CSCI 1320
Creating Modern Web Applications

Lecture 1: Course Introduction
Welcome To CSCI1320 (CS132)

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- HEAD TA (cs132headtas@cs.brown.edu)
- TAs (cs132tas@cs.brown.edu)
What is a Web Application

• A program that the user interacts with through the Internet.
  • Interact via a browser or a mobile front end
  • Using standard protocols (HTTP)
  • Where part of the program runs on a server
  • (Where the program uses a database)
Sample Web Applications

- Name some web applications
  - Which you like to use
  - Which you don’t like to use
Web Application Architecture

Front End

Web Browser

HTTP

Back End

Web Server

Database

Server

Mobile Platform
Elements of Web Applications

- The importance of Human-Centric Computing
- Distributed Programming
- Security and Privacy
- Scalability
- 
- Software Engineering (specs, design, testing, ...)

1/18/2018  Lecture 1: Course Introduction  6
What’s Involved in Web Apps

• Requires **understanding**
  • The application, the users, and the needs of the users

• Requires **design expertise**
  • User interface design, usability, scalability, maintainability

• Requires **sophisticated programming skill**
  • Handling 10,000 users; 3-5 9’s of up time; updatable

• Requires **programming expertise** in several areas
  • Interactive, Large-scale server technology, distributed programming
In This Course

- You are going to build a real web application
  - For real users
  - In teams with mixed skills
- You are going to learn the basics of web applications
  - Won’t become an expert in all of them
  - Will learn the alternatives, terminologies, etc.
  - Will learn enough to build your own application if desired
  - Will become an expert in some aspect for your project
CSCI1320 has Two+ Tracks

- **Concentrator’s Track**
  - For CS students with programming background (CS32/CS33)
    - How necessary is CS32/CS33
  - Emphasis on programming skills
  - Responsible for programming aspects of projects
  - Different levels of programming in the projects

- **Designer’s Track**
  - For students with design skills
  - Emphasis on web design and learning how it can be used
    - Assignments are design- not programming-oriented
  - Responsible for human-centric aspects of projects
  - Please email cs132headtas@cs.brown.edu
CS132 Has Two+ Tracks

- **Others Track**
  - For students without significant programming experience
  - Who don’t know HTML/JavaScript
  - Who have little design experience
CS132 Has Two+ Tracks

- **Capstone Track**
  - Students taking the course as a capstone
  - Expected to either
    - Propose and supervise a project
    - Serve as the team leader on their project
    - Both

- **CS Design Track**
  - Mix assignments to maximize knowledge gained
  - For CS students with a strong design bent
  - Work on design aspects of final project
CS132 Has Two+ Tracks

- Entrepreneurship Track
  - Student(s) propose a project that is basis for a startup
  - Initial proposal is for MVP
  - Elevator talk, poster, presentations
  - Build prototype in the course, develop product over summer
Course Mechanics

- We will be using iClickers, so come prepared
  - Attendance counts, but not that much (but enough)
  - You should still come to class
- **LAPTOPS**
- **SEAS, extensions, late days**
Course Contents

• There are three parts to the course
  • Learning the fundamentals of web applications
  • Learning the basics of building web applications
  • Creating a web application for a client
• Reflected in time commitment and grading
Fundamentals of Web Apps

• There are lots of different web technologies
  • More than we can cover in one course in any depth
  • But a web app expert should know of them all
    • What they are, what they are good for, how they work, …
    • You need to know what to use
    • You need to be able to talk to clients and others

• There are lots of things to consider in designing and building a web application
  • Security, human factors, universal access, testing, design, …
  • You need to understand and deal with these
Fundamentals of Web Apps

- Covered in lectures, homeworks, tutorials & labs
  - I’ll try to make this accessible to both tracks
  - Questions and comments are encouraged
    - PLEASE !!!!
- Checked w/ homeworks, labs, participation (23%)
  - All should be relatively easy if you come to class
- Final exam (10%)
  - Take-home
Basics of Building Web Apps

• Understand a specific set of technologies
  • HTML5/CSS
  • JavaScript
  • Node.js / SQL and NoSQL
  • React
  • Client-Server interaction (AJAX, Web sockets)

• These will be covered by 4 homework assignments
  • Each one to two weeks long
  • Separate assignments for the two tracks
  • Count for 32% of your final grade
Web Application Project

- We have gathered a suite of projects from real clients
  - Mix of commercial, non-profit, local
- Based on your preferences we will assign teams
  - Four people, mixed backgrounds, apt for project
- Teams should meet weekly with sponsor & mentor TA
  - Keep them happy
- You will have opportunities to present your project
- Counts as 35% of your grade
  - Grading based on project itself, presentations, sponsor feedback
Student Projects

