

Evidence

run_all_tests.sh

```
Running All Tests
=====
▶ Running baseline...
==== Starting Test: baseline ===
[INFO] Cleaning old results in results/baseline/run1...
[INFO] Setting up network conditions on lo...
    -> Network: No impairment (Baseline)
[INFO] Starting packet capture...
[INFO] Launching Server...
[INFO] Launching Client 1...
[INFO] Launching Client 2...
[INFO] Launching Client 3...
[INFO] Launching Client 4...
[INFO] Running test for 130 seconds...
[INFO] Stopping processes...
[INFO] Resetting network rules...
=====
[INFO] Collecting metrics from results/baseline/run1...
[INFO] Metrics written to results/baseline/run1/metrics.csv

=====
Results : BASELINE
=====
Latency (ms):Mean=1.28 | Median=1.26 | 95th=1.87
Jitter (ms):Mean=0.43 | Median=0.32 | 95th=1.09
Pos Error: Mean=0.0262 | Median=0.0000 | 95th=0.0000
Avg CPU Usage: 1.28 %
Update Rate: 24.32 Hz
-----
Bandwidth per Client (Session Avg):
    Client 1: 12.06 kbps
    Client 2: 12.06 kbps
    Client 3: 12.06 kbps
    Client 4: 12.06 kbps
[INFO] Stats saved to results/baseline/run1/stats_summary.txt
Server sustains ~20 updates/sec; avg latency <= 50 ms.;cpu usage<60%
[INFO] Generating plots...
[Plotter] Saved plot_latency.png
[Plotter] Saved plot_jitter.png
```

```
► Running loss2...
== Starting Test: loss2 ==
[INFO] Cleaning old results in results/loss2/run1...
[INFO] Setting up network conditions on lo...
    -> Network: 2% Loss
[INFO] Starting packet capture...
[INFO] Launching Server...
[INFO] Launching Client 1...
[INFO] Launching Client 2...
[INFO] Launching Client 3...
[INFO] Launching Client 4...
[INFO] Running test for 130 seconds...
[INFO] Stopping processes...
[INFO] Resetting network rules...
=====
[INFO] Collecting metrics from results/loss2/run1...
[INFO] Metrics written to results/loss2/run1/metrics.csv
=====
Results : LOSS2
=====
Latency (ms):Mean=1.32 | Median=1.26 | 95th=1.87
Jitter (ms):Mean=0.51 | Median=0.32 | 95th=1.06
Pos Error: Mean=0.0534 | Median=0.0000 | 95th=0.0000
Avg CPU Usage: 1.40 %
Update Rate: 23.79 Hz
-----
Bandwidth per Client (Session Avg):
    Client 1: 11.65 kbps
    Client 2: 11.68 kbps
    Client 3: 11.67 kbps
    Client 4: 11.64 kbps
[INFO] Stats saved to results/loss2/run1/stats_summary.txt
Mean Pos Error: 0.05
95% Pos Error: 0.00
Mean perceived position error < 0.5 units.
[INFO] Generating plots...
[Plotter] Saved plot_latency.png
[Plotter] Saved plot_jitter.png
```

```
► Running loss5...
== Starting Test: loss5 ==
[INFO] Cleaning old results in results/loss5/run1...
[INFO] Setting up network conditions on lo...
    -> Network: 5% Loss
[INFO] Starting packet capture...
[INFO] Launching Server...
[INFO] Launching Client 1...
[INFO] Launching Client 2...
[INFO] Launching Client 3...
[INFO] Launching Client 4...
[INFO] Running test for 130 seconds...
[INFO] Stopping processes...
[INFO] Resetting network rules...
=====
[INFO] Collecting metrics from results/loss5/run1...
