King Fahd University of Petroleum and Minerals
Information & Computer Science Department
ICS 103 – Computer Programming in C
Summer Semester 2007 (73)

Project *(weight 5%)*

Due: Tuesday, August 23, 2008

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Project Title:

Simple Flight Seating Arrangement Program.

Description:

The seating arrangement of a flight is stored in a data file **flight.txt** containing five lines. Each line contains four integers, a value of 1 represents a reserved seat, and a value of 0 represents an empty seat. The following is an example of the contents of **flight.txt**:

```
0  1  1  1
1  1  0  0
0  0  0  1
1  1  1  1
1  0  1  0
```

Write an interactive program which has a menu with the following options:

1. Show number of empty seats
2. Show empty seats
3. Reserve a seat
4. Cancel a seat
5. Exit the program

The program first reads the data file **flight.txt** and stores the data in one-dimensional integer array **seats** of size 20, then:

a. If option 1 is chosen, the main function passes the array **seats** to an integer function **NEMPTY** which returns the number of empty seats. Then the main function prints this number.

b. If option 2 is chosen, the main function passes the array **seats** to a void function **ESEATS** which prints the positions of all empty seats. The seat position means the row number and the column number of the seat.

c. If option 3 is chosen, the user is prompted to enter the row number and the column number of the seat to be reserved. The main function then passes these two numbers together with the array **seats** to a logical function **RESERV** which reserves a seat if it is empty and returns the value true (1) to the main function. If the requested seat is already reserved or if the row or column number is out of range, the function returns the value false (0) to the main function. The main function then prints the message ***SEAT RESERVED*** or ***SEAT NOT AVAILABLE*** respectively.

d. If option 4 is chosen, the user is prompted to enter the row number and the column number of the seat to be canceled. The main function then passes these two numbers together with the array **seats** to a logical function **CANCEL** which cancels a seat if it is reserved and returns the value true (1) to the main function. If the requested seat is already empty or if the row or column number is out of range, the function returns the value false (0) to the main function. The main function then prints the message ***SEAT CANCELED*** or ***WRONG CANCELLATION*** respectively.

e. If option 5 is chosen, the main function stops immediately if no changes were made to the array **seats**. Otherwise, the main function closes the data file **flight.txt** and then opens it again for writing to write into it the new seating arrangement stored in the array **seats** before stopping. It should write back the data in five lines. Each line should contain four integers with at least one space between the numbers.

In addition, it is obvious that the program should handle the most common errors possible to happen such as wrong input, out of range, try to use the seats already reserved or already canceled, and many others.

Hints:

- Given the seat position as row number ***n*** and column number ***m***, the corresponding array subscript ***i*** can be calculated as follows:

```
i = (n – 1) * 4 + (m - 1)
```

  For example, the status of seat (2,4) is sorted in seats[7].

- Given the array subscript ***i***, the corresponding seat position as row number ***n*** and column number ***m*** can be calculated as follows:

```
n = (i / 4) + 1
m = (i % 4) + 1
```

  For example, seats[12] contains the status of seat (4,1).

Where $1 \le n \le 5$, $1 \le m \le 4$, $0 \le i \le 19$, and status means reserved (value 1) or empty (value 0).

Submission Guidelines:

1. *Late project **will not** be accepted.*
2. *Write comments in your program wherever necessary.*
3. *Save your program as xxxxxx.cpp where xxxxxx is your ID number.*
4. *Submit both source code file and printout of the project.*
5. *The project **must be** solved individually or in a group of two students. Any kind of copying will result in **F** grade for all parties involved.*

Good luck,