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1. class Example
{ public static void main (string a[])
{ system.out.println ("Hello");
}
} Saved as 'Example.java' in Desktop

OUTPUT :

```
cd Desktop
javac Example.java
java Example
Hello World
```

Commands in cmd prompt

2. class Example Fibonacci Series
{ public static void main (String str[])
{ int i, n=7, a=0, b=1, c;
system.out.println (a);
system.out.println (b);
for (i=0; i<n; i++)
{ system.out.println (a+b);
c = a+b;
a = b;
b = c;
}
}
}

Saved as 'Example.java' in Desktop

OUTPUT :

```
cd Desktop
javac Example.java // compiling file 'Example'
java Example // running 'Example' class
0 1 1 2 3 5 8 13 21
```

3. Prime No.

```
import java.io.*;
import java.util.Scanner;
class prime
{ public static void main(String args[])
  {  int n;
     Scanner obj = new Scanner (System.in);
     System.out.println("Enter the number:");
     n = obj.nextInt();
     int i, c=2;
     for(i=2; i<n; i++)
     {  if(n%i==0)
        c++;
     }
     if(c>2 || n==0 || n==1)
     {  System.out.println(n+" is not prime");
     }
     else
     {  s.o.println(n+" is prime");
     }
  }
}
```

Saved as Example.java in Desktop

OUTPUT:

```
cd C:\Users\gau682\OneDrive\Desktop
javac Example.java
java prime
Enter the number: 1
1 is not prime
```

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Q. Input

```
{ public static void main(String a[])
  {
    Scanner s = new Scanner (System.in);
```

Q. Question is in Notes.

```
import java.util.scanner;
class grocery
{ double dal, pulse, sugar;
  grocery(double a, double b, double c)
  {  dal = a;
     pulse = b;
     sugar = c;
  }
  grocery(double a)
  {  dal = a;
     pulse = a;
     sugar = a;
  }
  grocery()
  {  dal = 1;
     pulse = 1;
     sugar = 0.5;
  }
  grocery (grocery obj)
  {  dal = obj.dal;
     pulse = obj.pulse;
     sugar = obj.sugar;
  }
  void total()
  { s.o.p.("Total is: ");
    s.o.p.(dal*150 + pulse*80 + sugar*50);
  }
}
```

```
class main
{  p.s.v.m (String args[])
   {  Scanner s = new Scanner (System.in);
      S.O.p. ("Enter quantity of dal:");
      double a = s.nextDouble();
      S.O.p. ("Enter quantity of pulse: ");
      double b = s.nextDouble();
      S.O.p. ("Enter quantity of sugar:");
      double c = s.nextDouble();

      grocery g1 = new grocery(a,b,c);
      grocery g2 = new grocery (a);
      grocery g3 = new grocery();
      grocery g4 = new grocery (g1);
      g1.total();
      g2.total();
      g3.total();
      g4.total();
   }
}
```

Save as main.java [∵ main class/block should be executed in cmd prompt]

OUTPUT:

```
Enter quantity of dal: 20
Enter —11— pulse: 10
—11— sugar: 5
Total is: 4050
—11— : 5600
—11— : 255
—11— : 4050
```

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LAB - 1

1. Student DataBase:

```
import java.util.Scanner;
class Student
{  private String usn;
   private String name;
   private int[] marks;

   public Student (String usn, String name)
   {  this.usn = usn;
      this.name = name;
      this.marks = new int[5];
   }

   public void acceptDetails()
   {  Scanner s = new Scanner(System.in);
      System.out.print ("Enter USN: ");
      this.usn = s.nextLine();
      System.out.print ("Enter Name: ");
      this.name = s.nextLine();
      for(int i=0; i<marks.length; i++)
      {  System.out.print ("Enter marks for Subject " + (i+1) + ":");
         this.marks[i] = s.nextInt();
      }
   }

   public double calculatePercentage()
   {  double totalMarks = 0;
      for (int i=0; i<6; i++)
         totalMarks += marks[i];
      return totalMarks/marks.length;
   }

   If it is int totalMarks = 0;
   return (double) totalMarks/marks.length;
```

```
public void displayDetails()
{ public void
System.out.print("USN: " + this.usn);
System.out.print("Name: " + this.name);
System.out.print("Marks: ");
for(int i=0; i<marks.length; i++)
{ System.out.print("Subject " + (i+1) + ":
  + marks[i] + " ");
}
System.out.println();
public double calculatePercentage()
{ int totalMarks = 0;
for
totalMarks += mark;
}
return
}
System.out.println("Avg. Marks: " +
calculatePercentage() + "%.");
}
}

public class StudentRun
{ p.s.v.m(String[] args)
{ Scanner sc = new Scanner(System.in);
Sys.out.print("Enter no. of students: ");
int numStudents = s.nextInt();
Student[] students = new Student[numStudents];

for(int i=0; i<numStudents; i++)
{ S.O.pln("\n Enter details for
Student" + (i+1) + ":");
students[i] = new Student("", "");
students[i].acceptDetails();
}
Sys.out.println("\n Details of Students:");
for(Student student: students)
{ Student.displayDetails();
S.O.pln("\n ----------");
}
}
}
```

