SC1003 2021/22 Sem 2 Assignment

The NTU Airlines fleet consists of one plane with a seating capacity of 5. It makes one flight daily. You are required to write a seating reservation program. The program uses an array of 5 structures. Each structure should hold:

- a seat number (ID) that has a value between 1 and 5,
- a marker (status) that indicates whether the seat is assigned (EMPTY or TAKEN), and
- the customer name of the seat holder.

A structure is defined to represent a seat record of a plane as follows:

```c
typedef struct
{
    char name[20];
    int ID;
    int status;
} Seat;
```

The seat number **ID** must be **unique**. Therefore, each Seat structure will have a different seat number (ID) when it is created. You may assume that the name of a customer is not more than 20 characters long. The program should display a menu to support the functions as shown below:

```
NTU AIRLINES SEATING RESERVATION PROGRAM:
1: listTakenSeat()
2: assignSeat()
3: removeSeat()
4: quit
```

The program should execute the functions of its menu. It will continue execution until the user selects to quit from the program.

The functions are described as follows:

(1) listTakenSeat() – The function requirements are given below:

- The function prints the list of seat assignments.
- It prints the following message when it is executed: **"listTakenSeat():"**.
- If all seats are empty, the function should display the message: **"The seat assignment list is empty"**.

(2) assignSeat() - The function requirements are given below:

- The function assigns a customer to a seat. It reads in the selected seat number (ID) and customer name from user, and then assigns the seat accordingly.
- It prints the following message when it is executed: **"assignSeat():"**.
- After assignment, the message "**The seat has been assigned successfully**" should be displayed.
- The program should issue a message "**Occupied! Please choose another seat**", if the selected seat has been assigned to another customer already.

- The program should issue the message "**The plane is full**" if the plane is full (i.e. 5) during seat assignment.
- The program should issue the message "**Please enter a seat number between 1 and 5**" if the selected seat number is not between 1 and 5.

(3) removeSeat() - The function requirements are given below:

- The function removes a seat assignment. It reads in the selected seat number (i.e. ID) from user and then remove the assigned seat accordingly.
- It prints the following message when it is executed: **"removeSeat():"**
- After seat removal, the message "**Removal is successful**" should be displayed.
- During seat removal, the program should issue the message "**All the seats are vacant**" if all the seats are empty.
- If the selected seat is empty, the function should issue the message "**Empty! Enter another seat number for removal**".
- The program should issue the message "**Please enter a seat number between 1 and 5**" if the selected seat number is not between 1 and 5.

You are required to write the program and the functions according to the program requirements. Note that:

- You should design the program and define the functions according to the requirements.
- You only need to consider the requirements stated in the program specification, and you do not need to implement any user input checking which is not stated in the specification.
- You may add any other supporting functions in the program if needed.
- You may include any C library functions in your program if needed.
- Sample test case are given below.

A sample program running session is given below (please note that the input data are shown in orange color):

```
NTU AIRLINES SEATING RESERVATION PROGRAM:
1: listTakenSeat()
2: assignSeat()
3: removeSeat()
4: quit
Enter your choice:
1
listTakenSeat():
The seat assignment list is empty
Enter your choice:
2
assignSeat():
Enter the seat number:
1
Enter customer name:
SC Hui
The seat has been assigned successfully
```

Enter your choice:
1
listTakenSeat():
Customer name: SC Hui
Seat number (ID): 1
Enter your choice:
4

The sample test cases for the program are given below. The sample test cases are organized in the form of input and output data for the convenience of your testing in APAS.

Sample Test Cases (Pretest Cases)

Case 1 - listTakenSeat (empty list condition)

Input	Output
1 4	NTU AIRLINES SEATING RESERVATION PROGRAM: 1: listTakenSeat() 2: assignSeat() 3: removeSeat() 4: quit Enter your choice: listTakenSeat(): **The seat assignment list is empty** Enter your choice:

Case 2 – assignSeat (2 seats) + listTakenSeat

Input	Output
2 1 SC Hui 2 2 PC Tan 1 4	NTU AIRLINES SEATING RESERVATION PROGRAM: 1: listTakenSeat() 2: assignSeat() 3: removeSeat() 4: quit Enter your choice: assignSeat(): Enter the seat number: Enter customer name: The seat has been assigned successfully Enter your choice: assignSeat(): Enter the seat number: Enter customer name: The seat has been assigned successfully Enter your choice: listTakenSeat(): Customer name: SC Hui Seat number (ID): 1 Customer name: PC Tan Seat number (ID): 2 Enter your choice:

Case 3 – assignSeat (invalid seat number condition)

Input	Output
2	NTU AIRLINES SEATING RESERVATION PROGRAM:

Input	Output
11 12 3 SC Hui 1 4	1: listTakenSeat() 2: assignSeat() 3: removeSeat() 4: quit Enter your choice: assignSeat(): Enter the seat number: **Please enter a seat number between 1 and 5** **Please enter a seat number between 1 and 5** Enter customer name: The seat has been assigned successfully Enter your choice: listTakenSeat(): Customer name: SC Hui Seat number (ID): 3 Enter your choice:

Case 4 – assignSeat (Occupied seat condition)

