香港中文大學
The Chinese University of Hong Kong

CSCI2720 - Building Web Applications

Lecture 18: Mid-term review

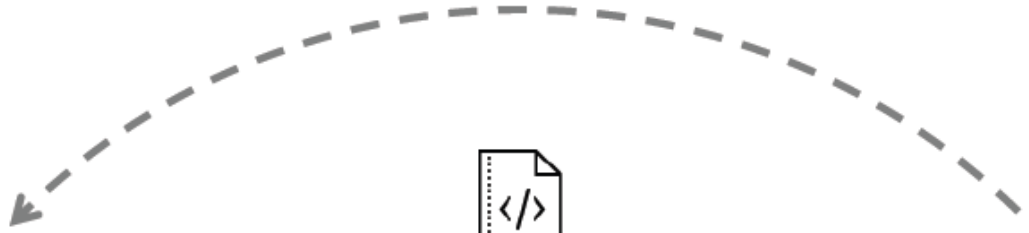
Dr Colin Tsang

Mid-term review

- In this review, we will discuss:
  - Overall structure of this course
  - Quick review of each chapter

- Coverage:
  - Q1-Q6 = everything from the beginning up to *Node.js*
  - Q7 T/F = everything from the beginning up to *Security*
  - *MongoDB* and later topics will not be included

HTML



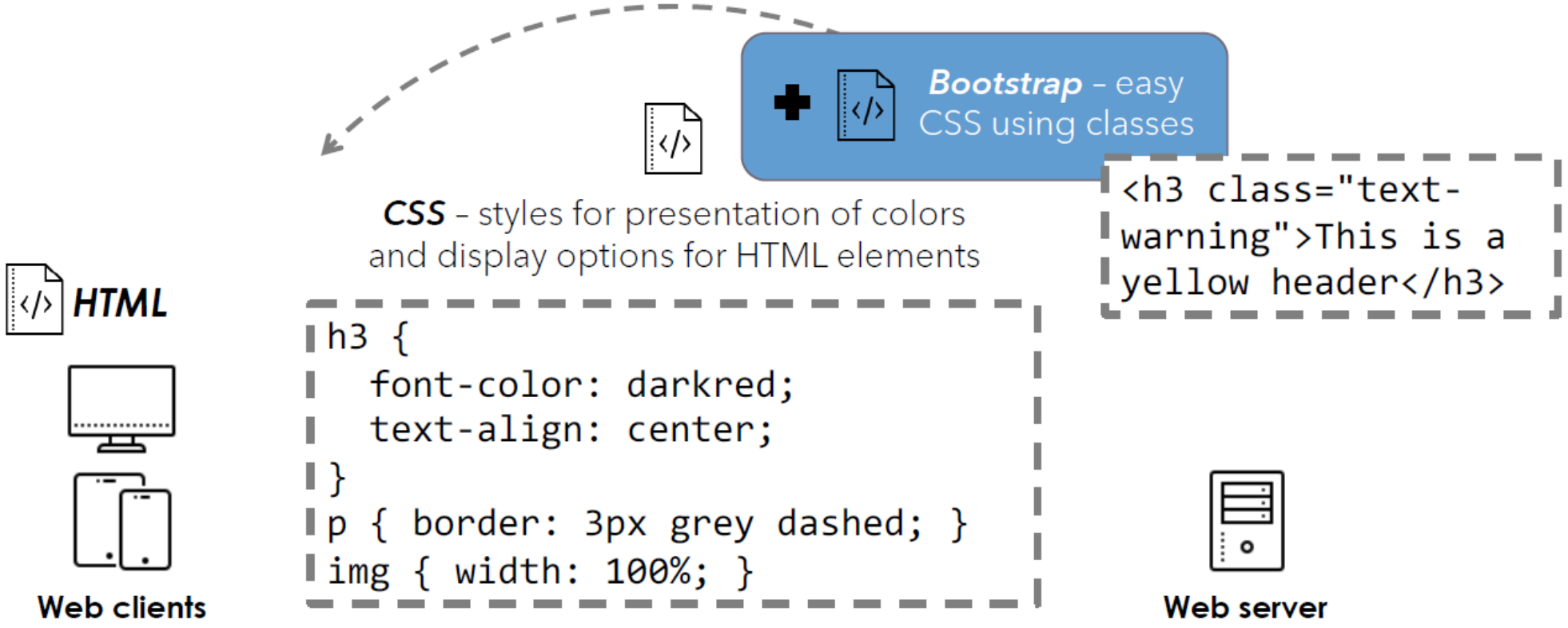
HTML – markup of display elements and input forms

```
<h3>A medium size heading</h3>
<p>A paragraph with <a
href="page2.html">link to
another page!</a> <img
src="photo.jpg"></p>
```

