```java
//Object Oriented Programming Lab
//4th Program
import java.util.Scanner;
public class BubbleSortDesc1 {
    private static Scanner sc;
    public static void main(String[] args) {
        int i, j, Size, temp;
        sc = new Scanner(System.in);
        System.out.print("Enter the Bubble Sort Array size = ");
        Size = sc.nextInt();
        int[] arr = new int[Size];
        System.out.format("Enter Bubble Sort Array %d elements  = ", Size);
        for(i = 0; i < Size; i++)
        {
            arr[i] = sc.nextInt();
        }
        for(i = 0; i < arr.length; i++)
        {
            for(j = 0; j < arr.length - i - 1; j++)
            {
                if(arr[j] < arr[j + 1])
                {
                    temp = arr[j];
                    arr[j] = arr[j + 1];
                    arr[j + 1] = temp;
                }
            }
        }
        System.out.println("Bubble Sort to Sort Integers in Descending Order");
        for(i = 0; i < arr.length; i++)
        {
            System.out.println(arr[i]);
        }
    }
}
```

// 5th Program

```
class binarysearchdemo{
  public static int binarySearch(int arr[], int first, int last, int key){
    if (last>=first){
      int mid = first + (last - first)/2;
      if (arr[mid] == key){
      return mid;
      }
      if (arr[mid] > key){
      return binarySearch(arr, first, mid-1, key);//search in left subarray
      }else{
      return binarySearch(arr, mid+1, last, key);//search in right subarray
      }
    }
    return -1;
  }
  public static void main(String args[]){
    int arr[] = {10,20,30,40,50};
    int key = 60;
    int last=arr.length-1;
    int result = binarySearch(arr,0,last,key);
    if (result == -1)
      System.out.println("Element is not found!");
    else
      System.out.println("Element is found at index: "+result);
  }
}
```

// 7th Program

```
class AreaPeri{

  double side1;
  double side2;
  double side3;
AreaPeri(){
  side1 = side2 = side3 = 1 ;
}
AreaPeri(double s1,double s2,double s3){
  side1 = s1;
  side2 = s2;
  side3 = s3;
}
 double getArea(){
  double s = ( side1 + side2 + side3 ) / 2.0;
  double area=Math.sqrt(s*(s-side1)*(s-side2)*(s-side3));
  return area;
}
 double getPerimeter(){
  return( side1 + side2 + side3  );
}
```

```
void set(double s1 , double s2 , double s3){
  side1 = s1;
  side2 = s2;
  side3 = s3;
}
void get(AreaPeri app){
  side1 = app.side1;
  side2 = app.side2;
  side3 = app.side3;
  return;
}
}
class Triangle{
 public static void main(String args[]){
   /* for default constructor */
 AreaPeri ap = new AreaPeri();
 System . out . println("The area of the triangle" +ap.getArea());
  System . out . println("The perimeter of the triangle" +ap.getPerimeter());
   /* for parameterized constructor */
  AreaPeri ap1 = new AreaPeri(4,5,6);
  System . out . println("The area of triangle" +ap1.getArea());
  System . out . println("The perimeter of the triangle" +ap1.getPerimeter());
   /* for set method */
  AreaPeri ap2 = new AreaPeri();
  ap2.set(1.5,2.5,3.5);
  System . out . println("The area of the triangle" +ap2.getArea());
  System . out . println("The perimeter of the triangle" +ap2.getPerimeter());
   /* for get method */
  AreaPeri ap3 = new AreaPeri();
  ap3.get(ap2);
  System . out . println("The area of the triangle" +ap3.getArea());
  System . out . println("the perimeter of the triangle" +ap3.getPerimeter());
}
}
```

