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**University Examinations 2014/2015**

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

**CCS 3327: SYSTEMS PROGRAMMING**

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

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

**QUESTION ONE (30 MARKS)**

1. In concurrency systems, several liveness issues arise. Describe the following issues. You can use an algorithm.
2. Livelocks (3 Marks)
3. Deadlocks (3 Marks)
4. When the average queue is only one, the disk scheduling algorithms reduces to FCFS scheduling. Explain why this assertion is true (2 Marks)
5. Using the layered approach explain the organization of a computer system (4 Marks)
6. Compare and contrast cluster and symmetrical multiprocessing (8 Marks)
7. Using suitable example, define remote procedure call (2 Marks)
8. Draw a process state transition diagram using the five states and explain the interpretation of each process (5 Marks)
9. Describe how memory and process management are accomplished by the operating system

(3 Marks)

**QUESTION TWO (20 MARKS)**

1. In context of multithreading systems, explain the importance of the following and briefly describe how it can be carried out in Java (12 Marks)
2. Thread Synchronization
3. Setting thread priority
4. Pausing thread
5. Blocking and unblocking thread using Inter-thread communication
6. Referencing to the figure below answer the following questions:

Figure 1

1. Briefly describe how interaction takes place between the two systems (3 Marks)
2. What do the 1625 and 80 refer to and why are the necessary in inter-process communication (3 Marks)
3. Explain the use and importance of 146.86.20.5 and 161.25.19.8 in the above system

(2 Marks)

**QUESTION THREE (16 MARKS)**

1. Briefly outline the main purpose of IPC (3 Marks)
2. The figure below shows two processes T1 and T2 executing in the CPU

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| T1 | T3 | T1 | T3 | T1 | … |

core 1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| T2 | T4 | T2 | T4 | T2 | … |

core 2

time

Figure 2

1. Explain the type of system exhibited in figure above (3 Marks)
2. Outline advantages of the system stated above (3 Marks)
3. Explain the process control block and the various pieces of information that it contains in regard to process management (4 Marks)
4. Describe the execution of a Remote Procedure Call (6 Marks)

**QUESTION FOUR (20 MARKS)**

1. Briefly explain what IO subsystem is and describe its role in a computer system (6 Marks)
2. Differentiate between connection oriented communication and connectionless communication (4 Marks)
3. Write a program in C/C++ which maliciously access file named studentfee.txt and clear all existing content and replace it with your nickname. Explain working of your program

(10 Marks)

**QUESTION FIVE (20 MARKS)**

1. With aid of a diagram differentiate between local and remote procedure call (6 Marks)
2. Below is a set of processes available for execution in a multi-programmed environment:

|  |  |  |
| --- | --- | --- |
| **Process** | **Burst Time (Relative Units)** | **Arrival time at ready state** |
| A | 10 | 0 |
| B | 6 | 1 |
| C | 4 | 3 |
| D | 1 | 4 |

Show that using Shortest Time Next (SRTN) scheduling algorithm will result in better values for waiting time and turn around time for each of the process compared to First Come First Served (FCFS) (6 Marks)

1. Discuss any two facilities to handle system calls errors (8 Marks)