TECHNICAL UNIVERISTY OF MOMBASA

Faculty of Engineering & Technology

DEPARTMENT OF COMPUTER SCIENCE & INFORMATION TECHNOLOGY

UNIVERSITY EXAMINATION FOR:
BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY
(BSIT 12P)

ICS 2208: OPERATING SYSTEMS II

END OF SEMESTER EXAMINATION
SERIES: DECEMBER 2013
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 **THREE** printed pages

Question One (Compulsory)

a) Describe THREE characteristics of distributed operating systems that distinguish them from network operating systems. **(3 marks)**

b) Give TWO disadvantages of distributed systems when compared to centralized systems **(4 marks)**

c) Define the following key features of distributed operating systems:
(i) Transparency **(2 marks)**
(ii) Remote procedure call **(1 mark)**
(iii) Lamport's algorithm **(2 marks)**
(iv) Multiprocessing **(1 mark)**
(v) Memory management **(1 mark)**

d) The sites in a distributed system can be connected physically in a variety of ways. Describe the advantages and disadvantages of the following configurations:
   (i) Fully connected network **(2 marks)**
   (ii) Ring network **(2 marks)**
   (iii) Star network **(2 marks)**
   Use diagrams to illustrate your answer

e) You have been asked to design a new distributed operating system for the National Bank of Kenya. Describe THREE goals you would ensure your new D.O.S would strive to attain. **(4 marks)**

f) Describe the following:
   (i) Cluster computing
   (ii) Cloud computing **(4 marks)**

g) Describe a real world application distributed operating system, and explain what is used for and the organization that is using it. **(2 marks)**

Question Two

a) Explain how the following are managed in a distributed operating system:
   (i) Concurrency
   (ii) Sharing resources **(4 marks)**

b) Compare and contrast detection and management of deadlock in a centralized system to deadlock in a distributed system **(6 marks)**

c) Describe THREE kinds of failure that may occur in a distributed system, for each, describe a method by which the failure can be overcome **(6 marks)**

d) Describe two distributed system models **(4 marks)**

Question Three

a) Explain the concept of a global clock. **(4 marks)**

b) Discuss challenges faced when synchronizing processes in a distributed environment. **(4 marks)**

c) Explain the following techniques, giving an algorithm that can be applied for each technique in a distributed environment:
   (i) Mutual exclusion **(3 marks)**
   (ii) Election **(3 marks)**

d) Distinguish between benign and Byzantine failures in a distributed operating system, and propose a solution for each type of failure **(6 marks)**

Question Four

a) Using illustrations, describe THREE distributed systems network models **(9 marks)**

b) Compare and contrast synchronous distributed systems with asynchronous distributed, stating which is more used in practice. **(4 marks)**

c) Describe the Network Time Protocol explain its application and use the internet **(3 marks)**

d) Define the concept of distributed shared memory and explain its impact on consistency of transactions. **(4 marks)**

Question Five

a) Describe TWO techniques that may be used to ensure security of a distributed O.S **(4 marks)**

b) Explain TWO techniques used to enable D.O.S recover from failure to complete a transaction. **(4 marks)**

c) Describe the problem of distributed deadlock, and propose a mechanism for resolving this **(3 marks)**

d) Explain FOUR roles of the file system in any operating system **(3 marks)**

e) Explain TWO roles the transaction co-coordinator file systems play in distributed systems **(3 marks)**

f) Explain the concept of ubiquitous computing and describe its impact on the life of an ordinary citizen. **(3 marks)**