CS/COE 1520

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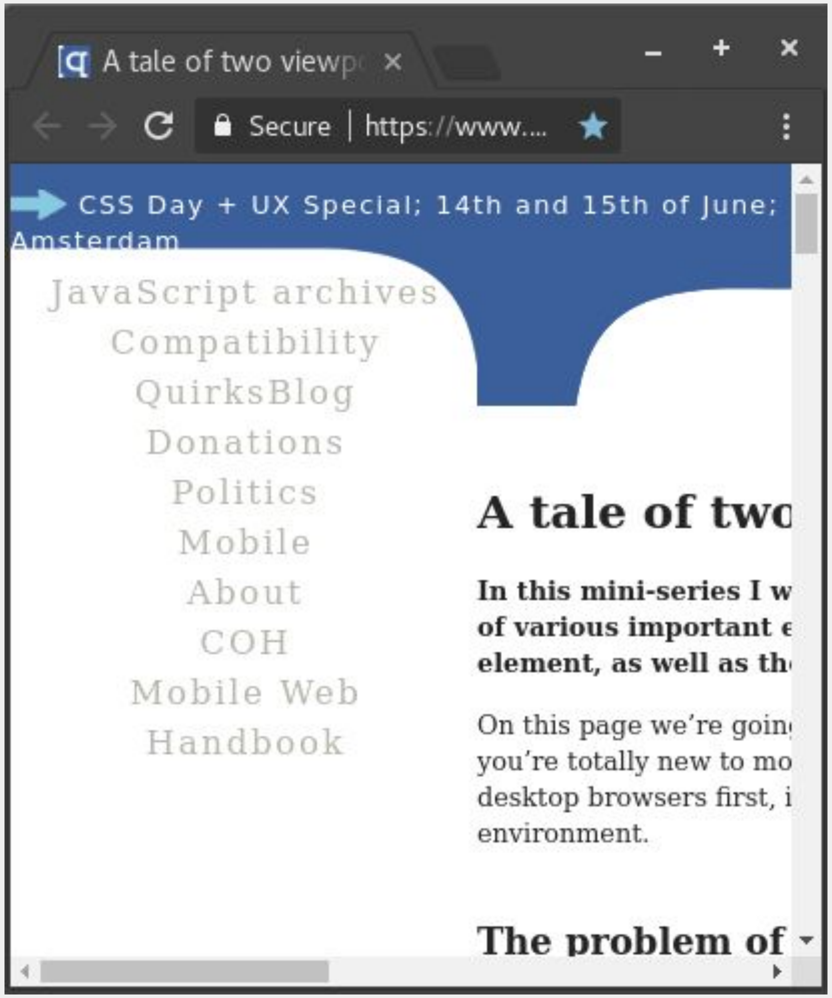
Responsive Web Design

Viewing a webpage in a small window



CSS Day + UX Special; 14th and 15th of June; Amsterdam

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Mobile Web
Handbook

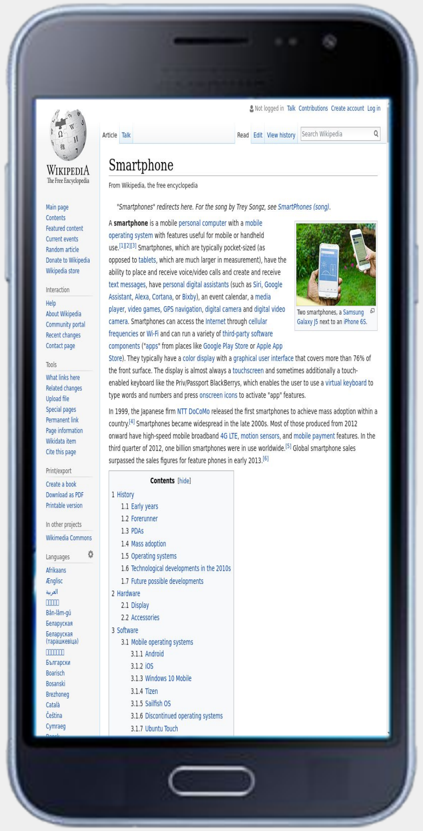
A tale of two

In this mini-series I w of various important e element, as well as th

On this page we're goin you're totally new to mo desktop browsers first, i environment.

