This report analyzes the performance of an operating system simulator designed to manage processes using three distinct scheduling algorithms and fixed partition memory management.

Scheduling algorithms evaluated:

1. External Priorities (EP) - A non preemptive algorithm where the CPU is assigned to the process with the highest priority. (lowest PID)
2. Round Robin (RR) - A preemptive algorithm with a time quantum of 100ms, designed to improve response time for interactive processes.
3. External Priorities with Round Robin (EP-RR) - A hybrid approach that respects priorities but uses time quantums to prevent CPU monopolization by high priority processes.

Metric	EP	RR	EP-RR
Total time	1286ms	1337ms	1269ms
Throughput	0.0054 proc/ms	0.0052 proc/ms	0.0055 proc/ms
Avg. Turnaround Time	685ms	722ms	650ms
Avg Response Time	350ms	155ms	310ms

Round Robin (RR) provided the best average response time (155). This is consistent with the theory that RR is optimized for time sharing systems where low response time to the user is critical.

Hybrid (EP-RR) algorithm provided the best throughput/Efficiency and lowest simulation time. With preemption, it prevented lower priority CPU tasks from blocking high priority tasks, while the priority mechanism ensured critical tasks finished faster than RR.

External Priorities performed adequately but lower priority processes waited significantly longer, driving up the average wait time.

For I/O, Round Robin performed the best as I/O bound processes tend to have short CPU bursts. RR allowed them to execute their burst before the quantum expired.

The simulation code implemented a best fit strategy as it iterated through the partitions to find the smallest partition that is large enough to hold the process. In test_mixed_1, process 36 (10MB) was placed into partition 4 (10MB), which is a perfect fit. Best fit would ideally produce the smallest leftover hole, preserving larger holes for larger processes.

The simulation demonstrates that while Round Robin offers superior response times for users, a priority based approach such as the Hybrid (EP-RR) offers better overall system throughput for a mixed workload.