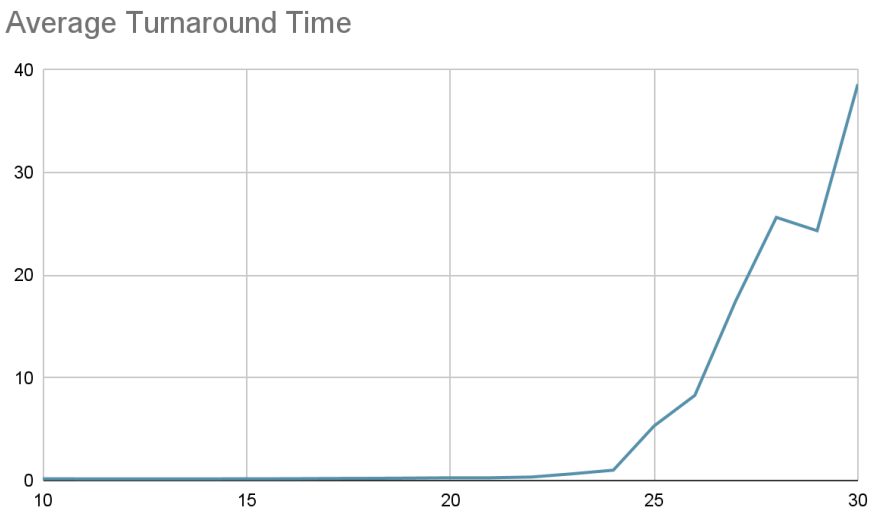
Introduction:

- Objective: Build a discrete-event simulator for a First-Come-First-Served CPU scheduling system. Analyze how different workloads impact the following metricsL
    - Average turnaround time of processes
    - Throughput
    - CPU utilization
    - Average number of processes in the Ready Queue
- To accomplish this, the program will generate arrival and service times based on a Poisson and Exponential distribution respectively, and vary the arrival rate (lambda) from 10 to 30 while keeping service time fixed at 0.04 seconds.

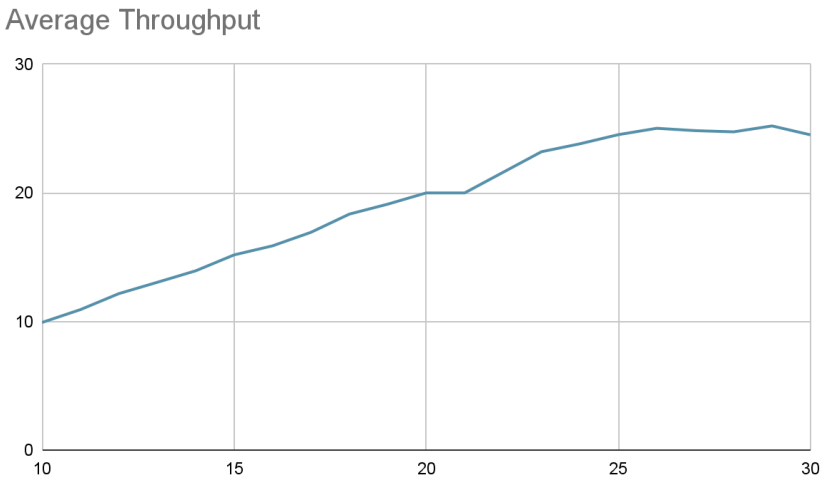
Submitted Files:

- Main.cpp: Main program which takes command line arguments and runs the simulation.
- Simulation.cpp: Constructor and implementation of the functions listed in Simulation.h.
- Simulation.h: Function prototypes and member variables for the Simulation class.
- Event.h: Header file that implements the Event structure.

