

UCI CS 143 W'12

Operating Systems

Project: Scheduling Algorithms

Programming & Analysis

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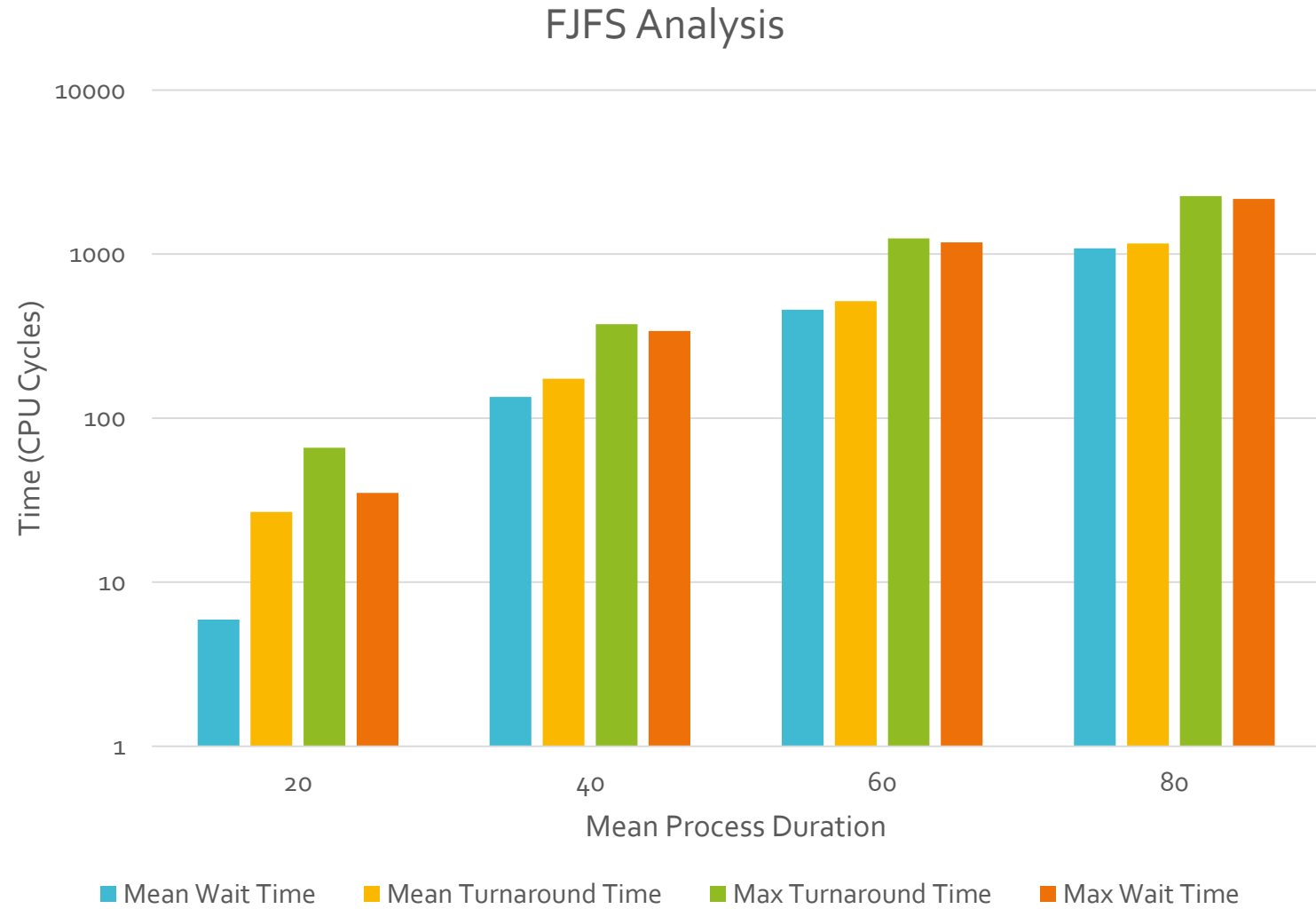
Observations

