6 Aim: Introduce the concept of Abstraction, packages.

What abstraction in Java?

Data abstraction is **the process of hiding certain details and showing only essential information to the user**. Abstraction can be achieved with either abstract classes or interfaces

The abstract keyword is a non-access modifier, used for classes and methods:

- **Abstract class:** is a restricted class that cannot be used to create objects (to access it, it must be inherited from another class).

Abstract method: can only be used in an abstract class, and it does not have a body. The body is provided by the subclass (inherited from).

JAVA PACKAGE

A java package is a group of similar types of classes, interfaces and sub-packages.

Package in java can be categorized in two form**, built-in package** and **user-defined package**.

There are many built-in packages such as java, lang, awt, javax, swing, net, io, util, sql etc.

Advantage of Java Package

1) Java package is used to categorize the classes and interfaces so that they can be easily maintained.

2) Java package provides access protection.

3) Java package removes naming collision.

How to access package from another package?

There are three ways to access the package from outside the package.

import package.*;
import package.classname;
fully qualified name.

1) Using packagename.*

If you use package.* then all the classes and interfaces of this package will be accessible but not subpackages.

The import keyword is used to make the classes and interface of another package accessible to the current package.

6 Program: Develop a java application to implement currency converter (Dollar to INR, EURO to INR, Yen to INR and vice versa), distance converter (meter to KM, miles to KM and vice versa), time converter (hours to minutes, seconds and vice versa) using packages.

ALGORITHM:

1. The package keyword is used to create a package in java.
2. Create a class CurrencyConverter inside a package name CurrencyConverter.
3. Class also contains methods dollortoinr, inrtodollor, eurotoinr, inrtoeuro, yentoinr, and inrtoyen with its parameters to convert given currency.

4. Create a class DistanceConverter inside a package name DistanceConverter.
5. Class also contains methods metertokm, kmtometer, milestokm and kmtomiles with its parameters to convert given distance.
6. Create a class TimeConverter inside a package name TimeConverter.
7. Class also contains methods hourstominutes, minutestohours, hourstoseconds and secondstohours with its parameters to convert given time.
8. Import the CurrencyConverter, DistanceConverter, TimeConverter and other java packages.
9. Create a class Converter and object for a class in memory and assign it to the reference variable, then the method is invoked.
10. By using Scanner class get the choices for switch statement during runtime.
11. By using switch case statement we can convert currency, distance and time for each choice.
12. Create object for a class in memory and assign it to the reference variable, then the method is invoked.
13. Finally, the conversion is displayed based on type of converter.

PROGRAM:

```
//For Packages, Folder Name should be CurrencyConverter
//File Name should be CurrencyConverter.java
package CurrencyConverter;
public class CurrencyConverter
{
public double dollortoinr(double x)
{
double inr=x*67.86;
return inr;
}
public double inrtodollor(double x)
{
double dollor=x/67.86;
return dollor;
}
public double eurotoinr(double x)
{
double inr=x*79.18;
return inr;
}
public double inrtoeuro(double x)
{
double euro=x/79.18;
return euro;
}
public double yentoinr(double x)
{
double inr=x*0.62;
return inr;
}
public double inrtoyen(double x)
{
```

