香港中文大學
The Chinese University of Hong Kong

MIDTERM REVIEW

CSCI2720 2022–23 Term 1

Building Web Applications

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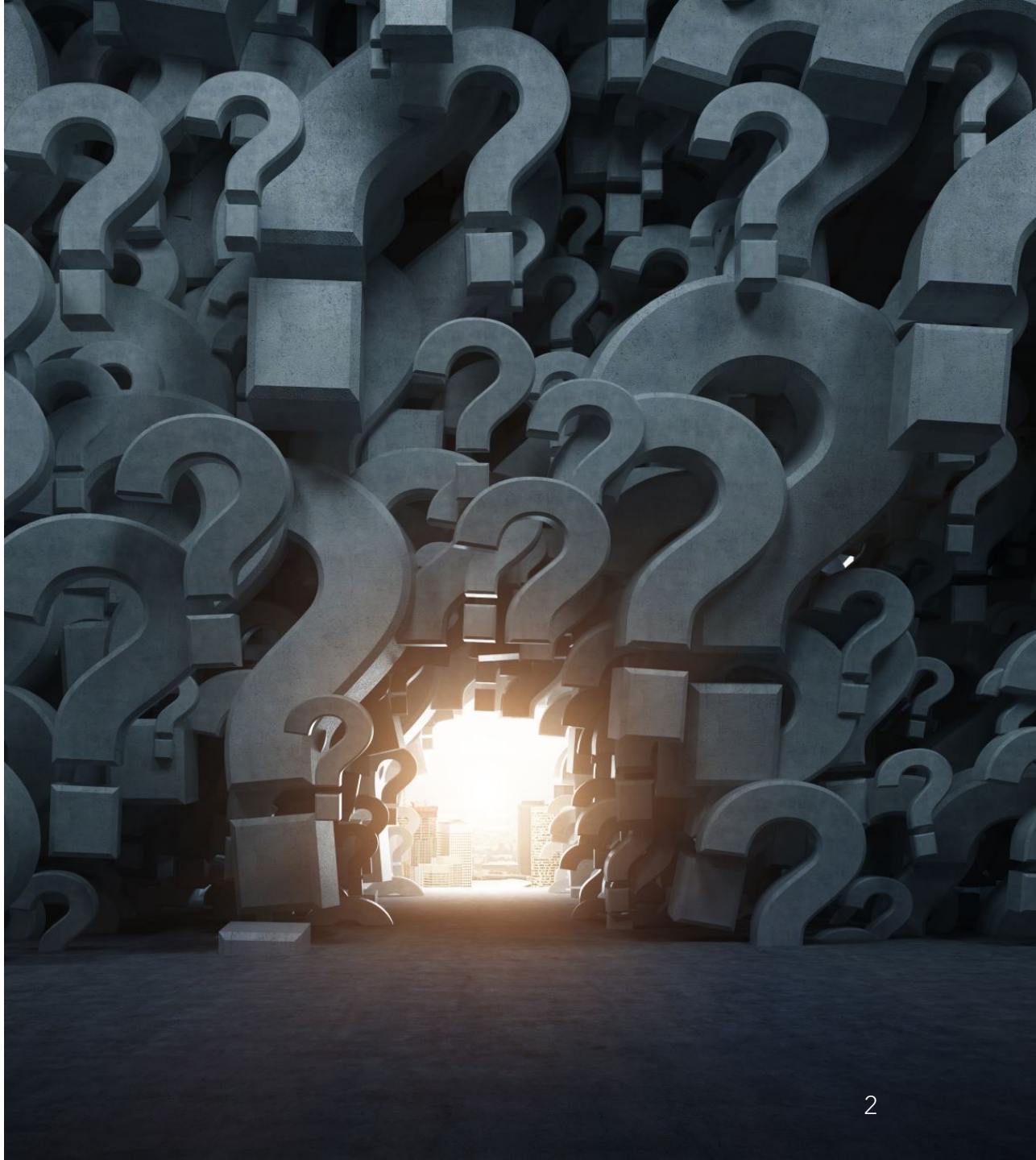
THIS COURSE IS NOT EASY



DRAW YOUR OWN STUDY NOTES

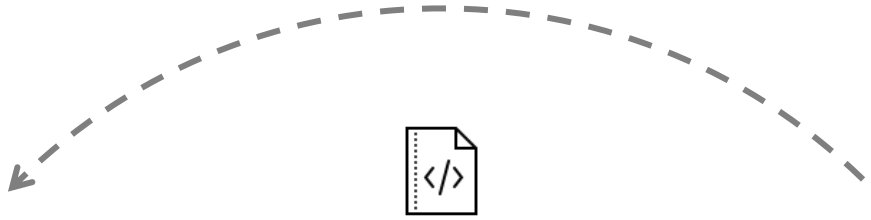
Figure out how thoughts and ideas ***connect*** with each other

ASK QUESTIONS!

