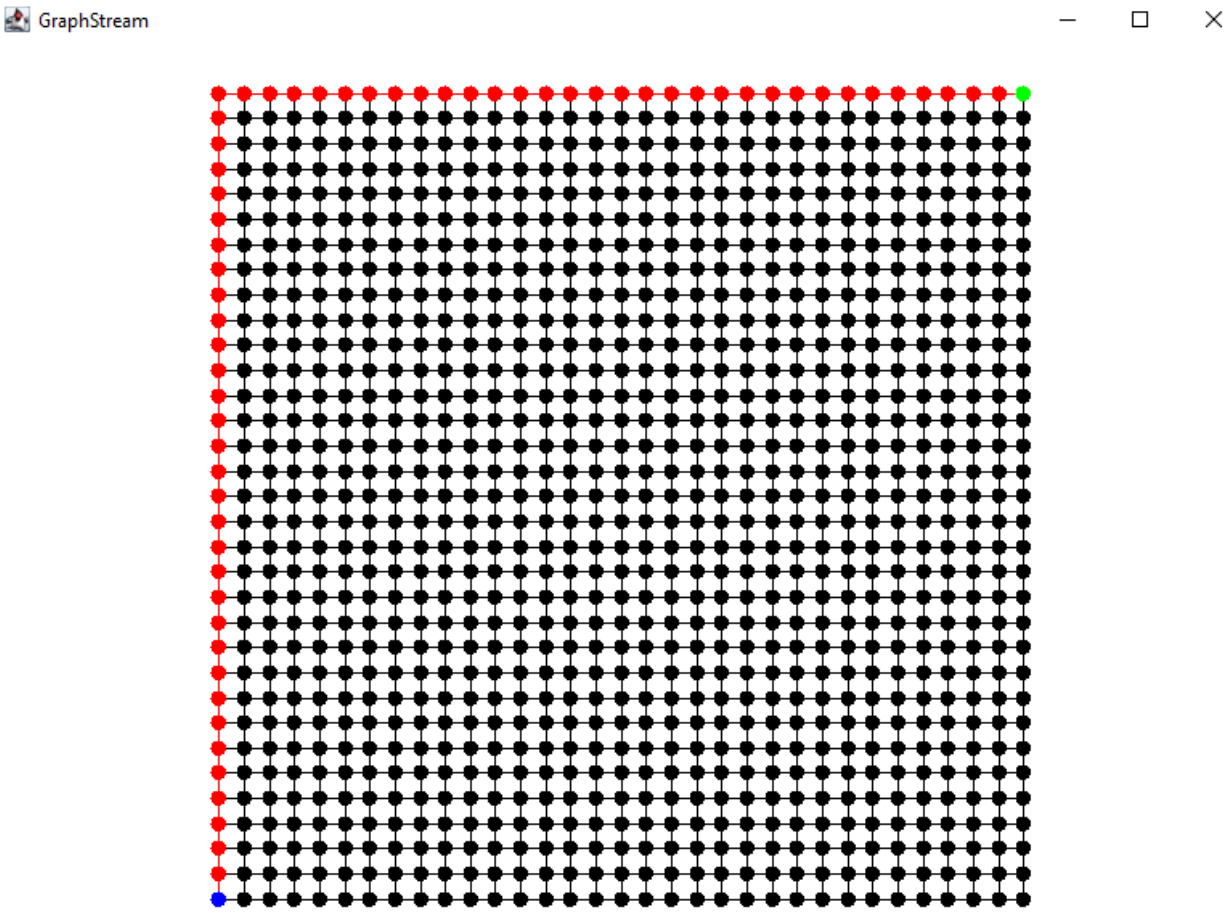
Robotics – Assignment 1

The environment displayed is a 33 by 33 square grid. The blue node represents the start node and the green node represents the goal node. The red color represents the nodes and edges traversed in order to get from the start node to the goal node. The heuristic function used for the A* star algorithm was the straight-line distance between the current node and the goal node.

Pair 1: Start Index: (0,0) Goal Index: (32,32)

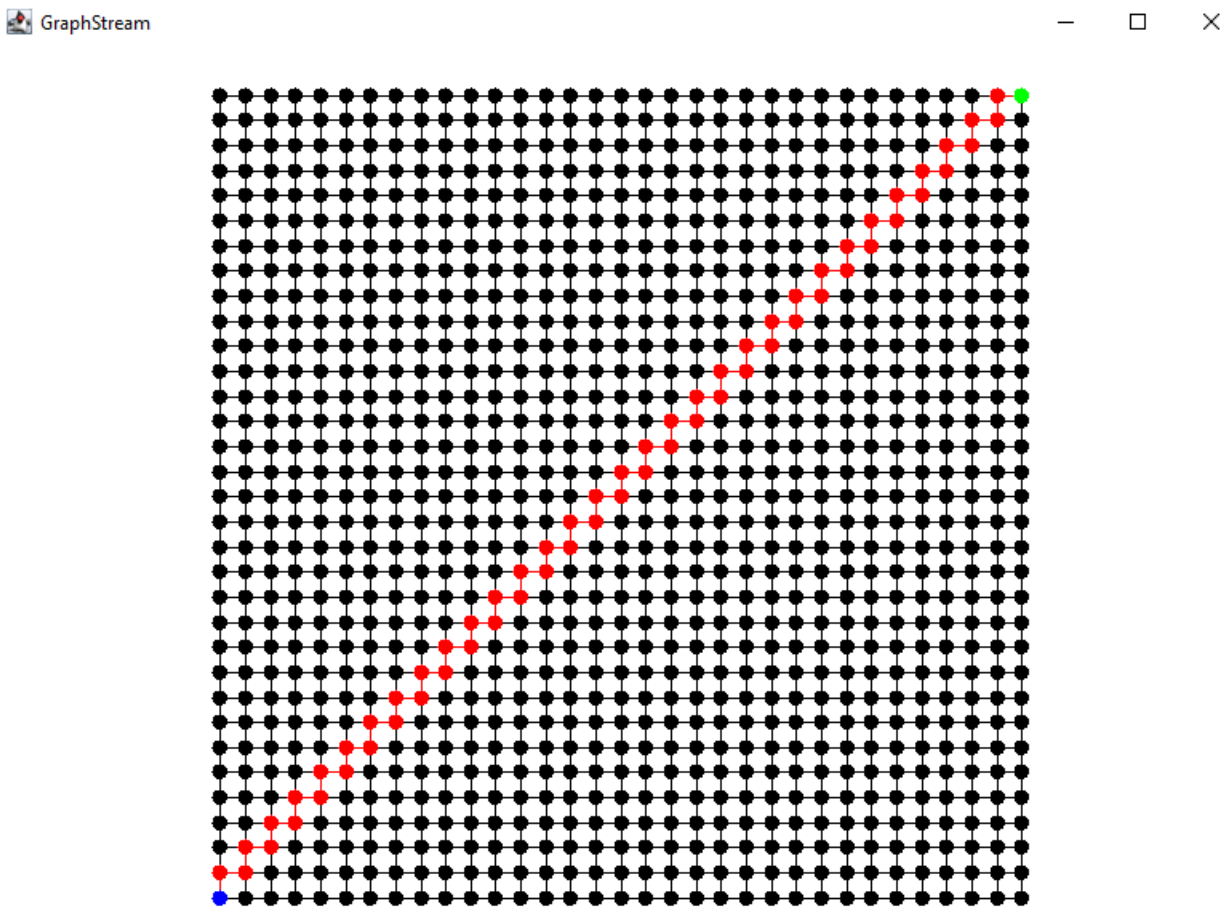
DFS



```
Enter: 0 to Exit, 1 to perform DFS, 2 to perform A*
1

Enter starting index e.g.: 0,0. Range is from (0,0) to (32,32).
0,0
Enter goal index e.g.: 0,0 Range is from (0,0) to (32,32).
32,32
Path Length Given by DFS is 64
Time Taken by DFS is 26900 nanoseconds
```

