



For Web Services

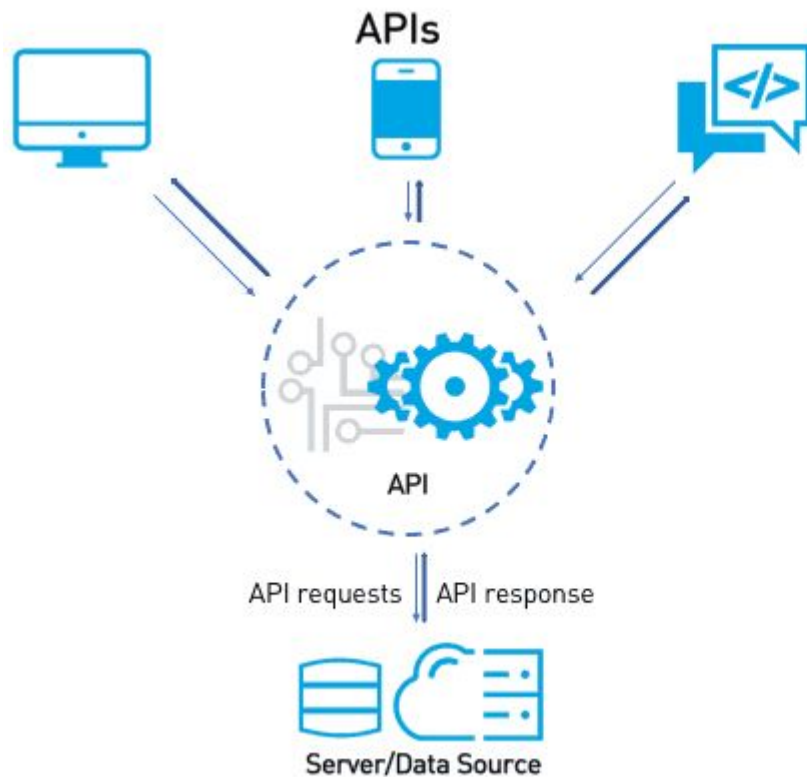
The Basics

Who am I?

- Name - Karl Amaya
- From - Valley of Peace, Cayo
- Bach. Student - Last Semester
- Work Exp. - 2yrs @ Dealer Spike
 - Web Support
 - Database Specialist

Training Overview

- Web Services Overview
- What is Node.js & how to setup
- Basics of Node.js
 - **Activity** - Kahoot Quiz
- Node.js for web services with express.js
 - **Activity** - Small Todo App
- What's Next? My recommendations for self-learning
- Closing
 - Feedback
 - Final Questions/Remarks