Yet, you need to formulate a possible answer first. This process is how you ***actually think***.

BUILDING BLOCKS

HYPERTEXT MARKUP LANGUAGE



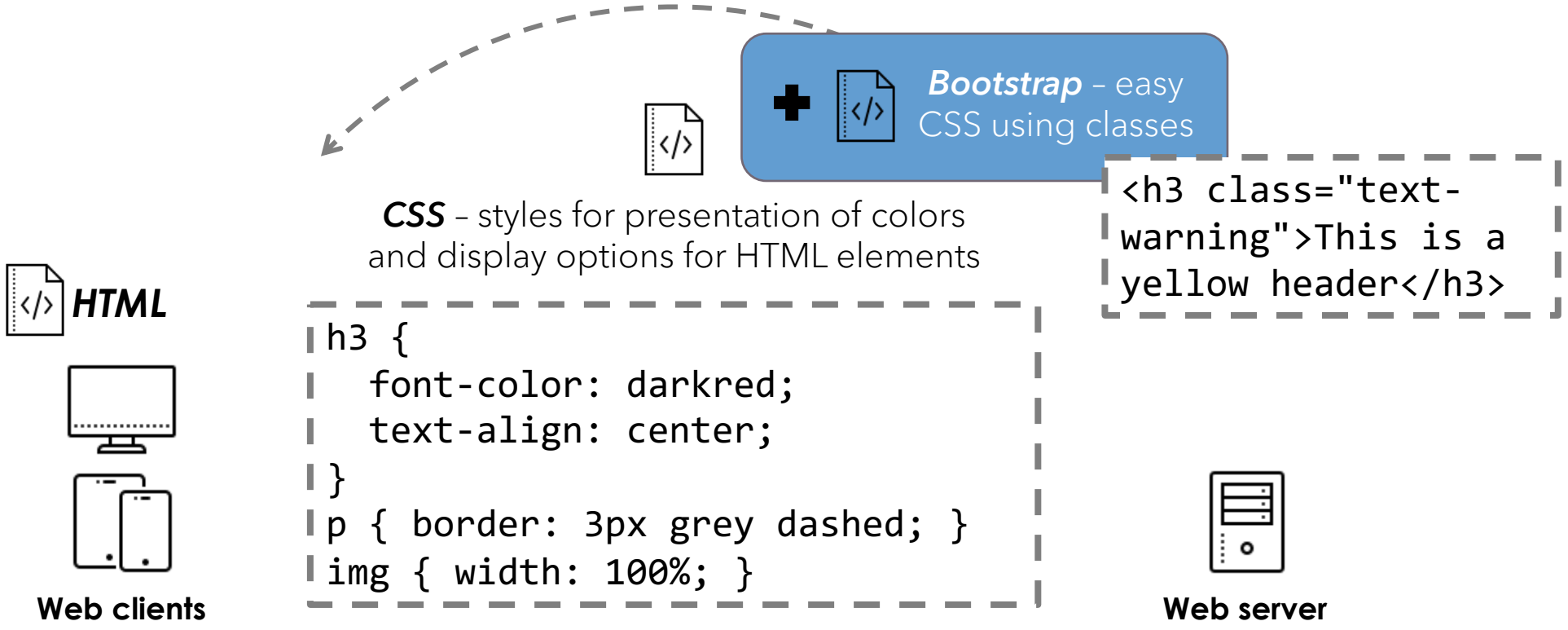