A*

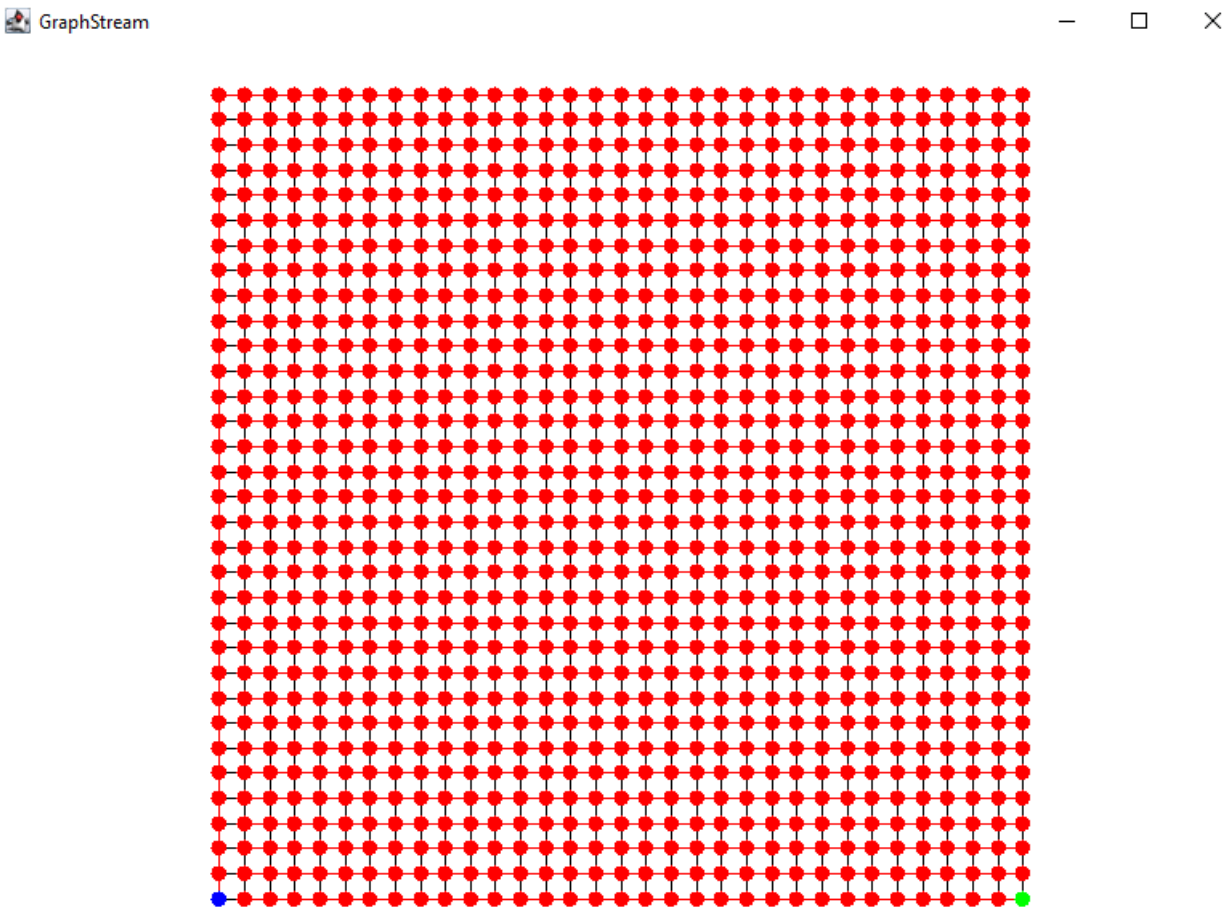



```
Enter: 0 to Exit, 1 to perform DFS, 2 to perform A*
2

Enter starting index e.g.: 0,0. Range is from (0,0) to (32,32).
0,0
Enter goal index e.g.: 0,0 Range is from (0,0) to (32,32).
32,32
Path Length Given by A* is 64
Time Taken by A* is 127700 nanoseconds
```

Pair 2: Start Index: (0,0) Goal Index: (32,0)

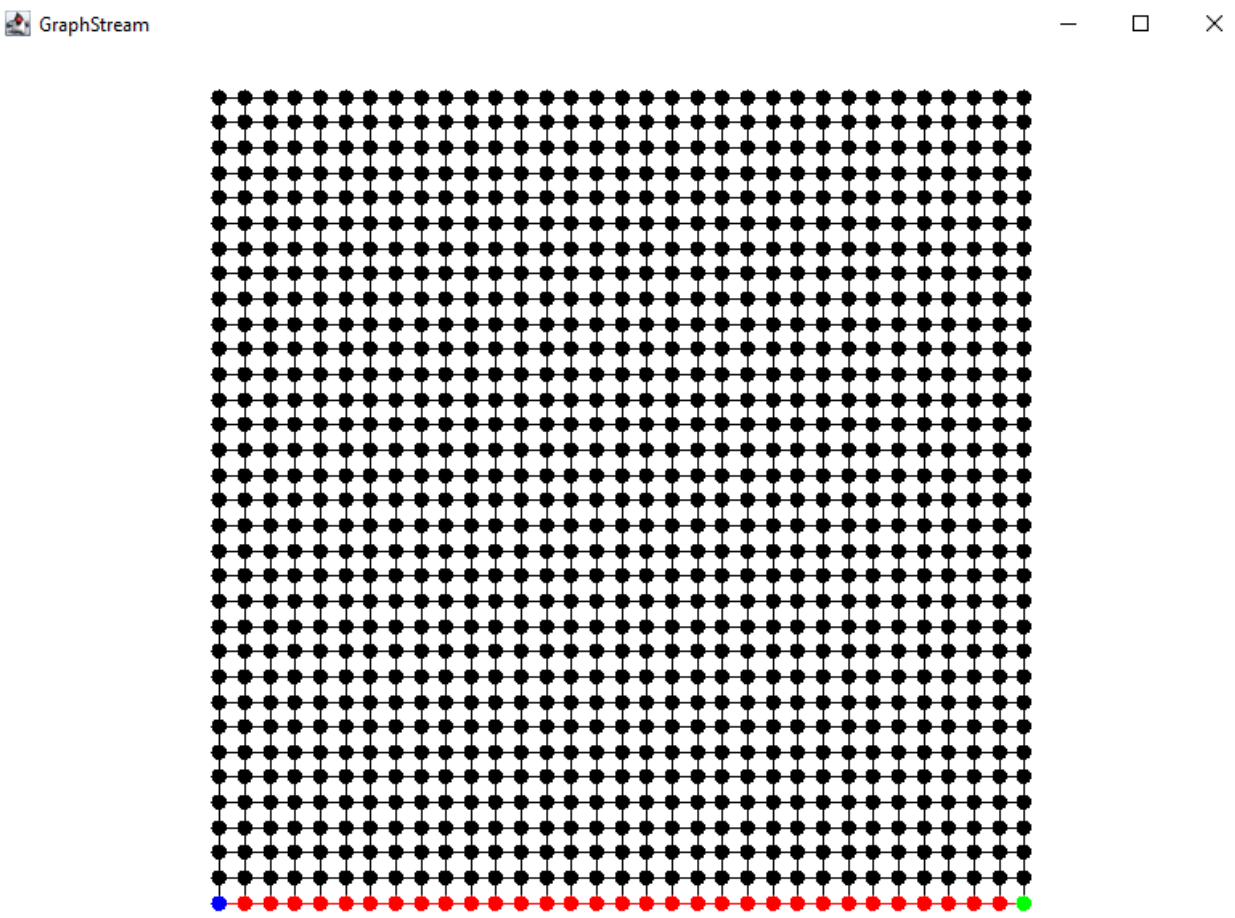
DFS




```
Enter: 0 to Exit, 1 to perform DFS, 2 to perform A*
1

Enter starting index e.g.: 0,0. Range is from (0,0) to (32,32).
0,0
Enter goal index e.g.: 0,0 Range is from (0,0) to (32,32).
32,0
Path Length Given by DFS is 1088
Time Taken by DFS is 134800 nanoseconds
```

