CS7026 – Media Queries

Different Screen Size Different Design...
Introduction

- Historically web content was viewed only on traditional desktop systems, but the dramatic uptake of smartphones, tablets, and other devices with a wide range of dimensions has changed all this.

- The challenge for web designers is to ensure that their websites look good not only on a big screen, but also on a tiny phone and everything in between.

- Media queries are an excellent way to deliver different styles to different devices, providing the best experience for each type of user.
Introduction

- Media queries are part of the CSS3 specification.

- They expand the role of the **media** attribute that controls how your styles are applied.

- E.g., it's been common practice for years to use a separate style sheet for printing web pages by specifying `media="print"`.

- Media queries take this idea to the next level by allowing designers to target styles based on a number of device properties, such as screen width, orientation, and so on.
Introduction

- So CSS Media Queries are a feature in CSS3 which allows you to specify *when* certain CSS rules should be applied.

- This allows you to apply a special CSS for mobile, or adjust a layout for print.
The basic syntax looks like this:

```css
/* normal style */
#header-image {
    background-repeat: no-repeat;
    background-image:url('image.gif');
}

/* show a larger image when you're on a big screen */
@media screen and (min-width: 1200px) {
    #header-image {
        background-image:url('large-image.gif');
    }
}

/* remove header image when printing. */
@media print {
    #header-image {
        display: none;
    }
}
```
The advantage of this method is that only the valid CSS is downloaded; so `print.css` is only downloaded when printing (or using print preview).
Media Queries

- Combining media queries can be done by combining them with an comma.

- The query below is to target devices with an device-ratio of 1.5. The first element is for webkit, the second is for all other browsers (1.5 * 96).

```
@media screen and (-webkit-device-pixel-ratio: 1.5),
screen and (resolution: 144dpi)
```
When a pixel is not a pixel… (an aside)

- The device pixel ratio (also called CSS Pixel Ratio) is what determines how a device's screen resolution is interpreted by the CSS.

- The reason it was created is because as phones screens get higher resolutions, if every device still had a CSS pixel ratio of 1 then webpages would render too small to see.

- A typical full screen desktop monitor is a 24" monitor at 1920x1080. Imagine if that monitor was shrunk down to < 5" but had the same resolution. Viewing things on the screen would be impossible because they would be so small.
When a pixel is not a pixel… (an aside)

- CSS interprets a device's resolution by the formula: \( \text{device\_resolution} / \text{css\_pixel\_ratio} \).
  For example:
  
  Samsung Galaxy S7 Edge
  
  - Actual resolution: 2560 \times 1440
  - CSS Pixel Ratio: 4
  - Interpreted resolution: \( 2560/4 \times 1440/4 = 640 \times 360 \)

When a pixel is not a pixel... (an aside)

- When viewing a web page, the CSS will think the device has a 360x640 resolution screen and Media Queries will respond as if the screen is 360x640.

- But the rendered elements on the screen will be four times as sharp as an actual 360x640 screen.

- So the number describes the ratio of how much "real" pixels (physical pixels of the screen) are used to display one "virtual" pixel (size set in CSS).
Back to Media Queries

- Because it's cascading, all non-overwritten rules remain valid; e.g. the background remains no-repeat.

- Using this syntax you can do a number of things:
  - Tweak that font so it really fits on that old iPhone,
  - Remove menus and fluff from Print pages
  - Create a full responsive site, by creating 'breakpoints' where the page should get a different design.
Media Queries

- For example:

```css
#block1, #block2 {
    float: left; width: 100%;
}
```

```css
@media (min-width: 1000px) {
    #block1, #block2 {
        width: 50%;
    }
}
```

- This example shows the 2 blocks on big screens next to each other, while on small screens they will be displayed below each other.
Support

- Media queries are supported in Internet Explorer (IE) 9+, Firefox 3.5+, Safari 3+, Opera 7+, as well as on most modern smartphones and other screen-based devices.
Available media types:

- **all**: All devices listen to this

- **braille**: Used for braille tactile feedback devices.

- **embossed**: Used for paged braille printers.

- **handheld**: Used for handheld devices (Smartphones and tablets do NOT listen to this!).

- **print**: Used for paged material and for documents viewed on screen in print preview mode.
Available media types:

- **projection**: Used for projected presentations, for example projectors.

- **screen**: Used primarily for colour computer screens, tablets and smartphones.

- **speech**: Used for speech synthesizers.

- **tty**: Used for media using a fixed-pitch character grid (such as teletypes, terminals, or portable devices with limited display capabilities).

- **tv**: Used for television-type devices (low resolution, colour, limited-scrollability screens, sound available).
Available media types:

- Of course browsers don't behave the way we expect to do.

- Most important; the *handheld* media type is not used by smartphones and tablets. Smartphones respond to screen.

- So in effect, the handheld media type is quite useless.

