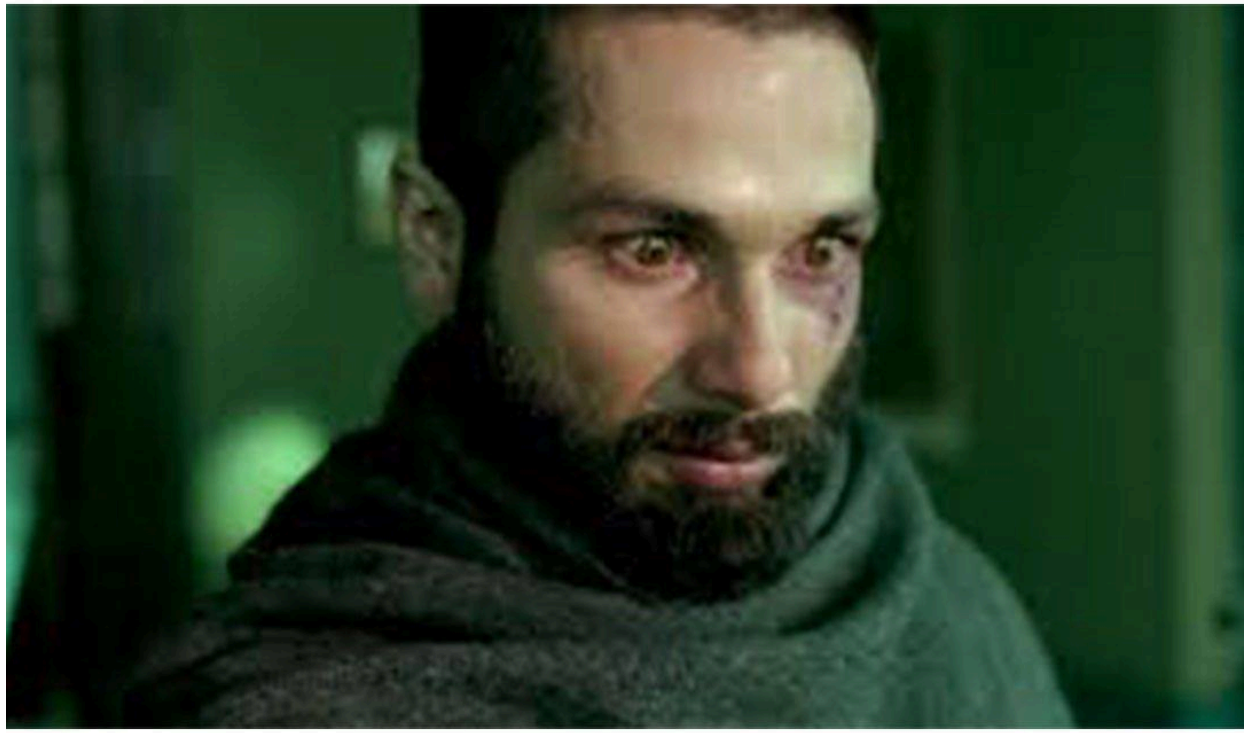
PROGRAMMING

Lecture 5

Sushil Paudel

SEMICOLON

When you debug 30 errors and 50 warnings All day long



and find it was all because of missing ;

PREVIOUS TOPICS

- Class
- Object
- Method

TODAY'S TOPIC

- Scanner – User Input
- Constructor
- Overloading
- Variable

SCANNER – USER INPUT

- The Scanner class is a class in **java.util**, which allows the user to read values of various types.
- A scanning operation may block waiting for input.
- Java Scanner class must be imported at the top before class declaration.

SCANNER - IMPORT

import is a keyword. **import** keyword is used to **import** built-in and user-defined packages into your **java** source file so that your class can refer to a class that is in another package by directly using its name. **import** should be done before creating class.

Syntax:

```
import package.name.ClassName; // To import a certain class only
import package.name.* // To import the whole package
```

Importing Scanner class

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

EXAMPLE

```
import java.util.Scanner; // 1. Import Scanner class

public class StudentData {

    public static void main(String[] args) {
        Scanner scan = new Scanner(System.in); // 2. Create object of Scanner class

        System.out.println("Enter name");
        String name = scan.nextLine(); // 3(a). Input the string value
        System.out.println("Name  is:  " + name);

        System.out.println("Enter  salary"); // 3(b). Input the double value
        double salary = scan.nextDouble();
        System.out.println("Salary  is:  " + salary);

    }
}
```

SCANNER METHODS

public String nextLine()	it moves the scanner position to the next line and returns the value as a string.
public byte nextByte()	it scans the next token as a byte.
public short nextShort()	it scans the next token as a short value.
public int nextInt()	it scans the next token as an int value.
public long nextLong()	it scans the next token as a long value.
public float nextFloat()	it scans the next token as a float value.
public double nextDouble()	it scans the next token as a double value.