[INFO] Metrics written to results/loss5/run1/metrics.csv

=====
Results : LOSS5
=====
Latency (ms):Mean=1.27 | Median=1.24 | 95th=1.92
Jitter (ms):Mean=0.46 | Median=0.34 | 95th=1.15
Pos Error: Mean=0.0658 | Median=0.0000 | 95th=0.0000
Avg CPU Usage: 1.40 %
Update Rate: 23.10 Hz
-----
Bandwidth per Client (Session Avg):
    Client 1: 11.68 kbps
    Client 2: 11.81 kbps
    Client 3: 11.62 kbps
    Client 4: 11.61 kbps
[INFO] Stats saved to results/loss5/run1/stats_summary.txt
Reliability: 100.00% (400/400 within 200ms)
Critical events reliably delivered (>=99% within 200 ms).
[INFO] Generating plots...
[Plotter] Saved plot_latency.png
[Plotter] Saved plot_jitter.png
```

```
▶ Running delay100...
== Starting Test: delay100 ==
[INFO] Cleaning old results in results/delay100/run1...
[INFO] Setting up network conditions on lo...
    -> Network: 100ms Delay (+/- 10ms jitter)
[INFO] Starting packet capture...
[INFO] Launching Server...
[INFO] Launching Client 1...
[INFO] Launching Client 2...
[INFO] Launching Client 3...
[INFO] Launching Client 4...
[INFO] Running test for 130 seconds...
[INFO] Stopping processes...
[INFO] Resetting network rules...
=====
[INFO] Collecting metrics from results/delay100/run1...
[INFO] Metrics written to results/delay100/run1/metrics.csv

=====
Results : DELAY100
=====
Latency (ms):Mean=92.62 | Median=101.88 | 95th=110.86
Jitter (ms):Mean=12.93 | Median=5.91 | 95th=15.72
Pos Error: Mean=1.1949 | Median=0.0000 | 95th=11.0454
Avg CPU Usage: 1.46 %
Update Rate: 24.37 Hz
-----
Bandwidth per Client (Session Avg):
    Client 1: 257.64 kbps
    Client 2: 257.63 kbps
    Client 3: 257.62 kbps
    Client 4: 257.62 kbps
[INFO] Stats saved to results/delay100/run1/stats_summary.txt
Latency check: 92.62ms (Expected ~100-150ms)
Clients continue functioning under 100ms delay.
[INFO] Generating plots...
[Plotter] Saved plot_latency.png
[Plotter] Saved plot_jitter.png
```

Logs Sample

Client 1

```
1 Client started.
2 Initial state: WAIT_FOR_JOIN
3 client: starting...
4 Client: state: WAIT_FOR_JOIN
5 Sent JOIN_REQ
6 JOIN_ACK received. ID: 1
7 Transition: WAIT_FOR_JOIN → WAIT_FOR_READY
8 → Sent READY_REQ
9 ✓ READY_ACK received. Waiting for start snapshot.
10 Transition: WAIT_FOR_READY → WAIT_FOR_STARTGAME
11 Waiting for full snapshot
12 Received full snapshot #0
13 [FULL] Applied full snapshot #0
14 Transition: WAIT_FOR_STARTGAME → IN_GAME_LOOP
15 [DELTA] Applied 1 changes (snapshot #1)
16 ✓ Applied delta snapshot #1
17 SNAPSHOT recv_time=1765545541.7459822 server_ts=1765545541.7449987 snapshot_id=1 seq=21 bytes=66
18 [DELTA] Applied 3 changes (snapshot #2)
19 ✓ Applied delta snapshot #2
