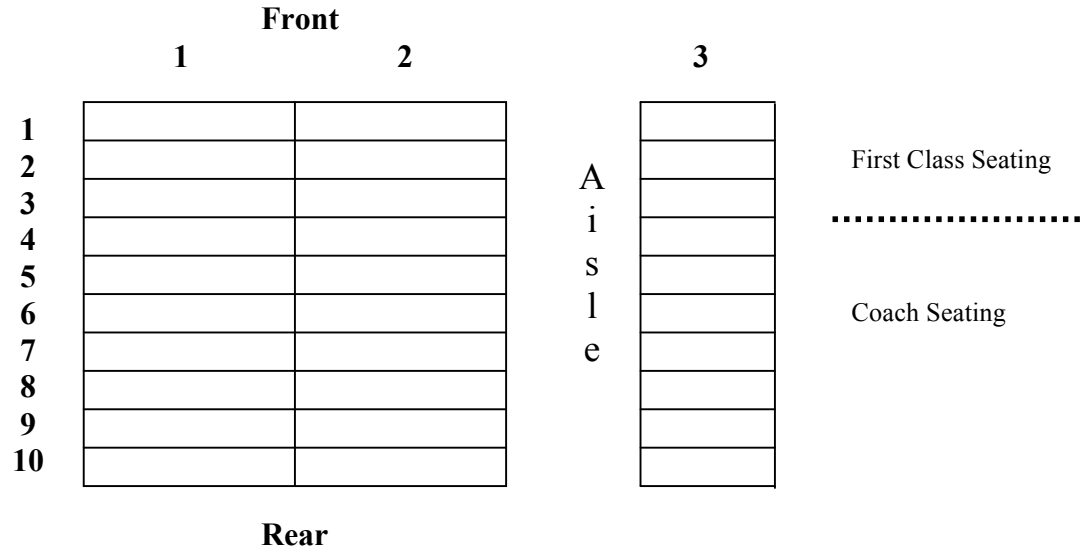
CSC 36000 – Data Structures

Programming Assignment #1 (Multi-dimensional Arrays ?) January 26, 2015

SITUATION: Southern Comfort Airlines has asked you to design a program that assigns seats to passengers on a "first-come, first serve" basis. Southern Comfort is a small commuter airline with service from Jackson, MS to several cities in other states. Each of their aircraft is a 30-passenger unit with a seating plan as shown below. Seats are numbered 1-1, 1-2, 1-3, 2-1, 2-2, .., 9-3, 10-1, 10-2, 10-3.



The first three rows are designed as "First Class" and the last seven rows are designated "Coach". In assigning seats, you must abide by the following rules:

Rule 1 - Specific seat requests are honored first. If a requested seat is already assigned to another passenger, the person should be place in the same row, if possible, starting from the left side (lowest seat number.) (Note: a value of -999 is to be used to indicate a vacant seat.)

Rule 2 - If the requested row is full, the passenger should be seated as far forward as possible in the requested column **but within** the requested section. THERE IS NO SWITCHING OF SECTIONS.

Rule 3 - If the request using Rule 2 or Rule 3 cannot be honored, the passenger should be assigned the first available seat starting from the front and left of the requested section going across each row until a vacant seat is found. AGAIN, THERE IS NO SWITCHING OF SECTIONS BETWEEN SECTIONS.

Rule 4 - First Class and Coach request must be honored. If there are no seats in the requested section, the passenger's Boarding Number must go on a "WAITING LIST" for the next flight.

The Airline has 4 cities it services. The cities and their flight numbers are:

Memphis, Tennessee	**1010**	**Little Rock, Arkansas**	**1020**
Shreveport , Louisiana	**1030**	**Orlando, Florida**	**1040**

Theses flights are from Jackson, Mississippi to the indicated city. Numbers for the return flights are the same except you add 5 to the appropriate number. For example, 1025 would be the flight number for the return flight from Little Rock to Jackson.

PROBLEM STATEMENT: You are to write a program using the C++ programming language that assigns seats on the various flights according to the rules mentioned on the previous page. In so doing, you may use any programming construct with which you are familiar. **ALL PROGRAMS MUST BE WELL DOCUMENTED AND MODULARIZED.** (Hint, use a 3D array for the seating chart and eight single dimension arrays for the waiting lists or an array of structures in which the arrays are part of the structure. You can also use classes.)
This program is due on February 9, 2015.

INPUT: The input file for this program will consist of an unknown number of passenger records. Each record will be on one line and have the format of:

Passenger's assigned Boarding Number,
the Requested Flight Number,
the Requested Section,
the Requested Seat Row, and
the Requested Seat Column.

Both the Passenger's Boarding Number and the flight number will be four digit integers. The section requested will be indicated by a single character, **F** for First Class and **C** for Coach. This will be followed by the row number which will be between 1 and 10. The last item in each record will be another single character and will be one of the three possible values of **L, M,** or **R** which stand for Left Seat, Middle Seat, and Right Seat respectively. A typical line of data might look like this:

6723 1045 C 8 M

You may assume all data is valid. A **sentinel** of a negative value for the passenger's Boarding Number will indicate the end of the input file. The data file name is **data1 .**

PROCESSING: All processing is to be completed according to the rules specified on the previous page. Process the data for one passenger BEFORE proceeding to the next passenger's data. An initial value of **–999** is to be assigned to all unused seats.

OUTPUT: Output for this program is to be in the form of a seating chart for each flight. Each chart must include the following: The name of the airline, the flight number, the city of departure, the city of destination, the actual seating chart, and the waiting list showing the passenger's boarding number. If there is no entry in the waiting list, the message " **There is no waiting list for this flight** " is to be printed in place of the actual waiting list. You DO NOT have to keep a separate Waiting List for First Class and Coach passengers. If you use one list, you can expect no more than 50 passengers. If you use separate waiting list for each section, you can expect no more than 30 passengers each. To save paper, print Waiting Lists in rows of 10 passengers each with 3 spaces between passenger numbers.

After **each** seating chart has been printed, the message **END OF SEATING CHART** must appear. **Each seating chart must appear on a separate page of output.** See the example on the next page for guidance.

After the last seating chart has been printed, the message **END OF PROGRAM OUTPUT** is to be printed.

Output example:

Southern Comfort Airlines

Flight 1010

FROM: Jackson, Mississippi
TO: Memphis, Tennessee

5472	**4426**	**2273**
4345	**3005**	**-999**
3119	**9892**	**1251**
2900	**3492**	**2274**
5999	**6651**	**8820**
9928	**5432**	**-999**
5489	**2395**	**2182**
4442	**6177**	**6232**
-999	**-999**	**-999**
9132	**7233**	**4434**

WAITING LIST

There is no waiting list for this flight.

END OF SEATING CHART

---new page ----------new page----------new page ----------new page----------new page ----------new page----------new page

Southern Comfort Airlines

Flight 1045

FROM: Orlando, Florida
TO: Jackson, Mississippi

3482	**7726**	**1283**
2345	**3345**	**7629**
1119	**9842**	**9991**
2900	**3492**	**2274**
-999	**6651**	**8820**
9928	**5432**	**-999**
-999	**2395**	**1182**
4442	**7177**	**1632**
-999	**-999**	**-999**
9122	**8233**	**1234**

WAITING LIST

6699 5551

END OF SEATING CHART

END OF PROGRAM OUTPUT