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**University Examinations 2014/2015**

SECOND YEAR FIRST SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY

THIRD YEAR FIRST SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF MATHEMATICS AND COMPUTER SCIENCE

SECOND YEAR SECOND SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF COMPUTER SCIENCE

**CIT 3229: OPERATING SYSTEM II**

**DATE: APRIL 2015 TIME: 2 HOURS**

**INSTRUCTIONS:** *Answer question* ***one*** *and any other* ***two*** *questions*

*Show all your working, to earn all the marks assigned*

*Calculators are allowed*

*Where possible illustrate with diagram*

**QUESTION ONE (30 MARKS)**

1. An experimental file server is up 3/4 of the time and the rest of time down due to bugs. How many times does this file server have to be replicated to give availability of at least 99 percent (7 Marks)
2. Beatrice is trying to figure the difference between process migration and migration transparency. As an expert of distributed operating system explain them to her (3 Marks)
3. In designing distributed operating system, most manufacturing companies are opting for micro kernel which performs minimal functions while they use monolithic kernel for central operating system which performs all jobs. State any three function performed by micro kernel (3 Marks)
4. Most of the distributed operating systems uses two-level naming, argue why this case is so, then what role does directories plays here (3 Marks)
5. Kamau heard the quotes “There is no free lunch” and remembered the computer science format: “You never get something for nothing” in light of the above statement consider the statements that follows: caching helps a lot in distributed operating system but comes at a cost, for example, if two clients process reads come file from the server and a third one reads thereafter, what inconsistence that can occur because of caching. Explain a semantics to solve the above (4 Marks)
6. When migrant process is restarted on its destination node after, it is given the same process identifier that is had on its node, is this necessary. Give two reasons for your answer

(3 Marks)

1. A loose coupled fee system which is using distributed shared memory has 100 nodes; node 20 has a process working on school fee wants to access data stored in node 40. Explain how node 20 will receive the data from node 40 (5 Marks)
2. How does a remote procedure call achieve transparency (2 Marks)

**QUESTION TWO (20 MARKS)**

1. Mbeke works in Ity2sl Company as the manager, which mainly is a Micro Finance Company. They use distributed operating system. The other day the main server went down due to various bugs, when it regained latter, a lot of FOSA accounts were corrupt and no way they could recover the data, hence the company was sued by its clients. As a result Mbeke was sacked. After advertising the vacancy you applied, then one panelist laid the above problem to you and he said one solution would be replication. Explain three reasons to support the panelist (6 Marks)

1. You have passed the interview and the Ity2sl Company has hired you, you go ahead and implement replication and use primary copy replication algorithms to update the copies whenever a modification occur, explain how it works and what short coming it has

(6 Marks)

1. Due to the above problem you decided to use voting algorithms and you have ten servers;
2. State the formula you would use to assemble read and write quorum and give three examples of read and write quorum for your company, in terms of set theory what is unique about them (5 Marks)
3. It is known in most application read are much common then write and so read quorum is usually smaller and write quorum is nearer 10 or total server replication, if several servers are down we cannot get write quorum, explain a solution to solve the above problem (3 Marks)

**QUESTION THREE (20 MARKS)**

1. “In distributed operating systems synchronization, it is unacceptable to collect all the information in a single place of processing” using the general properties of distributed algorithms explain the above statement (6 Marks)
2. In Eve University, they have a UPS powered server which all clients send request for time in the student distributed system. One day power went off, when power was back, a specific client noting it time was c(t), send a message the server which arrived at s(t) based on the server time, the server took s(w) to work on the request and send a message to the client stating it time was s(ti). The client received the message at c(ti). Using Christian algorithms derive an equation K to show
3. The average one way propagation of the message (4 Marks)
4. What time is the client update to (2 Marks)
5. The logical clock of a client is 10am, it send a message to time server asking what time it is. The message arrives at 10.05am stating the time is 10.30am. If an interrupt in time server takes 1 minute, taking interrupt as time taken to process the message, what will be the client new time using the above derived equation? (2 Marks)
6. Consider process P1,P1 and P2. They are using distributed algorithm to manage critical region W. Process P0 and P2 sends a request to everyone with timestamp 8 and 12 respectively requesting to enter critical region W. Explain what happens (6 Marks)

**QUESTION FOUR (20 MARKS)**

The above diagram shows process 1 up to process 4 where they are competing for resources, the arrows shows which process is holding a resource for the other process, it happen this is a distributed operating system which has implemented Chandy misra haas algorithm

1. What are the contents of the message send by Chandy misra haas algorithm (3 Marks)
2. Assume process 3 start by sending the message, enumerate all the messages which are send

(5 Marks)

1. Is there a deadlock here, explain (3 Marks)
2. Onyango works in Kimathi University, currently he is in Kampala attending a conference, and however, his boss calls him and tells him he has to come to university tomorrow urgently. Therefore he decides to book plane to Kisumu, then to Nairobi and finally to Nyeri. The online system is a distributed system and treats the above request as atomic request. Explain how plane is booked or not (9 Marks)

**QUESTION FIVE (20 MARKS)**

1. To build a robust distributed system, you must know what kinds of failures can occur
2. List three possible types of failure in a distributed system (3 Marks)
3. Specify which of the entries in your list also are applicable to a centralized system

(1 Mark)

1. Process migration within a heterogeneous network is usually impossible, given the differences in architectures and operating systems. Describe a method for process migration across different architectures running:
2. The same operating system (4 Marks)
3. Different operating systems (4 Marks)
4. Most of the protocol applicable in a centralized operating system cannot be applied in distributed system due to special requirements for distributed system architecture. Explain two of such requirements (4 Marks)
5. How do the following protocols for distributed system achieve transparency:
6. Fast Local Internet Protocol (2 Marks)
7. Versatile message transport protocol (2 Marks)