- Preemptive vs. non-preemptive
 - Response time == wait time for non-PE algos
 - Response time < wait time for PE
 - With small sigma, PE converge on non-PE algos
 - After all jobs are in queue, PE/non-PE are equal
 - PE advantage is larger when:
 - Std. deviation of job times/prios is large (bigger chance of being preempted)
 - Jobs enter queue slowly (once queue is filled, PE==non-PE)
- When jobs execute faster than they arrive, FCFS, SJFS, Prio all converge to FCFS (i.e. for job size == 20)
 - As job size increases, algos diverge
- SJFS may do arbitrarily better or worse depending on when short/long jobs arrive (i.e. badly if lots of short jobs come at the end, and jobs come in fast. First jobs will wait a long time)

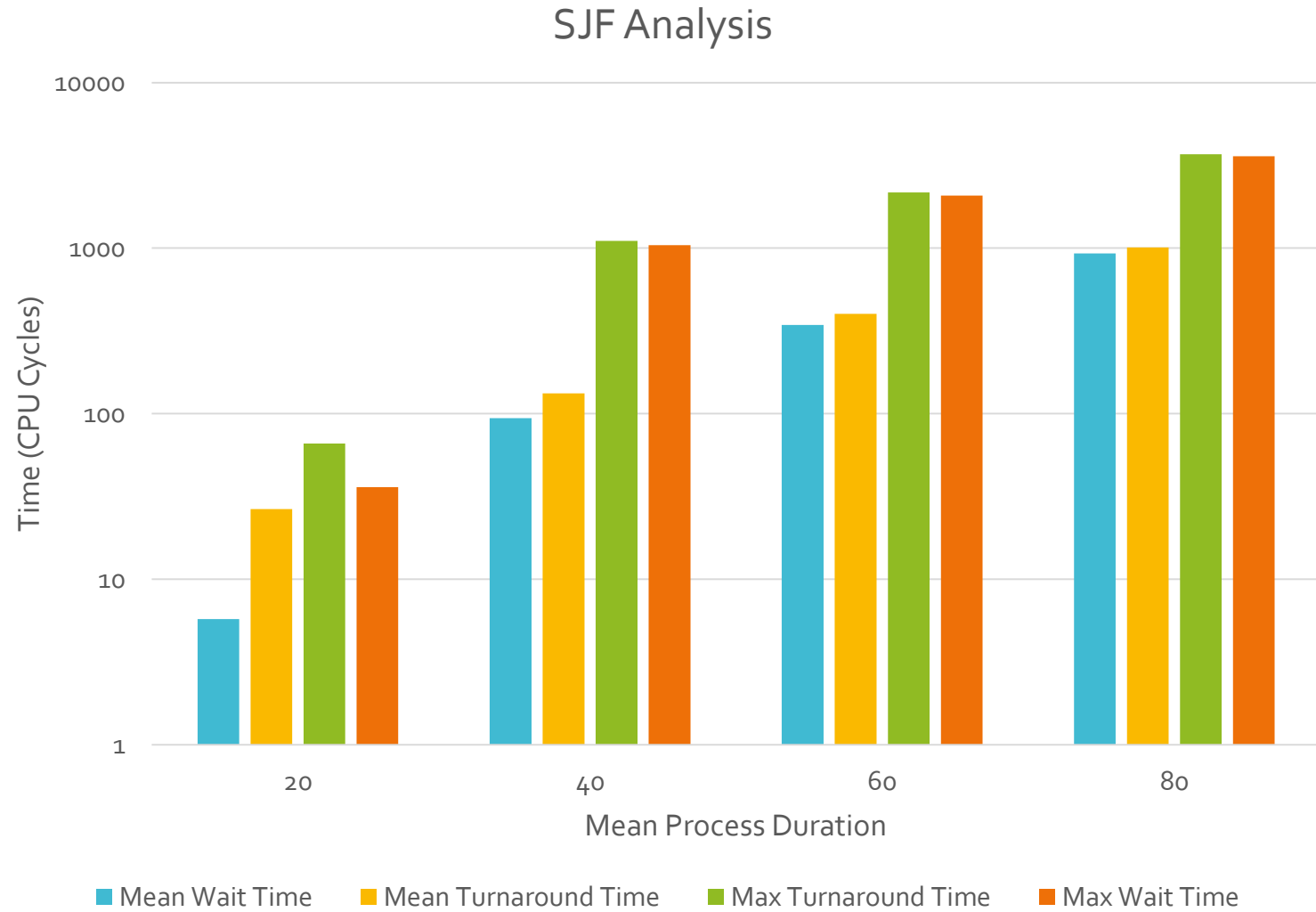
More Observations

- Essentially two regimes:
 - Jobs still entering queue (R1)
 - All jobs in queue (R2)
 - May be that different algos are optimal in each regime
 - FCFS optimal for R2 since at this point it makes sense to target jobs in order with highest wait + turn times already? Or SJFS?
 - What is optimal

