EXPERIMENT NO.- 09

AIM: Edit, compile, execute and test user defined Java packages.

THEORY:

Packages In Java

Package in Java is a mechanism to encapsulate a group of classes, sub packages and interfaces. Packages are used for:

- Preventing naming conflicts. For example there can be two classes with name Employee in two packages, college.staff.cse.Employee and college.staff.ee.Employee
- Making searching/locating and usage of classes, interfaces, enumerations and annotations easier
- Providing controlled access: protected and default have package level access control. A protected member is accessible by classes in the same package and its subclasses. A default member (without any access specifier) is accessible by classes in the same package only.
- Packages can be considered as data encapsulation (or data-hiding).

All we need to do is put related classes into packages. After that, we can simply write an import class from existing packages and use it in our program. A package is a container of a group of related classes where some of the classes are accessible are exposed and others are kept for internal purpose.
We can reuse existing classes from the packages as many time as we need it in our program.

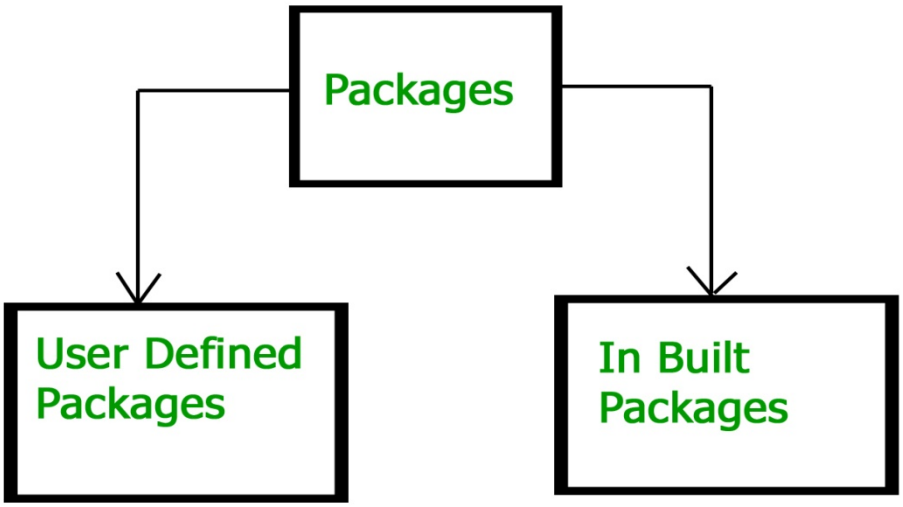
How packages work?

Package names and directory structure are closely related. For example if a package name is *college.staff.cse*, then there are three directories, *college*, *staff* and *cse* such that *cse* is present in *staff* and *staff* is present *college*. Also, the directory *college* is accessible through CLASSPATH variable, i.e., path of parent directory of college is present in CLASSPATH. The idea is to make sure that classes are easy to locate.
Package naming conventions : Packages are named in reverse order of domain names, i.e., org.geeksforgeeks.practice. For example, in a college, the recommended convention is college.tech.cse, college.tech.ee, college.art.history, etc.
Adding a class to a Package : We can add more classes to a created package by using package name at the top of the program and saving it in the package directory. We need a new **java** file to define a public class, otherwise we can add the new class to an existing **.java** file and recompile it.
Subpackages: Packages that are inside another package are the **subpackages**. These are not imported by default, they have to imported explicitly. Also, members of a subpackage have no access privileges, i.e., they are considered as different package for protected and default access specifiers.
Example :

```
importjava.util.*;
```

util is a subpackage created inside **java** package.

Types of packages:



Built-in Packages
These packages consist of a large number of classes which are a part of Java **API**.Some of the commonly used built-in packages are:
1) **java.lang:** Contains language support classes(e.g classed which defines primitive data types, math operations). This package is automatically imported.
2) **java.io:** Contains classed for supporting input / output operations.
3) **java.util:** Contains utility classes which implement data structures like Linked List, Dictionary and support ; for Date / Time operations.
4) **java.applet:** Contains classes for creating Applets.
5) **java.awt:** Contain classes for implementing the components for graphical user interfaces (like button , ;menus etc).
6) **java.net:** Contain classes for supporting networking operations.

User-defined packages
These are the packages that are defined by the user. First we create a directory **myPackage** (name should be same as the name of the package). Then create the **MyClass** inside the directory with the first statement being the **package names**.

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```
// Name of the package must be same as the directory

// under which this file is saved

packagemyPackage;
```

public class MyClass

```
{
public void getNames(String s)
   {
System.out.println(s);
   }
}
```

Now we can use the **MyClass** class in our program.

