University of Kelaniya – Sri Lanka

Centre for Distance & Continuing Education

Bachelor of Science (General) External

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Faculty of Science

COSC 36593 - Enterprise Software Design and Architecture

No. of Questions: **Four (04)**   No. of Pages: **Four (04)**   Time: $2\frac{1}{2}$ **hours**

Answer **ALL** questions.

1.

(a)

(i) What is an enterprise application, and how does it differ from other types of software applications?

(ii) Why do organizations use enterprise applications, and what are the benefits they provide?

(iii) List three (03) characteristics of enterprise applications.

(iv) What role does integration play in the effectiveness of enterprise applications? Explain using an example.

(b)

(i) A multinational corporation has disparate systems across different locations. Describe the implementation challenges they might face when adopting enterprise applications practices.

(ii) Mention which enterprise application type should be used to achieve the following functionalities.

    A. Customer Segmentation and Targeting

    B. Logistics optimization

    C. Predictive analytics

    D. Automate business processes.

2.

(a)

   (i)   What problem is addressed by the Rational Unified Process (RUP) view (Kruchten 4+1)? Briefly explain the solution.

   (ii)   Give sample UML diagram types for each view type in 4+1.

   (iii) Draw a sequence diagram to explore the sequence of interactions that occur during the user registration process in an enterprise application. The main actors in this process include the User, the RegistrationController, the AuthenticationService, and the Database.

- The process begins when a User accesses the registration page in the application. The RegistrationController, responsible for handling registration-related requests, responds by displaying the registration form to the User. The User proceeds to fill out the form with their desired username, email address, and password.

- Upon submitting the form, an HTTP POST request is sent to the RegistrationController. This request contains the user's provided information. The RegistrationController receives the request and extracts the user's details from the form. It then initiates interaction with the AuthenticationService.

- The AuthenticationService plays a critical role in ensuring the security and validity of the registration process. First, it checks if the entered email is not already associated with an existing account. Then, it generates a secure password hash for the user's password to enhance data security.

- After these verifications, the AuthenticationService collaborates with the Database. It sends the user's registration details, including the hashed password, to the Database for storage. The Database securely stores this information, ensuring the privacy of user data.

- Upon successful storage, the AuthenticationService informs the RegistrationController of the successful registration. The RegistrationController then sends a confirmation response to the User, indicating that their registration has been completed successfully.

(b)

   (i)   List three (03) possible issues of a software without an architecture.

   (ii)   Draw suitable diagrams to depict two-tier and three-tier layered architectures.

3.

    (i)   Describe "Enterprise Architecture" using two important aspects Business and Technology.

    (ii)   Briefly explain the typical layers in a three-tiered architecture and their respective responsibilities.

    (iii) What is meant by Thin Client and Fat Client in Client-Server architecture? Give two examples for each.

    (iv) Explain the responsibilities of each component (Model, View, and Controller) in the MVC architecture.

    (v)   Below is a component-based architecture designed for a Holiday Reservation system. Explain the goals/benefits of this enterprise application using the given architecture diagram.
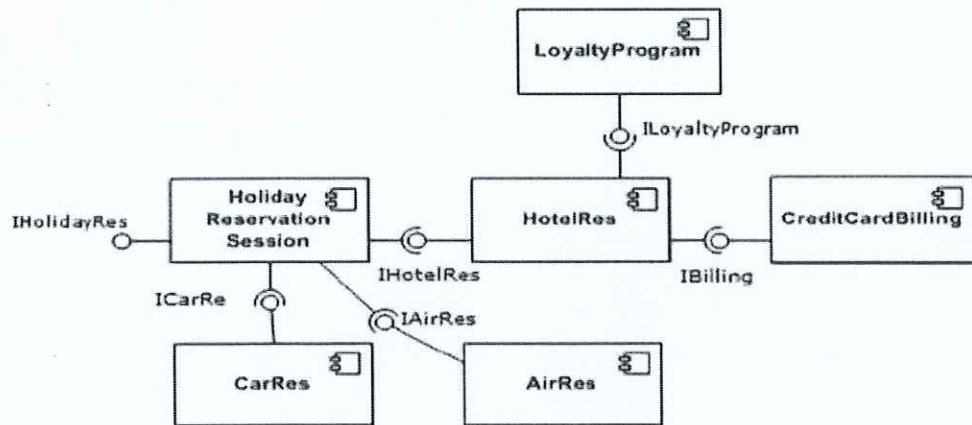
4.

    (i)   Mention which architectural approach (SOA, Microservices, or Monolithic) has the following characteristics. Justify your answers.
        A. Simpler development and deployment
        B. Reusability
        C. Increased agility
        D. Extra overload due to increased response time

    (ii)   What is the primary challenge of Monolithic Architecture when it comes to scaling an application?

    (iii) Briefly explain the life cycle of SOA.

(iv) Mention which technology is used by SOA and Microservices based on the following facts.

	SOA	Microservices
Communication		
Message passing protocol		
Message format		

(v) You are a developer at Microsoft who is responsible for developing the "Windows Clipboard" for their next operating system. Windows Clipboard is used to share (copy/paste) data between different instances of the same application or between different application instances. Design requirement is to have only one instance of the windows clipboard class at any given point of time while thousands of other application instances utilizing the one and only clipboard instance to share data between them.

Implement a sample windows clipboard class.