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**Benchmark and Analysis Report**

For this simulation, our group decided to run multiple simulations with our processors. We began with 1 CPU and kept incrementing until we hit 4 CPU’s. To implement the graphs, we ran the simulation first only with 1 CPU and calculated the Throughput time, Wait time, number of context switches, total CPU time and total IO time. We then ran the simulation multiple times with different number of CPU’s ranging from 1-4 and collected the data. Then for each simulation, we calculated the average for each output such as average for Throughput time etc, and finally used those averages to plot the graph with the number of CPU’s.

Secondly, the data for the number of processes was printed in other external files where we ran the simulation further to get the data for processes with and without timeouts, where the timeouts ranged from 5 to 25 timeouts. Lastly, for the processes, we calculated the busy (running) time and the idle time for the processors. Another thing to note here is that there was only one time interval for process 1, 2 for process 2, 3 for process 3 and so on, therefore, we calculated the average of times for number of processes more than one and then calculated the average of all towards to end to map the data on the graph.

**Observation:**

* Throughout the simulation, the number of context switches, total CPU time and total IO time remained the same regardless of the number of CPU’s running simultaneously.
* The average Throughput time decreased almost by half for the number of CPU’s decreasing by 1 except for the CPU count dropping for 2 to 1.
* The average wait time also decreased significantly as the number of CPU’s increased. A huge drop from 4 to 3 and then 3 to 2 CPU’s.
* For the number of processes, the data also kept decreasing with the greater number of CPU’s.
* Lastly, the average idle time was the only thing that was increasing as the number of CPU’s were increased.

**From all these observations, it can be concluded that the more the number of CPU’s the quicker and the more efficient the simulation is. Please refer to the excel sheet and the graph for exact numbers.**