ENSF 337– Programming Fundamentals
Term Project Instruction

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Objectives:

The objective of this term project is to give you an opportunity to apply the principles of C++ programming and some of its fundamental concepts of object-oriented programming in an application that is relatively close to a real-world example, but still in much smaller scale and without many real world software features such as client-server, or web-base programming.

Due Date:

The project is due on Monday June 15, 2020 at 11:59 PM. The source codes (.cpp and .h files) and the executable files (a.exe or a.out for Mac users) must be wrapped in a zip file using the following naming rule and post it on into a Dropbox on the D2L

`YourLastName_Term_Project.zip`

You should also demonstrate you project to myself and course teaching assistants on Tuesday June 16 and Wed June 17.

Project Description:

In this project you are going to develop a small "Flight Management Program" in C++ that its overall functionalities are as follows:

- The program starts with a title as follows:

```
Version: 1.0
Term Project – Flight Management Program in C++
Produced by: Student Name

<<< Press Return to Continue>>>>
```

- When the user presses return the program reads a file that contains the a Flight number (a combination of letters and numbers , for example `WJ1145` stands for `WestJet 1145`), followed by the number of rows and the number of seats per row in an aircraft (for example `24` rows and `6` seats per row), and the rest of the file is filled with the passengers information, which includes: first name, last name, phone number, assigned seat (for example `6A` that stands for row number `6` and seat `A`), and the last field is an id number for each passenger. Here is the example of such a file:

```
WJ1145   24    6
Tom                Harris              403-100-0000        6A  10000
Tim                Moore               403-020-0000        5B  10001
Jim                Li                  403-003-0000        23C 10002
```

  The data from this file must be read into an array of object of a class that you should develop and is called class `Passenger`. You have also the option of creating your own Linked List of `Passenger` objects, if you want. The other option is to use a C++ library class called vector. The last one (mean using vectors) is a preferred option as it is more powerful, easier to use, and saves you lots of time. For names and string types also preferred tool to use is C++ library class `string` instead of c-string. Which is much more powerful that primitive c-strings, and it is almost similar to String types that you learned in Processing, in ENGG 233. I will discuss these topics on Monday June 8, during the lecture time. However, the early birds who want to start working on the project should first read carefully two sets of slides, posted on D2L: `18_C++FileIO2020.pdf`, and `19_vectors and string in C++ 2020`
  When reading the data from file you should save the data about each passenger's seat inside another object of a class called `Seat`, which is accessible form class `Passenger` through a Seat Pointer. Moreover, another class called Flight should use class Passenger, and forms the list of passengers.
- Once the data from file is read into your program, your program should be able to:
  - Show the flight seat map on the screen
  - Show the passenger information on the screen
  - Add a new passenger to the list
  - Remove an existing passenger from the list
  - Save the passenger information from list back into the file
  - Terminate the program when user wishes

Here is a snapshot of a sample run of the expected program:

Note: the text in RED is the user input

```
Version: 1.0
Term Project – Flight Management Program in C++
Produced by: Student Name

<<< Press Return to Continue>>>>
<<< Press Return to Continue>>>>

Please select one the following options:
1. Display Flight Seat Map.
2. Display Passengers Information.
3. Add a New Passenger.
4. Remove an Existing Passenger
5. Save data
6. Quit.

Enter your choice: (1, 2, 3, 4, 5 or 6) 1

      Aircraft Seat Map
     A   B   C   D   E   F
   +---+---+---+---+---+---+
0  |   |   |   |   |   |   |
   +---+---+---+---+---+---+
1  |   |   |   |   |   |   |
   +---+---+---+---+---+---+
2  |   |   |   |   |   |   |
   +---+---+---+---+---+---+
3  |   |   |   |   |   |   |
   +---+---+---+---+---+---+
4  |   |   |   |   |   |   |
   +---+---+---+---+---+---+
5  |   | X |   |   |   |   |
   +---+---+---+---+---+---+
6  | X |   |   |   |   |   |
   +---+---+---+---+---+---+
7  |   |   |   |   |   |   |
   +---+---+---+---+---+---+
8  |   |   |   |   |   |   |
   +---+---+---+---+---+---+
9  |   |   |   |   |   |   |
   +---+---+---+---+---+---+
10 |   |   |   |   |   |   |
   +---+---+---+---+---+---+
11 |   |   |   |   |   |   |
   +---+---+---+---+---+---+
12 |   |   |   |   |   |   |
   +---+---+---+---+---+---+
13 |   |   |   |   |   |   |
   +---+---+---+---+---+---+
14 |   |   |   |   |   |   |
   +---+---+---+---+---+---+
15 |   |   |   |   |   |   |
   +---+---+---+---+---+---+
16 |   |   |   |   |   |   |
   +---+---+---+---+---+---+
17 |   |   |   |   |   |   |
   +---+---+---+---+---+---+
18 |   |   |   |   |   |   |
   +---+---+---+---+---+---+
19 |   |   |   |   |   |   |
   +---+---+---+---+---+---+
20 |   |   |   |   |   |   |
   +---+---+---+---+---+---+
21 |   |   |   |   |   |   |
   +---+---+---+---+---+---+
22 |   |   |   |   |   |   |
   +---+---+---+---+---+---+
23 |   |   | X |   |   |   |
   +---+---+---+---+---+---+
24 |   |   |   |   |   |   |
   +---+---+---+---+---+---+

<<< Press Return to Continue>>>>


Please select one the following options:
1. Display Flight Seat Map.
```

```
2. Display Passengers Information.
3. Add a New Passenger.
4. Remove an Existing Passenger
5. Save data
6. Quit.

Enter your choice: (1, 2, 3, 4, 5 or 6) 2

First Name       Last Name        Phone          Row   Seat  ID
 ------------------------------------------------------------------
Tom              Harris          403-100-0000    6     A     10000
 ------------------------------------------------------------------
Tim              Moore           403-020-0000    5     B     10001
 ------------------------------------------------------------------
Jim              Li              403-003-0000    33     C    10002
 ------------------------------------------------------------------

<<< Press Return to Continue>>>>

Please select one the following options:

1. Display Flight Seat Map.
2. Display Passengers Information.
3. Add a New Passenger.
4. Remove an Existing Passenger
5. Save data
6. Quit.

Enter your choice: (1, 2, 3, 4, 5 or 6) 3

Please enter the passenger id: 10005
Please enter the passenger first name: Mariam
Please enter the passenger last name: Wright
Please enter the passenger phone number: 403 000 1234

Enter the passenger's desired row:  23
Enter the passenger's desired seat: D

Please select one the following options:
1. Display Flight Seat Map.
2. Display Passengers Information.
3. Add a New Passenger.
4. Remove an Existing Passenger
5. Save data
6. Quit.

Enter your choice: (1, 2, 3, 4, 5 or 6) 2

First Name       Last Name        Phone          Row   Seat  ID
 ------------------------------------------------------------------
Tom              Harris          403-100-0000    6     A     10000
 ------------------------------------------------------------------
Tim              Moore           403-020-0000    5     B     10001
 ------------------------------------------------------------------
Jim              Li              403-003-0000    33     C    10002
 ------------------------------------------------------------------
Mariam           Wright          403-000-1234    23     D    10005
 ------------------------------------------------------------------


<<< Press Return to Continue>>>>

Please select one the following options:
1. Display Flight Seat Map.
2. Display Passengers Information.
3. Add a New Passenger.
4. Remove an Existing Passenger
5. Save data
6. Quit.


Enter your choice: (1, 2, 3, 4, 5 or 6) 3

Please enter the passenger id: 10006
Please enter the passenger first name: Emily
Please enter the passenger last name: Norman
Please enter the passenger phone number: 403 111 1234

Enter the passenger's desired row:  22
Enter the passenger's desired seat: D
```

```
Please select one the following options:

1. Display Flight Seat Map.
2. Display Passengers Information.
3. Add a New Passenger.
4. Remove an Existing Passenger
5. Save data
6. Quit.

Enter your choice: (1, 2, 3, 4, 5 or 6) 2

First Name       Last Name        Phone          Row   Seat  ID
 ---------------------------------------------------------------
Tom              Harris          403-100-0000    6     A     10000
 ---------------------------------------------------------------
Tim              Moore           403-020-0000    5     B     10001
 ---------------------------------------------------------------
Jim              Li              403-003-0000    33     C    10002
 ---------------------------------------------------------------
Mariam           Wright          403-000-1234    23     D    10005
 ---------------------------------------------------------------
Emily           Norman           403-111-1234    22     D    10006
---------------------------------------------------------------

<<< Press Return to Continue>>>>

Please select one the following options:
1. Display Flight Seat Map.
2. Display Passengers Information.
3. Add a New Passenger.
4. Remove an Existing Passenger
5. Save data
6. Quit.


Enter your choice: (1, 2, 3, 4, 5, or 6) 4

Please enter the id of the passenger that needs to be removed: 10005

Please select one the following options:
1. Display Flight Seat Map.
2. Display Passengers Information.
3. Add a New Passenger.
4. Remove an Existing Passenger
5. Save data
6. Quit.


Enter your choice: (1, 2, 3, 4, 5, or 6) 2

First Name       Last Name        Phone          Row   Seat  ID
 ---------------------------------------------------------------
Tom              Harris          403-100-0000    6     A     10000
 ---------------------------------------------------------------
Tim              Moore           403-020-0000    5     B     10001
 ---------------------------------------------------------------
Jim              Li              403-003-0000    33     C    10002
 ---------------------------------------------------------------
Emily           Norman           403-111-1234    22     D    10006
 ---------------------------------------------------------------

<<< Press Return to Continue>>>>

Please select one the following options:
1. Display Flight Seat Map.
2. Display Passengers Information.
3. Add a New Passenger.
4. Remove an Existing Passenger
5. Save data
6. Quit.


Enter your choice: (1, 2, 3, 4, 5, or 6) 5

Do you want to save the data in the "flight_info.txt"? Please answer <Y or N> Y

All the data in the passenger list was saved into the flight_info.txt.
```