//9th Program

```
import java.util.*;
abstract class Shape{
        int length,breadth,radius;
        Scanner input=new Scanner(System.in);
        abstract void printArea();
}
class Rectangle extends Shape{
        void printArea(){
System.out.println("***finding the Area of Rectangle***");
System.out.println("enter the length and breadth:");
        length=input.nextInt();
        breadth=input.nextInt();
System.out.println("The Area of Rectangle is:" +(length*breadth));
}
}
class Triangle extends Shape{
        void printArea(){
System.out.println("***Finding the Area of Triangle***");
System.out.println("enter Base and Height");
        length=input.nextInt();
        breadth=input.nextInt();
System.out.println("The Area of Triangle is:" +(length*breadth)/2);
}
}
class Circle extends Shape{
        void printArea(){
System.out.println("***Finding the Area of Circle***");
System.out.println("enter the radius:");
        radius=input.nextInt();
System.out.println("The Area of Circle is:" +(3.14f*radius*radius));
}
}
public class AbstractClassExample{
public static void main(String args[]){
        Rectangle rec=new Rectangle();
        rec.printArea();
        Triangle tri=new Triangle();
        tri.printArea();
        Circle cri=new Circle();
        cri.printArea();
}
}
```

//10th Program

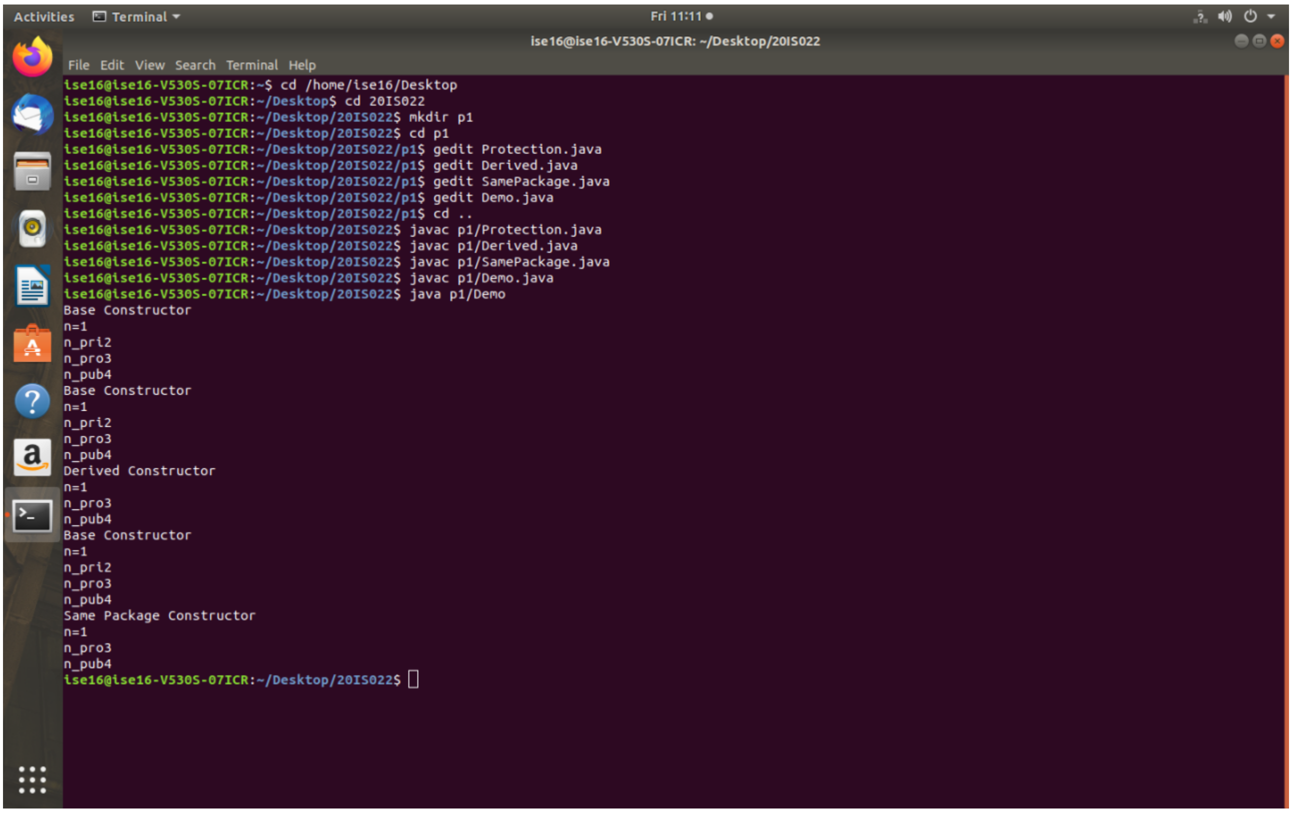
```
package p1;
public class Protection{
        int n = 1;
        private int n_pri = 2;
        protected int n_pro = 3;
        public int n_pub = 4;
public Protection(){
        System.out.println("Base Constructor");
        System.out.println("n=" +n);
        System.out.println("n_pri" +n_pri);
        System.out.println("n_pro" +n_pro);
        System.out.println("n_pub" +n_pub);
}
}


package p1;
class Derived extends Protection{
Derived(){
        System.out.println("Derived Constructor");
        System.out.println("n=" +n);
//class only
// System.out.println("n_pri" +n_pri);
  System.out.println("n_pro" +n_pro);
  System.out.println("n_pub" +n_pub);
}
}

package p1;
class SamePackage{
        SamePackage(){
         Protection p = new Protection();
         System.out.println("Same Package Constructor");
         System.out.println("n=" +p.n);
```

```
            //class only
            //System.out.println("n_pri" +p.n_pri);
            System.out.println("n_pro" +p.n_pro);
            System.out.println("n_pub" +p.n_pub);
}
}

package p1;
public class Demo{
            public static void main(String args[]){
             Protection ob1=new Protection();
             Derived ob2=new Derived();
             SamePackage ob3=new SamePackage();
}
}
```

