Operativsystemer øving 3

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1 Utskrift av programmet

```
Simulating.....done.

Simulation statistics:

Number of completed processes:                                  45
Number of created processes:                                    52
Number of (forced) process switches:                            272
Number of processed I/O operations:                             477
Average throughput (processes per second):                      0.18

Total CPU time spent processing:                                231545 ms
Fraction of CPU time spent processing:                          92.618%
Total CPU time spent waiting:                                   18455 ms
Fraction of CPU time spent waiting:                             7.382%

Largest occuring memory queue length:                           10
Average memory queue length:                                    3.323968
Largest occuring cpu queue length:                              6
Average cpu queue length:                                       3.56904
Largest occuring I/O queue length:                              4
Average I/O queue length:                                       0.167752
Average # of times a process has been placed in memory queue:   1
Average # of times a process has been placed in cpu queue:      17.066668
Average # of times a process has been placed in I/O queue:      10.377778

Average time spent in system per process:                       43092 ms
Average time spent waiting for memory per process:              15372 ms
Average time spent waiting for cpu per process:                 19229 ms
Average time spent processing per process:                      5145 ms
Average time spent waiting for I/O per process:                 926 ms
Average time spent in I/O per process:                          2419 ms
```

2 Eksperimentering etc

Hvis man setter opp maxCPUTime mye, gjør det at prosessoren sjeldent trenger å vente mye. Da får man en utskrift lignende:

```
Simulating.....done.

Simulation statistics:

Number of completed processes:                                  40
Number of created processes:                                    55
Number of (forced) process switches:                            13
Number of processed I/O operations:                             598
Average throughput (processes per second):                      0.16

Total CPU time spent processing:                                205306 ms
Fraction of CPU time spent processing:                          82.1224%
Total CPU time spent waiting:                                   44694 ms
Fraction of CPU time spent waiting:                             17.8776%

Largest occuring memory queue length:                           9
Average memory queue length:                                    1.587588
Largest occuring cpu queue length:                              7
Average cpu queue length:                                       2.546908
Largest occuring I/O queue length:                              6
Average I/O queue length:                                       0.49768
Average # of times a process has been placed in memory queue:   1
Average # of times a process has been placed in cpu queue:      11.725
Average # of times a process has been placed in I/O queue:      10.4

Average time spent in system per process:                       22272 ms
Average time spent waiting for memory per process:              3910 ms
Average time spent waiting for cpu per process:                 9426 ms
Average time spent processing per process:                      5132 ms
Average time spent waiting for I/O per process:                 1429 ms
Average time spent in I/O per process:                          2373 ms
```

Vi ser at prosessoren slipper sjeldnere å bytte prosesser som fjerner en del overhead prosessering, men det gjør til at en prosess kan holde CPU'en veldig lenge uten at andre slipper til. Det gjør at programmer som er veldig IO-krevende taper mye på dette, ettersom at de ofte må hoppe ut. En løsning til dette er å lage en egen prioriteringskø for dem som kommer ut av IO.

Endring av memorysize så jeg ikke mye forskjell på, ettersom at størrelsen prosessene tar avhenger av hvor stor memorysize er (I denne øvelsen)

Endring av avgIOTime førte til at antall IO operasjoner økte mye mer. Det førte ikke til så mye mer, ettersom at vi ikke tok med overhead tid det tar med å bytte prosesser / gå til IO.

```
Simulating.....done.

Simulation statistics:

Number of completed processes:                                  48
Number of created processes:                                    52
Number of (forced) process switches:                            234
Number of processed I/O operations:                             811
Average throughput (processes per second):                      0.192

Total CPU time spent processing:                                211013 ms
Fraction of CPU time spent processing:                          84.4052%
Total CPU time spent waiting:                                   38987 ms
Fraction of CPU time spent waiting:                             15.5948%

Largest occuring memory queue length:                           5
Average memory queue length:                                    0.901084
Largest occuring cpu queue length:                              7
Average cpu queue length:                                       3.684692
Largest occuring I/O queue length:                              4
Average I/O queue length:                                       0.04064
Average # of times a process has been placed in memory queue:   1
Average # of times a process has been placed in cpu queue:      18.833334
Average # of times a process has been placed in I/O queue:      13.291667

Average time spent in system per process:                       24800 ms
Average time spent waiting for memory per process:              3995 ms
Average time spent waiting for cpu per process:                 15621 ms
Average time spent processing per process:                      4396 ms
Average time spent waiting for I/O per process:                 121 ms
Average time spent in I/O per process:                          664 ms
```