COMP 1950

Web Development and Design 2

Day 02

Agenda

- Typography
- Custom Web Fonts
- Responsive Web Design Tools
- Media Queries
- Fluid Responsive Layout

Typography for the Web

Terminology

- Typeface
  - Is what we see. It is the artistic impression of how text looks, feels and reads[1]
- Font
  - Is a file that contains a typeface. Using a font on a computer allows the computer to access the typeface[1]

G

Typeface = how text looks

Abg

Century Gothic

Font = the file that contains the typeface

1. https://learn.shayhowe.com/html-css/working-with-typography/

General Typography Guidelines for the Web

Choose One or Two Fonts for your Site

- Keep your typeface choices to a minimum

- Ideally 1 – 2 typefaces per site will suffice
  - A typeface for headings
  - A typeface for paragraphs, lists, links, etc

- These are guidelines and there are always exceptions

The First Footstep

Neil Armstrong became the first man to step foot on the moon. As he touched the ground he famously declared: "That's one small step for man, one giant leap for mankind."

The first footstep text from: https://www.cartridgesave.co.uk/news/15-of-the-most-iconic-newspaper-headlines-ever-printed/

Use Decorative Typefaces for Headings Only

- Decorative typefaces are great for headings, but reading long passages of text in a decorative typeface can be difficult

Decorative typeface used on a long passage of text is difficult to read

Decorative typefaces are best used on headings or short passages of text

Chapter 1. I am Born

Whether I shall turn out to be the hero of my own life, or whether that station will be held by anybody else, these pages must show. To begin my life with the beginning of my life, I record that I was born (as I have been informed and believe) on a Friday, at twelve o'clock at night. It was remarked that the clock began to strike, and I began to cry, simultaneously.

-- From: David Copperfield by Charles Dickens

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Line Lengths

- Don't let line lengths (called measure in print) get too narrow or too wide for long passages of text

- A good rule of thumb for paragraphs in web design is between 40 and 80 characters per line or…

- …using a 1rem or 16px font-size your paragraph container should range in size from 1000px to 320px

- To keep your content fluid set a max-width property on the parent element instead of a fixed width property

Line Lengths

- Too wide

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In consideration of the day and hour of my birth, it was declared by the nurse, and by some sage women in the neighbourhood who had taken a lively interest in me several months before there was any possibility of our becoming personally acquainted, first, that I was destined to be unlucky in life; and secondly, that I was privileged to see ghosts and spirits; both these gifts inevitably attaching, as they believed, to all unlucky infants of either gender, born towards the small hours on a Friday night.

I need say nothing here, on the first head, because nothing can show better than my history whether that prediction was verified or falsified by the result. On the second branch of the question, I will only remark, that unless I ran through that part of my inheritance while I was still a baby, I have not come into it yet. But I do not at all complain of having been kept out of this property; and if anybody else should be in the present enjoyment of it, he is heartily welcome to keep it.

-- From: David Copperfield by Charles Dickens

Line Lengths

- Too narrow

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Line Lengths

- About right

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Type Size

- Don't let your type size for main blocks of content get too small

- 16px or 1rem is a good size for general readability. This is the default type size for paragraphs in most browsers.

- Smaller than 16px and type becomes difficult to read

- Feel free to experiment with larger type sizes for paragraphs
  - Large paragraph type sizes on mobile can hamper readability due to the limited horizontal screen widths
  - Use media queries to adjust paragraph type sizes on desktop down to mobile

Type Size

Paragraph font-size set to 0.7rem. Too small for easy readability

Paragraph font-size set to 1rem. A good all around font-size that works from desktop down to mobile. This is the default in most browsers

Type Alignment

- When in doubt align left

- Save centre alignment for headings

- Centre aligned paragraphs are difficult to read

- Justified alignment (CSS text-align: justify) can cause large amounts of empty space to form between words in your text on the web. Use text-align: justify; cautiously

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Contrast

- Make sure the color of the text has a high contrast relative to the background color
- If in doubt test your type colour and your background colour at the Color Contrast Checker on WebAIM
  - https://webaim.org/resources/contrastchecker/
- Be cautious when setting type on top of complex imagery

Contrast

Poor Contrast

Good Contrast

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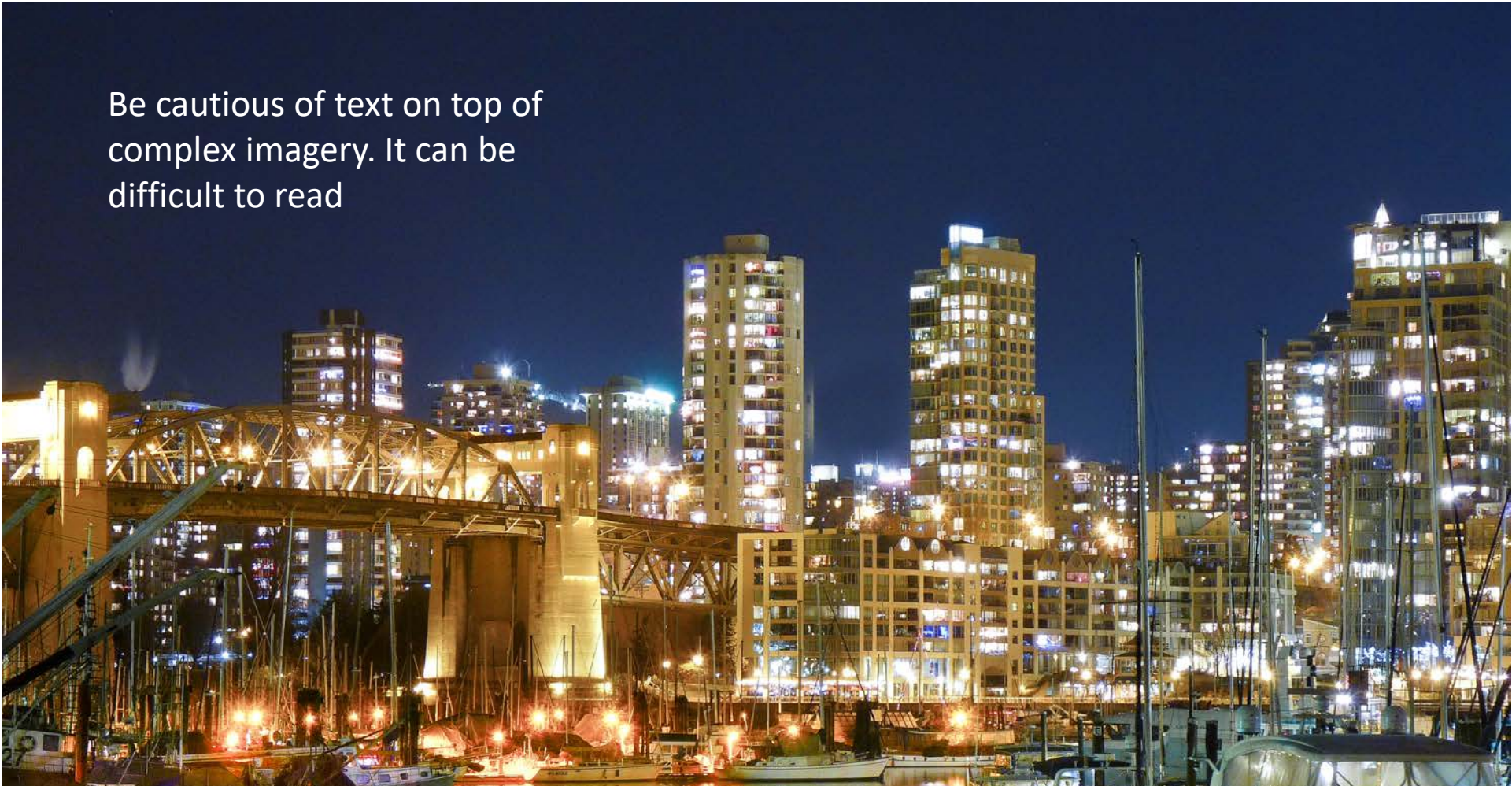
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Type on top of Complex Imagery