CREATING OBJECT IN JAVA

Syntax:

```
ClassName object = new ClassName();
```

Example:

```
Student object = new Student();
```

CONSTRUCTOR

- It is a special type of method which is used to initialize the object.
- It is called when an instance of the class is created.
- Every time an object is created using the new() keyword, at least one constructor is called.

RULES OF CONSTRUCTOR

- Constructor name must be the same as its class name
- A Constructor must have no explicit return type

EXAMPLE:

```
public class <Class_Name> {
        public <Class_Name> () {
        }
}
```

TYPES OF CONSTRUCTOR

There are three types of Constructor in java, they are:

1. Default constructor
2. No-Argument constructor:
3. Parameterized constructor

DEFAULT CONSTUCTOR

- If you do not implement any constructor in your class, Java compiler inserts a default constructor into your code on your behalf.
- This constructor is known as default constructor.

NO-ARGS CONSTRUCTOR

- A constructor that has no parameter is known as NO-ARGUEMENT constructor.
- If we don’t define a constructor in a class, then compiler creates **default constructor** for the class.
- If we write a constructor with arguments or no-arguments then the compiler does not create a default constructor.

NO-ARGS CONSTRUCTOR EXAMPLE

```
public class Student {

    public Student () {
        System.out.println("This is constructor");
    }

    public static void main(String[] args) {
        Student student = new Student();
    }
}
```

Output

This is constructor

PARAMETERIZED C0NSTRUCTOR

- Constructor with arguments(or you can say parameters) is known as Parameterized constructor.
- A class can have multiple parameterized constructors.

```
public class Student {

    public Student (String name) {
        System.out.println("My name is: "+name);
    }

    public static void main(String[] args) {
        Student student = new Student("Ram");
    }
}
```

OUTPUT

My name is: Ram

EXAMPLE

```
public class Addition{
    public Addition(){
        System.out.println("This is no-args constuctor");
    }

    public Addition(int a, int b){
        System.out.println(”Result from Parameterized constructor: "+(a+b));
    }

    public static void main(String[] args){
        Addition addition1 = new Addition(); // Calls no-args constructor
        Addition addition2 = new Addition(5, 8); // Calls constructor with 2 parameters
         Addition addition3 = new Addition(10, 20); // Calls constructor with 2 parameters
    }
}
```

OUTPUT

This is no-args constuctor

Result from Parameterized constructor: 13

Result from Parameterized constructor: 30

CONSTRUCTOR OVERLOADING

- Constructor overloading is a technique in Java in which a class can have any number of constructors that differ in parameter lists and data types.
- The compiler differentiates these constructors by taking into account the number of parameters in the list and their type.

CONSTRUCTOR OVERLOADING EXAMPLE

```
public class Addition{
    public Addition(int a, int b){
        System.out.println("Sum is: "+(a+b));
    }
    public Addition(int a, int b, int c){
        System.out.println("Sum is: "+(a+b+c));
    }
    public Addition(String firstName, String lastName){
        System.out.println(firstName + " " + lastName);
    }

    public static void main(String[] args){
        Addition addition1 = new Addition(10, 8);
        Addition addition2 = new Addition(10, 20, 30);
        Addition addition3 = new Addition("Ram", "Bahadur");
    }
}
```

OUTPUT

Sum is: 18

Sum is: 60

Ram Bahadur

METHOD OVERLOADING

- Method Overloading is a feature that allows a class to have more than one method having the same name, if their argument lists and/or data types are different.
- It is similar to constructor overloading in Java, that allows a class to have more than one constructor having different argument lists.

WAYS OF METHOD OVERLOADING

1. No of parameters

```
public class Addition {
    public void add(int a, int b) {
    }

    public void add(int a, int b, int c) {
    }

    public void add(int a, int b, int c, int d) {
    }
}
```

WAYS OF METHOD OVERLOADING

2. Data type of parameters

```
public class Operations {
    public void add(double a, int b) {
    }

    public void add(double a, double b) {
    }

    public void add(String a, int b, int c) {
    }
}
```

EXAMPLE

```
public class Addition{
    public void add(int a, int b){
        System.out.println("Sum is: "+(a+b));
    }
    public void add(int a, int b, int c){
        System.out.println("Sum is: "+(a+b+c));
    }
    public void test(){
        add(1,2);
        add(1,2,3);
    }
}
```

Question: What will be the output if the method test() is called?

