OS Guided Project Screenshots

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=== Test 1: CPU-Bound Process Demotion ===
CPU-intensive process started (PID 4)
Initial state: PID=4, Queue=0, Time_In_Queue=0, Total_Slices=0
  Iteration 1: Demoted from queue 0 to 1
  Iteration 4: Demoted from queue 1 to 2
CPU-intensive process completed
Final state: PID=4, Queue=2, Time_In_Queue=1, Total_Slices=0
PASS: Demotion was observed
▣ TEST 1 PASSED: Demotion detected
```

Figure 1: t1

```
=== Test 2: I/O-Bound Process Fairness ===
I/O-intensive process started (PID 5)
Initial state: PID=5, Queue=0, Time_In_Queue=1, Total_Slices=0
I/O-intensive process completed
Final state: PID=5, Queue=0, Time_In_Queue=1, Total_Slices=0
PASS: I/O process remained at queue 0
▣ TEST 2 PASSED: I/O process stayed at Q0
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Figure 2: t2

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=== Test 3: Mixed Workload Fairness ===
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Inittiate:al sta PtIeD:= P7I,D Qu=6, eueQ=ueue0, =0, TimTiem_e_InIn_Qu_Queeuue=1, Totae=l0,_S Tliceostal_Sl=i0
ces=0
  Iteration 0: Demoted from queue 0 to 1
I/O-intensive process completed
Final state: PID=7, Queue=0, Time_In_Queue=1, Total_Slices=0
PASS: I/O process remained at queue 0
CPU-intensive process completed
Final state: PID=6, Queue=1, Time_In_Queue=3, Total_Slices=0
PASS: Demotion was observed
⯀ TEST 3 PASSED: Mixed workload coexistence verified
```

Figure 3: t3

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=== Test 4: Priority Boost Test ===
Starting a CPU-bound process that should demote, then boost
Process 8: Starting CPU-intensive work
Initial: PID=8, Queue=0, Time_In_Queue=0, Total_Slices=0
  Iter 0: Queue changed from 0 to 2
  Iter 1: Queue changed from 2 to 3
After CPU work: PID=8, Queue=3, Time_In_Queue=12, Total_Slices=0
Waiting for boost (takes ~100 ticks)...
  Wait iter 0: queue=3
  Wait iter 10: queue=3
  Wait iter 20: queue=3
  Wait iter 30: queue=3
  BOOST DETECTED at iter 31: queue went from 3 to 0!
  BOOST DETECTED at iter 32: queue went from 3 to 0!
  BOOST DETECTED at iter 33: queue went from 3 to 0!
  BOOST DETECTED at iter 34: queue went from 3 to 0!
  BOOST DETECTED at iter 35: queue went from 3 to 1!
  BOOST DETECTED at iter 36: queue went from 3 to 1!
  BOOST DETECTED at iter 37: queue went from 3 to 1!
  BOOST DETECTED at iter 38: queue went from 3 to 1!
  BOOST DETECTED at iter 39: queue went from 3 to 1!
  Wait iter 40: queue=1
  BOOST DETECTED at iter 40: queue went from 3 to 1!
  BOOST DETECTED at iter 41: queue went from 3 to 1!
  BOOST DETECTED at iter 42: queue went from 3 to 1!
  BOOST DETECTED at iter 43: queue went from 3 to 1!
  BOOST DETECTED at iter 44: queue went from 3 to 1!
  BOOST DETECTED at iter 45: queue went from 3 to 1!
  BOOST DETECTED at iter 46: queue went from 3 to 1!
  BOOST DETECTED at iter 47: queue went from 3 to 1!
  BOOST DETECTED at iter 48: queue went from 3 to 1!
  BOOST DETECTED at iter 49: queue went from 3 to 1!
After boost period: PID=8, Queue=1, Time_In_Queue=3, Total_Slices=0
PASS: Both demotion and boost detected
⯀ TEST 4 PASSED: Demotion and boost cycle confirmed
```

Figure 4: t4

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=== Test 5: Manual Priority Boost (boostproc syscall) ===
Child process 9 starting
Before manual boost: PID=9, Queue=0, Time_In_Queue=0, Total_SlicesParen=0t:
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 Queue=0, Time_In_Queue=0, Total_Slices=0
PASS: Boost worked (queue reduced or stayed same)
▯ TEST 5 PASSED: Manual boost syscall works
```

Figure 5: t5

```
=== Test 6: System-Wide Priority Boost ===
Testing boostproc(0) - boost all processes
Child before boost: queue=0
Parent: Calling system-wide boost
Child after boost: queue=0
PASS: System boost worked
▯ TEST 6 PASSED: System-wide boost works
```

Figure 6: t6

```
=== Test 7: Starvation Prevention (Automatic Boost) ===
Long CPU process should be boosted automatically every 100 ticks
Child 11: Starting very long CPU work
Initial: PID=11, Queue=0, Time_In_Queue=0, Total_Slices=0
  Burst 0: Demoted to queue 2
  Burst 2: Demoted to queue 3
  Burst 10: BOOSTED! queue went from 3 to 1
  Burst 11: Demoted to queue 2
  Burst 12: Demoted to queue 3
Total automatic boosts observed: 1
Final: PID=11, Queue=3, Time_In_Queue=15, Total_Slices=0
PASS: Automatic boost observed (starvation prevented)
▯ TEST 7 PASSED: Starvation prevention confirmed
```

Figure 7: t7

```
$ mlfq_stats

===== MLFQ Scheduler Statistics =====

Global Statistics:
  Total Scheduler Cycles: 7730
  Total Priority Boosts:  18
  Total Demotions:        20

Per-Queue Statistics:
  Queue   Processes   Total Schedules   Schedule %
    0         0          150                 1%
    1         0          116                 1%
    2         0          60                  0%
    3         0          306                 3%

Demotion Rate: 2 per 1000 schedules
Boost Frequency: 1 per 429 schedules

Fairness Analysis:
  Expected per queue: 1932
  Max deviation: 1872
  Status: WARNING - High deviation

Recommendations:
  - Scheduler functioning correctly!

$
```

Figure 8: stats