

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:

Test Number	Test Name	Average Latency	Highest Latency	Lowest Latency
1	playerWin	118	194	99
2	twoPlayerWin	105	202	96
3	playerCollision	119	200	98
4	playerEnemyCollision	125	201	99
5	breakWallWithBomb	109	201	98
6	killPlayerWithBomb	123	201	97
7	testHiddenDoor	107	202	98
8	tryAndPlaceMultipleBombs	112	202	98
9	place2BombsWithPowerup	113	200	97
10	testBombRangePlusOne	119	200	98
11	testFlamePass	111	201	96
12	testInvulnerability	118	201	98
13	testUpgradedBombsChainReaction	107	200	98
14	onePlayerHeavyLoad	104	201	99
15	twoPlayerHeavyLoad	101	200	97
16	threePlayerHeavyLoad	102	201	92
17	fourPlayerHeavyLoad	100	203	95
Overall		103	201	92

Summary of results: For every test, the initial game start event generally takes more time to get back to the client, usually giving the highest latency for that particular test. The latency is mostly caused by the network and not our server. Since there are more commands being run by the heavy load tests, the latency skew being caused by the game start event is having less effect on the overall average of the latency.

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 average/high/low latency results for the Home Client having done 100 separate actions

Average Latency: 97
Highest Latency: 142
Lowest Latency: 48

Here are some average/high/low latency results for the Client on a separate machine having done 100 actions

Average Latency: 86
Highest Latency: 151
Lowest Latency: 30

From these results, we can see that there isn't much difference between the latency of the client running on the same machine as the server and the client running on a separate machine.

Actual results:

Separate Machine:

Player: 1 - Latency: 102 - Average Latency: 102
Player: 1 - Latency: 134 - Average Latency: 118
Player: 1 - Latency: 82 - Average Latency: 106
Player: 1 - Latency: 146 - Average Latency: 116
Player: 1 - Latency: 102 - Average Latency: 113
Player: 1 - Latency: 74 - Average Latency: 106
Player: 1 - Latency: 46 - Average Latency: 98
Player: 1 - Latency: 118 - Average Latency: 100
Player: 1 - Latency: 42 - Average Latency: 94
Player: 1 - Latency: 150 - Average Latency: 99

Player: 1 - Latency: 91 - Average Latency: 98
Player: 1 - Latency: 63 - Average Latency: 95
Player: 1 - Latency: 43 - Average Latency: 91
Player: 1 - Latency: 123 - Average Latency: 94
Player: 1 - Latency: 103 - Average Latency: 94
Player: 1 - Latency: 67 - Average Latency: 92
Player: 1 - Latency: 131 - Average Latency: 95
Player: 1 - Latency: 112 - Average Latency: 96
Player: 1 - Latency: 83 - Average Latency: 95
Player: 1 - Latency: 131 - Average Latency: 97
Player: 1 - Latency: 111 - Average Latency: 97
Player: 1 - Latency: 91 - Average Latency: 97
Player: 1 - Latency: 55 - Average Latency: 95
Player: 1 - Latency: 59 - Average Latency: 94
Player: 1 - Latency: 63 - Average Latency: 92
Player: 1 - Latency: 51 - Average Latency: 91
Player: 1 - Latency: 151 - Average Latency: 93
Player: 1 - Latency: 115 - Average Latency: 94
Player: 1 - Latency: 71 - Average Latency: 93
Player: 1 - Latency: 50 - Average Latency: 92
Player: 1 - Latency: 114 - Average Latency: 92
Player: 1 - Latency: 110 - Average Latency: 93
Player: 1 - Latency: 90 - Average Latency: 93
Player: 1 - Latency: 38 - Average Latency: 91
Player: 1 - Latency: 34 - Average Latency: 89
Player: 1 - Latency: 122 - Average Latency: 90
Player: 1 - Latency: 78 - Average Latency: 90
Player: 1 - Latency: 42 - Average Latency: 89
Player: 1 - Latency: 30 - Average Latency: 87
Player: 1 - Latency: 118 - Average Latency: 88
Player: 1 - Latency: 98 - Average Latency: 88
Player: 1 - Latency: 86 - Average Latency: 88
Player: 1 - Latency: 90 - Average Latency: 88
Player: 1 - Latency: 78 - Average Latency: 88
Player: 1 - Latency: 117 - Average Latency: 89
Player: 1 - Latency: 117 - Average Latency: 89
Player: 1 - Latency: 70 - Average Latency: 89
Player: 1 - Latency: 34 - Average Latency: 88
Player: 1 - Latency: 130 - Average Latency: 88