Input	Output
2 1 SC Hui 2 1 11 3 PC Tan 1 4	NTU AIRLINES SEATING RESERVATION PROGRAM: 1: listTakenSeat() 2: assignSeat() 3: removeSeat() 4: quit Enter your choice: assignSeat(): Enter the seat number: Enter customer name: The seat has been assigned successfully Enter your choice: assignSeat(): Enter the seat number: **Occupied! Please choose another seat** **Please enter a seat number between 1 and 5** Enter customer name: The seat has been assigned successfully Enter your choice: listTakenSeat(): Customer name: SC Hui Seat number (ID): 1 Customer name: PC Tan Seat number (ID): 3 Enter your choice:

Case 5 – assignSeat (full condition)

Input	Output
2 1 SC Hui 2 2 KY Lam 2 5 NY Ng 2 4	NTU AIRLINES SEATING RESERVATION PROGRAM: 1: listTakenSeat() 2: assignSeat() 3: removeSeat() 4: quit Enter your choice: assignSeat(): Enter the seat number: Enter customer name: The seat has been assigned successfully Enter your choice:

BK Tan 2 3 N Lim 2 1 4	assignSeat(): Enter the seat number: Enter customer name: The seat has been assigned successfully Enter your choice: assignSeat(): Enter the seat number: Enter customer name: The seat has been assigned successfully Enter your choice: assignSeat(): Enter the seat number: Enter customer name: The seat has been assigned successfully Enter your choice: assignSeat(): Enter the seat number: Enter customer name: The seat has been assigned successfully Enter your choice: assignSeat(): **The plane is full** Enter your choice: listTakenSeat(): Customer name: SC Hui Seat number (ID): 1 Customer name: KY Lam Seat number (ID): 2 Customer name: N Lim Seat number (ID): 3 Customer name: BK Tan Seat number (ID): 4 Customer name: NY Ng Seat number (ID): 5 Enter your choice:

Case 6 – removeSeat (all empty seats condition)

Input	Output
3 4	NTU AIRLINES SEATING RESERVATION PROGRAM: 1: listTakenSeat() 2: assignSeat() 3: removeSeat() 4: quit Enter your choice: removeSeat(): **All the seats are vacant** Enter your choice:

Case 7 – removeSeat (invalid seat number condition)

Input	Output
2 1 SC Hui 3 7 1 1	NTU AIRLINES SEATING RESERVATION PROGRAM: 1: listTakenSeat() 2: assignSeat() 3: removeSeat() 4: quit Enter your choice: assignSeat():

4	Enter the seat number: Enter customer name: The seat has been assigned successfully Enter your choice: removeSeat(): Enter the seat number: **Please enter a seat number between 1 and 5** Removal is successful Enter your choice: listTakenSeat(): The seat assignment list is empty Enter your choice:

Case 8 – removeSeat (remove one seat)

Input	Output
2 1 SC Hui 2 2 PC Tan 3 1 1 4	NTU AIRLINES SEATING RESERVATION PROGRAM: 1: listTakenSeat() 2: assignSeat() 3: removeSeat() 4: quit Enter your choice: assignSeat(): Enter the seat number: Enter customer name: The seat has been assigned successfully Enter your choice: assignSeat(): Enter the seat number: Enter customer name: The seat has been assigned successfully Enter your choice: removeSeat(): Enter the seat number: Removal is successful Enter your choice: listTakenSeat(): Customer name: PC Tan Seat number (ID): 2 Enter your choice:

Case 9 – removeSeat (empty seat condition)

Input	Output
2 1 SC Hui 3 5 11 4 1 1 4	NTU AIRLINES SEATING RESERVATION PROGRAM: 1: listTakenSeat() 2: assignSeat() 3: removeSeat() 4: quit Enter your choice: assignSeat(): Enter the seat number: Enter customer name: The seat has been assigned successfully Enter your choice: removeSeat(): Enter the seat number: **Empty! Enter another seat number for removal** **Please enter a seat number between 1 and 5**

	Empty! Enter another seat number for removal
	Removal is successful
	Enter your choice:
	listTakenSeat():
	The seat assignment list is empty
	Enter your choice:

Case 10 – removeSeat (mixed insert and remove seats)

Input	Output
2	NTU AIRLINES SEATING RESERVATION PROGRAM:
1	1: listTakenSeat()
SC Hui	2: assignSeat()
2	3: removeSeat()
2	4: quit
PC Tan	Enter your choice:
3	assignSeat():
1	Enter the seat number:
2	Enter customer name:
2	The seat has been assigned successfully
11	Enter your choice:
5	assignSeat():
N Lim	Enter the seat number:
3	Enter customer name:
11	The seat has been assigned successfully
4	Enter your choice:
2	removeSeat():
1	Enter the seat number:
4	Removal is successful
	Enter your choice:
	assignSeat():
	Enter the seat number:
	Occupied! Please choose another seat
	Please enter a seat number between 1 and 5
	Enter customer name:
	The seat has been assigned successfully
	Enter your choice:
	removeSeat():
	Enter the seat number:
	Please enter a seat number between 1 and 5
	Empty! Enter another seat number for removal
	Removal is successful
	Enter your choice:
	listTakenSeat():
	Customer name: N Lim
	Seat number (ID): 5
	Enter your choice: