JAVA PROGRAMMING LAB

(MCA 4262)

Rules & Regulations

- Seating Arrangements
- Login Book Entry
- Mobiles in Class & Lab – Switch off mode.
- Lab Attendance- 75%
  - Totally 12 Labs including Final Lab exam.

Rules & Regulations

- Managing missing Lab.
    - Work extra time to complete the exercises and submit Lab Records.
    - Inform faculty well before –Personally/ email regarding Absence.

Lab Evaluation

- **Total Internal Evaluation – 60 Marks**
  - Programming Tests(midterm): = 20 marks
  - Write-up (Record Book): 6+6=12 marks
  - Program Execution check: 7+7=14 marks
  - Quiz : 7+7=14 marks

Lab End Semester Exam – 40 Marks

References

1. Herbert Schildt, *Java The Complete Reference*, 11th Edition, McGraw Hill, 2019.

2. Cay S. Horstmann. *Core Java: Volume I - Fundamentals*. 11th Edition, Pearson Education, 2018.

3. Cay S.Horstmann, *Core Java: Volume II – Advanced Features*, 11th Edition, Pearson Education, 2019.

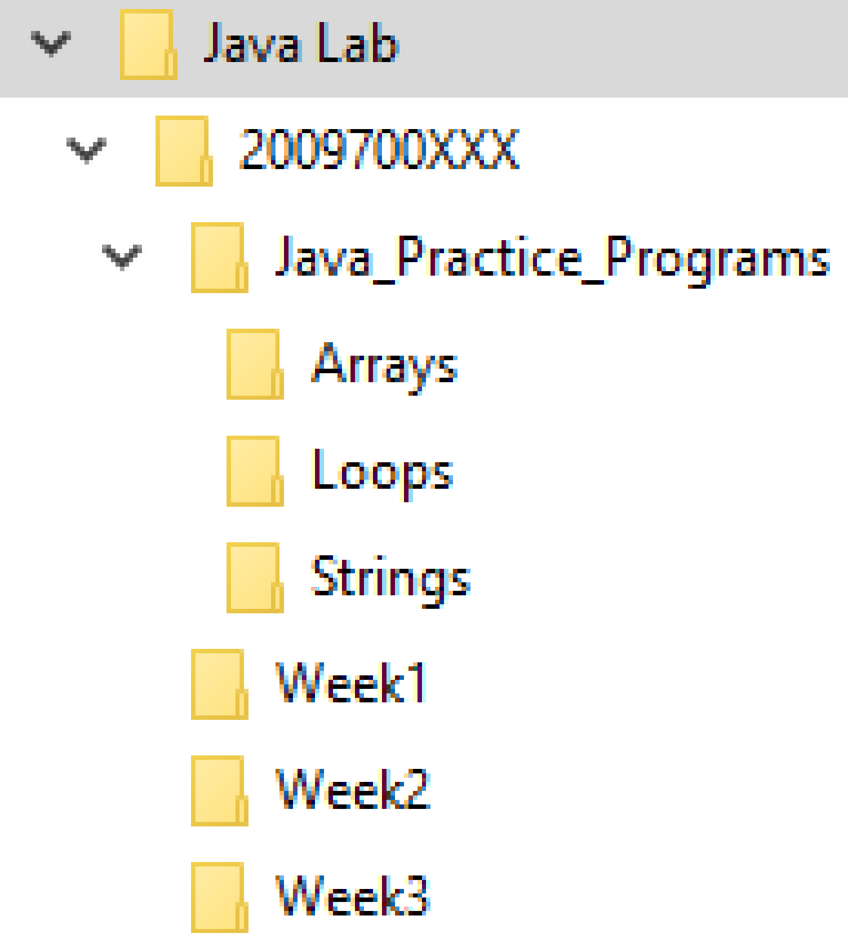
4. Herbert Schildt and Dale Skrien, *Java Fundamentals*, Tata McGraw-Hill Education, 2015.

Course Outcomes

1. Developing Java Applications based on basic programming concepts.
2. Understand the object oriented concepts of java.
3. Implement programs with other object oriented concepts such as – Inheritance, multithreading.
4. Read/Write using Java streams and error handling
5. Design GUI components with the Java Swings

Saving Your Programs

Create folder with your Registration Number in D:\

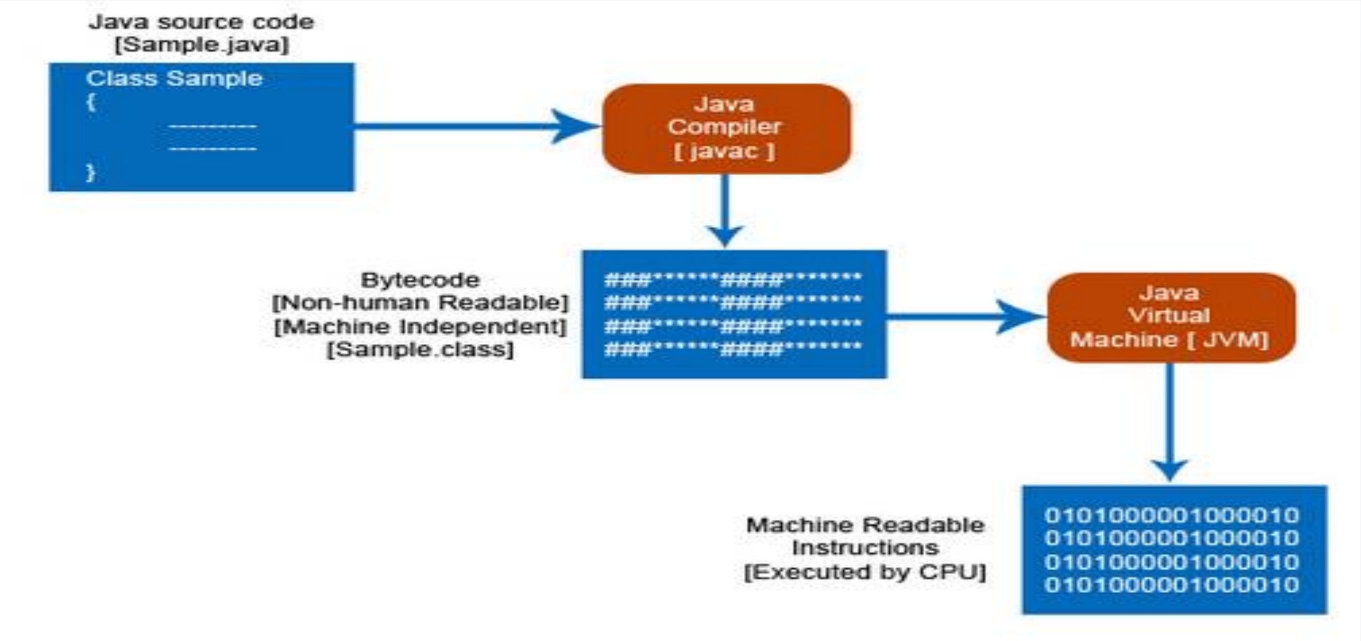


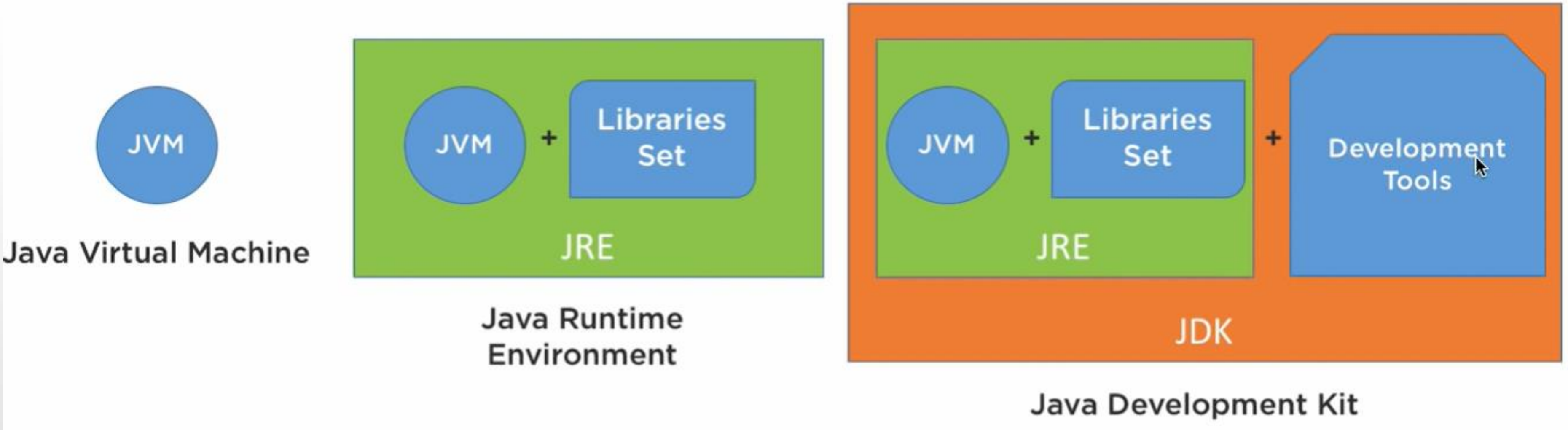
```
Java Lab
  2009700XXX
    Java_Practice_Programs
      Arrays
      Loops
      Strings
    Week1
    Week2
    Week3
```

