SPRING 2007
CSC 120.02 Introduction to Computer Science
Assignment 2
Due: February 8, 2007
Data Representation
(20 points)

Exercise 1. Start BlueJ, load a project, compile it, run the Java program, modify the code, compile and run the program again (10 points)

Step 1.1 (**optional!**) If you want to have Java and BlueJ at home, you're welcome to download them using the instruction provided separately on Angel. If you don't feel like messing with your computing system, just use the open lab.

Step 1.2. On a computer that has Java with BlueJ, locate the "picture" subfolder in the BlueJ examples directory. If the "picture" subfolder cannot be located, download picture.zip from Angel and uncompress the contents into a newly created "picture" subfolder as shown in class.
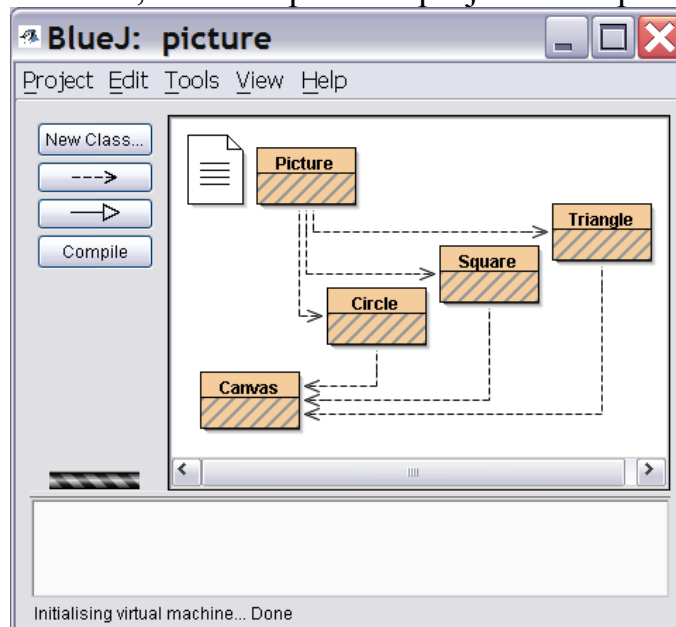
Step 1.3. Start BlueJ.
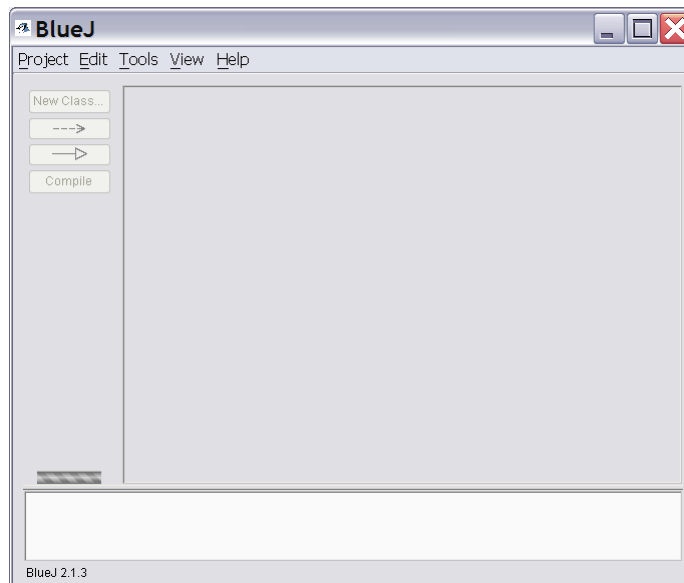
If a project shows up, instead of the empty gray field in the middle, choose "Project→Close". This may happen if you or someone else had used BlueJ on that computer before and did not close the project when exiting.
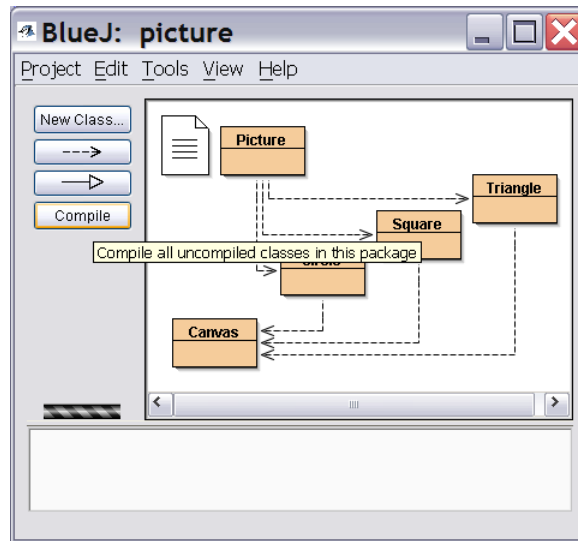
Step 1.4. Choose "Project→Open Project…", find the "picture" folder and click on it.
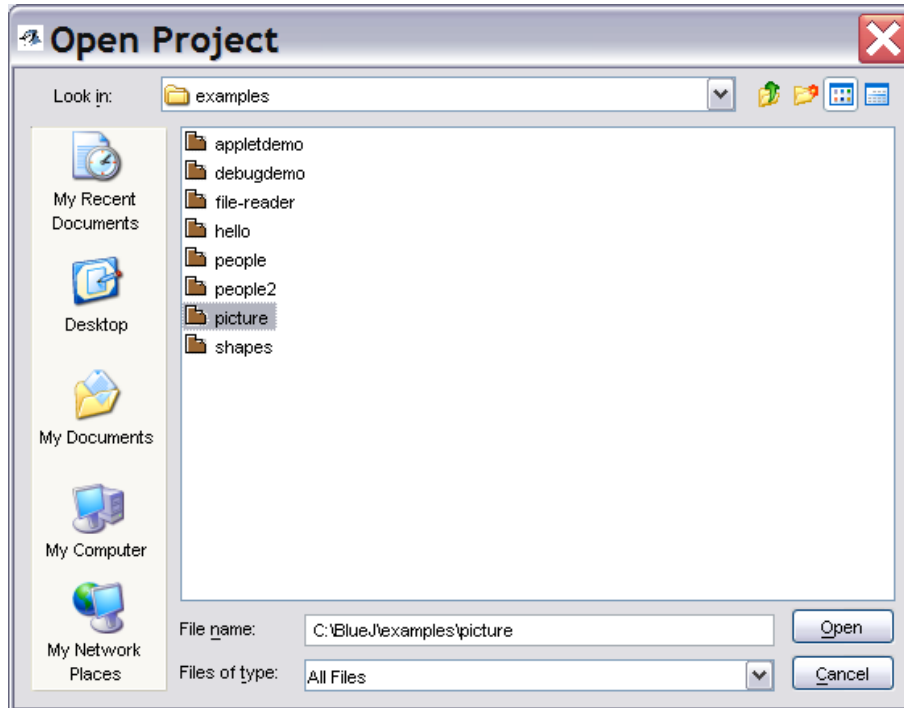
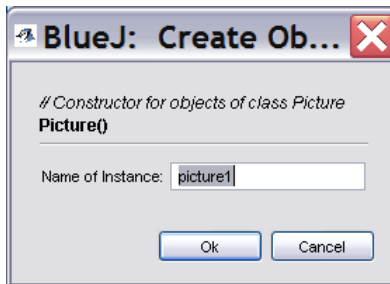Press the "Open" button, and the "picture" project will open:

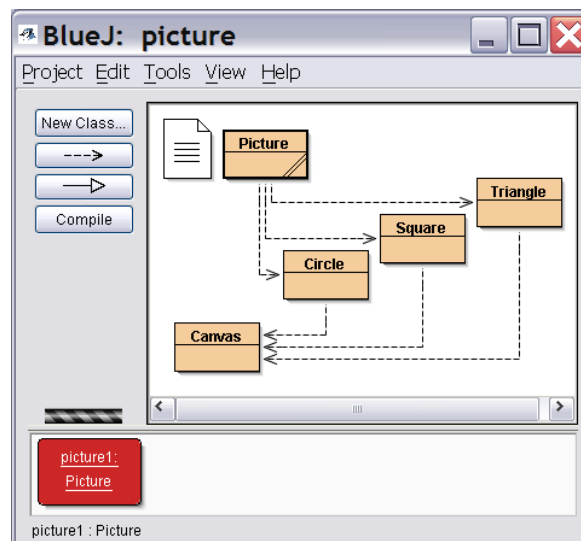Step 1.5. Press the "Compile" button.

If any classes are uncompiled at that point, they will compile.

Step 1.6. Right-click on the box named "Picture" and click on "new Picture()" in the pop-up menu.

Press "Ok". A red rectangle will appear near the bottom of the BlueJ window.

You have just created your first **object**! Its name is "picture1", and it belongs to a **class** named "Picture", so "picture1" is called an **instance** of that class. In order to create it, you **invoked** a special **method** called a **constructor**. The constructor was denoted by the words "new Picture()".

Step 1.7. Right-click on "picture1" and choose "void Draw()" from the pop-up menu. A new window will open, entitled "BlueJ Shapes Demo". In a word processor, such as MS Word, open your cover page and modify it appropriately for this assignment, then save the file under a different name, such as "Assignment_2.doc". Not exiting the word processor, get back to the "BlueJ Shapes Demo" window and capture its screenshot by pressing Alt-PrintScreen. Return to the word processor and paste the screenshot on the second page of your document. **5 points** will be awarded for having the correct screenshot in the printout that you will turn in.

Step 1.8. Close the "BlueJ Shapes Demo" window and return to the main project window. Right-click on "picture1" and choose "Remove" in the pop-up window.

Step 1.9. Right-click on "Picture" and choose "Open Editor" in the pop-up menu. In the source code of class Picture, find the part that is responsible for drawing the picture. Change it so that the sun will be black. (If the sun is already black, change its color to yellow.) In the editor window, click on the "Compile" button. If the class no longer compiles correctly, change the code again, until it does. Then close the editor.

Step 1.10. Create a new object of call Picture, right-click on it and invoke "void Draw()". Capture the screenshot with the black sun and paste it into your word processor document. **5 points** will be awarded for having a correct screenshot of the "BlueJ Shapes Demo" window with a black sun in your printout for this assignment. Change the code again so that the sun is yellow.

Step 1.11. Remove all objects. Choose "Project→Close". Exit BlueJ.

Exercise 2 (1 point). Convert 572_8 from octal to binary.

Exercise 3 (1 point). Convert 1010100_2 from Base 2 to Base 8.

Exercise 4 (1 point). Convert $1DC_{16}$ from Base 16 to Base 2.

Exercise 5 (1 point). Convert 100101010_2 from binary to hexadecimal.

Exercise 6 (1 point). Convert 1670_{10} from Base 10 to hexadecimal.

Exercise 7 (1 point). Having 8 bits available for the magnitude and one extra bit at the beginning for the sign, convert -131_{10} to the signed-magnitude binary representation such that the positive sign is represented by a '0' and the negative sign is represented by a '1' preceding the rest of the representation.

Exercise 8 (1 point). Compute Negative(423_{10}) in the Ten's Complement representation such that k=4 is the number of decimal digits used.

Exercise 9 (1 point). Compute Negative(1101010_2) in the Two's Complement representation such that k=8 is the number of bits used.

Exercise 10 (1 point). Write 6,965,910 in the scientific notation using an "E", as described on p. 66 of the textbook.

Exercise 11 (1 point). Convert 25.125_{10} from decimal to binary.