CS 454/SCS 491: Software Engineering for Distributed Systems

Assignment 2: A functioning online learning platform

Objective:

The objective of this assignment is to familiarize ourselves with the concepts provided by **EJBs and microservices**. We will implement an online learning application using EJBs.

Requirements:

Functional Requirements:

Admins in the system should have the following abilities:

1. View and manage user accounts, including students and instructors.
2. Review course content before it's published to ensure quality and compliance with platform guidelines.
3. Have the authority to edit or remove courses that violate policies or are deemed inappropriate. add review cascade on delete course
4. Track platform usage by students and instructors, check the courses popularity, ratings, reviews, ... etc.

As an instructor, you should be able to:

1. Register and login into the system. Registration should collect information like name, email, password, affiliation, years of experience, and bio.
2. Create courses, where each course has a name, duration, category, rating, capacity, number of enrolled students, and list of reviews.
3. View detailed information about each course and search courses by name, category or sort by ratings.
4. Accept/Reject student enrollments.

As a student, you should be able to:

1. Register and login into the system. Registration should collect information like name, email, password, affiliation, and bio.
2. View current and past course enrollments.
3. View detailed information about each course and search courses by name, category or sort by ratings.

4. Make or cancel course enrollment. Enrollments should be handled in a special way to avoid situations of server failure.
5. Get notified for course enrollments updates
6. Make a review and rating for a course.

Key & non-duplication constraints apply where it makes sense. Also, you should be handling case sensitivity while searching for courses.

Additional Features [For teams of 3]

1. As an admin, you can create accounts for test centers representatives.
    a. Given a range of center unique names
    b. Password for each center is auto generated
2. As a test center representative, you can:
    a. Login into the system using the generated credentials sent by the admin.
    b. Update center information like name, email, address, location, list of branches and bio.
    c. Create exams where an exam has a name, duration, list of available dates, list of scheduled dates, grades, ... etc. Exams' dates should be handled carefully.
    d. Set grade for a student's exam.
    e. View exams and view student grades of the exams.
3. As a student, you can:
    a. Search for available test centers by their nearby geographic location.
    b. Register for an exam by specifying the test center, date and time of the exam.
    c. View history for the exam grades.

Technical Requirements

1. **Using EJBs:**
    - You are required to use any two of these 4 different bean types to fulfill some of the above functional requirements.
        - Stateless
        - Stateful
        - Singleton
        - Message Driven
    - Your interface should be a web-based interface using any technology of your choice to simulate a functioning online learning platform with different users as per the above-mentioned functional requirements (i.e., we should be able to perform all the functionalities using such web-based interface).

- Your service should be exposed as REST APIs, and you should expose your beans using REST to fulfill the web service REST API as appropriate.
- Your submission should have:
    - A functioning UI. It can be a separate UI that calls the APIs exposed by your services.
    - The database can be one centralized separate DB, or you can save the information in-memory.

2. **Using Microservices:**
    - The above system should be designed to follow the microservice architectural style, and to include at least 2 services, while supporting the same functional requirements.
    - Each service should be implemented as its own project. This means that it has its own codebase and its own DB. If you have S1 Service and S2 Service then S1 shouldn't be able to get any information from the DB of S2, but instead should request it from the S2 Service through REST calls.
    - Your submission should have:
        - At least 2 complete services
        - All the services can be developed in Java only, OR you can choose to develop only one of the services in a different programming language (or using a different framework like Spring), while applying the two EJB types within the remaining services.
        - Have a functioning UI. It can be a separate UI that calls the APIs exposed by your services.

Bonus [2 marks]:

Dockerizing your project into images. This also includes the databases used. The image you create should be entirely self-contained.

This bonus task is a binary grade and there will be **no partial credit**

Deliverables:

The source code for your developed application. You need to submit two versions of the source code: the web service-based version and the microservices based version.

Rules of Submission:

1. No email submissions will be accepted.
2. There are no late submissions.
3. The assignment is in groups of 2 ~3 from the same lab or with the same TA. In case you're forming a group of 3, then you **MUST** implement the additional features.
4. If more than 3 team members submit the assignment, all team members will get zero.

5. Cheating is not tolerated and will be given negative grades
6. You should submit your assignment as **ONE zip file** with the below naming convention: **DS_Assign2_GroupNumber_ID1_ID2** (example: DS_Assign2_S1_20116001_20116002)
7. You should submit your **source code along with a document** explaining any decisions or assumptions that you made. This document should also include any steps needed so that the TA can properly run your code. It is your duty to write down the exact steps needed to run the source code properly.
8. You SHOULD NOT copy any code from the internet or from your colleagues. It will be detected and considered as a cheating case.
9. Submission of the assignment will be on Google Classroom through a Google form link that will be shared later.
10. Deadline for the submission is **Tuesday 14th of May 2024**

Helpful Resources

https://www.tutorialspoint.com/ejb/index.htm

https://www.javatpoint.com/ejb-tutorial