MONGODB

- Any of the usual MongoDB commands can be used after the connection is established
  - insertOne
  - updateOne
  - Find
- Mongoose
  - Schema
  - Casting
  - Validation
  - https://mongoosejs.com/

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**COMP 20
WEB PROGRAMMING**

WEEK 15: WHAT NEXT?

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ANNOUNCEMENTS

TA Office Hours

Mon 7pm
Tues 3:30pm
Wed 8pm
Thurs 8pm

Additional times available on request.

**Final Project
due April 30**

Project Review sessions
Apr 30, May 2 and May 4

Don't forget to sign up!

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WHERE HAVE WE BEEN?

WWW Mechanics	HTML	Javascript
jQuery	XML	JSON
AJAX	PHP	Relational Database
SQL	MongoDB/ NoSQL	Node.js
	Heroku	

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WHAT DIDN'T WE COVER …

A Lot!

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REST VS CURL VS AJAX

- **AJAX – A**synchronous **J**avascript **and XML**
  - HTTP Requests that can be made to an API on a server from the client
- **cURL – C**lient **URL**
  - Command line tool with that facilitates transfer of data via URL
  - Supports HTTP which makes it helpful for interacting with API's
  - Will need a supporting library to create programmatic implementation
    - Visit https://incarnate.github.io/curl-to-php/ to see the conversion of a curl command into PHP
- **REST** - **R**epresentational **S**tate **T**ransfer
  - Created by Roy Fielding in 2000
  - Suited for Internet-scale systems
  - When a RESTful API is called, it transfers a representation of the state of the requested resource to the client – usually in JSON
  - REST is one way to do AJAX

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WHAT MAKES AN API REST-FUL: 6 CONSTRAINTS

1. Uniform interface
   - Simply stated: URL – but there is more to it.
2. Client / Server
   - Client / server separation (they act independently)
3. Communication is Stateless
   - Just like HTML, it does not matter which operation happened before or after
4. Response from server can be Cacheable or Uncacheable
   - Version numbers can assist with caching data
5. Layered
   1. Client should only be aware of one layer with which it is communicating
6. Code-on-demand (optional – runnable script can be returned as the response to the client – like Javascript or a Java applet)

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FULL STACK DEVELOPMENT

A Full Stack developer is versed in working pn the front-end (client) and back-end (server)

The MEAN Stack	The MERN Stack
▪ Mongo	▪ Mongo
▪ Express	▪ Express
▪ Angular	▪ React
▪ Node	▪ Node

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EXPRESSJS

- Web app framework for Node.js
- ExpressJS is a framework that runs on top of Node to make common tasks easier
- Free and open source
- Express lets you work with Routes
  - A route is a combination of a URL path and a method (GET, POST, etc)
  - Handlers can be established for different routes

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USING EXPRESS

- Express is a Node.js module
  - npm install express
- You may also want to install:
  - body-parser – handles JSON and other data
  - cookie-parser – gets cookie data
  - multer – helps with uploading files in a form

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EXPRESS EXAMPLE: HELLO WORLD

```
var express=require('express');
var exp=express();
exp.get('/',function(req,res)
{
   res.send('Hello World!');
});
var server=exp.listen(3000,function() {});
```

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REACT VS ANGULAR

- React is a Library* -- Angular is a Framework
- React is more flexible -- Angular provides structure including templates
- React is FAST
- Angular provides two-way data binding
- React is seen as easier to get started with, Angular is seen as having more development elements in place
- Both are growing fast - React is ahead at this point

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ANGULAR.JS

- Client side (front end) framework for JavaScript
- Purpose is to extend HTML by creating dynamic views
- Created at Google in 2012 and supported/promoted by Google
- Supports MVC development (MVC => Multiple View Controller)
- Need to include the angularjs in your *client side* Javascript code
- `<script src= "https://ajax.googleapis.com/ajax/libs/angularjs/1.2.3/angular.min.js"></script>`

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ANGULAR "HELLO WORLD" EXAMPLE

```html
<html ng-app>
 <head>
   <script src="https://ajax.googleapis.com/ajax/libs/angularjs/1.7.9/angular.min.js"></script>
 </head>
 <body>
   <div>
     <label>Enter Name:</label>
     <input type="text" ng-model=" theName" >
     <h2>Hello {{theName}}!</h2>
   </div>
 </body>
</html>
```

