


Lecture 7
JavaScript Frameworks

Client/Server Programming
for Internet Applications

TCSS460
Summer 2020



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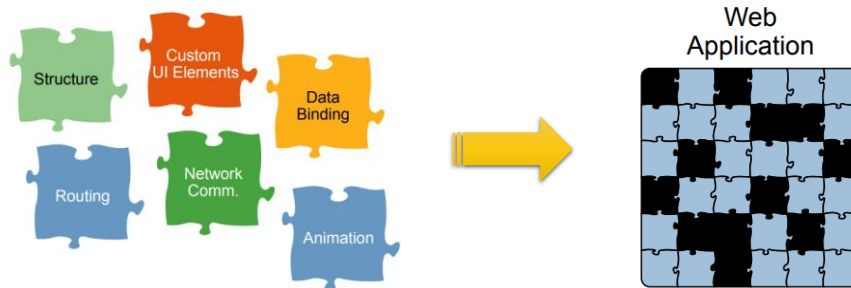
JavaScript Frameworks

- **software framework** is a reusable library code that you can utilize to simplify, improve and facilitate process of developing an application
- a wide range of JavaScript frameworks
 - a learning curve is associated with each framework
 - intent is to provide “big picture” understanding of related JS frameworks
- two main types of frameworks
 - JavaScript Front-End Frameworks
 - JavaScript Server Frameworks

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JavaScript Frameworks (cont'd)

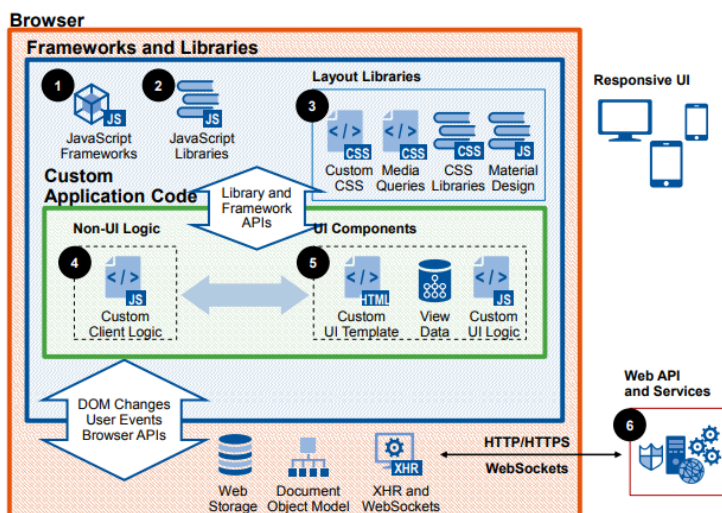
- Which Framework to Choose?



Brad Dayley, Gartner, Choosing the Right JavaScript Framework

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JavaScript Frameworks (cont'd)



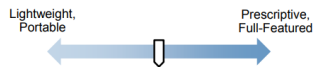
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JavaScript Frameworks (cont'd)

- save time
- provide structure
- provide consistency

why so many JavaScript Frameworks?



Custom Application Code

- UI Components
- Non-UI Application Logic

JavaScript Frameworks And Libraries

- Scaffolding
- Prebuilt Code
- Prescriptive Model

Browser

- Document Object Model
- Web Storage
- XHR and WebSockets

Library and Framework APIs

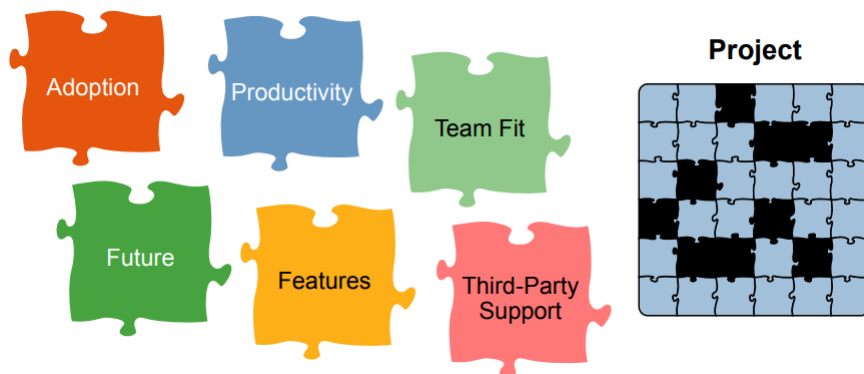
DOM Changes
User Events
Browser APIs

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JavaScript Frameworks (cont'd)

- How Can I choose the right JavaScript Framework?



