Responsive Design for Web Applications
What is the Problem?
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- **Mobile** web access is ubiquitous
- **One interface design does not fit all screens** for optimal user interaction
  - **Mobile** users may have **different needs** from **desktop** users
- So why not make designs flexible to dynamically match the screen environment?
Web App vs. Native App?

- **Web App**
  - Develop once, lower support costs
  - Cross device platform support
  - Dependent on a network connection
  - May be functional limitations

- **Native app**
  - More expensive to develop and support
  - Not portable
  - Better performance and security
  - Use local hardware
  - Better UX?
  - App store distribution

- **Hybrid app?** Native app accesses website data
Responsive Web Design

- Create a **single website** that works effectively on the **desktop** as well as **mobile devices**
- Responsive web sites **reorganize themselves automatically according to the device displaying them**
  - **Desktops/laptops** get the full experience – video, images, animation
  - **Smartphones** get a simplified experience that works quickly – app-like
  - **Tablets** – something in between
Responsive Web Design

- More than altering the layout based on viewport*
  size
- Invert the process of web design
  - Design for the smallest viewport first
  - Progressively enhance the design and content for larger viewports
- Can you find an example site with responsive design?

* Viewport is display area versus physical screen size
Responsive Design Example

iPhone

iPad

Desktop browser

http://www.andthewinnerisnt.com/

Check out the CSS File – look for @media
Responsive Web Design Guidelines

- **Group similar devices** by screen size to establish **target size** “breakpoints” for design
  - Don’t target specific devices and models
- **Optimize the UX** – **automatically adjust** to screen **viewport size** and **orientation**
Responsive Web Design Guidelines (cont)

- **Adaptive layouts** – e.g., large menu bar on the desktop, dropdown menu on smartphone

![Image showing adaptive layouts]

- Customize the **amount and type of content** – larger screens can support more text and other media types

- Adapt websites for **accessibility**
Fluid Grids

- **Proportional** versus fixed table based layouts
- **Scale** the layout to **match the screen dimensions**
- Determine the **scaling factor** for each layout element
  - Pick a reference screen context resolution (e.g., 960 pixels)
  - Measure the dimensions of each element in that context
  - Compute the **percent of layout** required for each element – the **scaling factor**
- Apply the scaling factor when displaying the element in each screen context
The use of **CSS3 and HTML5** encoding is recommended
- Stick to standard markup

**Gotcha – cross browser compatibility** and/or obsolescence

**Graceful degradation** – design for modern browsers but assure a useful experience on older browsers

**Progressive enhancement** – start with standard markup for all browsers and enhance the experience for more capable browsers – **recommended**

- Modernizr – open source JavaScript library that feature tests a browser’s capabilities
- Polyfill – downloadable code that provides capabilities missing from the native browser (e.g., HTML5 features)
Cascading Style Sheet (CSS) Media Types

- Specify **how** a document is to be **presented** on different **media**; e.g., screen vs. print
  - **Unique properties** to a media type
  - **Shared properties** with **different values** per media type; e.g., font size

- The **@media rule**
  - Specifies **target media type**
  - All following style sheet rules apply to that media type

```css
@media print {
  body { font-size: 10pt }
}
@media screen {
  body { font-size: 13px }
}
@media screen, print {
  body { line-height: 1.2 }
}
```

https://www.w3schools.com/css/css3_mediaqueries.asp
Cascading Style Sheet (CSS) Media Types

- **CSS3 media query** – query “screen” as media type with **screen properties** such as **size** and resolution
  - Substitute different **layout commands** or a **tailored CSS file** if those screen properties supported
  - **Scale** to match device screen resolution and size
  - **Transform** screen layout – e.g., number of columns of content
  - **Adjust object size** such as for links (Fitt’s Law)
  - **Adjust typography** – e.g., font size, line width and length
CSS Media Query Example

- @Media rule. What happens?

```css
body {
    background-color: grey;
}
@media screen and (max-width: 960px) {
    body {
        background-color: red;
    }
}
@media screen and (max-width: 768px) {
    body {
        background-color: orange;
    }
}
@media screen and (max-width: 550px) {
    body {
        background-color: yellow;
    }
}
@media screen and (max-width: 320px) {
    body {
        background-color: green;
    }
}
```
CSS Media Queries for Popular Form Factors

Smartphones
Portrait and Landscape
@media only screen and (min-device-width : 320px) and 
(max-device-width : 480px) { ... }
Landscape
@media only screen and (min-width : 321px) { ... }
Portrait
@media only screen and (max-width : 320px) { ... }

Tablets, Surfaces, iPads
Portrait and landscape
@media only screen and (min-device-width : 768px) and 
(max-device-width : 1024px) { ... }
Landscape
@media only screen and (min-device-width : 768px) and 
(max-device-width : 1024px) and (orientation : landscape) { ... }
Portrait
@media only screen and (min-device-width : 768px) and 
(max-device-width : 1024px) and (orientation : portrait) { ... }

Desktops, laptops, larger screens
@media only screen and (min-width : 1224px) { ... }
Large screen
@media only screen and (min-width : 1824px) { ... }
References

- Marcotte, Ethan (May 25, 2010). "Responsive web design". A List Apart
- Foster, Aidan. http://responsive.design/blog/responsive-web-design-what-is-it-and-why-should-i-care
- Frain, Ben, Responsive Web Design with HTML5 and CSS3 (eBook)