

# Time Performance Analysis of BFS and A-star Algorithms

## Case-1:

Starting State: 012345687  
BFS – 0.225ms, Moves=1  
A-star – 0.119ms, Moves=1

## Case-2:

Starting State: 041328675  
BFS – 5.920ms, Moves=5  
A-star – 1.885ms, Moves=5

## Case-3:

Starting State: 301682457  
BFS – 115.52ms, Moves=10  
A-star – 23.437ms, Moves=10

## Case-4:

Starting State: 832510647  
BFS – 546.13ms, Moves=14  
A-star – 109.30ms, Moves=16

## Case-5:

Starting State: 048617352  
BFS – 21.952sec, Moves=20  
A-star – 0.5415sec, Moves=24

## Case-6:

Starting State: 537160842  
BFS – 266.668sec, Moves=24  
A-star – 1.15292sec, Moves=26

## Conclusion:

We can see that A-star algorithm is taking less execution time compared to BFS even though the number of moves(steps) are higher in certain cases (4,5,6). Hence, we can conclude A-star algorithm is better than BFS.

Snapshot of terminal output:

```
Python - shruyansiddhanty
PROBLEMS OUTPUT TERMINAL DEBUG CONSOLE
Hello from the pygame community, https://www.pygame.org/contribute.html
BFS button
GoalState achieved. Moves = 1
Time taken for BFS = 0.000225067138671075
You win !!!
A star button
GoalState achieved. Moves = 1
Time taken for A-star = 0.00011920928955078125
You win !!!
BFS button
GoalState achieved. Moves = 5
Time taken for BFS = 0.005208866993480283
You win !!!
A star button
GoalState achieved. Moves = 5
Time taken for A-star = 0.00185809606033594
You win !!!
BFS button
GoalState achieved. Moves = 10
Time taken for BFS = 0.1155259609224121
You win !!!
A star button
GoalState achieved. Moves = 10
Time taken for A-star = 0.023437023162041797
You win !!!
BFS button
GoalState achieved. Moves = 20
Time taken for BFS = 21.9562371269226
You win !!!
A star button
GoalState achieved. Moves = 24
Time taken for A-star = 0.5415181051338566
You win !!!
BFS button
GoalState achieved. Moves = 24
Time taken for BFS = 266.6684069633484
You win !!!
A star button
GoalState achieved. Moves = 26
Time taken for A-star = 1.152923345565796
You win !!!
Ln 1, Col 1 Spaces: 4 UTF-8 CRLF Python 3.10.0 64-bit
```