CS 416
Web Programming

Midterm review

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Exam info

- Midterm worth 20% of your grade
- Exam will be a mix of:
  - Short answer
  - Detailed design
  - Architecture level descriptive design and explanation
- For detailed examples some **pseudo code** of the steps necessary might be required. For example:
  1. JDBC vs JPA
  2. Processing XML vs JSON Browser side

Important details

- Allowed one letter size page front and back of **handwritten** notes
- **I GIVE PARTIAL CREDIT** – if you don't know the answer exactly, describe what you know of the solution so I can give you partial credit for what you do understand
- Some of the example projects in GitHub cover material we didn't cover - **if we didn't cover it in class it won't be on the exam.**

Broad level what we have covered

- HTML (Lec 1-2)
- CSS & RWD (Lec 2)
- Javascript (Lec 2-6)
- Servlets (Lec 6-7)
- JDBC (Lec 8)
- Ajax (Lec 10)
- XML (Lec 10 - 11)
- JSON (Lec 11)
- JSPs (Lec 11)
- JPA (Lec 12)

HTML (Lec 1-2)- What to know

- Headings, paragraphs, lists
- Hyperlinks, images
- How to create a table
- Forms
  - Various input types
  - Form actions
  - Buttons
  - **GET vs. POST**

CSS & RWD (Lec 2)- What to know

- Cascading Style Sheets (CSS)
  - **Purpose**
  - Syntax
    - Be able to read basic selectors and classes
    - Know how overlapping styles combine/override
- Responsive Web Design (RWD)
  - Purpose
  - What is it/what is it not
  - General principles and application
- Role of CSS/JS frameworks

Javascript (Lec 2-6)

- Know how to program an element to respond to events such as clicking or typing
- Javascript actions:
  - Read page elements, set page elements – textboxes in particular
  - Working with numbers
  - Document write
  - Conditional execution (if/while)
- Arrays, String functions
- Canceling form submit
- Given some description using descriptive/pseudo code what would be the flow of execution

Servlets (Lec 6-7)

- What is purpose of a Servlet
- Responding to requests
- What is it, when would it be used, limitations
  - Request forwarding (Lec 6)
  - Response redirection (Lec 6)
- Accessing request parameters

Servlets cont. (Lec 6-7)

- Using request, session, context attributes – **make sure you know the difference and when you would use each**
- You do not need to worry about configuration syntax
- Processing form data
  - Reading single parameters, arrays of parameters
  - Tabulating results across session/context

JDBC (Lec 8)

- What has to be done to be able to use a database within your application server?
- Select queries and working with record sets
- Executing insert, update, delete
- From the technologies we have discussed thus far which are the most appropriate places to interact with the database

Ajax (Lec 10)

- What capability does it give your web application/when would you use it
- Sample application, given a description of a dynamic page describe how you would use Ajax to solve it **describing the steps in the Ajax flow**
- Difference in how you would do a GET vs. POST, and when you would need to use one over the other

Ajax cont. (Lec 10)

- From server side what forms can the response take how does that effect how read on javascript side
- How do you write AJAX return to the page
- Conceptually why would you use an XML response?

XML (Lect 10 cont)

- Conceptually how do you access elements within a XML document using the DOM in Javascript, from receipt to display
- XML document design
  - Object to XML structure
  - XML structure tailored to use

JSON(Lect 11)

- Conceptually how do you access elements within a JSON document in Javascript, from receipt to display
- JSON document design
  - Object to JSON structure
  - JSON structure tailored to use

- **Key concept when to use XML over JSON or vice versa**

JSP (Lec 11-12)

- What is it, when would you use it over a servlet/when would you use a servlet instead
  - Keep in mind HTML and XML very similar
- Using scriptlets, expressions
- Using and creating error pages
- Accessing request, session, context

JSPs and Java Beans (Lec 11-12)

- Know what is needed to create a java bean
- How do you use a bean on a page
- Scope of beans – how you would use beans of different scopes

Java Persistence API

- Advantages over JDBC
- How do you create a Entity bean
  - What if bean fields don't match database tables exactly?
  - How do you implement complex relationships such as 1-1,1-many, many-many
    - You don't need to memorize syntax, but concept
    - Know matching table design
  - How do you persist such beans
- Inserting, Update, Delete – transactions
- Searching and working with results - JPQL

JDBC vs JPA

- What are the similarities
- What are the differences
- What would be a scenario when it makes more sense to use JDBC rather than JPA?

MVC architecture and design

- What is the purpose of the MVC architecture
- What is the role of each part of the MVC
- Given application description, design implementation using MVC design
  - Identify model
  - Identify business logic (and where it resides based on chosen framework)
  - Identify views
  - Identify controllers
    - How implemented
  - **Be able to draw flow tying elements together**

What to expect

- **True/False**
  - For YYY the best way to do it is with XXX?
- **Short answer:**
  - What would you use technology XXX for?
  - When would it make sense to use one technology over another

Detailed design

Sample question

- A credit agency wants to provide an XML service that takes in a user's SSN and retrieves their credit cards. They can have more than one card and each card should have its account number, expiration data, and a list (1-many) of names on the account
- Design an appropriate XML document
- From an implementation perspective what would be a good way to implement creating the document
  - Architecture – what components involved
  - Flow of the application

Architectural solution problems

- Your boss asks you to develop a web app where the functionality is: a person is filling out an insurance form. The user enters some information to be populated in a simple HTML form and the application should lookup the results (which could change) in the database and update information in the context if it is unique then return the results. Your application should return the associated content without refreshing the page.
- **Describe the application flow of your solution and the technologies used along the way**
- *HTML or JSP, AJAX POST, Servlet (DB interaction set context)*

Sample problem

- You are developing a web app that is going to be dynamic and very HTML rich search page. On submission the user is taken to a page that is once again HTML rich, but that also has complex calculations results from the database that must be performed prior to displaying the page. These results will also be used throughout the session. Finally the user should be able to bookmark the search results page so in the future they can come back with the same search.
- **Describe the application flow and technologies**
- *Technologies: GET, JSP search page, complex calc and lookup so servlet enhance session, forward to JSP*

Sample problem

- A friend of yours has developed a web app that is a series of fairly simple servlets that responds to the user with a dynamic HTML rich web page. You also notice that from many paths you end up doing the same final DB lookup and rich display which is duplicated in all of the their servlets. You decide to help him improve his application. **What do you recommend?**
- *Servlets->JSP, extract common final flow to forward to same servlet/JSP*