

## AIRPLANE SEATING ARRANGEMENT SYSTEM TECH DOC

### TEST CASES

Base or Invalid/Garbage cases (Screenshot on 3rd page)

Test Case	Result
1. [ [0,0]]	Pass. System will not accept 0 or any value other than absolute integer
2. [[0,1]]	Pass. System will not accept 0 or any value other than absolute integer
3. [[-2,1]]	Pass. System will not accept 0 or any value other than absolute integer
4. [[r,5]]	Pass. System will not accept 0 or any value other than absolute integer
5. [[3.4,8]]	Pass. System will not accept 0 or any value other than absolute integer
6. []	Pass. System will not accept 0 or any value other than absolute integer
7. [dfcfe4d3d,333]	Pass. System will not accept 0 or any value other than absolute integer

Basic Positive/Negative /Edge Cases (Screenshots starting from 4<sup>th</sup> Page).

Test Case	Result
1. [[1,2][2,3]] , passenger size =2	Pass, Seat arrangement displayed .
2. [[1,1][1,1][1,1][1,1]] , passenger size =5	Pass, Seat arrangement displayed
3. [[1,1][1,1][1,1][1,1]] , passenger size =6	Pass (Negative test case) -Exception
4. [1,1][2,2][3,3][4,4][5,5]] , passenger size = 10	Pass, Seat arrangement displayed
5. [[1,9][9,1]] , passenger size = 18	Pass, Seat arrangement displayed
6. [[1,9][9,1]] , passenger size = 19	Pass, (Negative test case) -Exception
7. [[1,9][9,1]] , passenger size = 10	Pass, Seat arrangement displayed

More Complex test Cases (Screenshots starting from 11<sup>th</sup> Page).

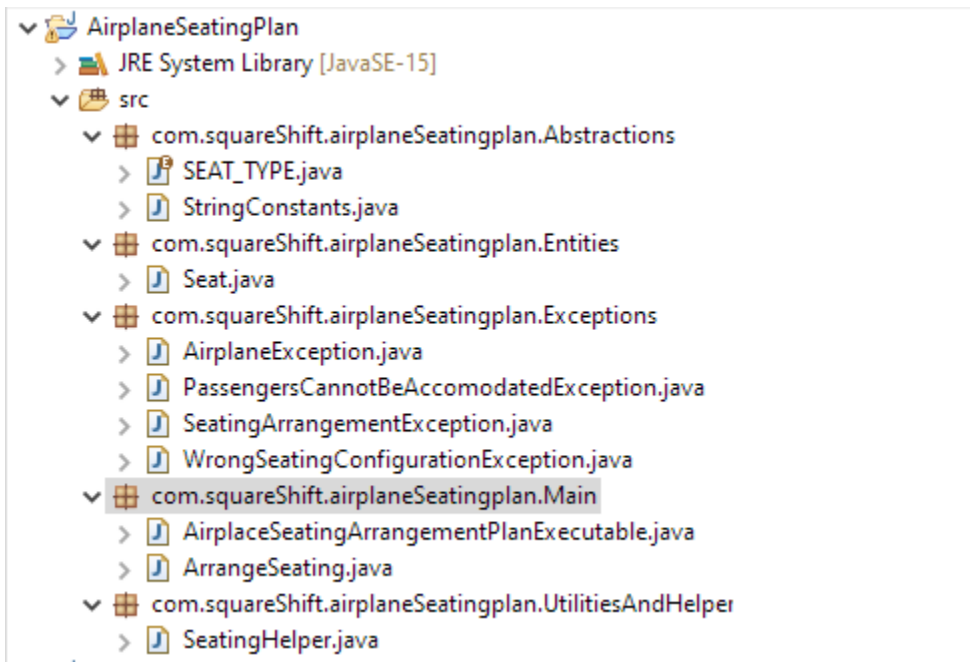
Test Case	Result
1. [[2,3],[3,4],[3,2][4,3]] , passenger size = 30	Pass, (pdf e.g.)Seat arrangement displayed
2. [[3,9],[6,1][1,9],[6,6]],passenger size = 60	Pass, Seat arrangement displayed
3. [[4,4][2,2][1,1][1,1],[7,3]] ,passenger size = 43	Pass, Seat arrangement displayed

**NOTE :** In the console output display of Seat Type and Passenger Number , is like A1 , A2 ,W2 ,M7 like that . If it is A0, M0 , W0 it denotes the seat is empty and not occupied. '0' represents empty.

