

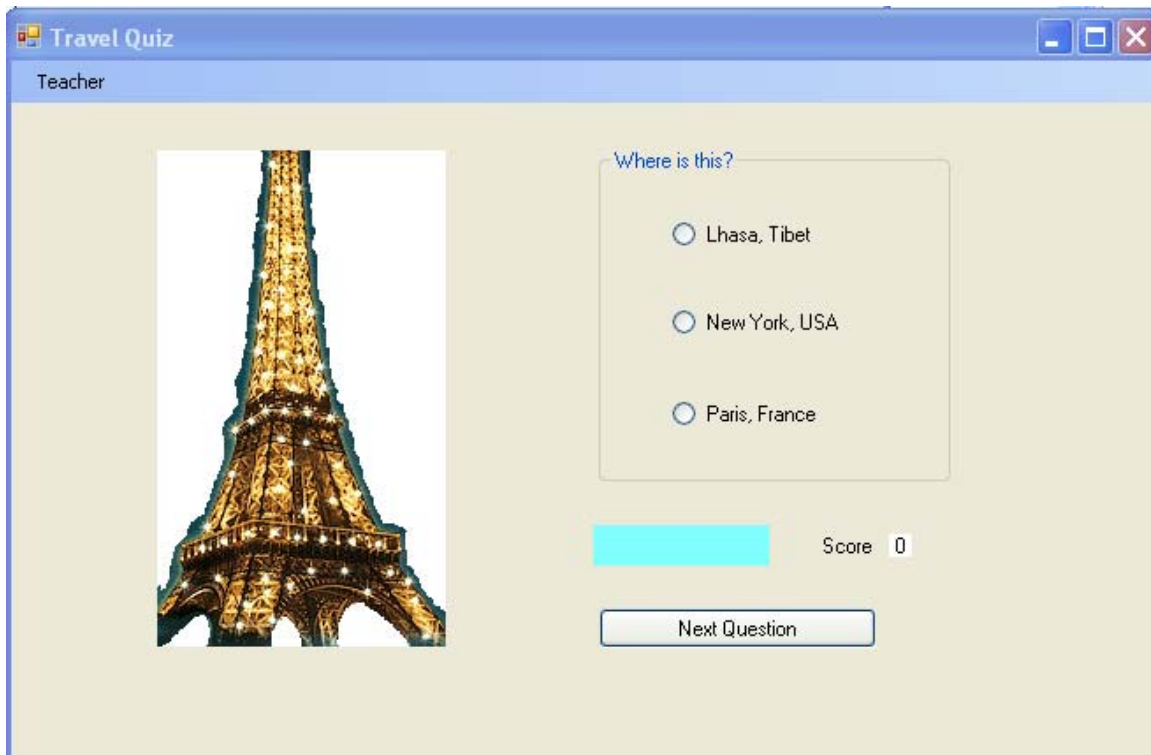
Instructions. This exam is similar to the midterms, except that you have two hours and fifteen minutes to work. The executable file to submit is *Final.exe*. Don't forget to put your ID number in the title bar—failure to do so costs one letter grade. For reference here are the rules again: you may use any books, notes, the course website, your past work, etc. Email, instant messaging, etc. are illegal and so is searching the Internet; only the course website is allowed. Submit the exam when ready at the link on the course website. Multiple submissions are OK. The link will automatically go dead when the exam period is over, so be sure you submit on time

Files you will need: *NewYork.bmp*, *Tibet.bmp*, *EiffelTower.bmp*. We have used these before so you probably have them on your computer already. If not, download them from the course website. *Note that your program must run without having those files present. TEST IT FROM YOUR DESKTOP BEFORE SUBMITTING.* You might also want to download *RioDeJaneiro.bmp* for testing purposes.

Note: You should read the whole exam first. Maybe the easiest parts are not at the beginning. There are programming hints at the end.

