Introduction to Java

Computer Programming

Programming is a process to construct an instruction for a computer system to perform a particular task. To construct an instruction, a computer programming language which can be understandable by human must be used. In order for the computer system to understand an instruction that we give there are two steps involved.

1. A translator known as "**compiler**" is used to translate a human readable language (programming language) into an intermediate language, binary format (1 and 0).
2. A program for a specific programming language is then used to translate this intermediate language into a machine language depending on type of operating system such as Windows, Mac, Linux, i.e.,. so that it can be run on that particular OS.

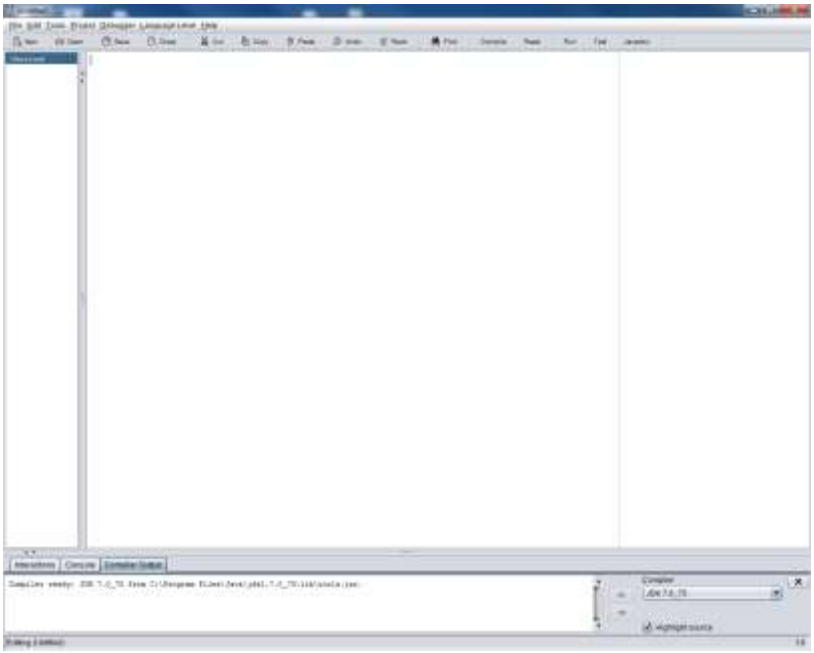
Java Programming Language

Java is a programming language that is suitable for any system and internet application. It is known as an **object-oriented programming (OOP)** (OOP will be covered at later class). Java is developed by a team lead by James Gosling at Sun Microsystems in 1991 which is now owned by Oracle Corporation. To translate Java language into a machine language, the two translation steps mentioned above are also involved.

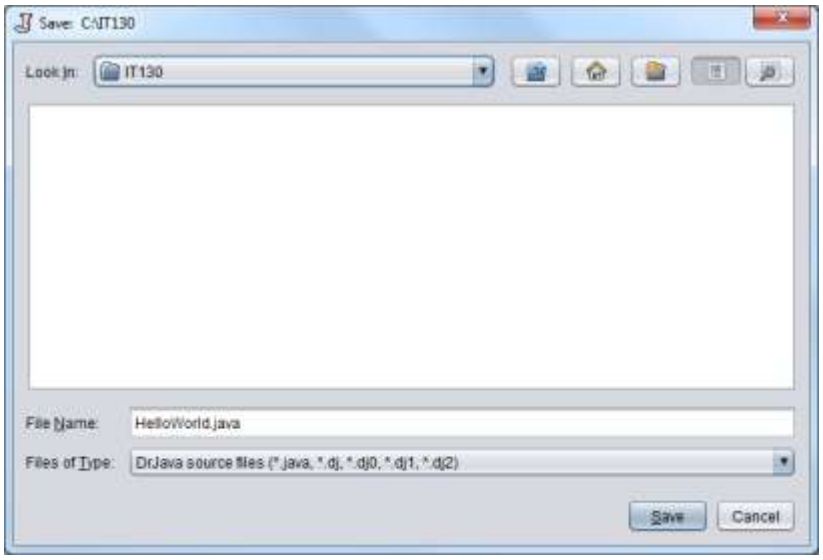
1. **Java Editor** (We use a tool called Dr Java) to write our Java code.
2. **Java Development Kit (JDK)**, a Java Compiler, is used to translate Java code into an intermediate language known as Java byte-code.
3. **Java Virtual Machine (JVM)**, Java Runtime Environment, is then used to translate Java byte-code into a machine language that can be executed. JVM can be installed on any type of operating system which makes Java powerful in terms of **"Write once, Run anywhere"**. In fact, JVM is now part of default software installed on any computer. You won't need to install JVM manually unlike JDK.