Web clients

Web server

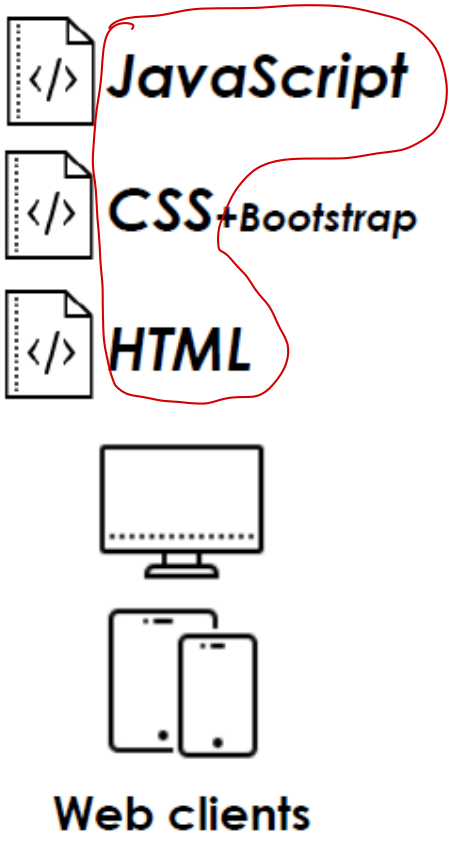
CSS


Bootstrap - easy CSS using classes
CSS - styles for presentation of colors and display options for HTML elements
<h3 class="text-warning">This is a yellow header</h3>
HTML
h3 {
font-color: darkred;
text-align: center;
}
p { border: 3px grey dashed; }
img { width: 100%; }
Web clients
Web server