Be cautious of text on top of complex imagery. It can be difficult to read

Line Height

- Line height is the spacing between lines of text

- When in doubt set a line-height of 1.4 on content text

- Values between 1.2 and 1.5 work well in web design for long passages of content text

Line Height

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Line Height set to 1. This is too low for good readability

Line Height set to 1.4, a good all around value for good readability

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Let your Content Breath

- Give your text content room to breath, meaning code in decent amounts of white space around text content elements

- Text set right up against the edges of screens and parent elements are difficult to read

- Set padding on parent elements to push text away from the edges of containing elements

- Set margin between elements to space out elements in the overall page layout

Content Spacing

- Poor content spacing
- Text is set right up against the edges of their parent elements hampering readability

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Chapter 2. I Observe

The first objects that assume a distinct presence before me, as I look far back, into the blank of my infancy, are my mother with her pretty hair and youthful shape, and Peggotty with no shape at all, and eyes so dark that they seemed to darken their whole neighbourhood in her face, and cheeks and arms so hard and red that I wondered the birds didn't peck her in preference to apples.

Chapter 3. I Have Change

The carrier's horse was the laziest horse in the world, I should hope, and shuffled along, with his head down, as if he liked to keep people waiting to whom the packages were directed. I fancied, indeed, that he sometimes chuckled audibly over this reflection, but the carrier said he was only troubled with a cough. The carrier had a way of keeping his head down, like his horse, and of drooping sleepily forward as he drove, with one of his arms on each of his knees. I say 'drove', but it struck me that the cart would have gone to Yarmouth quite as well without him, for the horse did all that; and as to conversation, he had no idea of it but whistling.

Content Spacing

- Good content spacing
- Elements are spaced away from the edges of their parent elements via padding
- White space is set between each element via margin

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Use CSS to Set Capitalization

- If you need headings in all-caps, use CSS, don't write the content in all CAPITAL letters.

- This gives you the flexibility to change the capitalization at a later time via CSS without touching the content (HTML)

```html
<h1>Hello World</h1>
```

```css
h1 {
    text-transform: uppercase;
}
```

HELLO WORLD

CSS Text Transform

- text-transform values
  - none (default)
    - No capitalization. Text renders as it is from the HTML
  - capitalize
    - Transforms the first character of each word to uppercase
  - uppercase
    - Transforms all characters to uppercase
  - lowercase
    - Transforms all characters to lowercase

Above text modified from text found at: https://www.w3schools.com/cssref/pr_text_text-transform.asp

CSS Text Transform

```
<h1>Hello World</h1>
```

Write your content in regular case.

```
h1 {
    text-transform: uppercase;
}
```

Set your capitalization with CSS. If you want regular capitalization then do not set this or set it to "none"

HELLO WORLD

Custom Typefaces on the Web

- Until recently web developers were limited to the use of web-safe typefaces on web sites and web apps

- In the past, to add a custom typeface to a web app or web site developers used image replacement or Flash.

- Today we have @font-face with good support in all modern browsers
  - @font-face allows us to load any font file onto our web site as long as we have the legal license to do so

Fonts and Copyright

- Just because you can does not mean you should
- @font-face allows us to take any font file on our computer, upload it to our server and use it on our web site
- Legally we can not do this unless we have a license which permits web use using @font-face
- Ignoring this can open up content creators and owners to legal action
- Most fonts located on your desktop are not licensed for @font-face use
- Get fonts from web font services or use services like Google fonts to ensure you have a license to use the font on the web
- We will explore some free and paid font services that you can use on your web site or web app

Using @font-face

- Inside the @font-face declaration:
  - Declare a name for your font
  - Tell the browser where the font file is located
    - Specify the font format
  - Declare what font-weight the font is
  - Declare what font-style the font is

```css
@font-face {
    font-family: 'foo';
    src: url('fonts/foo-type.woff2') format('woff2'),
         url('fonts/foo.woff') format('woff'),
         url('fonts/foo.ttf') format('truetype'),
    font-weight: normal;
    font-style: normal;
}
```

Code modified from: https://developer.mozilla.org/en-US/docs/Learn/CSS/Styling_text/Web_fonts

Using @font-face

- Once you have declared your font in an @font-face declaration, simply call the font inside a CSS ruleset

```css
@font-face {
    font-family: 'foo';
    src: url('fonts/foo-type.woff2') format('woff2'),
         url('fonts/foo.woff') format('woff'),
         url('fonts/foo.ttf') format('truetype'),
    font-weight: normal;
    font-style: normal;
}
```

```css
p {
    font-family: foo, sans-serif;
}
```

A Quick Note on Font File Types

- You can use a standard desktop font file (.otf/.ttf) on the web but these file types are not optimized for web use.

- OTF/TTF font file sizes will be larger then if using a web font file format

Web Font File Formats

- Web Font file formats
  - EOT (IE6-IE8)
  - SVG (Old iPhone – Mobile Safari)
  - WOFF (IE9, Edge, Chrome, Safari, Mobile Safari, Firefox, Android)
  - WOFF2 (Edge, Chrome, Safari (partial), Mobile Safari, Firefox, Latest Android)
  - TTF (Edge, Chrome, Safari, Mobile Safari, Firefox, Android)
- If you do not need to support IE6-8 than you can get by with just WOFF and WOFF2 font files for most modern browsers
- Need to support older Android: use TTF or OTF font files
- Need to support really old iPhones: use an SVG font file format

@font-face Format Order

- In your @font-face declaration format order matters, so declare the most modern format first (WOFF2), followed by older formats

- The browser will download the first format it understands

- One exception
  - If you have to support IE6-8 then declare the EOT formats first followed by WOFF2, WOFF, TTF and SVG

@font-face – Modern Browser Support Syntax

```
@font-face {
  font-family: 'foo';
  src: url('foo.woff2') format('woff2'), /* Latest browsers – 2017 */
       url('foo.woff') format('woff'); /* Modern browsers */
}
```

Code above modified from: https://css-tricks.com/snippets/css/using-font-face/

@font-face – Deep Browser Support Syntax

```css
@font-face {
  font-family: 'foo';
  src: url('foo.eot'); /* IE9 Compat Modes */
  src: url('foo.eot?iefix') format('embedded-opentype'), /* IE6-IE8 */
       url('foo.woff2') format('woff2'), /* Latest browsers – 2017 */
       url('foo.woff') format('woff'), /* Modern browsers */
       url('foo.ttf') format('truetype'), /* Safari, Android, iOS */
       url('foo.svg#svgFontName') format('svg'); /* Legacy iOs */
}
```

Code above modified from: https://css-tricks.com/snippets/css/using-font-face/

Free Fonts

- Try these sites to get free fonts to use in your graphic designs, web sites and web apps

- Double check licenses to make sure they are licensed for web use
  - On Font Squirrel look for the globe icon

- Web Sites with free fonts
  - https://www.fontsquirrel.com/
  - https://www.dafont.com/
  - https://www.theleagueofmoveabletype.com/
  - http://losttype.com/

