Midterm

Requirements

There are several questions listed below. You must answer the FP Design question. In addition, pick **two** of the other questions to answer. You **do not** need to answer all the questions. You will have **three** total responses including the required FP Design question and the two questions you select.

Each response should be essay format and 1-2 pages in length **at most**. Some of the questions allow you to follow an exercise, lab or tutorial, but you must also include the 1-2 page response as an answer.

I am not looking for verbosity, I am looking for clear and concise answers to illustrate your understanding of the topics, and that you can communicate these concepts in writing.

Your response to the FP question will be worth 25 points, and each of the other 2 responses will be worth 25 points each, for a total of 75 points.

Specific Requirements:

- Essay format. **Do not** submit an outline. **Do not** submit 2 pages of bullet points. 1-2 pages of **writing** per essay is required.
- One single document containing your three responses. **Do not** submit separate documents.
- Name your file **uid_midterm.pdf**. For example, mine would be spyrison_midterm.pdf
- **Do not** post your Midterm responses to GitHub Discussions. Midterm submissions **must** be submitted to Blackboard or Beacon via the Assignment link
- PDF format only. Post a question to GitHub Discussions if you have any challenges creating a PDF.
- Double spaced
- 12-point font
- Late assignments will lose many points

You *may* include diagrams and code samples to clarify your answers where appropriate. Be judicious in your use of diagrams and code samples. Where relevant, I have listed the chapters from our textbook that I feel are relevant to each question, as well as the lab that incorporated each topic. You do not need to (and should not) limit yourself to the textbook as a source.

Any material used from printed or web content, or from other media sources, must be properly cited as a reference. Directly quoted material cannot be greater than 10% of any given essay. Please refer to the "**Writing Research Papers**" section of your **ITM Student Handbook** for additional information on citing references, formatting and more: https://itm.iit.edu/StudentResources/

Plagiarism will not be tolerated and when identified will, at a minimum, result in a grade of zero for the entire exam (refer to course syllabus, "Academic Honesty and Ethics"). SafeAssign will be used as part of the submission process.

Do not copy the text of the question before each of your responses. It will be flagged by SafeAssign. Just note which number you are answering!

The ITM Guidelines for preparation of scholarly papers and papers for publication has the departmental guidelines on citations.

In addition to the ITM Student Handbook, here is a very good resource for "how to" cite sources, especially if you have no idea where to start: http://www. plagiarism.org/citing-sources/cite-sources/. The University at Albany also has excellent APA style examples here: http://library.albany.edu/cfox

Question 1 - FP Design Question (*Required*)

You must answer this FP question.

If you are not sure how to create a diagram, you might find the reverse engineering features of MySQL Workbench very helpful.

In our labs, you are designing and developing your own domain model that will carry forward into the Final Project.

You should base your domain model on a particular business area or problem that you are interested in. In all subsequent labs we will build layers on top of this model with EJB and JSF or related technologies. *I strongly encourage you to design your own domain model, but if you are stuck, please ask questions on GitHub Discussions and we will help you with ideas.*

To receive full credit on this question, you are required to discuss your ideas and design. Make appropriate use of diagrams if it aids your description.

1. You must have at least four entities in your **business domain**
2. Entities must support at least three relationships between one another (OneToMany, ManyToMany, etc), and at least one must be bi-directional
3. Your idea must support the logical concept of multiple types of users or roles. We must consider this now so we can introduce security in later projects. Do not use "User" and "Group" or "Role" as entities in your **business domain**. We will extend our business domain with standard security entities as part of a subsequent lab. In other words, we will introduce a **security domain.** For this answer, your idea must support the concept of multiple types of users.

An example could be an online marketplace. At a high level, Entities could include Products, Customers, Orders and Suppliers. A Supplier can supply many Products, and a given Product can be supplied by many Suppliers. An Order belongs to one Customer, but a Customer can make many Orders. An Order can be for many Products, and a given Product can be on many Orders.

When considering this example as a full stack web application, roles could include customers and suppliers (buyers and sellers). A customer/buyer might login to the online marketplace to place a new order for a particular product, to check the status of an existing order, or to update their contact and payment information. A supplier/seller might login to the online marketplace to list a new product for sale, or to process orders that have been placed by customers. In other words, it is the same online web application, but the functionality depends on the type of user, or what role(s) a given user has.

Your answer to this question is non-binding - you can always change your design before the final project. It is very important, however, that you are thinking about this design early in the semester and not at the last minute. To receive full credit for this question, please make sure to:

1. Discuss your Entities. Include a diagram.
2. Discuss how your Entities relate to one another, including any use of JPA inheritance strategies (if any)
3. Discuss what **functionality** you will expose in your FP web application, and how that functionality relates to your multiple roles/security. In other words, who can do what?

Question 2 - Jakarta EE Specification and Platform

Discuss the Jakarta EE specification and platform. In your words, what does "enterprise" mean in the context of application development? What industries are commonly thought of as entrerprise? Discuss the role of application servers as they relate to the platform, and what role the Glassfish application server plays. Discuss the different Jakarta EE APIs and specifications. What is a specification, and how does it relate to an implementation? Discuss how Jakarta EE relates to Java SE. Discuss the JCP and its relationship to the JESP (Jakarta EE specification process).

Hints for sources:

- Juneau Introduction
- Beginning Jakarta EE - Chapter 1.pdf
- https://www.eclipse.org/community/eclipse_newsletter/2019/august/jakartaee8.php
- https://blogs.eclipse.org/post/tanja-obradovic/how-eclipse-foundation-specification-process-efsp-different-java-community
- https://developers.redhat.com/blog/2019/09/12/jakarta-ee-8-the-new-era-of-java-ee-explained
- https://blogs.oracle.com/javamagazine/transition-from-java-ee-to-jakarta-ee
- https://blogs.oracle.com/javamagazine/the-top-25-greatest-java-apps-ever-written
- https://blogs.oracle.com/javamagazine/the-code-underpinning-the-brazilian-healthcare-system-and-other-world-changing-java-applications

Question 3 - Persistence Layer

Compare and contrast the JDBC and JPA persistence technologies. Consider concepts like relationship mapping, CRUD operations, and inheritance in your comparison. What are the different Java APIs that relate to persistence, and how do the specifications relate to

implementation? How does Hibernate relate to JPA? What is EclipseLink? How do the EntityManager and JPQL relate to JDBC and SQL? How does the life cycle of an Entity relate to a POJO with JDBC?

Hints for sources:

- Lab 2, 4, 5
- Juneau Chapter 5, 6, 9
- Oracle JDBC slides from Week 3
- Anything by Vlad Mihalcea
- Antonio Goncalves Excerpts

Question 4 - Presentation Layer and MVC

Compare and contrast Java presentation technologies, such as JSP, JSTL and EL. Include a discussion of Servlets in your response, and the presentation (or other) capabilities of a Servlet. How does a Servlet fit into the MVC pattern? For that matter, what is the MVC pattern? What Java technologies relate to what MVC components? How can Jakarta EE services such as validation be integrated into technologies related to views and presentation?

Hints for sources:

- Lab 3
- Juneau Chapter 1, 2
- Anything by by Bauke Scholtz (BalusC)