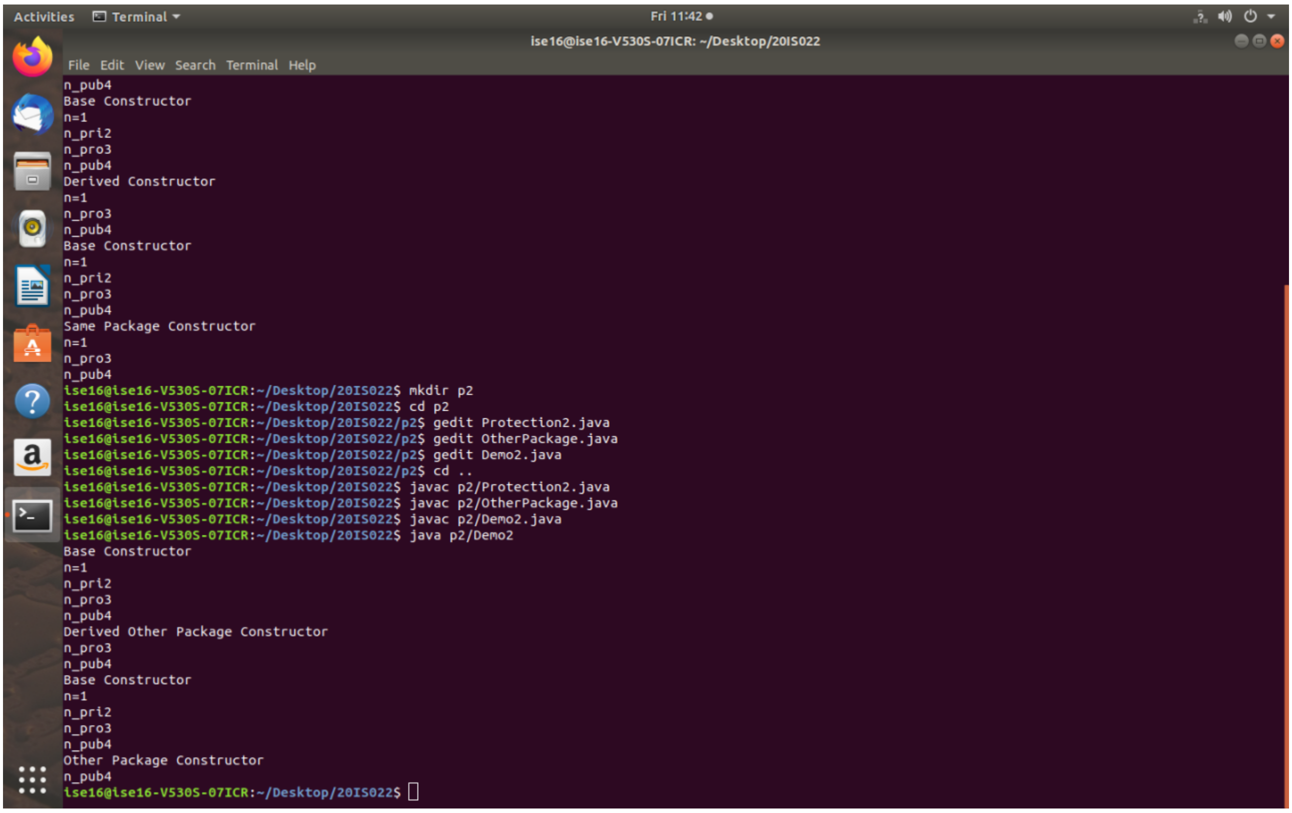


Activities
Terminal
Fri 11:11
ise16@ise16-V530S-07ICR: ~/Desktop/20IS022
File Edit View Search Terminal Help

```
ise16@ise16-V530S-07ICR:~$ cd /home/ise16/Desktop
ise16@ise16-V530S-07ICR:~/Desktop$ cd 20IS022
ise16@ise16-V530S-07ICR:~/Desktop/20IS022$ mkdir p1
ise16@ise16-V530S-07ICR:~/Desktop/20IS022$ cd p1
ise16@ise16-V530S-07ICR:~/Desktop/20IS022/p1$ gedit Protection.java
ise16@ise16-V530S-07ICR:~/Desktop/20IS022/p1$ gedit Derived.java
ise16@ise16-V530S-07ICR:~/Desktop/20IS022/p1$ gedit SamePackage.java
ise16@ise16-V530S-07ICR:~/Desktop/20IS022/p1$ gedit Demo.java
ise16@ise16-V530S-07ICR:~/Desktop/20IS022/p1$ cd ..
ise16@ise16-V530S-07ICR:~/Desktop/20IS022$ javac p1/Protection.java
ise16@ise16-V530S-07ICR:~/Desktop/20IS022$ javac p1/Derived.java
ise16@ise16-V530S-07ICR:~/Desktop/20IS022$ javac p1/SamePackage.java
ise16@ise16-V530S-07ICR:~/Desktop/20IS022$ javac p1/Demo.java
ise16@ise16-V530S-07ICR:~/Desktop/20IS022$ java p1/Demo
Base Constructor
n=1
n_pri2
n_pro3
n_pub4
Base Constructor
n=1
n_pri2
n_pro3
n_pub4
Derived Constructor
n=1
n_pro3
n_pub4
Base Constructor
n=1
n_pri2
n_pro3
n_pub4
Same Package Constructor
n=1
n_pro3
n_pub4
ise16@ise16-V530S-07ICR:~/Desktop/20IS022$
```

```
package p2;
class Protection2 extends p1.Protection{
        Protection2(){
        System.out.println("Derived Other Package Constructor");
//class or package only
//System.out.println("n=" +n);
//class only
//System.out.println("n_pri" +n_pri);
        System.out.println("n_pro" +n_pro);
        System.out.println("n_pub" +n_pub);
}
}
```

```
package p2;
class OtherPackage{
        OtherPackage(){
         p1.Protection p=new p1.Protection();
         System.out.println("Other Package Constructor");
//class or package only
//System.out.println("n=" +p.n);
//class only
//System.out.println("n_pri" +p.n_pri);
//class,subclass or package only
//System.out.println("n_pro" +p.n_pro);
        System.out.println("n_pub" +p.n_pub);
}
}
package p2;
public class Demo2{
public static void main(String args[]){
        Protection2 ob1=new Protection2();
        OtherPackage ob2=new OtherPackage();
}
}
```