Font Hosting Services

- Don't want to deal with @font-face declarations and hosting and serving your own font files, then use a font hosting service

- Font Hosting services host your fonts for you

- You declare fonts in your CSS file via the "font-family" property inside rulesets, but you do not need make an @font-face declaration

- Some font hosting services require a small snippet of JavaScript in the head section. JS files are provided by the font hosting service

Paid Web Font Hosting Services

- TypeKit
  - If you subscribe to Adobe's Creative Cloud, then you get TypeKit as part of your subscription
  - https://typekit.com/

- Cloud Typography
  - https://www.typography.com/cloud/welcome/

Free Web Font Hosting Services

- Google Fonts
  - The easiest to use and by far the most popular web font hosting service
  - Be careful with serving users in China as most Google services including fonts are blocked
  - https://fonts.google.com/

- Adobe Edge Web Fonts
  - A nice alternative to Google
  - Good selection of Typefaces
  - Font quality is high
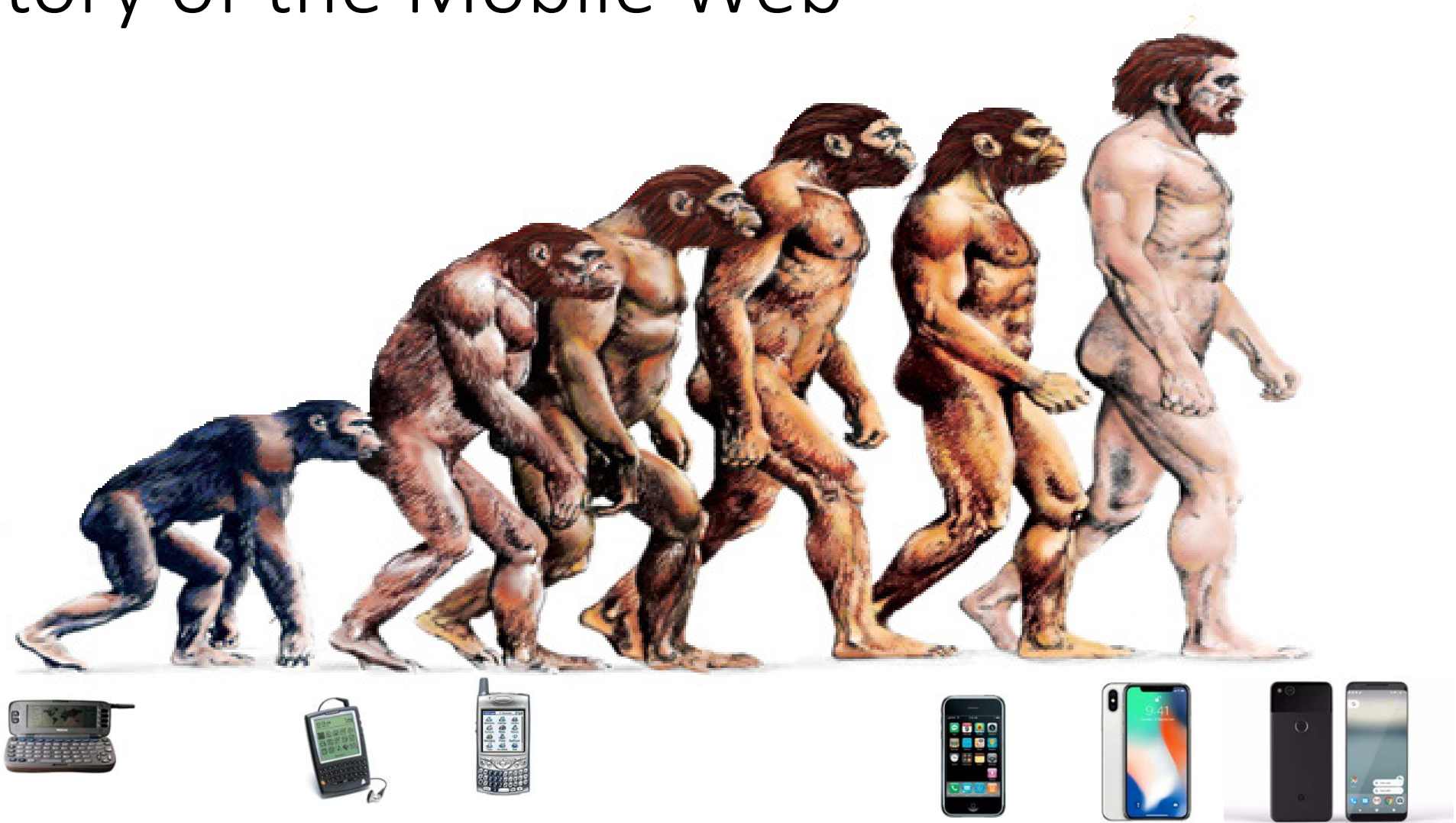 - https://edgewebfonts.adobe.com/

Responsive Web Design

What is the Mobile Web

- The Mobile Web refers to access to the world wide web, i.e. the use of browser-based Internet services, from a handheld mobile device, such as a smartphone, a feature phone or a tablet computer, connected to a mobile network or other wireless network.[1]

1. http://en.wikipedia.org/wiki/Mobile_Web

History of the Mobile Web

Evolution Image from: http://www.thehansindia.com/posts/index/Civil-Services/2016-09-26/How-culture-impacted-human-evolution/255872

Before iPhone

- Low powered devices
- Weak browsers that could only browse a sub set of the web
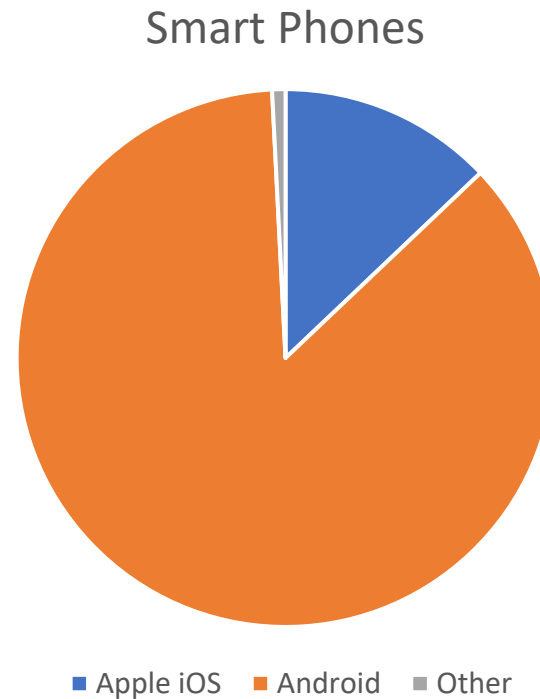- Slow connectivity to the web