Web service

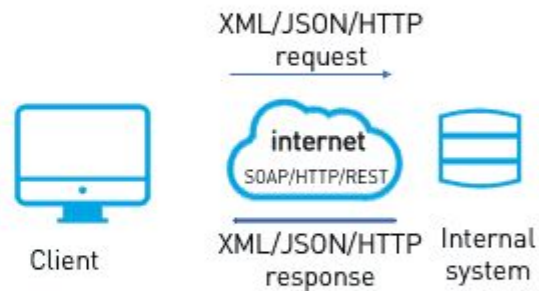


Image obtained from mulesoft.com

Web Services

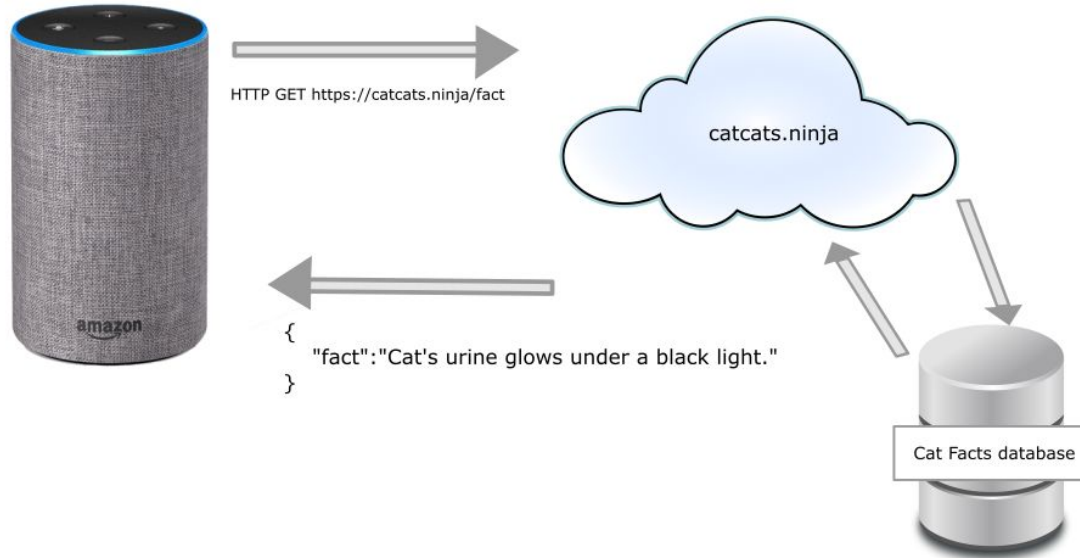
- According to IBM, "A web service is a software system that supports interoperable machine-to-machine interaction over a network... Web services fulfill a specific task or a set of tasks."
- Basically a Web Service is a method of providing and implementing [APIs](#) over a network.
- Web Services can be used by mobile apps, Desktop Applications, other Web Services, WebSites etc.
- Difference b/w Web Service and Web Page
 - Web Services are designed to work with other software systems, not for humans
 - Web pages are designed to have a rich user interface since they are designed for humans
 - Web pages may use multiple Web Services in order to display content on a web page

Web Services - HTTP

- HTTP
 - According to Techopedia, "HTTP is a fundamental protocol used on the Internet in order to control data transfer to and from a hosting server, in communication with a web browser."
- Methods used in HTTP to make requests to the server
 - GET - used for reading or retrieving data or resource from the HTTP server.
 - POST - used to create a resource on the server. POST requests usually contain a request body.
 - PUT - used to update, modify or replace a resource in the server, and like POST, PUT requests may contain a request body.
 - DELETE - used to delete a resource from the server.

Web Services - basic example

"Alexa tell me a cat fact"



Web Services - For API Development

How is HTTP used to develop Web Service APIs

- URI+JSON for information transfer
 - URI is used to identify and describe the resource
 - JSON is the data format in the request or response body
- There is also XML based information transfer as API methodologies and protocols.
 - XML based Web Services: https://www.w3schools.com/xml/xml_services.asp

URI+JSON based API Example

Request

```
GET /articles?include=author HTTP/1.1
```

Response

```
HTTP/1.1 200 OK
Content-Type: application/vnd.api+json

{
  "data": [{
    "type": "articles",
    "id": "1",
    "attributes": {
      "title": "JSON:API paints my bikeshed!",
      "body": "The shortest article. Ever.",
      "created": "2015-05-22T14:56:29.000Z",
      "updated": "2015-05-22T14:56:28.000Z"
    },
    "relationships": {
      "author": {
        "data": {"id": "42", "type": "people"}
      }
    }
  }],
  "included": [
    {
      "type": "people",
      "id": "42",
      "attributes": {
        "name": "John",
        "age": 80,
        "gender": "male"
      }
    }
  ]
}
```

Web Services - JSON basics

```
{  
  "name": "Karl Amaya",  
  "age": 23,  
  "isStudent": true,  
  "moneyOnHand": 4.50,  
  "fingers": ["index", "thumb", "middle", "pinky", "rings", 5, true, { "name": "index finger" }],  
  "hand": {  
    "mainFinger": "index"  
  }  
}
```

- Valid JSON Types:
 - JSON object
 - Strings - only use double quotes
 - Numbers (integers, floats)
 - Boolean
 - Arrays - arrays can hold any of the valid JSON data types
- More on JSON: <https://www.youtube.com/watch?v=iiADhChRriM>

Web Services - REST as an API methodology

What is REST?

- REST is a set of guidelines that describe how communication between client and server can be constrained, REST API can be implemented in different ways.
- REST APIs are constrained by:
 - client-server architecture, whose requests and responses are managed by HTTP
 - Stateless client-server communication, no information about client is saved
 - Cacheable data to streamline communication between client and server
 - Information is transferred in a standard form
- More about REST API constraints: <https://restfulapi.net/rest-architectural-constraints/>

Web Services - How URIs are used in a REST API

What is a URI?