OUTPUT:

```
Enter no. of Students: 1
Enter Details for Student 1:
Enter USN: 1BM22CS100
Enter Name: Gaurav
Enter marks for subject 1: 30
        ||          2: 40
        ||          3: 39
        ||          4: 38
        ||          5: 27
        ||          6: 28
Details of Students:
USN: 1BM22CS100
Name: Gaurav
Marks: Subject 1: 30
       2: 40
       3: 39
       4: 38
       5: 27
       6: 28
Avg. Marks: 33.67
```

2. Book DataBase Record :

```
import java.util.Scanner;

class Books
{   String Name;
    String Author;
    int price;
    int numPages;

    Books (String Name, String Author,
           int price, int numPages)
    {   this.Name = Name;
        this.Author = Author;
        this.numPages = numPages;
        this.price = price;
    }

    public String toString()
    {   String name, author, price, numPages;
        name = "Book name: " + this.Name + "\n";
        author = "Author name: " + this.Author + "\n";
        numPages = "Number of Pages: " +
                   this.NumPages + "\n";
        price = "Price: " + this.price + "\n";

        return name + author + numPages + price;
    }
}
```

```
class BooksRun
{   p.s.v.m (String[] args)
    {   Scanner s = new Scanner(System.in);
        int n;
        String Name;
        String Author;
        int price, numPages;
        S.O.p("Enter no. of books: ");
        n = s.nextInt();
        Books b[] = new Books[n];

        for(int i=0; i<n; i++)
        {   S.O.println("");
            S.O.p("Enter name of Book: ");
            Name = s.next();
            S.O.p("Enter name of Author: ");
            Author = s.next();
            S.O.p("Enter price: ");
            price = s.nextInt();
            S.O.p("Enter num of Pages: ");
            numPages = s.nextInt();

            b[i] = new Books(Name, Author, price,
                             numPages);
        }
        for(int i=0; i<n; i++)
        {   S.O.pln("\nBook" + (i+1));
            S.O.pln(b[i].toString());
        }
    }
}
```

OUTPUT:

```
Enter no of Books: 2
Enter name of Book: SteveJobs
Enter name of author: Franklin
Enter price: 2500
Enter num of pages: 280
Enter name of book: MeinKahf
Enter name of author: Hitler
Enter price: 999
Enter num of pages: 399
Book 1:
Book Name: SteveJobs
Author Name: Franklin
Number of pages: 280
Price: 2500
Book 2:
Book Name: MeinKahf
Author Name: Hitler
Number of Pages: 399
Price: 999
```

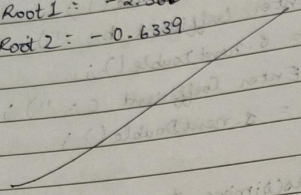
3. Roots of a Quadratic Equation:

```
import java.util.Scanner;

public class Quadratic
{ p.s.v.m (String[] args)
  { Scanner s = new Scanner (System.in);
    s.o.p ("Enter Coefficient a: ");
    double a = s.nextDouble();
    s.o.p ("Enter Coefficient b: ");
    double b = s.nextDouble();
    s.o.p ("Enter Coefficient c: ");
    double c = s.nextDouble();

    double discriminant = b*b - 4*a*c;
    if (discriminant > 0)
    { double root1 = (-b + Math.sqrt(discriminant))/(2*a);
      double root2 =
          (-b - Math.sqrt(discriminant))/(2*a);
      System.out.println("Root 1: " + root1);
      System.out.println("Root 2: " + root2);
    }
    else if (discriminant == 0)
    { double root = -b/(2*a);
      System.out.println("Root: " + root);
    }
    else
    { double realpart = -b/(2*a);
      double imaginary = Math.sqrt(-discriminant)/(2*a);
      System.out.println("Root1: " +
          realpart + "+" + imaginary + "i");
      System.out.println("Root2: " + realpart
          + "-" + imaginary + "i");
    }
```

