

Performance Report

To measure the performance of our bomberman game under light load and heavy load, we have written up a variety of test cases.

Light Load: These test cases are mostly our test cases from milestone 2. These test cases include delays within them in order to show some form of timing, this way, we can see the actions happen with the spectator view and we can also make the test players wait for specific events to happen such as a bomb exploding.

Heavy Load: These test cases are similar to the light load testcases, however, each test player will perform a lot more events without any timing delay between them. This will simulate the fact that a lot is going on, so much that not everything gets displayed. We are doing this to see if the final location of the player is associated with the sequence of events the player sent out. If the player does not end up where the series of actions should have taken him, that means something went wrong. Either a packet was lost or there was another error.

During each test, the latency and average latency for each player in the current test is printed to the console.

At the end of each test, the average latency, highest latency and lowest latency are printed to the console.

When all the tests are complete, the average, highest, and lowest latencies are again printed, but this time, for the entirety of the test cases.

The way we measure latency in our system is by looking at the time from which a player sent a `gameKeyEvent`, to the time that the same player receives a `gameKeyEventAck`. So, the time it takes for a player to receive the acknowledgement for an event that was sent to the server.

Sample results run by the test Framework:

Number of tests: 17
testing playerWin...

Player: 1 - Latency: 18 - Average Latency: 18
Player: 1 - Latency: 6 - Average Latency: 12
Player: 1 - Latency: 2 - Average Latency: 8
Player: 1 - Latency: 3 - Average Latency: 7
Player: 1 - Latency: 9 - Average Latency: 7

TestCase Performance:
Average Latency: 7
Highest Latency: 18
Lowest Latency: 2

Done
testing twoPlayerWin...

Player: 1 - Latency: 7 - Average Latency: 7
Player: 1 - Latency: 5 - Average Latency: 6
Player: 2 - Latency: 7 - Average Latency: 7
Player: 1 - Latency: 2 - Average Latency: 4
Player: 2 - Latency: 2 - Average Latency: 4
Player: 1 - Latency: 2 - Average Latency: 4
Player: 2 - Latency: 2 - Average Latency: 3
Player: 1 - Latency: 2 - Average Latency: 3
Player: 2 - Latency: 3 - Average Latency: 3
Player: 2 - Latency: 2 - Average Latency: 3
Player: 1 - Latency: 4 - Average Latency: 3
Player: 2 - Latency: 2 - Average Latency: 3
Player: 1 - Latency: 2 - Average Latency: 3
Player: 1 - Latency: 3 - Average Latency: 3
Player: 2 - Latency: 11 - Average Latency: 4

TestCase Performance:
Average Latency: 3
Highest Latency: 11
Lowest Latency: 2

Done
testing playerCollision...

Player: 1 - Latency: 5 - Average Latency: 5

Player: 1 - Latency: 5 - Average Latency: 5
Player: 1 - Latency: 2 - Average Latency: 4
Player: 1 - Latency: 8 - Average Latency: 5

TestCase Performance:

Average Latency: 5

Highest Latency: 8

Lowest Latency: 2

Done

testing testPlayerEnemyCollision...

Player: 1 - Latency: 3 - Average Latency: 3
Player: 1 - Latency: 7 - Average Latency: 5
Player: 1 - Latency: 6 - Average Latency: 5

TestCase Performance:

Average Latency: 5

Highest Latency: 7

Lowest Latency: 3

Done

testing breakWallWithBomb...

Player: 1 - Latency: 3 - Average Latency: 3
Player: 1 - Latency: 5 - Average Latency: 4
Player: 1 - Latency: 3 - Average Latency: 3
Player: 1 - Latency: 3 - Average Latency: 3
Player: 1 - Latency: 3 - Average Latency: 3
Player: 1 - Latency: 2 - Average Latency: 3
Player: 1 - Latency: 3 - Average Latency: 3
Player: 1 - Latency: 2 - Average Latency: 3
Player: 1 - Latency: 1 - Average Latency: 2
Player: 1 - Latency: 4 - Average Latency: 2

TestCase Performance:

Average Latency: 2

Highest Latency: 5

Lowest Latency: 1

Done

testing killPlayerWithBomb...

Player: 1 - Latency: 3 - Average Latency: 3

Player: 1 - Latency: 9 - Average Latency: 6

Player: 2 - Latency: 4 - Average Latency: 4

TestCase Performance:

Average Latency: 5

Highest Latency: 9

Lowest Latency: 3

Done

testing testHiddenDoor...

