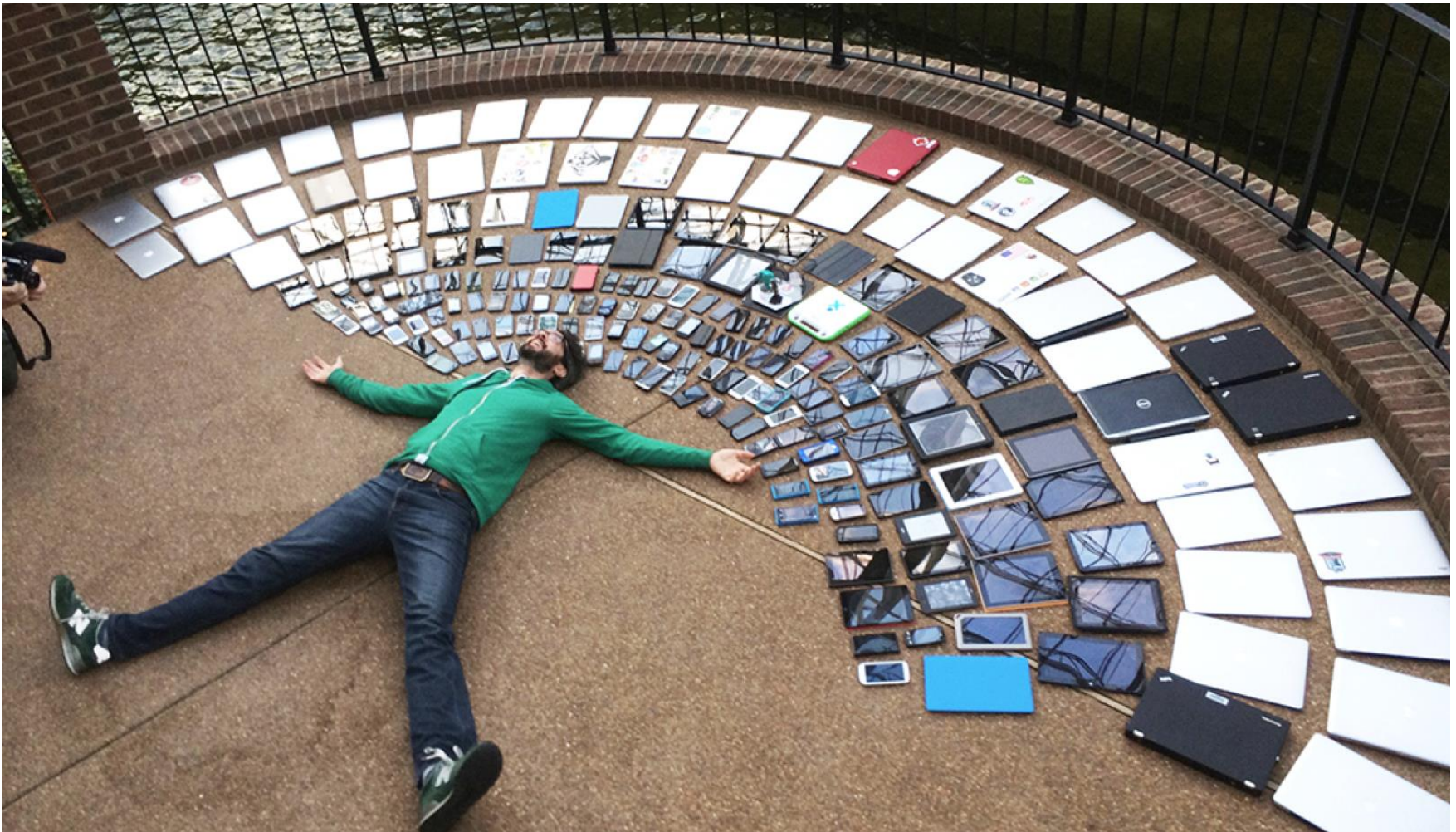


# Responsive Design for Web Applications

# What is the Problem?



Credit: Matt Griffin

# What is the Problem?

- **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

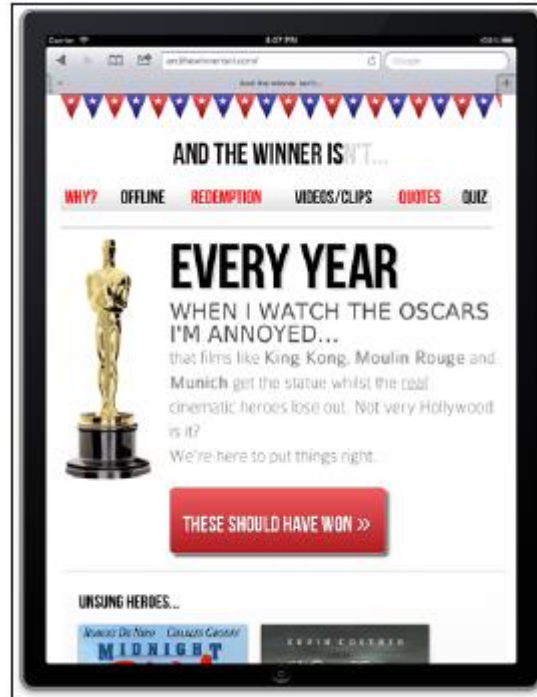
- **More than altering the layout** based on viewport\* size
- **Invert** the process of **web design**
  - **Design for the smallest viewport first**
  - **Progressively enhance** the design and content for larger viewports
- Can you find an example site with responsive design?
  - <http://socialdriver.com/2015/05/28/25-best-responsive-web-design-2015/>

\* 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’ target specific devices and models
- Optimize the UX – **automatically adjust** to screen **viewport size and orientation**





# Responsive Web Design Guidelines (cont)

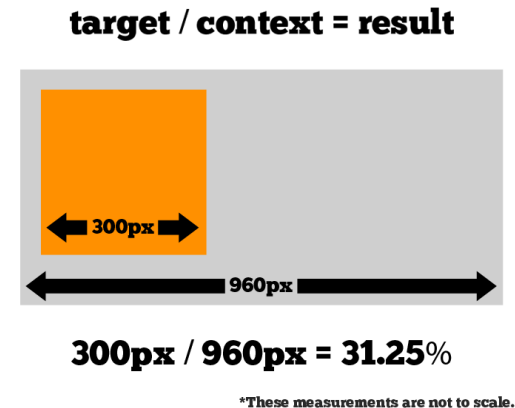
- **Adaptive layouts** – e.g., large menu bar on the desktop, dropdown menu on smartphone



- 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



# Design Techniques

- 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

```
@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](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?

```
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://responsivedesign.ca/blog/responsive-web-design-what-is-it-and-why-should-i-care>
- Frain, Ben, *Responsive Web Design with HTML5 and CSS3* (eBook)