<<< Press Return to Continue>>>>

Please select one the following options:
1. Display Flight Seat Map.
2. Display Passengers Information.
3. Add a New Passenger.
4. Remove an Existing Passenger
5. Save data
6. Quit.

Enter your choice: (1, 2, 3, 4, 5, or 6) 1

Aircraft Seat Map

```
     A   B   C   D   E   F
   +---+---+---+---+---+---+
0  |   |   |   |   |   |   |
   +---+---+---+---+---+---+
1  |   |   |   |   |   |   |
   +---+---+---+---+---+---+
2  |   |   |   |   |   |   |
   +---+---+---+---+---+---+
3  |   |   |   |   |   |   |
   +---+---+---+---+---+---+
4  |   |   |   |   |   |   |
   +---+---+---+---+---+---+
5  |   | X |   |   |   |   |
   +---+---+---+---+---+---+
6  | X |   |   |   |   |   |
   +---+---+---+---+---+---+
7  |   |   |   |   |   |   |
   +---+---+---+---+---+---+
8  |   |   |   |   |   |   |
   +---+---+---+---+---+---+
9  |   |   |   |   |   |   |
   +---+---+---+---+---+---+
10 |   |   |   |   |   |   |
   +---+---+---+---+---+---+
11 |   |   |   |   |   |   |
   +---+---+---+---+---+---+
12 |   |   |   |   |   |   |
   +---+---+---+---+---+---+
13 |   |   |   |   |   |   |
   +---+---+---+---+---+---+
14 |   |   |   |   |   |   |
   +---+---+---+---+---+---+
15 |   |   |   |   |   |   |
   +---+---+---+---+---+---+
16 |   |   |   |   |   |   |
   +---+---+---+---+---+---+
17 |   |   |   |   |   |   |
   +---+---+---+---+---+---+
18 |   |   |   |   |   |   |
   +---+---+---+---+---+---+
19 |   |   |   |   |   |   |
   +---+---+---+---+---+---+
20 |   |   |   |   |   |   |
   +---+---+---+---+---+---+
21 |   |   |   |   |   |   |
   +---+---+---+---+---+---+
22 |   |   |   | X |   |   |
   +---+---+---+---+---+---+
23 |   |   | X |   |   |   |
   +---+---+---+---+---+---+
24 |   |   |   |   |   |   |
   +---+---+---+---+---+---+
```

<<< Press Return to Continue>>>>

Please select one the following options:

1. Display Flight Seat Map.
2. Display Passengers Information.
3. Add a New Passenger.
4. Remove an Existing Passenger
5. Save data
6. Quit.

```
Enter your choice: (1, 2, 3, 4, 5, or ) 6

Program terminated.
```

Additional Help:

If you want you can use the following function to implement tasks such as, **<<< Press Return to Continue>>>> or cleaning the buffer when someone enters incorrect input. I will explain more about when and how this functions work during the class time.**

```
/*-------------------------------------------------------------*/
void pressEnter()
{
    cout << "\n<<< Press Return to Continue>>>>\n";
    cin.get();
}

/*-------------------------------------------------------------*/
void cleanStandardInputStream (void)
{
    int leftover;
    do {

        leftover = cin.get();

    } while (leftover !='\n' && leftover != EOF);

}
```

Here is also a part of the main function that you can use (if you want) in your program. The function uses a switch statement instead of if...else.

```
int main(){
Flight f;
    displayHeader();
f= populate_flight_from_file("/flight_info.txt");

int choice;

    while((choice = menu())){
        switch(choice){
            case 1:
                f.show_seat_map();
                pressEnter();
                break;
            case 2:
                displayPassengers(f);
                pressEnter();
                break;
            case 3:
                add_passenger(f);
                break;
            case 4:
                remove_passenger();
                break;
            case 5:
                save_infor();
                break;
            case 6:
                exit(1);
                break;

        }
    }

    return 0;
}
```

MORE HELP WLL BE PROVIDED DUIRING THE LECTURES IN THE WEEK OF JUNE 8.