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Experiment - 1

Toy Problem

(8-Puzzle problem)

Aim: To rearrange an 8-puzzle to get sorted puzzle.

4	7	3
5	1	0
8	6	2

Initial state (random order)

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1	2	3
4	5	6
7	8	0

Final state (sorted order)

Steps:

1) Set initial and final state
2) Define a function show_board to show the board
3) Print the instructions for playing and show the board
4) Take users choice as input and move the 0 block accordingly.
5) Repeat the above step till the board looks like the final state.
6) Display the congratulations message.

Sample input and output:

1	0	3
4	2	5
7	8	6

Initial state already set.

DATE
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User inputs w –
(Board remains same as can't move 0 up)

1	0	3
4	2	5
7	8	6

INVALID MOVE

User inputs a –
(0 moves left)

0	1	3
4	2	5
7	8	6

User inputs d –
(0 moves right)

1	0	3
4	2	5
7	8	6

User inputs s –
(0 moves down)

1	2	3
4	0	5
7	8	6

User inputs d –
(0 moves right)

1	2	3
4	5	0
7	8	6

User inputs s –
(0 moves down)
(final state reached)

1	2	3
4	5	6
7	8	0

CONGRATULATIONS!! YOU HAVE SOLVED THE PUZZLE!!

Result: This program has been successfully executed in Python language.

Experiment 1 - Toy problem (8-Puzzle problem)

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Code

```
import os

puzzle = [1, 0, 3, 4, 2, 5, 7, 8, 6]
solved = [1, 2, 3, 4, 5, 6, 7, 8, 0]

def zeroindex(puzzle):
    for i in range(9):
        if puzzle[i] == 0:
            return i
            break

def show_board(puzzle):
            print("""\n+---+---+---+
| {} | {} | {} |
+---+---+---+
| {} | {} | {} |
+---+---+---+
| {} | {} | {} |
+---+---+---+""".format(puzzle[0], puzzle[1], puzzle[2], puzzle[3], puzzle[4], puzzle[5], puzzle[6], puzzle[7], puzzle[8]))

print("\nPress W to swap UP, A to swap left, D to swap right and S to swap down")
show_board(puzzle)
while puzzle != solved:
    x = input("\nEnter your choice: ")
    index = zeroindex(puzzle)
    if x.lower() == 'w':
        if index - 3 < 0:
            os.system("cls")
            show_board(puzzle)
            print("\nINVALID MOVE")
        else:
            puzzle[index], puzzle[index-3] = puzzle[index-3], puzzle[index]
            os.system("cls")
            show_board(puzzle)
    elif x.lower() == 'a':
        if index % 3 == 0:
            os.system("cls")
            show_board(puzzle)
            print("\nINVALID MOVE")
        else:
            puzzle[index], puzzle[index-1] = puzzle[index-1], puzzle[index]
            os.system("cls")
            show_board(puzzle)
    elif x.lower() == 's':
        if index + 3 > 8:
            os.system("cls")
            show_board(puzzle)
            print("\nINVALID MOVE")
        else:
            puzzle[index], puzzle[index+3] = puzzle[index+3], puzzle[index]
            os.system("cls")
            show_board(puzzle)
    elif x.lower() == 'd':
```

```
        if index % 3 == 2:
            os.system("cls")
            show_board(puzzle)
            print("\nINVALID MOVE")
        else:
            puzzle[index], puzzle[index+1] = puzzle[index+1], puzzle[index]
            os.system("cls")
            show_board(puzzle)
    else:
        os.system("cls")
        show_board(puzzle)
        print("\nINVALID MOVE")
print("\nCONGRATULATIONS!! YOU HAVE SOLVED THE PUZZLE!!\n")
```

Output

```
Press W to swap UP, A to swap left, D to swap right and S to swap down

+---+---+---+
| 1 | 0 | 3 |
+---+---+---+
| 4 | 2 | 5 |
+---+---+---+
| 7 | 8 | 6 |
+---+---+---+

Enter your choice: w

+---+---+---+
| 1 | 0 | 3 |
+---+---+---+
| 4 | 2 | 5 |
+---+---+---+
| 7 | 8 | 6 |
+---+---+---+

INVALID MOVE
```

```
Enter your choice: a

+---+---+---+
| 0 | 1 | 3 |
+---+---+---+
| 4 | 2 | 5 |
+---+---+---+
| 7 | 8 | 6 |
+---+---+---+

Enter your choice: d

+---+---+---+
| 1 | 0 | 3 |
+---+---+---+
| 4 | 2 | 5 |
+---+---+---+
| 7 | 8 | 6 |
+---+---+---+

Enter your choice: s

+---+---+---+
| 1 | 2 | 3 |
+---+---+---+
| 4 | 0 | 5 |
+---+---+---+
| 7 | 8 | 6 |
+---+---+---+
```

```
Enter your choice: d

+---+---+---+
| 1 | 2 | 3 |
+---+---+---+
| 4 | 5 | 0 |
+---+---+---+
| 7 | 8 | 6 |
+---+---+---+

Enter your choice: s

+---+---+---+
| 1 | 2 | 3 |
+---+---+---+
| 4 | 5 | 6 |
+---+---+---+
| 7 | 8 | 0 |
+---+---+---+

CONGRATULATIONS!! YOU HAVE SOLVED THE PUZZLE!!
```