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ANGULAR DIRECTIVES

- ng-app tells AngularJS that a div "owns" the app
- ng-bind binds content to an Angular variable value
- ng-init initializes an Angular variable
- ng-model binds a field value to a variable

```html
<div ng-app="" ng-init="greet='World'">
<p>Hello <span ng-bind="greet"></span></p>
</div>
```

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ANGULAR EXPRESSIONS

- Expressions are in {{ … }}
- For example: {{10/2 }}

```html
<div ng-app="">
<input type="text" ng-model="first_name">
<p>Hello {{first_name}} </p>
</div>
```

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REACT

- Created at Facebook (2013) and strongly supported by Facebook
- Made for building user interfaces
- Minimalist approach: creates a VIRTUAL DOM that is manipulated before affecting the browser DOM
- Can be run client, with node or react native for mobile apps

- Uses JSX, XML/HTML based language built on top of JavaScript
- Creates components (mix of html and javascript) whose structure is similar to a class, and then renders the components – ex, button component
- There may be a hierarchy of the components
- Minimizes cross browser issues
- Facilitates unit testing and AJAX requests

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REACT EXAMPLE

- Assume:
```
<div id="hello"></div>
```
- React Code
```
import React from 'react';
import ReactDOM from 'react-dom';
class Hello extends React.Component {
  render() {
    return <h1>Hello World!</h1>;
  }
}
ReactDOM.render(<Hello />,
document.getElementById(hello'));
```

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CMS – CONTENT MANAGEMENT SYSTEMS

- A CMS merges page content with a design template.
  - Separation of content, design, and functionality.
- Easy content editing and publishing

- Reusable content /page elements
- Modules and/or templates
- Security/permissions
- Versioning / ability to rollback
- Previewing

A CMS lets you be content-driven.

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POPULAR CMS PLATFORMS

- WordPress (27+ Million Live Websites | 34% of *all* active sites – kinsta.com)
- Wix (3.8+ Million Live Websites)
- Squarespace (1.9+ Million Live Websites)
- Joomla! (1.8+ Million Live Websites)
- Shopify (1.1+ Million Live Websites)
- Drupal (630+ Thousand Live Websites)
- Blogger (430+ Thousand Live Websites)
- Prestashop (285+ Thousand Live Websites)
- Magento (265+ Thousand Live Websites)
- Bitrix (223+ Thousand Live Websites)

Source: websitesetup.org Oct 8, 2019   106

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Sites on Drupal	Sites on Joomla!	Sites on WordPress
• Entertainment Weekly	• Harvard	• The New Yorker
• NCAA	• IKEA	• BBC America
• Mint	• LINUX	• Variety
• Patch	• Lipton Ice Tea	• Sony Music
• Box.	• Holiday Inn	• MTV News
• US Dept of Energy	• The Hill	• Sweden's Official Website
	• Guggenheim	

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Drupal   Joomla!   WordPress

- Open source
- Have a community of evangelists and contributors
- PHP is the underlying server side coding language
-

- MySQL is the database platform
- Themes/templates for design
- Plugins/modules for extendibility
- Taxonomy

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HTML5 GRAPHICS / CANVAS

- Create graphics using Javascript and the HTML5 <canvas> element
- No need for Flash!
- Fun demo: http://www.kevs3d.co.uk/dev/arena5/
- WebGL for 3d graphics
- SVG vector images described in XML format

```
var canvas  =
document.getElementById("mycanvas"
);

if (canvas.getContext) {
  var c =
canvas.getContext('2d');
  // drawing code here
} else {

  // can't do canvas alternate
here
}
```

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MOBILE DEVELOPMENT

- Web app vs Mobile/Native app
- Native apps
  - Installed on device
  - Does not need internet to run
  - Must be accessed through Apple iStore or Google Play Store
  - Must be built separately for each platform
- SDK's to assist with development
- iOS vs Android
- Many frameworks and dev tools including React and Angular
- Laguages:
  - Objective C, Swift and C# for iOS
  - Java or Python (primarily) for Android

- 204 billion mobile app downloads in 2019
- Mobile app revenue 2019: $462 billion

(statista.com)

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