COSI 152J: Web Application Programming

An introduction to web programming that covers the fundamental languages and tools, including HTML/CSS for page layout, javascript/ajax for client-side interaction, and server side programming in Java, Ruby, and SQL. The course will also discuss security, scaling/optimization, and multi-tier architectures.

Textbooks:

- *Programming Ruby 1.9: The Pragmatic Programmers' Guide, by Dave Thomas*

  http://www.amazon.com/Programming-Ruby-1-9-Pragmatic-Programmers/dp/1934356085/ref=pd_sim_b_1

- Agile Web Development with Rails, Third Edition

  http://www.amazon.com/Agile-Web-Development-Rails-Third/dp/1934356166/ref=sr_1_1?ie=UTF8&s=books&qid=1259591051&sr=8-1

Prerequisites: COSI 11a, 12b, and 21a

Course Requirements:

Class participation: Students will be expected to actively participate in class discussions

Oral presentations: Every student will be expected to prepare and present a 30 minute lecture to the class on a selected topic in Web application programming, e.g. session management strategies.

Weekly homework assignments: Students will complete a homework assignment each week demonstrating their mastery of the material in the lectures.

Grading:

Class participation: 15%
Oral presentation: 25%
Homework assignments: 60%

Course Schedule:

Week 1: Core Web Architecture.

Content: This week we begin with an overview of web architecture, languages, and protocols, including IP addressing, DNS, HTTP, HTTPS, HTML, CSS, and web services. At the end of this week, students should be able to give a clear explanation of the architecture of the web at the hardware level of routers and servers with IP addresses and they should be able to directly communicate with varioius servers and clients using HTTP, HTML and CSS. Moreover, they should understand the performance/usability tradeoffs of various design decisions such as caching protocols at the client, server, or routers.

Activities:

- Explore concepts using scripting languages such as Ruby, Python, Scheme.
- Homework assignment involving setting up a server using HTML/CSS and HTTP properties.

Reading:

- Architecture of the Web
- Ruby Essentials (http://www.techotopia.com/index.php/Ruby_Essentials)
- Programming Ruby 1.9 (Ch 1-10)

Week 2: Web Application Architecture.

Content: This week we introduce the Model/View/Controller paradigm, the 3-tier architecture, and object/relational mapping.

Activities:

- Explore the concepts using a web programming framework such as Ruby on Rails.
- Set up an application using a multi-tier architecture.

Reading:

- Programming Ruby (finish book)
- Ruby on Rails (1st half of book) (http://guides.rubyonrails.org/getting_started.html)

Week 3: State management and Persistence.

Content: This week we explore approaches to maintaining persistent state including cookies, session variables, DB-connections, key-value databases and other forms of caching.

Activities:

- Compare the various approaches for maintaining persistent state on various platforms
- Run performance tests on various persistence schemes and analyze the results

Reading:

- Ruby on Rails (rest of book)
- Chapter 5 of Fieldings dissertation on REST (http://www.ics.uci.edu/~fielding/pubs/dissertation/rest_arch_style.htm)

Week 4: Security and the Integration of Client-side and Server-side applications.

Content: This week we introduce client side computing paradigms using javascript and the AJAX model. We also provide an overview of security issues related to web programming including injection attacks, phishing, https, and other security models.

Activities:

- Setup web applications that are vulnerable to attacks, and carry out those attacks (e.g. SQL injection, man-in-the-middle, cross-site-scripting), then revise to defend against those attacks

- Compare javascript/AJAX with java applets

Reading:

- A Re-introduction to Java Script https://developer.mozilla.org/en/A_re-introduction_to_JavaScript