

Comp 512 Project-2 Performance Analysis

1 Description

In this performance analysis, we explored how different number of players/different intervals affect the performance of our approach.

2 Experiment Setup

To examine the impact of the number of players, we set the interval and max-moves to be fixed number, 100 and 100 respectively. To keep away from outliers and occasionally outperforming/under-performing cases, all data are taken average from 3 trials. We then examined from 2 to 9 users, with intervals = 100, 10, 5. The time consumed for all trials are in 3.1.

To examine the difference in performances among different processes, given a shorter interval, we start from max-moves = 100 and interval = 100 and number of users (processes) = 9. Then decrease the interval by around 50 % after each trial.

To examine the max number of moves that can be processed, we modified the interval to be 1000, 200, 100, 20, 10, 5, 2, 0. Number of users to be 2, 5, 9, with maxmoves = 100. We Calculate the number of moves delivered ($100 * \text{number of users}$) over the total time elapsed (recorded in ms, $*1000$ to get per second), we then take the unit to be 1s.

3 Result Discussion

3.1 Question 1

We verified for intervals 5, 10 and 100. With the number of users increases from 2 to 9, the total number of moves received for one process increases from 200 to 900.

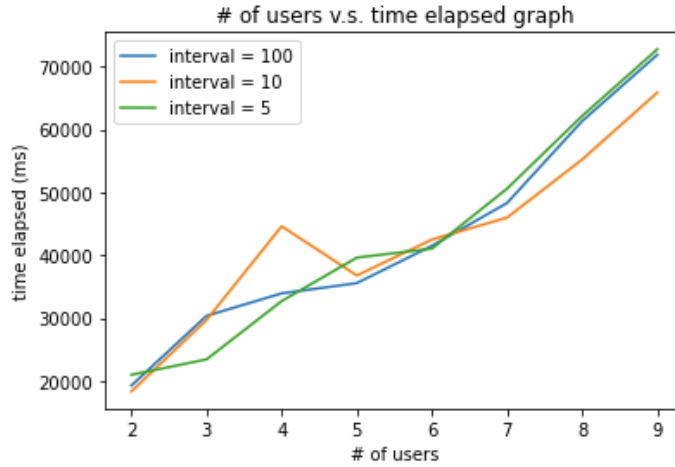


Figure 1: number of users vs total time used

In this case, the total time consumed increased linearly with some fluctuations due to randomized thread sleeps. However the rate there move being accepted (number of move processed per second), even the interval is set to 2, fluctuates between 9 - 15.

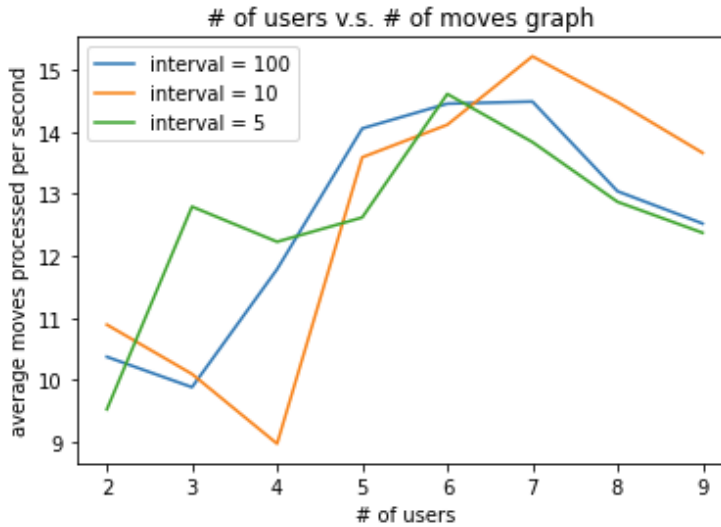


Figure 2: number of users v.s. avg number of moves per second

Nonetheless, we see the trend of number of move processed per second first increase then decrease as number of users increases.

3.2 Question 2

Yes they do have roughly the same rate at which their moves are being accepted, no process is consistently performing better than the others.

