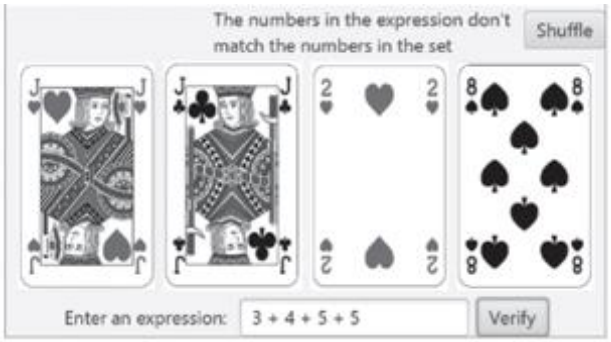
Homework 4 – Cards

GUI

Description

For this assignment we will create a simple math-based card game. We will also learn how to use images on our forms. A possible design is shown below.



Specifications

You will need to complete the following:

1. Create a new Project called Cards.
2. The goal of the 24-point card game is to pick any four cards from a 52-card deck.
    a. Jokers are excluded.
3. Each card represents a number. An Ace, King, Queen, and Jack represent 1, 13, 12, and 11, respectively.
4. The user can click the Shuffle button to get four new cards. Use System.Random Class to generate random numbers to select the cards.
5. The user then enters an arithmetic expression that uses the four numbers from the four selected cards.
    a. Each number must be used once and only once.
    b. The user can use an of the four basic arithmetic operators (addition, subtraction, multiplication, and division) and parentheses in the expression.
    c. The expression must evaluate to 24.
6. After entering the expression, the user clicks the Verify button to check whether the numbers in the expression are currently selected and whether the result of the expression is correct.
7. Display the verification in a label before the Shuffle button. Assume that images are stored in files named 1.png, 2.png, . . . , 52.png, in the order of spades, hearts, diamonds, and clubs. (These are given to you in the cards.zip file).
8. Thus, the first 13 images are for spades 1, 2, 3, . . . , and 13.
9. Use a PictureBox control to display the images of the cards. When the form loads display the backs of the cards.
    a. NOTE – You cannot copy the images into the solution folder outside of Visual Studio. You will need to create a folder (call it images) using the Visual Studio

Solution explorer, then copy the files into the folder. Once they are copied, use the Solution Explorer to add an existing item and add the images to your project. Once that is complete, you must edit the properties of the images to make sure they are copied to the output directory.

b. You can set the image using PictureBoxControl.Image = new BitMap(@"images\1.png");

10. To evaluate the expression, consider using a Stack. Create a stack of type int to old the operands and a Stack of type char to hold the operators.
    a. Consider the following pseudo code
    b. Create two stacks.
    c. While my string expression still has values
        i. If the current char is empty, do nothing – whitespace
        ii. If the current char is + or –
            1. While the operator stack is not empty and the operator stack has an operator (+ , - , * , /) on the top, then process that operation
            2. Push the operator onto the operator stack.
        iii. Else if the char is * or /
            1. While the operator stack is not empty and it has a * or / on the top, then process that operation.
            2. Push the operator onto the stack.
        iv. Else if the operator is (then push it onto the operator stack.
        v. Else if the operator is)
            1. While the operator stack top != (
                a. Process the operations.
            2. Remove the (from the stack
        vi. Else we must have an operand – push it onto the stack.
    d. While the operator stack is not empty
        i. Process the operation
    e. Return the last value on the operand stack.
11. Make sure you do not forget to put all XML comments and a comment at the top of the code file which contains your name and the assignment.

Documentation

You will create a document (.docx, .rtf, .pdf) which contains the following:

- Your name and assignment.
- A screenshot of your form running with at least three test cases.
- Your document should also contain a proof your evaluation of the calculations is correct. Work through each of your test cases step-by-step showing the values in the stacks.
- You will need to include your responses to the following questions – be detailed in your responses.

- Why does the stack make a good data structure to evaluate the expression? Why not a List or Set?
- What event did you use for the Numeric up down? Why?

What to Submit

You need to submit your entire solution folder (zipped) and your document. ***DO NOT*** zip your document. Make sure your document is in the correct format and all your files include your name and assignment.