THE HONG KONG POLYTECHNIC UNIVERSITY
Department of Electronic and Information Engineering

Computer Programming (ENG236) - Homework 5

A. By using Visual Studio 2005, develop a static library, namely `Cards.lib`, based on the class specifications given in `Cards.h` below. To do this part, you may prepare your own card picture files or download the file `Cards.zip` from the subject Web page. Store the card picture files to a folder `cards_gif` in your project folder.

```
// Implement using visual studio 2005 a static library.
// The classes Card and CardFrame are defined below.
// The class Card has been implemented. You are required to implement the
//   member functions of CardFrame
// (Words started with $ in the comments refer to the member variables as stated
//   in the private sections)

class Card
{
public:
     int getsuit() {return suit;}
     // Return $suit
     int getnumber() {return number;}
     // Return $number
     char * getfilename() {return filename;}
     // Return the character array $filename by a pointer
     void setsuit(int s) {suit = s;}
     // $suit = s
     void setnumber(int n) {number = n;}
     // $number = n
     void setfilename(char * fn) {strncpy(filename,fn,100);}
     // Copy fn[] to $filename[]

private:
     int suit;          // 1 = spade, 2 = heart, 3 = club, 4 = diamond
     int number;             // Represent the number of the cards.
                        // number = 2 to 10 for card no = 2 to 10
                        // Jack = 11, Queen = 12, King = 13, Ace = 1
     char filename[100];     // The filename of the card
};


class CardFrame
{
public:
     CardFrame(int num);
     // When an object of this class is instantiated, do the following
     //   $cardNum = num
     //   Create an array of num objects of the class Card in the heap.
     //        The pointer of the array should be saved in $pCardArr

     ~CardFrame();
     // Delete all Card in the heap

     void genCard(int array_index);
     // When this function is called, do the following
     //  1. Generate a random number in the range 1 to 4 and save into $suit of
      //   the "array_index" Card in the array.  E.g. if array_index = 0, the
      //   suit of the first Card in the array should be randomly generated
      //   and saved into its $suit variable.
     //  2. Generate a random number in the range 1 to 13 and save into $number
     //    of the "array_index" Card in the array.  E.g. if array_index = 0,
      //   the card number of the first Card in the array should be randomly
      //   generated and saved into its $number variable.

     char * genFilename(int array_index);
     // When this function is called, construct the filename of the
```

```
      // "array_index" Card based on the values of $suit and $number and save
     // into $filename[].  E.g., assume your cards_gif folder is stored in
     // e:\HW5, $suit and $number of the "array_index" Card are 2 and 12,
     // respectively.  The filename you should generate is
      // "e:\\HW5\\cards_gif\\hq.gif" (i.e. Heart Queen)
     // Note that \ is a special character.  It has to be preceded by another \
      //  in a string.
      // Hint: Use strcat to combine the strings together and form a filename
     // Return $filename of the "array_index" Card

private:
     int cardNum;        // Keep the number of cards
     Card * pCardArr;         // Keep the pointer that points to an array of
                               // Card in heap
};
```

Write a console application to test all the member functions of `CardFrame` using the developed static library.

B. By using Visual Studio 2005, develop a form with specifications as defined below:

1. You are required to make use of the library you developed in Question A in this Form project.
2. When the program is executed, the form in Fig.1 should be shown. In the form, 3 `pictureBox`'s are created and show 3 cards with face down.
3. Whenever the user clicks on any of the covered cards, a card of random suit and number will be shown as in Fig.2.
4. If the user clicks on any of the uncovered cards, the card will become covered again. Repeat step 3 to ensure that the covered card can be clicked again to show another card of random suit and number.

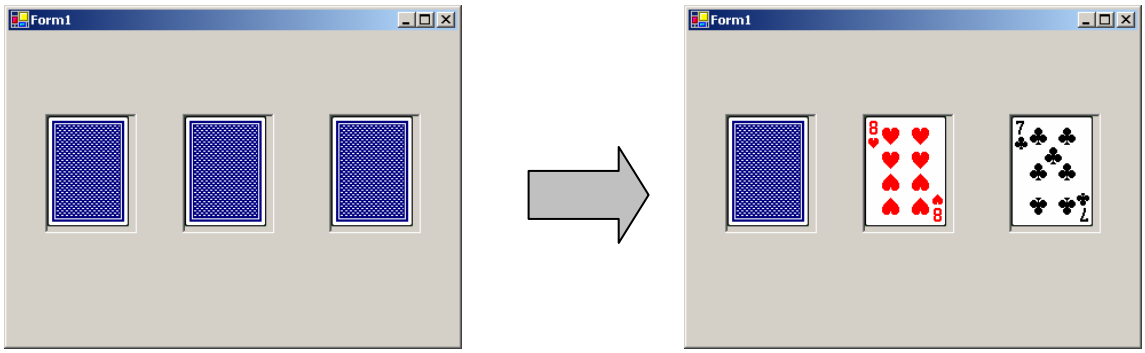

Fig.1 Fig.2

Hint 1: Add a private member variable with the following statement "`CardFrame *pCardFrame;`" in `Form1.h` (remember to include `Cards.h` at the beginning). In the constructor of `Form1.h`, create a `CardFrame` object in the heap. Save the pointer to `pCardFrame`.

Hint 2: If a character array `fn[]` contains the filename of a picture as follows:

```
char fn[] = "e:\\HW5\\cards_gif\\hq.gif";
```

you can display the picture in a `pictureBox`, say, `pictureBox1`, by

```
pictureBox1->Image = Image::FromFile(fn);
```

Instructions

You need to follow exactly the requirement of the questions as shown above when developing your programs. Failure to do so is unacceptable even if your programs can give a similar result. Try to explain your program as clear as possible using comments.