HTML – markup of display elements and input forms

```
<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

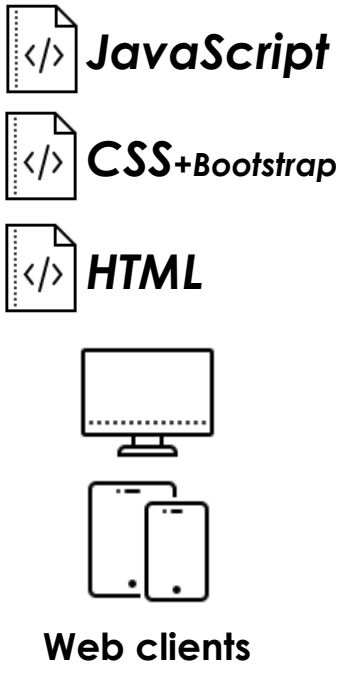
CASCADING STYLE SHEET

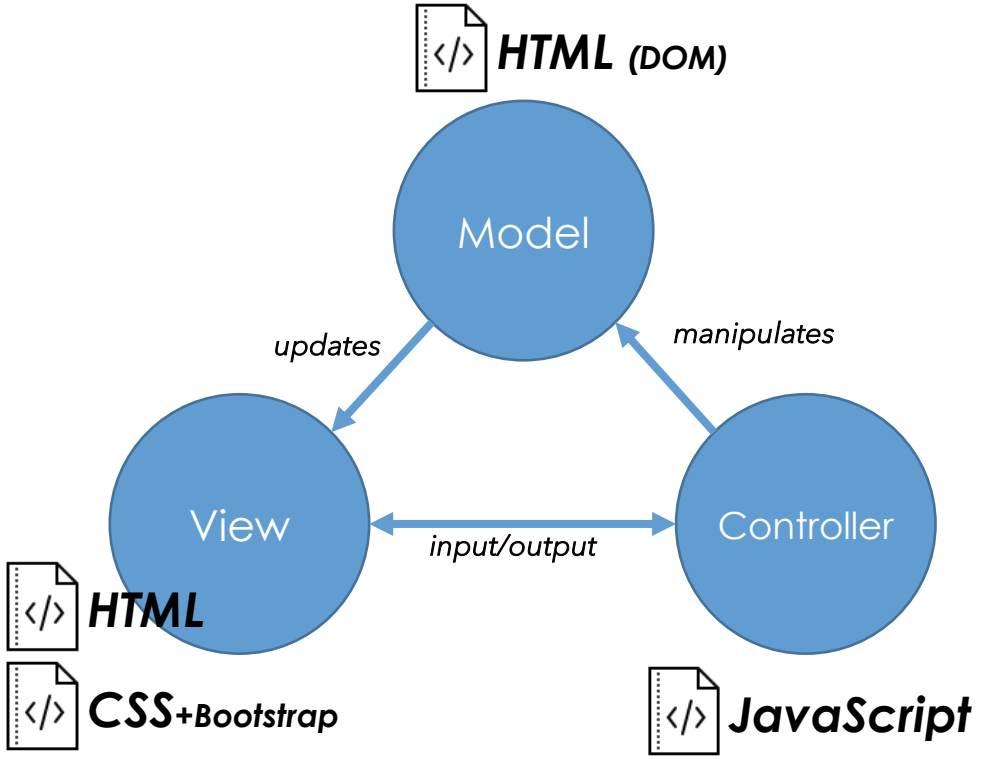


JAVASCRIPT