```
/* import 'MyClass' class from 'names' myPackage */
importmyPackage.MyClass;


public class PrintName
{
public static void main(String args[])
  {
    // Initializing the String variable
    // with a value
    String name = "PackagesforPackages";


    // Creating an instance of class MyClass in
    // the package.
MyClassobj = new MyClass();


obj.getNames(name);
  }
}
```

Note : MyClass.java must be saved inside the **myPackage** directory since it is a part of the package.

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PROGRAM:

Illustration of user-defined packages:

Creating our first package:

File name – ClassOne.java

```
packagepackage_name;

publicclassClassOne {
    publicvoidmethodClassOne() {
        System.out.println("Hello there its ClassOne");
    }
}
```

Creating our second package:

File name – ClassTwo.java

```
packagepackage_one;

publicclassClassTwo {
    publicvoidmethodClassTwo(){
        System.out.println("Hello there i am ClassTwo");
    }
}
```

Making use of both the created packages:

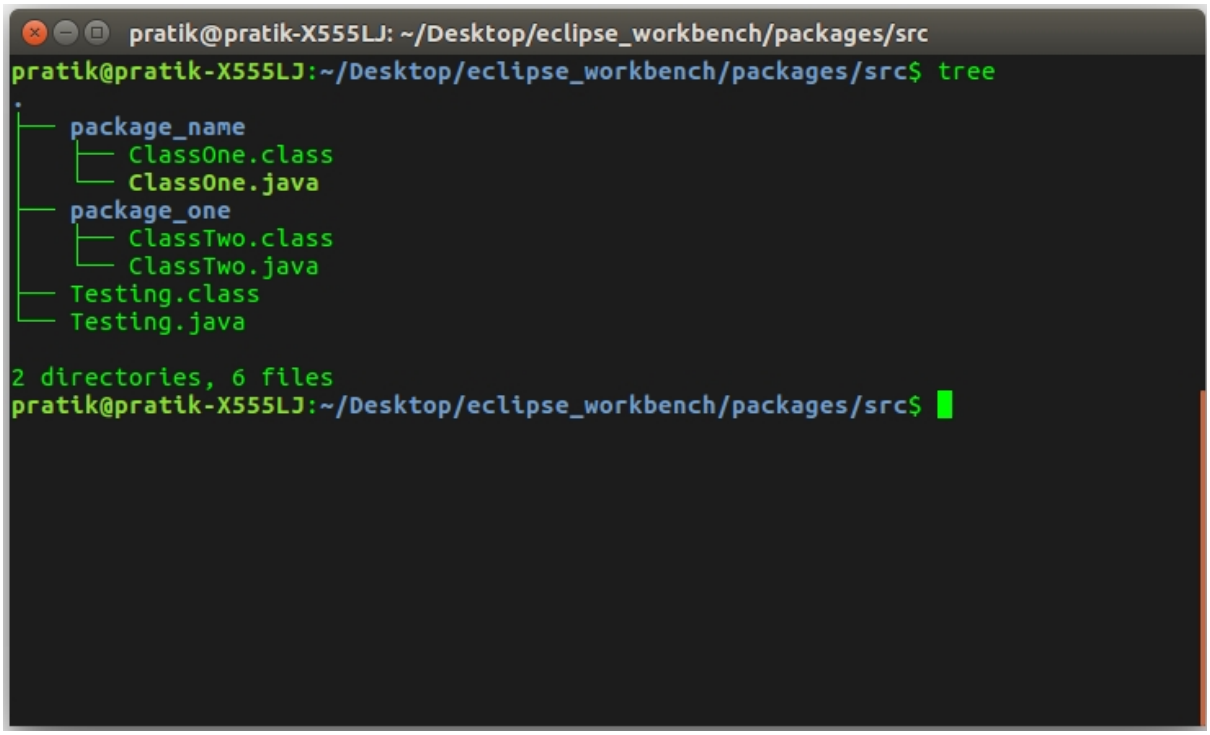
File name – Testing.java

```
importpackage_one.ClassTwo;
importpackage_name.ClassOne;

publicclassTesting {
    publicstaticvoidmain(String[] args){
        ClassTwo a = newClassTwo();
        ClassOne b = newClassOne();
        a.methodClassTwo();
        b.methodClassOne();
    }
}
```

Output:

```
Hello there i am ClassTwo

Hello there itsClassOne
```

Now having a look at the directory structure of both the packages and the testing class file:



CONCLUSION: Thus we have successfully studied about editing, compiling, executing and testing user defined Java packages.