TECHNICAL UNIVERISTY OF MOMBASA

Faculty of Engineering & Technology

DEPARTMENT OF COMPUTER SCIENCE & INFORMATION TECHNOLOGY

UNIVERSITY EXAMINATION FOR:
BACHELOR OF TECHNOLOGY IN INFORMATION TECHNOLOGY
(BTIT 11M)

EIT 4312: DISTRIBUTED SYSTEMS

SPECIAL/SUPPLEMENTARY EXAMINATION
SERIES: MARCH 2014
TIME: 2 HOURS

Instructions to Candidates:
You should have the following for this examination
- *Answer Booklet*

This paper consists of **FIVE** questions. Attempt question **ONE** and any other **TWO** questions
Maximum marks for each part of a question are as shown
This paper consists of **TWO** printed pages

Question One (Compulsory)

a) Define the following terms: **(5 marks)**
   (i) Data oritented V/S control oriented communication
   (ii) Synchronous V/S asynchronous communication
   (iii) Multier and peer to peer
   (iv) Process groups and object groups
   (v) Distributed systems and centralized system **(5 marks)**

b) Briefly explain any TWO major breakthrough in implementing distributed system in co-perates. **(4 marks)**

c) A failure can occur in any system, state any TWO critical failures of a distributed system. **(2 marks)**

d) Explain why there is not explicit data typing in CORBA CDR **(2 marks)**

e) Briefly explain about a remote procedure call and outline the steps involved when it is involved. **(6 marks)**

f) With examples, describe what are multi-computers **(4 marks)**

g) The above diagram is a conceptual layering of protocol software in networking:
   (i) Define protocol? Explain the TWO important parts of protocol **(3 marks)**
   (ii) Outline the layers from 1 to layer n **(4 marks)**
   (iii) How does it overcome the delay problems when the recipient has not received the message. **(2 marks)**

Question Two

a) Explain in detail about communication paradigm under the following topics:
   (i) Interprocess communication
   (ii) Remote invocation
   (iii) Indirect communication **(6 marks)**

b) In a distributed system written in object-oriented language, resources may be encapsulated as objects and accessed by clients. Explain any TWO ways on how a client can invonke a method upon a server object. **(4 marks)**

c) Describe any FOUR challenges when constructing a distributed system. **(4 marks)**

d) Figure –secure channel
   (i) Security has been a challenge in distributed system, why is the need of secure channel between processes **(2 marks)**
   (ii) Explain the TWO major possible threats from an enemy **(2 marks)**
   (iii) How can you stop a process or a message from being replayed or re-ordered **(2 marks)**

Question Three

a) A client send a 200 byte request message to a service which produces a response containing 500 bytes. Estimate the total time required to complete the request in each of the following cases, with the performance assumption listed below:
   (i) Using connectionless datagram communication **(4 marks)**
   (ii) Using connection-oriented communication **(4marks)**
   (iii) When the server process is in the same machine as the client **(4 marks)**

Key

Latency per packet (local or remote, incurred on both send and receive = 5m) Connection setup time (TCP) = 5ms Date transfer rate = 10mbps MTU = 1000 bytes Server request processing time = 2 ms NB: Assume that the network is lightly loaded

b) How can we be sure that no two computer in the internet have the same IP address **(2 marks)**

c) RPC and RMI are closely related explain any THREE commonalities between RMI and RPC. **(6 marks)**

Question Four

a) The figure above is a clock synchronization using a time sever

(i) State the theorem of Christian 1989 **(2 marks)**

(ii) With the help of the above diagram, differentiate between a clock skew and clock drift. **(4 marks)**

(iii) In connection with the above diagram, explain with a help of a suitable diagram on a skew between computer clocks in a distributed system. **(6 marks)**

b) Explain any TWO roles of group communication. **(2 marks)**

c) Describe the architecture of a distributed operating system. **(6 marks)**

Question Five

a) Discuss the networking and internetworking under the following topics:

(i) PANS

(ii) WANS

(iii) WLANS **(6 marks)**

b) Explain the difference between a tightly coupled or loosely coupled system and give an example in each. **(4 marks)**

c) State any FOUR challenges distributed systems that apply to DFS **(4 marks)**

d) Define CORBA to what extent may CORBA objects be migrated from one server to another. **(6 marks)**