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Faculty of Engineering, Built Environment and Information Technology

Fakulteit Ingenieurswese, Bou-omgewing en Inligtingtegnologie / Lefapha la Boetšenere, Tikologo ya Kago le Theknolotši ya Tshedimošo

Department of Computer Science

COS 122 Operating Systems

Assignment 5

Due: 03 November 2022 @ 23:00

PLAGIARISM POLICY

UNIVERSITY OF PRETORIA

The Department of Computer Science considers plagiarism as a serious offence. Disciplinary action will be taken against students who commit plagiarism. Plagiarism includes copying someone else's work without consent, copying a friend's work (even with consent) and copying material (such as text or program code) from the Internet. Copying will not be tolerated in this course. For a formal definition of plagiarism, the student is referred to `http://www.ais.up.ac.za/plagiarism/index.htm` (from the main page of the University of Pretoria site, follow the *Library* quick link, and then click the *Plagiarism* link). If you have any form of question regarding this, please ask one of the lecturers, to avoid any misunderstanding. Also note that the OOP principle of code re-use does not mean that you should copy and adapt code to suit your solution.

Objectives

This assignment evaluates the understanding and application of various key concepts and functions found in computer and operating systems. It covers chapters 9 and 11 of the prescribed textbook. This assignment has 4 tasks for a total of 20 marks.

Upload Instructions

You need to provide written answers to the tasks in this assignment. You are then required to submit a document containing these answers in order for them to be marked. Show all the intermediate and calculation steps in your answers (excluding the multiple choice task). Some marks will be awarded for intermediate steps.

- Upload your document to the Assignment 5 assignment slot on COS 122 ClickUP before 23:00 on 03-Nov-2022. **No late submissions will be accepted!**
- All documents must be in either text, Word or PDF format (typed not handwritten) as **no other formats** will be marked.
- **This assignment is compulsory and failure to upload your answers will result in 0 marks being awarded for this assignment and its inclusion in the contribution to your overall assignment mark!**

Task 1 ..... (5 marks)

1.1 Which of the following scheduling policies swaps out running processes in the queue based on a timer? (1)

A. FIFO
B. HRRN
C. Feedback
D. FCFS

1.2 The decision as to whether to permit a program into the system for processing: (1)

A. Long-term scheduling
B. I/O scheduling
C. Short-term scheduling
D. Medium-term scheduling

1.3 The decision as to which suspended process to swap into main memory: (1)

A. Long-term scheduling
B. I/O scheduling
C. Short-term scheduling
D. Medium-term scheduling

1.4 Which of the following disk scheduling policies reverses scan direction when reaching the last track? (1)

A. FIFO
B. SSTF
C. SCAN
D. FCFS

1.5 On a hard disk, what is the time taken to rotate to the start of the correct sector? (1)

A. Access time
B. Seek time
C. Transfer time
D. Rotational delay

Task 2 ..... (6 marks)

Five batch jobs, A through E, arrive at a computer at essentially at the same time. They have an estimated running time of 11, 7, 5, 9 and 13 minutes, respectively. Their externally defined priorities are 6, 3, 7, 4 and 9, respectively, with a lower value corresponding to a higher priority. For each of the following scheduling algorithms, determine the process schedule and the average turnaround time (TAT). Hint: First you should determine the TAT of each job and then you can determine the average TAT. Ignore the dispatcher and the process switching overhead. In the last 2 cases assume that only one job at a time runs until it finishes and that all jobs are completely processor bound. Include the calculation steps in your answers.

2.1 Round Robin with a time quantum of 1 minute (run in order A to E) (2)

2.2 Priority Scheduling (2)

2.3 Shortest Process Next (2)

Task 3 ..... (1 marks)

In a certain device, the disk rotates at 12,500 rpm.

3.1 How long does one revolution take? (½)

3.2 What is the average rotational delay of this disk drive? (½)

Task 4 ..... (8 marks)

Consider a disk drive with 2,000 tracks, numbered 0 to 1,999. The request queue has the following composition:

1000 740 1150 940 1200 1850 1145 555 1775 1695

The current position is 1197 and the previous request was served at 1100. For each of the following disk scheduling algorithms, compute the total distance (in tracks) that the disk arm would move. Include the calculation steps in your answers.

4.1 First-In-First-Out (FIFO) (2)

4.2 Shortest-Service-Time-First (SSTF) (2)

4.3 SCAN (No LOOK variation) (2)

4.4 C-SCAN (No C-LOOK variation) (2)