}
}

OUTPUT:

```
Enter coefficient a: 2
Enter coefficient b: 6
Enter coefficient c: 3
Root 1 : -2.3660
Root 2 : -0.6339
```



LAB-2

22/1

1. Develop a Java Program to create an abstract class named shape that contains two integers & an empty method named printArea().

```
import java.util.*
abstract class shape
{   protected int dim1;
    protected int dim2;
    public shape (int dim1, int dim2)
    {   this.dim1 = dim1;
        this.dim2 = dim2;
    }
    public abstract void printArea();
}

class Rectangle extends shape
{   public Rectangle (int length, int width)
    {   super(length, width);
    }
    public void printArea()
    {   int area = dim1 * dim2;
        S.O.Pln ("Area of Rectangle" + area);
    }
}

class Triangle extends shape
{   public Triangle (int base, int height)
    {   super (base, height);
    }
    public void printArea()
    {   double Area = 0.5 * dim1 * dim2;
        S.O.Pln ("Area of Triangle" + area);
    }
}
```

```
class circle extends shape
{ public Circle (int radius)
  { super (radius, 0);
  }
public void printArea()
  { double area = Math.PI * dim1 * dim1;
    S.O.Pln ("Area of circle" + area);
  }
}

public class Main
{ p.s.v.m (String[] args)
  { Rectangle r = new Rectangle (4,5);
    r.printArea();
    Triangle t = new Triangle (3,6);
    t.printArea();
    Circle c = new Circle (7);
    C.printArea();
  }
}
```

OUTPUT =

Area of Rectangle : 20
Area of Triangle : 9
Area of Circle : 153.00

2. Bank

```
import java.util.Scanner;
class Account
{ String custName;
  int accNo;
  String acctype;
  double bal;

Account (String custName, int accNo,
         String acctype, double bal)
{ this.custName = custName;
  this.accNo = accNo;
  this.acctype = acctype;
  this.bal = bal;
}

void deposit (double amount)
{ bal += amount;
  S.O.Pln ("Balance = " + bal);
}

void displayBal()
{ S.O.Pln ("Balance : " + bal); }

void withdraw (double amount)
{ if (bal < amount)
  { S.O.Pln ("Insufficient balance");
    return;
  }
  bal = amount;
  S.O.Pln ("Withdrawal of " + amount +
           " successful");
}
}
```

```
class SavingsAcc extends Account
{ SavingsAcc (String custName, int accNO,
    String acctype, double bal)
  { super (custName, accNO,
      acctype, bal)
  }
  void compoundint()
  { double rate = 0.05;
    double time = 1.0;
    double interest = bal * Math.pow (1+
      rate, time) - bal;
    bal -= amount;
    S.O.Pln ("Withdrawal of " + amount +
      " successful");
  }
}

class CurrentAcc extends Account
{ double minbal = 1000;
  double servicecharge = 50;

  currentAcc (String custName, int accNO,
    String acctype, double bal)
  { super (custName, accNO, acctype,
      bal);
  }

  void withdraw (double amt)
  { if (bal - amt < minbal)
    { S.O.Pln ("Insufficient Balance");
      return;
    }
    balance -= amt;
    S.O.Pln ("Withdrawal of " + amt + "Successful");
  }

  void imposeservicecharge ()
  { if (bal < minbal)
    { bal -= servicecharge;
      S.O.Pln ("Service charge of " +
        servicecharge + " imposed");
    }
  }
}

class Bank
{ p.s.v.m (String [] args)
  { Scanner S = new Scanner (System.in);
    S.O.P ("Enter customer Name: ");
    String custName = S.nextline(); → Can include spaces
    S.O.P ("Enter account number:");
    int accNo. = S.nextInt();
    S.O.P ("Enter Account Type (Savings | Current):");
    String acctype = S.next(); → Can't have spaces.
    S.O.Pln ("Enter Initial Balance:");
    double bal = S.nextDouble();

    Account a;
    if (acctype.equals ("Savings"))
    { a = new SavingsAcc (custName, accNO,
        acctype, bal);
    }
    else
    { a = new CurrentAcc (custName, accNO,
        acctype, bal); }

    while (True)
    { S.O.Pln ("1. Deposit");
      S.O.Pln (" 2. Display Balance \n 3. Compute & Deposit interest \n 4. Withdraw \n
```