- The TV media type apparently works with the **Wii browser**, powered by Opera. But that’s about it. All other smart TVs seem to have gone for screen as well.
## Media Features for setting conditions in media queries

<table>
<thead>
<tr>
<th>Feature</th>
<th>Value</th>
<th>Min/Max</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>width</td>
<td>Length</td>
<td>Yes</td>
<td>Width of display area</td>
</tr>
<tr>
<td>height</td>
<td>Length</td>
<td>Yes</td>
<td>Height of display area</td>
</tr>
<tr>
<td>device-width</td>
<td>Length</td>
<td>Yes</td>
<td>Width of device</td>
</tr>
<tr>
<td>device-height</td>
<td>Length</td>
<td>Yes</td>
<td>Height of device</td>
</tr>
<tr>
<td>orientation</td>
<td>portrait or landscape</td>
<td>No</td>
<td>Orientation of device</td>
</tr>
<tr>
<td>aspect-ratio</td>
<td>Ratio (w/h)</td>
<td>Yes</td>
<td>Ratio of width to height, expressed as two integers separated by a slash (e.g., 16/9)</td>
</tr>
</tbody>
</table>
## Media Features for setting conditions in media queries

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</thead>
<tbody>
<tr>
<td><strong>device-aspect-ratio</strong></td>
<td>Ratio (w/h)</td>
<td>Yes</td>
<td>Ratio of device-width to device-height</td>
</tr>
<tr>
<td><strong>color</strong></td>
<td>Integer</td>
<td>Yes</td>
<td>Number of bits per colour component (if not colour, the value is 0)</td>
</tr>
<tr>
<td><strong>color-index</strong></td>
<td>Integer</td>
<td>Yes</td>
<td>Number of entries in the output device's colour lookup table</td>
</tr>
<tr>
<td><strong>monochrome</strong></td>
<td>Integer</td>
<td>Yes</td>
<td>Number of bits per pixel in the monochrome frame buffer (if not monochrome, the value is 0)</td>
</tr>
</tbody>
</table>
# Media Features for setting conditions in media queries

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<th>Feature</th>
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<tbody>
<tr>
<td>resolution</td>
<td>Resolution</td>
<td>Yes</td>
<td>Density of pixels of output device, express as integer followed by dpi (dots per inch) or dpcm (dots per centimeter)</td>
</tr>
<tr>
<td>scan</td>
<td>progressive or interlace</td>
<td>No</td>
<td>Scanning process used by TV devices</td>
</tr>
<tr>
<td>grid</td>
<td>0 or 1</td>
<td>No</td>
<td>If set to 1, the device is grid-based, such as a teletype terminal or phone display with only one fixed font (all other devices are 0)</td>
</tr>
</tbody>
</table>
Media Features

- The first five features (width, height, device-width, device-height, and orientation) are the most useful.

- You can prefix most features with `min-` and `max-` to indicate minimum and maximum values, such as `min-width` and `max-width`.
Perhaps one of the most confusing aspects of media queries is the difference between width and height and the equivalent values prefixed by device-.

In the case of desktop and laptop computers, the difference is easy to understand: width and height refer to the size of the browser viewport, whereas device-width and device-height refer to the dimensions of the monitor.

Not everybody runs his or her browser full-screen, so width and height are the measurements that you need to use.
width, device-width, and viewport

- Mobile browsers fill the available screen, so you might expect width and device-width to be the same. Unfortunately, that's not always the case.

- Most smartphones, including Android, iPhone, and Windows Phone 7, set width to a nominal viewport approximately 1,000 pixels wide (in an iPhone and iPod touch, it's 980 pixels; Windows Phone 7 uses 1024 pixels).
Even though the style sheet attached to the page may use media queries to serve different styles depending on the values of min-width and max-width, the iPod touch ignores the styles and displays the desktop version because the viewport is considered to be 980 pixels wide.

To confuse matters even further, the iPhone, iPod touch, and iPad don't take orientation into account when calculating width, whereas other devices do.
width, device-width, and viewport

- Thankfully, there's a simple solution to this confusion.

- Apple devised a new `<meta>` tag, which has been widely adopted by other mobile device manufacturers and has been incorporated into the specification likely to be approved by the W3C.

- Add the following line to the `<head>` of each web page:

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

- This tells mobile devices to treat the viewport as being the same width as the physical width of the device.

- What's more, it tells the iPhone, iPod touch, and iPad to take orientation into account when calculating width.

- As a result, you can use width in media queries safe in the knowledge that it means what you think it does.
The futility of chasing devices…

- There are hundreds of devices with different resolutions for portrait and landscape not to mention that you have no knowledge of what an iPhone 12 will look like whenever it arrives.

- The best course of action is to forget about all devices and orientation and simply base the design on min or max-width. This is very easy because by default an unstyled web page will adapt to all pages without doing anything to it (apart from adding the viewport meta tag). It's only when the designer starts styling it that it breaks down :-(
The futility of chasing devices...

- All you need to do is design on the desktop and drag your browser window smaller or wider.

- If at any point you see a horizontal scrollbar on the viewport or if the design doesn't work well at the width you are looking at then throw in a media query at that width and change the design to fit.