First Java Program

1. Open Dr.Java Editor installed on your computer



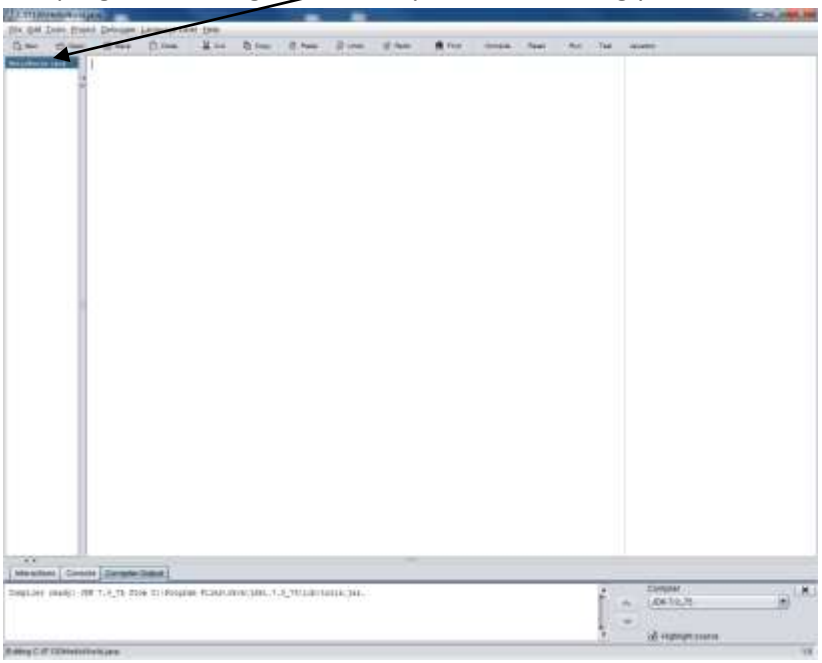
2. Create a Java File by clicking File → Save As. Save dialog box appears.



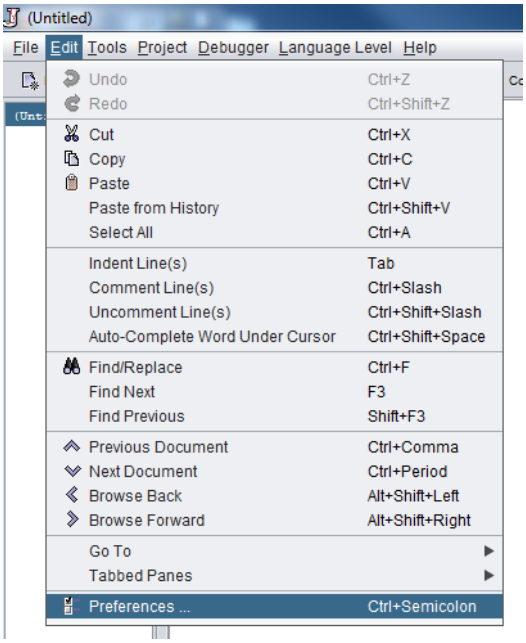
3. Name your Java File in the File Name box by following the requirements below.
    a. Name of the file must NOT contain any space
    b. Name of the file must end with an extension .java
    c. First letter of each word of your file name should be capitalized.
    d. Your file name must not begin with a number or symbol.

    For example: Hello.java, HelloWorld.java, MyFirstJavaProgram.java
4. Browse to a location where you would like to save the file and click Save.