After iPhone

- Relatively high powered devices
- Full HTML5 compliant browsers that could browse the entire web
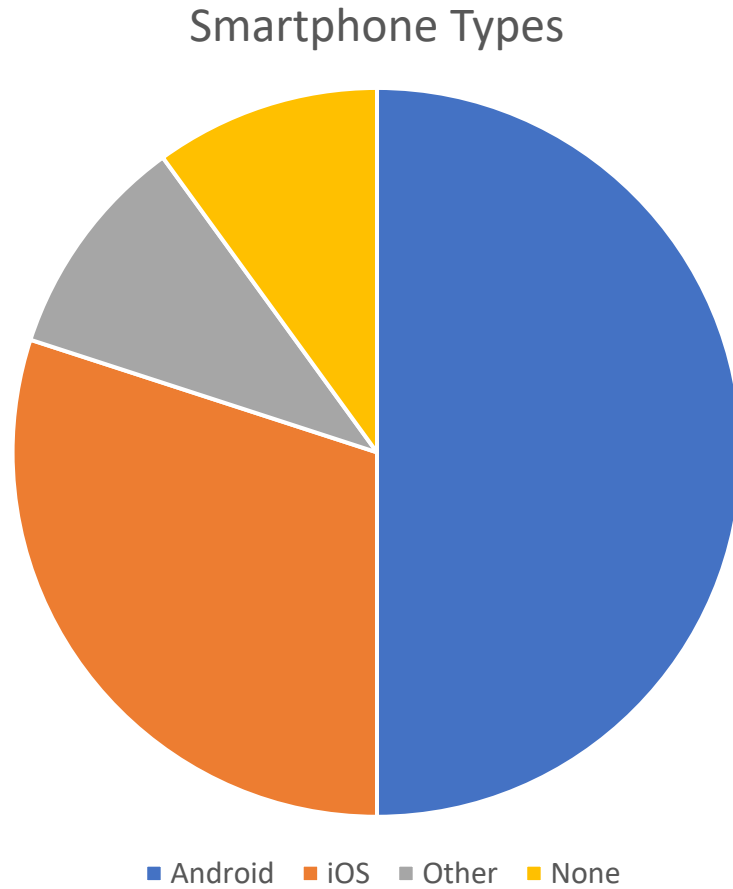- fast connectivity to the web

Why go Mobile

Source: http://instagram.com/p/W2BuMLQLRB

Global Smartphone Market Share

Smart Phones

■ Apple iOS ■ Android ■ Other

Class Poll - Smartphones

Smartphone Types

■ Android ■ iOS ■ Other ■ None

Responsive Web Design – Design Inspiration

- http://mediaqueri.es
  - To see the different versions of these web sites, from desktop to tablet, simply resize your desktop browser window
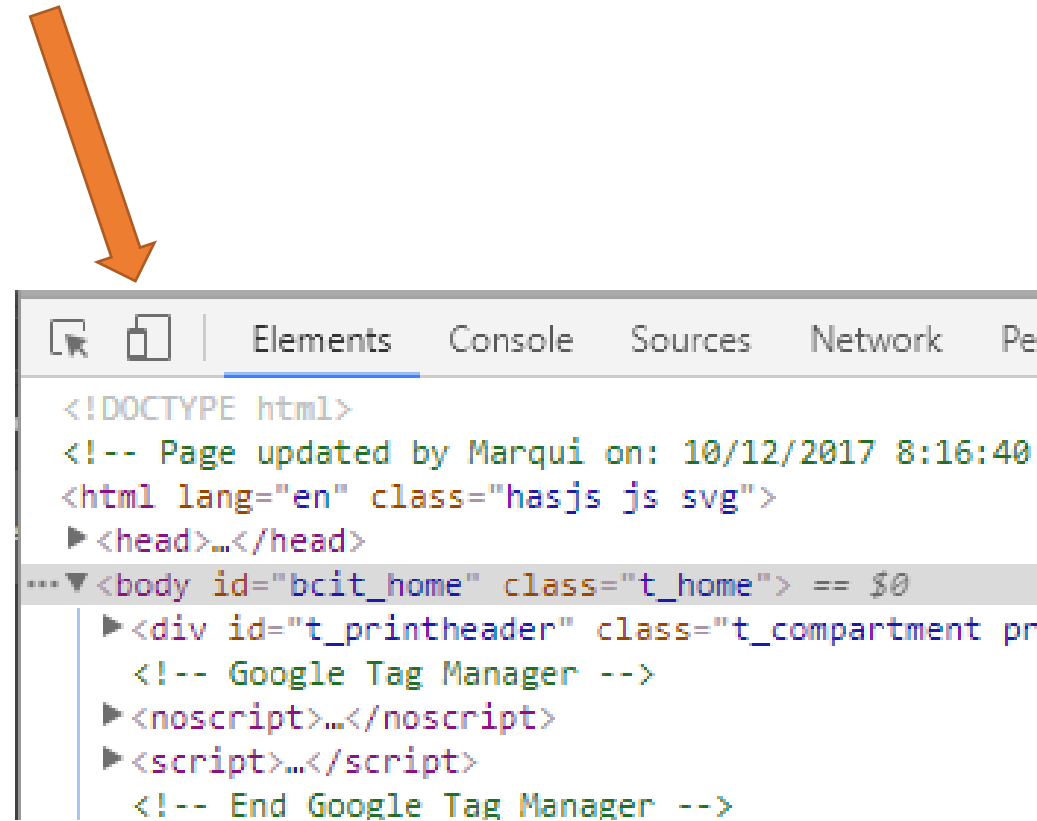
Responsive Web Design Tools

The above images from: http://contactlessintelligence.com/2012/07/06/smartphones-the-new-digital-swiss-army-knife
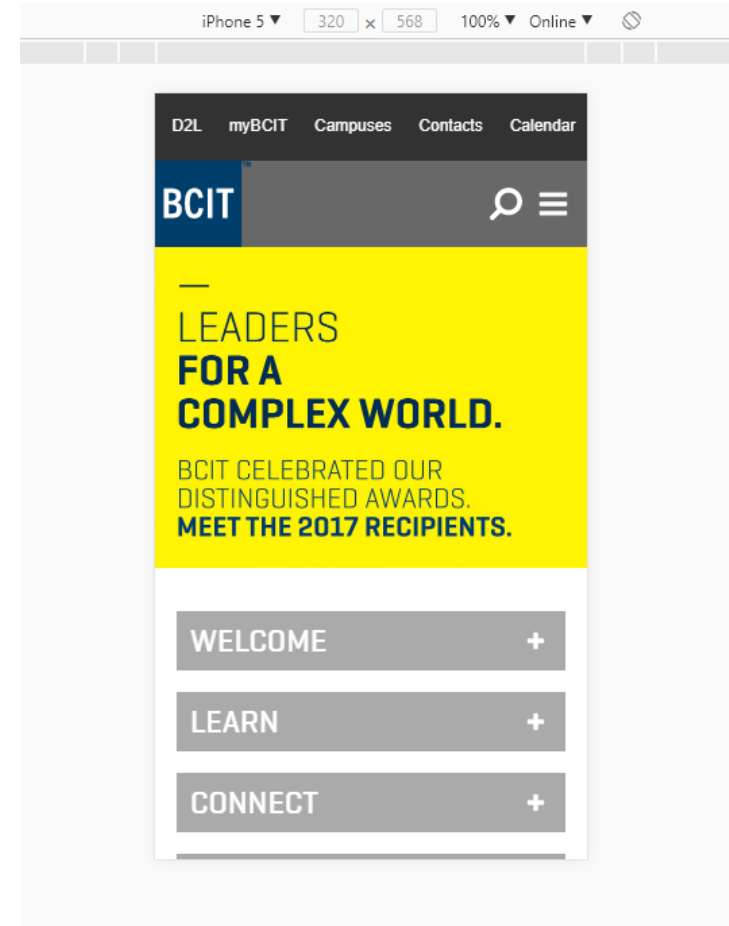
Browser Tools - Chrome

- Activate developer tools and click the phone icon to activate device emulation

- This is not a true emulator, it still uses the Chrome desktop rendering engine

- This tool will give you a good idea of what your layout will look like at different device sizes