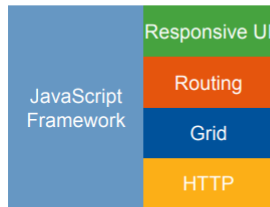
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JavaScript Frameworks (cont'd)

Third-Party Tools and Libraries

Extend Frameworks



Trade-Off

Generic JavaScript Libraries **Versus** Framework Specific Libraries



Third-party modules are not always as mature as frameworks

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JavaScript Frameworks (cont'd)

ECMAScript (ES) is a scripting-language specification standardized by Ecma International

- **ECMA**: European Computer Manufacturers Association (ECMA)
- goals: **standardize JavaScript**
 - focuses mainly on client-side scripting
 - JavaScript is governed by this specification
- other known implementations
 - **JScript** (Internet Explorer),
 - **ActionScript** (Adobe Systems)

Scripting engine	Reference application(s)	Conformance ^[35]			
		ES5 ^[36]	ES6 ^[37]	ES7 ^[38]	Newer (2016+) ^{[39][39]}
Chakra	Microsoft Edge	100%	96%	100%	54%
SpiderMonkey	Firefox	100%	98%	100%	77%
Chrome V8	Google Chrome, Opera	100%	98%	100%	93%
JavaScriptCore (Nitro)	Safari	97%	99%	100%	83%

[Wikipedia: Comparison of JavaScript frameworks](https://en.wikipedia.org/wiki/ECMAScript)

<https://en.wikipedia.org/wiki/ECMAScript>

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JavaScript Frameworks

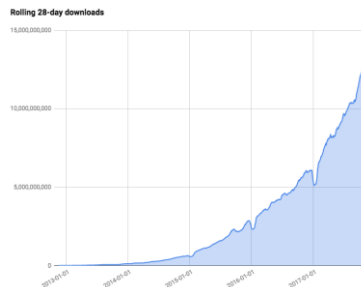
→ Node Package Manager (npm)

- **npm (Node Package Manager)**

- default package manager for node.js → a JavaScript run-time environment

- article: The State of JavaScript Frameworks, 2017 (Jan 2018)

- npm estimates that 75% of JavaScript developers use npm
- npm study considered
 - Backbone
 - React
 - Angular
 - Ember
 - Vue



The State of JavaScript Frameworks, 2017, npm

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JavaScript Frameworks

→ JavaScript Front-End Frameworks (cont'd)

- **Angular**

- open-source JavaScript MVC framework
 - shares similarities with Ember
 - maintained by Google
- **Angular 1.x** (AngularJS, 2010) is well suited for creating **Single-Page Application (SPA)**
 - web application typical consisting of a single page updated dynamically using JavaScript AJAX techniques
- **Angular 2.x** (simply Angular, 2016)
 - required developers to switch from JavaScript to TypeScript
 - TypeScript: a JavaScript preprocessor
 - Angular 2 uses a new set of concepts and requires a substantial learning curve (even for experience AngularJS developers)



The State of JavaScript Frameworks, 2017, npm

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JavaScript Frameworks

→ JavaScript Front-End Frameworks (cont'd)

- **Backbone (2010)**



- one of the earliest JavaScript frameworks
- used variation of **MVC design pattern**
- rich in APIs
 - uses RESTful JSON interface
- tried to bring modern **software patterns** to JavaScript development

The State of JavaScript Frameworks, 2017, npm

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JavaScript Frameworks

→ JavaScript Front-End Frameworks (cont'd)

- **Ember (2011)**



- full-framework, build complete solutions
 - follows a known approaches for structuring and implementing web applications
- variant of MVC pattern which involves writing
 - **models** to represent your data
 - **templates** to handle presentation
 - handles for **data binding** connecting view and model
 - module for **routing** to describe how users interact with application
- some learning curve

