Theory Assignment 3

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Question 1:

A)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 0 | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 2 | 3 | 6 | 7 | 6 | 7 | 0 | 1 | 2 | 3 | 4 |
| 0 | 0\* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3\* | 3 | 3 | 3 | 3 | 0\* | 0 | 0 | 3\* | 3 |
| 1 |  | 1\* | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 6\* | 6 | 6 | 6 | 6 | 1\* | 1 | 1 | 4\* |
| 2 |  |  | 2\* | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 7\* | 7 | 7 | 7 | 7 | 2\* | 2 | 2 |

B)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 0 | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 2 | 3 | 6 | 7 | 6 | 7 | 0 | 1 | 2 | 3 | 4 |
| 0 | 0\* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1\* | 1 | 1 | 4\* |
| 1 |  | 1\* | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 7\* | 7 | 7 | 7 | 7 | 2\* | 2 | 2 |
| 2 |  |  | 2\* | 2 | 2 | 2 | 2 | 2 | 2 | 3\* | 6\* | 6 | 6 | 6 | 6 | 6 | 6 | 3\* | 3 |

C)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 0 | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 2 | 3 | 6 | 7 | 6 | 7 | 0 | 1 | 2 | 3 | 4 |
| 0 | 0\* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3\* | 3 | 3 | 3 |  | 0\* | 0 | 0 | 3\* | 3 |
| 1 |  | 1\* | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 6\* | 6 | 6 | 6 | 6 | 1\* | 1 | 1 | 4\* |
| 2 |  |  | 2\* | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 7\* | 7 | 7 | 7 | 7 | 2\* | 2 | 2 |
| Alloc. | 1 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 2 | 3 | 3 | 3 |

Question 2

A) An advantage of this strategy is that it is fast than having it off the CPU the CPU memory is quick to access

B) A disadvantage is that it takes up some of the very limited amount of main memory instead of placing it on the very large secondary memory

Question 3:

Question 4:

i) When TPF is greater than Tfs the performance will work best since there is time between the page fault service time and the time till the next page fault, meaning the degree of multiprogramming can be relatively good

ii) When it is smaller, the chance of having time to service actual processes goes very low. Therefore allow the lowest degree of multiprogramming bringing it very very close to not being able to use multiprogramming

iii) When they are equal, it gives a better degree than when it is lower but it is still very low degree.

Question 5:

A) Preemption indicates that a running process can be removed from the CPU so another process can run. Non-preemptive doesn’t allow you to do so. In a way it allow the implementation of priority. If a system is providing both batch and timesharing it needs to be able to switch out processes to allow others to run the only way to do so would be by using a preemptive schedule.

B) The trade off for quantum size is that the smaller the quantum size the more context switches there will be. The bigger the quantum size the less context switches giving better performance.

Question 6:

Having different quantum sizes on each level allows a certain priority amongst the levels. It ensures that the higher (more important levels) have more time to process. So there will be fairness between processes in the same level but not between levels. There will not be starvation because you are allowing each process to go at least for a given amount of time (lower priority lower amount of time).

Question 7:

i) Opening the file reference the first time it opens and closing it when it terminates is advantageous because it will minimize the I/O functions since it will not wait for the user to explicitly open and close files. Giving better performance

ii) The disadvantage is that if the file goes into an infinite loop the system will crash. The other files have to wait until the process is completely finished before starting. Essentially causing possible starvation

Question 8:

A)

FCFS

0 20 35 57 63 75

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| P0 | P1 | P2 | P3 | P4 |

SJN

0 6 18 33 53 75

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| P3 | P4 | P1 | P0 | P2 |

Priority

0 15 27 47 69 75

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| P1 | P4 | P0 | P2 | P3 |

RR

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| P0 | P1 | P2 | P3 | P4 | P0 | P1 | P2 | P3 | P4 | P0 | P1 | P2 | P4 | P0 | P1 | P2 | P4 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| P0 | P1 | P2 | P0 | P2 | P0 | P2 | P2 |

B) Wait Time

FCFS: P0 = 0 P1= 20 P2 = 35 P3 = 57 P4 = 63

SJN: P0 = 33 P1= 18 P2 = 53 P3 = 0 P4 = 6

Prior. P0 = 27 P1= 0 P2 = 47 P3 = 69 P4 = 15

RR: P0 = 51 P1= 45 P2 = 54 P3 = 21 P4 = 42

C) Response Time

FCFS: P0 = 0 P1= 20 P2 = 35 P3 = 57 P4 = 63

SJN: P0 = 33 P1= 18 P2 = 53 P3 = 0 P4 = 6

Prior. P0 = 27 P1= 0 P2 = 47 P3 = 69 P4 = 15

RR: P0 = 0 P1= 3 P2 = 6 P3 = 9 P4 = 12

D) Turnaround Time

FCFS: P0 = 20 P1= 35 P2 = 57 P3 = 63 P4 = 75

SJN: P0 = 53 P1= 33 P2 = 75 P3 = 6 P4 = 18

Prior. P0 = 47 P1= 15 P2 = 69 P3 = 75 P4 = 27

RR: P0 = 69 P1= 60 P2 = 75 P3 = 27 P4 = 54