20 SNAPSHOT recv_time=1765545541.787834 server_ts=1765545541.7862785 snapshot_id=2 seq=22 bytes=90
21 ♦ Sent ACQUIRE event (10,6) AT 1765545541.8162532
22 POS_CLIENT x=10 y=6 ts=1765545541.8165452
23 ✓ Received ACK for (10,6) recv_time=1765545541.817824
24 [DELTA] Applied 3 changes (snapshot #3)
25 ✓ Applied delta snapshot #3
26 SNAPSHOT recv_time=1765545541.8282182 server_ts=1765545541.8267164 snapshot_id=3 seq=23 bytes=89
27 [DELTA] Applied 0 changes (snapshot #4)
1382 ✓ Received ACK for (9,10) recv_time=1765545562.4797368
1383 [DELTA] Applied 2 changes (snapshot #354)
1384 ✓ Applied delta snapshot #354
1385 SNAPSHOT recv_time=1765545562.513873 server_ts=1765545562.5124211 snapshot_id=354 seq=374 bytes=81
1386 [DELTA] Applied 0 changes (snapshot #355)
1387 ✓ Applied delta snapshot #355
1388 SNAPSHOT recv_time=1765545562.5543356 server_ts=1765545562.5535653 snapshot_id=355 seq=375 bytes=59
1389 [DELTA] Applied 0 changes (snapshot #356)
1390 ✓ Applied delta snapshot #356
1391 SNAPSHOT recv_time=1765545562.594927 server_ts=1765545562.5940297 snapshot_id=356 seq=376 bytes=59
1392 [DELTA] Applied 0 changes (snapshot #357)
1393 ✓ Applied delta snapshot #357
1394 SNAPSHOT recv_time=1765545562.6353729 server_ts=1765545562.6344724 snapshot_id=357 seq=377 bytes=59
1395 [DELTA] Applied 0 changes (snapshot #358)
1396 ✓ Applied delta snapshot #358
1397 SNAPSHOT recv_time=1765545562.6768715 server_ts=1765545562.6758358 snapshot_id=358 seq=378 bytes=59
1398 [DELTA] Applied 0 changes (snapshot #359)
1399 ✓ Applied delta snapshot #359
1400 SNAPSHOT recv_time=1765545562.71832 server_ts=1765545562.7171211 snapshot_id=359 seq=379 bytes=59
1401 [DELTA] Applied 0 changes (snapshot #360)
1402 ✓ Applied delta snapshot #360
1403 SNAPSHOT recv_time=1765545562.7597573 server_ts=1765545562.758305 snapshot_id=360 seq=380 bytes=59
1404 [DELTA] Applied 0 changes (snapshot #361)
1405 ✓ Applied delta snapshot #361
1406 SNAPSHOT recv_time=1765545562.800136 server_ts=1765545562.798501 snapshot_id=361 seq=381 bytes=59
1407 [DELTA] Applied 0 changes (snapshot #362)
3927 ♻ Game Over message received (Leaderboard)
3928 🏆 Leaderboard:
3929 1. player 1 – score 112
3930 2. player 4 – score 106
3931 3. player 2 – score 99
3932 4. player 3 – score 83
3933 Transition: IN_GAME_LOOP → GAME_OVER
3934 ♻ Game Over! Finalizing session...
3935 ✓ Sent game over acknowledgment to server.
3936 🔒 Client session ended.
```

Client 2

```
1 Client started.
2 Initial state: WAIT_FOR_JOIN
3 client: starting...
4 client: state: WAIT_FOR_JOIN
5 Sent JOIN_REQ
6 JOIN_ACK received. ID: 2
7 Transition: WAIT_FOR_JOIN → WAIT_FOR_READY
8 → Sent READY_REQ
9 ✓ READY_ACK received. Waiting for start snapshot.