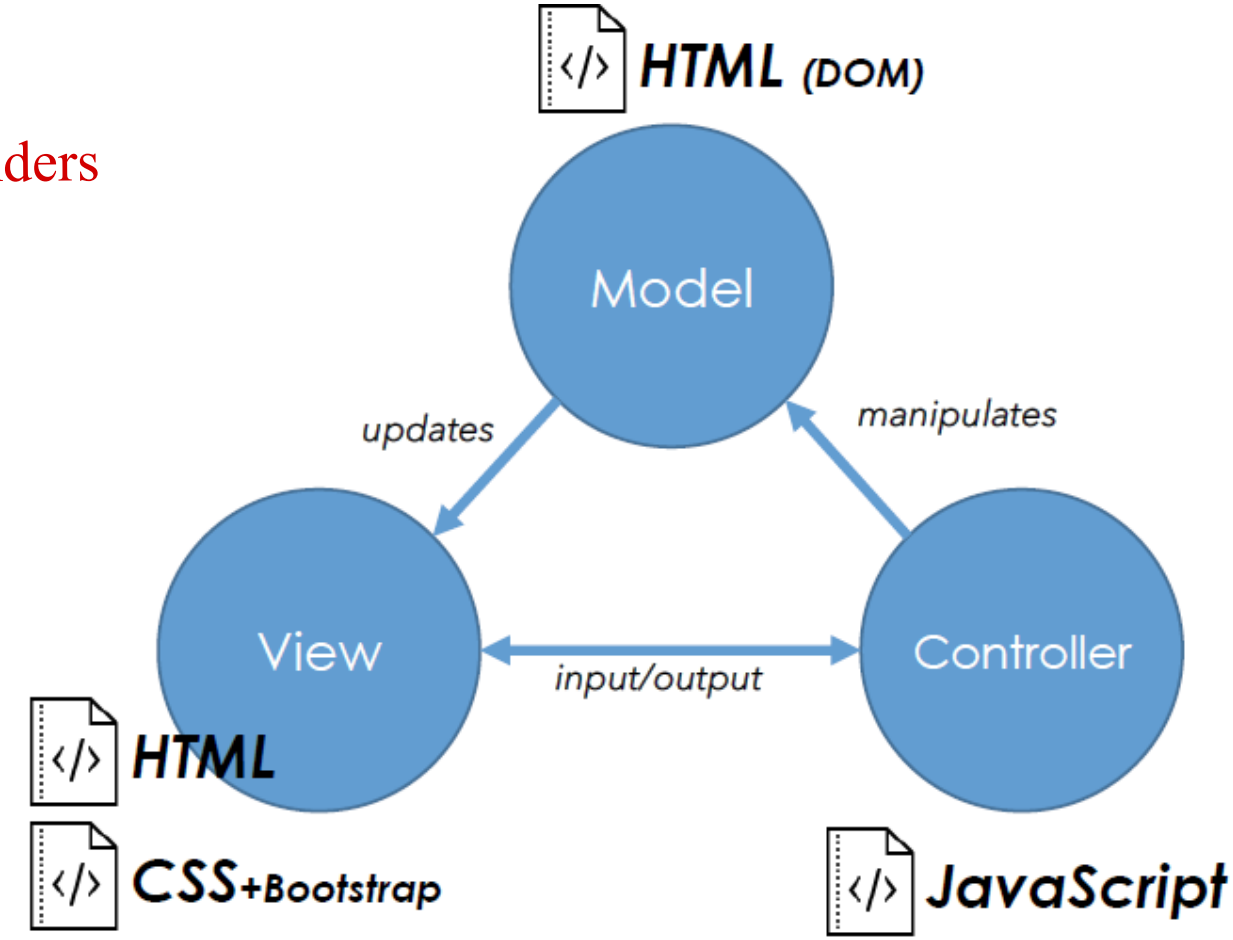
JavaScript


CSS+Bootstrap
HTML
JavaScript – code executed at client to adjust contents/markup/styling dynamically in DOM
Click
<script>
function fun() {
alert("Look at me!");
document.querySelector("h3")
.innerHTML("This is a new heading);
}
Web clients
Web server