FJFS Results



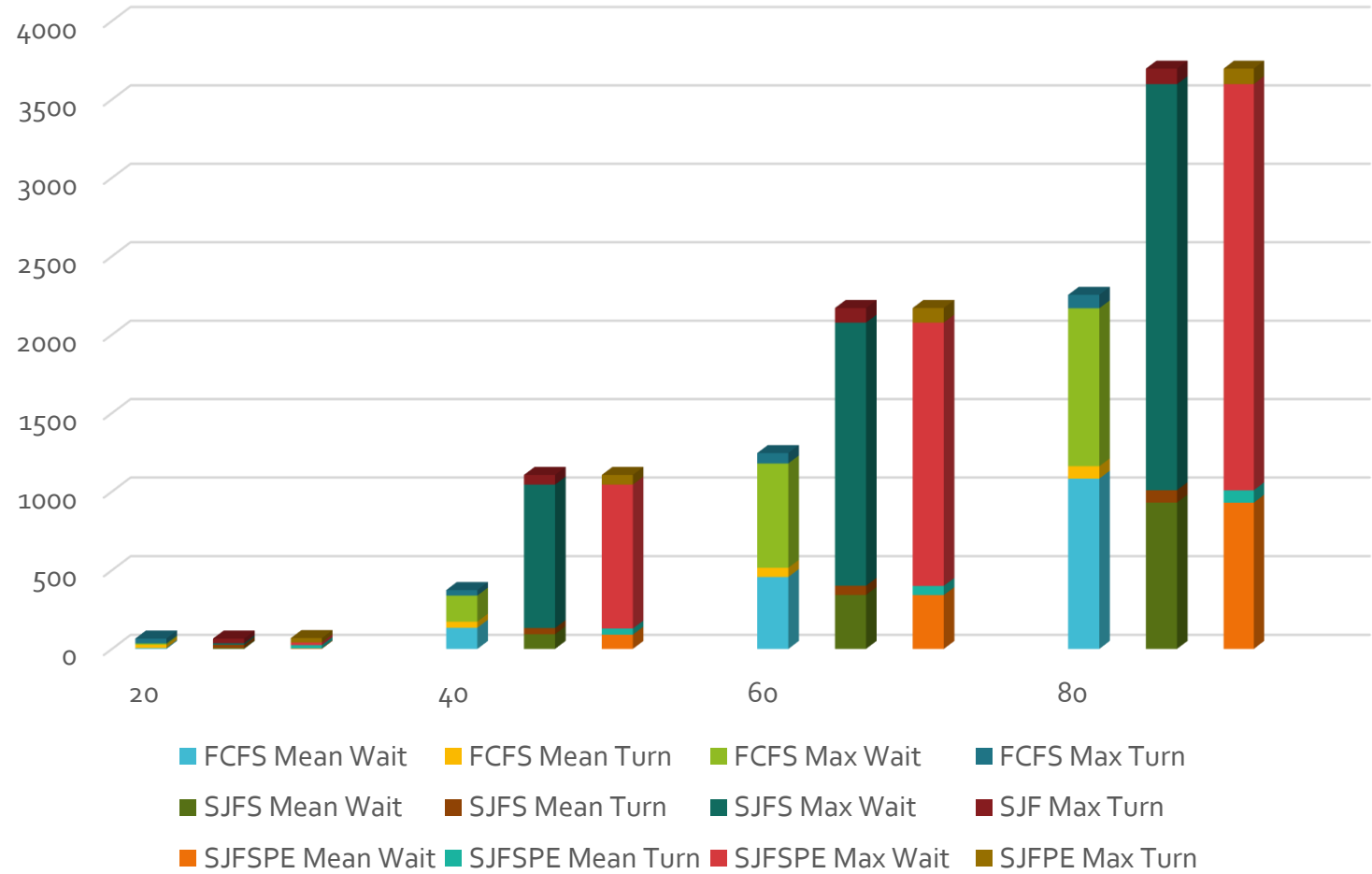
SJF Results



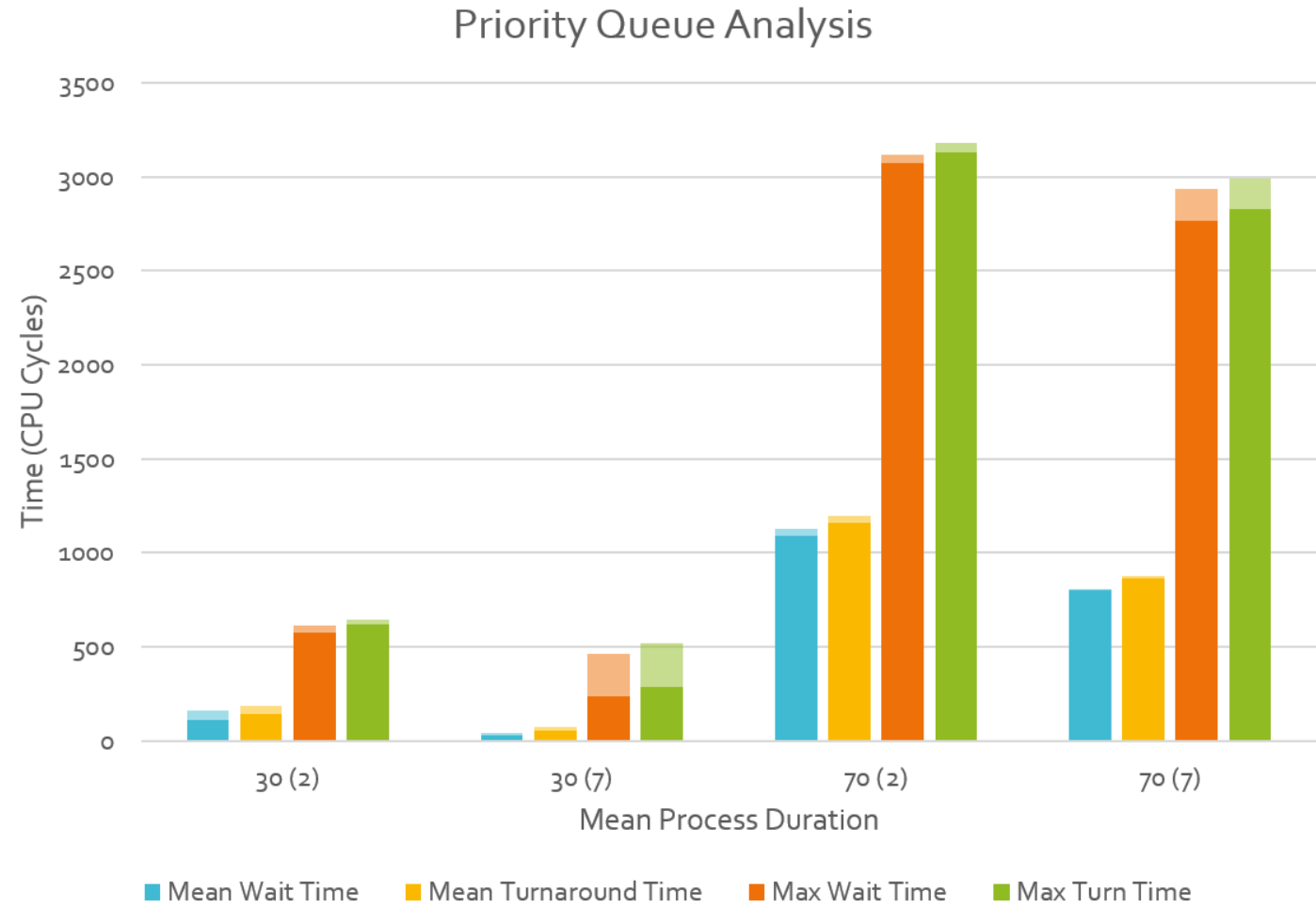
Comparative Results

The chart displays the performance of three scheduling algorithms: FCFS, SJFS, and SJFSPE. The Y-axis represents the magnitude of the metrics, ranging from 0 to 4000. The X-axis shows the number of processes (20, 40, 60, 80). Each bar is composed of four segments representing different metrics: Mean Wait, Mean Turn, Max Wait, and Max Turn. The colors used are: FCFS Mean Wait (light blue), FCFS Mean Turn (yellow), FCFS Max Wait (light green), FCFS Max Turn (dark blue), SJFS Mean Wait (dark green), SJFS Mean Turn (brown), SJFS Max Wait (teal), SJFS Max Turn (dark red), SJFSPE Mean Wait (orange), SJFSPE Mean Turn (cyan), SJFSPE Max Wait (red), and SJFSPE Max Turn (dark brown).