10 Transition: WAIT_FOR_READY → WAIT_FOR_STARTGAME
11 Waiting for full snapshot
12 Received full snapshot #0
13 [FULL] Applied full snapshot #0
14 Transition: WAIT_FOR_STARTGAME → IN_GAME_LOOP
15 [DELTA] Applied 1 changes (snapshot #1)
16 ✓ Applied delta snapshot #1
17 SNAPSHOT recv_time=1765545541.7468164 server_ts=1765545541.7452722 snapshot_id=1 seq=21 bytes=66
18 📦 Sent ACQUIRE event (18,9) AT 1765545541.7492962
19 POS_CLIENT x=18 y=9 ts=1765545541.7495222
20 ✓ Received ACK for (18,9) recv_time=1765545541.7507656
21 📦 Sent ACQUIRE event (5,2) AT 1765545541.7672708
22 POS_CLIENT x=5 y=2 ts=1765545541.767537
23 ✓ Received ACK for (5,2) recv_time=1765545541.7687597
24 [DELTA] Applied 3 changes (snapshot #2)
25 ✓ Applied delta snapshot #2

1640 SNAPSHOT recv_time=1765545566.2488313 server_ts=1765545566.2478254 snapshot_id=445 seq=465 bytes=59
1641 [DELTA] Applied 1 changes (snapshot #446)
1642 ✓ Applied delta snapshot #446
1643 SNAPSHOT recv_time=1765545566.2908378 server_ts=1765545566.2894828 snapshot_id=446 seq=466 bytes=68
1644 [DELTA] Applied 0 changes (snapshot #447)
1645 ✓ Applied delta snapshot #447
1646 SNAPSHOT recv_time=1765545566.3319273 server_ts=1765545566.3301935 snapshot_id=447 seq=467 bytes=59
1647 [DELTA] Applied 0 changes (snapshot #448)
1648 ✓ Applied delta snapshot #448
1649 SNAPSHOT recv_time=1765545566.371903 server_ts=1765545566.370948 snapshot_id=448 seq=468 bytes=59
1650 [DELTA] Applied 1 changes (snapshot #449)
1651 ✓ Applied delta snapshot #449
1652 SNAPSHOT recv_time=1765545566.4121761 server_ts=1765545566.4109533 snapshot_id=449 seq=469 bytes=70
1653 [DELTA] Applied 1 changes (snapshot #450)
1654 ✓ Applied delta snapshot #450
1655 SNAPSHOT recv_time=1765545566.4523907 server_ts=1765545566.4511995 snapshot_id=450 seq=470 bytes=69
1656 [DELTA] Applied 0 changes (snapshot #451)
1657 ✓ Applied delta snapshot #451
1658 SNAPSHOT recv_time=1765545566.4947932 server_ts=1765545566.4932003 snapshot_id=451 seq=471 bytes=59
1659 [DELTA] Applied 0 changes (snapshot #452)
1660 ✓ Applied delta snapshot #452
1661 SNAPSHOT recv_time=1765545566.5348878 server_ts=1765545566.5340273 snapshot_id=452 seq=472 bytes=59
1662 [DELTA] Applied 0 changes (snapshot #453)
1663 ✓ Applied delta snapshot #453

3882 🎮 Game Over message received (Leaderboard)
3883 🏆 Leaderboard:
3884 1. player 1 – score 112
3885 2. player 4 – score 106
3886 3. player 2 – score 99
3887 4. player 3 – score 83
3888 Transition: IN_GAME_LOOP → GAME_OVER
3889 🎮 Game Over! Finalizing session...
3890 ✓ Sent game over acknowledgment to server.
3891 🔒 Client session ended.
```

Client 3

```
1 Client started.
2 Initial state: WAIT_FOR_JOIN
3 client: starting...
4 client: state: WAIT_FOR_JOIN
5 Sent JOIN_REQ
6 JOIN_ACK received. ID: 3
7 Transition: WAIT_FOR_JOIN → WAIT_FOR_READY
8 → Sent READY_REQ
9 ✓ READY_ACK received. Waiting for start snapshot.