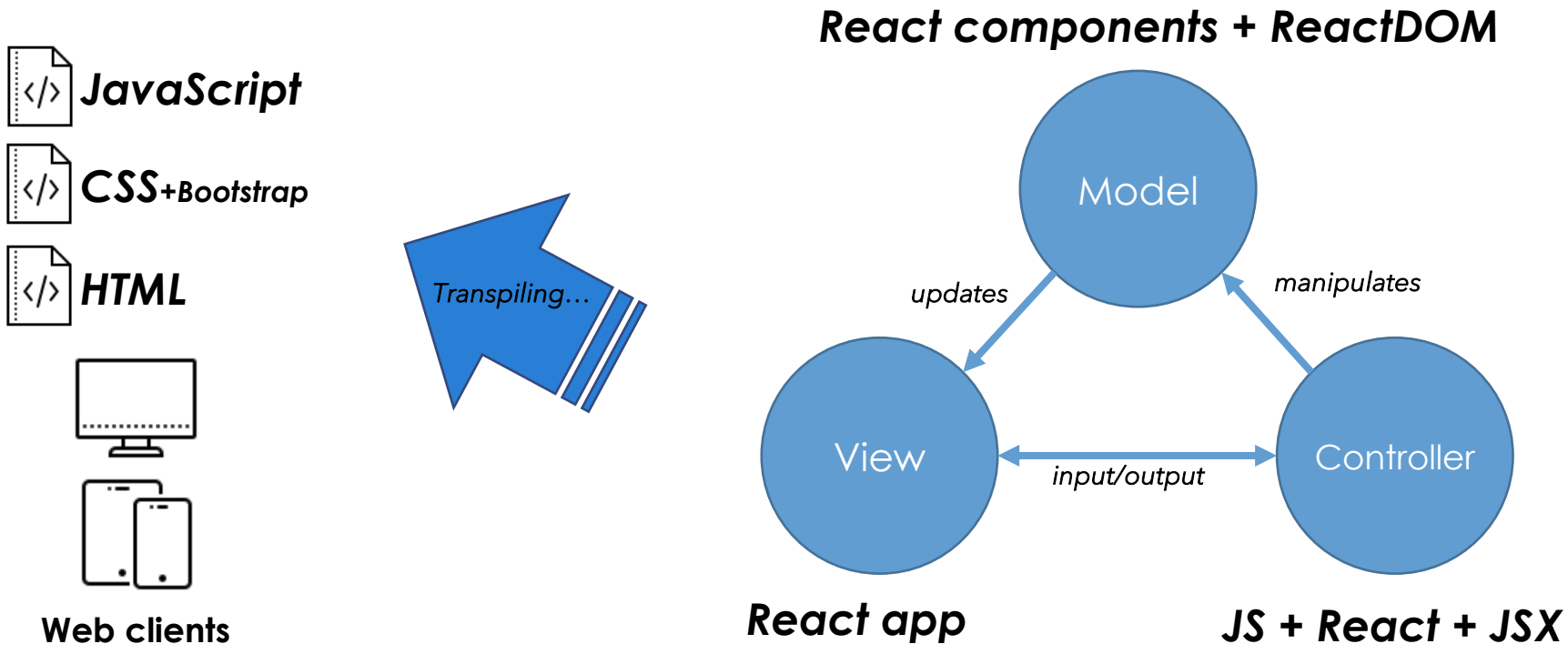

CSS+Bootstrap
HTML
JavaScript – code executed at client to adjust contents/markup/styling dynamically in DOM
Click
<script>
function fun() {
alert("Look at me!");