- In a fluid site a few well placed media queries will cater for hundreds of devices whether they be in landscape or portrait mode. It really is that simple.
How to Write Media Queries – A Closer Look

- To add a media query to the media attribute, you set one or more conditions using the available media features.

- You specify the value for a media feature after a colon in the same way as for a CSS property.

- Each condition is wrapped in parentheses and added to the media declaration using the keyword `and`.

```
media="screen and (min-width: 401px) and (max-width: 600px)"
```
How to Write Media Queries

- Media queries are Boolean: they will either be true or false.

- If the entire statement is true, the style sheet is applied. If false, it will be ignored.

- So when using the query, all parts must be true for the style sheet to be applied. In other words, it will apply only to screens between 401 and 600 pixels wide.
How to Write Media Queries

- Some media features, such as `color`, `monochrome`, and `grid`, can be used as conditions without specifying a value.

- For example, the following targets all colour visual displays:

  ```
  media="screen and (color)"
  ```
Specifying Alternatives

- There is no `or` keyword to specify alternative media features.

- Instead, you list alternatives as a comma-separated list like this:

  ```
  media="screen and (min-width: 769px), print and (min-width: 6in)"
  ```

- This applies styles to screens wider than 769 pixels or print devices using paper at least 6 inches wide.
Specifying Negative Conditions

- To specify a negative condition, you can precede the media declaration with the keyword `not` like this:

  `media="not screen and (monochrome)"`

- You can't use `not` in front of an individual condition. The keyword `must` come at the beginning of the declaration, and it negates the whole declaration.

- So, the preceding example applies to all devices except monochrome screens.
Hiding media queries from older browsers

- The media queries specification also provides the keyword `only`, which is intended to hide media queries from older browsers.

- Like `not`, the keyword must come at the beginning of the declaration. For example:

  ```
  media="only screen and (min-width: 401px) and (max-width: 600px)"
  ```
Hiding media queries from older browsers

- Browsers that don't recognize media queries expect a comma-separated list of media types, and the specification says they should truncate each value immediately before the first non-alphanumeric character that isn't a hyphen.

- So, an old browser should interpret the preceding example as this:

  ```
  media="only"
  ```

- Because there is no such media type as only, the style sheet is ignored.
Hiding media queries from older browsers

- Similarly, an old browser should interpret the following as `media="screen"`:

  ```media="screen and (min-width: 401px) and (max-width: 600px)"
  ```

- In other words, it should apply the style rules to *all* screen devices, even though it doesn't know what the media queries mean.
Hiding media queries from older browsers

- Unfortunately, IE 6–8 failed to implement the specification correctly - instead of applying the styles to all screen devices, it ignores the style sheet altogether.

- In spite of this behaviour, it's still recommended to prefix media queries with `only` if you want to hide the styles from other, less common browsers.
Dealing with older versions of Internet Explorer

- The lack of support for media queries in IE 6 through IE 8 is not a problem.

- Simply create a basic set of styles that are served to all browsers without using media queries, and use the media queries to provide an enhanced experience for visitors using more advanced browsers.
Dealing with older versions of Internet Explorer

- Alternatively, use an Internet Explorer conditional comment to serve a special set of rules to older versions of IE like this:

```
<!--[if lt IE 9 & !IEMobile]> <link href="iestyles.css" rel="stylesheet" type="text/css"> <![endif]-->
```
Using media queries with @import and @media

- In addition to using media queries in `<link>` tags when attaching an external style sheet, you can use them with @import and @media.

- The basic syntax is the same. E.g., the following imports a style sheet and applies the styles to devices with a screen that's no wider than 400 pixels:

  ```
  @import url("phone.css") only screen and (max-width:400px);
  ```
Using media queries with `@import` and `@media`

- Media queries can also be used within a style sheet like this:

```
@media only screen and (max-width:400px) {
  #navbar { float: none; width: 400px; }
}
```
Video files tend to be large, and sending very high-quality video can be wasteful if sent to handheld devices where the small screen sizes make high quality unnecessary.

There’s no point in sending high-definition video meant for a widescreen monitor to a handheld device screen.

Compressing a video down to a size appropriate for a small screen can save a lot of bandwidth, making your server and - most importantly - your mobile users happy.
Sending Differently-Compressed Videos to Handheld Devices

- HTML5 allows you to use the media attribute on the source element, which queries the browser to find out screen size (or number of colours, aspect ratio, and so on) and send different files that are optimised for different screen sizes.

- This functionality and syntax is borrowed from the CSS Media Queries specification dev.w3.org/csswg/css3-mediaqueries/) but is part of the markup, as we’re switching source files depending on device characteristics.
Sending Differently-Compressed Videos to Handheld Devices

- Here, the browser is “asked” if it has a min-device-width of 800px - that is, does it have a wide screen. If it does, it receives \texttt{hi-res.ogv}; if not, it is sent \texttt{lo-res.ogv}:

\begin{verbatim}
<video controls>
<source src=hi-res.ogv... media="(min-device-width: 800px)">
<source src=lo-res.ogv>
</video>
\end{verbatim}

- Note that you should still use the type attribute with codecs parameters and fallback content previously discussed.