Repeated the above test cases with any order of preference like Aisle first, Window second, Middle third.

**ALTERNATIVELY**, Window first, Aisle second, Middle third OR another combination. However, there is no explicit, ask for this however, the program is generic enough for that also by configuring the preference map in code. (Screenshot on page 14<sup>th</sup> page )

## PACKAGE STRUCTURE



## Data Structure used

1. 2d Array for seating block. [2,3,] -> For 2 rows and 3 columns.
2. 1d Array of Object [], master array for holding the 2d array block references.
3. A Queue for each Seat type like window, Middle, Aisle, which is holding the assigned number of seats, and we poll it once we assigned to any seat in FIFO order.
4. Linked List, used the Singly Linked List implementation of Queue, double linked list not required.

## Algorithm

1. Used the BFS instead of DFS to allocate the Passenger seat number row wise in seat block then moving to the Next block unless the all the Queue for respective seat type (W,A,M) get emptied . DFS would be of complex task to allocate the seats assigned in a single block and it will involve complex logic to derive seat numbers.

## OOP Principles Used

1. Create an abstraction layer of class ArrangeSeating.java to hide the detailed implementation in SeatingHelper.java (kind of façade design) and exposed only the driver functions.
2. Segregate the Entity (Seat), Utility/Helper Class, String Constants, Exceptions classes, enums, to follow the Single responsibility principle.
3. Delegation of responsibility principle, where we pass the delegation of each execution to the respected class.

## Screen Shots :

Screenshot for input validations for number for rows and columns in 2d array and number of passengers, and the total number of seating blocks.

```
Enter number of seating groups
-2
Either Entered number is not numeric or having less that equal to 0. Please enter a proper Integer with value greater than 0 for seating group
e
Either Entered number is not numeric or having less that equal to 0. Please enter a proper Integer with value greater than 0 for seating group
3e3rd
Either Entered number is not numeric or having less that equal to 0. Please enter a proper Integer with value greater than 0 for seating group
4
Enter the row and column of seating group
www
Either Entered number is not numeric or having less that equal to 0. Please enter a proper Integer with value greater than 0 for number of rows in a group
2
3
Enter the row and column of seating group
4
0
Either Entered number is not numeric or having less that equal to 0. Please enter a proper Integer with value greater than 0 for number of columns in a group
2
Enter the row and column of seating group
1
2
Enter the row and column of seating group
3
2
Enter the number of Passengers waiting in queue
0
Either Entered number is not numeric or having less that equal to 0. Please enter a proper Integer with value greater than 0 for number of Passesnegers
3
Below are the seating group sizes and Passenger Size
2 3
4 2
1 2
3 2
Passenegers Size :3
===== SEATING ARRANGEMENT =====
W M A      A A      A A      A W
W M A      A A      A W
          A A      A W
          A A
===== Order of Preference Seat is =====
{1=A, 2=W, 3=M}
===== PASSENGERS ARRANGEMENT =====
W0 M0 A1    A2 A3    A0 A0    A0 W0
W0 M0 A0    A0 A0    A0 W0    A0 W0
          A0 A0
```

## Basic Positive/Negative /Edge Cases

1.

[[1,2][2,3]] , passenger size =2

```
Enter number of seating groups
2
Enter the row and column of seating group
1
2
Enter the row and column of seating group
2
3
Enter the number of Passengers waiting in queue
2
Below are the seating group sizes and Passenger Size
1 2
2 3
Passenegers Size :2
===== SEATING ARRANGEMENT =====
W A      A M W
      A M W
===== Order of Preference Seat is =====
{1=A, 2=W, 3=M}
===== PASSENGERS ARRANGEMENT =====
W0 A1      A2 M0 W0
      A0 M0 W0
```

2. [[1,1][1,1][1,1][1,1]], passenger size =5

```
Enter number of seating groups
5
Enter the row and column of seating group
1
1
Enter the row and column of seating group
1
1
Enter the row and column of seating group
1
1
Enter the row and column of seating group
1
1
Enter the row and column of seating group
1
1
Enter the number of Passengers waiting in queue
5
Below are the seating group sizes and Passenger Size
1 1
1 1
1 1
1 1
1 1
Passengers Size :5
===== SEATING ARRANGEMENT =====
W      A      A      A      W
===== Order of Preference Seat is =====
{1=A, 2=W, 3=M}
===== PASSENGERS ARRANGEMENT =====
W4      A1      A2      A3      W5
```

3.