A*



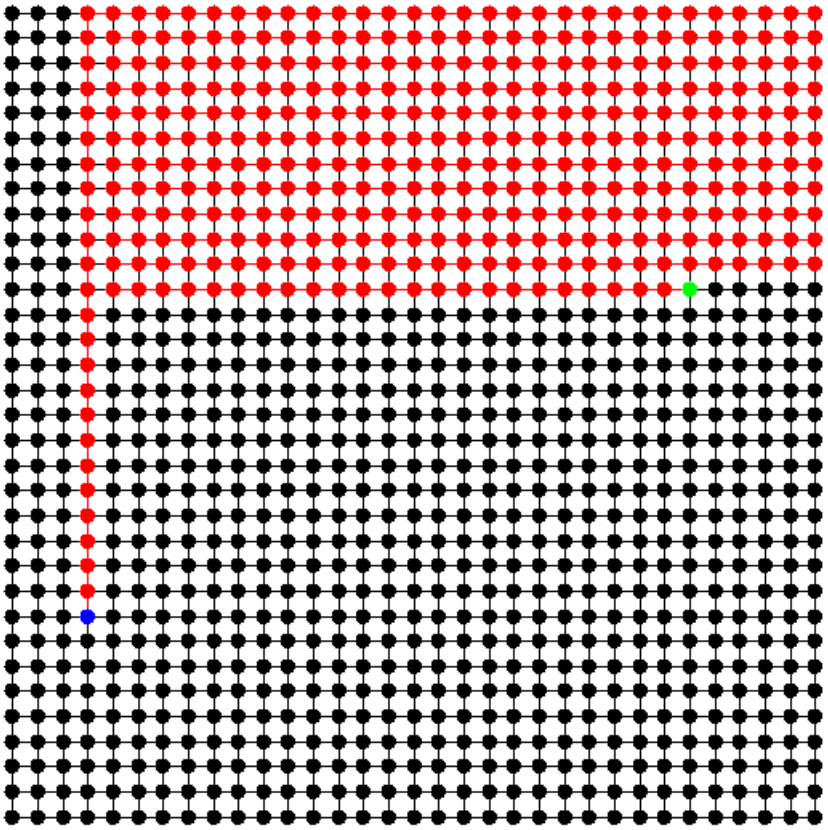

```
Enter: 0 to Exit, 1 to perform DFS, 2 to perform A*
2

Enter starting index e.g.: 0,0. Range is from (0,0) to (32,32).
0,0
Enter goal index e.g.: 0,0 Range is from (0,0) to (32,32).
32,0
Path Length Given by A* is 32
Time Taken by A* is 52200 nanoseconds
```

Pair 3: Start Index: (3,8) Goal Index: (27,21)

DFS

GraphStream

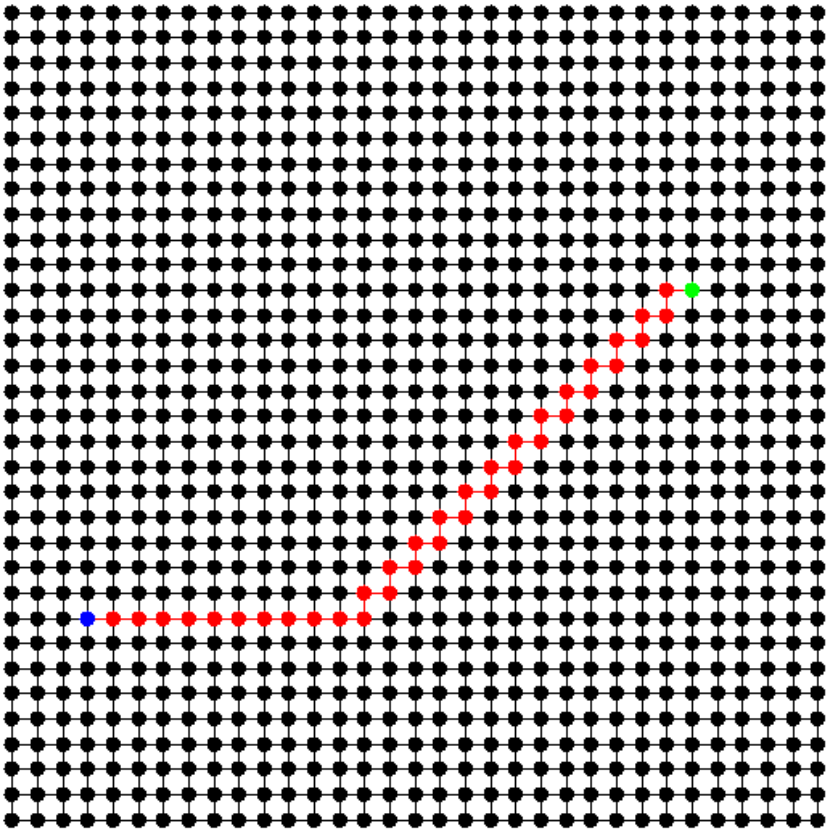


```
Enter: 0 to Exit, 1 to perform DFS, 2 to perform A*
1

Enter starting index e.g.: 0,0. Range is from (0,0) to (32,32).
3,8
Enter goal index e.g.: 0,0 Range is from (0,0) to (32,32).
27,21
Path Length Given by DFS is 367
Time Taken by DFS is 61500 nanoseconds
```

A*

GraphStream



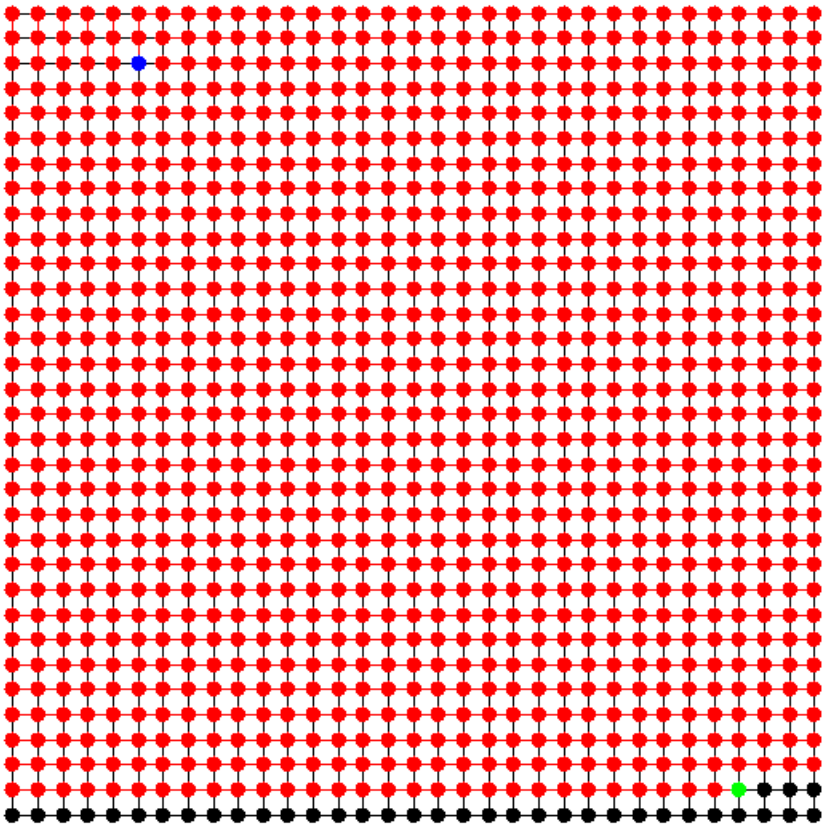
```
Enter: 0 to Exit, 1 to perform DFS, 2 to perform A*
2

Enter starting index e.g.: 0,0. Range is from (0,0) to (32,32).
3,8
Enter goal index e.g.: 0,0 Range is from (0,0) to (32,32).
27,21
Path Length Given by A* is 37
Time Taken by A* is 62800 nanoseconds
```