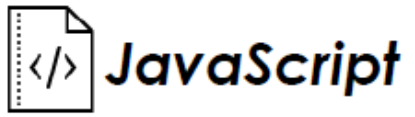
On the client side

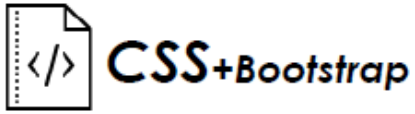


Browser only renders



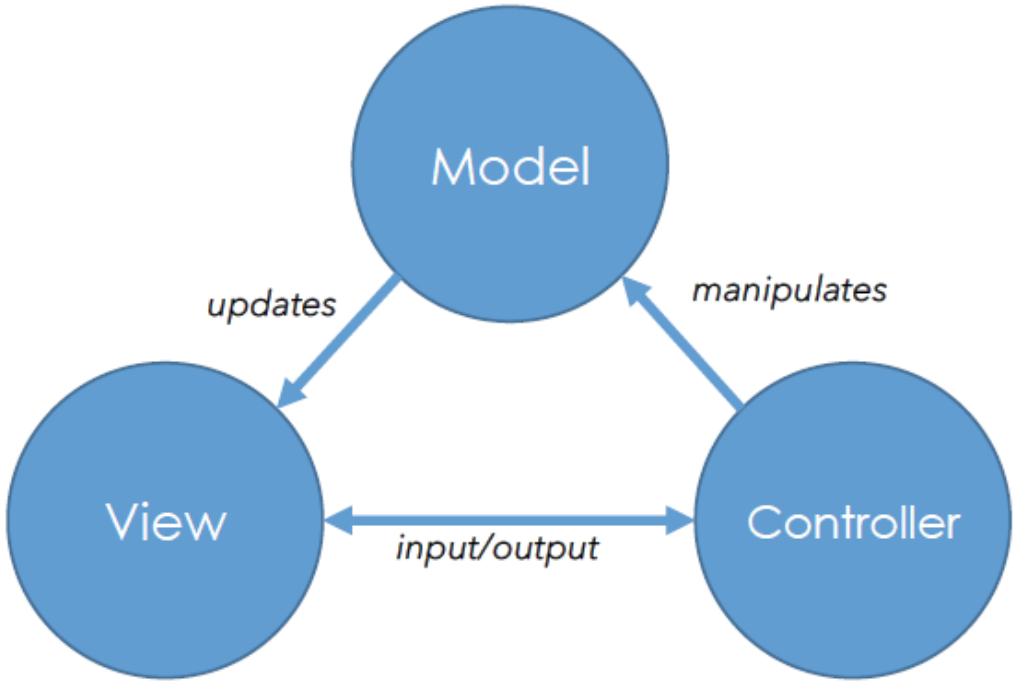
React.js





Web clients

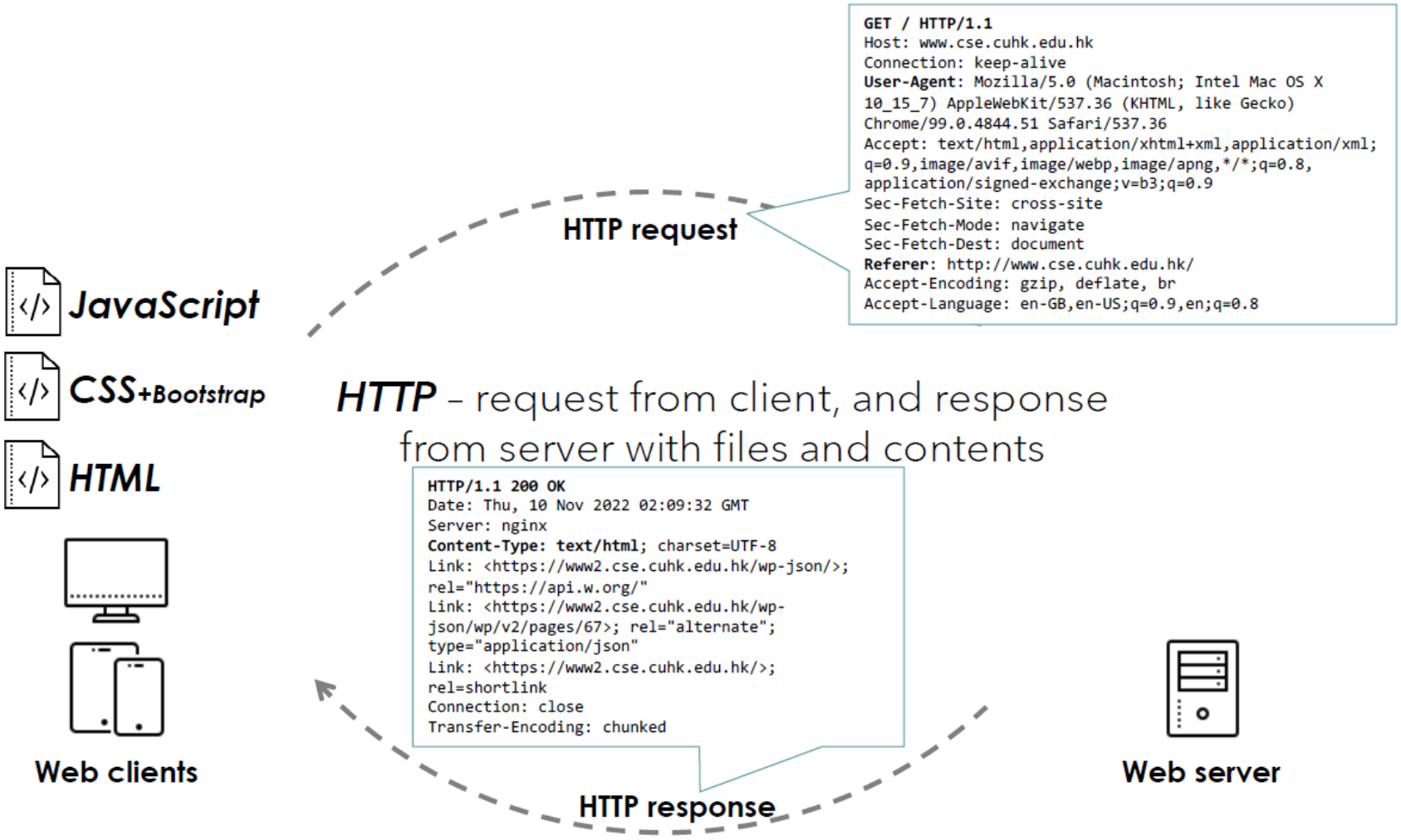
React components + ReactDOM



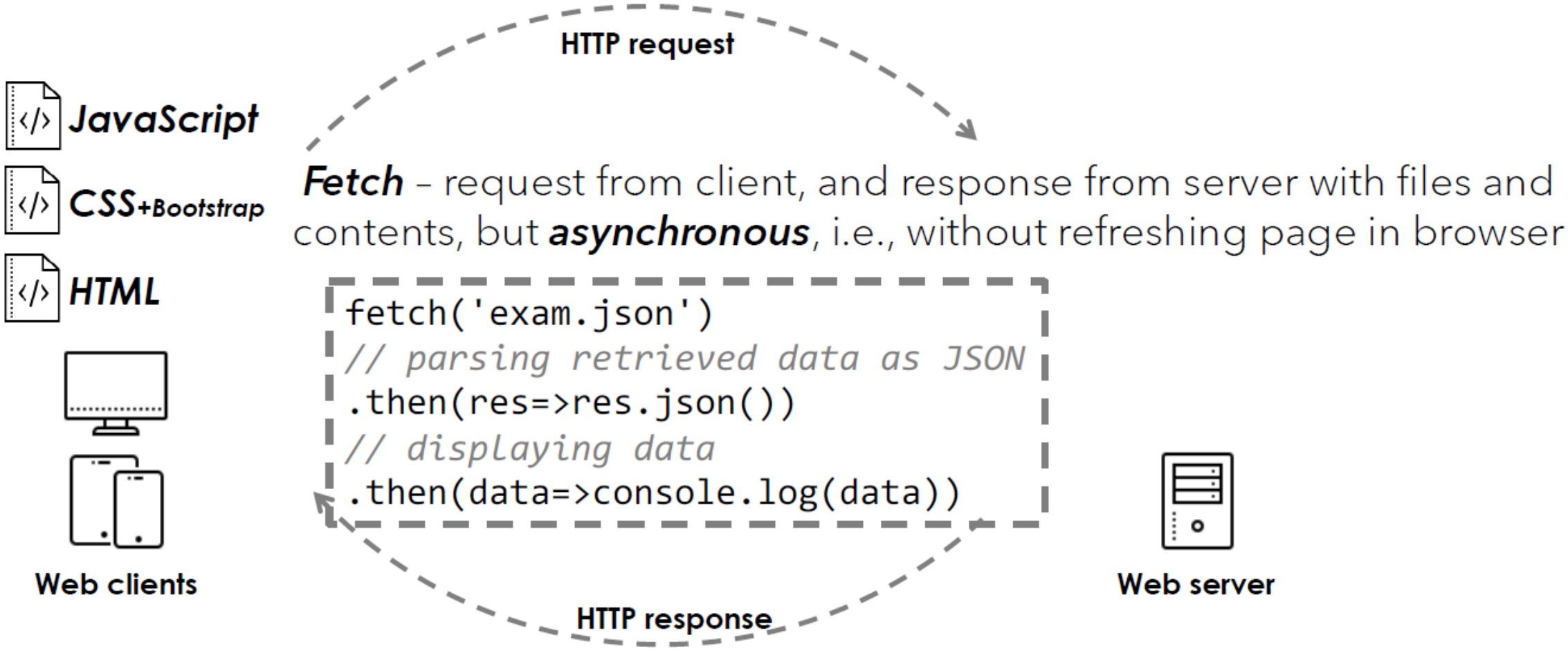
React app

JS + React + JSX

HTTP

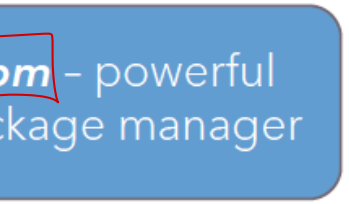

GET / HTTP/1.1
Host: www.cse.cuhk.edu.hk
Connection: keep-alive
User-Agent: Mozilla/5.0 (Macintosh; Intel Mac OS X 10_15_7) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/99.0.4844.51 Safari/537.36
Accept: text/html,application/xhtml+xml,application/xml;q=0.9,image/avif,image/webp,image/apng,*/*;q=0.8,application/signed-exchange;v=b3;q=0.9
Sec-Fetch-Site: cross-site
Sec-Fetch-Mode: navigate
Sec-Fetch-Dest: document
Referer: http://www.cse.cuhk.edu.hk/
Accept-Encoding: gzip, deflate, br
Accept-Language: en-GB,en-US;q=0.9,en;q=0.8
HTTP request
JavaScript
CSS+Bootstrap
HTML
HTTP – request from client, and response from server with files and contents
HTTP/1.1 200 OK
Date: Thu, 10 Nov 2022 02:09:32 GMT
Server: nginx
Content-Type: text/html; charset=UTF-8
Link: <https://www2.cse.cuhk.edu.hk/wp-json/>; rel="https://api.w.org/"
Link: <https://www2.cse.cuhk.edu.hk/wp-json/wp/v2/pages/67>; rel="alternate"; type="application/json"
Link: <https://www2.cse.cuhk.edu.hk/>; rel=shortlink
Connection: close
Transfer-Encoding: chunked
Web clients
Web server
HTTP response

