

COMP20003

Assignment 2

Experimentation

Report

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All the testing was done on my personal Linux machine.
The results are as follows:

Test Case 1: 14 13 15 7 11 12 9 5 6 0 2 1 4 8 10 3

```
gcc -Wall -Werror -O3 -c -o puzzle.o puzzle.c
gcc -o 15puzzle puzzle.o -Wall -Werror -O3
aryan@aryan-Surface-Book-2:~/Desktop/Algo/15-puzzle-base-code$ ./15puzzle test1.
txt
14 13 15 7
11 12 9 5
6 0 2 1
4 8 10 3
Initial Estimate = 41
Threshold = 43 45 47 49 51 53 55 57
Solution = 57
Generated = 499,911,606
Expanded = 253,079,561
Time (seconds) = 25.59
Expanded/Second = 9,889,426
```

Test Case 2: 13 5 4 10 9 12 8 14 2 3 7 1 0 15 11 6

```
aryan@aryan-Surface-Book-2:~/Desktop/Algo/15-puzzle-base-code$ ./15puz
zle test1.txt
13 5 4 10
9 12 8 14
2 3 7 1
0 15 11 6
Initial Estimate = 43
Threshold = 45 47 49 51 53 55
Solution = 55
Generated = 18,983,862
Expanded = 9,777,811
Time (seconds) = 0.94
Expanded/Second = 10,411,363
```

Test Case 3: 14 7 8 2 13 11 10 14 2 3 7 1 0 15 11 6

```
aryan@aryan-Surface-Book-2:~/Desktop/Algo/15-puzzle-base-code$ ./15puzzle te
st1.txt
14 7 8 2
13 11 10 4
9 12 5 0
3 6 1 15
Initial Estimate = 41
Threshold = 43 45 47 49 51 53 55 57 59
Solution = 59
Generated = 455,125,298
Expanded = 229,658,355
Time (seconds) = 23.97
Expanded/Second = 9,580,204
```

Test Case 4: 5 12 10 7 15 11 14 0 8 2 1 13 3 4 9 6

```
aryan@aryan-Surface-Book-2:~/Desktop/Algo/15-puzzle-base-code$ ./15puzzle test1.txt
5 12 10 7
15 11 14 0
8 2 1 13
3 4 9 6
Initial Estimate = 42
Threshold = 44 46 48 50 52 54 56
Solution = 56
Generated = 82,631,583
Expanded = 41,689,054
Time (seconds) = 4.36
Expanded/Second = 9,569,927
```

Test Case 5: 7 6 8 1 11 5 14 10 3 4 9 13 15 2 0 12

```
aryan@aryan-Surface-Book-2:~/Desktop/Algo/15-puzzle-base-code$ ./15puzzle test1.txt
7 6 8 1
11 5 14 10
3 4 9 13
15 2 0 12
Initial Estimate = 41
Threshold = 43 45 47 49 51 53 55 57 59
Solution = 59
Generated = 937,956,626
Expanded = 475,109,931
Time (seconds) = 50.50
Expanded/Second = 9,407,392
```

Test Case 6: 15 2 12 11 14 13 9 5 1 3 8 7 0 10 6 4

```
aryan@aryan-Surface-Book-2:~/Desktop/Algo/15-puzzle-base-code$ ./15puzzle test1.txt
15 2 12 11
14 13 9 5
1 3 8 7
0 10 6 4
Initial Estimate = 43
Threshold = 45 47 49 51 53 55 57 59 61 63 65
Solution = 65
Generated = 6,195,467,140
Expanded = 3,176,234,869
Time (seconds) = 343.94
Expanded/Second = 9,234,870
```

Table Showing the conclusion of the experiment.

N	h(s0)	Thresholds	Sol utio n	Generated	Expanded	Expanded/seco nd	Time (sec)
1	41	41 43 45 47 49 51 53 55 57	57	499,911,606	253,079,561	9,889,426	25.59
2	43	43 45 47 49 51 53 55	55	18,983,862	9,777,811	10,411,363	0.94
3	41	41 43 45 47 49 51 53 55 57 59	59	455,125,298	229,658,355	9,580,204	23.97
4	42	42 44 46 48 50 52 54 56	56	82,631,583	41,689,054	9,569,927	4.36
14	41	41 43 45 47 49 51 53 55 57 59	59	937,956,626	475,109,931	9,407,392	50.5
88	43	41 43 45 47 49 51 53 55 57 59 61 63 65	65	6,195,467,140	3,176,234,869	9,234,870	343.94