The trials are listed in Appendix, from the logs we can see that when the interval is kept larger or equal to 1, with 9 players, the moves performed are rather discrete (player 1 - 9 equally distributed). This is because `paxos.broadCast` is blocking. One process can not broadcast another move until its previous move is delivered to the AL. Therefore, in any confirmed sequence/order delivered, there will be at most one move from each of the player.

3.3 Question 3

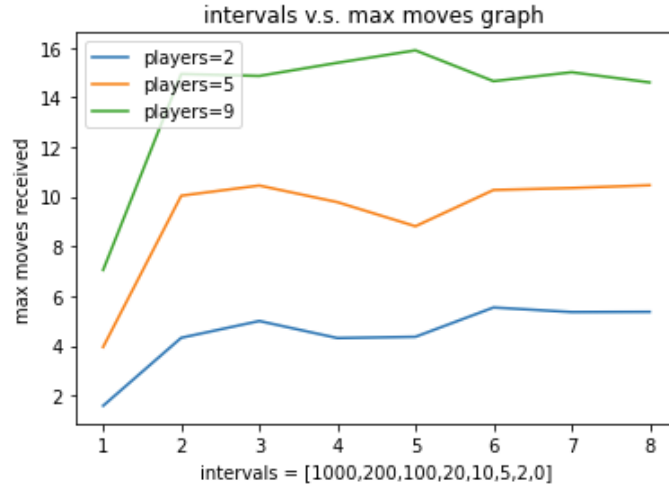


Figure 3: intervals in millisecond vs maximum number of moves that can be processed in 1 second vs number of player. The 1,2,3,, 9 label on the x-axis, correspond to intervals set to 1000, 200, 100,....., 5, 2, 0 milliseconds

The maximum number of moves that our system can process per second for different time intervals is shown in the graph. This graph also indicates that when the interval is below 200, the maximum number of moves that can be processed per second flattens out.

If we increase the number of players from 2 to 5, from 5 to 9, the max moves processed per second surprisingly increases. The reason is that our algorithm is not pushed to its limit with the parameter (`maxmove = 100`, `interval = 0` and `player = 9`).

Thus, we examined for `maxmove = 500`, `interval = 0`, and `player = 9`, finds out that in this case, our approach could process 27.2 moves in 1 second.

4 Appendix

```
Move request: player number 6 direction L
Move request: player number 2 direction L
Move request: player number 3 direction R
Move request: player number 4 direction U
Move request: player number 9 direction D
Move request: player number 8 direction U
Move request: player number 1 direction U
Move request: player number 6 direction D
Move request: player number 7 direction R
Move request: player number 5 direction D
Move request: player number 2 direction U
Move request: player number 3 direction R
Move request: player number 4 direction D
Move request: player number 9 direction D
Move request: player number 8 direction L
Move request: player number 1 direction U
Move request: player number 6 direction R
Move request: player number 7 direction U
Move request: player number 5 direction D
Move request: player number 2 direction U
Move request: player number 4 direction L
Move request: player number 3 direction R
Move request: player number 8 direction L
```

Figure 4: screen shot of the messages processed under interval = 50

```
Game : game-42-99 : Player : 8 record.  
Move request: player number 1 direction U  
Move request: player number 6 direction L  
Move request: player number 7 direction R  
Move request: player number 5 direction D  
Move request: player number 2 direction L  
Move request: player number 3 direction R  
Move request: player number 4 direction U  
Move request: player number 9 direction D  
Move request: player number 8 direction U  
Move request: player number 1 direction U  
Move request: player number 6 direction D  
Move request: player number 7 direction U  
Move request: player number 5 direction D  
Move request: player number 3 direction R  
Move request: player number 4 direction D  
Move request: player number 9 direction D  
Move request: player number 8 direction L  
Move request: player number 6 direction R  
Move request: player number 2 direction U  
Move request: player number 2 direction U  
Move request: player number 7 direction L  
Move request: player number 5 direction D  
Move request: player number 9 direction U  
Move request: player number 1 direction D  
Move request: player number 4 direction L  
Move request: player number 6 direction D  
Move request: player number 3 direction R  
Move request: player number 8 direction L  
Move request: player number 7 direction R  
Move request: player number 5 direction L
```