Browser Tools - Chrome

- Once the device emulator has activated you can:
  - Resize to popular mobile device sizes
  - Resize to any browser size
  - Throttle connection speeds to simulate mobile connections
  - Change device orientation
  - Change pixel ratio

Browser Tools - Firefox

- Firefox has a responsive design view

- To activate it press:
  - On Windows: Ctrl + Shift + M
  - On Mac: Cmd + Option + M

- Once the tool is activated you can:
  - Resize to any size, or resize to common popular mobile device sizes
  - Throttle connection speeds
  - Change device orientation
  - Change pixel ratio
  - Take a screebshot

Browserstack

- Normally a paid service that allows you to test your web sites on multiple devices virtually using virtual machines running in the browser
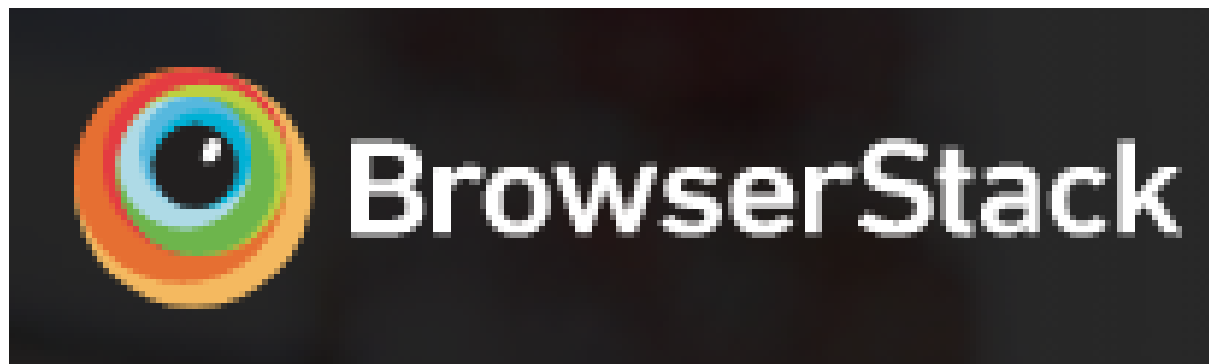
- Sign up for a free trial:
    - http://www.browserstack.com

Image source: http://www.browserstack.com

Browsersync

- Free open source tool that allows you to sync up and test multiple browsers simultaneously
  - You can configure it so that shanges to CSS and HTML files are reflected immediately on save without a browser refresh
- If your mobile devices are on the same Wi-Fi network then you can sync up your mobile browsers as well
- Read the docs at:
  - http://www.browsersync.io
- Browsersync spins up a simple web server, that also injec

Browsersync - Install

- To get it up and running follow these steps
  1. Install Node JS - https://nodejs.org
  2. Open a Node JS Command Prompt on Windows or open Terminal on Mac and type:
     - npm install -g browser-sync
  3. Navigate to your project folder in Command Prompt or Terminal and type:
     - browsersync start --server --files "*.html, styles/*.css"
     - The above command assumes the following:
       - Your CSS files are stored in a directory called "styles" change this directory in the above command if needed

Browsersync – Install - Mac

- Have problems installing on a Mac
- Easy fix is to preface the npm install -g browser-sync command with "sudo"
  - sudo npm install -g browser-sync
  - Most developers do not like this approach as it can be risky to give any program root user permissions
- A better approach is to change file permissions on the default npm install directory. Follow the instructions on this page:
  - https://docs.npmjs.com/getting-started/fixing-npm-permissions

Responsive Design Tools - Mac

- If you have a Mac you have access to a couple of extra responsive design tools
  - The iOS emulator
    - This is a full emulator running a full recreation of an iOS device on your Mac
    - Emulates several iOS devices including iPads and iPhones
  - Plug an iPhone or iPad into your Mac and run browser developer tools on it via the desktop Safari Browser

iOS Simulator

- You can get the iOS Simulator by installing X-Code from the App store. X-Code is used for developing iOS and Mac apps. Its free
- To run it
  - Launch Xcode
  - Run the iOS simulator
    - Right click on the Xcode dock icon (or two finger tap)
    - Select "Open Developer Tools"
    - Select "Simulator"
  - For easier future access
    - Right click on the Simulator icon in the dock (or two finger tap)
    - Select Options
    - Select "Keep in Dock"
    - To run the Simulator in the future, simply click on the Dock icon

Plug an iPhone/iPad into your Mac for Testing

1. Make sure developer tools is enabled in both iOS Safari and Mac OS Safari
    - iOS Safari
        - Settings > Safari > Advanced > Web Inspector (enable this)
    - Mac OS Safari
        - Preferences > Advanced > Check "Show Develop Menu in Menu bar"
2. Plug your iOS device into your Mac and launch the web site you wish to test in iOS Safari
3. In Mac OS Safari
    - Develop > [Your iOS device] > Develop on this device
4. In Mac OS Safari
    - Develop > [Your iOS device] > select the web site you wish to run developer tools on

Coding Mobile Web Sites

Above image from: http://tytaniummobile.com/mobile-gallery-mobile-website-design-examples-qr-codes-lead-capture-pages

Coding Mobile Web Sites

- The code for a mobile / responsive web site is very similar to coding a regular HTML coded web site

- Just like desktop web sites we will use the following languages to code our sites
  - HTML – for content
  - CSS – for presentation
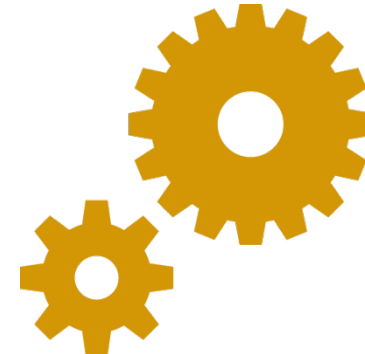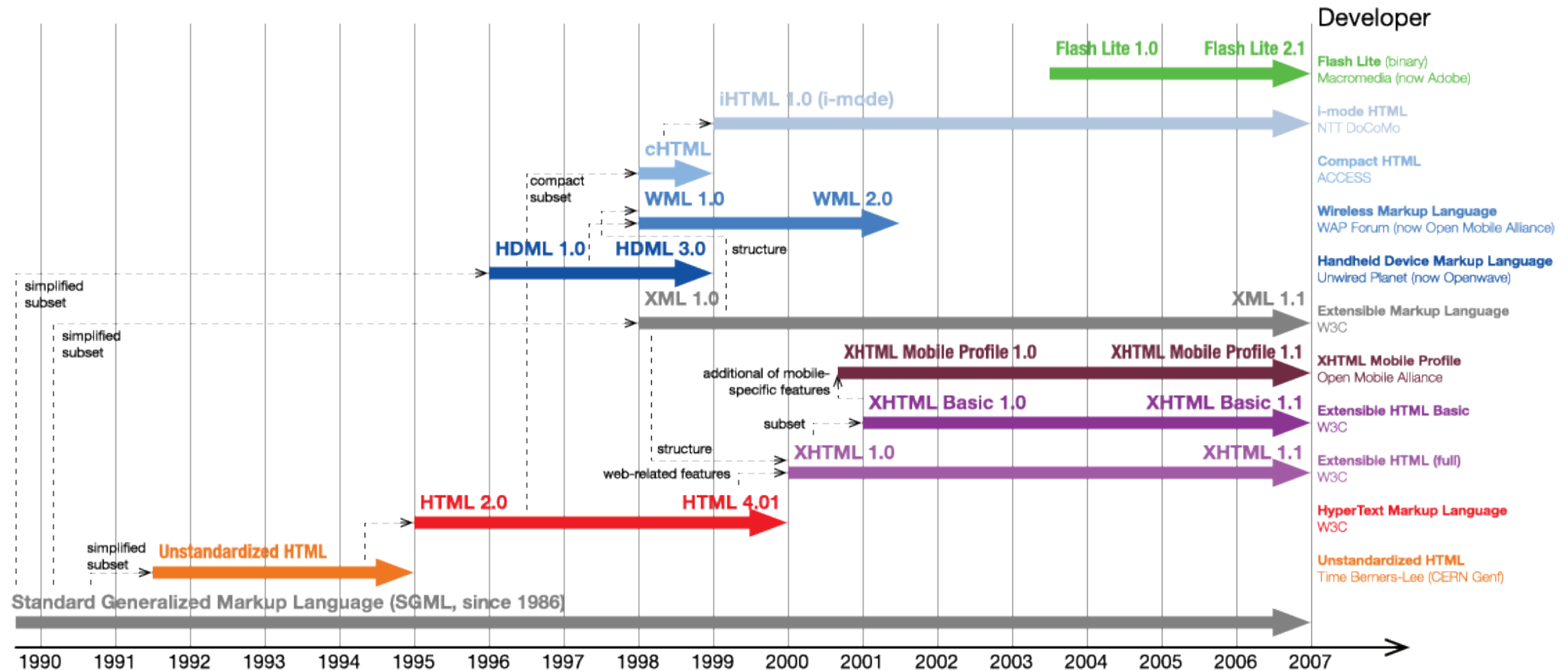 - JavaScript – for behaviours