Pair 4: Start Index: (5,30) Goal Index: (29,1)

DFS

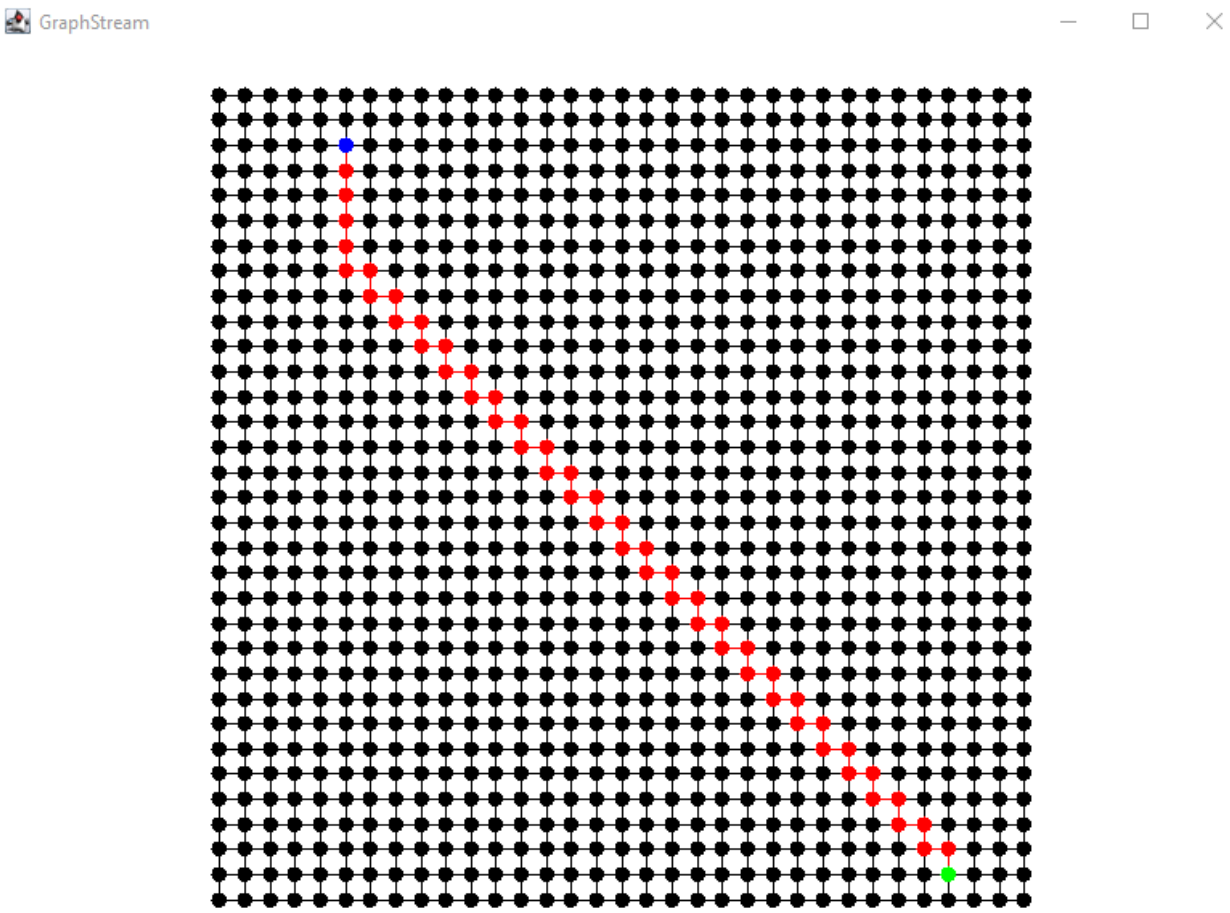
GraphStream



```
Enter: 0 to Exit, 1 to perform DFS, 2 to perform A*
1

Enter starting index e.g.: 0,0. Range is from (0,0) to (32,32).
5,30
Enter goal index e.g.: 0,0 Range is from (0,0) to (32,32).
29,1
Path Length Given by DFS is 1052
Time Taken by DFS is 119600 nanoseconds
```

A*



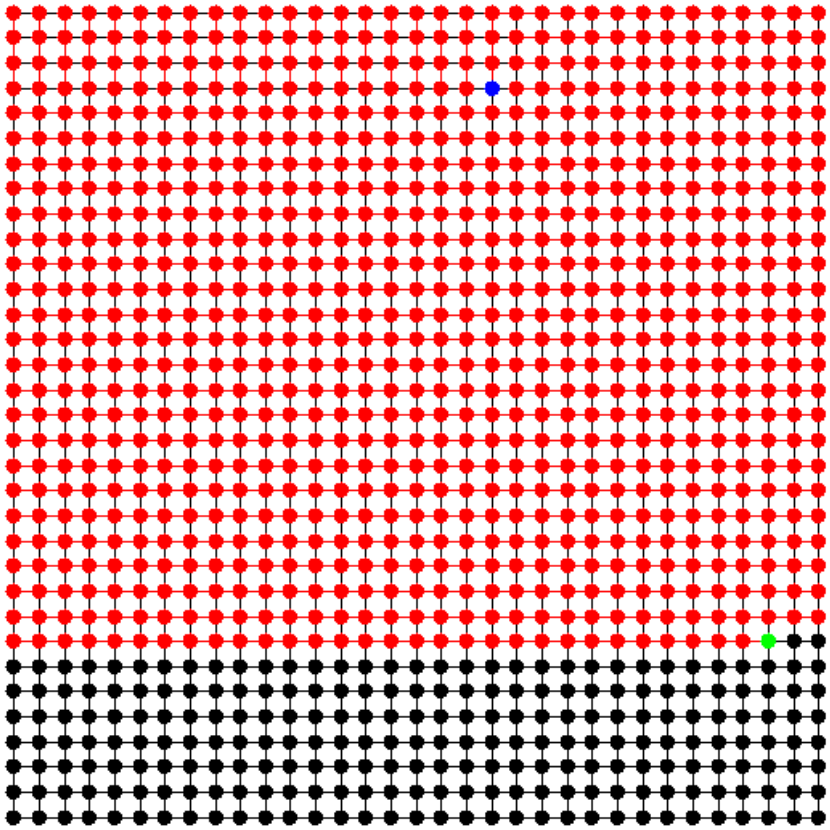

```
Enter: 0 to Exit, 1 to perform DFS, 2 to perform A*
2

Enter starting index e.g.: 0,0. Range is from (0,0) to (32,32).
5,30
Enter goal index e.g.: 0,0 Range is from (0,0) to (32,32).
29,1
Path Length Given by A* is 53
Time Taken by A* is 322400 nanoseconds
```

Pair 5: Start Index: (19,29) Goal Index: (30,7)