Figure 5: screen shot of the messages processed under interval = 20

```
Move request: player number 3 direction D
Move request: player number 8 direction R
Move request: player number 1 direction D
Move request: player number 4 direction R
Move request: player number 2 direction R
Move request: player number 7 direction L
Move request: player number 6 direction D
Move request: player number 9 direction L
Move request: player number 5 direction D
Move request: player number 3 direction U
Move request: player number 8 direction U
Move request: player number 4 direction L
Move request: player number 8 direction D
Move request: player number 7 direction D
Move request: player number 9 direction D
Move request: player number 6 direction U
Move request: player number 5 direction R
Move request: player number 8 direction R
Move request: player number 3 direction R
Move request: player number 7 direction U
Move request: player number 9 direction U
Move request: player number 5 direction L
Move request: player number 8 direction R
Move request: player number 9 direction L
Move request: player number 5 direction L
Move request: player number 8 direction R
Move request: player number 9 direction U
```

Figure 6: screen shot of the messages processed under interval = 10

```
Move request: player number 5 direction L
Move request: player number 9 direction U
Move request: player number 8 direction U
Move request: player number 3 direction U
Move request: player number 6 direction R
Move request: player number 4 direction R
Move request: player number 7 direction U
Move request: player number 2 direction U
Move request: player number 5 direction R
Move request: player number 9 direction R
Move request: player number 6 direction U
Move request: player number 8 direction R
Move request: player number 3 direction R
Move request: player number 1 direction L
Move request: player number 7 direction L
Move request: player number 2 direction D
Move request: player number 6 direction L
Move request: player number 3 direction U
Move request: player number 5 direction D
Move request: player number 1 direction L
Move request: player number 4 direction U
Move request: player number 7 direction D
Move request: player number 2 direction R
Move request: player number 8 direction R
Move request: player number 6 direction D
Move request: player number 3 direction U
Move request: player number 9 direction R
Move request: player number 5 direction D
Move request: player number 8 direction D
```

Figure 7: screen shot of the messages processed under interval = 5

```
Move request: player number 4 direction L
Move request: player number 9 direction R
Move request: player number 6 direction D
Move request: player number 8 direction D
Move request: player number 3 direction D
Move request: player number 5 direction U
Move request: player number 4 direction R
Move request: player number 9 direction R
Move request: player number 7 direction U
Move request: player number 6 direction D
Move request: player number 3 direction U
Move request: player number 5 direction U
Move request: player number 8 direction R
Move request: player number 4 direction L
Move request: player number 9 direction L
Move request: player number 5 direction D
Move request: player number 6 direction D
Move request: player number 8 direction R
Move request: player number 5 direction D
Move request: player number 3 direction R
Move request: player number 9 direction D
Move request: player number 6 direction U
Move request: player number 9 direction U
Move request: player number 5 direction R
Move request: player number 8 direction R
Move request: player number 9 direction L
Move request: player number 5 direction L
Move request: player number 9 direction U
Move request: player number 5 direction L
```

Figure 8: screen shot of the messages processed under $\text{interval} = 2$


```
Move request: player number 9 direction R
Move request: player number 6 direction D
Move request: player number 5 direction D
Move request: player number 3 direction D
Move request: player number 1 direction D
Move request: player number 4 direction L
Move request: player number 2 direction D
Move request: player number 7 direction U
Move request: player number 6 direction D
Move request: player number 5 direction R
Move request: player number 3 direction U
Move request: player number 8 direction R
Move request: player number 2 direction R
Move request: player number 9 direction R
Move request: player number 6 direction D
Move request: player number 5 direction L
Move request: player number 8 direction U
Move request: player number 3 direction R
Move request: player number 6 direction D
Move request: player number 9 direction L
Move request: player number 5 direction L
Move request: player number 8 direction D
Move request: player number 9 direction D
Move request: player number 6 direction U
Move request: player number 8 direction R
Move request: player number 9 direction U
Move request: player number 8 direction R
Move request: player number 9 direction L
Move request: player number 8 direction R
Move request: player number 9 direction U
```

Figure 9: screen shot of the messages processed under interval = 1