Content =
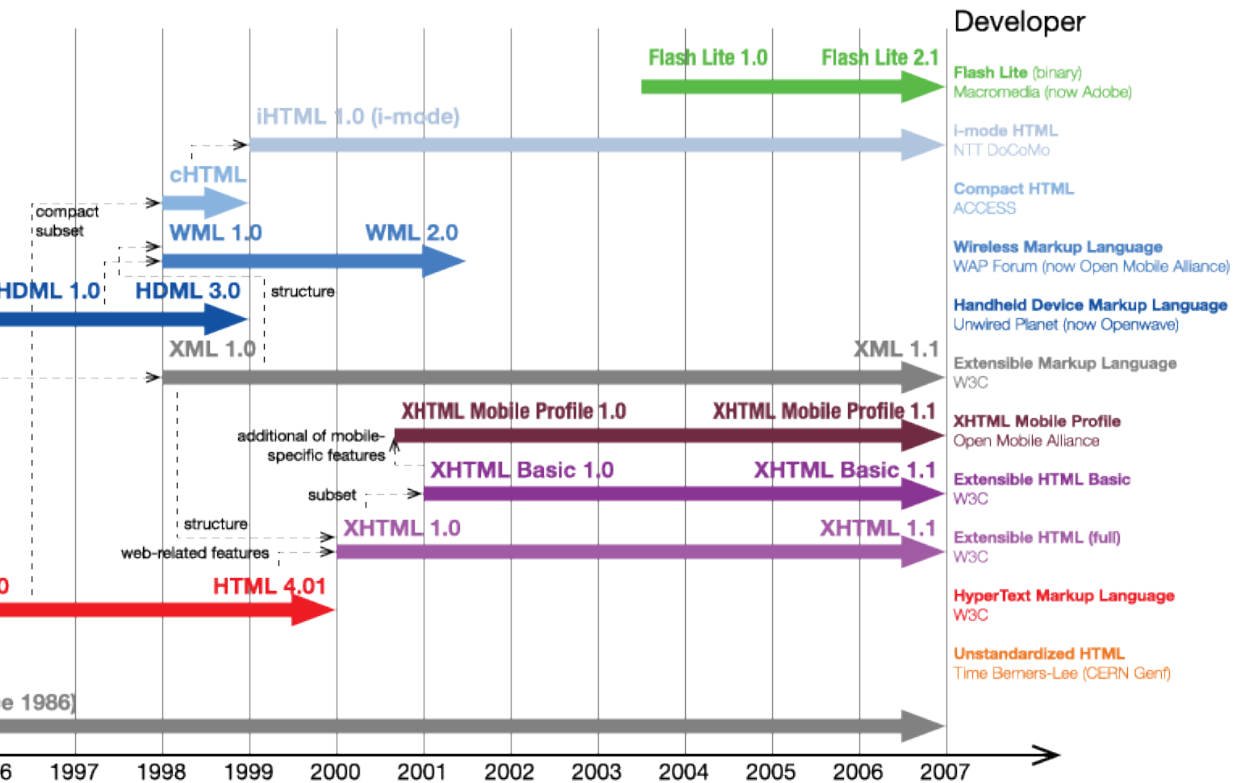HTML

Style =
CSS

Behaviour =
JavaScript

Evolution of Mobile Web–Related Markup Languages

The above image from: http://en.wikipedia.org/w/index.php?title=File:Mobile_Web_Standards_Evolution_Vector.svg&page=1

bile Web–Related Markup Languages

Developer

Flash Lite 1.0 **Flash Lite 2.1**
Flash Lite (binary)
Macromedia (now Adobe)

iHTML 1.0 (i-mode)
i-mode HTML
NTT DoCoMo

cHTML
Compact HTML
ACCESS

compact
subset

WML 1.0 **WML 2.0**
Wireless Markup Language
WAP Forum (now Open Mobile Alliance)

HDML 1.0 **HDML 3.0** structure
Handheld Device Markup Language
Unwired Planet (now Openwave)

XML 1.0 **XML 1.1**
Extensible Markup Language
W3C

XHTML Mobile Profile 1.0 **XHTML Mobile Profile 1.1**
XHTML Mobile Profile
Open Mobile Alliance

additional of mobile-
specific features

XHTML Basic 1.0 **XHTML Basic 1.1**
Extensible HTML Basic
W3C

subset

XHTML 1.0 **XHTML 1.1**
Extensible HTML (full)
W3C

structure

web-related features

HTML 4.01
HyperText Markup Language
W3C

Unstandardized HTML
Time Berners-Lee (CERN Genf)

e 1986)

6 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007

Today

Components of a Responsive Web Site or App

- Viewports
  - Setting your viewport meta tag
- Flexible or Fluid layouts
  - Setting up a fluid grid system
- Media Queries
- Responsive Images and Media

Setting Up Your Viewport for Mobile Browsers

First, A little bit on the humble pixel

- What is a pixel (px)

- In none-web development terms a pixel is a single unit on a screen capable of displaying a colour

- In web development terms a pixel is an abstraction from device pixels. When we set a width of an element with CSS or JavaScript to pixels we are setting CSS pixels not device pixels

CSS Pixels vs Device Pixels

- As mentioned before device pixels are physical elements on a screen.
- CSS pixels are an abstraction from device pixels set independently by the browser vendors
  - On most desktop non-retina screens 1 CSS pixel = 1 device pixel
    - If the user zooms into a web site using the zoom controls than 1 CSS pixel may equal multiple device pixels
  - On retina (or Hi-DPI) screens 1 CSS pixel can equal 4 or more device pixels
    - Every iPhone since the iPhone 4 is retina
    - Most modern Android phones are Hi-DPI devices
    - Recent MacBook Pros are retina

CSS Pixels vs Device Pixels

- Set the width of an element in CSS to 200px and the element will take up different amounts of device pixels depending on the device and the browser
  - On an iPhone4 and higher the element with a CSS pixel width of 200 will actually take up 400 device pixels (width)
- Fortunately for us Web Developers we need not really concern ourselves with the difference as the calculation between CSS pixels and device pixels has been abstracted away. We simple set our element to 200px and we expect it to appear to be 200px wide.
  - Even JavaScript will report an elements width back to us in CSS pixels

CSS Pixels vs Device Pixels, Who cares?