10 Transition: WAIT_FOR_READY → WAIT_FOR_STARTGAME
11 Waiting for full snapshot
12 Received full snapshot #0
13 [FULL] Applied full snapshot #0
14 Transition: WAIT_FOR_STARTGAME → IN_GAME_LOOP
15 [DELTA] Applied 1 changes (snapshot #1)
16 ✓ Applied delta snapshot #1
17 SNAPSHOT recv_time=1765545541.7468185 server_ts=1765545541.7458975 snapshot_id=1 seq=21 bytes=66
18 📦 Sent ACQUIRE event (7,19) AT 1765545541.7547011
19 POS_CLIENT x=7 y=19 ts=1765545541.7549767
20 ✓ Received ACK for (7,19) recv_time=1765545541.7562537
21 [DELTA] Applied 3 changes (snapshot #2)
22 ✓ Applied delta snapshot #2
23 SNAPSHOT recv_time=1765545541.7876606 server_ts=1765545541.7867067 snapshot_id=2 seq=22 bytes=90
24 [DELTA] Applied 3 changes (snapshot #3)
25 ✓ Applied delta snapshot #3
26 SNAPSHOT recv_time=1765545541.82841 server_ts=1765545541.827149 snapshot_id=3 seq=23 bytes=89
27 [DELTA] Applied 0 changes (snapshot #4)

1265 ✓ Received ACK for (5,9) recv_time=1765545562.2857654
1266 [DELTA] Applied 2 changes (snapshot #349)
1267 ✓ Applied delta snapshot #349
1268 SNAPSHOT recv_time=1765545562.3078449 server_ts=1765545562.306432 snapshot_id=349 seq=369 bytes=80
1269 [DELTA] Applied 0 changes (snapshot #350)
1270 ✓ Applied delta snapshot #350
1271 SNAPSHOT recv_time=1765545562.3481789 server_ts=1765545562.3467572 snapshot_id=350 seq=370 bytes=59
1272 [DELTA] Applied 0 changes (snapshot #351)
1273 ✓ Applied delta snapshot #351
1274 SNAPSHOT recv_time=1765545562.3893585 server_ts=1765545562.3881876 snapshot_id=351 seq=371 bytes=59
1275 [DELTA] Applied 0 changes (snapshot #352)
1276 ✓ Applied delta snapshot #352
1277 SNAPSHOT recv_time=1765545562.4307323 server_ts=1765545562.429538 snapshot_id=352 seq=372 bytes=59
1278 [DELTA] Applied 0 changes (snapshot #353)
1279 ✓ Applied delta snapshot #353
1280 SNAPSHOT recv_time=1765545562.4724753 server_ts=1765545562.4713445 snapshot_id=353 seq=373 bytes=59
1281 [DELTA] Applied 2 changes (snapshot #354)
1282 ✓ Applied delta snapshot #354
1283 SNAPSHOT recv_time=1765545562.51406 server_ts=1765545562.5128264 snapshot_id=354 seq=374 bytes=81
1284 [DELTA] Applied 0 changes (snapshot #355)
1285 ✓ Applied delta snapshot #355
1286 SNAPSHOT recv_time=1765545562.5554695 server_ts=1765545562.5541084 snapshot_id=355 seq=375 bytes=59
1287 [DELTA] Applied 0 changes (snapshot #356)
1288 ✓ Applied delta snapshot #356

3831 🎮 Game Over message received (Leaderboard)
3832 🏆 Leaderboard:
3833 1. player 1 – score 112
3834 2. player 4 – score 106
3835 3. player 2 – score 99
3836 4. player 3 – score 83
3837 Transition: IN_GAME_LOOP → GAME_OVER
3838 🎮 Game Over! Finalizing session...
3839 ✓ Sent game over acknowledgment to server.
3840 🔒 Client session ended.
```

Client 4

```
1 Client started.
2 Initial state: WAIT_FOR_JOIN
3 client: starting...
4 client: state: WAIT_FOR_JOIN
5 Sent JOIN_REQ
6 JOIN_ACK received. ID: 4
7 Transition: WAIT_FOR_JOIN → WAIT_FOR_READY
8 → Sent READY_REQ
9 ✓ READY_ACK received. Waiting for start snapshot.