JAVA

- **Features of Java**
  - Object Oriented Language
  - Platform-independent (Architecture-Neutral) and Portable
  - Robust and Secure
  - Multi-threaded

- **Program Life Cycle**





JVM

Java Virtual Machine

JVM + Libraries Set

JRE

Java Runtime Environment

JVM + Libraries Set

JRE

+ Development Tools

JDK

Java Development Kit

Java Development Kit (JDK)

Java Runtime Environment (JRE)

Java Virtual Machine (JVM)

Jre = jvm + library classes

Jdk = jre + development tools

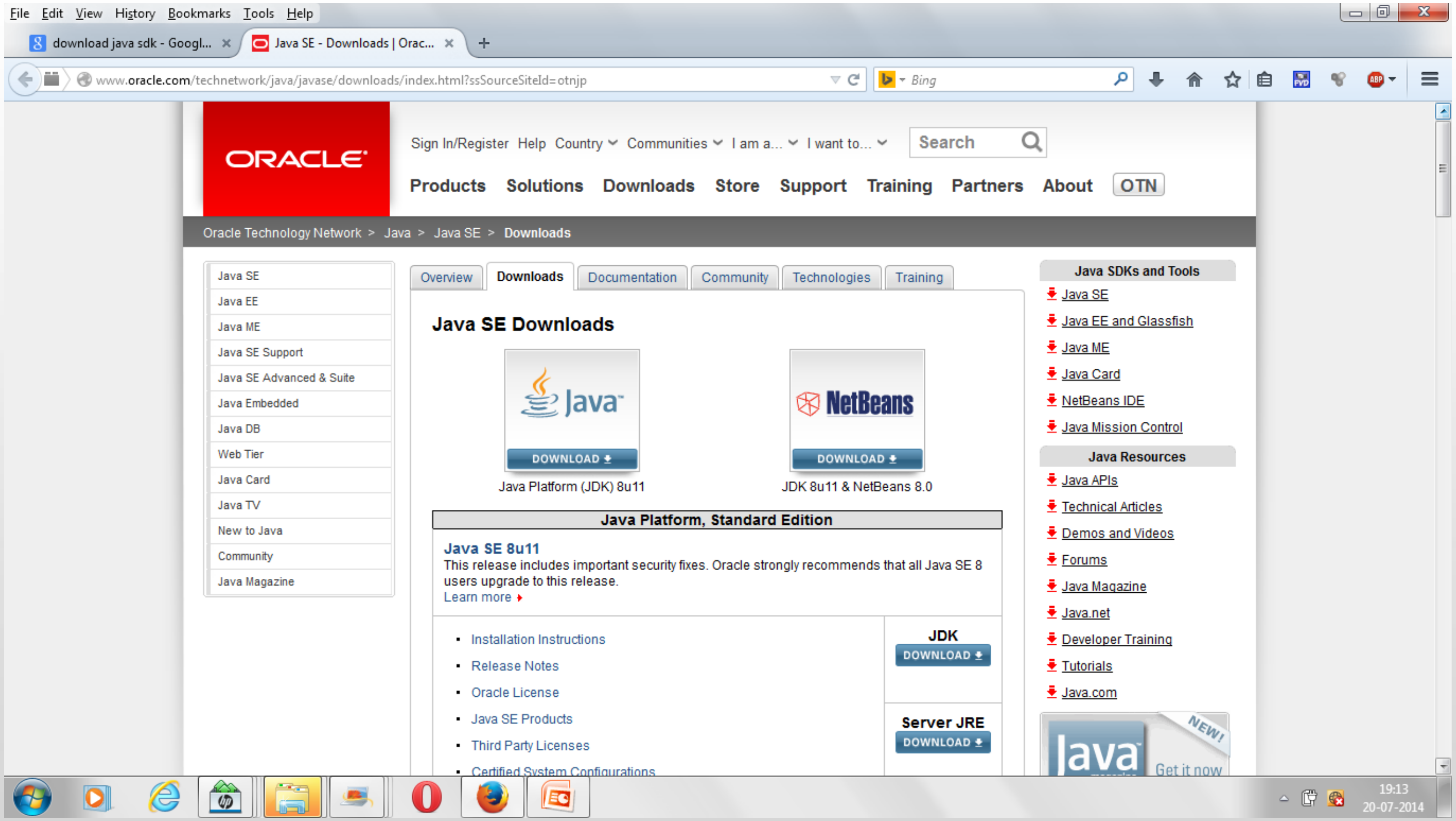
Example 1

```
class Example
 {
        public static void main(String  args[] )
        {
                  System.out.println (“Hello Welcome");
         }
 }
```

Note : String, System

class name is same as file name with the extension .java

Downloading and installing JDK



Java SE Downloads

Java Platform (JDK) 8u11

JDK 8u11 & NetBeans 8.0

Java Platform, Standard Edition

Java SE 8u11

This release includes important security fixes. Oracle strongly recommends that all Java SE 8 users upgrade to this release.

Learn more

- Installation Instructions
- Release Notes
- Oracle License
- Java SE Products
- Third Party Licenses
- Certified System Configurations

JDK

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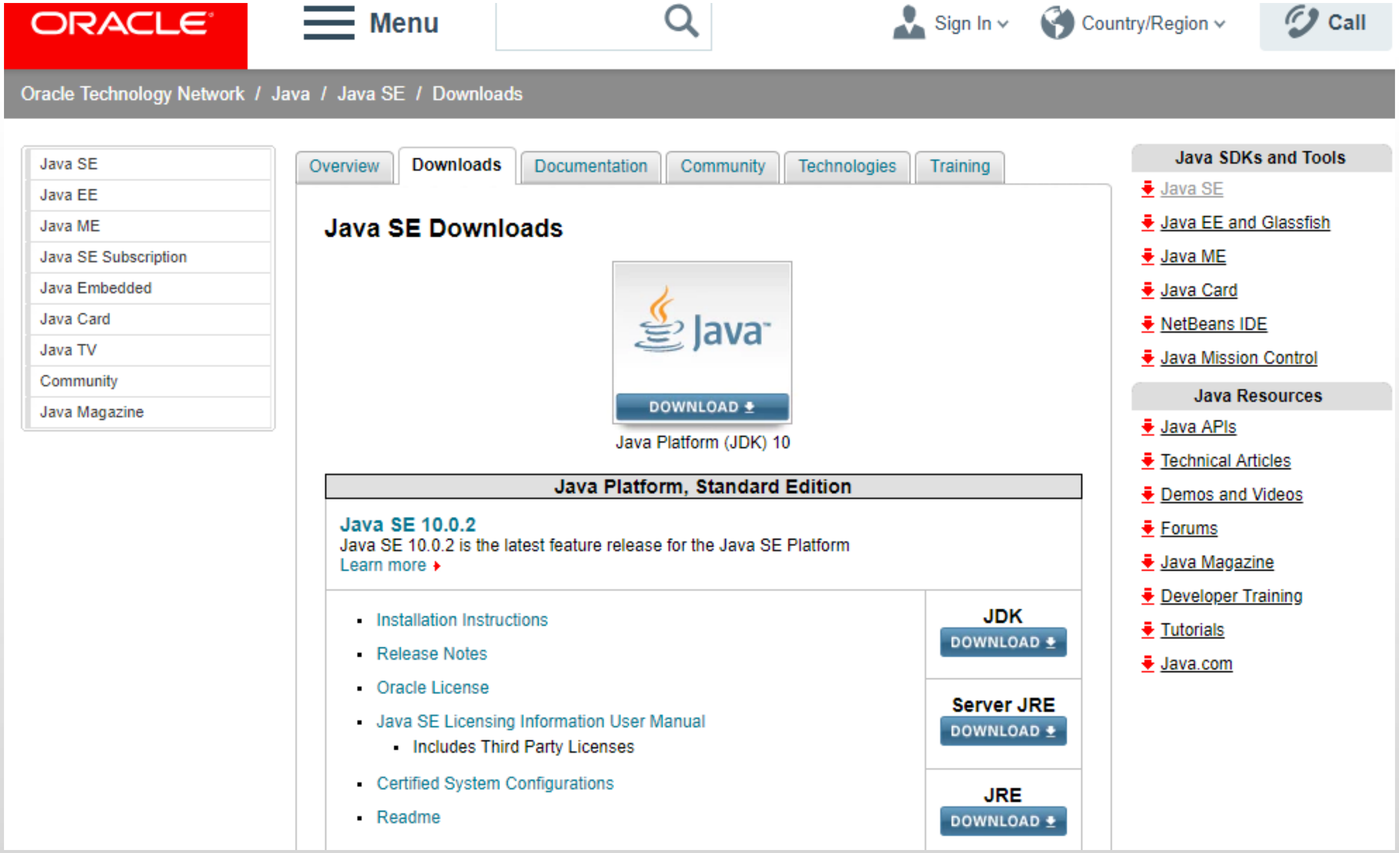
Server JRE