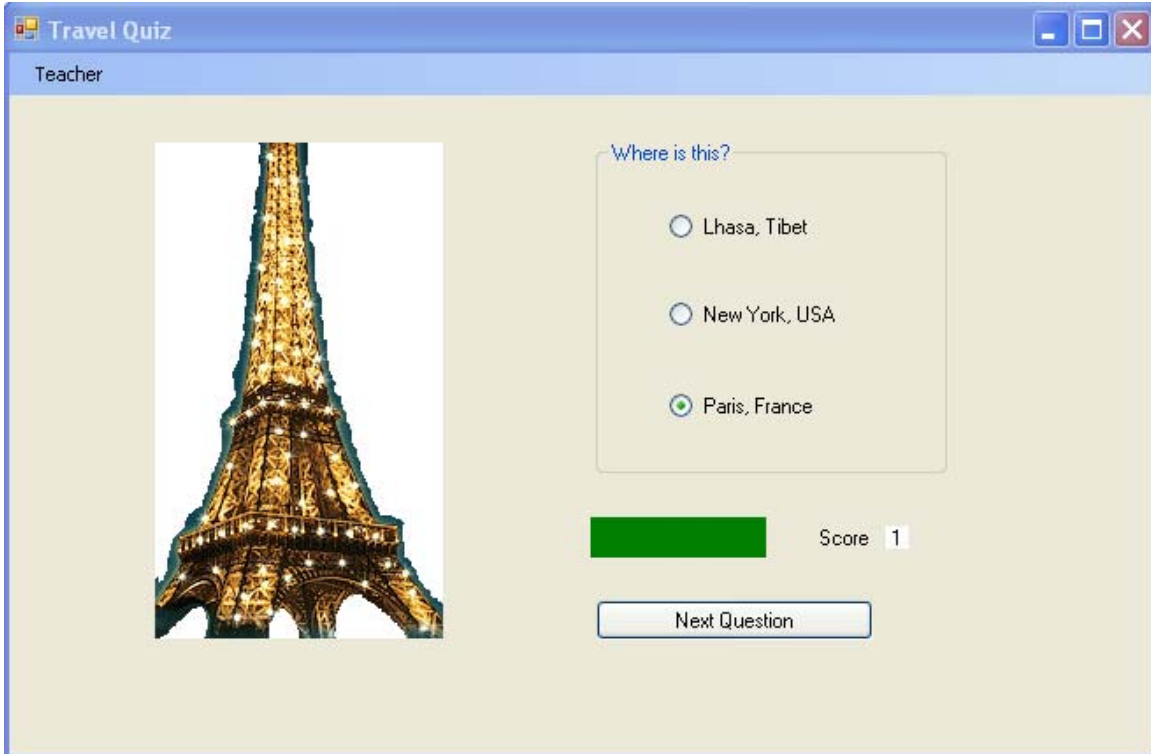
The Program as a user sees it:

When the program opens it looks like this:



The label above the *Next Question* button has the color cyan (which indicates that the question hasn't been answered, either wrong or right, yet). None of the radio buttons is checked. The score is 0.

Now if the user correctly answers, by checking the *Paris, France* radio button, the cyan label turns green, and the score becomes 1.



Now the user presses the *Next Question* button:



The picture changes, and the Statue of Liberty is displayed. The radio buttons are once again all unchecked and the “light” label turns cyan. The score remains 1.

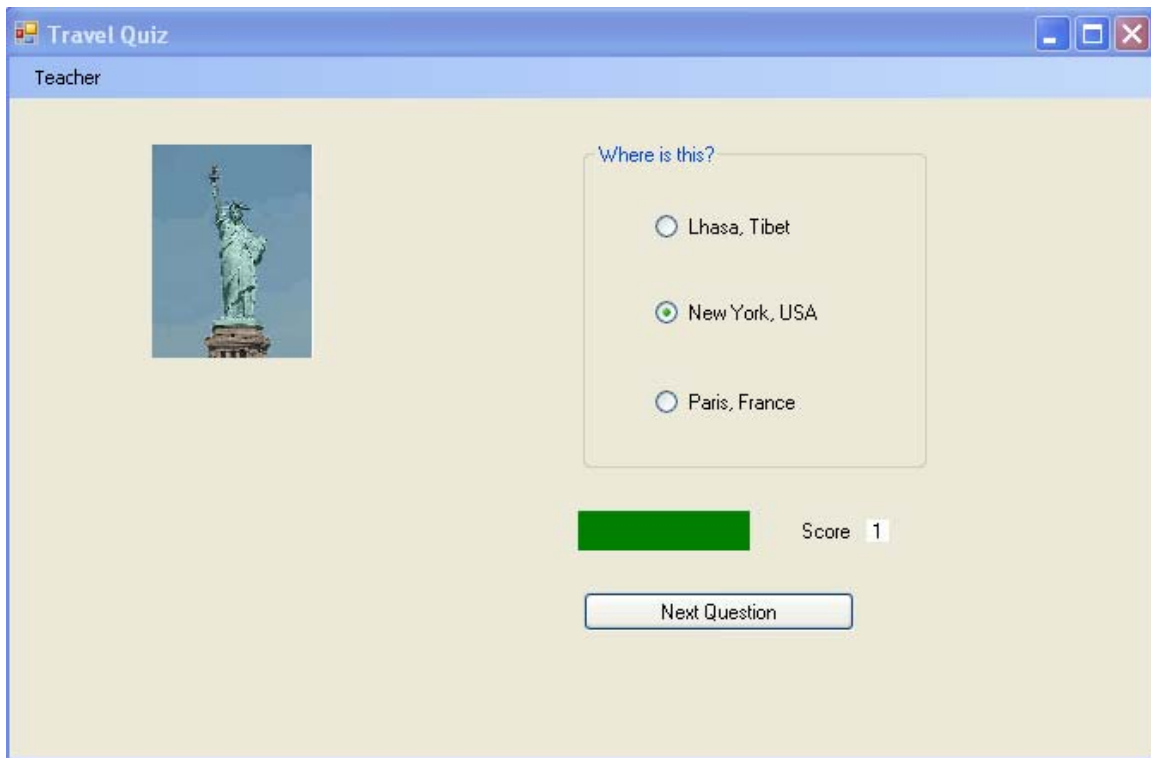
If you keep using the *Next Question* button, eventually you “wrap around” to the first question again. To start with, there are only three built-in questions, corresponding to the three image files mentioned at the beginning, and the three answers shown. But the teacher can add more, so you should not assume there will always be just three questions.