DFS

GraphStream

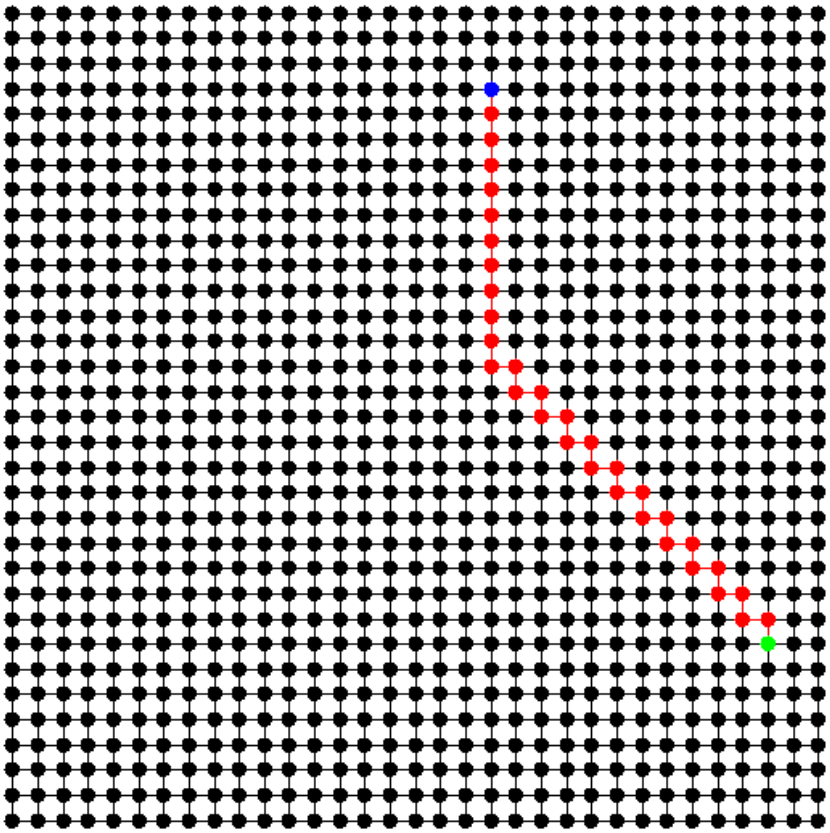


```
Enter: 0 to Exit, 1 to perform DFS, 2 to perform A*
1

Enter starting index e.g.: 0,0. Range is from (0,0) to (32,32).
19,29
Enter goal index e.g.: 0,0 Range is from (0,0) to (32,32).
30,7
Path Length Given by DFS is 855
Time Taken by DFS is 149200 nanoseconds
```

A*

GraphStream



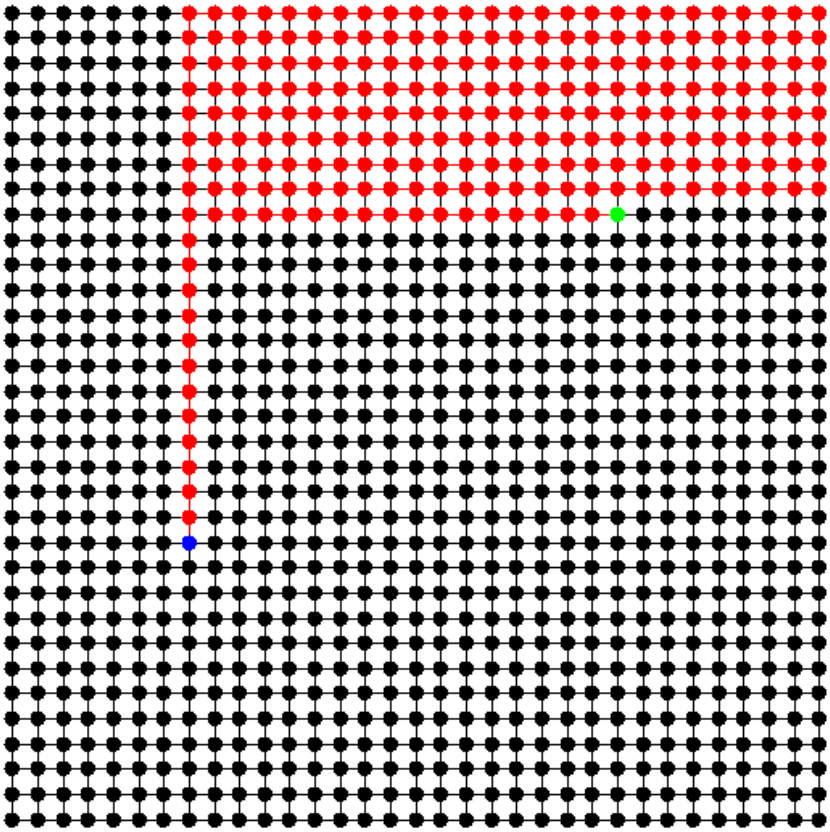
```
Enter: 0 to Exit, 1 to perform DFS, 2 to perform A*
2

Enter starting index e.g.: 0,0. Range is from (0,0) to (32,32).
19,29
Enter goal index e.g.: 0,0 Range is from (0,0) to (32,32).
30,7
Path Length Given by A* is 33
Time Taken by A* is 181700 nanoseconds
```

Pair 6: Start Index: (7,11) Goal Index: (24,24)

DFS

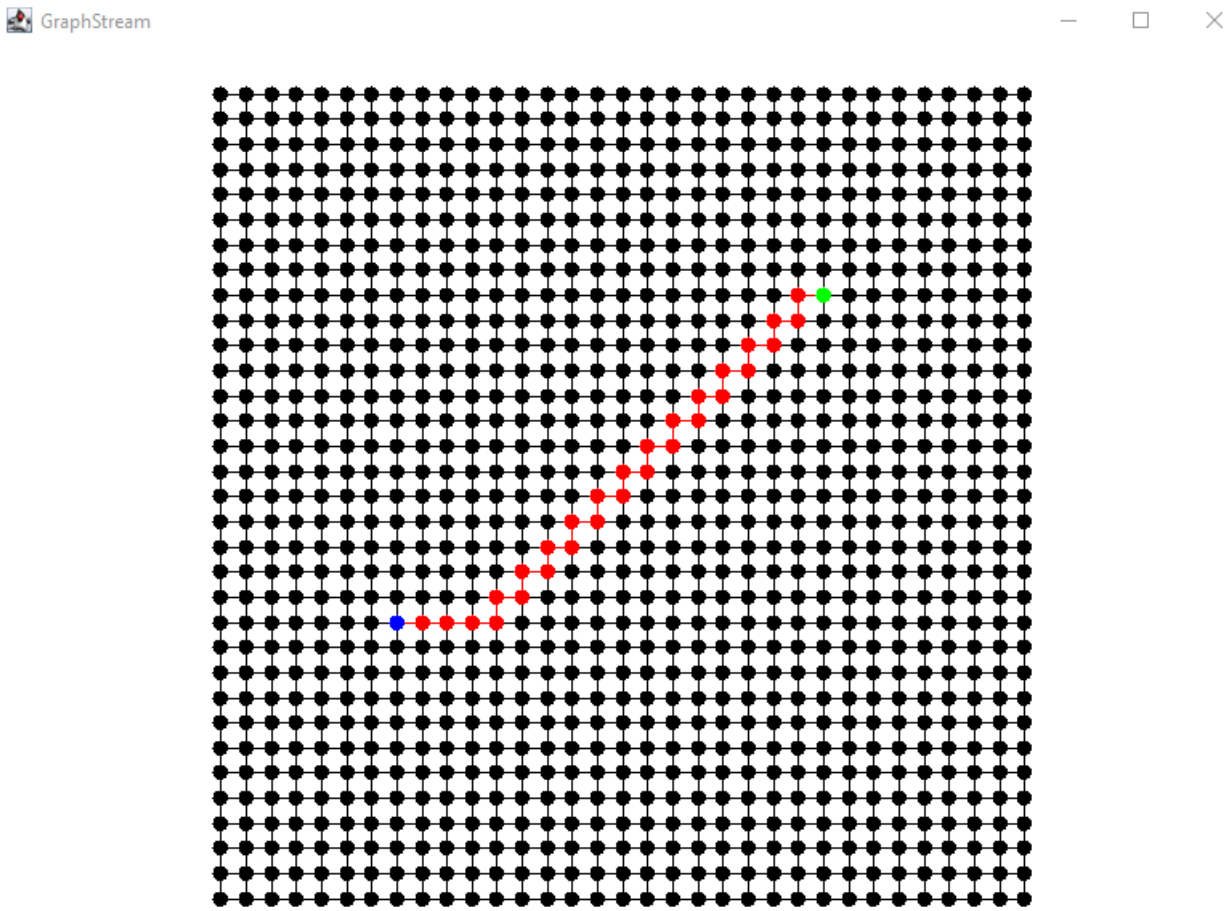
GraphStream



```
Enter: 0 to Exit, 1 to perform DFS, 2 to perform A*
1

Enter starting index e.g.: 0,0. Range is from (0,0) to (32,32).
7,11
Enter goal index e.g.: 0,0 Range is from (0,0) to (32,32).
24,24
Path Length Given by DFS is 238
Time Taken by DFS is 43700 nanoseconds
```