DOWNLOAD

Downloading and installing JDK



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Java SDKs and Tools

- Java SE
- Java EE and Glassfish
- Java ME
- Java Card
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- Java Mission Control

Java Resources

- Java APIs
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- Forums
- Java Magazine
- Developer Training
- Tutorials
- Java.com

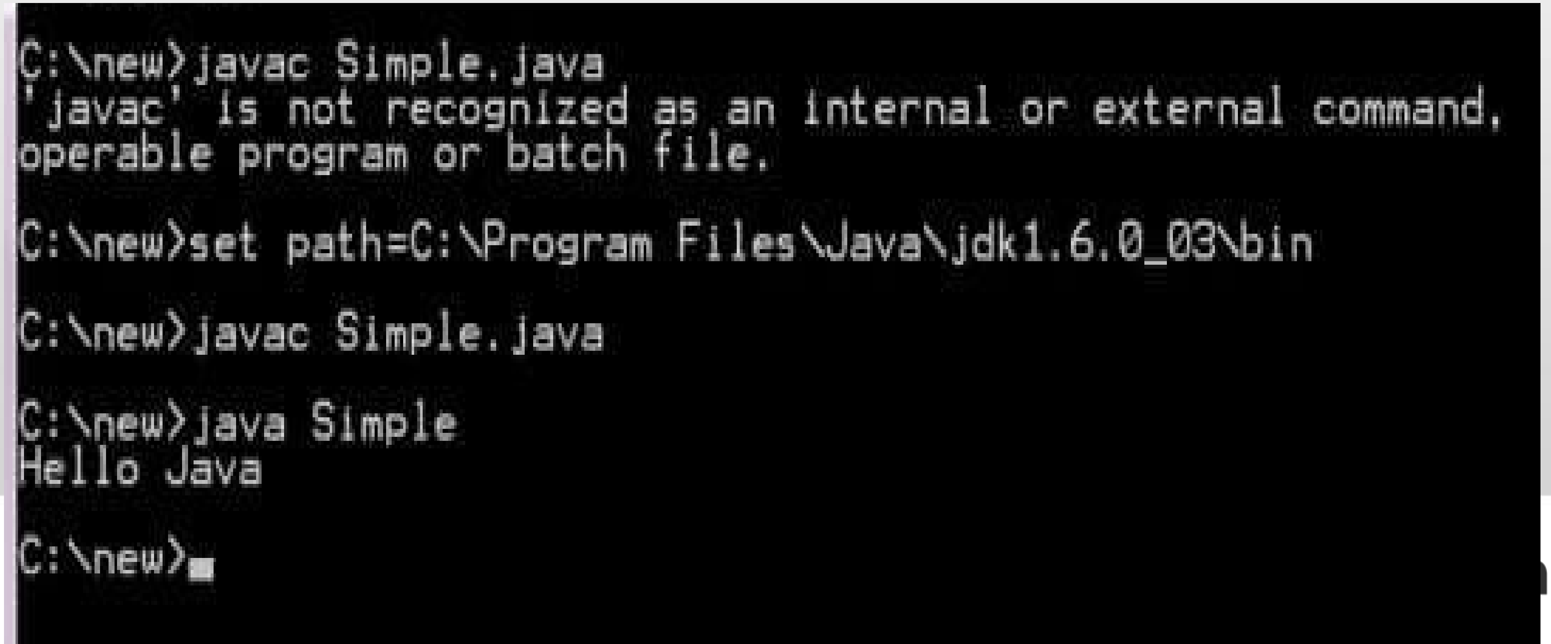
How to set path in Java

The path is required to be set for using tools such as javac, java, etc.

How to set the Temporary Path of JDK in Windows

- Open the command prompt
- Copy the path of the JDK/bin directory
- Write in command prompt: set path=copied_path

- For Example:
  - **set path=C:\Program Files\Java\jdk1.6.0_23\bin**



```
C:\new>javac Simple.java
'javac' is not recognized as an internal or external command,
operable program or batch file.

C:\new>set path=C:\Program Files\Java\jdk1.6.0_03\bin

C:\new>javac Simple.java

C:\new>java Simple
Hello Java

C:\new>
```

2) How to set Permanent Path of JDK in Windows

For setting the **permanent path** of JDK, you need to follow these steps:

Go to My Computer properties →advanced tab

→ environment variables

→ new tab of user variable

→ Edit the path variable

→ write path of bin folder in variable value

→ ok → ok → ok

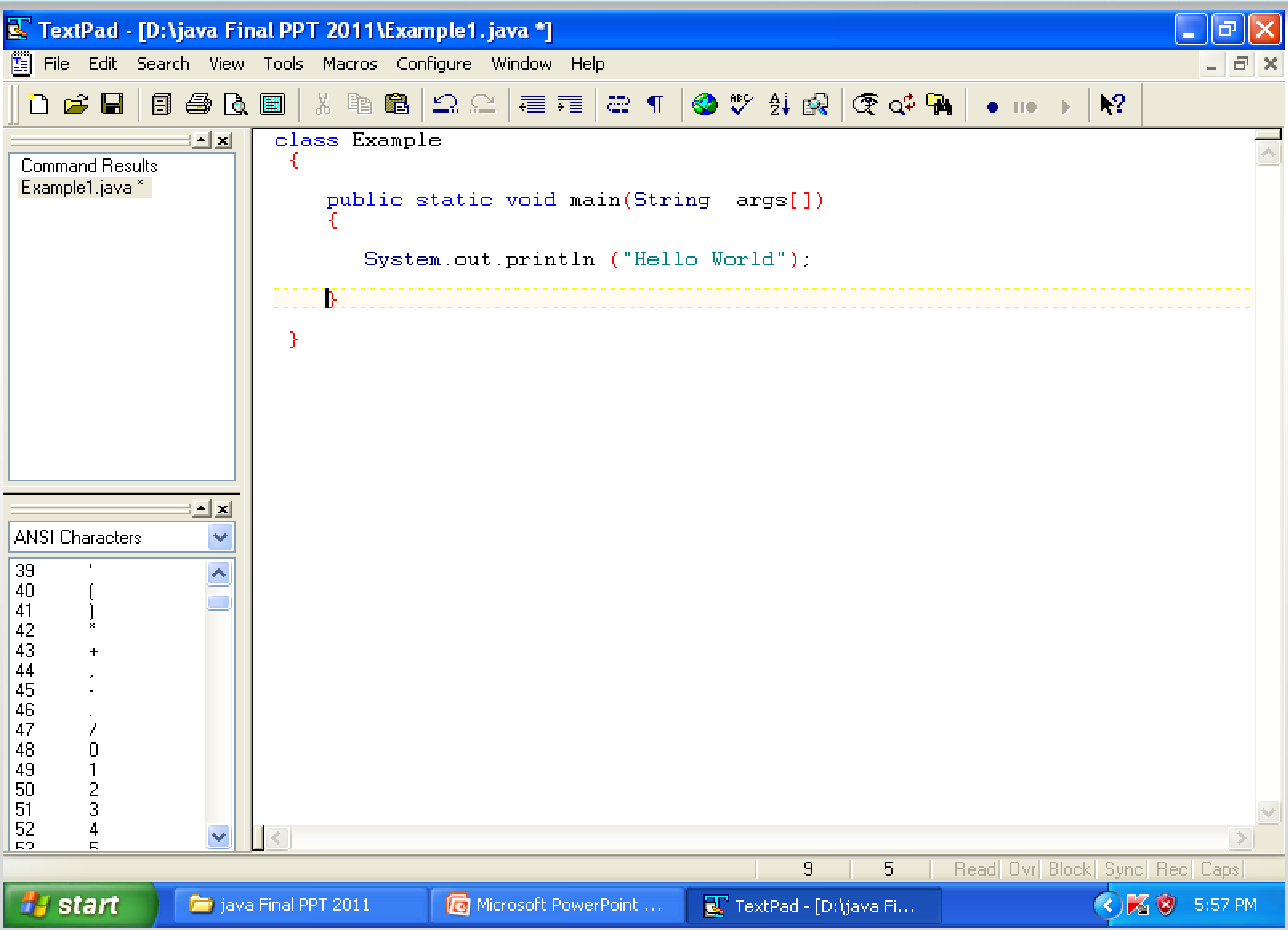
Now your permanent path is set.

