we want the content to fill 100% of the container:

```
<div class="row-fluid">
  <div class="span8">
    <div class="row">
      <div class="span6">...</div>
      <div class="span6">...</div>
    </div>
  </div>
</div>
```

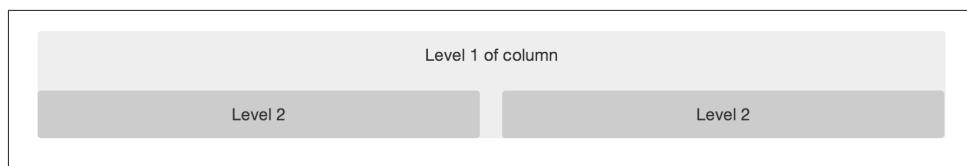


Figure 1-4. Nesting fluid grid

Container Layouts

To add a fixed-width, centered layout to your page, simply wrap the content in `<div class="container">...</div>`. If you would like to use a fluid layout but want to wrap everything in a container, use the following: `<div class="container-fluid">...</div>`. Using a fluid layout is great when you are building applications, administration screens, and other related projects.

Responsive Design

To turn on the responsive features of Bootstrap, you need to add a `<meta>` tag to the `<head>` of your web page. If you haven't downloaded the compiled source, you will also need to add the responsive CSS file. An example of required files looks like this:

```
<!DOCTYPE html>
<html>
  <head>
    <title>My amazing Bootstrap site!</title>
    <meta name="viewport" content="width=device-width,
initial-scale=1.0">
    <link href="/css/bootstrap.css" rel="stylesheet">
    <link href="/css/bootstrap-responsive.css" rel="stylesheet">
  </head>
```



If you get started and find that the Bootstrap responsive features aren't working, make sure that you have these tags. The responsive features aren't added by default at this time because not everything needs to be responsive. Instead of encouraging developers to remove this feature, the authors of Bootstrap decided that it was best to enable it as needed.

What Is Responsive Design?

Responsive design is a method for taking all of the existing content that is on the page and optimizing it for the device that is viewing it. For example, the desktop not only gets the normal version of the website, but it might also get a widescreen layout, optimized for the larger displays that many people have attached to their computers. Tablets get an optimized layout, taking advantage of their portrait or landscape layouts. And then with phones, you can target their much narrower width. To target these different widths, Bootstrap uses CSS media queries to measure the width of the browser viewport and then, using conditionals, changes which parts of the stylesheets are loaded. Using the width of the browser viewport, Bootstrap can then optimize the content using a combination of ratios or widths, but it mostly relies on *min-width* and *max-width* properties.

At the core, Bootstrap supports five different layouts, each relying on CSS media queries. The largest layout has columns that are 70 pixels wide, contrasting with the 60 pixels of the normal layout. The tablet layout brings the columns to 42 pixels wide, and when narrower than that, each column goes fluid, meaning the columns are stacked vertically and each column is the full width of the device (see [Table 1-1](#)).

Table 1-1. Responsive media queries

Label	Layout width	Column width	Gutter width
Large display	1200px and up	70px	30px
Default	980px and up	60px	20px
Portrait tablets	768px and up	42px	20px
Phones to tablets	767px and below	Fluid columns, no fixed widths	
Phones	480px and below	Fluid columns, no fixed widths	

To add custom CSS based on the media query, you can either include all rules in one CSS file via the media queries below, or use entirely different CSS files:

```
/* Large desktop */
@media (min-width: 1200px) { ... }

/* Portrait tablet to landscape and desktop */
@media (min-width: 768px) and (max-width: 979px) { ... }

/* Landscape phone to portrait tablet */
@media (max-width: 767px) { ... }
```

```
/* Landscape phones and down */
@media (max-width: 480px) { ... }
```

For a larger site, you might want to divide each media query into a separate CSS file. In the HTML file, you can call them with the `<link>` tag in the head of your document. This is useful for keeping file sizes smaller, but it does potentially increase the HTTP requests if the site is responsive. If you are using LESS to compile the CSS, you can have them all processed into one file:

```
<link rel="stylesheet" href="base.css" />
<link rel="stylesheet" media="(min-width: 1200px)" href="large.css" />
<link rel="stylesheet" media="(min-width: 768px) and (max-width: 979px)"
      href="tablet.css" />
<link rel="stylesheet" media="(max-width: 767px)" href="tablet.css" />
<link rel="stylesheet" media="(max-width: 480px)" href="phone.css" />
```

Helper classes

Bootstrap also includes a handful of helper classes for doing responsive development (see [Table 1-2](#)). Use these sparingly. A couple of use cases that I have seen involve loading custom elements based on certain layouts. Perhaps you have a really nice header on the main layout, but on mobile you want to pare it down, leaving only a few of the elements. In this scenario, you could use the `.hidden-phone` class to hide either parts or entire dom elements from the header.

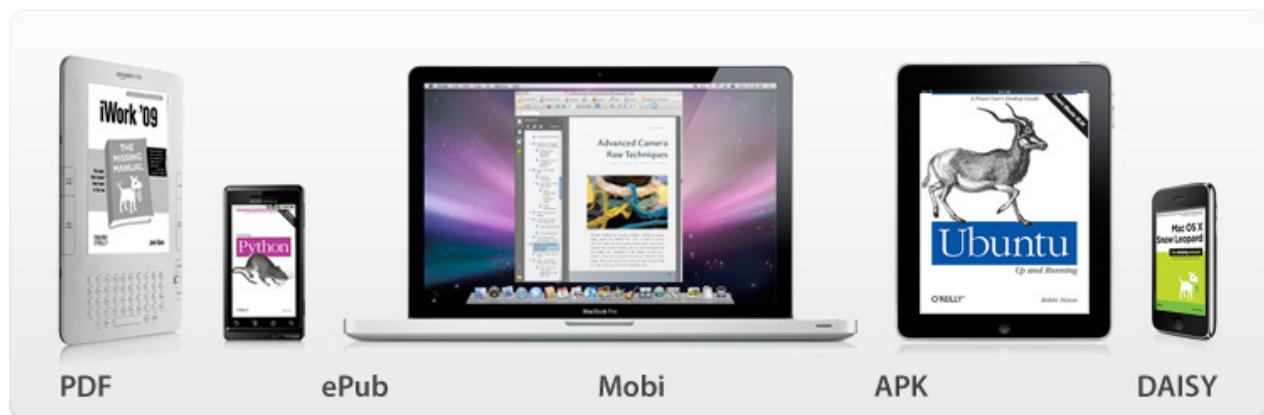
Table 1-2. Media queries helper classes

Class	Phones	Tablets	Desktops
.visible-phone	Visible	Hidden	Hidden
.visible-tablet	Hidden	Visible	Hidden
.visible-desktop	Hidden	Hidden	Visible
.hidden-phone	Hidden	Visible	Visible
.hidden-tablet	Visible	Hidden	Visible
.hidden-desktop	Visible	Visible	Hidden

There are two major ways that you could look at doing development. The mantra that a lot of people are shouting now is that you should start with mobile, build to that platform, and let the desktop follow. Bootstrap almost forces the opposite, where you would create a full-featured desktop site that “just works.”

If you are looking for a strictly mobile framework, Bootstrap is still a great resource.

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