Modern Web Apps

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Announcements

• Piazza
  • https://piazza.com/utexas/fall2022/52998
1. Domain Name
2. Accessible in browsers
3. Secure access (https)

Web page

Web site

Web app

Common things
- Programmatic access through APIs
- Communicate with other web apps/APIs
Modern Web Apps

Front End

HTML
CSS
JavaScript

Back End

Python
Java
MySQL
NodeJS

Execution Environment

Browser
Web Server
Reverse Proxy
SSL handling
Cloud deployment
HTML, CSS, JavaScript

• HTML
  • Hypertext (text, images and media, links to other pages) markup language
  • What is a markup language – A set of special tags (called “elements”) with meaning associated towards how to render the content within such elements.
    • <hr>,<p>

• CSS
  • Cascading Style Sheets
  • Styling language to define “style” (fonts, layouts, background colors, etc.) for HTML elements

• JavaScript
  • Programming language that make web pages “dynamic”
    • Example: Reacting to user actions
HTTP Client <-> Server Interaction

Browser

Local filesystem

Web server: www.cs.utexas.edu

~/.devdatta/index.html

(index.html -> web page)

HTTP GET

HTTP client (Hypertext Transfer Protocol)

Local data read

curl
Web Page as a Document Object Model (DOM) tree

Browser’s in-memory representation of a web page

```
html
  head
    script
    style
  body
    div
    input
    button
    p
    ...  
    ...
```

“document” variable set by browser to refer to the “root” of the DOM tree

HTML, CSS and JavaScript -> instructions for the Browser on how to render a web page.
HTML Element Styling – Attributes

- height
- viewport height (vh)
- width
- background-color
- flex direction
- float
- padding
- margin
- text-align

Event Handlers and dynamic HTML generation

- Unique Ids for Elements
- Definition of Event Handler
  - onclick
- <script> definition
- Event Handler function definition

https://www.cs.utexas.edu/~devdatta/tic-tac-toe.html
Browser and JavaScript Event Handling

1. Browser is managing the web page

2. User interacts with web page (Click in a square)

3. Browser captures the Mouse click as an Event

4. Put the event on a Queue

5. Event picked up by JavaScript Thread

6. Invoke Event Handler

0. Browser sets up the Event handling table

User

Web Page (as a DOM tree)

Browser Event Handling

JavaScript Thread

Queue (part of Browser Process)
Cascading Style Sheet (CSS)

- `<style>`
- class definition
- class association with an element

JavaScript

- onload event handler
- Function definition
- for loop
- logic operators
- arithmetic operators
- if/else statement
- createElement
- setAttribute
- appendChild

https://www.cs.utexas.edu/~devdatta/chess-css.html
HTML Debugging

• Debugging
  • Browser -> View -> Developer -> JavaScript Console

• Page source code
  • Right click on HTML page -> View Page Source
JavaScript cont.

- button
  - onclick handler
- header
  - h1, h2
- display
  - block, none
- label
- Input
  - text, select, radio, checkbox
- ul
- table
  - td, tr
- JS Objet
- alert function
- querySelector
- innerHTML
- style override
  - Register button width

[https://www.cs.utexas.edu/~devdatta/musicmarketplace.html](https://www.cs.utexas.edu/~devdatta/musicmarketplace.html)
Bootstrap

• Mobile first UI framework with pre-defined CSS classes to support wide variety of devices
• Built at Twitter; Now open source (MIT license)
  • https://github.com/twbs/bootstrap

• https://getbootstrap.com/docs/4.1/getting-started/introduction/

• In HTML,
  • <link> to download bootstrap CSS in head section
  • <script> tag referring to jQuery, Popper, Bootstrap JavaScript libraries in the body section
  • <meta> tag in the head section
Main concepts – Grid layout

- 12 column grid
- Data displayed in columns
- A row encapsulates a column
- CSS classes
  - container-fluid
  - row
  - col-*

https://www.cs.utexas.edu/~devdatta/france-bootstrap.html
Main concepts – tables

https://www.cs.utexas.edu/~devdatta/bootstrap-examples.html

• Bordered tables
• Borderless tables
• Column span

• CSS classes
  • table
  • table-bordered
  • colspan
Bootstrap example websites

• City of Austin Utilities

• Spectrum
  • [https://www.spectrum.com/business](https://www.spectrum.com/business) -> custom/extended CSS classes

• Texas Gas Service
  • [https://www.texasgasservice.com/](https://www.texasgasservice.com/)
Modal

https://getbootstrap.com/docs/4.0/components/modal/

• data-target
• modal fade
Iframe – Embed an HTML page inside another

https://www.cs.utexas.edu/~devdatta/iframe.html

- iframe
- Cannot mix and match http and https contents
- Embedding needs to be allowed by the target HTML page server
Home work
Home work

• HW1: https://www.cs.utexas.edu/~devdatta/mwa-hw1.txt
• HW2: https://www.cs.utexas.edu/~devdatta/mwa-hw2.txt
Assignments
Assignments

• Assignment1:
  • https://www.cs.utexas.edu/~devdatta/mwa-assignment1.pdf
References

Clarification

• In previous lecture I made a mistake when discussing about flex-direction property.

  • “flex-direction: vertical” is not valid value. Valid values are row, row-reverse, column, and column-reverse.

• In all our html examples, float:left is achieving the end result. We don't really need the flex-direction attribute. I have updated all the example pages by removing the flex-direction property.