You can now **execute any program of java from any drive**.

Compiling & Executing Java Program

```
C:\ >jdk1.8\bin\     edit Example.java


C:\ >jdk1.8\bin\      javac Example.java


C:\ > jdk1.8\bin\      java Example
          Hello World
```

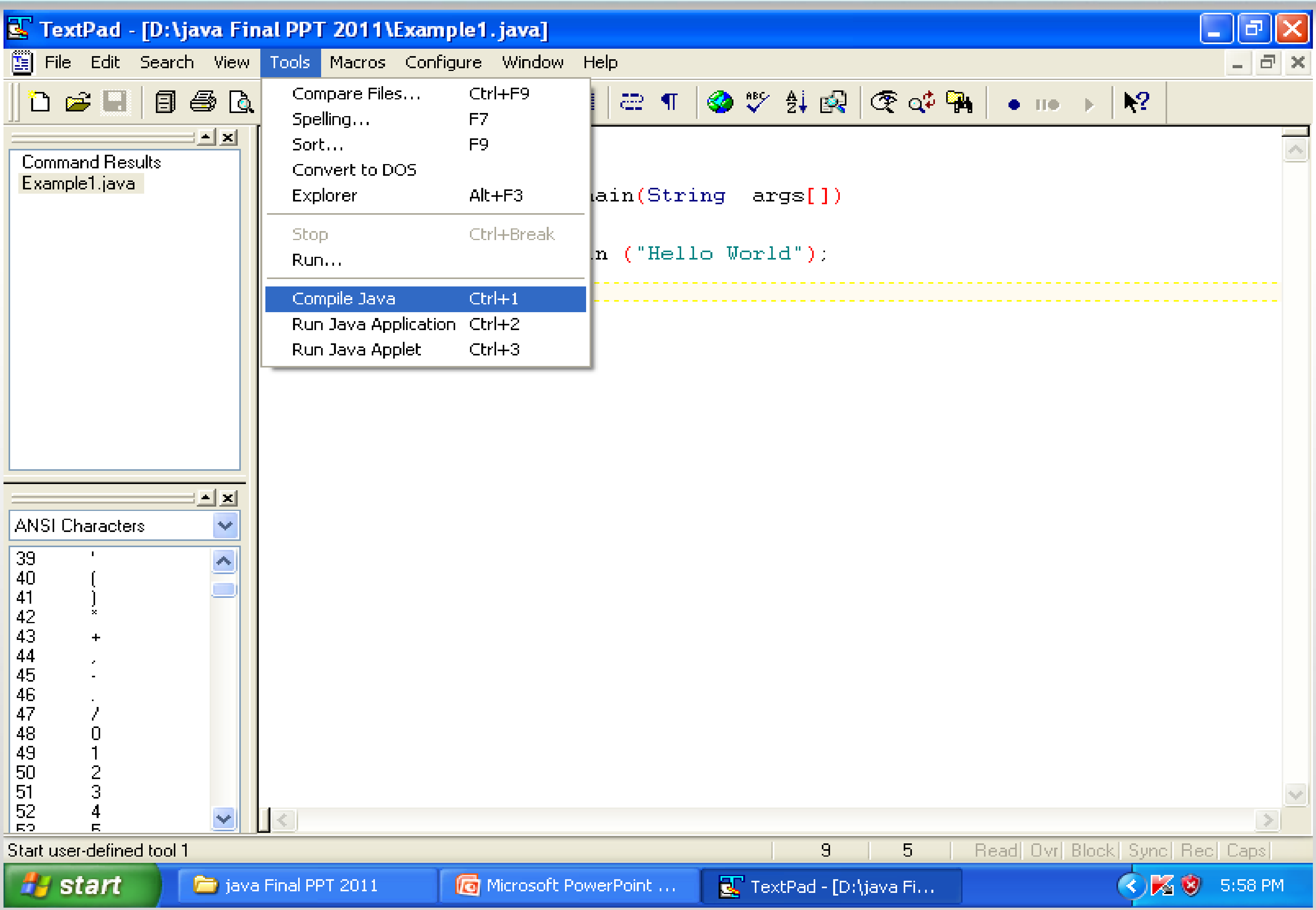
Using TextPad



TextPad - [D:\java Final PPT 2011\Example1.java *]
File Edit Search View Tools Macros Configure Window Help
Command Results
Example1.java *
ANSI Characters
9
5
Read Ovr Block Sync Rec Caps
start
java Final PPT 2011
Microsoft PowerPoint ...
TextPad - [D:\java Fi...
5:57 PM

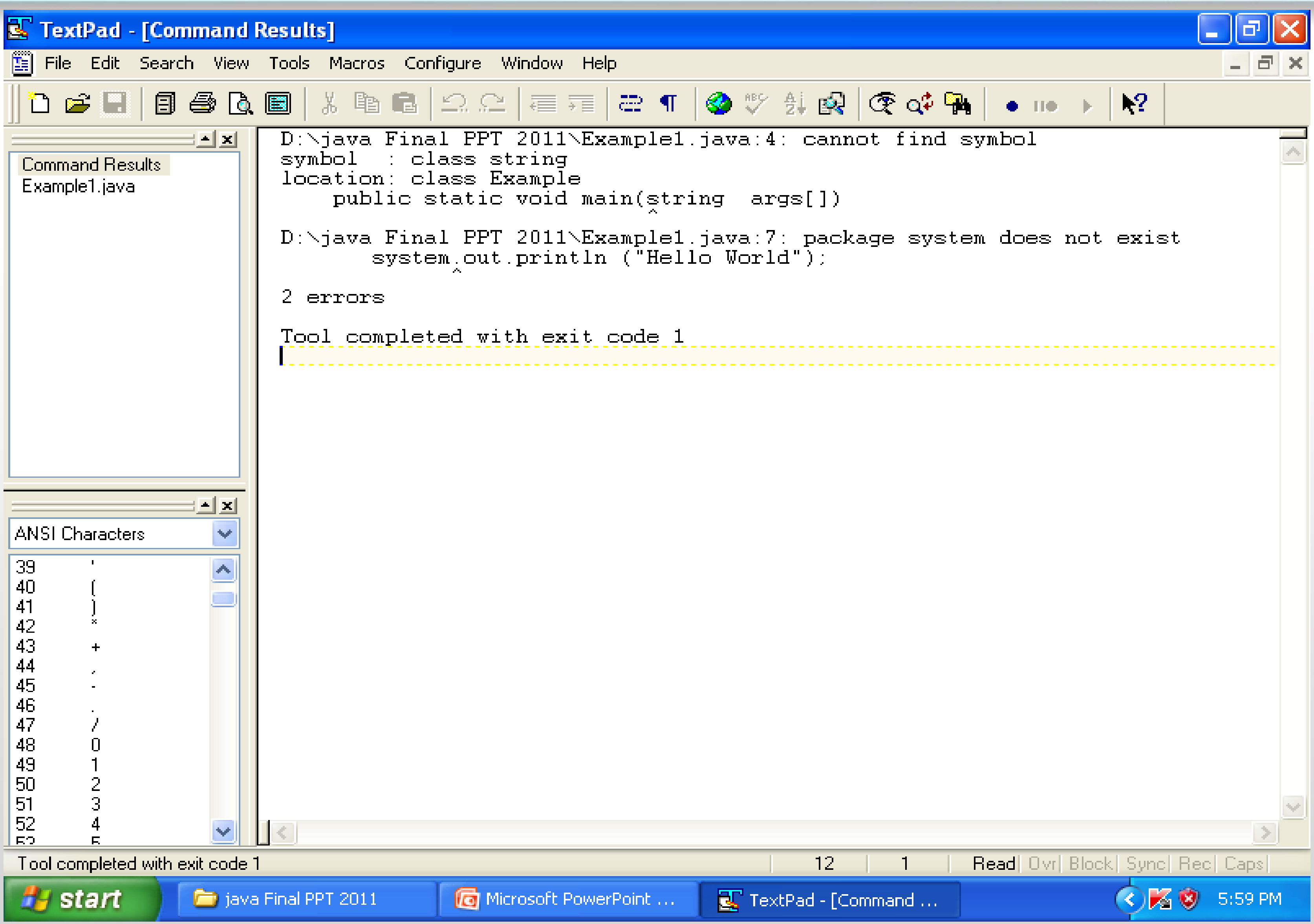
```
class Example
 {

    public static void main(String  args[])
    {

       System.out.println ("Hello World");

    }

 }
```