Now suppose the user answers the question incorrectly:



The Statue of Liberty is not in Paris, so the score does not change, and the light turns red, indicating a wrong answer. Also, there is an audible *Beep*.

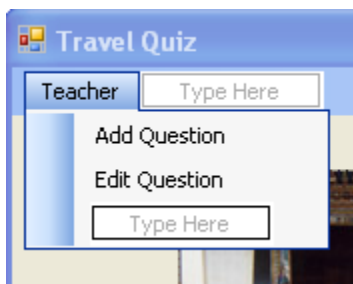
Now let the user answer the question correctly with *New York*. The light turns green, indicating a correct answer, but the score does not increment. You only score points when you answer correctly the first time.



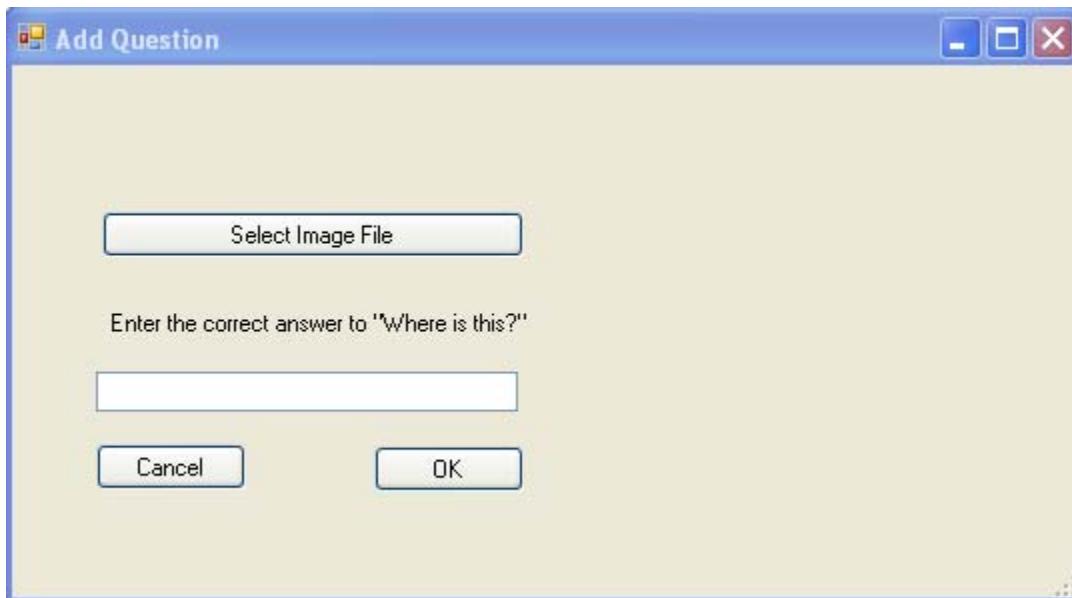
After having answered a question correctly, you can, of course, click another radio button instead of choosing *Next Question*. If you do that, the light will turn red again and the score will not change.

The Add Question Dialog.