[1,1][1,1][1,1][1,1]], passenger size =6

```
Enter number of seating groups
5
Enter the row and column of seating group
1
1
Enter the row and column of seating group
1
1
Enter the row and column of seating group
1
1
Enter the row and column of seating group
1
1
Enter the row and column of seating group
1
1
Enter the number of Passengers waiting in queue
6
Below are the seating group sizes and Passenger Size
1 1
1 1
1 1
1 1
1 1
1 1
Passengers Size :6
EXCEPTION OCCURRED ==>com.squareShift.airplaneSeatingplan.Exceptions.PassengersCannotBeAccomodatedException: Passengers size is greater than the seat avialable
===== SEATING ARRANGEMENT =====
W      A      A      A      W
===== Order of Preference Seat is =====
{1=A, 2=W, 3=M}
===== PASSENGERS ARRANGEMENT =====
W0      A0      A0      A0      W0
```

4.

[1,1][2,2][3,3],[4,4],[5,5]], passenger size = 10

```
Enter number of seating groups
5
Enter the row and column of seating group
1
1
Enter the row and column of seating group
2
2
Enter the row and column of seating group
3
3
Enter the row and column of seating group
4
4
Enter the row and column of seating group
5
5
Enter the number of Passengers waiting in queue
10
Below are the seating group sizes and Passenger Size
1 1
2 2
3 3
4 4
5 5
Passengers Size :10
===== SEATING ARRANGEMENT =====
W      A A      A M A      A M M A      A M M M W
      A A      A M A      A M M A      A M M M W
          A M A      A M M A      A M M M W
              A M M A      A M M M W
                  A M M M W
                      A M M M W
===== Order of Preference Seat is =====
{1=A, 2=W, 3=M}
===== PASSENGERS ARRANGEMENT =====
W0      A1 A2      A3 M0 A4      A5 M0 M0 A6      A7 M0 M0 M0 W0
      A8 A9      A10 M0 A0      A0 M0 M0 A0      A0 M0 M0 M0 W0
          A0 M0 A0      A0 M0 M0 A0      A0 M0 M0 M0 W0
              A0 M0 M0 A0      A0 M0 M0 M0 W0
                  A0 M0 M0 M0 W0
```

5

[[1,9][9,1], passenger size = 18

Enter number of seating groups

2

Enter the row and column of seating group

1

9

Enter the row and column of seating group

9

1

Enter the number of Passengers waiting in queue

18

Below are the seating group sizes and Passenger Size

1 9

9 1

Passenegers Size :18

===== SEATING ARRANGEMENT =====

W M M M M M M M A

W

W

W

W

W

W

W

W

===== Order of Preference Seat is =====

{1=A, 2=W, 3=M}

===== PASSENGERS ARRANGEMENT =====

W2 M12 M13 M14 M15 M16 M17 M18 A1

W3

|

W4

W5

W6

W7

W8

W9

W10

W11



**[[1,9][9,1], passenger size = 19**

[illegible]

7.

[[1,9][9,1], passenger size = 10

```
Enter number of seating groups
2
Enter the row and column of seating group
1
9
Enter the row and column of seating group
9
1
Enter the number of Passengers waiting in queue
10
Below are the seating group sizes and Passenger Size
1 9
9 1
Passenegers Size :10
===== SEATING ARRANGEMENT =====
W M M M M M M A      W
                        W
                        W
                        W
                        W
                        W
                        W
                        W
===== Order of Preference Seat is =====
{1=A, 2=W, 3=M}
===== PASSENGERS ARRANGEMENT =====
W2 M0 M0 M0 M0 M0 M0 M0 A1      W3
                                   W4
                                   W5
                                   W6
                                   W7
                                   W8
                                   W9
                                   W10
                                   W0
```

## More Complex test Cases

1. `[[2,3],[3,4],[3,2][4,3]]` , passenger size = 30 (Sample PDF example -> in the pdf example the rows ,columns name are given in other way , correct representation of 2d array is `[rows][columns]0`).

```
Enter number of seating groups
4
Enter the row and column of seating group
2
3
Enter the row and column of seating group
3
4
Enter the row and column of seating group
3
2
Enter the row and column of seating group
4
3
Enter the number of Passengers waiting in queue
30
Below are the seating group sizes and Passenger Size
2 3
3 4
3 2
4 3
Passengers Size :30
===== SEATING ARRANGEMENT =====
W M A      A M M A      A A      A M W
W M A      A M M A      A A      A M W
              A M M A      A A      A M W
                              A M W

===== Order of Preference Seat is =====
{1=A, 2=W, 3=M}
===== PASSENGERS ARRANGEMENT =====
W19 M25 A1      A2 M26 M27 A3      A4 A5      A6 M28 W20
W21 M29 A7      A8 M30 M0 A9      A10 A11      A12 M0 W22
              A13 M0 M0 A14      A15 A16      A17 M0 W23
                              A18 M0 W24
```

