B.Sc. Engg. / HD CSE 6th Semester

27 October 2017

ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)
ORGANISATION OF ISLAMIC COOPERATION (OIC)
Department of Computer Science and Engineering (CSE)

SEMESTER FINAL EXAMINATION **SUMMER SEMESTER, 2016-2017**

DURATION: 3 Hours **FULL MARKS: 150**

CSE 4635: Web Architecture

Programmable calculators are not allowed. Do not write anything on the question paper.

There are **8 (eight)** questions. **Question No. 1 is mandatory.** Answer any **5 (five)** from the remaining questions. Figures in the right margin indicate marks.

[Question no. 1 is mandatory]

1. Suppose, you are asked to design an architecture of a web application that will enable customers to buy different types of agricultural products online. You have to create an administration console alongside the website, which will allow staff members to keep track of orders. Based on the scenario, you have identified the following requirements:: 25

- An online representation of the products that are sold in the physical store. There are four categories (dairy, meats, bakery, fruit, and vegetables), and four products for each category, which online shoppers can browse. Details are provided for each product (i.e., name, image, description, price).
- Shopping cart functionality, which includes the ability to:
  - Add items to a virtual shopping cart.
  - Remove items from the shopping cart.
  - Update item quantities in the shopping cart.
  - View a summary of all items and quantities in the shopping cart.
  - Place an order and make payment through a secure checkout process.
- An administration console, enabling staff to view customer orders.
- Security, in the form of protecting sensitive customer data while it is transferred over the Internet, and preventing unauthorized access to the administration console.

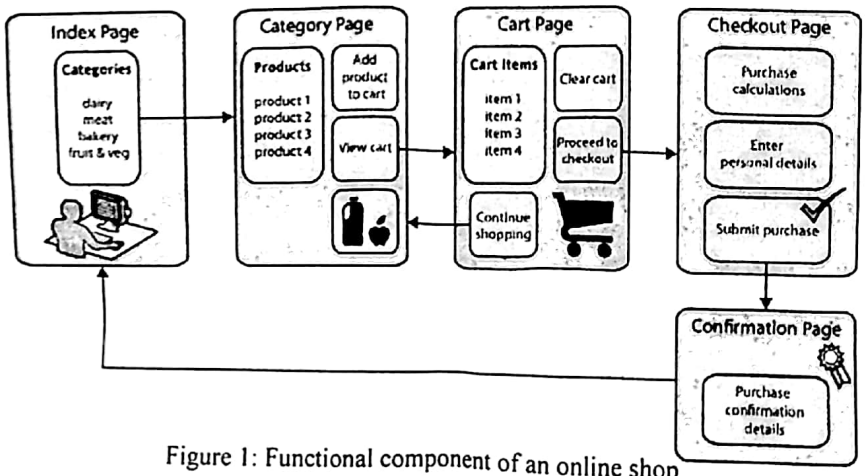

Figure 1: Functional component of an online shop

Figure 1, demonstrates the process flow of the application, displays the visual and functional components of each page, and highlights the primary actions available to the user in order to navigate through the site to complete a purchase.

i. Draw the architectural solution which will run on a J2EE application server.

ii. Describe the justification for choosing different J2EE technologies (e.g. Servlet, Java Beans, JSPs, EJBs. JPA 2.0 etc.), design patterns and how you will use them to implement the architecture.

2. a) A sample HTML form is shown in Figure 2. Write the HTTP request message to be sent by the browser. If you click on the 'Get Quote' button and the requested resource is redirected to another page then what will be the HTTP response message? 6+6

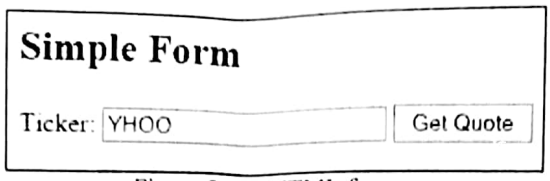

Figure 2: An HTML form

b) What is XML document? What are the requirements of an XML document to be well-formed? 6

c) Consider the following architecture to produce dynamic HTML. Explain the architecture with a real-life example. 7

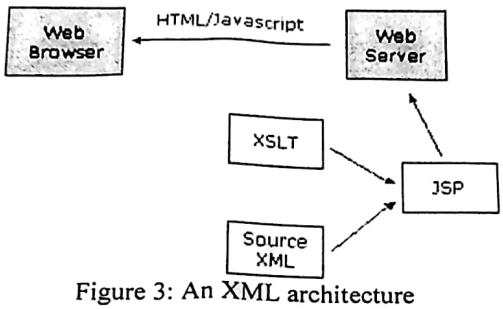

Figure 3: An XML architecture

3. a) *What is session tracking?* Write a simple Servlet to count the number of times a client has accessed it and also display the session data. 8

b) *Write an authentication filter* to check the password given by a user in filter class, if given password is 'admin', it will forward the request to the WelcomeAdmin servlet otherwise it will display an error message. 12

c) Write the deployment descriptor for the filter and servlet of the Question 3.(b). 5

4. a) Sometimes, some pre-processing needs to be done after the user has submitted a form. The result of this pre-processing decides where the control flow should go next. Such pre-processing code is frequently referred to as a "controller". JSP can be used to implement this controller. Give an example code of the controller using JSP technology. Your controller should invoke/redirect to one Servlet and two JSP pages. 9

b) What are the differences between Request attributes, Session attributes, and ServletContext attributes? 6

c) Briefly explain the JSTL tag libraries according to their functionalities. 10

5. a) What are the differences between Java Bean and Entity Bean? 6

b) The Model 1 architecture has one thing going for it: simplicity. If your project is small, simple, and self-contained, it is the quickest way to get up and running. Explain the disadvantages of Model 1 architecture for developing a web project. 10

c) What is JSON? With example describe the uses of JSON technology. 9

6. a) "RMI is used as standard API for many distributed objects in EJB" – Explain the statement. 5

b) Suppose you have to implement an RMI application for the police department. Consider a scenario that a motorcyclist has crossed the speed limit and a policeman has stopped the rider. Officer wants fine him and before that, he wants to check the driver for warrants. Through his smart device, the officer places a request to the central computer to check warrant history. From the RMI coding perspective, the client submits the request and the server executes the result, returns the result to the client. Write a Java RMI application for the scenario. 20

7. a) What do you mean by enterprise application? What do you mean by enterprise application? Why is EJB one of the preferred technologies for developing enterprise applications? 2+3

b) Briefly explain different types of EJB technologies. 10

c) Demonstrate with code how to invoke a Stateless Session Bean from Servlet and display any output through a JSP page. 10

8. a) EJB Entity Beans are like the Value Objects (VO) that can be designed following Data Access Object (DAO) pattern. With a real-life example describe how you could use DAO pattern with Entity Beans. 12

b) Explain the relationship between Entity Manager and Persistence Context with a diagram. 5

c) What are entities in EJB 3.0? Consider the following schema of a database table for course information: 8

```
Course (course_id, course_name, semester, credithours)
```

i. Where, `course_id` is the primary key and need to be generated automatically. Write an Entity class for this table in EJB 3.0.