document.querySelector("h3")
.innerHTML("This is a new heading);
}
Web clients
Web server

ON THE CLIENT SIDE

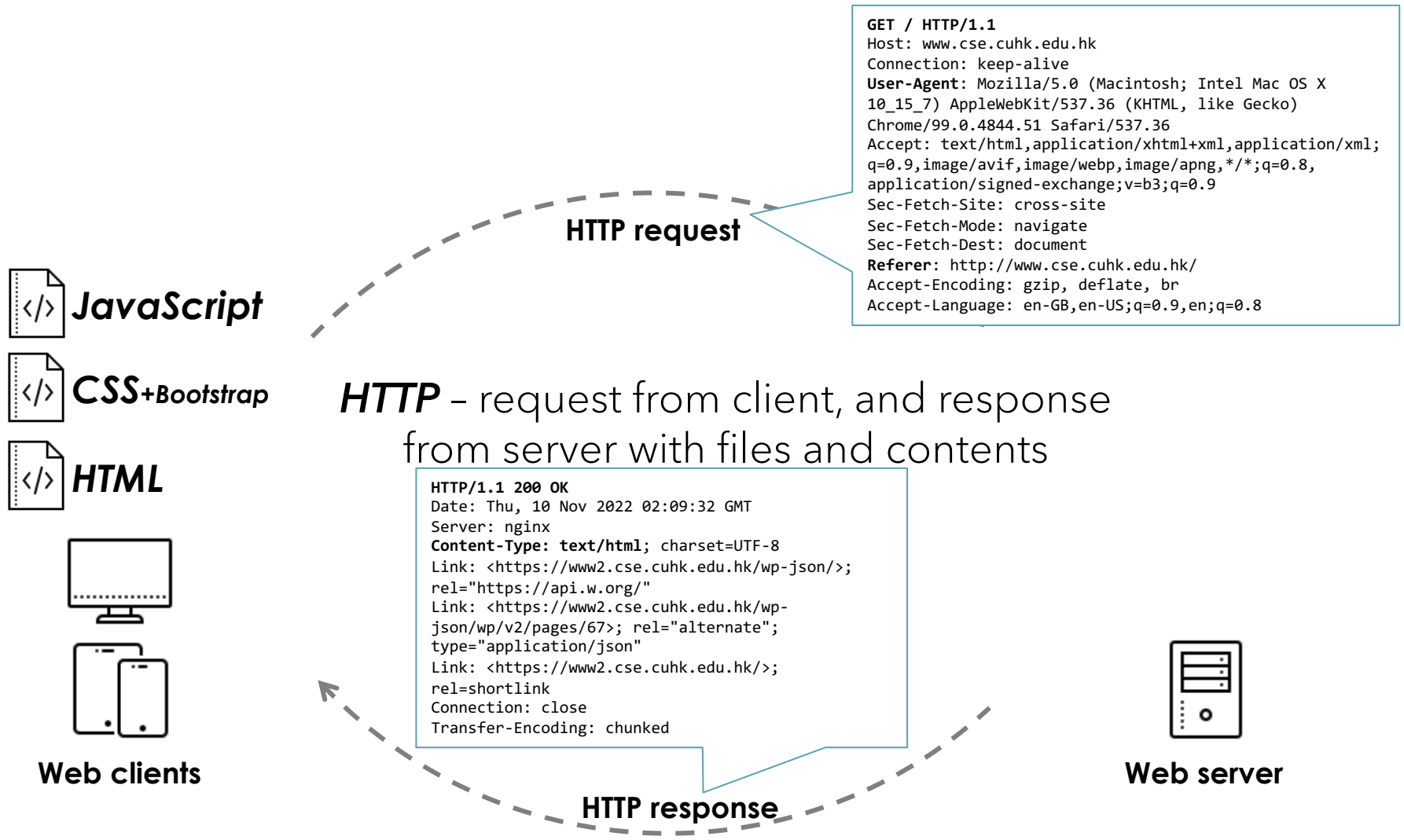




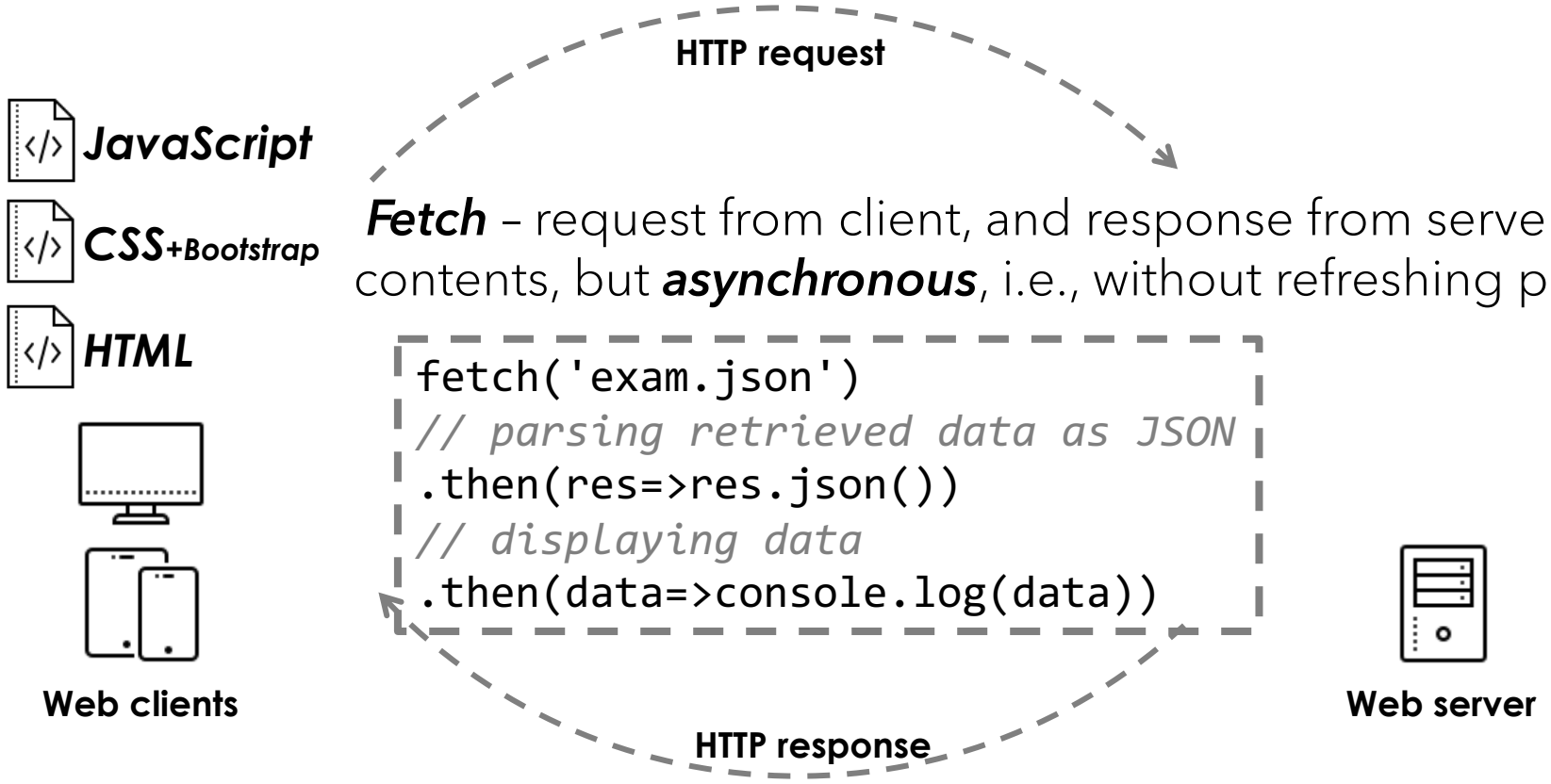
REACT.JS