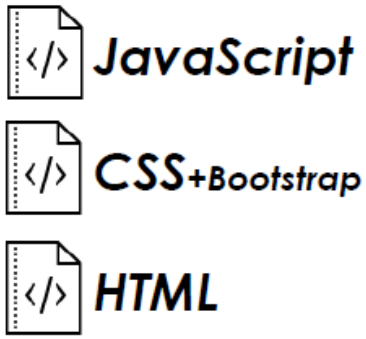
Asynchronous HTTP with Fetch



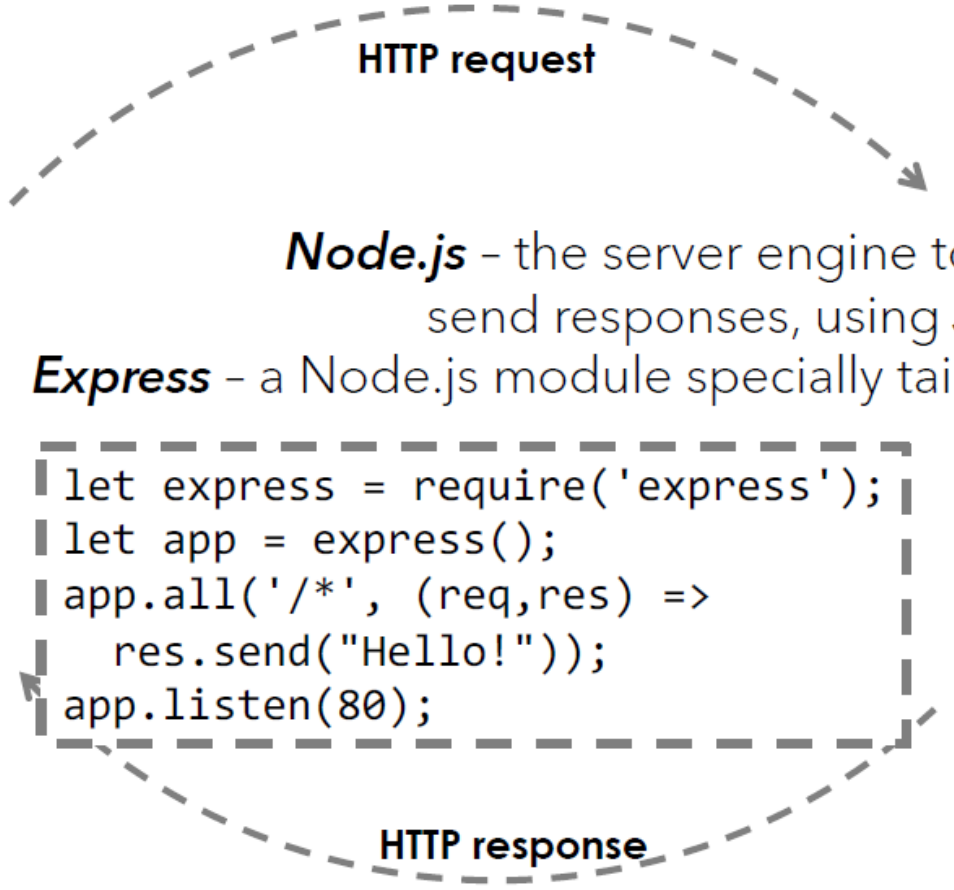
Node.js

Node.JS + Express + CORS + Mongoose





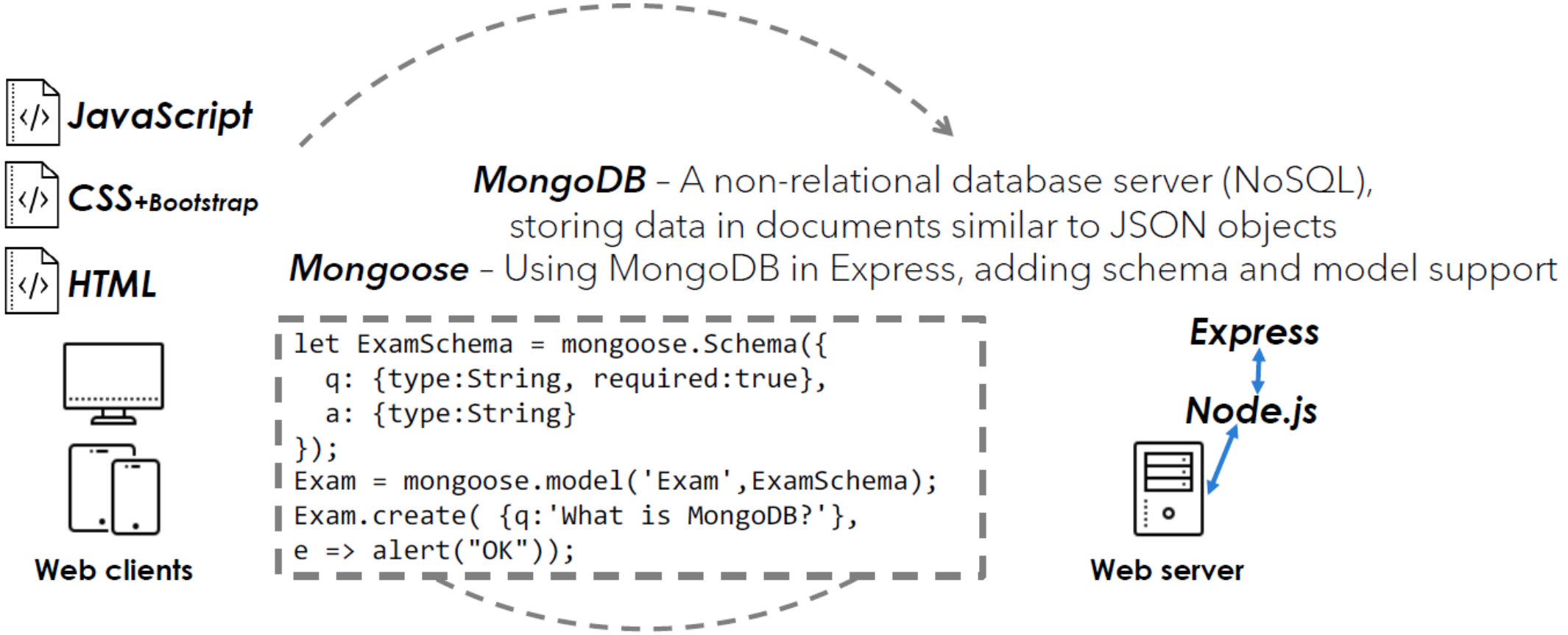
Web clients



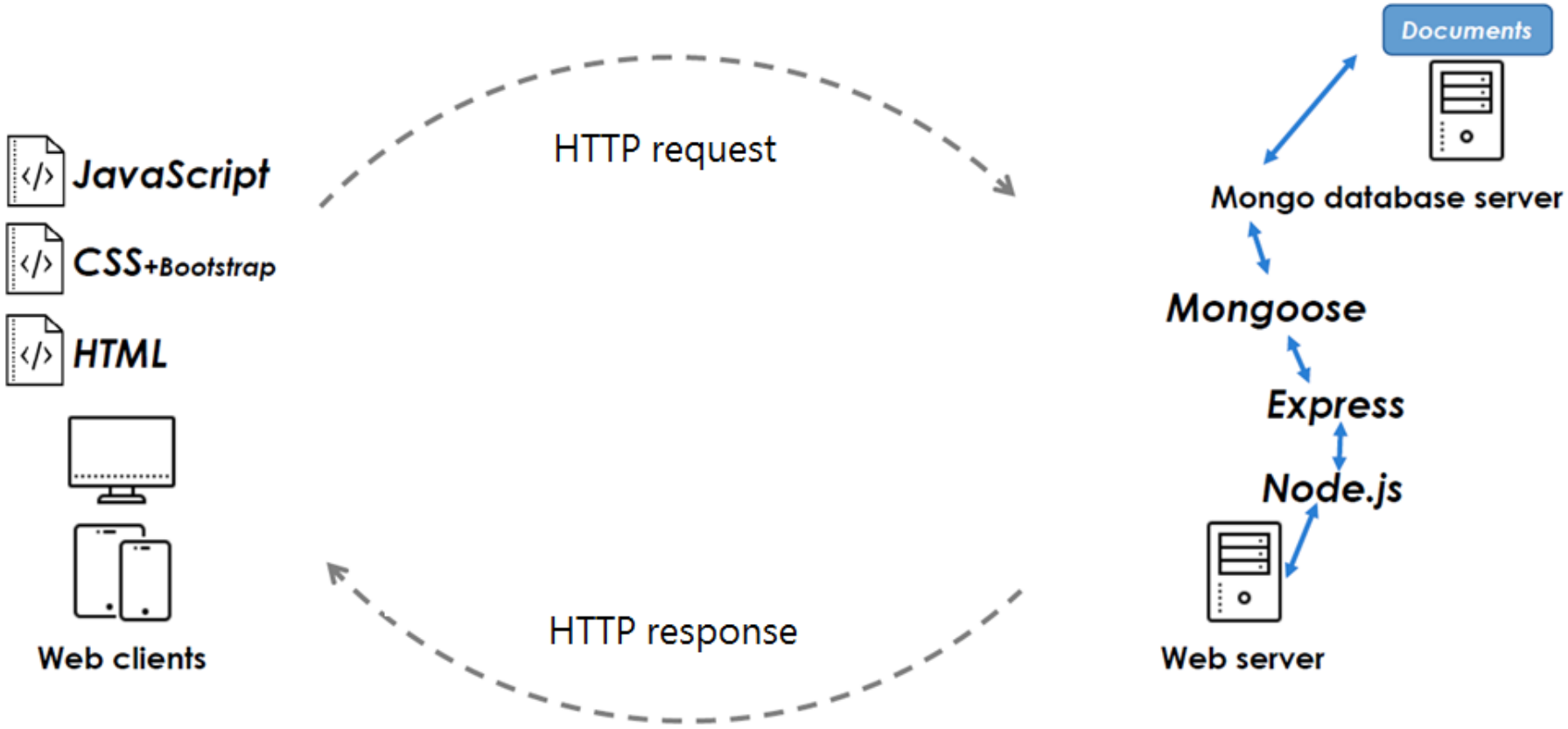
Web server

MongoDB and Mongoose

- MongoDB and Mongoose will not be in your mid-term exam……



The big picture of CSCI2720



Review

- Now, we will have a quick review of each chapter.
- No tips for tomorrow’s questions.
- This is just an overall review of what we have learned so far.

1. Introduction

- An overall picture of Client & Server

2. HTML

- HTML: the basics of web contents
- Syntax of HTML elements and attributes
- Basic elements:
  - Heading
  - Paragraph
  - Lists
  - Tables
  - Images
  - Audio/video
  - Hyperlinks

```
<audio controls autoplay>
  <source src="horse.ogg" type="audio/ogg">
  <source src="horse.mp3" type="audio/mpeg">
Your browser does not support the audio element.
</audio>
```

```
<video width="320" height="240" autoplay>
  <source src="movie.mp4" type="video/mp4">
  <source src="movie.ogg" type="video/ogg">
Your browser does not support the video tag.
</video>
```