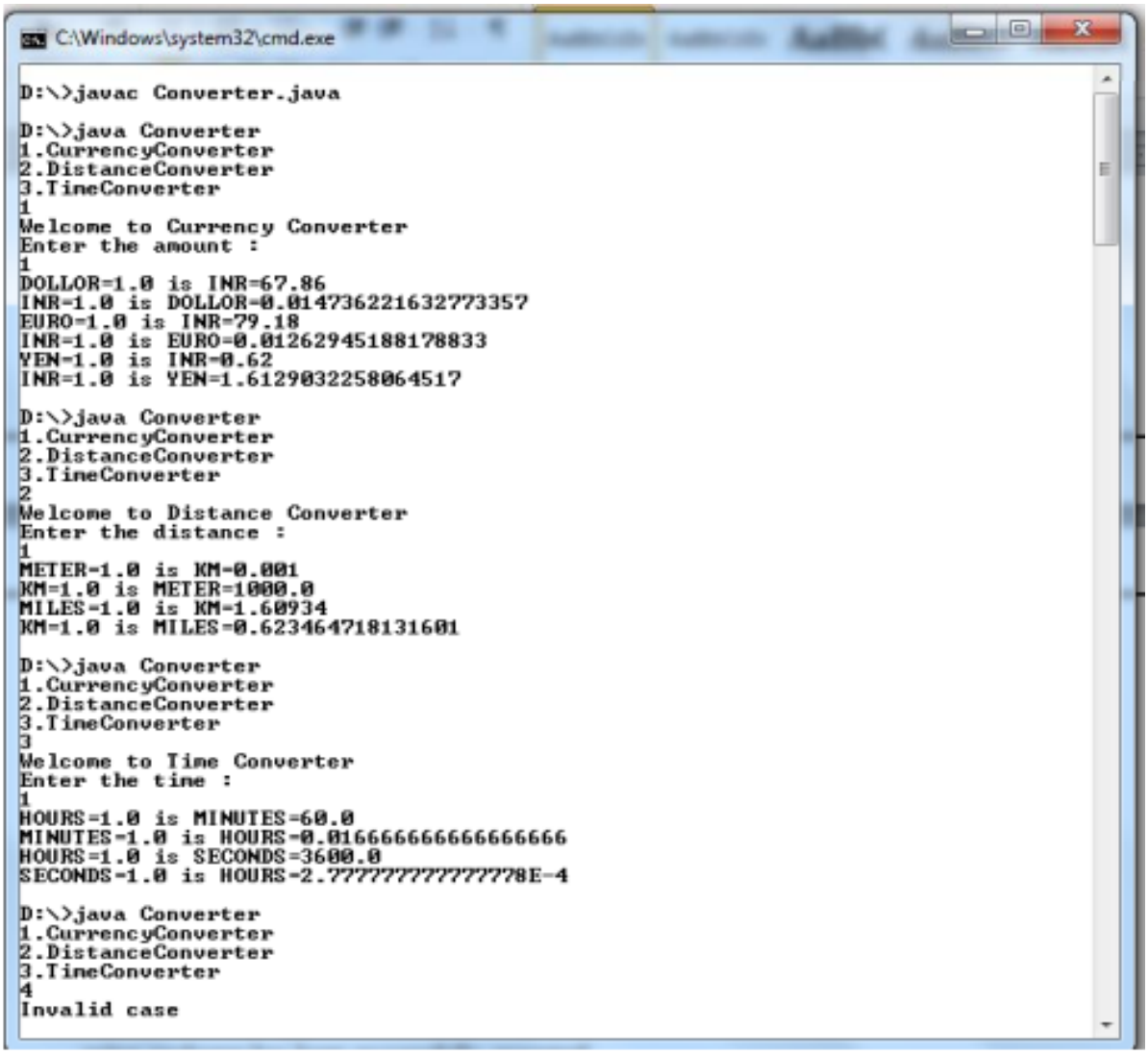
```
double yen=x/0.62;
return yen;
}
}
//For Packages, Folder Name should be DistanceConverter
//File Name should be DistanceConverter.java
package DistanceConverter;
public class DistanceConverter
{
public double metertokm(double x)
{
double km=x*0.001;
return km;
}
public double kmtometer(double x)
{
double meter=x/0.001;
return meter;
}
public double milestokm(double x)
{
double km=x*1.60934;
return km;
}
public double kmtomiles(double x)
{
double miles=x/1.60394;
return miles;
}
}
//For Packages, Folder Name should be TimeConverter
//File Name should be TimeConverter.java
package TimeConverter;
public class TimeConverter
{
public double hourstominutes(double x)
{
double minutes=x*60;
return minutes;
}
public double minutestohours(double x)
{
double hours=x/60;
return hours;
}
public double hourstoseconds(double x)
{
double seconds=x*3600;
return seconds;
}
public double secondstohours(double x)
```

```
{
double hours=x/3600;
return hours;
}
}
//File Name should be Converter.java separate this file from above 3 folders
import CurrencyConverter.*;
import DistanceConverter.*;
import TimeConverter.*;
import java.io.*;
import java.util.*;
class Converter
{
public static void main(String args[])
{
System.out.println("1.CurrencyConverter");
System.out.println("2.DistanceConverter");
System.out.println("3.TimeConverter");
Converter cr = new Converter();
Scanner c = new Scanner(System.in);
int choice = c.nextInt();
String op = null;
switch(choice)
{
case 1: cr.Currency(); break;
case 2: cr.Distance(); break;
case 3: cr.Time(); break;
default:
System.out.println("Invalid case");
return;
}
}
public void Currency()
{
Scanner in = new Scanner(System.in);
System.out.println("Welcome to Currency Converter");
System.out.println("Enter the amount :");
double amt = in.nextInt();
CurrencyConverter cc = new CurrencyConverter();
System.out.println("DOLLOR="+amt+" is INR="+cc.dollortoinr(amt));
System.out.println("INR="+amt+" is DOLLOR="+cc.inrtodollor(amt));
System.out.println("EURO="+amt+" is INR="+cc.eurotoinr(amt));
System.out.println("INR="+amt+" is EURO="+cc.inrtoeuro(amt));
System.out.println("YEN="+amt+" is INR="+cc.yentoinr(amt));
System.out.println("INR="+amt+" is YEN="+cc.inrtoyen(amt));
}
public void Distance()
{
Scanner in = new Scanner(System.in);
System.out.println("Welcome to Distance Converter");
System.out.println("Enter the distance :");
```

```
double dis = in.nextInt();
DistanceConverter dd = new DistanceConverter();
System.out.println("METER="+dis+" is KM="+dd.metertokm(dis));
System.out.println("KM="+dis+" is METER="+dd.kmtometer(dis));
System.out.println("MILES="+dis+" is KM="+dd.milestokm(dis));
System.out.println("KM="+dis+" is MILES="+dd.kmtomiles(dis));
}
public void Time()
{
Scanner out = new Scanner(System.in);
System.out.println("Welcome to Time Converter");
System.out.println("Enter the time :");
double tim = out.nextInt();
TimeConverter tt = new TimeConverter();
System.out.println("HOURS="+tim+" is MINUTES="+tt. hourstominutes(tim));
System.out.println("MINUTES="+tim+" is HOURS="+tt.minutestohours(tim));
System.out.println("HOURS="+tim+" is SECONDS="+tt.hourstoseconds(tim));
System.out.println("SECONDS="+tim+" is HOURS="+tt.secondstohours(tim));
}
}
```