Player: 1 - Latency: 118 - Average Latency: 89
Player: 1 - Latency: 74 - Average Latency: 89
Player: 1 - Latency: 30 - Average Latency: 88
Player: 1 - Latency: 134 - Average Latency: 88
Player: 1 - Latency: 122 - Average Latency: 89
Player: 1 - Latency: 62 - Average Latency: 89
Player: 1 - Latency: 126 - Average Latency: 89
Player: 1 - Latency: 106 - Average Latency: 89
Player: 1 - Latency: 111 - Average Latency: 90
Player: 1 - Latency: 91 - Average Latency: 90
Player: 1 - Latency: 71 - Average Latency: 90
Player: 1 - Latency: 151 - Average Latency: 91
Player: 1 - Latency: 63 - Average Latency: 90
Player: 1 - Latency: 127 - Average Latency: 91
Player: 1 - Latency: 91 - Average Latency: 91
Player: 1 - Latency: 79 - Average Latency: 90
Player: 1 - Latency: 67 - Average Latency: 90
Player: 1 - Latency: 63 - Average Latency: 90
Player: 1 - Latency: 83 - Average Latency: 90
Player: 1 - Latency: 55 - Average Latency: 89
Player: 1 - Latency: 59 - Average Latency: 89
Player: 1 - Latency: 115 - Average Latency: 89
Player: 1 - Latency: 103 - Average Latency: 89
Player: 1 - Latency: 75 - Average Latency: 89
Player: 1 - Latency: 95 - Average Latency: 89
Player: 1 - Latency: 67 - Average Latency: 89
Player: 1 - Latency: 79 - Average Latency: 89
Player: 1 - Latency: 51 - Average Latency: 88
Player: 1 - Latency: 71 - Average Latency: 88
Player: 1 - Latency: 67 - Average Latency: 88
Player: 1 - Latency: 131 - Average Latency: 88
Player: 1 - Latency: 86 - Average Latency: 88
Player: 1 - Latency: 90 - Average Latency: 88
Player: 1 - Latency: 78 - Average Latency: 88
Player: 1 - Latency: 74 - Average Latency: 88
Player: 1 - Latency: 54 - Average Latency: 87
Player: 1 - Latency: 58 - Average Latency: 87
Player: 1 - Latency: 46 - Average Latency: 87
Player: 1 - Latency: 58 - Average Latency: 86

Player: 1 - Latency: 122 - Average Latency: 87
Player: 1 - Latency: 102 - Average Latency: 87
Player: 1 - Latency: 82 - Average Latency: 87
Player: 1 - Latency: 94 - Average Latency: 87
Player: 1 - Latency: 90 - Average Latency: 87
Player: 1 - Latency: 78 - Average Latency: 87
Player: 1 - Latency: 74 - Average Latency: 87
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Player: 1 - Latency: 78 - Average Latency: 86
Player: 1 - Latency: 58 - Average Latency: 86
Player: 1 - Latency: 62 - Average Latency: 86

Home:

Player: 2 - Latency: 133 - Average Latency: 133
Player: 2 - Latency: 103 - Average Latency: 118
Player: 2 - Latency: 57 - Average Latency: 97
Player: 2 - Latency: 107 - Average Latency: 100
Player: 2 - Latency: 74 - Average Latency: 94
Player: 2 - Latency: 135 - Average Latency: 101
Player: 2 - Latency: 110 - Average Latency: 102
Player: 2 - Latency: 103 - Average Latency: 102
Player: 2 - Latency: 140 - Average Latency: 106
Player: 2 - Latency: 77 - Average Latency: 103
Player: 2 - Latency: 88 - Average Latency: 102
Player: 2 - Latency: 116 - Average Latency: 103
Player: 2 - Latency: 83 - Average Latency: 102
Player: 2 - Latency: 58 - Average Latency: 98
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Player: 2 - Latency: 92 - Average Latency: 95
Player: 2 - Latency: 73 - Average Latency: 94
Player: 2 - Latency: 142 - Average Latency: 95
Player: 2 - Latency: 140 - Average Latency: 96
Player: 2 - Latency: 79 - Average Latency: 96
Player: 2 - Latency: 52 - Average Latency: 95
Player: 2 - Latency: 128 - Average Latency: 95
Player: 2 - Latency: 141 - Average Latency: 96
Player: 2 - Latency: 115 - Average Latency: 96
Player: 2 - Latency: 107 - Average Latency: 97
Player: 2 - Latency: 80 - Average Latency: 96

Player: 2 - Latency: 102 - Average Latency: 96
Player: 2 - Latency: 122 - Average Latency: 97
Player: 2 - Latency: 104 - Average Latency: 97
Player: 2 - Latency: 91 - Average Latency: 97
Player: 2 - Latency: 101 - Average Latency: 97
Player: 2 - Latency: 100 - Average Latency: 97
Player: 2 - Latency: 79 - Average Latency: 97
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Player: 2 - Latency: 84 - Average Latency: 97