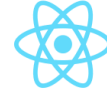
The State of JavaScript Frameworks, 2017, npm

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JavaScript Frameworks

→ JavaScript Front-End Frameworks (cont'd)

- **React (or React.js or ReactJS) (2013)**



- open-source JavaScript library for UI development
 - used to build rich interfaces
 - not a full-fledged framework (*a library for building GUIs*)
 - maintained by Facebook
- uses virtual DOM (ReactDOM)
- used extensively for developing single-page applications (SPAs)
 - mobile applications (iOS and Android)

- **Vue.js (2014)**



- open-source JavaScript framework
- used to build web applications and SPAs
- small learning curve

[The State of JavaScript Frameworks, 2017, npm](#)

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JavaScript Frameworks

→ JavaScript Server Frameworks

- **JavaScript** is mainly a programming language used within the browser
 - recent trend: adoption of JavaScript on the server-side
- **one advantage:**
 - development team only needs expertise in a **single programming language**
- (potentially) main reason behind the growth of interest in server-side JavaScript is the power provided by **Node.js**
 - **Node.js** → a JavaScript framework for developing applications
 - JavaScript run-time environment that enables execution of JavaScript code on the server-side



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JavaScript Frameworks

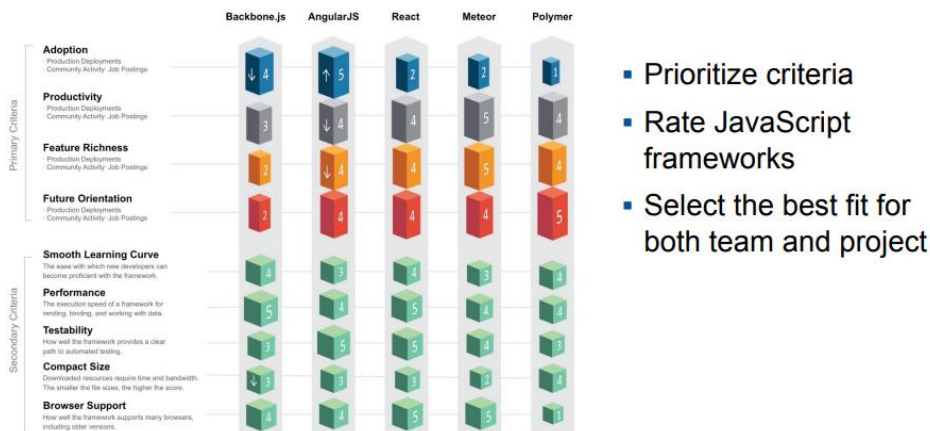
→ JavaScript Server Frameworks (cont'd)

- growth of interest in **Node.js** and server-side **JavaScript** in general has led to the rise of a new web software stack that competes with
 - **LAMP** → Linux-**A**pache-**M**ySQL-**P**HP
 - **WISA** → **W**indows-**I**IS-**S**QL Server-**A**SP.NET
- a new stack → referred to as **MEAN**
 - **MEAN** → **M**ongoDB-**E**xpress-**A**ngular-**N**ode.js
 - not functionally equivalent to LAMP or WISA
 - typically runs on Linux-based OS (can also run on Windows/Mac)
 - Node.js is not a web server (does not replace Apache)
 - Node.js has a rich HTTP library and can be used to write programs with web server functionality

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JavaScript Frameworks

→ Choosing a JavaScript Framework



Brad Dayley, Gartner, Choosing the Right JavaScript Framework

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JavaScript Frameworks

→ Summary

- *What is the best web technology employers are looking for?*
 - answer: it depends
 - employment trends vary from city to city
 - some industries are more partial to certain technology stacks
 - smaller startups tend to have their own technology culture

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Goals of This Module

- You should be comfortable with using jQuery
- You should be able to know how to add jQuery into HTML and manipulate HTML elements
- You should be comfortable with jQuery code and functions
- You should be familiar with some of the top JavaScript frameworks that exist

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Module Topics



- ☒ jQuery (Part I)
- ☒ jQuery (Part II)
- ☒ JavaScript Frameworks