Recap to previous lecture!

- What is a Compiler?
- What is a Main function?
- What is a String, and String concatenation?
- Different types of programming errors?
package welcomejava;

public class WelcomeJava {
    public static void main(String[] args) {
        // TODO code application logic here
        System.out.println("Welcome to Java !");
    }
}

run:
Welcome to Java !
BUILD SUCCESSFUL (total time: 1 second)
Prepare netbeans

Required installations:
JDK 8: http://www.oracle.com/technetwork/java/javase/downloads/index.html
For more information: https://netbeans.org/community/releases/81/install.html

Check netbeans:
1- From File select new project.
2- under java, select java application, then select next.
3- enter project name and location.
4- check create main class also check set as main project.
5- click finish.

New empty project is created with main function, then:
6- Click the hammer icon in the tool bar to build the main project.
7- Click the Green Arrow to run the project, Output should be at the bottom of the screen.
Lecture 03, Java vars and data-types

• What is java variable?
• What are the primitive data-types supported?
Java Variables!

- Lets try to solve a small problem, assume we want to develop a program that calculates and prints the area of a rectangle!

1- The problem is to calculate: Area = length * width
2- Our algorithm will be like:

   We have the Length, say 10

   We have the Width, say 5

   Calculate Area, Length * Width

   Print the Area on console

3- Translate this algorithm to java.
• These are user defined symbols (known as variables), to store some values in computer’s memory.

• Variables also provide a way of labeling data with a descriptive name, so programmers can understand more clearly the code.

• Think of variable as a container that holds information (data) to be manipulated in a program and be further used throughout your program.

• The data inside this container can be changed during the program lifetime, and the variable still refers to this container.
• In machine language, data can only be referred to by giving the numerical address of the location in memory where it is stored.

• In a high-level language such as Java, names are used instead to refer to data.

• It is the job of the computer to keep track of where in memory the data is actually stored; the programmer only has to remember the name.
• As these are user-defined variables, we need to let the compiler know what are these variables.

• Defining variable is in terms of its data types, the kind of data stored in the variable, whether character, real number, or something else.

• This process is known as “declaring variables”. 
• Java offers a large set of primitive data types.

• For sake of this example, we need to declare length, width and area as numbers (with no decimal point).

• Java uses the keyword “int”, to declare a no-decimal number variable.

```java
public static void main(String[] args) {
    // TODO code application logic here
    int length;   // Declare radius
    int width;    // Declare radius
    int Area;     // Declare area
```
• To keep the example simple, we will not ask the user to give us values for length and width to calculate the area.

• Thus we will “assign” values to these variables. Assignment is to place value to variable.
length = 10;  // assign value to length to be 10
width = 5;   // assign value to width to be 5
Area = length * width;  // Calculate the value of area
• Placing everything together and display the area:

```java
public class WelcomeJava {
    public static void main(String[] args) {
        int length;  // Declare radius
        int width;   // Declare radius
        int Area;    // Declare area

        length = 10;  // assign value to length to be 10
        width = 5;    // assign value to width to be 5

        Area = length * width;  // Calculate the value of area

        System.out.println("The area for the rectangle is ");
        System.out.println(Area);
    }
}
```
In summary, Java variables are statically typed, that means datatype must be declared before the variable can be used.

Variable has name, store data with specific type

Length 10 int
Try to guess the output

```java
Int variable1;
Variable1 = 100;
System.out.println("variable1 value is :" + variable1);

Variable1= 200;
System.out.println("variable1 value now is :" + variable1);

Variable1 = 100 * 3;
System.out.println("variable1 value now is :" + variable1);
```
Try to guess the output

```java
Int variable2 = 500;
System.out.println("variable2 value now is :" + variable2);

Int variable3;
System.out.println("variable3 value now is :" + variable3);

System.out.println("variable4 value now is :" + variable4);
```
Try to guess the output

```java
Int variable5 = 3;
Int variable6 = 2;
Int variable7;
variable7 = variable5 + variable6 + 8;

System.out.println("variable7 value now is :" + variable7);
```
Try to guess the output

Int Variable8 = 3;

Variable8 = Variable8 + 7;

System.out.println("variable8 value now is :") + Variable8);
Primitives datatypes

<table>
<thead>
<tr>
<th>Name</th>
<th>Range</th>
<th>Storage Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>byte</td>
<td>$-2^7$ to $2^7 - 1$ ($-128$ to $127$)</td>
<td>8-bit signed</td>
</tr>
<tr>
<td>short</td>
<td>$-2^{15}$ to $2^{15} - 1$ ($-32768$ to $32767$)</td>
<td>16-bit signed</td>
</tr>
<tr>
<td>int</td>
<td>$-2^{31}$ to $2^{31} - 1$ ($-2147483648$ to $2147483647$)</td>
<td>32-bit signed</td>
</tr>
<tr>
<td>long</td>
<td>$-2^{63}$ to $2^{63} - 1$</td>
<td>64-bit signed</td>
</tr>
<tr>
<td></td>
<td>(i.e., $-9223372036854775808$ to $9223372036854775807$)</td>
<td></td>
</tr>
<tr>
<td>float</td>
<td>Negative range: $-3.4028235E + 38$ to $-1.4E - 45$</td>
<td>32-bit IEEE 754</td>
</tr>
<tr>
<td></td>
<td>Positive range: $1.4E - 45$ to $3.4028235E + 38$</td>
<td></td>
</tr>
<tr>
<td>double</td>
<td>Negative range: $-1.7976931348623157E + 308$ to $-4.9E - 324$</td>
<td>64-bit IEEE 754</td>
</tr>
<tr>
<td></td>
<td>Positive range: $4.9E - 324$ to $1.7976931348623157E + 308$</td>
<td></td>
</tr>
</tbody>
</table>

**Boolean** (logical value): has value true or false  
  e.g. boolean x = true;

**Char** (character): is a 16-bit Unicode representation of a symbol  
  e.g. char d = ‘e’;
example

• boolean result = true;
• char capitalC = 'C';
• byte b = 100;
• short s = 10000;
• int i = 100000;
• double d1 = 123.4;
• float f1 = 123.4f;
Variables Names

• According to the syntax rules of Java, a name is a sequence of one or more characters.
• It must begin with a letter or underscore and must consist entirely of letters, digits, and underscores:

  E.g.  
  
  | N | _n | x15 | Long_name | Helloworld |

• No spaces are allowed in identifiers:
  E.g. HelloWorld is a legal, but “Hello World” is Not.
Try this out!

• Calculate the perimeter of a rectangle: \(2(\text{Length} + \text{Width})\)

• Calculate the area of a circle: \(\text{Radius} \times \text{Radius} \times \pi\)

• Total number of balls in bucket; you have 4 red, 5 green and 3 blue balls