Compile Java – ctrl+1



```
ain(String  args[])
n ("Hello World");
```

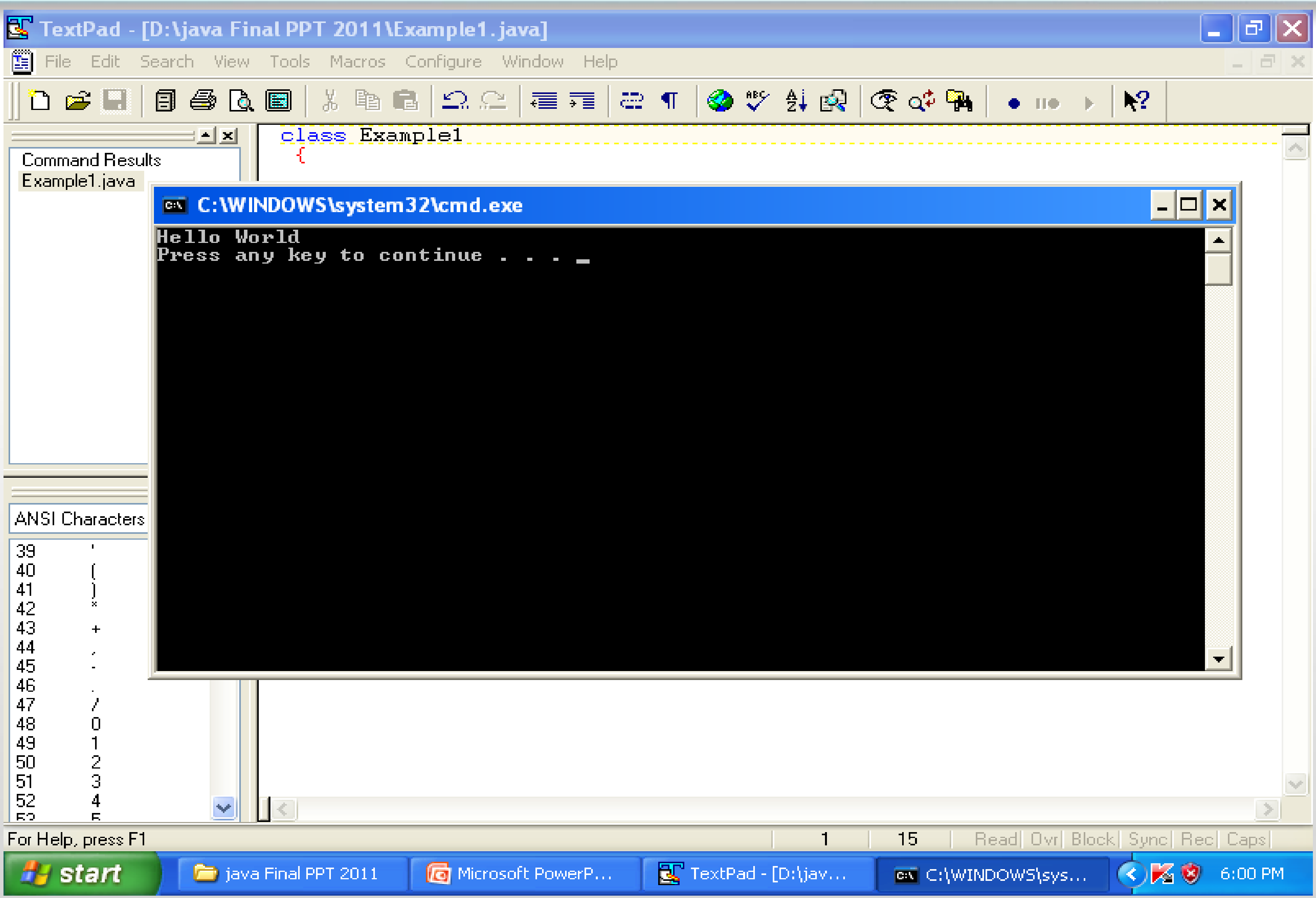
Start user-defined tool 1 9 5 Read Ovr Block Sync Rec Caps



```
D:\java Final PPT 2011\Example1.java:4: cannot find symbol
symbol  : class string
location: class Example
    public static void main(string  args[])
                            ^
D:\java Final PPT 2011\Example1.java:7: package system does not exist
       system.out.println ("Hello World");
             ^
2 errors

Tool completed with exit code 1
```