10 Transition: WAIT_FOR_READY → WAIT_FOR_STARTGAME
11 Waiting for full snapshot
12 Received full snapshot #0
13 [FULL] Applied full snapshot #0
14 Transition: WAIT_FOR_STARTGAME → IN_GAME_LOOP
15 📈 Sent ACQUIRE event (6,7) AT 1765545541.71159
16 POS_CLIENT x=6 y=7 ts=1765545541.711884
17 ✓ Received ACK for (6,7) recv_time=1765545541.7131793
18 [DELTA] Applied 1 changes (snapshot #1)
19 ✓ Applied delta snapshot #1
20 SNAPSHOT recv_time=1765545541.747211 server_ts=1765545541.7461965 snapshot_id=1 seq=21 bytes=66
21 [DELTA] Applied 3 changes (snapshot #2)
22 ✓ Applied delta snapshot #2
23 SNAPSHOT recv_time=1765545541.788186 server_ts=1765545541.7869072 snapshot_id=2 seq=22 bytes=90
24 📈 Sent ACQUIRE event (5,7) AT 1765545541.800293
25 POS_CLIENT x=5 y=7 ts=1765545541.80066
26 ✓ Received ACK for (5,7) recv_time=1765545541.8020067
27 [DELTA] Applied 3 changes (snapshot #3)
28 ✓ Applied delta snapshot #894
29 SNAPSHOT recv_time=1765545584.7406075 server_ts=1765545584.7392333 snapshot_id=894 seq=914 bytes=59
30 [DELTA] Applied 0 changes (snapshot #895)
31 ✓ Applied delta snapshot #895
32 SNAPSHOT recv_time=1765545584.7816925 server_ts=1765545584.7805934 snapshot_id=895 seq=915 bytes=59
33 [DELTA] Applied 0 changes (snapshot #896)
34 ✓ Applied delta snapshot #896
35 SNAPSHOT recv_time=1765545584.8216674 server_ts=1765545584.82037 snapshot_id=896 seq=916 bytes=59
36 [DELTA] Applied 0 changes (snapshot #897)
37 ✓ Applied delta snapshot #897
38 SNAPSHOT recv_time=1765545584.863835 server_ts=1765545584.8627577 snapshot_id=897 seq=917 bytes=59
39 [DELTA] Applied 0 changes (snapshot #898)
40 ✓ Applied delta snapshot #898
41 SNAPSHOT recv_time=1765545584.903764 server_ts=1765545584.9027297 snapshot_id=898 seq=918 bytes=59
42 [DELTA] Applied 0 changes (snapshot #899)
43 ✓ Applied delta snapshot #899
44 SNAPSHOT recv_time=1765545584.9437742 server_ts=1765545584.9425812 snapshot_id=899 seq=919 bytes=59
45 [DELTA] Applied 0 changes (snapshot #900)
46 ✓ Applied delta snapshot #900
47 SNAPSHOT recv_time=1765545584.9850142 server_ts=1765545584.9837413 snapshot_id=900 seq=920 bytes=59
48 [DELTA] Applied 0 changes (snapshot #901)
49 ✓ Applied delta snapshot #901
50
51 🎊 Game Over message received (Leaderboard)
52 🏆 Leaderboard:
53 1. player 1 – score 112
54 2. player 4 – score 106
55 3. player 2 – score 99
56 4. player 3 – score 83
57 Transition: IN_GAME_LOOP → GAME_OVER
58 🎊 Game Over! Finalizing session...
59 ✓ Sent game over acknowledgment to server.
60 🔒 Client session ended.
```

Server