5. Exit \n 6. Enter Choice : ");
int choice = s.nextInt();
switch (choice)
{ case 1: S.O.P ("Enter amount to Deposit : ");
double amt = s.nextDouble();
a.deposit (amount);
break;
case 2: a.displayBal();
break;
case 3: if(a instanceof SavingsAcc)
{ ((SavingsAcc)a).compoundint();
}
else
{ S.O.Pln("Interest not available for current account");
} break;
case 4: S.O.Pln("Enter amount to withdraw:");
double amount = s.nextdouble();
a = withdraw(amount);
if(a instanceof CurrentAcc)
{ ((CurrentAcc)a).imposeServicecharge();
}
break;
case 5: System.exit(0);
}
}
}
}

LAB - 3

2a/1

1. Package CIE having 2 class - Student Eg Internals.
Package SEE having 1 class - Externals

Student.java :-
```
package CIE;
public class student
{ public string usn, name;
  public int sem;
  public student(string USN, string name,
      int sem)
  { this.usn = usn;
    this.name = name;
    this.sem = sem;
  }
}
```

Internals.java :-
```
package CIE;
public class Internals extends student
{ public int m[] = new int[5];
  public Internals(string USN, string name,
      int sem, int[] m)
  { super(usn, name, sem);
    this.m = m;
  }
}
```

Externals.java :-
```
package SEE;
import CIE.student;
public class Externals extends Student
{ public int sm[] = new int[5];
  public Externals(string usn, Stoing name,
      int sem, int[] sm)
```

```
    { super(usn, name, sem);
      this.sm = sm;
    }
}
```

Main.java :-

```
import java.util.*;
import CIE.student;
import CIE.Internals;
import SEE.*;
public class main
{ psvm(String args[])
  { int fm=0;
    Scanner in = new Scanner(System.in);
    S.O.println("Enter no. of students : ");
    int n = in.nextInt();
    Internals []im = new Internals[n];
    Externals []em = new Externals[n];
    Student []stu = new Student[n];
    for(int i=0; i<n; i++)
    { S.O.println("Enter details of student" + (i+1) +
      + ":");
      S.O.println("Enter name:");
      in.nextLine();
      String name = in.nextline();
      S.O.println("Enter USN:");
      String usn = in.nextline();
      S.O.println("Enter Semester:");
      int sem = in.nextInt();
      int []imarks = new int[5];
      int []emarks = new int[5];
      S.O.println("Enter marks details:");
      for(int j=0; j<5; j++)
      { S.O.println("Enter internal marks
        for course" + (j+1) + ":");
        imarks[j] = in.nextInt();
        S.O.println("Enter SEE marks for
          course" + (j+1) + ":");
        emarks[j] = in.nextInt();
      }
      stu[i] = new Student(usn, name, sem);
      im[i] = new Internals(usn, name, sem,
                            imarks);
      em[i] = new Externals(usn, name, sem,
                            emarks);
    }
    S.O.println("Final marks Details:");
    for(int i=0; i<n; i++)
    { S.O.println("Student" + (i+1) + ":");
      S.O.println("Name:" + stu[i].name);
      S.O.println("USN:" + stu[i].usn);
      S.O.println("Sem:" + stu[i].sem);
      for(int j=0; j<5; j++)
      { fm += im[i].m[j] + em[i].sm[j];
        S.O.println("Finals marks of Course" +
        (j+1) + ":" + fm);
        fm = 0;
      }
      S.O.println();
    }
  }
}
```

Folder Structure :