Tool completed with exit code 1

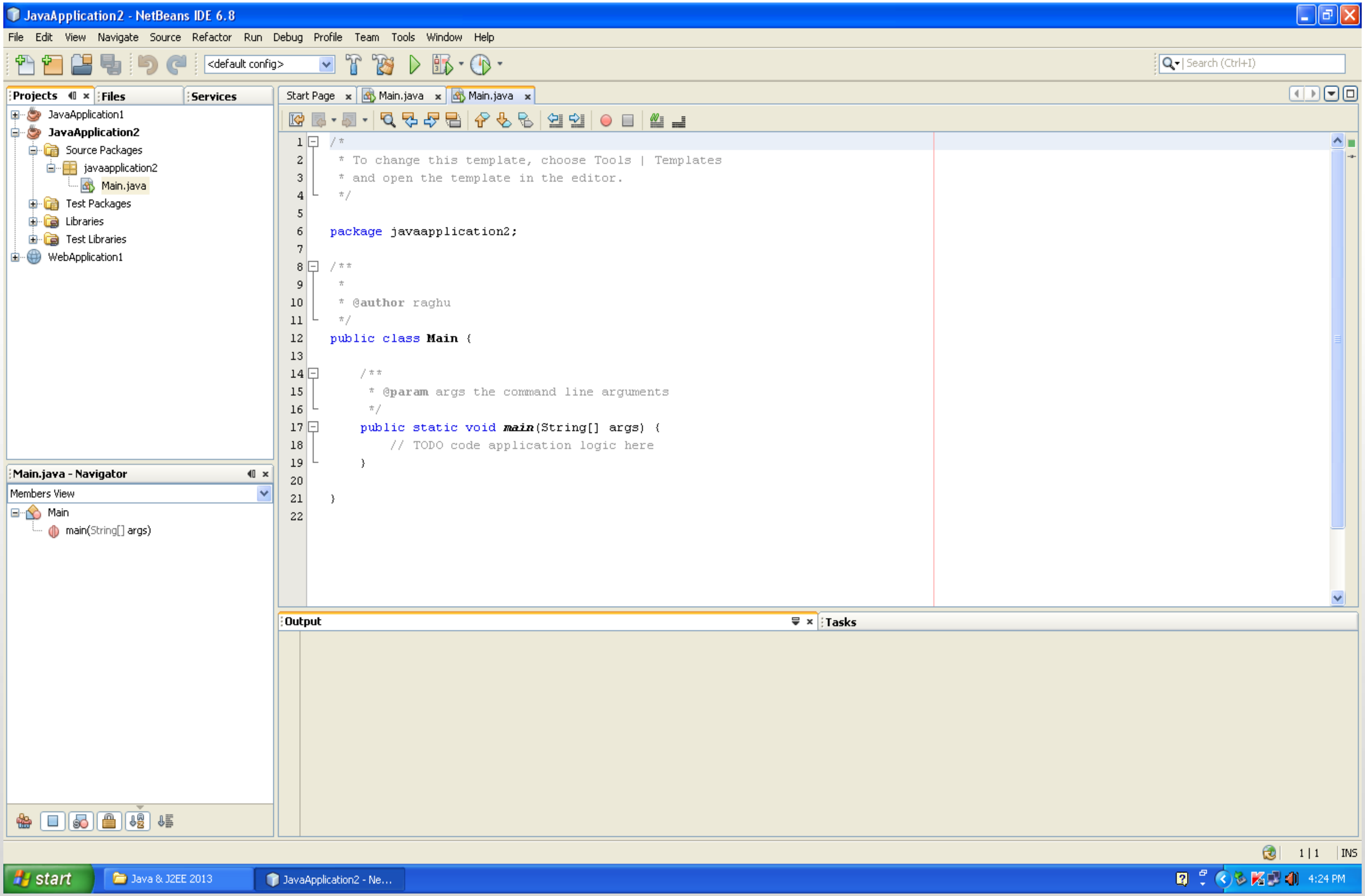
Run Java Program-   ctrl+2



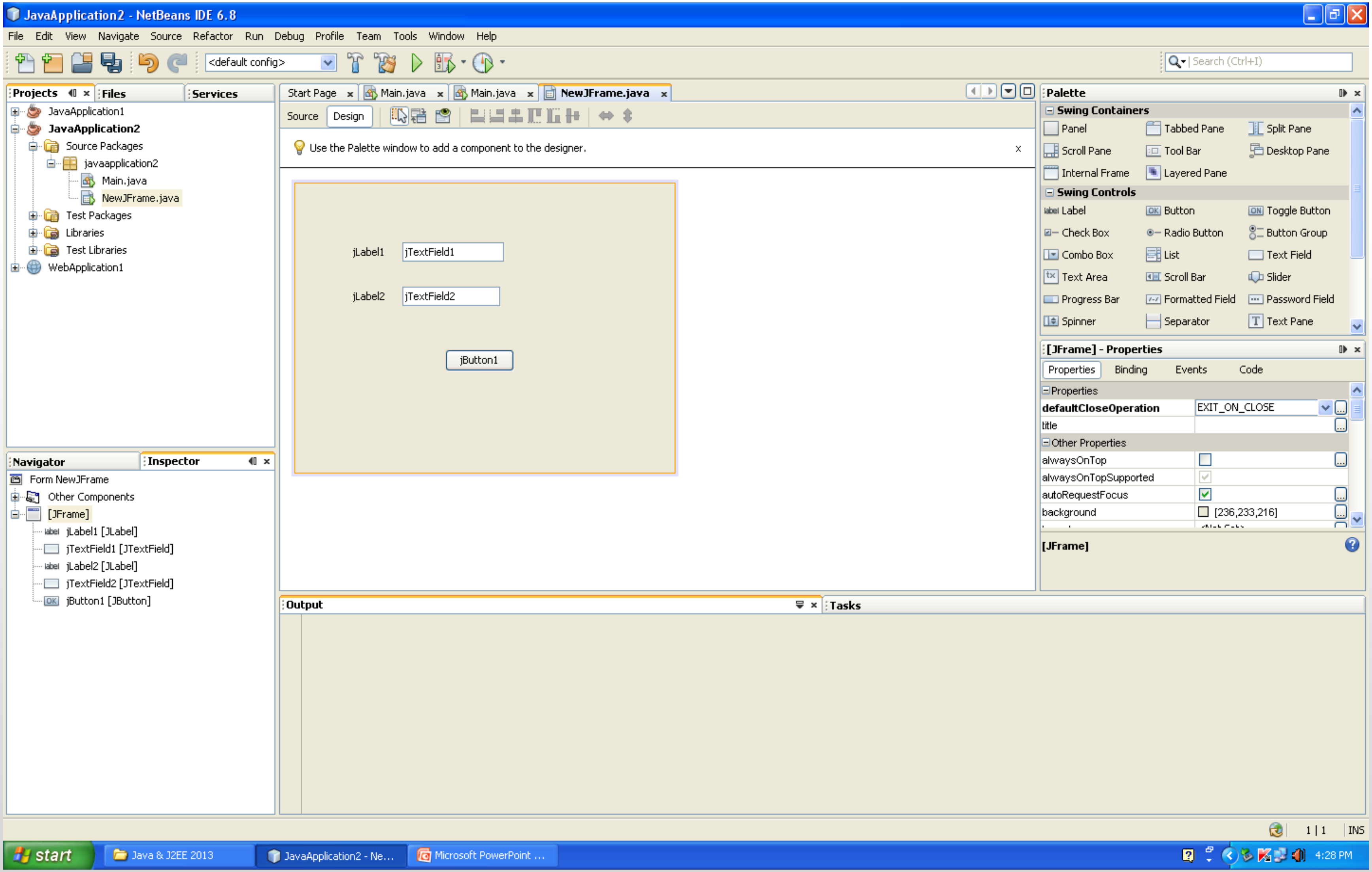
```
class Example1
  {
```

```
Hello World
Press any key to continue . . . _
```

Using NetBeans IDE



```
/*
 * To change this template, choose Tools | Templates
 * and open the template in the editor.
 */

package javaapplication2;

/**
 *
 * @author raghu
 */
public class Main {

    /**
     * @param args the command line arguments
     */
    public static void main(String[] args) {
        // TODO code application logic here
    }

}
```



Use the Palette window to add a component to the designer.

Properties

defaultCloseOperation	EXIT_ON_CLOSE
title	

Other Properties

alwaysOnTop	□
alwaysOnTopSupported	☑
autoRequestFocus	☑
background	[236,233,216]

[JFrame]

Example2 : Variable Declaration

```
class Example2
{     public static void main(String args[])
      {         int  a,b,c;
                a=2;
                b=3;
                c = a+b;
                System.out.println(c);
                System.out.println(“sum is”+c);
                System.out.println(“sum of”+a+”and”+b+ “is”+c);
       }
}
```

OUTPUT :

```
5
sum is 5
Sum of 2 and 3 is 5
```

Example2 : Variable Declaration

```
class Example2
{     public static void main(String args[])
      {         int  a,b,c;
                a=2;
                b=3;
                c = a+b;
                System.out.println(c);
                System.out.println(“sum is”+c);
                System.out.println(“sum of”+a+”and”+b is”+c);
               System.out.println(“sum of”+ (a+b));
        }
}
```

OUTPUT : 5

```
sum is 5
```

Data Types and Variables

Primitive Data Types

- **Integers**: byte 8, short 16, int 32 and long 64
  - Java does not support unsigned integers

Name	Width in bits	Range	
long	64	-9,223,372,036,854,775,808	9,223,372,036,854,775,807
int	32	-2,147,483,648	2,147,483,647
short	16	-32,768	32,767
byte	8	-128	127

- **Floating-Point**: float 32, double 64

Name	Width in bits	Approximate Range	
double	64	4.9e-324	1.8e+308
float	32	1.4e-045	3.4e+038

- **Character**: char 16 (Unicode)
- **Boolean**: boolean 8 (true, false)