Player: 1 - Latency: 3 - Average Latency: 3

Player: 1 - Latency: 4 - Average Latency: 3

Player: 1 - Latency: 1 - Average Latency: 2

Player: 1 - Latency: 2 - Average Latency: 2

Player: 1 - Latency: 1 - Average Latency: 2

Player: 1 - Latency: 2 - Average Latency: 2

Player: 1 - Latency: 1 - Average Latency: 2

Player: 1 - Latency: 2 - Average Latency: 2

Player: 1 - Latency: 2 - Average Latency: 2

Player: 1 - Latency: 1 - Average Latency: 1

Player: 1 - Latency: 1 - Average Latency: 1

Player: 1 - Latency: 3 - Average Latency: 1

TestCase Performance:

Average Latency: 1

Highest Latency: 4

Lowest Latency: 1

Done

testing tryAndPlaceMultipleBombs...

Player: 1 - Latency: 2 - Average Latency: 2

Player: 1 - Latency: 2 - Average Latency: 2

Player: 1 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 2 - Average Latency: 1
Player: 1 - Latency: 2 - Average Latency: 1
Player: 1 - Latency: 2 - Average Latency: 1
Player: 1 - Latency: 3 - Average Latency: 1

TestCase Performance:

Average Latency: 1

Highest Latency: 3

Lowest Latency: 1

Done

testing place2BombsWithPowerUp...

Player: 1 - Latency: 2 - Average Latency: 2
Player: 1 - Latency: 3 - Average Latency: 2
Player: 1 - Latency: 2 - Average Latency: 2
Player: 1 - Latency: 1 - Average Latency: 2
Player: 1 - Latency: 2 - Average Latency: 2
Player: 1 - Latency: 2 - Average Latency: 2
Player: 1 - Latency: 2 - Average Latency: 2

TestCase Performance:

Average Latency: 2

Highest Latency: 3

Lowest Latency: 1

Done

testing testBombRangePlusOne...

Player: 1 - Latency: 2 - Average Latency: 2
Player: 1 - Latency: 3 - Average Latency: 2
Player: 1 - Latency: 2 - Average Latency: 2
Player: 1 - Latency: 2 - Average Latency: 2
Player: 1 - Latency: 2 - Average Latency: 2

TestCase Performance:

Average Latency: 2

Highest Latency: 3
Lowest Latency: 2

Done

testing testFlamePass...

Player: 1 - Latency: 3 - Average Latency: 3
Player: 1 - Latency: 3 - Average Latency: 3
Player: 1 - Latency: 2 - Average Latency: 2
Player: 1 - Latency: 1 - Average Latency: 2
Player: 1 - Latency: 1 - Average Latency: 2
Player: 1 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 2 - Average Latency: 1

TestCase Performance:

Average Latency: 1
Highest Latency: 3
Lowest Latency: 1

Done

testing testInvulnerability...

Player: 1 - Latency: 2 - Average Latency: 2
Player: 1 - Latency: 2 - Average Latency: 2
Player: 1 - Latency: 2 - Average Latency: 2
Player: 1 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 2 - Average Latency: 1
Player: 1 - Latency: 3 - Average Latency: 1

TestCase Performance:

Average Latency: 1
Highest Latency: 3
Lowest Latency: 1

Done

testing testUpgradedBombsChainReaction...

Player: 1 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 2 - Average Latency: 1
Player: 1 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 2 - Average Latency: 1
Player: 1 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 2 - Average Latency: 1
Player: 1 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 2 - Average Latency: 1
Player: 1 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 2 - Average Latency: 1

TestCase Performance:

Average Latency: 1

Highest Latency: 2

Lowest Latency: 1

Done

testing OnePlayerHeavyLoad...

Player: 1 - Latency: 3 - Average Latency: 3
Player: 1 - Latency: 1 - Average Latency: 2
Player: 1 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 2 - Average Latency: 1
Player: 1 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 2 - Average Latency: 1
Player: 1 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 1 - Average Latency: 1

Player: 1 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 2 - Average Latency: 1
Player: 1 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 2 - Average Latency: 1
Player: 1 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 0 - Average Latency: 1
Player: 1 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 0 - Average Latency: 1
Player: 1 - Latency: 0 - Average Latency: 1
Player: 1 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 0 - Average Latency: 1
Player: 1 - Latency: 0 - Average Latency: 1
Player: 1 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 0 - Average Latency: 1
Player: 1 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 0 - Average Latency: 0

TestCase Performance:

Average Latency: 0

Highest Latency: 3

Lowest Latency: 0

Done

testing twoPlayerHeavyLoad...