The problem of

Viewing a webpage on a smartphone



Smartphone

From Wikipedia, the free encyclopedia

"Smartphones" redirects here. For the song by Trey Songz, see SmartPhones (song).

A **smartphone** is a mobile personal computer with a mobile operating system with features useful for mobile or handheld use.[1][2][3] Smartphones, which are typically pocket-sized (as opposed to tablets, which are much larger in measurement), have the ability to place and receive voice/video calls and create and receive text messages, have personal digital assistants (such as Siri, Google Assistant, Alexa, Cortana, or Bixby), an event calendar, a media player, video games, GPS navigation, digital camera and digital video camera. Smartphones can access the Internet through cellular frequencies or Wi-Fi and can run a variety of third-party software components ("apps" from places like Google Play Store or Apple App Store). They typically have a color display with a graphical user interface that covers more than 76% of the front surface. The display is almost always a touchscreen and sometimes additionally a touch-enabled keyboard like the Priv/Passport BlackBerrys, which enables the user to use a virtual keyboard to type words and numbers and press onscreen icons to activate "app" features.

Two smartphones, a Samsung Galaxy J5 next to an iPhone 6S.

In 1999, the Japanese firm NTT DoCoMo released the first smartphones to achieve mass adoption within a country.[4] Smartphones became widespread in the late 2000s. Most of those produced from 2012 onward have high-speed mobile broadband 4G LTE, motion sensors, and mobile payment features. In the third quarter of 2012, one billion smartphones were in use worldwide.[5] Global smartphone sales surpassed the sales figures for feature phones in early 2013.[6]

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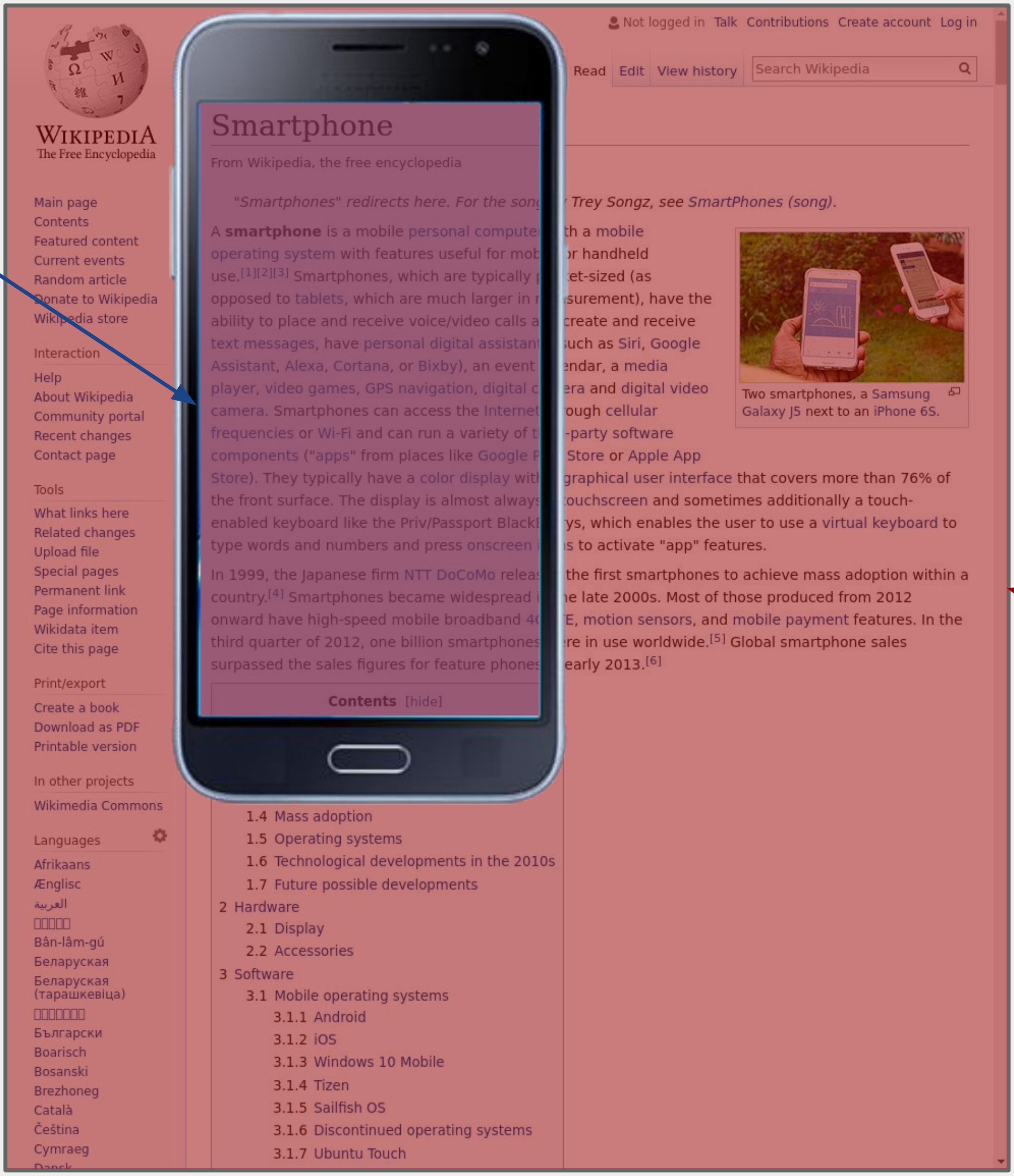
Viewports

