**ABSTRACT CLASS:**

Q 1 :

package com.company;

import java.util.\*;

abstract class Parent{

abstract public void message();

}

class subclass1 extends Parent{

@Override

public void message() {

System.out.println("This is first subclass");

}

}

class subclass2 extends Parent{

@Override

public void message() {

System.out.println("This is second subclass");

}

}

public class Main {

public static void main(String[] args) {

subclass1 a1 = new subclass1();

subclass2 a2 =new subclass2();

a1.message();

a2.message();

}}

Q 2 :

package com.company;

import java.util.\*;

public class Main {

public static void main(String[] args) {

bank\_A a1 =new bank\_A();

bank\_B a2 = new bank\_B();

bank\_C a3 = new bank\_C();

a1.get\_balance();

a2.get\_balance();

a3.get\_balance();

}

}

abstract class bank{

abstract public void get\_balance();

}

class bank\_A extends bank{

@Override

public void get\_balance() {

System.out.println("100$");

}

}

class bank\_B extends bank{

@Override

public void get\_balance() {

System.out.println("150$");

}

}

class bank\_C extends bank{

@Override

public void get\_balance() {

System.out.println("200$");

}}

Q 5 :

package com.company;

import java.util.\*;

public class Main {

public static void main(String[] args) {

Cats c1 = new Cats();

Dogs d1 = new Dogs();

c1.cats();

d1.dogs();

}

}

abstract class animals{

abstract public void cats();

abstract public void dogs();

}

class Cats extends animals{

@Override

public void cats() {

System.out.println("Cats meow");

}

@Override

public void dogs() {}

}

class Dogs extends animals{

@Override

public void dogs(){

System.out.println("Dogs Bark");

}

@Override

public void cats() {}

}

**ITERFACE:**

Q 7 :

ackage com.company;

import java.util.\*;

public class Main {

public static void main(String[] args) {

Scanner t=new Scanner(System.in);

System.out.println("Enter size of array; ");

int s=t.nextInt();

int m[] =new int[s];

for(int x=0;x<s;x++) {

System.out.println("Enter "+(x+1)+" element: ");

m[x]=t.nextInt();

}

Array c1 = new Array();

c1.add(m);

c1.remove(m);

c1.check(m);

}

}

interface queue{

void add(int m[]);

void remove(int m[]);

void check(int m[]);

}

class Array implements queue{

Array(){}

@Override

public void add(int m[]) {

int tot=0;

for(int x=0;x<m.length;x++) {

tot=tot+m[x];

}

System.out.println("sum is "+tot);

}

@Override

public void remove(int m[]) {

Scanner t=new Scanner(System.in);

System.out.println("Enter the element to Remove: ");

int r=t.nextInt();

for(int x=0;x<m.length;x++)

if(m[x]==r) {

int tem=m[x];

m[x]=m[m.length-1];

m[m.length-1]=m[x];

m[x]=tem;

}

System.out.print("Element is removed: ");

for(int x=0;x<m.length-1;x++) {

System.out.print(m[x]+" ");

}}

@Override

public void check(int m[]) {

if(m==null)

System.out.println("Array is empty:");

else

System.out.println("Array isn't empty: ");

}}

**JENERICS:**

Q 1

package com.company;

import java.util.\*;

public class task {

public static void main(String[] args) {

Scanner sc = new Scanner(System.in);

ArrayList<Integer> list = new ArrayList<>(5);

int i=0;

while(i!=5){

System.out.println("Enter "+(i+1)+" Element: ");

int a = sc.nextInt();

list.add(a);

i++;

}

System.out.println("Array: "+list);

list.clear();

System.out.println("Array has been Deleted: "+list);

}

}

Q 3

package com.company;

import java.util.\*;

public class task2 {

public static <T> void fun(T a, T b){

System.out.println("Value of before swaping: "+a+","+ b);

T c=null;

c=a;

a=b;

b=c;

System.out.println("Value of after swaping: "+a+","+ b);

}

public static void main(String[] args) {

Scanner sc = new Scanner(System.in);

System.out.println("Enter first value: ");

int a= sc.nextInt();

System.out.println("Enter Second value: ");

int b = sc.nextInt();

fun(a, b);

}

}

Q 4

package com.company;

import java.util.\*;

class employe<T, D>{

T username= (T) "israr";

D password =(D) "123";

employe(){}

public void check(T user ,D ps){

if(username.equals(user) && password.equals(ps)){

System.out.println("You Have Been Logined Succefully: ");

}

else{

System.out.println("SORRY INVLID INPUT: ");

}}

}

public class task4 {

public static void main(String[] args) {

Scanner sc = new Scanner(System.in);

employe<String, Integer> e = new employe<>();

System.out.println("Enter username: ");

String username = sc.nextLine();

System.out.println("Enter password: ");

String password =sc.next();

e.check(username, password);