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Player: 2 - Latency: 0 - Average Latency: 1
Player: 1 - Latency: 1 - Average Latency: 1
Player: 2 - Latency: 0 - Average Latency: 1
Player: 1 - Latency: 1 - Average Latency: 1
Player: 2 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 1 - Average Latency: 1
Player: 2 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 1 - Average Latency: 1
Player: 2 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 1 - Average Latency: 1
Player: 2 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 1 - Average Latency: 1
Player: 2 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 0 - Average Latency: 1
Player: 2 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 0 - Average Latency: 1
Player: 2 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 1 - Average Latency: 1
Player: 2 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 2 - Average Latency: 1
Player: 1 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 0 - Average Latency: 1
Player: 1 - Latency: 0 - Average Latency: 1
Player: 1 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 0 - Average Latency: 1
Player: 1 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 3 - Average Latency: 1

TestCase Performance:

Average Latency: 1

Highest Latency: 6

Lowest Latency: 0

Done

testing threePlayerHeavyLoad...

Player: 1 - Latency: 0 - Average Latency: 0

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Player: 1 - Latency: 1 - Average Latency: 1
Player: 2 - Latency: 1 - Average Latency: 1
Player: 3 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 1 - Average Latency: 1
Player: 2 - Latency: 1 - Average Latency: 1
Player: 3 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 1 - Average Latency: 1
Player: 3 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 0 - Average Latency: 1
Player: 3 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 1 - Average Latency: 1
Player: 3 - Latency: 0 - Average Latency: 1
Player: 1 - Latency: 1 - Average Latency: 1
Player: 3 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 0 - Average Latency: 1
Player: 3 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 1 - Average Latency: 1
Player: 3 - Latency: 0 - Average Latency: 1
Player: 1 - Latency: 1 - Average Latency: 1
Player: 3 - Latency: 0 - Average Latency: 1
Player: 3 - Latency: 1 - Average Latency: 1
Player: 3 - Latency: 1 - Average Latency: 1
Player: 3 - Latency: 0 - Average Latency: 1
Player: 3 - Latency: 1 - Average Latency: 1
Player: 3 - Latency: 1 - Average Latency: 1
Player: 3 - Latency: 1 - Average Latency: 1
Player: 3 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 2 - Average Latency: 1
Player: 3 - Latency: 2 - Average Latency: 1

TestCase Performance:

Average Latency: 1

Highest Latency: 5

Lowest Latency: 0

Done

testing fourPlayerHeavyLoad...

Player: 1 - Latency: 9 - Average Latency: 9
Player: 1 - Latency: 2 - Average Latency: 5
Player: 2 - Latency: 2 - Average Latency: 2
Player: 3 - Latency: 3 - Average Latency: 3
Player: 4 - Latency: 3 - Average Latency: 3
Player: 1 - Latency: 2 - Average Latency: 4
Player: 2 - Latency: 1 - Average Latency: 1
Player: 3 - Latency: 1 - Average Latency: 2
Player: 4 - Latency: 2 - Average Latency: 2
Player: 1 - Latency: 1 - Average Latency: 3
Player: 2 - Latency: 2 - Average Latency: 1
Player: 3 - Latency: 2 - Average Latency: 2
Player: 4 - Latency: 1 - Average Latency: 2
Player: 1 - Latency: 2 - Average Latency: 3
Player: 2 - Latency: 1 - Average Latency: 1
Player: 3 - Latency: 1 - Average Latency: 1
Player: 4 - Latency: 2 - Average Latency: 2
Player: 1 - Latency: 1 - Average Latency: 2
Player: 2 - Latency: 2 - Average Latency: 1
Player: 3 - Latency: 2 - Average Latency: 1
Player: 4 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 2 - Average Latency: 2
Player: 2 - Latency: 1 - Average Latency: 1
Player: 3 - Latency: 1 - Average Latency: 1
Player: 4 - Latency: 2 - Average Latency: 1
Player: 1 - Latency: 1 - Average Latency: 2
Player: 2 - Latency: 2 - Average Latency: 1
Player: 3 - Latency: 2 - Average Latency: 1
Player: 4 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 2 - Average Latency: 2
Player: 2 - Latency: 1 - Average Latency: 1
Player: 3 - Latency: 1 - Average Latency: 1
Player: 4 - Latency: 2 - Average Latency: 1
Player: 1 - Latency: 1 - Average Latency: 2
Player: 2 - Latency: 1 - Average Latency: 1
Player: 3 - Latency: 1 - Average Latency: 1