Data Types and Variables

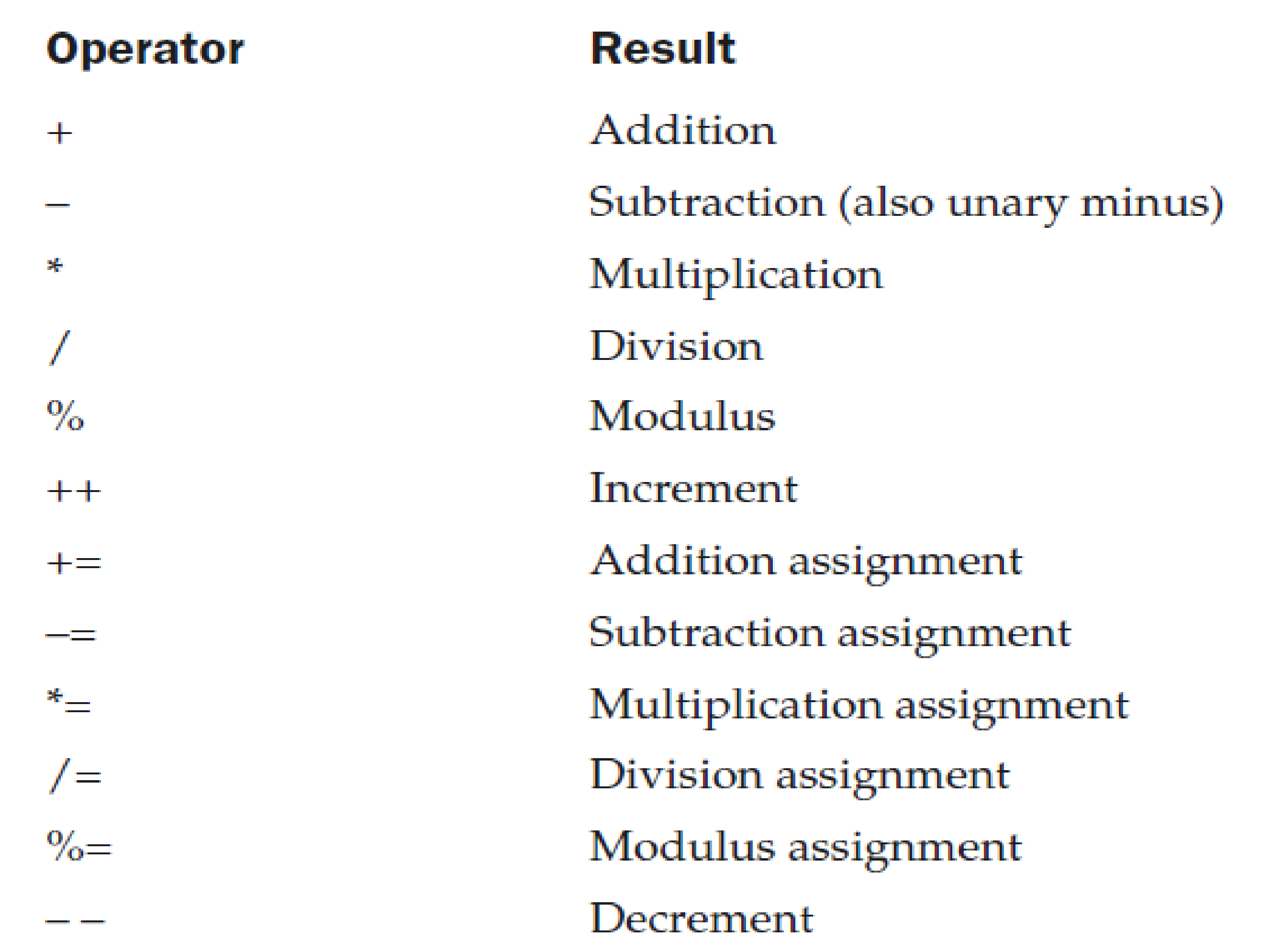
Variables

- Syntax: type identifier [= value][, identifier [=value]…];
- Examples:

```
int a, b, c;
int d = 3, e, f = 5;
byte z = 10;
double pi = 3.14159;
float k = 3.56f;
char x = ‘x’;
```

- Types of variables
  - Local variables
  - Instance variables
  - Class / Static variables

Arithmetic Operators



Operator	Result
+	Addition
–	Subtraction (also unary minus)
*	Multiplication
/	Division
%	Modulus
++	Increment
+=	Addition assignment
–=	Subtraction assignment
*=	Multiplication assignment
/=	Division assignment
%=	Modulus assignment
– –	Decrement

Example

```
// Demonstrate the basic arithmetic operators.
class BasicMath
{          public static void main(String args[])
        {      System.out.println("Integer Arithmetic");
               int   a = 1 + 1;
               int   b = a * 3;
               int   c = b / 4;
               int   d = c - a;
               int   e = -d;
               System.out.println("a = " + a);
               System.out.println("b = " + b);
               System.out.println("c = " + c);
               System.out.println("d = " + d);
               System.out.println("e = " + e);
   } }
```

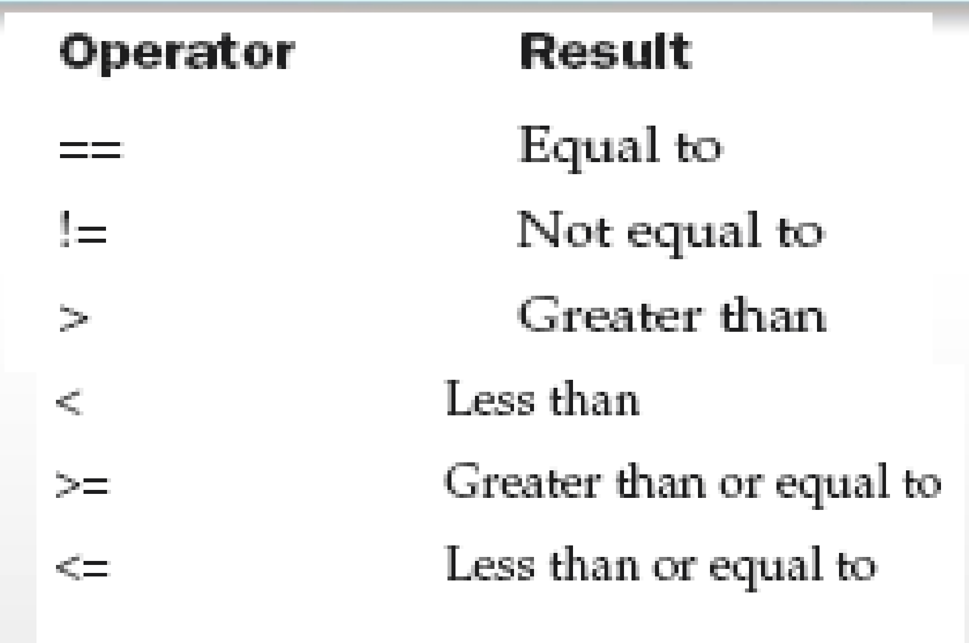
The modulus operator

```
// Demonstrate the % operator.
class Modulus
 {     public static void main(String args[])
      {
                int x = 42;
                double y = 42.25;
                System.out.println("x mod 10 = " + x % 10);
               System.out.println("y mod 10 = " + y % 10);
       }
}
```

output:

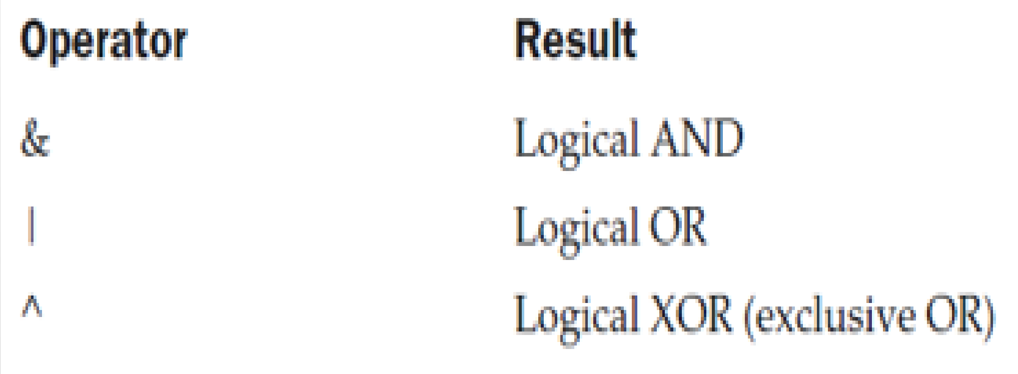
```
x mod 10 = 2
y mod 10 = 2.25
```

Relational Operator



Operator	Result
==	Equal to
!=	Not equal to
>	Greater than
<	Less than
>=	Greater than or equal to
<=	Less than or equal to

Boolean Logical Operators



Operator	Result
&	Logical AND
|	Logical OR
^	Logical XOR (exclusive OR)

Reading input from keyboard

```
int a;
Scanner sc = new Scanner(System.in);
 a = sc.nextInt();
```

```
import java.util.Scanner;
```

1) int nextInt()

It is used to read an integer value from the keyboard.

2) int nextFloat()

It is used to read a float value from the keyboard.