The menu is shown in the following screen shot from the form editor:

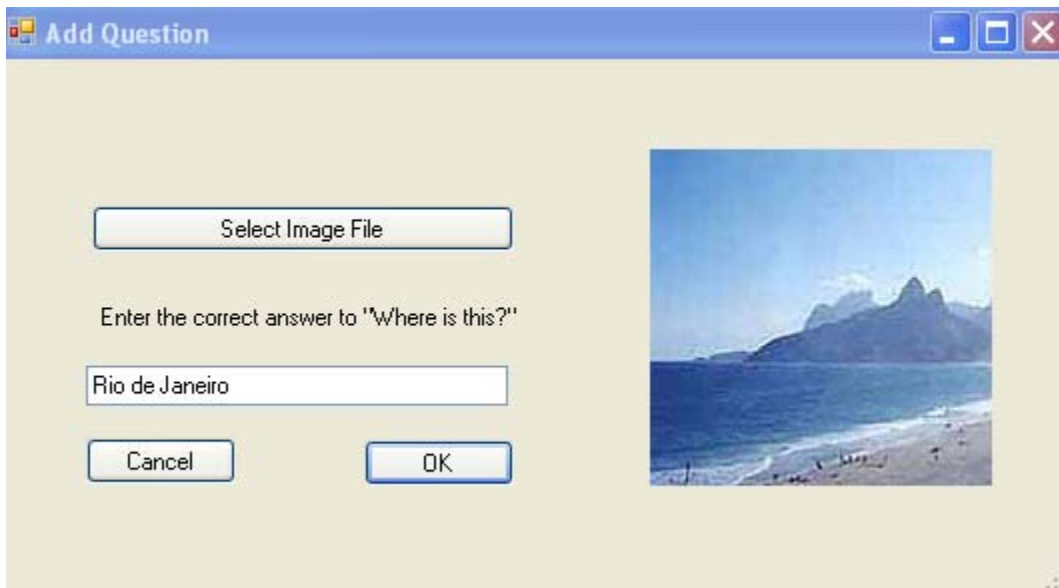


The second choice, *Edit Question*, will be implemented only by the A++ students. The first choice, *Add Question*, brings up the following dialog:



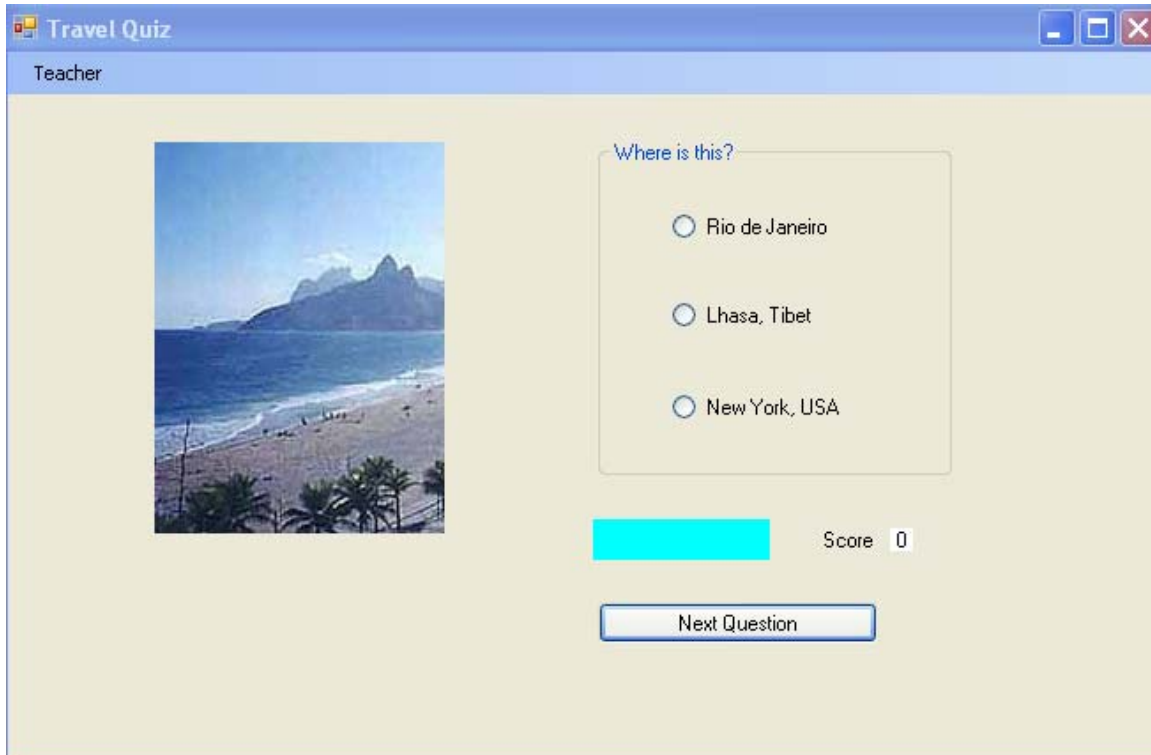
The button brings up an Open File dialog and allows the user to select an image file. The allowed file types are *.bmp and *.jpg (only).