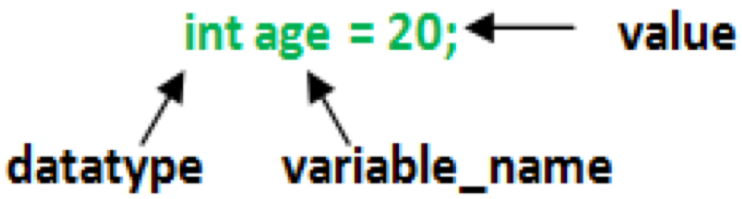
OUTPUT

Sum is: 3

Sum is: 6

VARIABLE

- Variables are containers for storing data values.
- The value stored in a variable can be changed during program execution.
- In Java, all the variables must be declared before use.
- Here, the value 20 is also called **literal**.



TYPES OF VARIABLES

- Local Variables
- Instance Variables
- Static Variables

LOCAL VARIABLES

- A variable defined within a block or method or constructor is called local variable.
- These variable are created when the block in entered or the function is called and destroyed after exiting from the block or when the call returns from the function.
- The scope of these variables exists only within the block in which the variable is declared. i.e. we can access these variable only within that block.

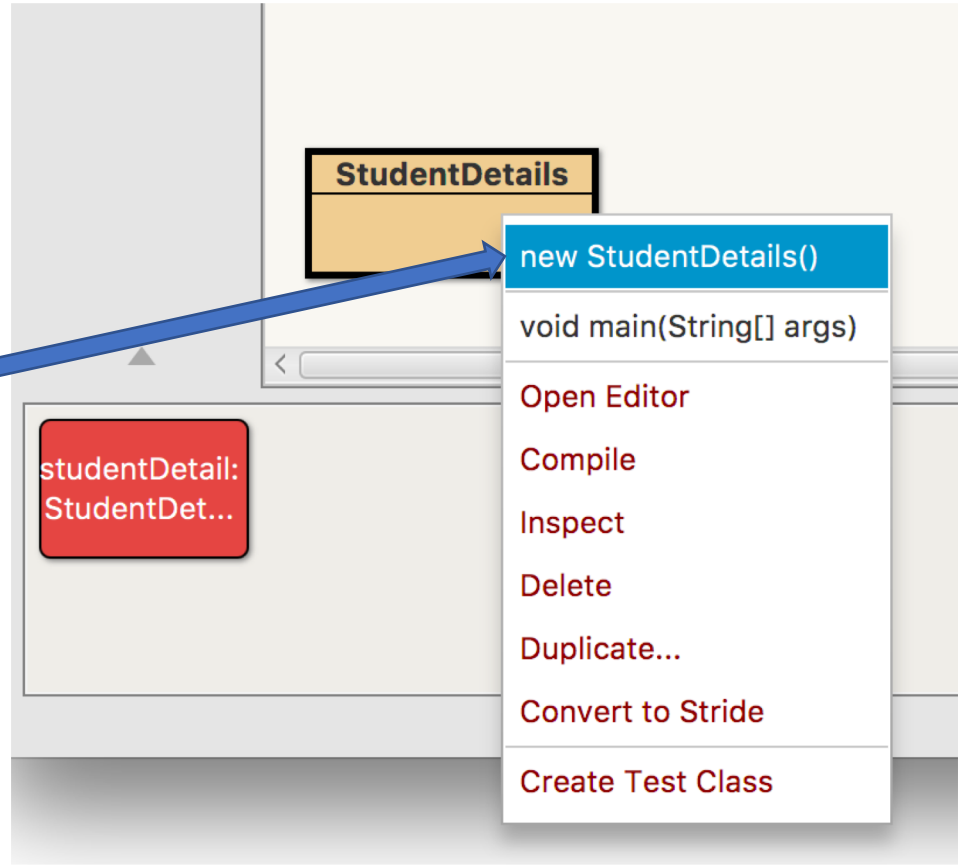
LOCAL VARIABLE EXAMPLE

```
public class StudentDetails {

    public void studentAge() {
        //local variable age
        int age = 10;
        age = age + 5;
        System.out.println("Student age is : " + age);
    }

    public static void main(String args[]) {
        StudentDetails obj = new StudentDetails();
        obj.studentAge();

        // Is the following statement correct?
       // System.out.println("Student age is : " + age);
    }
}
```