JavaScript
CSS+Bootstrap
HTML
Web clients
Transpiling…
React components + ReactDOM
Model
updates
manipulates
View
input/output
Controller
React app
JS + React + JSX

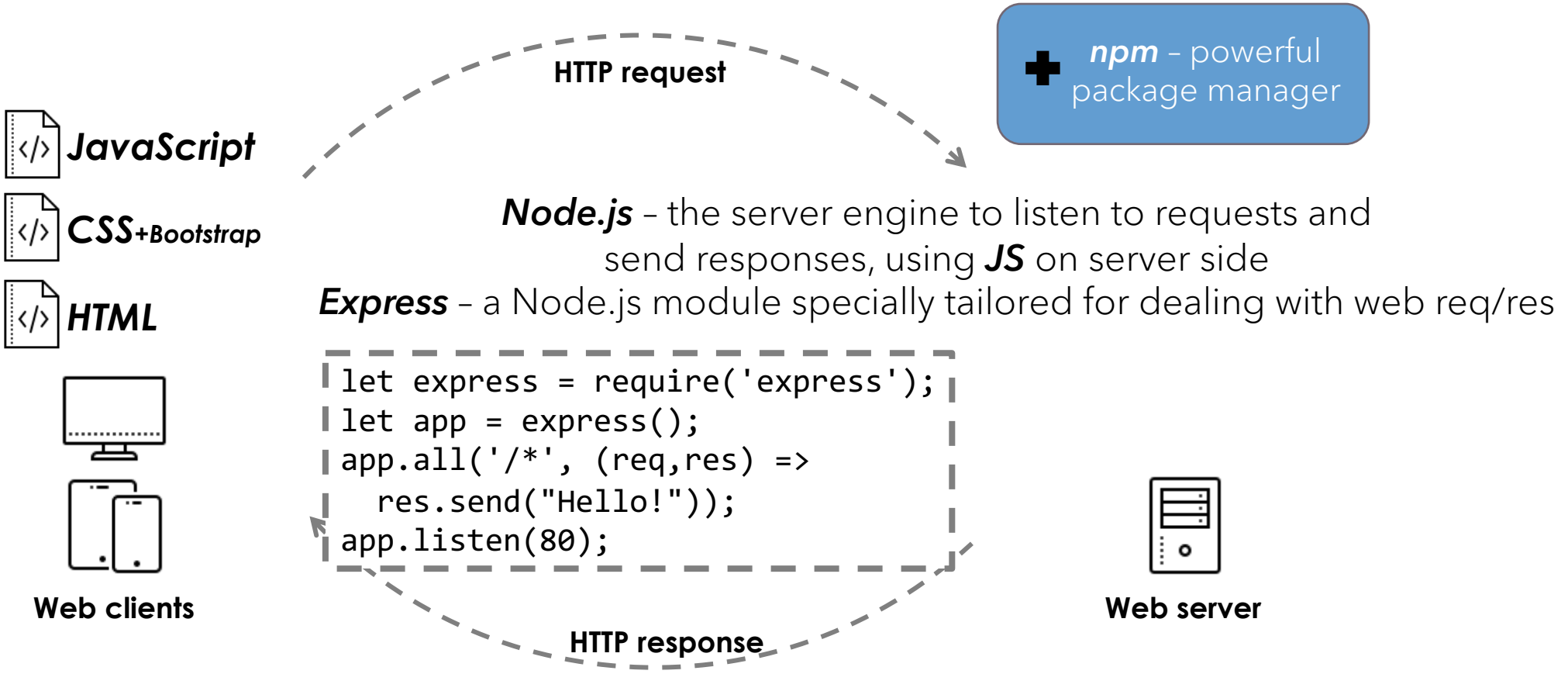