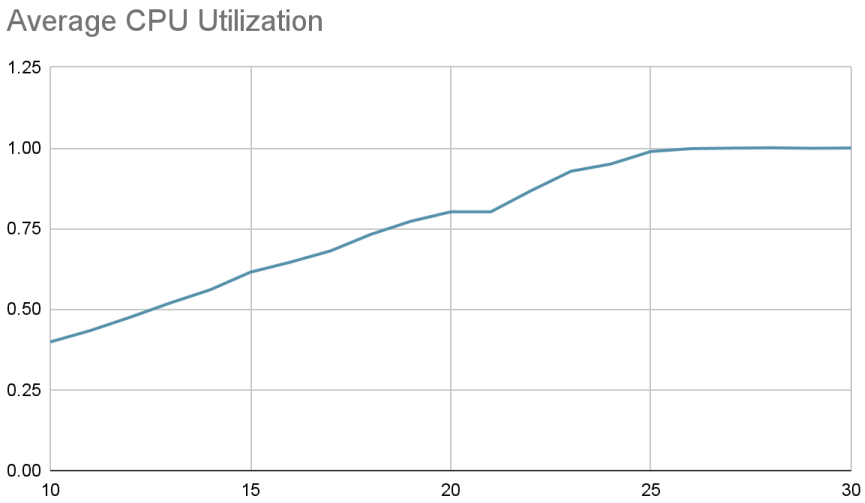
Plots:



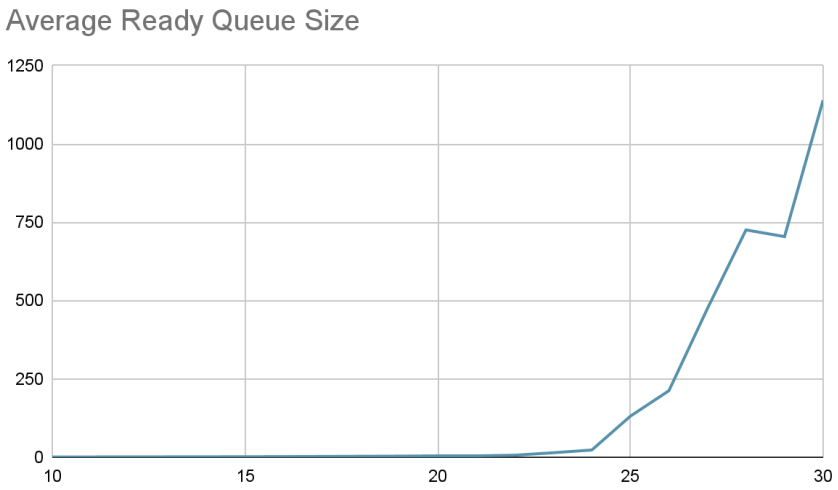
- Turnaround time increases at a steady rate as lambda increases. However, once lambda approaches the system's capacity (lambda > 25), the turnaround time drastically increases as processes enter the system faster than they are being serviced.



- Throughput steadily increases as lambda increases until it reaches the system's capacity. Afterward, throughput stabilizes at its maximum even as lambda continues to increase.



- CPU utilization increases alongside lambda until reaching the systems capacity, reaching nearly 100%, indicating full CPU usage.



- Ready Queue Size slightly increases as lambda increases up until reaching the system's capacity. After exceeding capacity, the ready queue size drastically increases due to processes entering the system faster than they are being serviced.

Plotted Data:

Lambda	Turnaround	Throughput	CPU Utilz	RQ Size
10	0.171381	9.91921	0.398698	0.700005
11	0.161254	10.9201	0.4339	0.760912
12	0.155994	12.1639	0.47545	0.897528
13	0.160193	13.0437	0.519735	1.09033
14	0.1617	13.9377	0.560626	1.25373
15	0.166343	15.1759	0.615045	1.52453
16	0.17427	15.8806	0.646076	1.76758
17	0.196448	16.9322	0.680916	2.32697
18	0.210168	18.3487	0.73189	2.8571
19	0.232084	19.1231	0.772566	3.44919
20	0.265137	19.9968	0.801913	4.30216
21	0.265137	19.9968	0.801913	4.30216
22	0.340738	21.5987	0.867103	6.35955
23	0.654018	23.1991	0.927609	14.2079
24	1.00773	23.8161	0.950301	23.001
25	5.31554	24.5279	0.98902	131.026
26	8.29549	25.0219	0.997859	212.276
27	17.4742	24.8398	0.999382	474.682
28	25.6359	24.7451	1.0004	725.538
29	24.3376	25.2056	0.99903	704.213
30	38.6172	24.5124	0.999763	1139.32