CS 149 HW 2

Sung Chi

Benton Li

Kevin Daniels

Paul Huang

Manpreet Sran

Brett Albano

**Final Outputs and Report**

**Outputs for Each Algorithm**

1. First-come first-served (FCFS)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | 1 | 2 | 3 | 4 | 5 | average |
| turnaround time | 59.48 | 55.10 | 52.12 | 52.60 | 49.41 | 53.742 |
| waiting time | 54.18 | 49.92 | 47.31 | 57.68 | 44.64 | 50.746 |
| response time | 5.3 | 5.18 | 5.03 | 5.07 | 4.8 | 5.076 |

1. Shortest job first (SJF)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | 1 | 2 | 3 | 4 | 5 | average |
| turnaround time | 35.83 | 33.95 | 35.63 | 32.04 | 36.06 | 34.702 |
| waiting time | 30.73 | 29.09 | 30.73 | 27.47 | 31.15 | 29.834 |
| response time | 5.09 | 4.86 | 4.90 | 4.57 | 4.9 | 4.864 |

1. Shortest remaining time (SRT)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | 1 | 2 | 3 | 4 | 5 | average |
| turnaround time | 26.4997 | 39.17 | 44.199 | 37.09 | 36.34 | 36.659 |
| waiting time | 22.78 | 33.828 | 38.49 | 32.101 | 31.48 | 31.73 |
| response time | 3.718 | 5.349 | 5.708 | 4.989 | 4.857 | 4.9242 |

1. Round robin (RR)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | 1 | 2 | 3 | 4 | 5 | average |
| turnaround time | 77.07 | 77.1513 | 72.473 | 64.3011 | 77.8377 | 73.766 |
| waiting time | 71.876 | 71.7259 | 67.38 | 59.533 | 72.64722 | 62.63 |
| response time | 5.199 | 5.425 | 5.09 | 4.767 | 5.19 | 5.1342 |

1. Highest priority first (HPF) preemptive

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | 1 | 2 | 3 | 4 | 5 | average |
| turnaround time | 47.105 | 54.25 | 68.806 | 72.26 | 62.11 | 60.906 |
| waiting time | 42.67 | 49.54 | 62.98 | 66.72 | 57.615 | 55.905 |
| response time | 4.43 | 4.706 | 5.825 | 5.43 | 4.495 | 4.9772 |

1. Highest priority first (HPF) non- preemptive

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | 1 | 2 | 3 | 4 | 5 | average |
| turnaround time | 60.86 | 54.94 | 50.82 | 58.39 | 59.50 | 56.902 |
| waiting time | 55.18 | 50.02 | 46.02 | 52.49 | 53.74 | 51.49 |
| response time | 5.68 | 4.92 | 4.81 | 5.90 | 5.76 | 5.414 |

**Conclusion**

From our results, it is clear that Shortest Job First (and followed closely by another version of SJF, Shortest Remaining Job) are the best algorithms if you want the lowest turnaround, waiting, and response times. SJF is much more efficient because moving a short process before a long one decreases the overall waiting time of the rest of the short processes more than it increases the waiting time for the following long processes. It ultimately gives the minimum average waiting time for all the processes you inputted. The downside of this is, you need to give all of the jobs/processes at once with their estimated runtimes, otherwise the CPU will not be able to figure out which job to execute in which order. You must take into account equal CPU times for multiple processes. If more than 1 process shares the same CPU burst time, FCFS is used.

The other algorithms are much slower because they disregard process time and only rely on either priority, the order in which the job was submitted, or using Round Robin to equally share CPU time between processes. These algorithms ultimately produce a much higher average statistic because they are not meant to create the fastest turnaround. The throughput for these jobs are lower because they prioritize jobs using other variables, such as priority level or input order.

There is no one best algorithm to solve every problem you have. Some OS’s may use time sharing, others may use raw throughput. Depending on the goal you want to achieve with your OS, you need to consider all options and weigh the pros and cons with every algorithm because they each serve a different purpose.