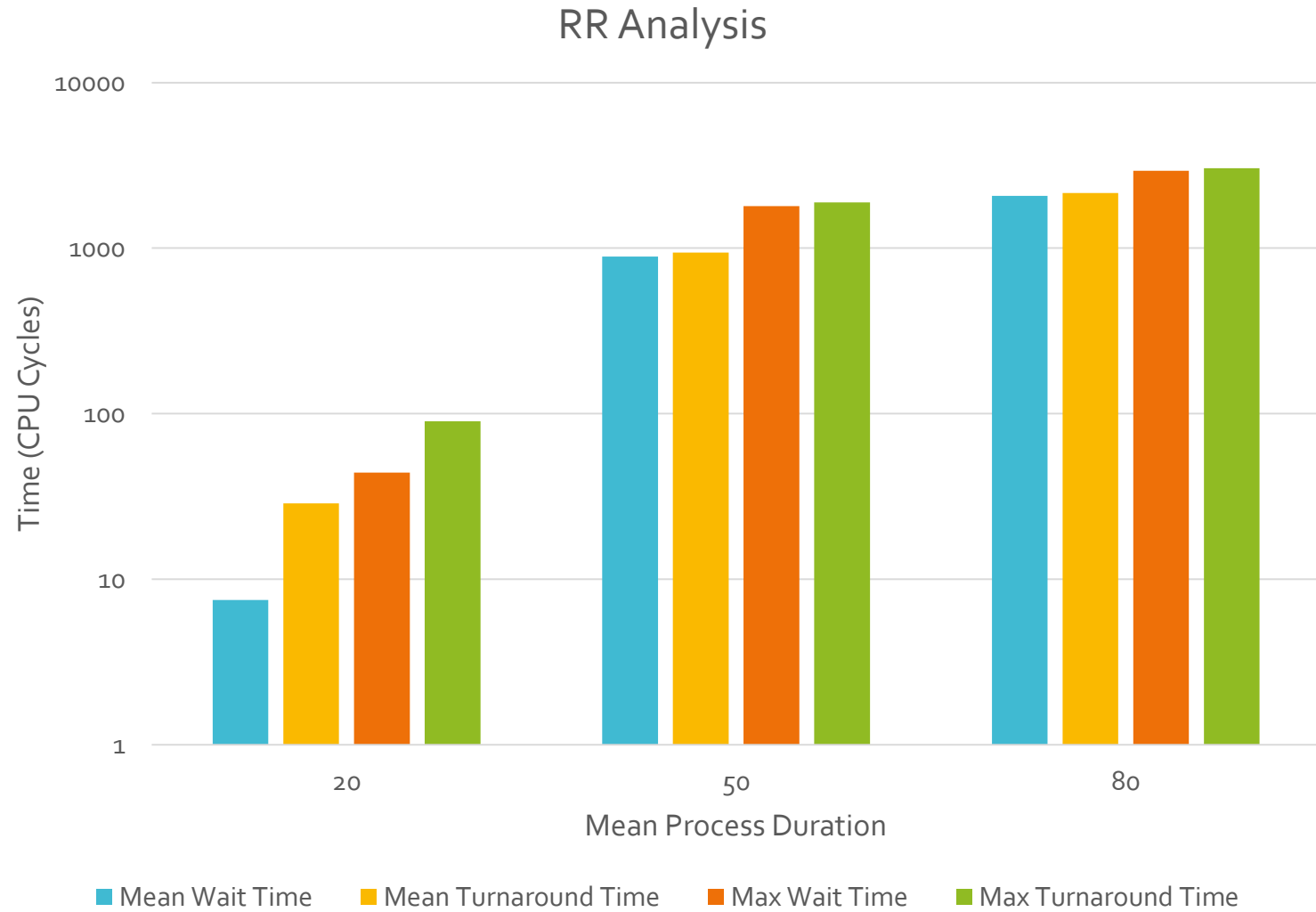
| Processes | Algorithm | Mean Wait | Mean Turn | Max Wait | Max Turn |
|-----------|-----------|-----------|-----------|----------|----------|
| 20 | FCFS | ~100 | ~50 | ~100 | ~100 |
| 20 | SJFS | ~50 | ~50 | ~100 | ~100 |
| 20 | SJFSPE | ~50 | ~50 | ~100 | ~100 |
| 40 | FCFS | ~200 | ~100 | ~200 | ~200 |
| 40 | SJFS | ~100 | ~100 | ~1000 | ~100 |
| 40 | SJFSPE | ~100 | ~100 | ~1000 | ~100 |
| 60 | FCFS | ~500 | ~100 | ~700 | ~100 |
| 60 | SJFS | ~400 | ~100 | ~1700 | ~100 |
| 60 | SJFSPE | ~400 | ~100 | ~1700 | ~100 |
| 80 | FCFS | ~1100 | ~100 | ~1000 | ~100 |
| 80 | SJFS | ~1000 | ~100 | ~2600 | ~100 |
| 80 | SJFSPE | ~1000 | ~100 | ~2600 | ~100 |