HYPERTEXT TRANSMISSION PROTOCOL



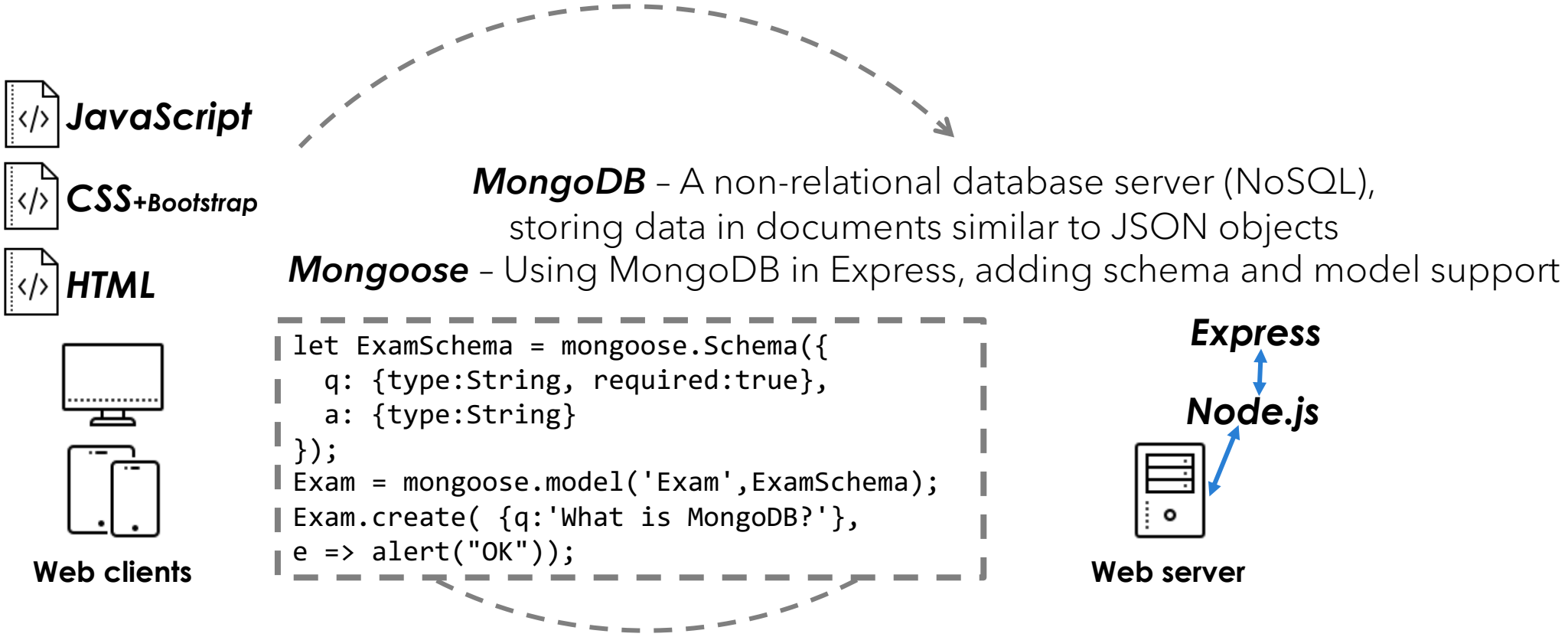
ASYNCHRONOUS HTTP WITH FETCH



NODE.JS AND EXPRESS



MONGODB AND MONGOOSE

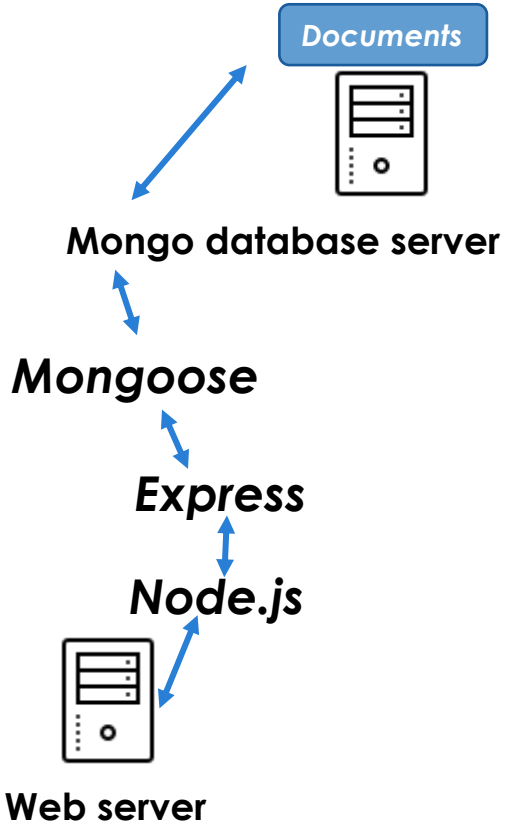


WHAT'S NEXT?