- Since it has been abstracted away, you can largely forget about the theory, and code away knowing your CSS pixels or JavaScript pixels will appear on any screen as expected
- Where it comes into play is setting up the viewport for mobile screens and creating retina or HiDPI ready imagery

Viewports 101

- The viewport on desktop screens is simple
  - The viewport width is equal to the browsers width
- The viewport on Mobile is a little more complex
  - Setting the viewport width equal to the browsers width on mobile devices would cause problems for sites not designed for mobile (a big problem when the iPhone came out in 2007 as most sites were not designed for mobile)
  - Mobile browsers realized this and made their browsers viewport width independent of the physical pixel dimension of the device
    - Mobile browser viewport widths range anywhere from 768px to 1024px (CSS pixels not device pixels)
    - Basically the Mobile browser zooms out to fit a desktop site into a mobile browser
    - This compromise was needed in the early days of the mobile web but causes problems for sites designed for mobile
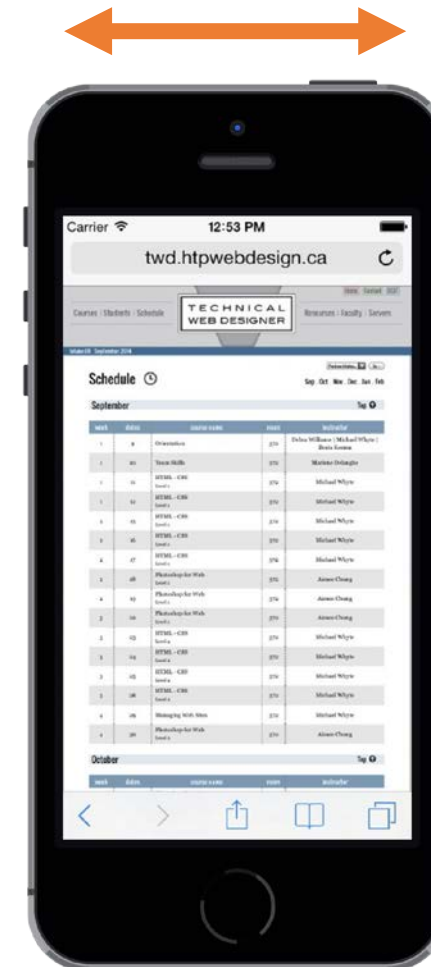
Viewports on Mobile Browsers

- Mobile browsers have three viewports[1]
  - Layout viewport
  - Visual viewport
  - The ideal viewport
- For Responsive web design and development we are mostly concerned with the ideal viewport

1. The Mobile Web Handbook, by Peter-Paul Koch, pg. 89
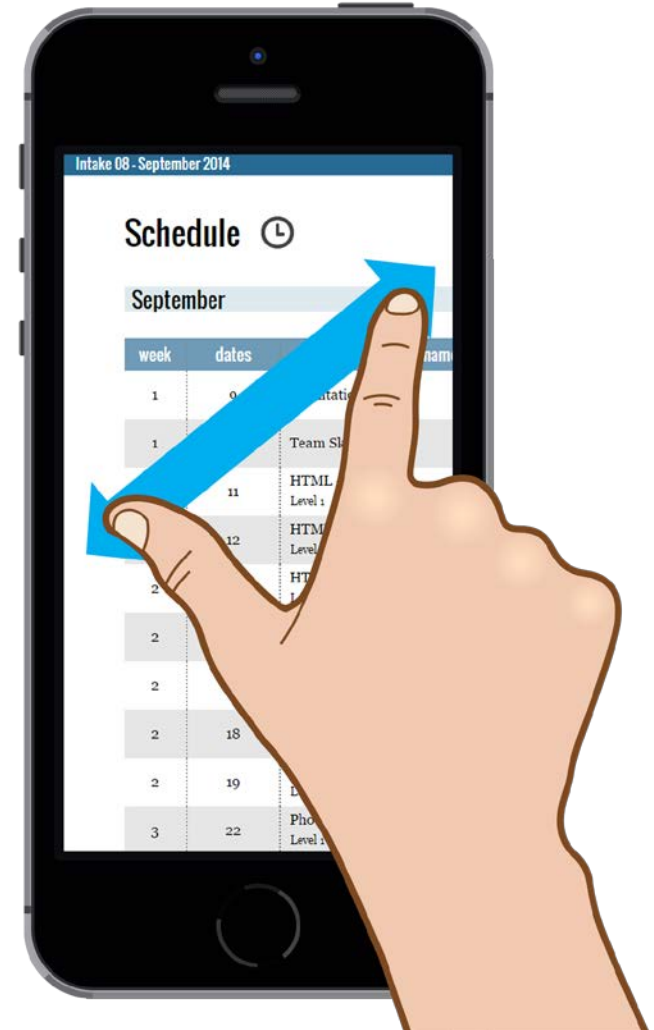
The Layout Viewport

- In order for small screen mobile devices to show a large desktop only web site the mobile browsers vendors have a layout viewport

- The layout viewport is a screen size that the mobile browser pretends to be
  - The actual width varies from device to device but is often somewhere around 980px
  - The image to the right shows an iPhone 5 which has a physical pixel width of 640 device pixels, but for non-responsive web sites it pretends to be a device with 980px of width
  - You can override this behaviour by using a viewport meta tag

This iPhone is 640 device pixels wide, but it pretends to be 980px wide for non-responsive web sites

The Visual Viewport

- The visual viewport is the area of screen that the user is currently seeing

- This changes when the user pinches to zoom in or out

- We usually are not interested in the visual viewport in responsive web design

The Ideal Viewport

- Each browser maker for each device can choose an ideal viewport
- Browser vendors pick an ideal viewport size that they believe sites designed for mobile will look their best
- The ideal viewport is different across browsers and devices
- <mark>***By Default browsers will not render websites at their ideal viewport***</mark>
- To make mobile browsers display sites at their ideal viewport we (web developers) must set a viewport meta tag in our HTML
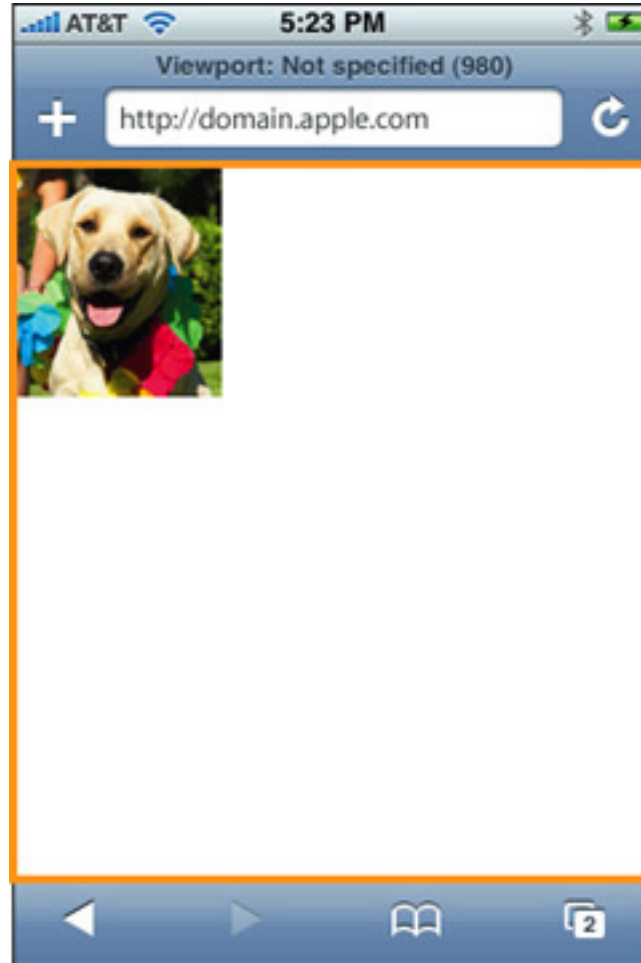- The ideal viewport can change on device orientation change