Visual viewport



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Layout viewport

The idea behind *responsive design*

- "If you put water into a cup, it becomes the cup. You put water into a bottle and it becomes the bottle. You put it in a teapot, it becomes the teapot."

  - Bruce Lee

When a pixel is not a pixel...

- What happens when the user zooms in on their phone?
  - Need to display same portion of the page using more pixels
    - Should this scale up the size of the layout viewport?
- Pixel density of displays has begun to increase dramatically
  - How can we render the same page on both standard and HiDPI displays?
- In both cases, we'll consider an abstract "pixel" size when drawing the layout viewport, and map that to hardware pixels in the visual viewport
  - Layout viewport size is measured in "CSS pixels"

By default…

- Mobile browsers attempt to show the entire layout viewport in the browser window
    - The first tiny wikipedia page a few slides back
- How do we size the layout viewport appropriately?
    - We want to ensure that our webpage isn't rendered at the default layout viewport size and then "zoomed out" to fit

Meta viewport tags

- HTML `<meta>` tags are used to specify metadata that cannot be encoded in other tags
- With the development of their Retina displays, Apple started using the `<meta name="viewport" ...>` tag to instruct the browser on sizing the layout viewport to properly display webpages formatted for mobile
- E.g.:

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

Great! But how to we build one page for all?

- CSS media queries
    - Allow the developer to tailor the site to present on a variety of output media without changing the content
    - Relevant for our case:
        - max-width: 600px
        - min-width: 500px
        - orientation: landscape
            - orientation: portrait
    - Can be included in <link> tags to stylesheets, @import statements, or directly in css via @media tags

MDN's "pseudo-BNF" for media queries

- media_query_list: <media_query> [, <media_query>]*

  media_query: [[only | not]? <media_type> [and <expression>]*]

    | <expression> [and <expression>]*

  expression: (<media_feature> [: <value>]?)