Folder : CIE → Internals.java , Student.java
SEE → Externals.java

Main.java

OUTPUT:

```
Enter no of students: 1
Enter details for student 1:
Enter Name: Gaurav
Enter USN: 45678
Enter Semester: 3
Enter marks details:
Enter internal marks for course 1: 34
        SEE                      : 98
        internal   course 2: 39
        SEE                      : 97
        internal   course 3: 33
        SEE                      : 56
        internal   course 4: 33
        SEE                      : 64
        internal   course 5: 40
        SEE                      : 90
Final marks details:
Student 1:
Name: Gaurav
USN: 45678
Sem: 3
Final marks of course 1 : 132
        course 2 : 136
        course 3 : 89
        course 4 : 97
        course 5 : 130
```

1. Exception Handling:

```
import java.util.*;
class WrongAge extends Exception
{ public WrongAge()
    { super("Invalid age provided");
    }
}
class Father
{ int fage;
  public Father(int fage) throws WrongAge
    { this.fage = fage;
      if(fage < 0)
      { throw new WrongAge();
      }
      else
      { S.O.println("Age of father is " + fage);
      }
    }
}
class Son extends Father
{ int sage;
  public Son(int fage, int sage) throws WrongAge
    { super(fage);
      this.sage = sage;
      if(sage >= fage)
      { throw new WrongAge();
      }
      else
      { S.O.println("Age of Son is " + sage);
      }
    }
}
```

```
class Agerun
{ psvm(String args[])
  { Scanner s = new Scanner(System.in)
    int fatherage, sonage;
    S.o.pln("Enter father's age: ");
    fatherage = s.nextInt();
    S.o.pln("Enter son's age: ");
    sonage = s.nextInt();
    try
    { Father f = new Father(fatherage);
      Son so = new Son(sonage);
    }
    catch(WrongAge e)
    { s.o.pln("Exception Caught");
    }
  }
}
```

OUTPUT:

1. Enter father's age: 19
   Enter son's age: 25
   Exception Caught

2. Enter father's age: 32
   Enter son's age: 4
   Age of Father is 32
   Age of son is 4

2. Multi Threading:

```
class Display implements Runnable
{ String message;
  int interval;
  public Display(String message, int interval)
  { this.message = message;
    this.interval = interval;
  }
@Override
  public void run()
  { try
    { while(true)
      { s.o.pln(message);
        Thread.sleep(interval);
      }
    }
    catch(InterruptedException e)
    { s.o.pln(e);
    }
  }
}
class DisplayRun
{ psvm(String args[])
  { Thread t1 = new Thread(new Display("BMC.SE", 10000));
    t1.start();
    Thread t2 = new Thread(new Display("CSE", 2000));
    t2.start();
  }
}
```

OUTPUT:

BMSCE
CSE
CSE
CSE
CSE
CSE
BMSCE
CSE
CSE
CSE
CSE
CSE
BMSCE
:
:
:
5 times 'CSE'

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26/2

AWT

1. Creating label, button & Textfield in a Frame using AWT

```
import java.awt.*;
import java.awt.event.*;
public class AWTExample extends WindowAdapter
{   Frame f;
    AWTExample()
    {   f = new Frame();
        f.addWindowListener(this);
        Label l = new Label("Employee id:");
        Button b = new Button("Submit");
        TextField t = new TextField();
        l.setBounds(20,80,80,30);
        t.setBounds(20,100,80,30);
        b.setBounds(100,100,80,30);
        f.add(b);
        f.add(l);
        f.add(t);
        f.setSize(400,300);
        f.setTitle("Employee info");
        f.setLayout(null);
        f.setVisible(true);
    }
    public void windowClosing(WindowEvent e)
    {   System.exit(0);
    }
    public static void main(String[] args)
    {   AWTExample awt_obj = new AWTExample;
    }
}
```

2. Create a button & add a action listener for mouse click.

```
import java.awt.*;
import java.awt.event.*;
public class EventHandling extends WindowAdapter
    implements ActionListener
{ Frame f;
  TextField tf;
  EventHandling ()
  { f = new Frame();
    f.addWindowListener(this);
    tf = new TextField();
    tf.setBounds(60, 50, 170, 20);
    Button b = new Button("Click me");
    b.setBounds(100, 120, 80, 30);
    b.addActionListener(this);
    f.add(b);
    f.add(tf);
    f.setSize(300, 300);
    f.setLayout(null);
    f.setVisible(true);
  }
public void actionPerformed(ActionEvent e)
  { tf.setText("Welcome");
  }
public void windowClosing(WindowEvent e)
  { System.exit(0);
  }
public static void main(String args[])
  { new EventHandling();
  }
}
```