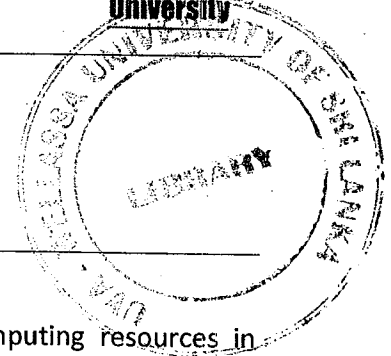


Uva Wellassa University of Sri Lanka
Faculty of Science and Technology
Department of Computer Science and Technology
300 level 2nd Semester Examination – Dec. / Jan. 2017
CST324-2 Middleware Architecture



**Uva Wellassa
University**



Instructions to candidates

Duration: Two (02) hours

Number of questions: Four (04)

Answer all questions

Mark allocation: 100

1.

- a. Distributed computing is a type of an arrangement of the computing resources in organizations.
 - i. List four (04) characteristics of distributed computing environment. (2 mark)
 - ii. Explain why most of the organizations go for distributed computing systems rather than centralized computing systems. (6 mark)
- b. Briefly explain the importance of 'fault-tolerance' in distributed computing environment. (6 mark)
- c. List three (03) disadvantages of distributed computing. (3 mark)
- d. There are several dimensions of transparencies in distributed computing environment.
 - i. Explain the term 'Transparency' in distributed computing. (2 mark)
 - ii. Explain the importance of 'replication transparency' and 'concurrency transparency' in distributed systems. (6 mark)

2.

- a. What is meant by 'Middleware'? Explain three (03) challenges a system would face if middleware was not available? (5 mark)
- b. Explain four (04) benefits of a middleware system. (8 mark)
- c. What are 'legacy applications'? Explain how middleware systems can be used to incorporate the features of legacy applications into current applications? (6 mark)
- d. Briefly explain three (03) core middleware requirements. (6 mark)

(65)



3.

- a. Differentiate Local Procedure Call (LPC) and Remote Procedure Call (RPC). (6 mark)
- b. Explain the process of marshaling and unmarshaling in RPC environment. (4 mark)
- c. Using a diagram, clearly describe how an Interface Definition Language (IDL) is incorporated into the implementation of a distributed application that uses RPC. Mention the files created and their purposes in RPC environment. (6 mark)
- d. You are required to implement a temperature converter as a simple middleware system using RPC to satisfy the clients by providing the following services.

Service 1: Convert Celsius to Fahrenheit

Service 2: Convert Fahrenheit to Celsius

- i. Write the complete IDL file called 'TempCalculator.x' for the above scenario. (6 mark)
- ii. What is the importance of 'rpcgen' in RPC implementation? (3 mark)

4.

- a. Describe the Remote Method Invocation (RMI) process using a diagram while naming each component and their interaction sequence for a client request. (6 mark)
- b. Assume that you have to implement a basic calculator using RMI in Java environment.
 - i. What is the name of the interface that you have to extend in your program? (2 mark)
 - ii. Write the necessary code lines for the following requirements in the RMI server file of the calculator program.
 - Create a registry on port 5050.
 - Create a new service named 'CalcProg' and bind it to the registry. (4 mark)
 - iii. Explain the meaning of the following statements in the RMI client file.

```
Registry reg = LocateRegistry.createRegistry(5050);  
reg.rebind("CalcProg", new CalcImpl());
```

(4 mark)
- c. State three (03) advantages of Service Oriented Architecture (SOA). (3 mark)
- d. Discuss the benefits of web services. (6 mark)