A*



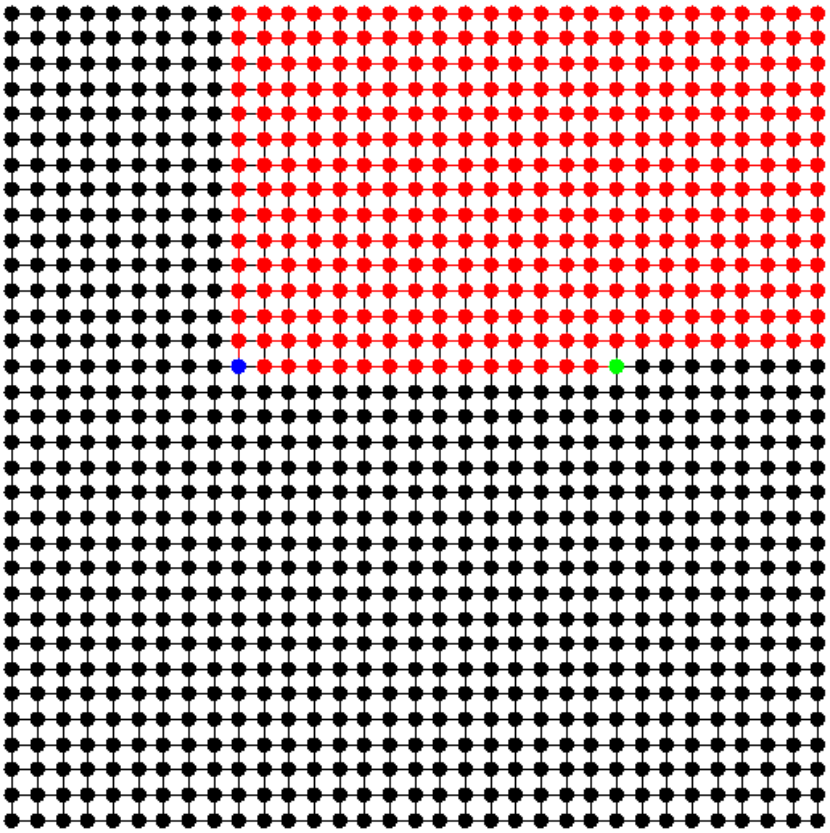

```
Enter starting index e.g.: 0,0. Range is from (0,0) to (32,32).
7,11
Enter goal index e.g.: 0,0 Range is from (0,0) to (32,32).
24,24
Path Length Given by A* is 30
Time Taken by A* is 145900 nanoseconds

Enter: 0 to Exit, 1 to perform DFS, 2 to perform A*
```

Pair 7: Start Index: (9,18) Goal Index: (24,18)

DFS

GraphStream

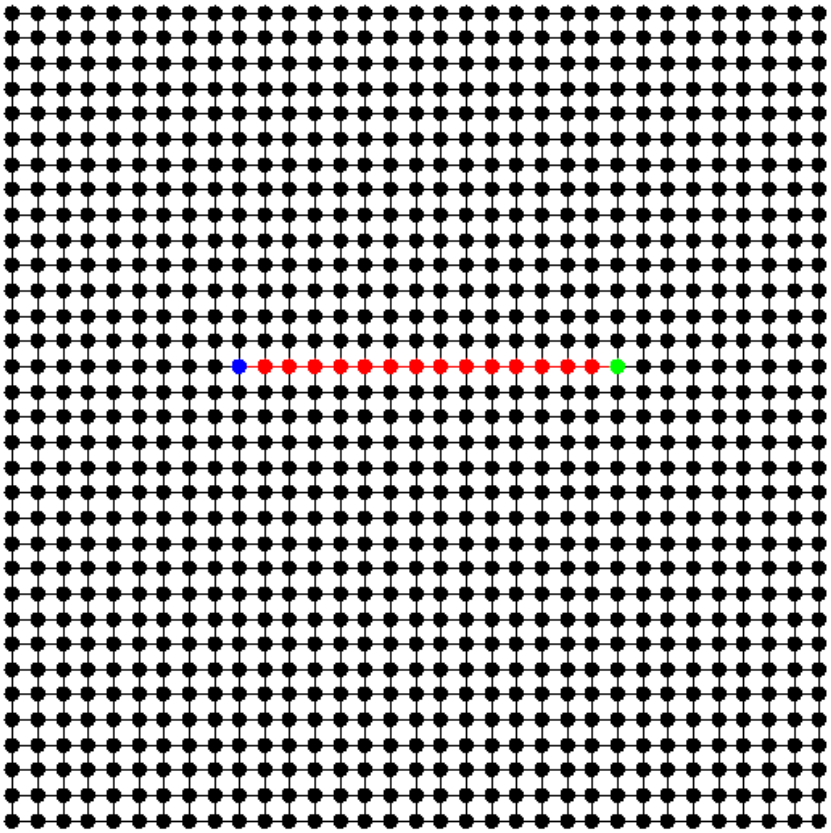


```
Enter: 0 to Exit, 1 to perform DFS, 2 to perform A*
1

Enter starting index e.g.: 0,0. Range is from (0,0) to (32,32).
9,18
Enter goal index e.g.: 0,0 Range is from (0,0) to (32,32).
24,18
Path Length Given by DFS is 351
Time Taken by DFS is 57800 nanoseconds
```