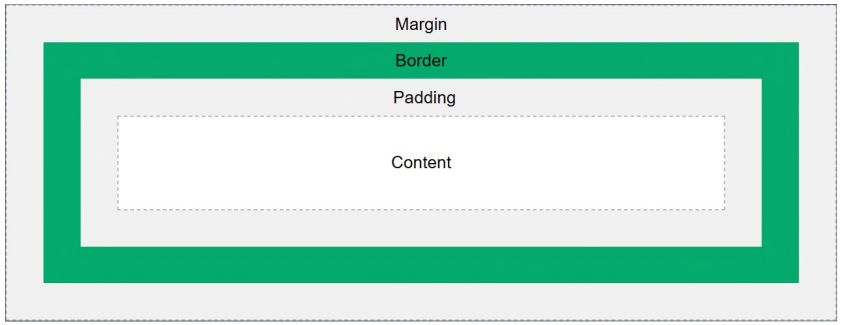
3. Bootstrap

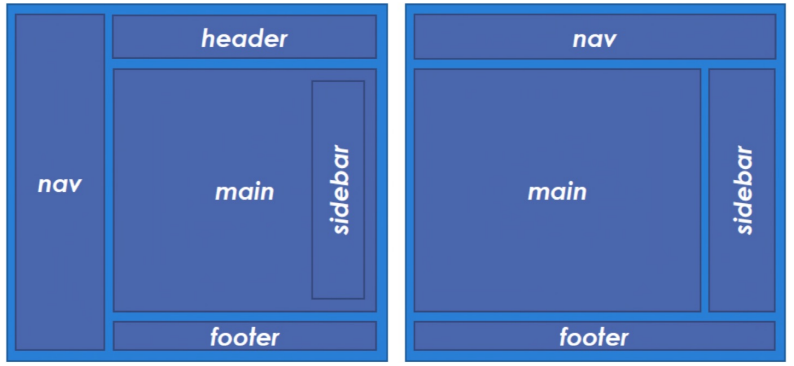
- Using Bootstrap classes
- Grid system
- Responsive breakpoints

4. CSS

- CSS: separating design from contents
- External vs Internal vs Inline
- Inheritance and cascading
- Inline vs Block-level elements
- Element selectors
- Box model
- Visibility, display, position
- Responsive web design
- Fonts

inline	元素並排顯示，元素的大小依其內容決定，無法設定 height, width, margin 等屬性
block	下一個元素會換行，可以設定 height, width 等屬性
inline-block	元素為區塊(block)，可以設定width, height 等屬性，但是並排顯示。
none	元素不顯示，也不佔有版面空間。





5. JavaScript

- Basics of JS:
  - Variables
  - Types
  - Operators
  - Object
  - If else
  - Loops
  - Object

6. Form

- The **<form>** HTML element
- Text and relevant input fields
- Checkbox vs Radio
- Labels, groups
- Buttons and submit action
- GET vs POST

7. Fetch

- Callback functions
- Promise:
  - states
  - **.then()**
  - **.catch()**
- **fetch()** for GET and POST with promise

8. Events and Objects

- HTML selectors: **querySelector()**, **getElementById()**
- Contents of elements: **.innerHTML**, **.innerText**, **.value**
- DOM tree navigation and editing
  - nodes, children, …
- Events and handlers:
  - **onclcik**, **onmouseover**, …
- JSON: JavaScript Object Notation

9. Functions and Arrays

- Function parameters and argument
- Rest operator and spread operator
- Arrow functions
- Array modification function:
  - **slice()**, **splice()**, ….
- For and forEach loops
- Searching in arrays
  - **filter()**
- Transforming arrays
  - **map()**

10. React

- The idea of transpilation for generating HTML/CSS/JS
- React entry point and ReactDOM
- Basic syntax of JSX
- React components: class components
- Props and states

11. npm

- The use of package managers
- Dependency management

12. SPA and Routing

- Page-based vs SPA
- Pagination and infinite scrolling
- History API
- React-router

13. HTTP

- OSI network model
- Ports, socket, localhost
- Client-server architecture: requests and responses
- HTTP messages with headers
- HTTP methods
- HTTP requests with query

14. Node.js

- Node.js: JS on the server-side
- Express: web server module to handle req/res
- Basic routing in Express
- Parameters and queries

15. Sessions

- The use of cookies
- The use of session
- Cookie and session in Express
- Web storage on browser

16. Security

- Validation, verification, authentication, authorization
- Access control vulnerabilities
- Mitigation: validation, escaping, sanitization
- HTTPS
- Certificates
- DDoS

17. MongoDB

- Non-relational database
- Mongoose
- Schema and Model
- CRUD
- Documents in another collection

- *MongoDB will not be in your mid-term exam……*

Reminders

- 23rd November, 12:45 – 14:15 (90 mins), MMW-LT1.
  - **You should arrive at 12:30**
- Mid-term = 40% of this course
  - Grading on a curve
- Calculator or any other electronic devices are not allowed
- Close-book
  - You are allowed to use only one piece of cheat sheet of A4 double-side
- **Any form of cheating = go to FDC ≈ failed this course**