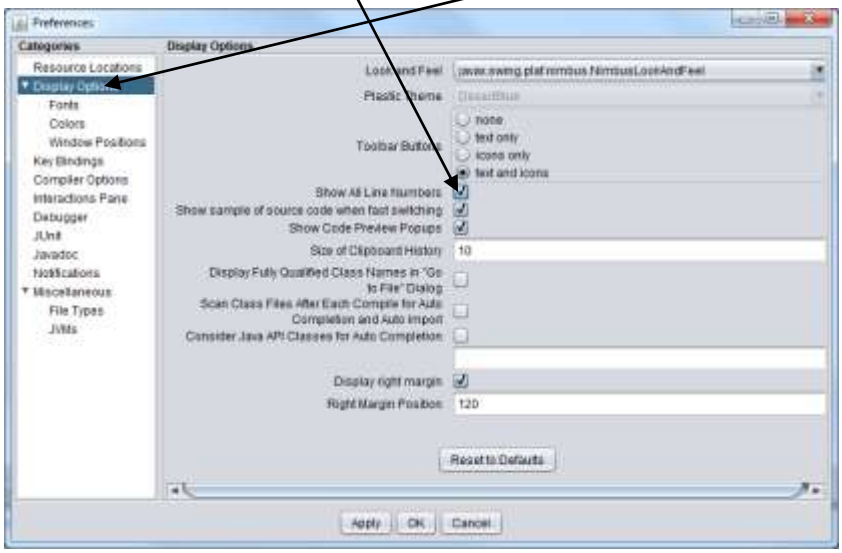
5. On Dr.Java should now show your Java File on the left panel. On the right panel, it is your Java program working area where you will be writing your Java code.



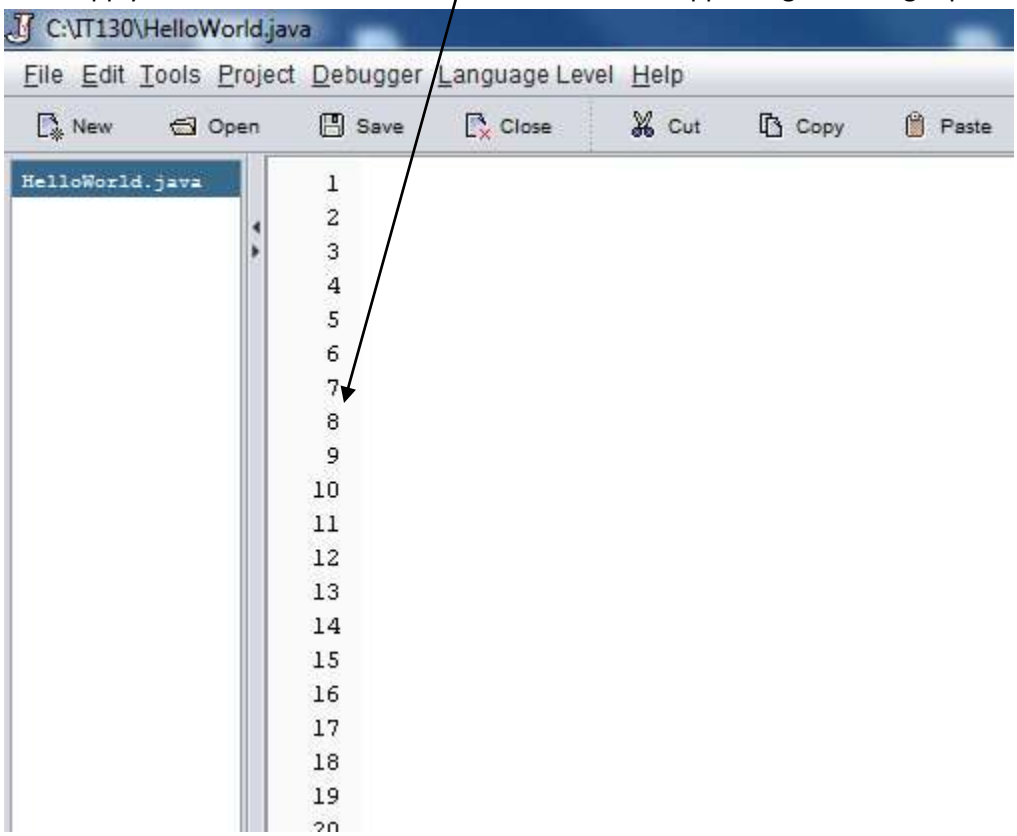
6. Let's make line numbers appeared on the right panel, so we can look at our Java code easier. Select Edit → Preferences on the menu bar like shown below.