Activities
Terminal
Fri 11:42
ise16@ise16-V530S-07ICR: ~/Desktop/20IS022
File Edit View Search Terminal Help

```
n_pub4
Base Constructor
n=1
n_pri2
n_pro3
n_pub4
Derived Constructor
n=1
n_pro3
n_pub4
Base Constructor
n=1
n_pri2
n_pro3
n_pub4
Same Package Constructor
n=1
n_pro3
n_pub4
ise16@ise16-V530S-07ICR:~/Desktop/20IS022$ mkdir p2
ise16@ise16-V530S-07ICR:~/Desktop/20IS022$ cd p2
ise16@ise16-V530S-07ICR:~/Desktop/20IS022/p2$ gedit Protection2.java
ise16@ise16-V530S-07ICR:~/Desktop/20IS022/p2$ gedit OtherPackage.java
ise16@ise16-V530S-07ICR:~/Desktop/20IS022/p2$ gedit Demo2.java
ise16@ise16-V530S-07ICR:~/Desktop/20IS022/p2$ cd ..
ise16@ise16-V530S-07ICR:~/Desktop/20IS022$ javac p2/Protection2.java
ise16@ise16-V530S-07ICR:~/Desktop/20IS022$ javac p2/OtherPackage.java
ise16@ise16-V530S-07ICR:~/Desktop/20IS022$ javac p2/Demo2.java
ise16@ise16-V530S-07ICR:~/Desktop/20IS022$ java p2/Demo2
Base Constructor
n=1
n_pri2
n_pro3
n_pub4
Derived Other Package Constructor
n_pro3
n_pub4
Base Constructor
n=1
n_pri2
n_pro3
n_pub4
Other Package Constructor
n_pub4
ise16@ise16-V530S-07ICR:~/Desktop/20IS022$ 
```

//11th Program

```
class TrunkCall
{
  double duration;
  double charge;
TrunkCall()
{
  duration=0;
}
TrunkCall(double d)
{
  duration=d;
}
void calcCharge()
{
  System.out.println("No Policy");
}
}
class OrdinaryCall extends TrunkCall
{
  double call_rate;
OrdinaryCall()
{
  super();
  call_rate=0.60;
}
OrdinaryCall(double d)
{
  super(d);
  call_rate=0.60;
}
OrdinaryCall(double d , double f)
{
  super(d);
  call_rate=f;
}
void calcCharge()
{
  charge=duration*call_rate;
  System.out.println("For OrdinaryCall charge:" +charge);
}
}
class UrgentCall extends TrunkCall
{
  double call_rate;
UrgentCall()
{
  super();
  call_rate=1.0;
}
UrgentCall(double d)
{
  super(d);
  call_rate=1.0;
}
UrgentCall(double d , double f)
{
  super(d);
  call_rate=f;
}
void calcCharge()
{
  charge=duration*call_rate;
  System.out.println("For UrgentCall charge:" +charge);
}
}
class LightningCall extends TrunkCall
```

```
{
 double call_rate;
LightningCall()
{
 super();
 call_rate=1.2;
}
LightningCall(double d)
{
  super(d);
  call_rate=1.2;
}
LightningCall(double d , double f)
{
 super(d);
 call_rate=f;
}
void calcCharge()
{
 charge=duration*call_rate;
 System.out.println("For LightningCall charge:" +charge);
}
}
class Telephone
{
 public static void main(String args[])
{
 TrunkCall tref;
```

```
  OrdinaryCall ordCall=new OrdinaryCall(4);
  UrgentCall  urgCall=new UrgentCall(1.0,2.0);
  LightningCall ligCall=new LightningCall(2.0,3.0);
  tref=ordCall;
  tref.calcCharge();
  tref=urgCall;
  tref.calcCharge();
  tref=ligCall;
  tref.calcCharge();
}
}
```