After the image file is selected, the image is displayed as shown here:



When the OK button is pressed, there is error checking to verify that the answer textbox contains some visible characters. If not, an error provider is correctly displayed to flag the error. Similarly, you cannot close the dialog successfully without selecting an image file.

Once the file is selected and the answer is entered, you can press OK to close the dialog. The new question is now available at the end of the list of questions. You can see it by using the *Next Question* button to advance to the end of the list, as shown here.



The two wrong answers are chosen somehow from the answers to other questions. I don't care how, as long as three different answers are presented, one of which is correct. The correct answer should not always be in the same position. (In my program, I took the correct answers to the two previous questions as the wrong answers, and set the position of the correct answer to the current question number mod 3.)

Note that you don't see the new question immediately after closing the modal dialog, you have to cycle through to the end using *Next Question* in order to see the newly added question.

What to do if time is running out and you're worried about failing.

Show that you are getting the answer and filename back correctly from the dialog somehow, for example by replacing the image of the current picture with the selected image, and the first answer of the current question with the correct answer for the new question. Then you'll get credit for your dialog.

Programming hints. You don't have to follow these hints. There are many correct ways to write the required program, this is just one approach. But anyway, if you want hints, here is the start of my *Form1* class.

```
public partial class Form1 : Form
{
    int[] m_correct;
    // m_correct[i] is the number of the correct answer to question i.
    int m_whichQuestion = 0; // number of the currently visible question
    int m_nQuestions = 3;    // number of questions total
    int m_theScore = 0;
    int firstTime = 1; // use this to prevent a beep and red light when
                       // the program first starts up
    PictureBox[] m_pictures;
    // first three are the ones you create using the Toolbox
    // the rest are created when the teacher adds new pictures
    String[] m_answers; // i-th entry is the answer to the i-th question
    int maxPictures = 100;
}
```

and here are three crucial lines to use after the dialog closes successfully. You might not know to do *this.Controls.Add* since that line is usually written for you by Visual Studio, but not when you are adding a picture box dynamically like this.

```
m_pictures[m_nQuestions] = new PictureBox();
this.Controls.Add(m_pictures[m_nQuestions]);
m_pictures[m_nQuestions].Location = new System.Drawing.Point(83, 51);
```

Grading Criteria.

Your modal dialog must work in order to get to the C- level. Working includes having the specified appearance, allowing the user to select a file, showing the picture in the dialog, and getting the file name and correct answer text back into the main program; and having the Enter and Esc keys work like the OK and Cancel buttons. If you cannot achieve the desired result with that file name and text, then at least display the picture and the answer text somehow to prove that you got it back from the dialog. You do not need data validation to get a C-.

To rise to the B+ level, you must pass the following tests.

1. It looks right to begin with (no beep and cyan light).
2. Answer the first question correctly. You get a green light and score of 1.
3. Next question. Radio buttons are unchecked, picture changes, light turns cyan.
4. Answer incorrectly. Red light, beep, radio button checked, no change in score.
5. Answer correctly. Green light, no beep, radio button changes, score does not change.
6. Next question, repeat above tests. Next question, wraps around to first question.
7. Data validation works in your dialog: if you press OK without selecting a file, or without putting visible text in the answer field, you get an error provider. But you can cancel anyway.

Having achieved the B+ level, you can achieve the A level by being able to add one new question successfully. To get an A+, you must be able to add as many new questions as you want (up to 100 total questions).

Other grades will result if some of these things are achieved and others are not. For example if you can add one picture, but not all the B+ level things are working, you will get some grade that is hard to predict in advance by a rule, depending on exactly what works and what doesn't.

Should you want an A++, then implement the *Edit Question* dialog, which is just like the *Add Question* dialog, except it initializes with the data of the current question, and when it closes successfully, it replaces that question instead of adding a new one. You cannot, however, edit the first three questions, which are built-in and unchangeable.