A THREE-COURSE SEQUENCE FOR API-BASED WEB DEVELOPMENT AND DEPLOYMENT

Jeremy Shafer
Assistant Professor of Management Information Systems
jeremy@temple.edu | community.mis.temple.edu/jshafer

David Schuff
Professor of Management Information Systems
schuff@temple.edu | @dschuff | community.mis.temple.edu/dschuff
The task

- Teaching API-based web development
- When it has become very, very complicated
  - React/Node/jQuery/Angular/Axios/Express
- And little space in overall undergrad curriculum
- And other subjects to teach in the major (Cybersecurity, UX)
- Build an application, but not programmers
- DevOps mentality, but not operations
The Environment: Fox School of Business and MIS Department

- Fox School of Business
  - Nine academic departments
  - Largest b-school in Philadelphia
  - 6,500+ students

- MIS Department
  - ~385 majors
  - ~270 minors (2)
Why APIs?

• Modern application development depends on
  • Consuming resources
    • Simplify development
  • Making resources available
    • Internal and external interoperability
    • Data access layers
• SaaS/API economy
  • Business models built around web-based services
  • It’s about architecture and development
Our approach

Three course sequence

JavaScript as the language
• One language used across multiple courses
• Ubiquitous in industry

Five unifying principles

1. Keep it real! *real tools and products*
2. Narrow scope, high expectations. *do a few things well*
3. Focus on APIs. *consume and create*
4. Use frameworks. *simplify development*
5. Don’t start from scratch. *too big a lift otherwise*
Web application development (MIS2402)

Objectives
• Apply basic programming principles
• Develop critical thinking, problem-solving skills
• Make API calls using web protocols

Skills
• JavaScript and HTML
• Debugging tools and techniques in VSCode
• Bootstrap and jQuery
Cloud architecture (MIS3406)

Objectives
• Create a scalable, robust cloud-based application hosting environment
• Create an API – data access layer
• Host the API on the cloud environment

Skills
• AWS (EC2, RDS, Elastic Beanstalk)
• IP-based Networking
• Node.js and Express
Web service programming (MIS3502)

Objectives
• Develop mobile-ready, web-based, API-driven applications
• Develop in line with RESTful conventions
• Design and implement a business solution

Skills
• All prior: AWS, JavaScript, Node.js, Bootstrap, jQuery, etc.
• Develop on Linux platform
Sample assignment: US State Codes API (Web Application Development)
https://tinyurl.com/a16USAstates

1. Using VSCode and other “real” resources
2. Narrow Scope / High Expectations
3. API Focused
4. Using frameworks
5. Don’t start from scratch

Start file: https://tinyurl.com/6a23nuzm
Solution: https://tinyurl.com/bd56pnww
Cloud Architecture Sample Assignment: Deploy TollCalculator to AWS

Full project instructions: https://tinyurl.com/46wvemyf

Web Service Programming Sample Assignment: Rock-paper-scissors

Assignment Instructions: https://tinyurl.com/aosrps
Start file: https://tinyurl.com/52dy6h89
Solution: https://tinyurl.com/mmsvefgd
<table>
<thead>
<tr>
<th>Challenge:</th>
<th>Web frameworks are exceedingly difficult</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><em>Templates, examples, starter files</em></td>
</tr>
<tr>
<td>Challenge:</td>
<td>Web is a “black box”</td>
</tr>
<tr>
<td></td>
<td><em>Tutorials, drilling, forced interaction</em></td>
</tr>
<tr>
<td>Challenge:</td>
<td>Empowering students – they need to believe!</td>
</tr>
<tr>
<td></td>
<td><em>In-class exercises are practice for assignments</em></td>
</tr>
</tbody>
</table>
Thanks!

- Ongoing process of refinement
- The API is integral
  - Important on its own
  - Enables complex applications