```
1 Server started. Waiting for players...
2 Player 1 joined from ('127.0.0.1', 33282)
3 Player 1 is ready (1/1)
4 Player 2 joined from ('127.0.0.1', 43807)
5 Player 2 is ready (2/2)
6 Player 3 joined from ('127.0.0.1', 60689)
7 Player 3 is ready (3/3)
8 Player 4 joined from ('127.0.0.1', 38234)
9 Player 4 is ready (4/4)
10 Conditions met, moving to INIT state.
11 Sending initial snapshot...
12 Sent initial snapshot to Player 1
13 Sent initial snapshot to Player 2
14 Sent initial snapshot to Player 3
15 Sent initial snapshot to Player 4
16 Entering GAME_LOOP...
17 Player 4 acquired cell (6, 7)
18 POS_SERVER id=4 x=6 y=7 ts=1765545541.7119527
19 CPU_USAGE percent=0.9 ts=1765545541.7445753
20 SNAPSHOT_SEND server_ts=1765545541.745027 snapshot_id=1 seq=21
21 SNAPSHOT_SEND server_ts=1765545541.7452877 snapshot_id=1 seq=21
22 SNAPSHOT_SEND server_ts=1765545541.7459126 snapshot_id=1 seq=21
23 SNAPSHOT_SEND server_ts=1765545541.7462094 snapshot_id=1 seq=21
24 Player 2 acquired cell (18, 9)
25 POS_SERVER id=2 x=18 y=9 ts=1765545541.7501335
26 Player 3 acquired cell (7, 19)
27 POS_SERVER id=3 x=7 y=19 ts=1765545541.7559493
28
2957 SNAPSHOT_SEND server_ts=1765545574.1080034 snapshot_id=636 seq=656
2958 SNAPSHOT_SEND server_ts=1765545574.1082308 snapshot_id=636 seq=656
2959 SNAPSHOT_SEND server_ts=1765545574.108456 snapshot_id=636 seq=656
2960 SNAPSHOT_SEND server_ts=1765545574.1086566 snapshot_id=636 seq=656
2961 CPU_USAGE percent=0.0 ts=1765545574.1488025
2962 SNAPSHOT_SEND server_ts=1765545574.1492329 snapshot_id=637 seq=657
2963 SNAPSHOT_SEND server_ts=1765545574.1495435 snapshot_id=637 seq=657
2964 SNAPSHOT_SEND server_ts=1765545574.1498232 snapshot_id=637 seq=657
2965 SNAPSHOT_SEND server_ts=1765545574.150068 snapshot_id=637 seq=657
2966 CPU_USAGE percent=3.0 ts=1765545574.1901178
2967 SNAPSHOT_SEND server_ts=1765545574.1905093 snapshot_id=638 seq=658
2968 SNAPSHOT_SEND server_ts=1765545574.1907327 snapshot_id=638 seq=658
2969 SNAPSHOT_SEND server_ts=1765545574.1909335 snapshot_id=638 seq=658
2970 SNAPSHOT_SEND server_ts=1765545574.191409 snapshot_id=638 seq=658
2971 CPU_USAGE percent=0.0 ts=1765545574.2323947
2972 SNAPSHOT_SEND server_ts=1765545574.2328033 snapshot_id=639 seq=659
2973 SNAPSHOT_SEND server_ts=1765545574.2330317 snapshot_id=639 seq=659
2974 SNAPSHOT_SEND server_ts=1765545574.23324 snapshot_id=639 seq=659
2975 SNAPSHOT_SEND server_ts=1765545574.2334561 snapshot_id=639 seq=659
2976 Player 3 acquired cell (11, 12)
2977 POS_SERVER id=3 x=11 y=12 ts=1765545574.263014
2978 CPU_USAGE percent=3.1 ts=1765545574.2725575
2979 SNAPSHOT_SEND server_ts=1765545574.272889 snapshot_id=640 seq=660
2980 SNAPSHOT_SEND server_ts=1765545574.2731164 snapshot_id=640 seq=660
2981
2982 === FINAL LEADERBOARD ===
2983 1. Player 1 - Score: 112
2984 2. Player 4 - Score: 106
2985 3. Player 2 - Score: 99
2986 4. Player 3 - Score: 83
2987 =====
2988
2989 1. Player 1 - Score: 112
2990 2. Player 4 - Score: 106
2991 3. Player 2 - Score: 99
2992 4. Player 3 - Score: 83
2993 =====
2994
2995 Leaderboard sent to Player 1
2996 Leaderboard sent to Player 4
2997 Leaderboard sent to Player 2
2998 Leaderboard sent to Player 3
2999 Player at ('127.0.0.1', 33282) acknowledged Game Over.
3000
3001 === FINAL LEADERBOARD ===
3002 1. Player 4 - Score: 106
3003 2. Player 2 - Score: 99
3004 3. Player 3 - Score: 83
3005 =====
3006
3007 Leaderboard sent to Player 4
3008 Leaderboard sent to Player 2
3009 Leaderboard sent to Player 3
3010 Player at ('127.0.0.1', 38234) acknowledged Game Over.
3011 Player at ('127.0.0.1', 43807) acknowledged Game Over.
3012 Player at ('127.0.0.1', 60689) acknowledged Game Over.
3013 Game session ended. Server ready for next round.
```


Delay 100ms metrics.csv

Loss 2% metrics.csv

Loss 5% metrics.csv

