Object-Oriented Software Development
Project 4 — Due: Thursday, March 9

Steganography refers to the process of hiding information within an obvious form of communication. Digital steganography involves the hiding of data, say a message, inside an image file or an audio file.

You will find two files, *parrots.tif* and *frank.tif*, at the ftp site for OOSD and in my public directory, slonnegr/public/oosd. The first file is a normal tiff file showing a couple of parrots. In second file *frank.tif* I have hidden a text message containing several hundred characters followed by the character '#' at its end. In hiding the message, I skipped the first 80 bytes of the tiff file, placing the bits of the message in successive bytes of the tiff file starting at the 81st byte. You can view the tiff files with the linux command *eog*. For example, *eog parrots.tif* or *eog fank.tif*.

Here is an example of how digital steganography works. Suppose we have a message with four characters (32 bits).

Message	= "Iowa"
Hex	= 49 6f 77 61
Binary	= 0100 1001 0110 1111 0111 0111 0110 0001
	= 010 010 010 110 111 101 110 111 011 000 01

Below you will see eleven pixels from inside the file *parrots.tif*. Each pixel consists of three bytes for Red, Green, and Blue, in that order. The 32 bits of the message are stored in the right-most (least significant) bit of the first 32 bytes of the eleven pixels. The bytes of the altered file are shown on the right. Those bytes that are actually changed by the coding are given with a bold hex digit.

	Original File			Altered File		
Pixel	Red	Green	Blue	Red	Green	Blue
1	56	3e	39	56	3**f**	3**8**
2	52	52	39	52	5**3**	3**8**
3	52	52	39	52	5**3**	3**8**
4	56	3e	39	5**7**	3**f**	3**8**
5	52	52	39	5**3**	5**3**	39
6	52	52	39	5**3**	52	39
7	52	52	39	5**3**	5**3**	3**8**
8	56	3e	39	57	3**f**	39
9	52	52	39	52	5**3**	39
10	52	52	39	52	52	3**8**
11	56	3e	39	56	3**f**	39

Your mission is to download the file *frank.tif* and extract the message.

Turn in listings of your program and the execution of the program. Also submit the program, which will be graded on the correctness and clarity of your code.