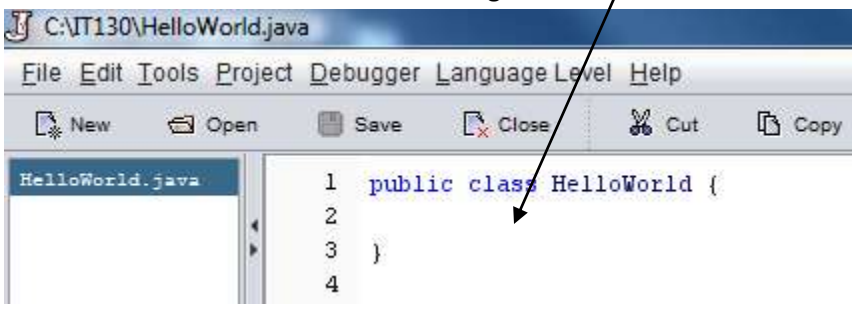
Preferences dialog box should appear now. Select “Display Options” on the Categories list and check on “Show All Line Numbers”.



Click “Apply” and “OK” buttons. Line numbers should be appearing on the right panel now.



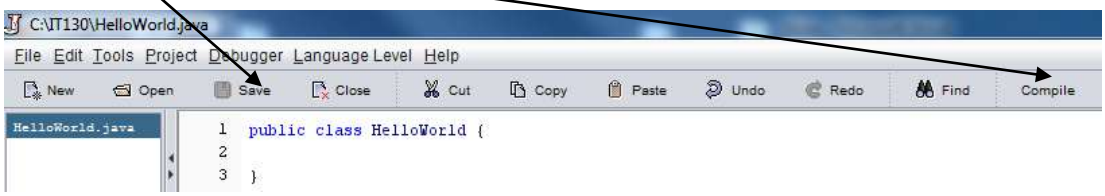
7. Let's begin writing our first Java program. On the right panel, create a Java Class as shown below. Be sure to spell everything exactly as shown. Java is a **case-sensitive language** which means "A" and "a" are two different things.



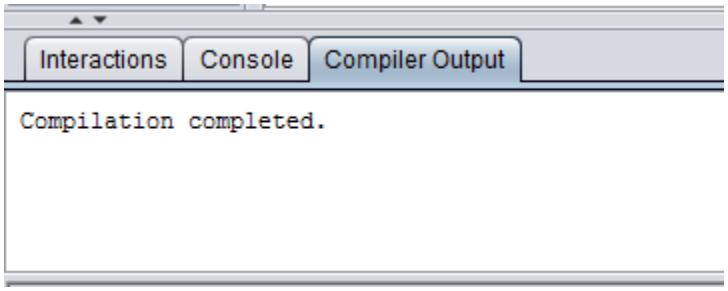
Note: A **Java Class** is a blueprint of a Java program or application where you will be writing Java codes in.

   a. A Java Class begins by two Java keywords public and class.
   b. After the keyword class, the name of your Java file without .java is followed.
   c. The open curly bracket, {, indicates that HelloWorld class begins here.
   d. The closed curly bracket, }, indicates that HelloWorld class ends here. There should be no Java code outside this closed curly bracket.

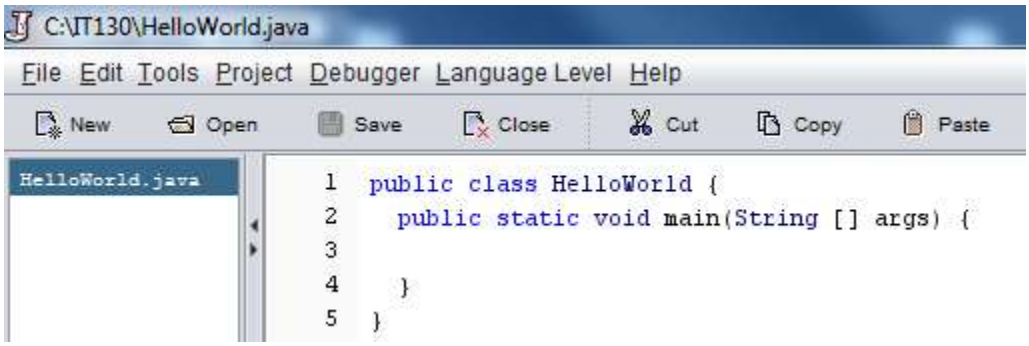
8. Click Save and Compile buttons to check whether your codes for class creation are correct or not.



Note: The "Compile" button is used to translate/convert your Java code into Java byte-code using JDK that you have installed on your computer system so that I can be translated into a machine language by JVM and be executed by your computer system. If your Java codes are all correct, Dr.Java should display a successful message, "Compilation completed" at the bottom panel. If there is something wrong with your Java codes, you will see error messages instead. You will then need to fix the error by editing your Java codes before you can move on to the next step.