- [Uniform Resource Identifier](#) (URI) provides a simple and extensible means for identifying a resource.
- Don't confuse it with URL, URL is a URI but URI is not a URL

Examples:

- `https://example.com/users`
- `https://example.com/file/file.pdf`
- `https://example.com/users/4`

URI Parameters - identify a resource or resources, often a sub resource

- `https://example.com/users/{userId}`
- `https://example.com/students/{studentId}/parents/{parentId}`

Web Services - How URIs are used in a REST API

Query Strings/Parameters - used to filter, sort or describe how the resources are returned

- Key value pairs, `key=value`
- Multiple query strings are separated by a `&`
- To begin defining query strings in a URI, you place a `?`, after which you list of your query strings
- Example: `https://example.com/users?filter_active=true&sort_age=asc`

Introduction to



Intro. To Node.js

What is node.js?

- Is a javascript runtime that uses the chrome V8 engine
- Created by [Ryan Dahl :\)](#)
- JavaScript Running on the server
- Not too confident in your JavaScript skills?
 - ["Absolute javascript for beginners"](#) & ["What even is javascript?"](#)

Intro. To Node.js - Setup

Download Node.js from <https://nodejs.org/en/>

- Access Node.js from CMD or PowerShell (windows)

Download and install vscode text editor from <https://code.visualstudio.com/>

- Open a terminal window and access the node REPL

Node.js Basics

- Package management with NPM
 - Package.json file
 - Initializing a project
 - ``$ npm init``
 - dependencies
 - ``$ npm install --save <package-name>``
 - Dev dependencies
 - ``$ npm install --save-dev <package-name>``
 - Automation with run
 - ``$ npm run <script key name>``
 - Removing a dependency or package
 - ``$ npm uninstall <package-name>``
 - Global package install
 - ``$ npm install --global <package-name>``
 - More on NPM: <https://nodesource.com/blog/an-absolute-beginners-guide-to-using-npm/>

Node.js Basics - working with packages

- Including installed packages
 - Import vs require
 - `require()` can be called from any scope while import syntax cannot
 - Import syntax statements require you to use the file extension while require doesn't for local files
 - `import myFunction from 'myfunctions.js'` vs `const myFunction = require('./myfunctions')`
 - To use import add the below line to your package.json file:
 - `"type": "module"`
- Including your own Javascript files
 - `module.exports` for require syntax
 - Filepath - the `__dirname` global variable

Node.js Basics - Working with files

- Working with Files
 - The `fs` module
 - Reading from a file
 - `fs.readFileSync(filepath)`
 - `fs.existsSync(filepath)` - check if a file or file path exists
 - Writing to a file
 - `fs.writeFileSync(filepath, stringData)`
 - Working with JSON files
 - `JSON.stringify(Object)`
 - `JSON.parse(JSONFormattedString)`
 - More on fs: <https://nodejs.org/api/fs.html>

Node.js Basics - making HTTP requests

- What if our web service wants to contact other web services?
 - We can use the axios package to make HTTP requests
 - Install axios with npm: ``$ npm install axios --save``
- Axios uses Promises
 - Server requests take time
 - Javascript is not patient so it won't wait for server to respond
 - Promises provides us with a way to define code that will run once the server has responded
 - More on Promises: <https://youtu.be/DHvZLI7Db8E>

Node.js Basics - .env files

- Why use .env files
 - .env files allow you to manage your environment variables
 - .env files contain key value pairs eg. ``DB_HOST=localhost``
 - For Security
 - Save your passwords and API keys or other sensitive information on this file instead of saving it inside your code.
 - Add your .env file to your .gitignore file so you don't publish it to your remote repository.
 - For Configurability
 - using a .env file allows for changes in environment to be more streamlined and configurable.
- Using the dotenv package
 - Using dotenv package and configuring it to use our .env file
 - Accessing .env file variables using ``process.env`` object

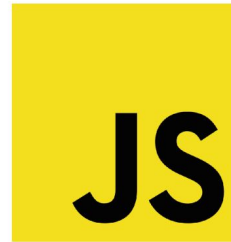


Activity 1 - Kahoot, 15 question quiz



Web Services using

Express



Nodejs Express.js Basics - creating a server

- Create a new folder to use as a project
- Initialize your package.json
- Install express.js ``$ npm install express --save``
- Use express.js to create a server
- Install [postman](#) to test our Web Service APIs
 - Note: You will need to create an account with postman

