CS 454/SCS 491: Software Engineering for Distributed Systems

Assignment 2: A functioning online shopping system

Objective:

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

Requirements:

Functional Requirements:

Since the shopping application will need products to be added by their selling companies, and will need shipping companies for delivering the products, some administrative activities need to be supported.

Admins in the system should have the following abilities

1. Creation of product selling companies representative accounts.
    a. Given a range of company unique names
    b. Password for each company is auto generated
2. Creation of Shipping companies
    a. Companies should have a geographic coverage including specific regions (i.e., a customer cannot request shipping from a company that doesn't cover his geographic location)
3. Listing of customer accounts
4. Listing of shipping companies
5. Listing of selling companies representative accounts

As a selling company representative, you should be able to:

1. Login into the system using the generated credentials as sent by the admin
2. View products that are currently offered for sale.
3. View previously sold products, including information about the customers who bought each product and the shipping company.
4. Add new products.

As a shipping company, it should be able to process shipping requests as long as the customer who purchased that order falls within its supported geographic region(s). Customers should be notified, once the shipping request is processed.

As a customer, you should be able to

1. Register as a new customer through the system.
2. Login into the system using the credentials used during registration.
3. View current and past purchase orders.
4. Make new purchase orders. Orders should be handled in a special way to avoid situations of server failure
5. Both orders processing and their shipping should be confirmed back to customers.

Key & non-duplication constraints apply where it makes sense.

Technical Requirements

- You are required to use these 4 different bean types to fulfill the above functional requirements.
    1. Stateless
    2. Stateful
    3. Singleton
    4. Message Driven

- Your interface should be a web-based interface using any technology of your choice to simulate a functioning online shopping application with different users as per the above mentioned functional requirements (i.e., we should be able to perform all the above mentioned 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:
    - 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.
    - **Your submission shouldn't use Spring or any other Java based framework aside from the EJB and JavaEE approach**

New Bonus [2 marks]:

- Update the above system 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 entails 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 the 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 have 2 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 keeping the remaining services in EJBs.
    - Have a functioning UI. It can be a separate UI that calls the APIs exposed by your services.

Note: The previously posted bonus task of dockerizing the application has been CANCELLED and replaced by the new above bonus.

Deliverables

The source code for your developed application. In case you want to submit the bonus task, then you need to submit two versions of the source code: the web service based version and the microservice based version. The source code means all files with the extension .java not the IDE project files.

Rules of Submission

1. Deadline is **Monday 1st of May**, 2023
2. No email submissions will be accepted.
3. There are no late submissions.
4. The assignment is in groups of 2 ~3 from the same lab.
5. If more than 3 team members submit the assignment, all team members will get zero.
6. Cheating is not tolerated and will be given negative grades
7. All of the deliverables should be bundled in a single ZIP file named "CS454_A1_<ID1>_<ID2>_<ID3>..zip"

Helpful Resources

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

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