2. [[3,9],[6,1][1,9],[6,6]],passenger size = 60

```
Enter number of seating groups
4
Enter the row and column of seating group
3
9
Enter the row and column of seating group
6
1
Enter the row and column of seating group
1
9
Enter the row and column of seating group
6
6
Enter the number of Passengers waiting in queue
60
Below are the seating group sizes and Passenger Size
3 9
6 1
1 9
6 6
Passenegers Size :60
===== SEATING ARRANGEMENT =====
W M M M M M M M A      A      A M M M M M M M A      A M M M M W
W M M M M M M M A      A      A M M M M M M M W
W M M M M M M M A      A      A M M M M M W
                                A M M M M W
                                A M M M M W
                                A M M M M W
                                A M M M M W
===== Order of Preference Seat is =====
{1=A, 2=W, 3=M}
===== PASSENGERS ARRANGEMENT =====
W18 M27 M28 M29 M30 M31 M32 M33 A1      A2      A3 M34 M35 M36 M37 M38 M39 M40 A4      A5 M41 M42 M43 M44 W19
W20 M45 M46 M47 M48 M49 M50 M51 A6      A7      A8 M52 M53 M54 M55 W21
W22 M56 M57 M58 M59 M60 M0 M0 A9      A10      A11 M0 M0 M0 M0 W23
                                A12 M0 M0 M0 M0 W24
                                A14 M0 M0 M0 M0 W25
                                A16 M0 M0 M0 M0 W26
```

3.

[[4,4][2,2][1,1][1,1],[7,3]] ,passenger size = 43

Enter number of seating groups

5

Enter the row and column of seating group

4

4

Enter the row and column of seating group

2

2

Enter the row and column of seating group

1

1

Enter the row and column of seating group

1

1

Enter the row and column of seating group

7

3

Enter the number of Passengers waiting in queue

43

Below are the seating group sizes and Passenger Size

4 4

2 2

1 1

1 1

7 3

Passenegers Size :43

===== SEATING ARRANGEMENT =====

```
W M M A      A A      A      A      A M W
W M M A      A A      A M W
W M M A      A M W
W M M A      A M W
                A M W
                A M W
                A M W
```

===== Order of Preference Seat is =====

{1=A, 2=W, 3=M}

===== PASSENGERS ARRANGEMENT =====

```
W18 M29 M30 A1      A2 A3      A4      A5      A6 M31 W19
W20 M32 M33 A7      A8 A9      A10 M34 W21
W22 M35 M36 A11      A12 M37 W23
W24 M38 M39 A13      A14 M40 W25
                A15 M41 W26
                A16 M42 W27
                A17 M43 W28
```

---

Screenshot when the order of seating got changed i.e. Middle first , Window second , Aisle last .

Repeated the last example

[[4,4][2,2][1,1][1,1],[7,3]] ,passenger size = 43

```
Enter number of seating groups
5
Enter the row and column of seating group
4
4
Enter the row and column of seating group
2
2
Enter the row and column of seating group
1
1
Enter the row and column of seating group
1
1
Enter the row and column of seating group
7
3
Enter the number of Passengers waiting in queue
43
Below are the seating group sizes and Passenger Size
4 4
2 2
1 1
1 1
7 3
Passenegers Size :43
===== SEATING ARRANGEMENT =====
W M M A      A A      A      A      A M W
W M M A      A A      A M W
W M M A      A M W
W M M A      A M W
                        A M W
                        A M W
                        A M W

===== Order of Preference Seat is =====
{1=M, 2=W, 3=A}
===== PASSENGERS ARRANGEMENT =====
W16 M1 M2 A27      A28 A29      A30      A31      A32 M3 W17
W18 M4 M5 A33      A34 A35      A36 M6 W19
W20 M7 M8 A37      A38 M9 W21
W22 M10 M11 A39      A40 M12 W23
                        A41 M13 W24
                        A42 M14 W25
                        A43 M15 W26
```