A*

GraphStream



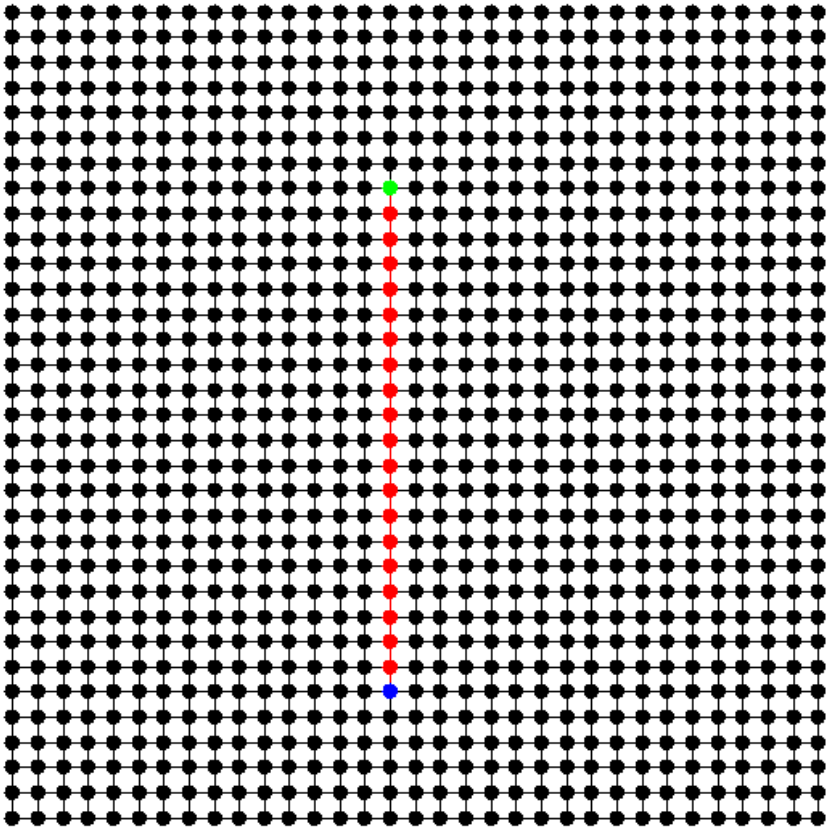
```
Enter: 0 to Exit, 1 to perform DFS, 2 to perform A*
2

Enter starting index e.g.: 0,0. Range is from (0,0) to (32,32).
9,18
Enter goal index e.g.: 0,0 Range is from (0,0) to (32,32).
24,18
Path Length Given by A* is 15
Time Taken by A* is 81100 nanoseconds
```

Pair 8: Start Index: (15,5) Goal Index: (15,25)

DFS

GraphStream

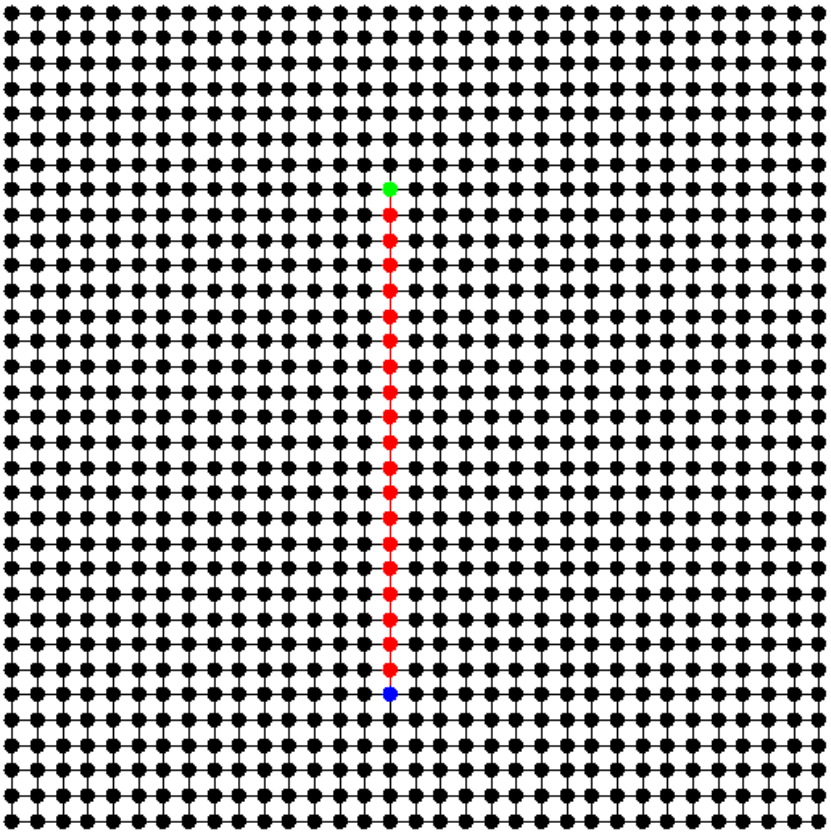


```
Enter: 0 to Exit, 1 to perform DFS, 2 to perform A*
1

Enter starting index e.g.: 0,0. Range is from (0,0) to (32,32).
15,5
Enter goal index e.g.: 0,0 Range is from (0,0) to (32,32).
15,25
Path Length Given by DFS is 20
Time Taken by DFS is 23100 nanoseconds
```

A*

GraphStream



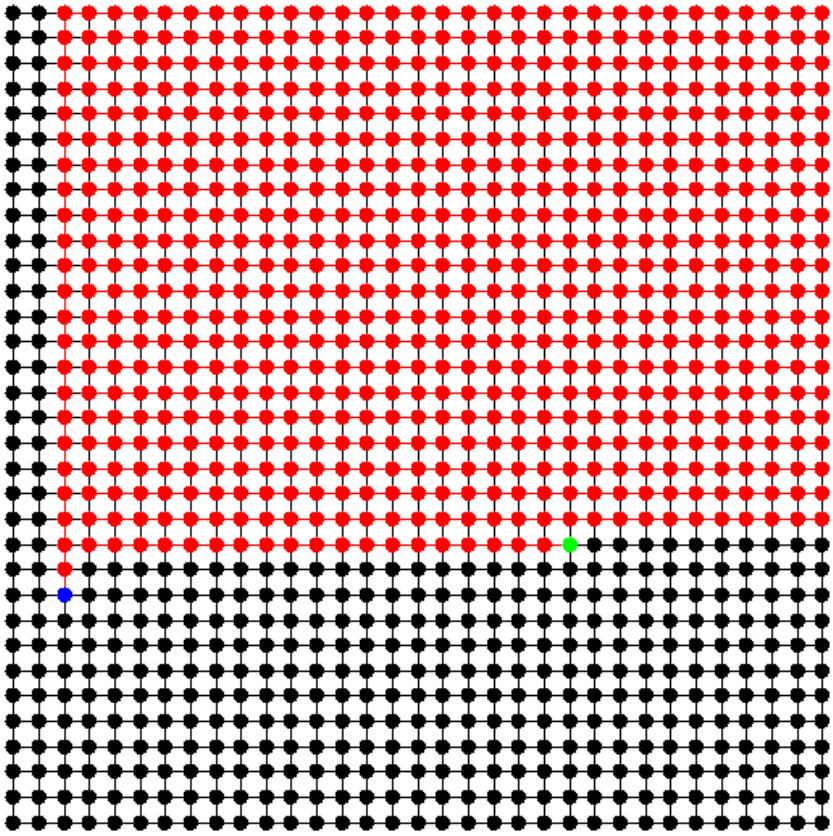
```
Enter: 0 to Exit, 1 to perform DFS, 2 to perform A*
2

Enter starting index e.g.: 0,0. Range is from (0,0) to (32,32).
15,5
Enter goal index e.g.: 0,0 Range is from (0,0) to (32,32).
15,25
Path Length Given by A* is 20
Time Taken by A* is 88200 nanoseconds
```

Pair 9: Start Index: (2,9) Goal Index: (22,11)

