**JAVA**

**Inheritance**

**Lab Exercise No:**34

**Exercise Objective(s):***The concept of inheritance*

**Exercise:***Create a class called Vehicle. Create subclasses like Truck, Bus, Car etc. Add common methods*

*in the base class and specific methods in the corresponding class. Create a class called Road*

*and create objects for the Truck, Car, Bus etc and display the appropriate message.*

**Recommended duration:** *20 Mins*

**Solution Code:**

**package** pack.day3.com;

**public** **class** Road {

**public** **static** **void** main(String[] args) {

// **TODO** Auto-generated method stub

// Object Creation

Truck truck = **new** Truck();

Bus bus = **new** Bus();

Car car = **new** Car();

truck.luggage();

bus.travel();

car.personalUse();

}

}

**class** Vehicle {

**public** **void** move() {

System.***out***.println("Every Vehicle Moves on the road");

}

}

**class** Truck **extends** Vehicle {

**public** **void** luggage() {

System.***out***.println("Truck is mainly used for transport of luggage");

}

}

**class** Bus **extends** Vehicle {

**public** **void** travel() {

System.***out***.println("Bus is mainly used for travel");

}

}

**class** Car **extends** Vehicle{

**public** **void** personalUse() {

System.***out***.println("Car is for personal use");

}

}

**Lab Exercise No:**35

**Exercise Objective(s):***super keyword*

**Exercise:***In the Lab Exercise 34, in the Vehicle class constructor initialize few variables like color, no of*

*wheels, model etc. Give appropriate values for these variables from the invoking subclass.*

**Recommended duration:** *20 Mins*

**Solution Code:**

**package** pack.day3.com;

**public** **class** Solution35 {

**public** **static** **void** main(String[] args) {

// **TODO** Auto-generated method stub

// **TODO** Auto-generated method stub

Truck35 truck = **new** Truck35();

Bus35 bus = **new** Bus35();

Car35 car = **new** Car35();

truck.luggage();

bus.travel();

car.personalUse();

}

}

**class** Vehicle35 {

**public** String color ;

**public** **int** noOfWheels;

**public** String model;

**public** String getColor() {

**return** color;

}

**public** **void** setColor(String color) {

**this**.color = color;

}

**public** **int** getNoOfWheels() {

**return** noOfWheels;

}

**public** **void** setNoOfWheels(**int** noOfWheels) {

**this**.noOfWheels = noOfWheels;

}

**public** String getModel() {

**return** model;

}

**public** **void** setModel(String model) {

**this**.model = model;

}

**public** **void** move() {

System.***out***.println("Every Vehicle Moves on the road");

}

}

**class** Truck35 **extends** Vehicle35 {

@Override

**public** String toString() {

**return** "Truck35 [color=" + color + ", noOfWheels=" + noOfWheels + ", model=" + model + "]";

}

**public** **void** luggage() {

System.***out***.println("Truck is mainly used for transport of luggage");

Truck35 truck = **new** Truck35();

truck.setColor("Black");

truck.setModel("T4");

truck.setNoOfWheels(8);

System.***out***.println(truck);

}

}

**class** Bus35 **extends** Vehicle35 {

@Override

**public** String toString() {

**return** "Bus35 [color=" + color + ", noOfWheels=" + noOfWheels + ", model=" + model + "]";

}

**public** **void** travel() {

System.***out***.println("Bus is mainly used for travel");

Bus35 bus = **new** Bus35();

bus.setColor("Blue");

bus.setModel("Volvo");

bus.setNoOfWheels(6);

System.***out***.println(bus);

}

}

**class** Car35 **extends** Vehicle35 {

@Override

**public** String toString() {

**return** "Car35 [color=" + color + ", noOfWheels=" + noOfWheels + ", model=" + model + "]";

}

**public** **void** personalUse() {

System.***out***.println("Car is for personal use");

Car35 car = **new** Car35();

car.setColor("White");

car.setModel("Audi Q8");

car.setNoOfWheels(4);

System.***out***.println(car);

}

}

**Lab Exercise No:**36

**Exercise Objective(s):***protected access specifier*

**Exercise:***In the Lab Exercise 35, create another class called City which creates an object for the Car,*

*Truck and Bus class and displays the details through a display () method in the Vehicle class.*

*The other methods and data members should not be accessible by the City class.*

**Solution Code:**

**package** pack.day3.com;

**public** **class** City {

**public** **static** **void** main(String[] args) {

// **TODO** Auto-generated method stub

Truck36 truck = **new** Truck36();

Bus36 bus = **new** Bus36();

Car36 car = **new** Car36();