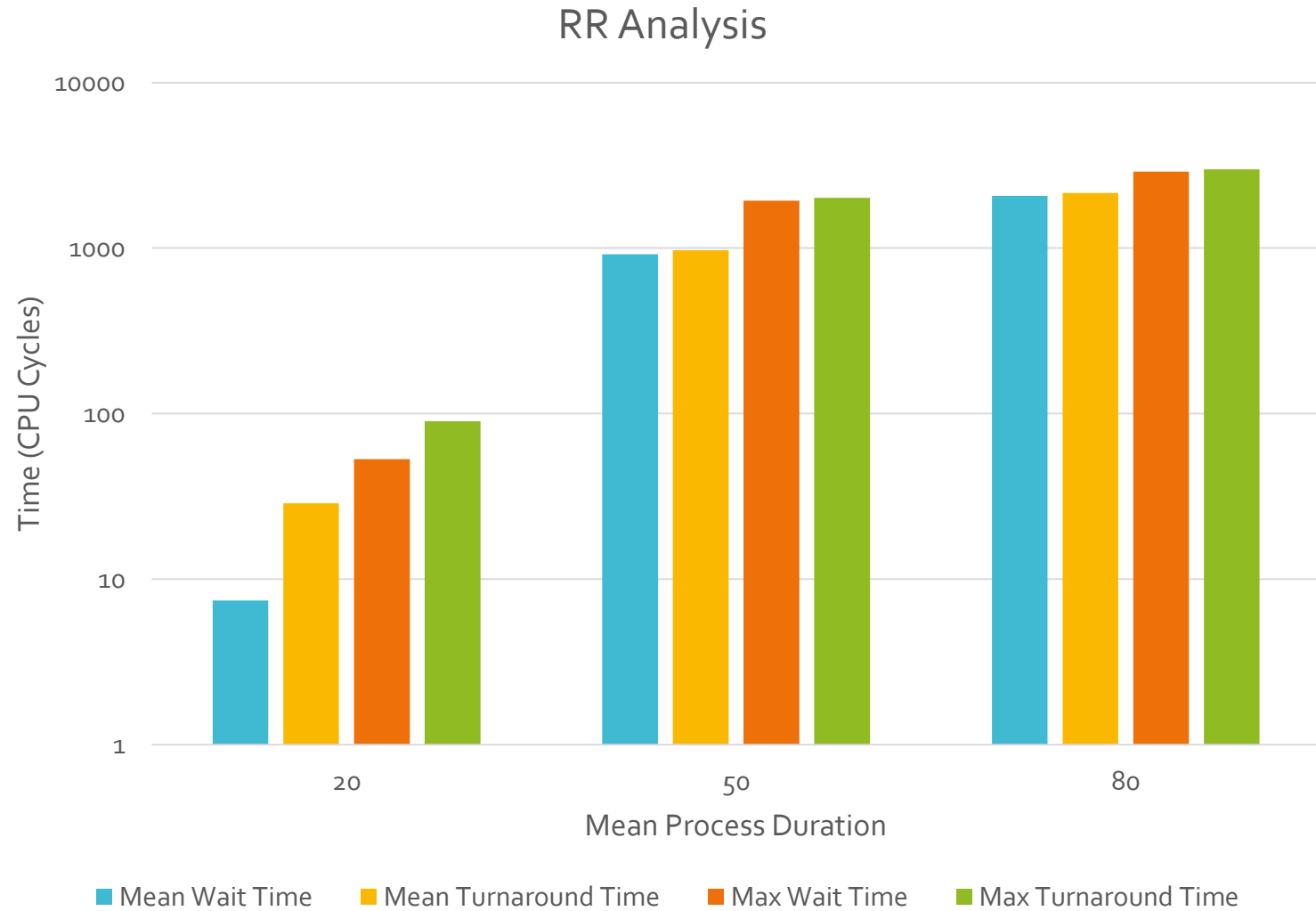
Single-Priority-Queue Results



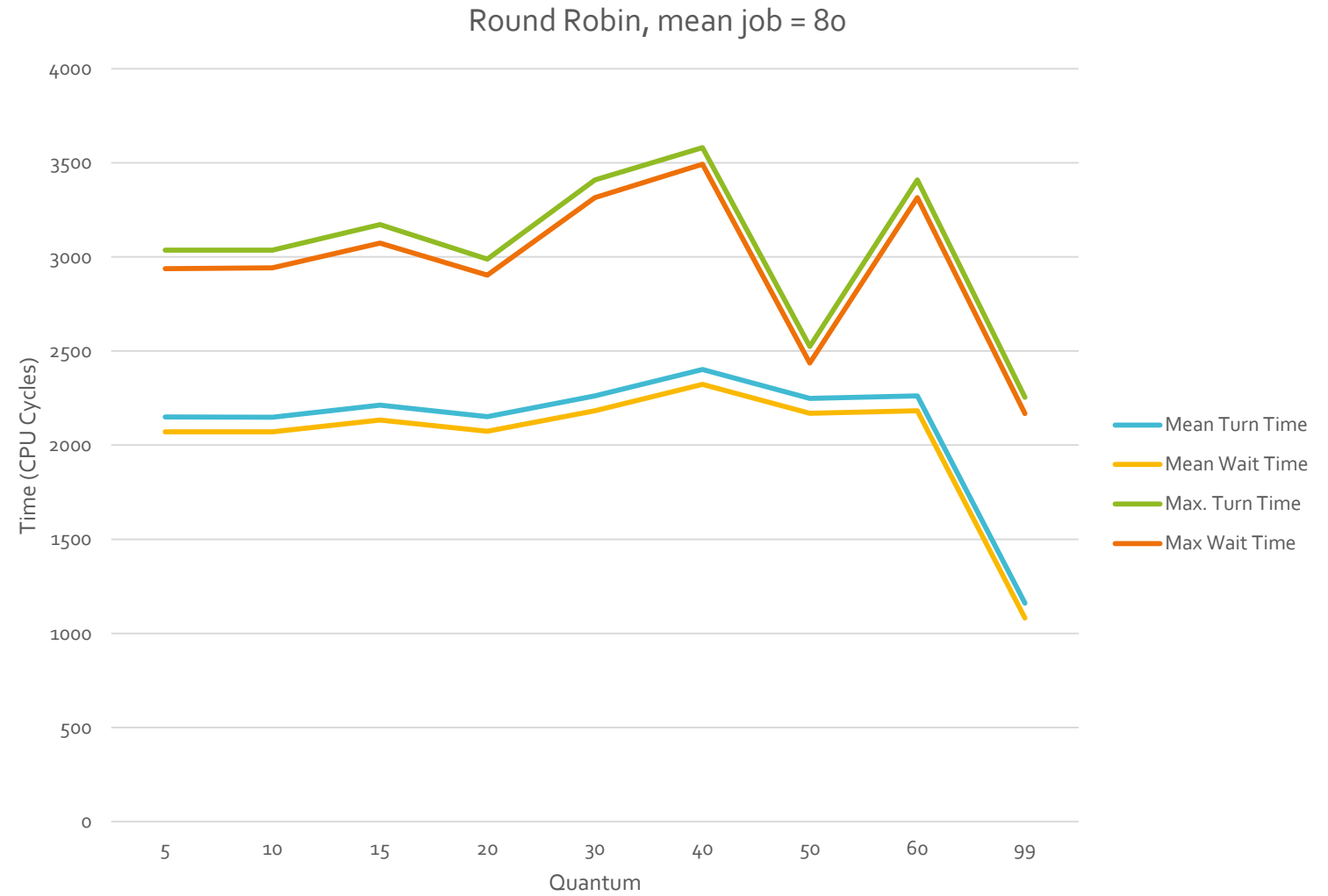
Round Robin Results: $q=5$



Round Robin Results: $q=20$



Round Robin Results



Multi-Queue Results