9. Edit your Java codes by adding a Java main method to the Java Class as shown below.



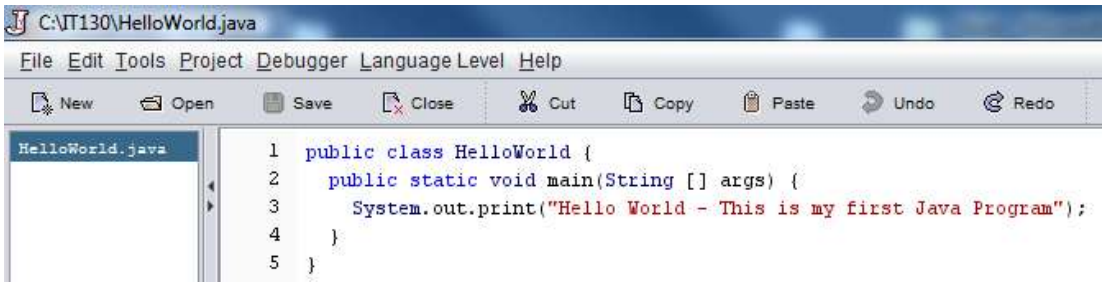
Note: **Java main method** indicates to JVM that this is where the computer system needs to begin executing the codes and starts performing the tasks you specify.

   a. For now, just memorize the structure a Java main method. We will get to the meaning of each keyword when the class moves along.
   b. The open curly bracket, {, indicates that task begins here.
   c. The closed curly bracket, }, indicates that task ends here.
   d. The main method must be inside the Java class. Notice, Java class begins at line 1 and ends at line 5.

10. Click "Save" and "Compile" buttons to check correctness of your Java Code. If error messages are shown, you will again need to fix it before going to the next step. If you get the message "Compilation completed.", you have just then finished setting up your Java working area and it is now ready for writing Java codes to perform tasks**.**

A task, we are going to include in this HelloWorld java program, is to add a Java statement so that it will display a message (output) when the Java program is executed.

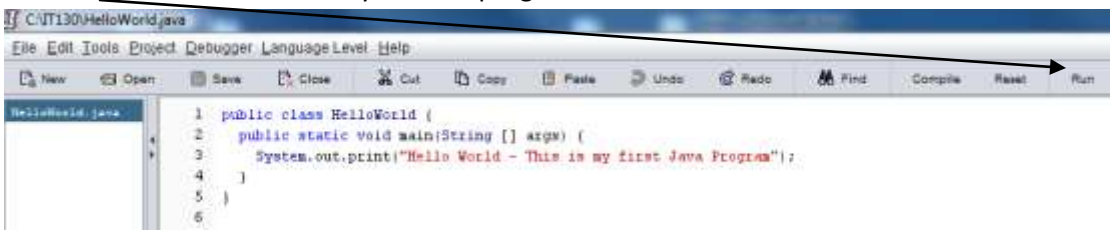
1. Add the following Java statement inside the main method as shown below. Again, be sure to make the spelling as exactly as shown.



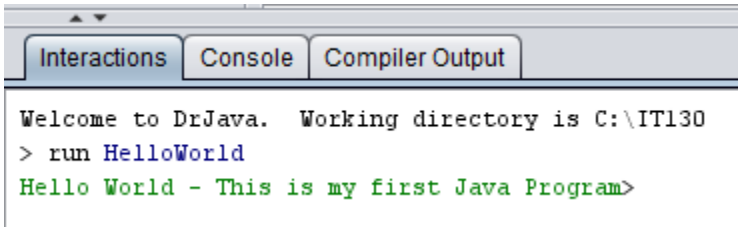
Note: **System.out.print** are a way of saying "output what is shown in parentheses."

2. Click "Save" and "Compile" buttons to check correctness of your Java code. If there is no error, then continue to the next step.

3. Click “Run” button to execute your Java program.



Your program should now display the message “"Hello World - This is my first Java Program" on the output panel at the bottom of Dr.Java as shown below.



NOTE: Three kinds of possible errors when writing a program are:

1. Compile Time Error – This error occurs when your statement contains an incorrect syntax.

2. Runtime Error – This error occurs while the program is running that could cause the system to stop the program’s execution.

3. Logic Error – This error occurs when your statement produces unintended or incorrect output or behavior.