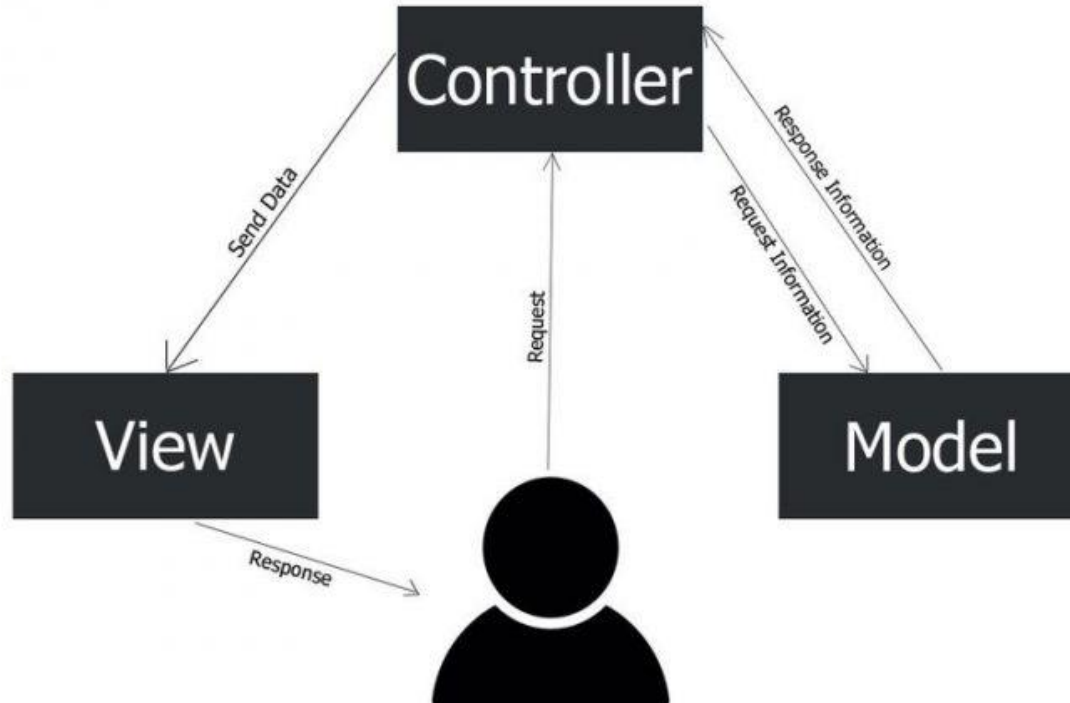
Express.js Basics - Routing

- Defining routes
 - Defining routes with URI parameters
 - Accessing our URI parameters
 - Using Query Strings
 - Using GET, POST, PUT, DELETE within express.js
 - How to access request body

Express.js basics

- Defining our own middleware
 - Using `next()` method
- Planning for scalability
 - Using the Router object
 - Establishing a Model View Controller (MVC) Structure
 - Model - Database Interface
 - Controller - receive user input then tie it to business logic
 - In express this would be our route handler functions
 - View - the presentation layer, the output
 - The representation of the resource, can be a file or the data we send back to the client.

Model-View-Controller



Activity 2 - Small Todo App

What's Next? My recommendations for self-learning

Self-learning

- Review The Activity's db.js, Model.js, and TodoModel.js for better understanding.
- Checkout all the links provided in the slides to other resources.
- Use a relational database instead of a .json file as the activity's database
- Learn about Node.js Authentication methodologies
 - JWTs, Session-based authentication, OAuth
 - Passport.js for implementing the above methodologies
- Other web frameworks for Node.js
 - Checkout adonis.js
 - Also look into headless cms, such as strapi
- Try build your own web service using express.js
 - Something small or something big
 - For semester projects use nodejs if you can (advanced database)

Closing: Feedback

Feedback URL: <https://forms.gle/4kdv47gWWXe3avyV7>

Closing - Final Questions/Remarks?

Thank You and Stay Learning!



[Node.js and Express.js - Full Course - YouTube](#)

Git Repo With Code Examples

<https://github.com/amayakarl/nodejsTraining>