Here are what you should/could do…

- Understand the basics thoroughly
- Replace tedious tasks with ***libraries***
- Learn about ***frameworks***, and decide whether to align to the trend
- Read *examples*, read *articles*

- PRACTISE and WORK HARD!!



QUICK REVIEW OF EACH CHAPTER!

01. HTML

- HTML: the basics of web contents
- Syntax of HTML elements and attributes
- Basic elements: heading, paragraph, formatting, lists, tables, images, audio/video
- Hyperlinks and paths

02. BOOTSTRAP FOR CSS

- Using Bootstrap classes
- Responsive breakpoints: `-sm`, `-md`, `-lg`, `-xl`, `-xxl`
- Grid system: 12 columns
- Bootstrap components and utilities

03. CSS

- CSS: separating design from contents
- External/internal stylesheets and inline styles
- Inheritance and cascading
- Element and pseudo-element selectors
- Basic CSS properties and length units
- Inline vs. block-level elements
- Visibility, display, position
- Box model: margin, padding, border
- Responsive web design
- Other possibilities of CSS: fonts, animations, …

04. JAVASCRIPT

- JavaScript: the interpreted language inside a browser, between user and DOM
- Basics of JS: identifiers, types, operators, if, loops

05. INPUT AND FORMS

- The `<form>` HTML element
- Text and relevant input fields
- Checkbox, radio button
- Labels, groups
- Buttons and submit action
- GET vs. POST

06. ASYNCHRONOUS JS AND FETCH API

- `setTimeout()` and `setInterval()`
- Callback functions
- Promise: states, `.then()`, `.catch()`, callbacks
- `fetch()` for getting and posting with promise

07. JS DOM, EVENTS, AND OBJECTS

- HTML selectors: `querySelector()`, `getElementById()`, …
- Contents of elements: `.innerHTML`, `.innerText`, `.value`
- DOM tree navigation and editing: nodes, children
- Events and handlers: `onclick`, `onmouseover`, …
- Objects: key/value pairs but different ways to notate
- JSON: syntax, use, and encoding/decoding

08. JS FUNCTIONS AND ARRAYS

- Functions parameters and arguments
- Rest operator `...`
- Arrow functions
- Spread operator `...`
- Array modification: `slice()` `splice()` `pop()` `push()` `shift()` `unshift()`
- For and forEach loops
- Searching in arrays: e.g., `filter()`
- Transforming arrays: e.g., `map()`

09. AN INTRODUCTION TO REACTJS

- 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: unidirectional data flow
- What's special with events, lists, forms

10. PACKAGE MANAGERS

- The use of package managers
- Dependency management
- npm local and global packages

11. SPA AND ROUTING

- Page-based vs. SPA: pros and cons
- SPA paradigm: fragments of data in follow-up requests
- Pagination vs. infinite scrolling
- History API
- React-router

12. SERVER, CLIENT, AND HTTP

- OSI Network Model and protocols
- Ports, socket, localhost
- Client-server architecture: requests and responses
- HTTP messages with headers
- HTTP methods
- HTTP requests with query

13. NODE.JS WITH EXPRESS

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

14. COOKIES, SESSIONS, AND STORAGE

- Application states: client side vs. server side
- The use of cookies: headers
- The use of session
- Cookie and session in Express
- Web storage on browser

15. WEB SECURITY

- Validation, verification, authentication, authorization
- Application security
- Access control vulnerabilities
- Mitigation: validation, escaping, sanitization
- Using HTTPS for authentication and encryption
- Certificates for identity verification
- Network security: DDoS

16. MONGODB BASICS

- Non-relational database: documents
- Mongoose: The bridge between MongoDB and Node
- Schema and model: types, unique, require
- CRUD in Mongoose
- Query methods and operators
- Documents in another collection

MIDTERM EXAM

November 17 (Thursday), ~70–80 mins during class 12:30–14:15

- 40% of course grade
  - Must pass Midterm Exam to pass course
- Paper exam
  - One double-sided A4 written cheat-sheet is allowed
  - Format could be similar to the provided "past paper"
- Coverage
  - EVEVRYTHING from lecture and labs up to November 9
  - Assignments 1 & 2
  - *ESTR2106 students: same exam duration, more on coverage*

GOOD LUCK!