//12th Program

```
class Player{
String name;
int age,matches,ranking;
Player(String n,int a,int m,int r){
name=n;
age=a;
matches=m;
ranking=r;
}
}
 class CricketPlayer extends Player{
int High_score,Bowl_average,Bat_average;
CricketPlayer(String a,int b,int c,int d,int e,int f,int g){
super(a,b,c,d);
High_score=e;
Bat_average=f;
```

```
Bowl_average=g;
}
 void disp(){
System.out.println("Name:" +name);
System.out.println("Age:" +age);
System.out.println("No. of matches:" +matches);
System.out.println("Highscore:" +High_score);
System.out.println("Batting average:" +Bat_average);
System.out.println("Balling average:" +Bowl_average);
System.out.println("Player ranking:" +ranking);
}
}
class FootballPlayer extends Player{
int goals,g_avg,pass;
FootballPlayer(String a,int b,int c,int d,int e,int f, int g){
super(a,b,c,d);
goals=e;
g_avg=f;
pass=g;
}
void disp(){
System.out.println("Name:" +name);
System.out.println("Age:" +age);
System.out.println("no.of matches:" +matches);
System.out.println("no.of Goals:" +goals);
System.out.println("goals average:" +g_avg);
System.out.println("passing efficiency:" +pass+"%");
System.out.println("player ranking:" +ranking);
```

```
}
}
class HockeyPlayer extends Player{
int goals,g_avg,pass;
HockeyPlayer(String a,int b,int c,int d,int e, int f,int g){
super(a,b,c,d);
goals=e;
g_avg=f;
pass=g;
}
void disp(){
System.out.println("Name:" +name);
System.out.println("Age:" +age);
System.out.println("no.of matches:" +matches);
System.out.println("no. of goals:" +goals);
System.out.println("goal average:" +g_avg);
System.out.println("passing efficiency:" +pass+"%");
System.out.println("player ranking:" +ranking);
}
}
class PlayerDemo{
public static void main(String args[]){
CricketPlayer C=new CricketPlayer("sachin Tendulkar",38,600,8,200,55,60);
FootballPlayer F=new FootballPlayer("Leonel Messi",32,120,90,3,80,94);
HockeyPlayer H=new HockeyPlayer("Dhanraj Pillay",32,120,90,3,80,94);
C.disp();
F.disp();
H.disp();
```

```
}
}
```

//14th Program

```
//InterfaceMain.java
import java.io.*;

interface area{
float compute(float x,float y);
}
class rectangle{
public float compute(float x,float y)
 {
  return(x*y);
 }
}
class triangle{
public float compute(float x,float y)
 {
   return(x*y/2);
 }
}
class result extends rectangle implements area{
public float compute(float x,float y)
 {
  return(x*y);
 }
}
class result1 extends triangle implements area{
```

```
public float compute(float x,float y)
 {
   return(x*y/2);
 }
}
class InterfaceMain{
public static void main(String args[]){
        result rect=new result();
        result1 tri=new result1();
        area a;
        a=rect;
System.out.println("\nArea of rectangle:" +a.compute(10,20));
        a=tri;
System.out.println("\n Area of triangle:" +a.compute(10,2));
}
}
```

