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Course No: SWE 4417 **Course Title: Distributed System.** **Date: 20/ 05 / 2014** **No. of Questions: _____4_____** **Time: 2 H.** **Using Calculator (Yes)**	**University of Palestine** **Final Exam** **2nd Term 2013/2014** **Total Grade: 60**	**Instructor Name: Eng. M. Timraz** **Student No.: _____** **Student Name: _____** **College Name: Engineering** **Dep. / Specialist: Software** **Using Dictionary (No)**

First Question — No. of Branches (1) — (20/60)

(A) Choose the correct answer (a, b, c or d) and then put it in the specific table in the model answer note.

1. **What is meant by access transparency?**

A) remote resources are accessed using location independent names
B) local and remote resources are accessed using the same operations
C) a replicated resource is accessed exactly as if it was a single object
D) a resource will handle all requests equally independent of location of client

2. **What is meant by location transparency?**

A) remote resources are accessed using location independent names
B) local and remote resources are access using the same operation
C) a replicated resources is accessed exactly as if it was a single object
D) a resource will handle all request equal independent of location of client

3. **What is significant for a peer-to-peer architecture?**

A) no single node may initiate an operation
B) nodes are structured in a hierarchy of client and servers
C) all nodes can communicate directly with all other nodes in the network1
D) all nodes are active and can be the initiator of operations

4. **What is meant by replication transparency?**

A) processes have knowledge of replication scheme and can take advantage of it
B) users of a resource access it as if it was not replicated
C) data is immutable and can be serialized on disk
D) replies to queries are copied and logged to avoid dirty reads

5. **What is significant for client server architecture?**

A) the client is the active part
B) servers have more execution power
C) several clients but only one server
D) the server is the active part

6. **What would we call a system where one node is always reacting on requests and other nodes only communicate with this node?**

A) an asynchronous system
B) a client server system
C) a peer-to-peer system
D) a synchronous system

7. **What do we know in a synchronous system?**

A) that all operations will take equal amount of time
B) exactly how long time it takes to deliver a message
C) that all messages will be delivered
D) the upper bound of the time to perform an operation

8. How are arguments passed in Java RMI?

A) call by reference only
B) call by copy only
C) remote objects as reference, all other as copies
D) serialized objects as reference, all other as copy

9. Can a synchronous communication interface be used in an asynchronous way?

A) yes, by performing the send operation in a separate thread
B) no, the send operation will block and stop the whole execution
C) no, synchronizing clocks will always take time
D) yes, by minimizing the latency for the receive operation

10. What is the difference between the two nodes that are communicating over a stream socket?

A) the node that connected to the server-socket is the node that should close the socket
B) the node that created the server-socket should close the socket
C) nothing, they have equal rights and responsibilities
D) the node that connected to the server-socket must send the first message

11. What is the purpose of the marshaling procedure?

A) consistency checking of type information
B) to compress data structures
C) to protect an application from unauthorized requests
D) to encode application layer structures in an external form

12. What is a good reason for choosing UDP rather than TCP?

A) you need to know that a message is handled by the remote application
B) you have large messages or a sequence of messages
C) you have a small message that should be sent with little delay
D) UDP will guarantee the delivery of a message

13. Which invocation semantic is provided by Java RMI?

A) no guarantees
B) at least once
C) exactly once
D) at most once

14. What is the maximum TCP capacity in a 100 Mbps link with 250 ms round trip latency using a 64 Kbyte window size?

A) 40 Mbps
B) 2 Mbps
C) 10 Mbps
D) 512 Kbps

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15. Which address (es) can be found in the TCP header?

A) there is no address field in the TCP header
B) the network IP address
C) a process identifier
D) the port number(s)

16. What is true if A happened before B?

A) B is a consequence of A
B) A and B occurred in the same process
C) A must have occurred in real-time before B
D) it is unknown if A occurred in real-time before B

17. Why is a remote object passed as a reference and not as a copy in Java RMI?

A) more efficient since it requires less bytes to be sent
B) wrong, they are copied
C) the object contains a mutable state that should not be duplicated
D) objects are always passed as reference

18. What is the difference when an error is reported for an at-least-once and at-most-once remote procedure call?

A) in the at-most-once case, the remote call will not have been executed
B) nothing, in either case we don't know if the remote call has been executed
C) in the at-least-once case, the remote call will not have been executed at all
D) in the at-least-once case, the call could have been executed more than once

19. What is true for events A and B?

A) if A caused B then A happened before B
B) if A happened before B then A caused B
C) if A occurred in real-time before B then A happened before B
D) if A occurred in real-time before B then A caused B

20. Why is it important that a primary server in a passive replicated system uses view-synchronous group communication?

A) so that requests from front-ends will be serialized
B) so that all or none of the backup servers have received an update before a new primary is elected
C) to make sure backups receive updates in a total order
D) it is not necessary, its sufficient to use a reliable multicast

1	2	3	4	5	6	7	8	9	10

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Second Question **No. of Branches (2)** **(20/60)**

Q2 B1 **(10/10)**

(A) You are to design a distributed database system for an online ticket booking system for an airline. There will be more than one copy of the database for reliability and fault tolerance. **(5/12)**

1. Explain some of the problems (in distributed systems) you would have solved during the development of this system.
2. In particular what problems have to be solved they are special for the domain (an online ticket booking system).

(B) With examples describe what Middleware is? **(2.5/12)**

(C) With examples describe the client server model? **(2.5/12)**

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Q2 B2 (10/10)

Bring the following steps of a remote procedure call into the right order.

A. Client's OS gives message to client stub.
B. Server stub unpacks parameters, calls server.
C. Client procedure calls client stub in normal way.
D. Remote OS gives message to server stub.
E. Server's OS sends message to client's OS.
F. Client stub builds message, calls local OS.
G. Stub unpacks result, returns to client.
H. Server stub packs it in message, calls local OS.
I. Server does work, returns result to the stub.
K. Client's OS sends message to remote OS.

1	2	3	4	5	6	7	8	9	10

Third Question No. of Branches (1) (10/60)

(A) Define the major function for the following terms:

(1) At-Least-Once Invocation Semantics:

(2) At-Most-Once Invocation Semantics:

(3) Exactly once semantics:

(4) Binder:

(5) RMI registry:

(6) Actions:

(7) Events:

(8) Peer to peer:

(9) Middleware:

(10) Signature:

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Fourth Question Number of Branches (1) (10/60)

(A) Suppose that it is early 2005 and you are designing a web site allowing registered users to upload videos and anybody to download and watch them.
You expect and hope that the site will be popular, so you use replication to handle the anticipated request rate. (Assume that, unlike a certain mainstream site whose name you can probably guess, no comments are associated with the videos.)
(i) Describe the advantages and disadvantages of using each for this application, paying particular attention to any assumptions you must make about the users' behavior. **(3/10)**

(ii) You should consider the following: **(5/10)**

2.1 The type of the architectural model.
2.2 The tire type you need to implement.
2.3 The number of tire that you need.
2.4 The minimun capacity for storage data will be
  a. at most 1 TByte.
  b. Between 20 GByte to 500 GByte.
  c. More than 20 TByte.
  d. at Least 5 TByte.
2.5 Which do you prefer client to server or peer to peer application? Why?

(iii) Draw a suggestion graph to implement the system above showing all DS parts you use or need. **(2/10)**

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End of Questions