SYSC 4001: Assignment 3
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Part 1 Report

Test 1: CPU only, Short Bursts, Staggered Arrivals

Scheduler	Throughput (ms)	Avg. Wait Time (ms)	Avg. Turnaround Time (ms)	Avg. I/O Response Time (ms)
EP	0.001905	792.5	1317.5	0
RR	0.001905	792.5	1317.5	0
EP & RR	0.001905	742.5	1267.5	0

Analysis:
All three schedulers achieved the same throughput. EP & RR delivered a slight improvement in performance, resulting in the lowest average wait time and average turnaround time, while EP and RR performed identically on all metrics.

Test 2: Long CPU Bursts, Single I/O

Scheduler	Throughput (ms)	Avg. Wait Time (ms)	Avg. Turnaround Time (ms)	Avg. I/O Response Time (ms)
EP	0.00125	1201.67	2006.67	0
RR	0.00125	823.33	1623.33	0
EP & RR	0.00125	756.67	1556.67	0

Analysis:
Throughput was identical for all schedulers. EP & RR demonstrated the best performance with the lowest average wait time and average turnaround time, followed closely by RR. EP was significantly outperformed by the other two in both of the time based metrics.

Test 3: Varied CPU Bursts, Mixed I/O

Scheduler	Throughput (ms)	Avg. Wait Time (ms)	Avg. Turnaround Time (ms)	Avg. I/O Response Time (ms)

EP	0.001124	2234	3130	0
RR	0.001124	1820	2710	0
EP & RR	0.001124	1830	2720	0

Analysis:
The throughput was the same across all three schedulers. RR and EP & RR showed comparable and superior performance, with RR achieving the lowest average wait time and average turnaround time. EP recorded the highest wait time and turnaround time, indicating the poorest result for this workload.

Test 4: Simultaneous Arrivals, CPU only, Varied Sizes

Scheduler	Throughput (ms)	Avg. Wait Time (ms)	Avg. Turnaround Time (ms)	Avg. I/O Response Time (ms)
EP	0.001	1800	2800	0
RR	0.001	1800	2800	0
EP & RR	0.001	2200	3200	0

Analysis:
All schedulers maintained an identical throughput. Both EP and RR performed identically and superiorly to EP & RR, achieving lower average wait time and average turnaround time, while EP & RR had the highest values for these metrics.

Test 5: Staggered Arrivals, Medium Bursts, Frequent I/O

Scheduler	Throughput (ms)	Avg. Wait Time (ms)	Avg. Turnaround Time (ms)	Avg. I/O Response Time (ms)
EP	0.001481	2055	2736.67	0
RR	0.001481	1695	2370	0
EP & RR	0.001481	1645	2320	0

Analysis:

Throughput remained consistent across all schedulers. EP & RR delivered the best performance with the lowest average wait time and average turnaround time. RR was the next best, with EP recording the highest average wait and turnaround times.

Test 6: Large Arrival Gaps, Infrequent I/O

Scheduler	Throughput (ms)	Avg. Wait Time (ms)	Avg. Turnaround Time (ms)	Avg. I/O Response Time (ms)
EP	0.001905	991.25	1526.25	0
RR	0.001905	720	1245	0
EP & RR	0.001905	770	1295	0

Analysis:
All three schedulers produced the same throughput. RR was the most effective, resulting in the lowest average wait time and average turnaround time, with EP & RR close behind. EP was the least effective with the highest wait and turnaround times.

Test 7: Large Process Sizes, Long CPU Bursts

Scheduler	Throughput (ms)	Avg. Wait Time (ms)	Avg. Turnaround Time (ms)	Avg. I/O Response Time (ms)
EP	0.000714	1423.33	2823.33	0
RR	0.000714	1423.33	2823.33	0
EP & RR	0.000714	1456.67	2856.67	0

Analysis:
Throughput was consistent across the board. EP and RR performed identically and marginally better than EP & RR, which registered slightly higher average wait time and average turnaround time.

Test 8: Frequent I/O, Short CPU Bursts

Scheduler	Throughput (process/ms)	Avg. Wait Time (ms)	Avg. Turnaround Time (ms)	Avg. I/O Response Time (ms)
EP	0.004706	124.25	809.25	85

RR	0.004706	122.75	807.75	84.81
EP & RR	0.003683	230	818.75	88.12

Analysis:
RR achieved the best performance with the lowest average wait time, average turnaround time, and average I/O response time, while sharing the highest throughput with EP. EP & RR had the lowest throughput and significantly higher average wait time.

Test 9: Very Short Bursts, Very Frequent I/O

Scheduler	Throughput (ms)	Avg. Wait Time (ms)	Avg. Turnaround Time (ms)	Avg. I/O Response Time (ms)
EP	0.005531	128.4	843.8	63.48
RR	0.005171	116	831.4	62.42
EP & RR	0.004808	185.6	767.2	61.6

Analysis:
EP attained the highest throughput. RR had the lowest average wait time and the second highest throughput. EP & RR secured the lowest average turnaround time and average I/O response time, but also recorded the lowest throughput and the highest average wait time.

Test 10: Medium CPU Bursts, Moderate I/O

Scheduler	Throughput (ms)	Avg. Wait Time (ms)	Avg. Turnaround Time (ms)	Avg. I/O Response Time (ms)
EP	0.002849	83	1013	106.29
RR	0.002849	83	1013	106.29
EP & RR	0.002786	103.33	983.33	113.64

Analysis:
EP and RR performed identically with higher throughput and lower average wait and I/O response times. EP & RR, despite having slightly lower throughput and higher average wait and I/O response times, achieved the lowest average turnaround time.