//15th Program

```
import java.io.*;
interface operations
{
 void push();
 void pop();
 void display();
}
class Fstack implements operations
{
private int top=-1;
private int[] fstack=new int[5];
```

```
BufferedReader br=new BufferedReader(new InputStreamReader(System.in));
public void push()
{
 if(top==fstack.length-1)
System.out.println("\n Stack is Overflow");
else
{
try
{
System.out.println("enter the item:\t");
fstack[++top]=Integer.parseInt(br.readLine());
}
catch(Exception e)
{
System.out.println(e);
}
}
}
public void pop()
{
 if(top==-1)
System.out.println("\n stack is underflow");
else
System.out.println("\n Deleted item is:\b" +fstack[top--]);
}
public void display()
{
if(top==-1)
```

```
System.out.println("\n stack is empty");
else
{
System.out.println("the elements of stack are:");
for(int i=top;i>=0;i--)
System.out.println(fstack[i]);
}
}
}
class Dstack implements operations
{
private int top=-1;
private int[] dstack;
Dstack(int size)
{
dstack=new int[size];
}
BufferedReader br=new BufferedReader(new InputStreamReader(System.in));
public void push()
{
if(top==dstack.length-1)
System.out.println("\n Stack Overflow");
else
{
try
{
System.out.println("enter the item:\t");
dstack[++top]=Integer.parseInt(br.readLine());
}
catch(Exception e)
{
System.out.println(e);
}
}
}
public void pop()
{
if(top==-1)
System.out.println("\n stack underflow");
else
System.out.println("\n the deleted item:\b" +dstack[top--]);
}
public void display()
{
if(top==-1)
System.out.println("\n stack is empty");
else
System.out.println(" the elements of stack are:");
for(int i=top;i>=0;i--)
System.out.println(dstack[i]);
}
}

class stackinterface
{
public static void main(String args[])throws IOException
```

```
{
int ch;
BufferedReader br=new BufferedReader(new InputStreamReader(System.in));
while(true)
{
System.out.println("\n1.Fixed_stack\n 2.Dynamic_stack\n 3.exit");
System.out.println("\n enter your choice:\t");
ch=Integer.parseInt(br.readLine());
switch(ch)
{
case 1:operations obj=new Fstack();
    while(true)
   {
    System.out.println("\n1.PUSH\n2.POP\n3.DISPLAY\n4.MAIN_MENU");
    System.out.println("enter your choice:\t");
    ch=Integer.parseInt(br.readLine());
    switch(ch)
    {
    case 1:obj.push();
        break;
        case 2:obj.pop();
            break;
        case 3:obj.display();
            break;
        case 4:break;
        default:System.out.println("invalid choice");
        }
    if(ch==4)
```

```
        break;
        }
        break;
case 2:System.out.println("enter the size of array\n");
        int size=Integer.parseInt(br.readLine());
        operations obj1=new Dstack(size);
        while(true)
        {
        System.out.println("\n 1.PUSH\n2.POP\n3.DISPLAY\n4.MAIN_MENU");
        System.out.println("enter your choice:\t");
        ch=Integer.parseInt(br.readLine());
        switch(ch)
        {
        case 1:obj1.push();
            break;
        case 2:obj1.pop();
             break;
        case 3:obj1.display();
            break;
        case 4:break;
        default:System.out.println("invalid choice");
        }
        if(ch==4)
        break;
        }
        break;
case 3:System.exit(0);
default:System.out.println("\ninvalid choice");
```

```
}
}
}
}
```

//16th Program

```
package Balance;
public class Account
{
 double principal,rate,balance;
 int time;
public Account(double pr,int ti,double ra)
{
  principal=pr;
  time=ti;
  rate=ra;
}
public void calcAmount()
{
balance=principal*rate*time;
}
public void DisplayBalance()
{
 System.out.println("\n\n Principal Amount:" +principal+ "Rs\n Time:" +time+ "years\n\n current Balance:" +balance+"Rs");
}
}
```

```
import Balance.Account;
class DemoPackage
{
public static void main(String args[])
{
 Account acc=new Account(5000,2,3);
  acc.calcAmount();
  acc.DisplayBalance();
}
}
```

//17th Program

```
class Collision
{
String DirectionTrain1,DirectionTrain2;
Collision(String dir1,String dir2)
{
DirectionTrain1=dir1;
DirectionTrain2=dir2;
}
void checkCollision()
{
try
{
if(DirectionTrain1==DirectionTrain2)
{
System.out.println("The two vehicles are moving in same direction,hence no collision in pair1");
}
else
{
throw new Exception("The two vehicles are moving in opposite directions,so collission occurs in pair2");
}
}
catch(Exception e)
{
System.out.println(e);
}
}
}
class ExceptionDemo{
public static void main(String args[])
{
Collision pair1=new Collision("north","north");
Collision pair2=new Collision("north","south");
pair1.checkCollision();
System.out.println();
pair2.checkCollision();
System.out.println();
}
}
```

//20th Program

```
import java.io.*;
class Enumaration
{
 public enum DayOfWeek
{
MONDAY(1),TUESDAY(2),WEDNESDAY(3),THURSDAY(4),FRIDAY(5),SATURDAY(6),SUNDAY(7);
 public int val;
DayOfWeek(int val)
{
  this.val=val;
}
boolean isWorkDay()
{
 if(val<6)
 return true;
 else
 return false;
}
}
public static void main(String args[])
{
  DayOfWeek Day;
 System.out.println("verification of sunday(isWorkDay())");
 System.out.println(DayOfWeek.SUNDAY.isWorkDay());
 System.out.println("verification of wednesday(isWorkDay())");
 System.out.println(DayOfWeek.WEDNESDAY.isWorkDay());
}
}
```