NOTE:

To Compile, go to CurrencyConverter folder
javac CurrencyConverter.java
To Compile, go to DistanceConverter folder
javac DistanceConverter.java
To Compile, go to TimeConverter folder
javac TimeConverter.java
To Compile,
javac Converter.java
To Run
java Converter


C:\Windows\system32\cmd.exe
D:\>javac Converter.java
D:\>java Converter
1.CurrencyConverter
2.DistanceConverter
3.TimeConverter
1
Welcome to Currency Converter
Enter the amount :
1
DOLLOR=1.0 is INR=67.86
INR=1.0 is DOLLOR=0.014736221632773357
EURO=1.0 is INR=79.18
INR=1.0 is EURO=0.012629451881788833
YEN=1.0 is INR=0.62
INR=1.0 is YEN=1.6129032258064517
D:\>java Converter
1.CurrencyConverter
2.DistanceConverter
3.TimeConverter
2
Welcome to Distance Converter
Enter the distance :
1
METER=1.0 is KM=0.001
KM=1.0 is METER=1000.0
MILES=1.0 is KM=1.60934
KM=1.0 is MILES=0.6234647181316O1
D:\>java Converter
1.CurrencyConverter
2.DistanceConverter
3.TimeConverter
3
Welcome to Time Converter
Enter the time :
1
HOURS=1.0 is MINUTES=60.0
MINUTES=1.0 is HOURS=0.016666666666666666
HOURS=1.0 is SECONDS=3600.0
SECONDS=1.0 is HOURS=2.7777777777777778E-4
D:\>java Converter
1.CurrencyConverter
2.DistanceConverter
3.TimeConverter
4
Invalid case