The Viewport Meta Tag

- The viewport meta tag is a non-standard HTML meta tag invented by Apple that goes in the head section of an HTML file

- Apple was the first to the modern mobile web, so all other popular modern mobile web browsers use this meta tag as well, even though it is a non-standard tag

- The viewport meta tag can instruct the browser to display a web site at its ideal viewport

The Viewport Meta Tag

- Below are two identical web sites
  - The web page on the left has no viewport set, so the mobile browser lays out the site using its layout viewport
  - The web page on the right has a viewport meta tag set that instructs the browser to display the web site at its ideal viewport

Viewport not set

Viewport set to device width

Viewport Meta Tag

- `<!doctype html>`
- `<html>`
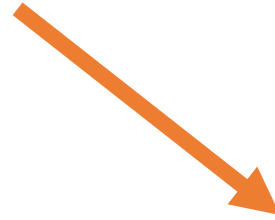- `<head>`
- `<meta charset="utf-8">`
- `<meta name="viewport" content="width=device-width, initial-scale=1">`
- `<title>Responsive and Mobile Websites</title>`
- `<link href="style.css" rel="stylesheet">`
- `</head>`

Viewport meta tag

Viewport Meta Tag

Tells the browser
how to display the
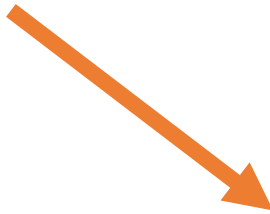web site
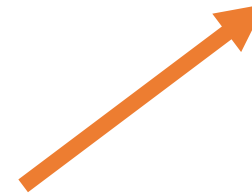
`<meta name="viewport" content="width=device-width">`

"width=device-width" tells the mobile browser
to display the website using its ideal viewport

The Ideal Viewport Meta Tag

Tells a mobile browser to use its ideal viewport.

```
<meta name="viewport" content="width=device-width, initial-scale=1">
```

Sets the initial scale of the web site on page load. This is used to fix an old iOS bug that prevents iOS safari from reflowing a web page when the devices orientation is changed

Viewport Meta Tag

You can pass multiple parameters to the content attribute. Parameters must be separated by a comma

- `<meta name="viewport" content="width=device-width, initial-scale=1, maximum-scale=1">`

The optional parameter "initial-scale" tells the browser how much to scale your web site upon initial load. 1 equals no scaling

Maximum scale tells the browser how much to allow a user to scale into your web site. For accessibility it is often best to allow a user to zoom into or out of your web site

Media Queries

Media Queries

- Media Queries are conditional statements in your CSS that will run style rulesets nested inside them if their condition is true
- Common uses for media queries
  - Directing styles to be ran only for printing
  - Directing styles to be ran only at certain screen sizes, aspect ratios, orientation and pixel densities
    - This is the feature we will use in developing responsive web site that work across a variety of devices

Media Queries

- Media Queries can be included in one of three ways
  - Embedded into an existing stylesheet
  - Link to a stylesheet (external)
  - Imported into a style sheet (@import)
- For this class we will concentrate on using the first method as it is by far the most common method used today

Embedding a Media Query

- Embedding a media query simply means including it in an existing CSS stylesheet file.
  - In standard CSS they usually live at the bottom of a stylesheet, but they can go anywhere in the CSS file
  - Below is an example of a media query added to an existing CSS file

```css
@media only screen and (max-width:390px) {

        .highlight {
          background-color: #00FF66;
        }


}
```

Media Queries

- Let's breakdown the following media query

"only":
The "only" keyword causes older browsers to ignore these media queries as they would not understand the syntax that follows

"screen":
The "screen keyword means this query is for devices that output to some sort of screen

"(max-width: 390px)":
The "(max-width:390px)" tells the browser to only run the following styles if the screen has a width less than or equal to 390px

```
@media only screen and (max-width:390px) {

        .highlight {
            background-color: #00FF66;
        }

}
```

These styles will only run if the media query returns true

In plain English this media query says – only run these styles if the output of the device is a screen and that screen's width is less than or equal to 390px wide

Media Queries

- You can set multiple parameters to determine if a media query should run or not

Is the device a screen? (yes/no) → Does the screen have a width greater than 390px? (yes/no) → Does the screen have a width that is less than 768px? (yes/no) → If the three previous questions all equal true than run the styles inside the media query

```css
@media only screen and (min-width:390px) and (max-width:768px) {

        .highlight {
            background-color: #FF99FF;
        }

}
```

Media Queries

- Less common but still good to know you can have a logical "or" in your media queries by comma separating them.
- The media query below will run if either the screen has a width up to 960px wide or the screen has a height that is smaller than 600px

```css
@media only screen and (max-width:960px), screen and (max-height:600px) {

        .highlight {
            background-color: #FF99FF;
        }

}
```

Ems and Media Queries

- A common practice these days is to set your media queries with Ems instead of pixels
- In regards to media queries an Em is equal to the font size of the root element on an HTML page (the HTML element). This is often but not always 16px, so 1em usually equals 16px.
  - The user can change this in the browser settings
- For modern browsers you can use px or ems in your media queries and for most situations either unit will do
- For older browsers Em units might be more reliable
- The debate is ongoing…
- Ok, what does Bootstrap do
  - They set their media queries in pixels

Mobile Layouts

- For Responsive web design our layouts need to reflow from large desktop screens down to narrow mobile phones
- Fluid layouts work best as they are more flexible across a wider array of device sizes
  - A good fluid layout will work for current device sizes and unknown future devices sizes
- A fluid layout involves setting widths in percentages
  - Remember the default on the web is fluid so no need to set a percentage width on the body. It is responsive by default
  - Use a fixed pixel width to set a maximum width on the outer most containing element to prevent a web site or app from become super wide on large desktop screens
    - A max-width value of 1200px works well for most designs
    - Setting "max-width: 1200px" tells the browser to max out at 1200px but below that value act like a responsive fluid width container

Fluid Layouts

- For simple layouts you can use basic percentage based layout with a max-width set in pixels on the outer containing element to prevent unwieldy ultra-wide layouts from occurring on large wide displays

- For simple layouts you can develop and implement your own percentage based grid system

- For more advanced layouts the use of a pre-built CSS grid system can help speed up development at the cost of a slightly weightier CSS file and less flexibility in your design

- Some common grid systems include:
  - Bootstrap
  - Foundation
  - Skeleton
  - 960 gs
  - 1% CSS grid

Pre-Built CSS Grid Systems

- Pros
  - Quick to implement
    - Just add the CSS
    - Add classes to your HTML and go
- Cons
  - Some Extra CSS code that is never used on a design
  - less flexibility with breakpoints and design
    - You can usually set it to break once at a certain width and go from a multi-column to a single column but you can not go from a 4 column down to a 2 column easily without digging into the CSS and changing class widths or adding extra HTML markup