• We are going to allow a limited number of student projects
  • If you have a web applications you really want to create
  • Proposer will act as project mentor
• These need to be well-defined and scoped
• If anyone is interested in doing one of these
  • We need a detailed proposal for it soonest
    • Today preferred, Friday at the latest
  • Talk to the TAs for advice and suggestions
Project Schedule I

- 1/29: Project preferences out; due 2/02
- 2/05: Final project teams announced
- 2/16: Initial client report
- 2/26: Project specifications hand in
- 3/02: Potential user feedback reports hand in
- 3/05, 3/07: Project Elevator Talks
- 3/12: Initial project design presentation to TA
- 3/16: Project design hand in
- 3/19, 3/21: Project Poster Fair
Project Schedule II

- 4/11: Project web design due
- 4/16-4/18: Project presentations
- 4/18: Project design hand in if not presenting
- 4/20: Project prototype up and running
- 4/25: Prototype feedback from client
- 4/30: Project testing reports due
- 5/07: Final project presentations (whole day)
- 5/08: Final project hand-in
- 5/09-5/14: TA meeting with project team
Collaboration Policy

• Please pick one up, read and sign, hand in
  • You won’t be assigned to a project unless you do
• We expect you to do your own work on 4 assignments
  • Not copy from others
  • Not copy from the web
• Much of the rest of the class is collaborative
• We **will** detect cheating
  • When in doubt about using something, ASK.
  • Always cite any external code, references, ideas, etc.
  • Always include external copyrights, etc.
  • Several students got directed NCs for the course in the past
Intellectual Property (IP)

• You own your code (Brown’s policy)
• Since you are working with others, they have rights too
  • Non-exclusive perpetual right to the code and its use
  • Complete rights to any images, etc. they provide
• You should negotiate/agree with sponsor on final rights
  • They might want code open sourced (should be in project def)
  • They might want documentation on maintenance and use
  • They might want code they can easily modify
  • Do this early in the process
• Some projects are constrained
  • Take this into account in choosing projects
Hours

• **TA Hours will be announced**
  • Based on homeworks, assignments, etc.
  • Each project will have an assigned mentor TA
    • You are responsible for setting up meetings

• **My office hours**
  • Monday, Thursday 1-3 (tentative)
  • Open office policy (8:30-4:30)
  • I expect to see everyone at office hours at least once
  • I’m usually free even if the TA hours are very busy
Course Web Site

- http://www.cs.brown.edu/courses/csci1320
- Reference Materials
  - Links to that other material, cherry picked for you
- Calendar
- Keeping up to Date
Questions regarding the Course
Next Time

• The Browser, HTML, CSS, & the web front end

• Homework:
  • Assignment
    • Available on web page, due 2/3
    • Collaboration policy
    • Account setup, etc.
  • Preliminary work for Lab 1 (due Wednesday)
    • Available on web site
Problem

- You have been hired to work on creating a system for web-based course registration, let's call it Banter.
  - What are the problems you would anticipate?
  - How would you proceed?
- What do you see as the potential problems?
- What would you work on first?
- How would you sell it?
Human-Centric Computing

- User interface design
- Ease of use
- Looking good
- Accessibility and internationalization
- These make or break a web application
Distributed Computing

- Web applications are inherently distributed
- They use facilities outside of programmer’s control
- They are written in a multitude of languages
- Communication is asynchronous
- Frameworks try to make this simpler
- Nothing is standard
Security and Privacy

• Are major concerns
  • In the press daily
  • Your application is exposed to the world
  • All types of attacks are possible
• Same interface used by multiple users at once
• Multiple applications might run on same server
• Private data needs to be secure
  • Especially sensitive data (e.g., credit cards, health data (HIPAA))
Scalability

• How many users do you expect to have
  • After you’ve been slash-dotted
  • On Cyber Monday

• Handling 1000 users at once is hard
  • Handling 10,000 requires a different approach
  • Handling 1,000,000 requires rethinking the application
Evolution

• Web apps need to change
  • The look gets stale after a year (more or less)
  • New functionality desired
  • Users expect new features, new look and feel
  • Need to keep up with competition

• Different form factors and capabilities
  • Different browsers
  • Tablets, phones, watches and other devices
Software Engineering

- Different programming languages and models
- How to work in teams
- How to work with clients
- How to work with deadlines
- How to organize a large project
- How to plan for evolution
- How to plan for problems