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**JAVA PROGRAMMING TASK 3**

Task3

1. Explain the differences between primitive and reference data types.

Primitive data types specify the size and type of variable values while reference data types specify the reference/address of the variable values.

Primitive data types are already defined in Java while reference data types can be defined by the user.

2. Define the scope of a variable (hint: local and global variable)

A scope is a region of the program and broadly speaking there are three places where variables can be declared: Outside of all functions which are called global variables. Inside a function or a block which is called local variables, in the definition of function parameters which is called formal parameters.

3. Why is initialization of variables required?

- So that they can be used in a program.
- To avoid run-time errors.

4. Differentiate between static, instance and local variables.

Local variables can be defined within a method or a code block.

Instance variables can be defined outside a method at the class level.

Static variables can be defined outside a method at the class level.

Local variables remain in memory as long as the method executes .

Instance variables remain in memory as long as the object is in memory.

Static variables remain in memory as long as the program executes.

5. Differentiate between widening and narrowing casting in java.

Widening conversions preserve the source value but can change its representation while

narrowing conversion changes a value to a data type that might not be able to hold some of the possible values.

6. The following table shows data type, its size, default value and the range. Filling in the missing values.

TYPE	SIZE (IN BYTES)	DEFAULT	RANGE
Boolean	1 bit	false	true, false
Char	2	'\u0000'	'\0000' to '\xffff'
Byte	1	0	-2 <sup>7</sup> to +2 <sup>7</sup> -1
Short	2	0	-2 <sup>15</sup> to +2 <sup>15</sup> -1
Int	4	0	-2 <sup>31</sup> to +2 <sup>31</sup> -1
Long	8	0L	-9,223,372,036,854,775,808 to 9,223,372,036,854,775,807
Float	4	00.0f	3.4E-38 to 3.4E+38
Double	8	0.0d	-1.8E+308 to +1.8E+308

7. Explain the importance of using Java packages

- To avoid name conflicts.
- To group related classes.

8. Explain three controls used when creating GUI applications in Java language.

- Checkbox - Used to display options to the user, where the user can select more than one option.
- Label - Is used to provide a descriptive text string that cannot be changed directly by the user.
- Button - Used to execute blocks of code in a program when clicked by the user.
- Text Field - Used to get text input from the user into the program for processing.

9. Explain the difference between containers and components as used in Java. Containers can have other containers and components in it while components cannot have other components in them.

10. Write a Java program to reverse an array having five items of type int.

```
import java.util.*;
import java.util.stream.*;
public class PrintArrays
{
    public static void main(String[] args) {
        //creating the array with 5 items
        Integer[] myArray = { 1, 2, 3, 4, 5};

        //print the array starting from last element
        for(int i=myArray.length-1;i>=0;i--) {
            System.out.print(myArray[i] + " ");
        }
    }
}
```

11. Programs written for a graphical user interface have to deal with “events.”

Explain what is meant by the term event.

Give at least two different examples of events, and discuss how a program might respond to those events.

Event - Is the changing of the state of an object or behavior by performing actions. These actions can be a button click, cursor movement, keypress through keyboard or page scrolling, etc.

Example: - when the user clicks a button, the program can display a dialog box.

- When the user moves the cursor in a container, the cursor can change its shape.

12. Explain the difference between the following terms as used in Java programming.

#### Polymorphism and encapsulation

Polymorphism ensures that the proper method will be executed based on the calling object's type. Encapsulation allows you to control access to your object's state, while making it easier to maintain or change your implementation at a later date.

#### Method overloading and method overriding

Method overloading is used when we want multiple methods providing a similar implementation. However, method overriding is used when we want to add some additional functionality on top of base class implementation.

#### Class and interface

An object of a class can be created while an object of an interface cannot be created.

#### Inheritance and polymorphism

Inheritance supports the concept of reusability and reduces code length in object-oriented programming while polymorphism allows the object to decide which form of the function to implement at compile-time as well as run-time.

13. Using examples, explain the two possible ways of implementing polymorphism. Show your code in java.

There are many ways to implement polymorphism in Java. One common way is to use the instanceof operator. This allows you to check if an object is an instance of a particular class. For example:

```
if (obj instanceof String) {  
  
    String str = (String) obj;  
  
    // do something with str  
  
}  
  
else if (obj instanceof Integer) {  
  
    Integer num = (Integer) obj;
```

```
// do something with num
```

```
}
```

```
else {
```

```
// obj is not a String or Integer
```

```
}
```

Another way to implement polymorphism is to use Java interfaces. An interface is a type that can be implemented by any class. For example, the Comparable interface defines a compareTo() method. Any class can implement Comparable and provide its own implementation of compareTo().