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Player: 3 - Latency: 1 - Average Latency: 1
Player: 4 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 1 - Average Latency: 1
Player: 3 - Latency: 1 - Average Latency: 1
Player: 4 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 1 - Average Latency: 1
Player: 3 - Latency: 1 - Average Latency: 1
Player: 4 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 1 - Average Latency: 1
Player: 3 - Latency: 1 - Average Latency: 1
Player: 4 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 1 - Average Latency: 1
Player: 3 - Latency: 1 - Average Latency: 1
Player: 4 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 1 - Average Latency: 1
Player: 3 - Latency: 1 - Average Latency: 1
Player: 4 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 0 - Average Latency: 1
Player: 3 - Latency: 1 - Average Latency: 1
Player: 4 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 1 - Average Latency: 1
Player: 3 - Latency: 1 - Average Latency: 1
Player: 3 - Latency: 0 - Average Latency: 1
Player: 3 - Latency: 1 - Average Latency: 1
Player: 3 - Latency: 1 - Average Latency: 1
Player: 1 - Latency: 2 - Average Latency: 1
Player: 3 - Latency: 3 - Average Latency: 1

TestCase Performance:

Average Latency: 1

Highest Latency: 9

Lowest Latency: 0

Done

Average Latency per action: 1

Highest Latency Overall: 18
Lowest Latency Overall: 0
Stopping the server

As for testing the latency of a client that is run on a separate machine than the server, we needed to run the client and server manually and capture some sample results.

Here are some sample results for the Home Client having done 20 separate actions

Player: 1 - Latency: 11 - Average Latency: 11
Player: 1 - Latency: 3 - Average Latency: 7
Player: 1 - Latency: 2 - Average Latency: 5
Player: 1 - Latency: 2 - Average Latency: 4
Player: 1 - Latency: 2 - Average Latency: 4
Player: 1 - Latency: 2 - Average Latency: 3
Player: 1 - Latency: 1 - Average Latency: 3
Player: 1 - Latency: 1 - Average Latency: 3
Player: 1 - Latency: 2 - Average Latency: 2
Player: 1 - Latency: 2 - Average Latency: 2
Player: 1 - Latency: 1 - Average Latency: 2
Player: 1 - Latency: 2 - Average Latency: 2
Player: 1 - Latency: 1 - Average Latency: 2
Player: 1 - Latency: 1 - Average Latency: 2
Player: 1 - Latency: 1 - Average Latency: 2
Player: 1 - Latency: 1 - Average Latency: 2
Player: 1 - Latency: 1 - Average Latency: 2
Player: 1 - Latency: 1 - Average Latency: 2
Player: 1 - Latency: 1 - Average Latency: 1

From looking at these results we get:

Average Latency: 3.15
Highest Latency: 11
Lowest Latency: 1

Here are some sample results for the Client on a separate machine having done 20 actions

Player: 1 - Latency: 24 - Average Latency: 24
Player: 1 - Latency: 16 - Average Latency: 20
Player: 1 - Latency: 5 - Average Latency: 15
Player: 1 - Latency: 4 - Average Latency: 12
Player: 1 - Latency: 9 - Average Latency: 11
Player: 1 - Latency: 7 - Average Latency: 10
Player: 1 - Latency: 5 - Average Latency: 10
Player: 1 - Latency: 6 - Average Latency: 9
Player: 1 - Latency: 3 - Average Latency: 8
Player: 1 - Latency: 4 - Average Latency: 8
Player: 1 - Latency: 3 - Average Latency: 7
Player: 1 - Latency: 5 - Average Latency: 7
Player: 1 - Latency: 9 - Average Latency: 7
Player: 1 - Latency: 3 - Average Latency: 7
Player: 1 - Latency: 5 - Average Latency: 7
Player: 1 - Latency: 3 - Average Latency: 6
Player: 1 - Latency: 9 - Average Latency: 7
Player: 1 - Latency: 4 - Average Latency: 6
Player: 1 - Latency: 4 - Average Latency: 6
Player: 1 - Latency: 6 - Average Latency: 6

Average Latency: 9.65
Highest Latency: 24
Lowest Latency: 6

From these results we can see that the Client that is based on the same machine could be said to have a slight advantage. However, since they are so very close together, the advantage isn't going to make much of a difference. Especially when we as humans are slow compared to the presented latency.