

Spring Semester 2020 Final Exam
Course: - Distributed Computing

Deadline: - Mentioned on SIC

Marks: - 50

Program: - MS (CS)

Dated: 24 June 2020

Student Name: Masood Ur Rehman
Class and Section: MS(CS) 4rth semmester

Student ID#:14354

Section: Remote Invocation

Q1. Describe briefly the purpose of the three communication primitives in request-reply protocols. (6)

Ans: Basically all the Client/Server communication follows the pattern of request/reply protocol. Normally, request-reply communication is synchronous because the client process blocks until the reply arrives from the server. Asynchronous request-reply communication is an alternative that may be useful in situations where clients can afford to retrieve replies later. The purpose of the three communication primitives are as follows:

- ***Do-Operation ()***: It sends a message containing request to the server remotely placed and returns the reply. Its argument identifies the remote server. Its argument also specifies the operation to be invoked and it specify the arguments of the invoked operation.
- ***getRequest ()***: The purpose of this primitive is to get client request through the server port.
- ***sendReply ()***: This primitive is used by the server to send reply message to the client after necessary actions being done on the request.

Q2. Explain the technical difference between RPC and RMI? (4)

Ans: RPC supports Procedural programming while RMI supports Object-Oriented Programming. RPC have dependent platform while RMI have Independent Platform (i.e.JAVA Platform). RPC is less efficient then RMI. RMI is the updated version of RPC. The parameters in RPC are normal data while in RMI objects are passed as parameters. Programming/Coding is easy in RPC as compared to RMI. RMI provides more security then RPC. Development cost of RPC is Huge then RMI.

Section: Indirect Communication

Q:3 In contrast to Direct Communication, which two important properties are present in Indirect Communication? (6)

Ans: The two most important properties of indirect communication in contrast to direct communication are as follows:

1. ***Space Uncoupling***: In this property the sender doesn't know or don't need to know the identity of the receiver.

2. **Time Uncoupling:** In this property the sender and the receiver doesn't need to exist at the same time to communicate.

Advantages of the above mentioned Properties:

By **Space Uncoupling** the developer has the freedom of dealing with change as in today's era we have different devices and architectures. Senders/Receivers can be replaced, updated or migrated. This is very important for today's distributed system because millions of users with different devices and architectures access global network and if we have third source between sender and receiver for communication than it's very reliable to work with distributed system. By **Time uncoupling** sender and receiver are not bound to sit on exact time for communication but they can communicate in offline mode and they are free to send and receive messages any time they want.

Q:4 Provide three reasons as why group communication (single multicast operation) is more efficient than individual unicast operation? (9)

Ans: In unicast a piece of information is sent from one point to another point. In this case there is just one sender and one receiver. It is one-to-one communication. In Multicast a piece of information is sent from one or more points to a set of other points. It is one-to-many or many-to-many communication. The three reasons of group communication (multicast) which makes it better than Unicast operation are as follows:

- Multicast is Time-reliable because sender can send a message efficiently to the group in a single transmission. Copies are automatically generated by the other network such as router, switches etc for all the receivers. Up to date and wide variety of information can be handled reliably and in fewer time frames. So there is no need to send copy to each receiver and it saves the time and energy.
- It supports collaborative applications which provide a common view to multiple users. For instance multiple users are playing online game from different devices (i.e mobiles, laptops etc) and every device has different architectures so here multicast is reliable to support different architectures and provide a reliable and common view to all the users playing online game together.
- Multicasting support system monitoring and management. In multicasting the receiver can choose whether to receive a message or not. So multicasting doesn't affect all the computers on the network. Therefore, Multicasting prevents unwanted messages transmission which controls data trafficking and low data load.

Section: OS Support

Q5. Differentiate a between a network OS and distributed OS. (6)

Ans: The main objective of Network OS is to provide the local services to the remote client and the main objective of the Distributed OS is to manage the hardware resources. In network OS all nodes can have different operating system while in Distributed OS all nodes have same operating system. In Network OS fault tolerance is less then Distributed OS. Distributed OS is less scalable then Network OS. In Network OS communication take place on the basis of files, while Distributed OS communication takes place on the basis of messages and shared memory.

Q6. Describe briefly how the OS supports middleware in a distributed system by providing and managing (6)

a) Process and threads

Ans: A process is an executing program. One or more threads run in the context of the process. We can also say that a thread is a mini process or process within the process. A thread is the basic unit to which the operating system allocates processor time. A thread can execute any part of the process code, including parts currently being executed by another thread.

b) System Virtualization

Ans: Operating system virtualization includes a modified form than a normal operating system so that different users can operate its end use in different applications. In OS virtualizations, the virtual eyes environment accepts command from any of the user operating it and performs different task on the same machine by running different applications.

Section: Distributed Objects and Components

Q7. Write in your own words the issues with Object (distributed) oriented middlewares. (13)

Ans: There are two fundamental trends by which are influenced to construct new computing and information system. The first one is that all type of technology is becoming more cheaper and faster and the second one is the global acceptance of network-centric paradigm, which have led us to Object Oriented middlewares. But this has some issues to be addressed like:

- Nowadays people are focusing on integration instead of programming. Customizing and configuring reusable components besides the Programming applications.
- The next generation applications have necessity of simultaneous satisfaction of multiple QOS properties, such as predictable Latency/Jitter/Throughput , scalability, dependability and security.
- Shrinking of profit margins and increasing shareholder pressure to reduce the cost are making it harder for companies to invest in long term research.
- Increased greed for disruptive technologies leads to increased global competition. Especially companies like telecom and aerospace are more vulnerable to disruptive technologies. For example: They need Advances in high-performance COTS hardware are being combined with fault-tolerant and real-time middleware services.
- The complexity for next generation system is increasing day by day. It have many challenging research problems. In particular problems of scale, diversity of operating environment and required level of trusts.