DFS

GraphStream

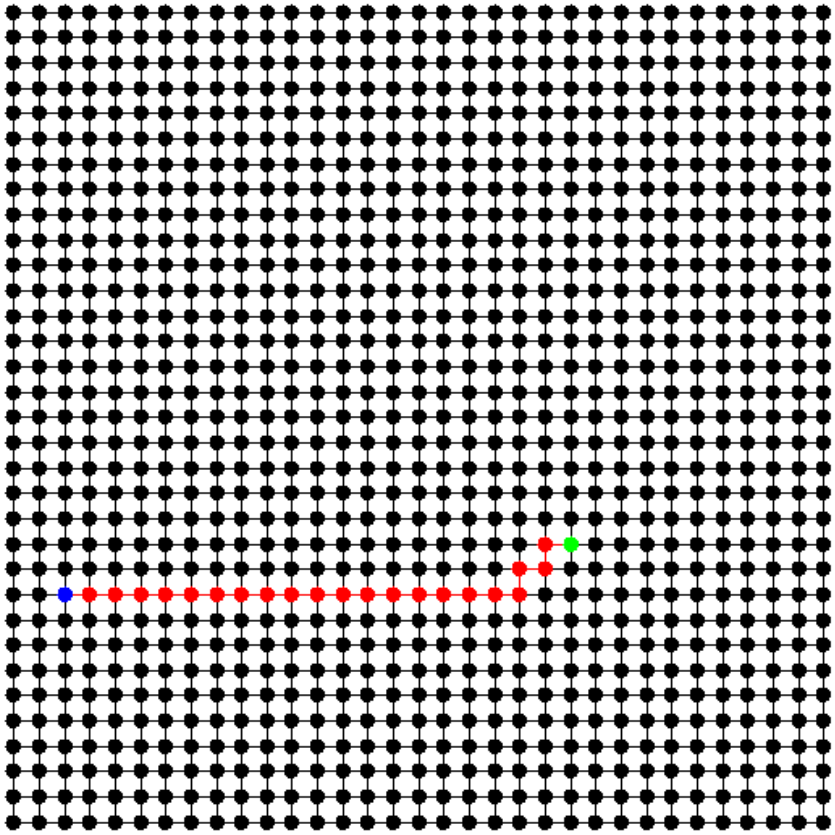


```
Enter: 0 to Exit, 1 to perform DFS, 2 to perform A*
1

Enter starting index e.g.: 0,0. Range is from (0,0) to (32,32).
2,9
Enter goal index e.g.: 0,0 Range is from (0,0) to (32,32).
22,11
Path Length Given by DFS is 673
Time Taken by DFS is 92600 nanoseconds
```

A*

GraphStream



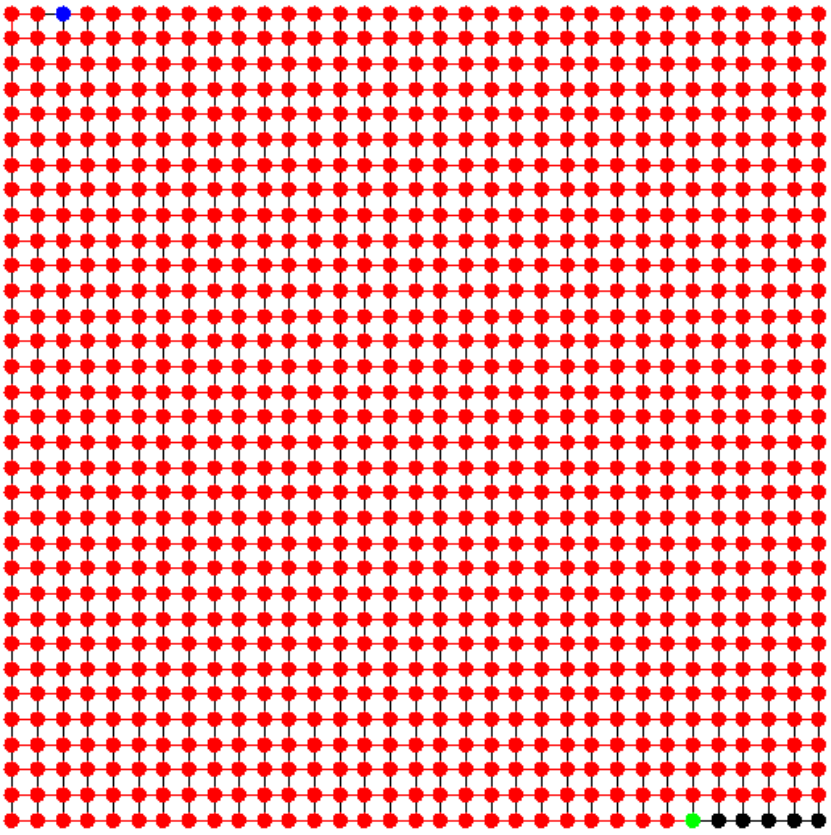
```
Enter: 0 to Exit, 1 to perform DFS, 2 to perform A*
2

Enter starting index e.g.: 0,0. Range is from (0,0) to (32,32).
2,9
Enter goal index e.g.: 0,0 Range is from (0,0) to (32,32).
22,11
Path Length Given by A* is 22
Time Taken by A* is 99900 nanoseconds
```

Pair 10: Start Index: (2,32) Goal Index: (27,0)

DFS

GraphStream

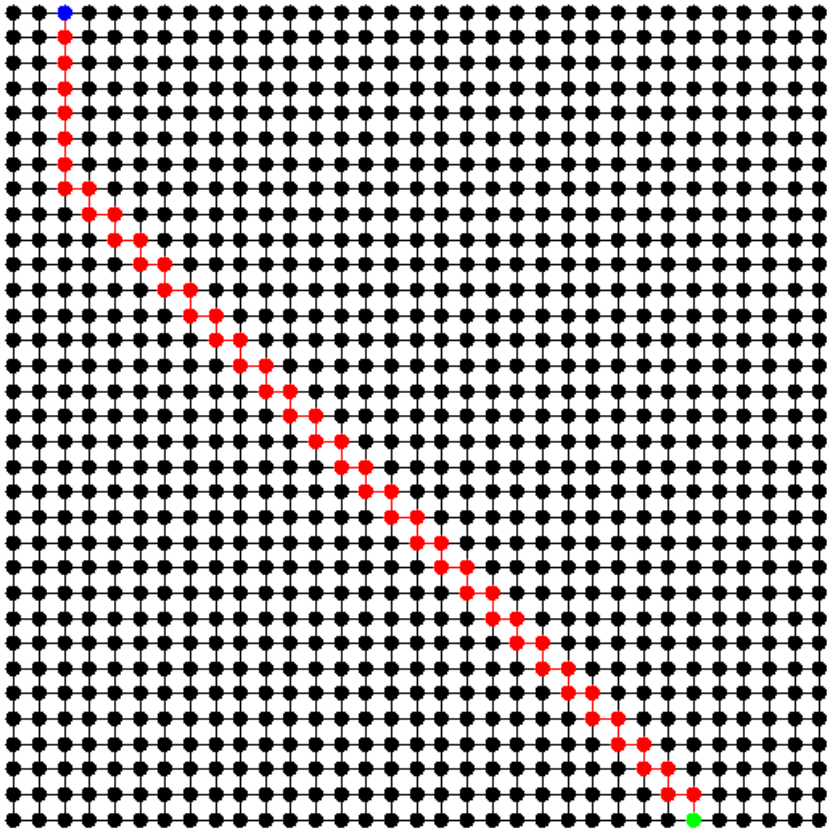


```
Enter: 0 to Exit, 1 to perform DFS, 2 to perform A*
1

Enter starting index e.g.: 0,0. Range is from (0,0) to (32,32).
2,32
Enter goal index e.g.: 0,0 Range is from (0,0) to (32,32).
27,0
Path Length Given by DFS is 1083
Time Taken by DFS is 119700 nanoseconds
```

A*

GraphStream



```
Enter: 0 to Exit, 1 to perform DFS, 2 to perform A*
2

Enter starting index e.g.: 0,0. Range is from (0,0) to (32,32).
2,32
Enter goal index e.g.: 0,0 Range is from (0,0) to (32,32).
27,0
Path Length Given by A* is 57
Time Taken by A* is 358000 nanoseconds
```

The average path length given by DFS is 579.1.

The average path length given by A* is 36.3.

The average time take by DFS is 82,890 nanoseconds.

The average time take by A* is 151,990 nanoseconds.