}

}

**Nested class and exception handle:**

ackage israralic;

import java.util.\*;

class Job{

private String roll\_ID;

private int salary;

Job(){}

Job(String id, int salary){

}

public String getRoll\_ID() {

return roll\_ID;

}

public void setRoll\_ID(String roll\_ID) {

this.roll\_ID = roll\_ID;

}

public int getSalary() {

return salary;

}

public void setSalary(int salary) {

this.salary = salary;

}

class Person{

Person(){}

Person(String id, int salary){

Job j = new Job();

}

public void setSalary(int sal) {

salary = sal;

}

public int getSalary() {

return salary;

}

public String getRoll\_ID() {

return roll\_ID;

}

public void setRoll\_ID(String roll) {

roll\_ID = roll;

}

}

}

public class lab09\_task1 {

public static void main(String[] args) {

Scanner sc = new Scanner(System.in);

Job j = new Job();

Job.Person p1 =j.new Person();

System.out.println("Enter the Person's ID");

String id = sc.next();

System.out.println("Enter the Persosn Salary: ");

int salary = sc.nextInt();

p1.setRoll\_ID(id);

p1.setSalary(salary);

System.out.println("Roll\_ID: "+p1.getRoll\_ID());

System.out.println("Salary: "+p1.getSalary());

}

}

Q 2

package israralic;

import java.util.\*;

class CPU{

double price;

class Processor{

double cores;

String manaufacture;

double getCache() {

return 4.2;

}

}

class RAM{

double memory;

String manufacture;

double getClockSpeed() {

return 5.3;

}

}

}

public class lab09\_task2 {

public static void main(String[] args) {

Scanner sc = new Scanner(System.in);

CPU c1 = new CPU();

CPU.Processor p1 = c1.new Processor();

CPU.RAM r1 = c1.new RAM();

System.out.println("Returned Value of Processor Function: "+p1.getCache());

System.out.println("Returned Value of RAM Function: "+r1.getClockSpeed());

}

}

Q 3

package israralich;

import java.util.\*;

class Carr{

String carname, cartype;

Carr(){}

Carr(String carname, String cartype){

this.carname=carname;

this.cartype=cartype;

}

private String getCarName() {

return this.carname;

}

class Engine{

String engine\_type;

public String getEngine\_type() {

return engine\_type;

}

public String setEngine\_type() {

if(cartype.contains("4T")) {

if(carname.contains("Mehran")) {

this.engine\_type ="Small";

}else

this.engine\_type="large";

}else

this.engine\_type="Bigger";

return this.engine\_type;

}

}

}

public class lab09\_task03 {

public static void main(String[] args) {

Scanner sc = new Scanner(System.in);

System.out.println("Enter Car Name");

String car\_name=sc.nextLine();

System.out.println("Enter car Type: ");

String car\_type =sc.next();

Carr c1 = new Carr(car\_name, car\_type);

Carr.Engine e1 = c1.new Engine();

System.out.println("Car Name: "+c1.carname);

System.out.println("Car Type: "+c1.cartype);

System.out.println("Engine Type: "+e1.setEngine\_type());

}

}

Q 4

package israralich;

import java.util.\*;

public class lab09\_task4 {

public static void main(String[] args) {

Scanner sc = new Scanner(System.in);

System.out.println("Enter a size of Array: ");

int size=sc.nextInt();

int [] array = new int[size];

try {

for(int i=0; i<size+1; i++) {

System.out.println("Enter "+(i+1)+" element: ");

array[i]=sc.nextInt();

}

}catch(Exception e) {

System.out.println(e);

}

finally {

System.out.print("Array elements is:");

for(int i: array)

System.out.print(i+" ");

}

}

}

Q 5

package israralich;

import java.util.\*;

public class lab09\_task5 {

public static void main(String[] args) {

Scanner sc = new Scanner(System.in);

int sum=0, result=0;

int [] subject = new int[5];

try {

System.out.println("Enter the Total Marks: ");

int total=sc.nextInt();

for(int i=0; i<5; i++) {

System.out.println("Enter "+(i+1)+ " subject marks");

subject[i]=sc.nextInt();

sum+=subject[i];

}

result=sum/total;

}

catch(ArithmeticException e) {

System.out.println(e);

}

catch(ArrayIndexOutOfBoundsException e ) {

System.out.println(e);

}

catch(NullPointerException e) {

System.out.println(e);

}

finally{

System.out.println("Result: "+result);

}

}

}

Q 6

package israralich;

import java.util.\*;

public class lab09\_task6 {

public static void main(String[] args) {

Scanner sc = new Scanner(System.in);

System.out.println("Enter first value: ");

int a =sc.nextInt();

System.out.println("Enter second value: ");

int b=sc.nextInt();

try {

System.out.println("Result: "+a/b);

}

catch(ArithmeticException e) {

System.out.println("Exception: "+e.getMessage());

}

finally{

System.out.println("After Exception Handle: "+a/1);

}}}