Vehicle36 vehicle = **new** Vehicle36();

vehicle.display(truck, bus, car);

}

}

**class** Vehicle36 {

**protected** String color ;

**protected** **int** noOfWheels;

**protected** String model;

**protected** **void** display (Truck36 truck, Bus36 bus, Car36 car) {

truck.luggage();

bus.travel();

car.personalUse();

}

**protected** String getColor() {

**return** color;

}

**protected** **void** setColor(String color) {

**this**.color = color;

}

**protected** **int** getNoOfWheels() {

**return** noOfWheels;

}

**protected** **void** setNoOfWheels(**int** noOfWheels) {

**this**.noOfWheels = noOfWheels;

}

**protected** String getModel() {

**return** model;

}

**protected** **void** setModel(String model) {

**this**.model = model;

}

**protected** **void** move() {

System.***out***.println("Every Vehicle Moves on the road");

}

}

**class** Truck36 **extends** Vehicle36 {

@Override

**public** String toString() {

**return** "Truck36 [color=" + color + ", noOfWheels=" + noOfWheels + ", model=" + model + "]";

}

**protected** **void** luggage() {

System.***out***.println("Truck is mainly used for transport of luggage");

Truck36 truck = **new** Truck36();

truck.setColor("Black");

truck.setModel("T4");

truck.setNoOfWheels(8);

System.***out***.println(truck);

}

}

**class** Bus36 **extends** Vehicle36 {

@Override

**public** String toString() {

**return** "Bus36 [color=" + color + ", noOfWheels=" + noOfWheels + ", model=" + model + "]";

}

**protected** **void** travel() {

System.***out***.println("Bus is mainly used for travel");

Bus36 bus = **new** Bus36();

bus.setColor("Blue");

bus.setModel("Volvo");

bus.setNoOfWheels(6);

System.***out***.println(bus);

}

}

**class** Car36 **extends** Vehicle36 {

@Override

**public** String toString() {

**return** "Car36 [color=" + color + ", noOfWheels=" + noOfWheels + ", model=" + model + "]";

}

**protected** **void** personalUse() {

System.***out***.println("Car is for personal use");

Car36 car = **new** Car36();

car.setColor("White");

car.setModel("Audi Q8");

car.setNoOfWheels(4);

System.***out***.println(car);

}

}

**Lab Exercise No:**37

**Exercise Objective(s):***Overriding*

**Exercise:** *In the Lab Exercise 30, create a super class called Animal and make all the existing classes as*

*the sub class for Animal class. Move the method isVegetarian and canClimb to the super class*

*and implement generically. Whenever necessary change the implementation of these methods*

*in the respective subclasses.Display the characteristic of each animal.*

**Recommended duration:** *20 Mins*

**Solution Code:**

**package** pack.day4.com;

**public** **class** Tiger {

String color;

**int** weight, age;

**public** Tiger(String color, **int** weight, **int** age) {

**super**();

System.***out***.println("This is a tiger");

**this**.color = color;

**this**.weight = weight;

**this**.age = age;

}

**public** **void** getColor() {

System.***out***.println(**this**.color);

}

**public** **void** getWeight() {

System.***out***.println(**this**.weight + " kgs.");

}

**public** **void** getAge() {

System.***out***.println(**this**.age);

}

**public** **void** isVegetarian() {

System.***out***.println("Tiger is not vegetarian");

}

**public** **void** canClimb() {

System.***out***.println("Tiger can climb trees");

}

**public** **void** sound() {

System.***out***.println("Tigers growls");

}

}

**final** **class** Lion {

String color;

**int** weight,age;

**public** Lion(String color, **int** weight, **int** age) {

**super**();

System.***out***.println("This is a lion");

**this**.color = color;

**this**.weight = weight;

**this**.age = age;

}

**public** **void** getColor() {

System.***out***.println(**this**.color);

}

**public** **void** getWeight() {

System.***out***.println(**this**.weight + " kgs.");

}

**public** **void** getAge() {

System.***out***.println(**this**.age);

}

**public** **void** isVegetarian() {

System.***out***.println("Lion is not vegetarian");

}

**public** **void** canClimb() {

System.***out***.println("Lions cannot climb trees");

}

**public** **void** sound() {

System.***out***.println("Lion roars");

}

}

**final** **class** Deer {

String color;

**int** weight, age;

**public** Deer(String color, **int** weight, **int** age) {

**super**();

System.***out***.println("This is a deer");

**this**.color = color;

**this**.weight = weight;

**this**.age = age;

}

**public** **void** getColor() {

System.***out***.println(**this**.color);

}

**public** **void** getWeight() {

System.***out***.println(**this**.weight + " kgs.");