Test 11: Many Processes, Simultaneous, Frequent I/O

Scheduler	Throughput (ms)	Avg. Wait Time (ms)	Avg. Turnaround Time (ms)	Avg. I/O Response Time (ms)
EP	0.00738	143.67	645.83	54.19
RR	0.008345	167.17	669.33	56
EP & RR	0.006704	212.67	628.17	50.65

Analysis:
RR achieved the highest throughput. EP & RR delivered the best average turnaround time and lowest average I/O response time, but also resulted in the highest average wait time and the lowest throughput.

Test 12: Long I/O Wait Times

Scheduler	Throughput (ms)	Avg. Wait Time (ms)	Avg. Turnaround Time (ms)	Avg. I/O Response Time (ms)
EP	0.003709	131	1269.4	76.57
RR	0.003709	131	1269.4	76.57
EP & RR	0.003544	270.4	1231.6	73.7

Analysis:
EP and RR shared the highest throughput and had identical, low average wait times. EP & RR achieved the best average turnaround time and average I/O response time, but its average wait time was significantly higher than the other two.

Test 13: Staggered I/O, Medium Bursts

Scheduler	Throughput (ms)	Avg. Wait Time (ms)	Avg. Turnaround Time (ms)	Avg. I/O Response Time (ms)
EP	0.004556	128.25	793.75	101.85
RR	0.004556	128.25	793.75	101.85
EP & RR	0.004556	191.25	764.5	87.9

Analysis:

All schedulers maintained the same throughput. EP and RR had identical, lower average wait times. EP & RR, however, achieved the lowest average turnaround time and the best average I/O response time, despite having the highest average wait time.

Test 14: Large Sizes, Long I/O Waits

Scheduler	Throughput (ms)	Avg. Wait Time (ms)	Avg. Turnaround Time (ms)	Avg. I/O Response Time (ms)
EP	0.002899	267	1320.75	138
RR	0.002899	267	1320.75	138
EP & RR	0.002188	304.5	1302	118.17

Analysis:
EP and RR shared the highest throughput and had lower average wait times. EP & RR demonstrated the lowest average turnaround time and the best average I/O response time but had the lowest throughput among the three.

Test 15: Alternating CPU only and I/O Processes

Scheduler	Throughput (ms)	Avg. Wait Time (ms)	Avg. Turnaround Time (ms)	Avg. I/O Response Time (ms)
EP	0.00224	675.75	1259.5	102.25
RR	0.00224	675.75	1259.5	102.25
EP & RR	0.002122	617.5	1201.25	66.5

Analysis:
EP and RR achieved identical and higher throughput. EP & RR provided the best performance in all time-based metrics, with the lowest average wait time, average turnaround time, and a significantly lower average I/O response time.

Test 16: Varied Mix, Different Sizes

Scheduler	Throughput (ms)	Avg. Wait Time (ms)	Avg. Turnaround Time (ms)	Avg. I/O Response Time (ms)
EP	0.001873	1184	2020	291.36

RR	0.001859	1187	2023	285
EP & RR	0.001672	1054	1890	102.73

Analysis:
EP had the highest throughput. EP & RR showed the best time based performance with the lowest average wait time, average turnaround time, and a substantially lower average I/O response time, though it had the lowest throughput. RR performed the worst on the time-based metrics.

Test 17: Many Processes, Alternating Workload Types

Scheduler	Throughput (ms)	Avg. Wait Time (ms)	Avg. Turnaround Time (ms)	Avg. I/O Response Time (ms)
EP	0.001924	1705	2385	271.25
RR	0.001924	1709.83	2389.83	268.96
EP & RR	0.002	1106.67	1786.67	55

Analysis:
EP & RR was the best overall performer, achieving the highest throughput, the lowest average wait time, the lowest average turnaround time, and a significantly superior average I/O response time. EP and RR were similar to each other but notably worse than EP & RR.

Test 18: Heavy I/O with Long CPU

Scheduler	Throughput (ms)	Avg. Wait Time (ms)	Avg. Turnaround Time (ms)	Avg. I/O Response Time (ms)
EP	0.001526	1331.75	2133	179.38
RR	0.001517	1225.75	2022	124.12
EP & RR	0.001463	1080	1876.25	66.5

Analysis:
EP achieved the highest throughput. EP & RR exhibited the best overall time-based performance with the lowest average wait time, average turnaround time, and best average I/O response time, despite having the lowest throughput. RR was the intermediate performer.

Test 19: Simultaneous Mixed Workloads

Scheduler	Throughput (ms)	Avg. Wait Time (ms)	Avg. Turnaround Time (ms)	Avg. I/O Response Time (ms)
EP	0.002263	1334.33	1977	161.21
RR	0.0023	1336.67	1976.67	164.42
EP & RR	0.002066	1088.33	1728.33	52

Analysis:
RR recorded the highest throughput. EP & RR demonstrated the best performance across all time-based metrics (lowest average wait time, average turnaround time, and average I/O response time), but had the lowest throughput. EP and RR were otherwise similar in performance.

Test 20: Staggered Mixed, Large CPU Variations

Scheduler	Throughput (ms)	Avg. Wait Time (ms)	Avg. Turnaround Time (ms)	Avg. I/O Response Time (ms)
EP	0.001586	954.75	1796	257.25
RR	0.00165	958.25	1794.5	234.5
EP & RR	0.001878	680	1516.25	96.5

Analysis:
EP & RR showed the best overall performance, achieving the highest throughput, the lowest average wait time, the lowest average turnaround time, and the best average I/O response time. EP and RR had similar, lesser performance compared to EP & RR.