



A 3D isometric illustration showing several people working on a large, interactive screen. One person is standing on a ladder, another is sitting at a keyboard, and others are holding tools like a pencil or a ruler. The screen displays a grid of colored squares and some text. Below the screen, there's a keyboard and a pencil.

Lecture 7
JavaScript Frameworks

**Client/Server Programming
for Internet Applications**

TCSS460

Summer 2020

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The logo consists of a stylized purple 'W' on a yellow square background, with the word 'TACOMA' in white capital letters below it.

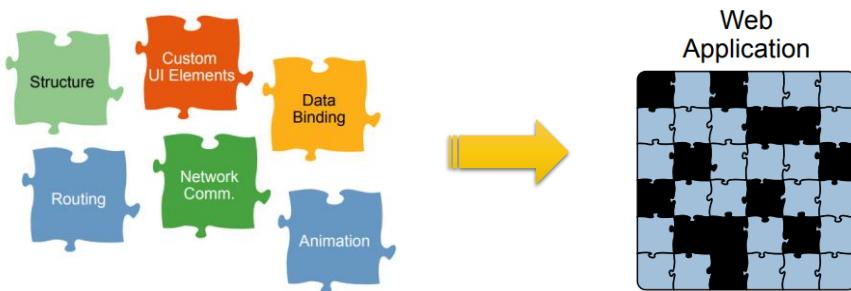
JavaScript Frameworks

- **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)

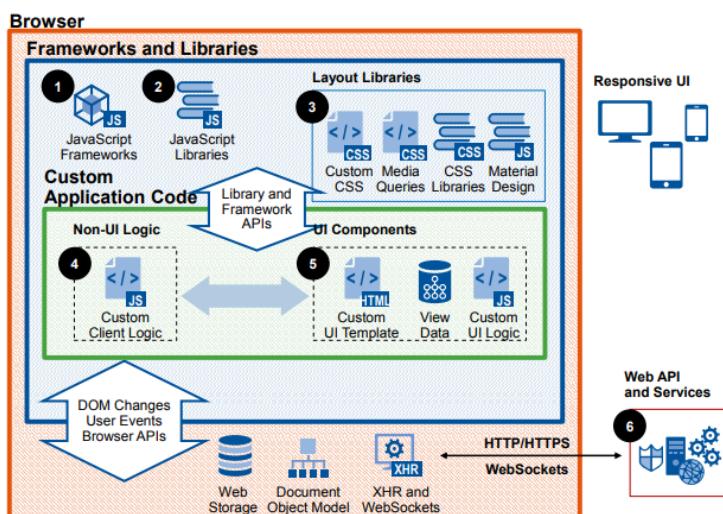
- Which Framework to Choose?



Brad Dayley, Gartner, Choosing the Right JavaScript Framework

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JavaScript Frameworks (cont'd)



Brad Dayley, Gartner, Choosing the Right JavaScript Framework

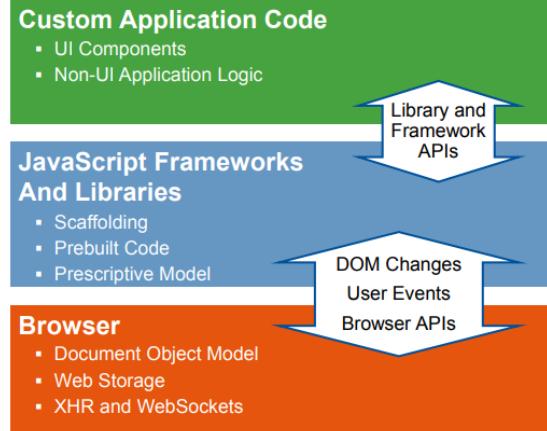
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JavaScript Frameworks (cont'd)

- save time
- provide structure
- provide consistency

why so many JavaScript Frameworks?

Lightweight, Portable Prescriptive, Full-Featured

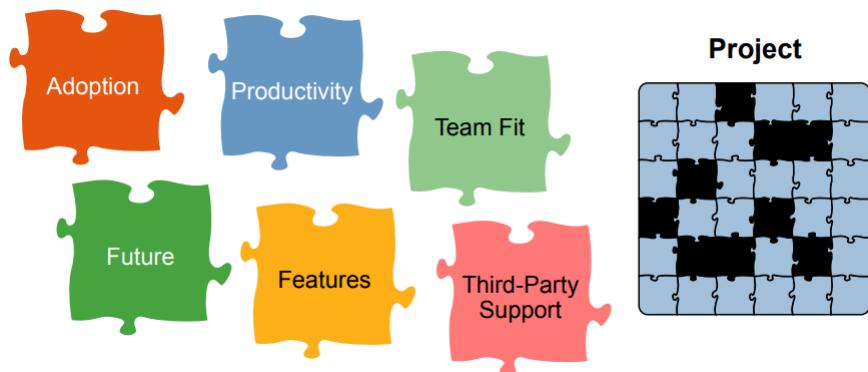


Brad Dayley, Gartner, Choosing the Right JavaScript Framework

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JavaScript Frameworks (cont'd)

- How Can I choose the right JavaScript Framework?



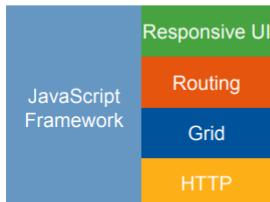
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JavaScript Frameworks (cont'd)

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

Brad Dayley, Gartner, Choosing the Right JavaScript Framework

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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+) ^{[38][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](#)

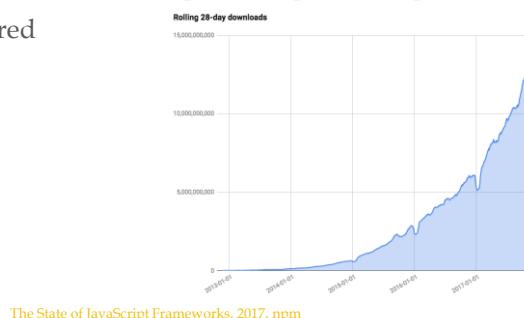
<https://en.wikipedia.org/wiki/ECMAScript>

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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



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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 experienced 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

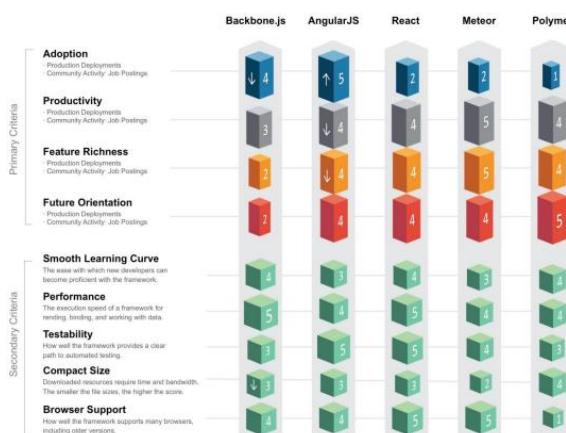
→ JavaScript Server Frameworks (cont'd)

- 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-Apache-MySQL-PHP
 - **WISA** → Windows-IIS-SQL Server-ASP.NET
- a new stack → referred to as **MEAN**
 - **MEAN** → MongoDB-Express-Angular-Node.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



- Prioritize criteria
- Rate JavaScript frameworks
- Select the best fit for both team and project

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

Module Topics



jQuery (Part I)



jQuery (Part II)



JavaScript Frameworks