

SYSC 4001

## Assignment 3 REPORT

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## **SYSC 4001 Assignment 3:**

This assignment talks about how concurrency, shared memory, virtual memory, files work and part 1's goal was to build a small Scheduler Simulator using the given code template and run them using test run cases using 3 algorithms that are EP (external priority), RR (Round Robin) and EP-RR scheduler respectively. The goal was to understand how each scheduler works when processes change due to different factors such as the CPU-bound, I/O bound, mixed and then use metrics like waiting time, turnaround time, response time to analyze the results.

After running all the simulation traces and generating the transition logs, we were able to clearly see how differently each scheduler behaves depending on the process characteristics and system load.

EP selects the next process based only on priority (PID) and it doesn't pre-empt processes once they start running unless if they get blocked for I/O operations. In this assignment, we found out that small and early processes ran extremely fast due to its high priority whereas the larger CPU-bound processes were delayed since EP refuses to give them CPU until all higher-priority jobs finish.

RR on the other hand gives each process its fair chance of the CPU. The time quantum for this assignment was 100ms so after that time, the next process gets its chance. We found out that this only works best if the system has many long CPU-bound tasks thus not making it the fastest.

EP-RR behaves like EP when selecting which process should run, but in mid-process, it behaves like RR by allowing pre-emption and with the help of Time Quantum. We came to a conclusion that the EP-RR hybrid is better when compared to all the 3 algorithms due to its versatility.

In terms of the waiting time, EP had very low waiting time for high-priority jobs whereas extremely high waiting time for larger jobs. RR produced consistent waiting times, and the hybrid EP-RR was the most balanced since the waiting times were reasonable for all processes.

In terms of the turnaround time, for EP all the small jobs were finished quickly meanwhile the big jobs took very long. RR's turnaround time was consistent due to constant rotation and EP-RR hybrid was the most balanced here as well due to its versatility.

In terms of response time, EP: lowest for high-priority jobs, RR's response time was the same (consistent like previous ones) and for EP-RR: ( EP – small jobs, RR – big jobs).

In terms of throughput, based on the traces EP-RR hybrid was the best and EP was the worst due to mixed workloads.

```
===== METRICS REPORT =====  
  
Process 1:  
  Arrival Time      : 0  
  Start Time       : 0  
  Finish Time      : 722  
  Waiting Time     : 162  
  Response Time    : 0  
  Turnaround Time  : 722  
  
Process 2:  
  Arrival Time      : 3  
  Start Time       : 21  
  Finish Time      : 748  
  Waiting Time     : 225  
  Response Time    : 18  
  Turnaround Time  : 745  
  
Process 3:  
  Arrival Time      : 5  
  Start Time       : 47  
  Finish Time      : 779  
  Waiting Time     : 249  
  Response Time    : 42  
  Turnaround Time  : 774  
  
===== AVERAGES =====  
Average Waiting Time : 212.00  
Average Response Time : 20.00  
Average Turnaround Time : 747.00  
Throughput : 0.0039 processes per time unit  
=====
```

This is an example of the metrics report that we obtained.