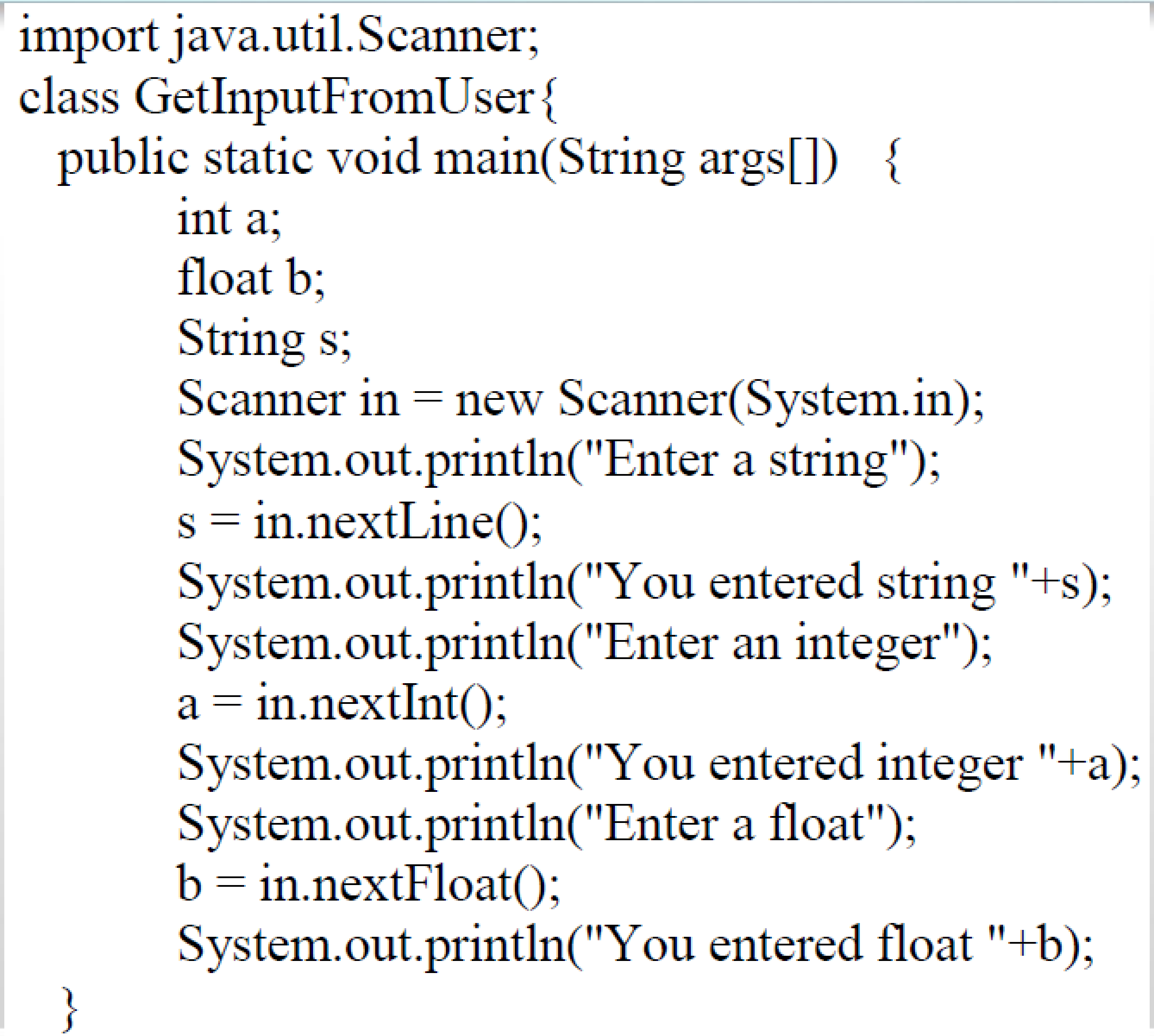
3) long nextLong()

It is used to read a long value from the keyboard.

4) String next()

It is used to read string value from the keyboard.

```
import java.util.Scanner;
class prg3
{       public static void main(String args[])
        {       int a,b,c;
                Scanner sc = new Scanner(System.in);
                System.out.println("Enter a first number");
                a = sc.nextInt();
                System.out.println("Enter a second number");
                b = sc.nextInt();
                c = a+ b;
                System.out.println("sum is :"+c);
        }    }
```



```
import java.util.Scanner;
class GetInputFromUser{
  public static void main(String args[])   {
          int a;
          float b;
          String s;
          Scanner in = new Scanner(System.in);
          System.out.println("Enter a string");
          s = in.nextLine();
          System.out.println("You entered string "+s);
          System.out.println("Enter an integer");
          a = in.nextInt();
          System.out.println("You entered integer "+a);
          System.out.println("Enter a float");
          b = in.nextFloat();
          System.out.println("You entered float "+b);
  }
```

Decision Structures

```
if (condition)
    statement;
else if (condition)
    statement;
.
.
else
    statement;
```

Java program to illustrate if-else-if ladder

```
class ifelseifDemo
{
        public static void main(String args[])
        {
                int i = 20;

                if (i == 10)
                        System.out.println("i is 10");
                else if (i == 15)
                        System.out.println("i is 15");
                else if (i == 20)
                        System.out.println("i is 20");
                else
                        System.out.println("i is not present");
        }
}
```

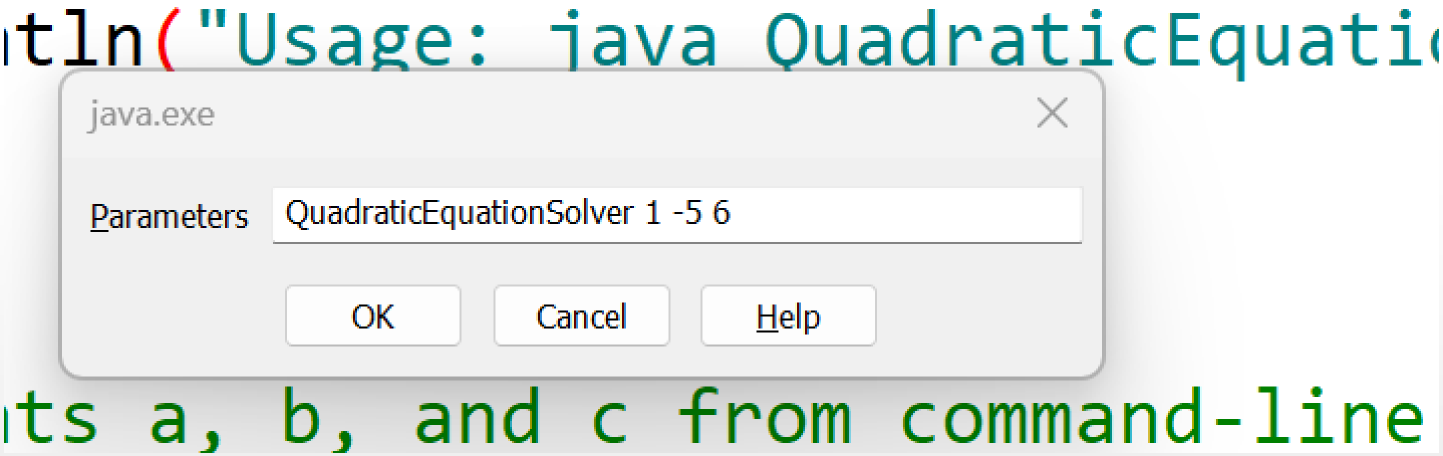
Using Math Package methods

```
import java.util.Scanner;
public class MathFunctionsDemo {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter a number: ");
        double number = scanner.nextDouble();
        double sqrtResult = Math.sqrt(number);
        System.out.println("Square Root: " + sqrtResult);
       double absResult = Math.abs(number);
        System.out.println("Absolute Value: " + absResult);
        System.out.print("Enter an exponent: ");
        double exponent = scanner.nextDouble();
        double powerResult = Math.pow(number, exponent);
        System.out.println("Power: " + powerResult);
     } }
```

The Math class is part of the java.lang package

No need to import, **is automatically imported into every Java program.**

Running Command Line Argument Programs



```
tln("Usage: java QuadraticEquati
ts a, b, and c from command-line
```

java.exe

Parameters: QuadraticEquationSolver 1 -5 6

Note: Inside the program you need to **Parse coefficients** a, b, c received from the command-line arguments

```
        double a = Double.parseDouble(args[0]);
        double b = Double.parseDouble(args[1]);
        double c = Double.parseDouble(args[2]);
```