  media_type: all | aural | braille | handheld | print |

    projection | screen | tty | tv | embossed | speech

  media_feature: width | min-width | max-width

    | height | min-height | max-height

    | aspect-ratio | min-aspect-ratio | max-aspect-ratio

    | color | min-color | max-color

    | color-index | min-color-index | max-color-index

    | monochrome | min-monochrome | max-monochrome

    | resolution | min-resolution | max-resolution

    | scan | grid

Aside: BNF, or Backus–Naur form

- A way to describe a grammar
- Symbols are enclosed in < >
- Symbols are defined using ::=
- Options for defining a symbol are enumerated with |
- E.g.:

  -
    ```
    <integer> ::= <digit> | <digit> <integer>
    <digit> ::= "0" | "1" | "2" | "3" | "4" | "5" | "6" | "7" | "8" | "9"
    ```

  -
    ```
    <loop-statement> ::= <while-loop> | <for-loop>
    <while-loop> ::= "while (" <condition> ")" <statement>
    ```

US Postal address BNF Example

```
<postal-address> ::= <name-part> <street-address> <zip-part>

<name-part> ::= <personal-part> <last-name> <opt-suffix-part> <EOL>
              | <personal-part> <name-part>

<personal-part> ::= <initial> "." | <first-name>

<street-address> ::= <house-num> <street-name> <opt-apt-num> <EOL>

<zip-part> ::= <town-name> "," <state-code> <ZIP-code> <EOL>

<opt-suffix-part> ::= "Sr." | "Jr." | <roman-numeral> | ""

<opt-apt-num> ::= <apt-num> | ""
```

BNF in BNF

```
<syntax>         ::= <rule> | <rule> <syntax>

<rule>           ::= <opt-whitespace> "<" <rule-name> ">" <opt-whitespace> "::=" <opt-whitespace> <expression> <line-end>

<opt-whitespace> ::= " " <opt-whitespace> | ""

<expression>     ::= <list> | <list> <opt-whitespace> "|" <opt-whitespace> <expression>

<line-end>       ::= <opt-whitespace> <EOL> | <line-end> <line-end>

<list>           ::= <term> | <term> <opt-whitespace> <list>

<term>           ::= <literal> | "<" <rule-name> ">"

<literal>        ::= '"' <text1> '"' | "'" <text2> "'"

<text1>          ::= "" | <character1> <text1>

<text2>          ::= "" | <character2> <text2>

<character>      ::= <letter> | <digit> | <symbol>

<letter>         ::= "A" | "B" | "C" | "D" | "E" | "F" | "G" | "H" | "I" | "J" | "K" | "L" | "M" | "N" | "O" | "P" | "Q" |
"R" | "S" | "T" | "U" | "V" | "W" | "X" | "Y" | "Z" | "a" | "b" | "c" | "d" | "e" | "f" | "g" | "h" | "i" | "j" | "k" | "l" |
"m" | "n" | "o" | "p" | "q" | "r" | "s" | "t" | "u" | "v" | "w" | "x" | "y" | "z"

<digit>          ::= "0" | "1" | "2" | "3" | "4" | "5" | "6" | "7" | "8" | "9"

<symbol>         ::=  "|" | " " | "!" | "#" | "$" | "%" | "&" | "(" | ")" | "*" | "+" | "," | "-" | "." | "/" | ":" | ";" |
">" | "=" | "<" | "?" | "@" | "[" | "\" | "]" | "^" | "_" | "`" | "{" | "}" | "~"

<character1>     ::= <character> | "'"

<character2>     ::= <character> | '"'

<rule-name>      ::= <letter> | <rule-name> <rule-char>

<rule-char>      ::= <letter> | <digit> | "-"
```

Common BNF extensions

- Optional items are enclosed in [ ]
- Items repeated 0 or more time are suffixed with *
- Items repeated 1 or more time are suffixed with +

Back to responsive design

- A couple of guidelines:
  - Use relative sizes
    - E.g., define the width of divs as a percentage of the page instead of a fixed pixel size
  - Set min and max widths for images
  - Change the layout as your page size changes
  - Start with the smallest needed size and define "breakpoints" as necessary