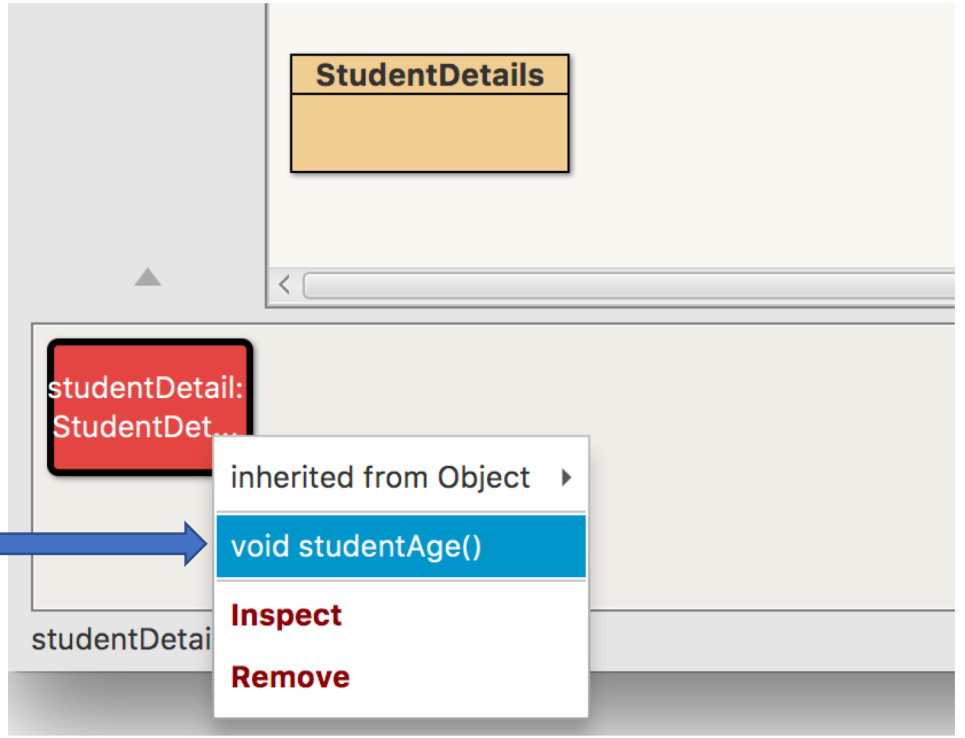
LOCAL VARIABLE EXAMPLE

```
public class StudentDetails {

    public void studentAge() {
        //local variable age
        int age = 10;
        age = age + 5;
        System.out.println("Student age is : " + age);
    }

    public static void main(String args[]) {
        StudentDetails obj = new StudentDetails();
        obj.studentAge();

        // Is the following statement correct?
       // System.out.println("Student age is : " + age);
    }
}
```



INSTANCE VARIABLE

- Instance variables are declared in a class, but outside a method, constructor or any block.
- Instance variables are created when an object is created with the use of the keyword 'new' and destroyed when the object is destroyed.
- The instance variables are visible for all methods, constructors and block in the class.

EXAMPLE

```
public class Student {

        private int id;
        public String name;

        public Student(String name, int id) {
                this.name = name;
                this.id = id;
        }

        public void printStudentDetail() {
                System.out.println("Name: " + name);
                System.out.println("Id: " + id);
        }

        public static void main(String[] args) {
                Student student = new Student("Leo”, 10);
                student.printStudentDetail();
        }
}
```

OUTPUT

Name: Leo

Id: 1

CLASS/STATIC VARIABLE

- Class variables also known as static variables are declared with the static keyword in a class, but outside a method, constructor or a block.
- There would only be one copy of each class variable per class, regardless of how many objects are created from it.
- Static variables are created when the program starts and destroyed when the program stops.
- Static variables can be accessed by calling with the class name

  ClassName.VariableName

EXAMPLE

```
public class Student {

        // Instance variable
        public String name;
        public int rollNo;

        // Static/Class variable
        public static int total;

        // The name variable is assigned in the constructor.
        public Student(String name) {
                this.name = name;
                total++;
                rollNo++;
        }

        public void printEmp() {
                System.out.println("name  : " + name);
                System.out.println("roll No  : " + rollNo);
                System.out.println("total :" + Student.total);
        }

        public static void main(String args[]) {
                Student s1 = new Student("Ram");
                s1.printEmp();

                Student s2 = new Student("Shyam");
                s2.printEmp();
        }
}
```

OUTPUT

name : Ram

roll No : 1

total :1

name : Shyam

roll No : 1

total :2

THIS KEYWORD

- Using *this* you can refer the members of a class such as constructors, variables and methods.
- The keyword *this* is used only within instance methods or constructors.
- In general, the keyword *this* is used to differentiate the instance variables from local variables if they have same names, within a constructor or a method.

EXAMPLE

```
public class Student {

        public String name;

        public Student(String name) {
                this.name = name;
        }

        public void printEmp() {
                System.out.println("name  : " + this.name);
        }

        public static void main(String args[]) {
                Student s1 = new Student("Ram");
                s1.printEmp();
        }
}
```

OUTPUT

name : Ram

THANK YOU!

Any questions?