}

**public** **void** getAge() {

System.***out***.println(**this**.age);

}

**public** **void** isVegetarian() {

System.***out***.println("Deers are vegetarians");

}

**public** **void** canClimb() {

System.***out***.println("Deers cannot climb trees");

}

**public** **void** sound() {

System.***out***.println("Deer grunts");

}

}

**public** **class** Animal {

**public** **void** isVegetarian() {

System.***out***.println("Animals exist in different classes of diet: Herbivores | Carnivores | Omnivores ");

}

**public** **void** canClimb() {

System.***out***.println("A few animals are climb trees");

}

**public** Animal() {

**super**();

}

**public** **static** **void** main(String[] args) {

Lion lion =**new** Lion("ABC",140,19);

System.out.print("Color Information : ");

lion.getColor();

System.out.print("Age Information : ");

lion.getAge();

System.out.print("Weight Information : ");

lion.getWeight();

System.out.print("Capability to climb : ");

lion.canClimb();

System.out.print("Vegetarian or not : ");

lion.isVegetarian();

System.out.print("Animal sound : ");

lion.sound();

Tiger tiger =**new** Tiger("Orange",140,19);

System.out.print("Color Information : ");

tiger.getColor();

System.out.print("Age Information : ");

tiger.getAge();

System.out.print("Weight Information : ");

tiger.getWeight();

System.out.print("Capability to climb : ");

tiger.canClimb();

System.out.print("Vegetarian or not : ");

tiger.isVegetarian();

System.out.print("Animal sound : ");

tiger.sound();

Deer deer =**new** Deer("Ochre",50,22);

System.out.print("Color Information : ");

deer.getColor();

System.out.print("Age Information : ");

deer.getAge();

System.out.print("Weight Information : ");

deer.getWeight();

System.out.print("Capability to climb : ");

deer.canClimb();

System.out.print("Vegetarian or not : ");

deer.isVegetarian();

System.out.print("Animal sound : ");

deer.sound();

}

**Lab Exercise No:**38

**Exercise Objective(s):***final Keyword*

**Exercise:***In the Lab Exercise 37, make the Lion, Tiger, Deer, Monkey, Elephant and Giraffe classes such*

*that these classes cannot be inherited.*

**Recommended duration:** *20 Mins*

**Solution Code:**

**package** com.hsbc.pack;

**final** **class** Tiger {

String color;

**int** weight, age;

**public** Tiger(String color, **int** weight, **int** age) {

**super**();

System.***out***.println("This is a tiger");

**this**.color = color;

**this**.weight = weight;

**this**.age = age;

}

**public** **void** getColor() {

System.***out***.println(**this**.color);

}

**public** **void** getWeight() {

System.***out***.println(**this**.weight + " kgs.");

}

**public** **void** getAge() {

System.***out***.println(**this**.age);

}

**public** **void** isVegetarian() {

System.***out***.println("Tiger is not vegetarian");

}

**public** **void** canClimb() {

System.***out***.println("Tiger can climb trees");

}

**public** **void** sound() {

System.***out***.println("Tigers growls");

}

}

**final** **class** Lion {

String color;

**int** weight,age;

**public** Lion(String color, **int** weight, **int** age) {

**super**();

System.***out***.println("This is a lion");

**this**.color = color;

**this**.weight = weight;

**this**.age = age;

}

**public** **void** getColor() {

System.***out***.println(**this**.color);

}

**public** **void** getWeight() {

System.***out***.println(**this**.weight + " kgs.");

}

**public** **void** getAge() {

System.***out***.println(**this**.age);

}

**public** **void** isVegetarian() {

System.***out***.println("Lion is not vegetarian");

}

**public** **void** canClimb() {

System.***out***.println("Lions cannot climb trees");

}

**public** **void** sound() {

System.***out***.println("Lion roars");

}

}

**final** **class** Deer {

String color;

**int** weight, age;

**public** Deer(String color, **int** weight, **int** age) {

**super**();

System.***out***.println("This is a deer");

**this**.color = color;

**this**.weight = weight;

**this**.age = age;

}

**public** **void** getColor() {

System.***out***.println(**this**.color);

}

**public** **void** getWeight() {

System.***out***.println(**this**.weight + " kgs.");

}

**public** **void** getAge() {

System.***out***.println(**this**.age);

}

**public** **void** isVegetarian() {

System.***out***.println("Deers are vegetarians");

}

**public** **void** canClimb() {

System.***out***.println("Deers cannot climb trees");

}

**public** **void** sound() {

System.***out***.println("Deer grunts");

}

}

**public** **class** Animal {

**public** **void** isVegetarian() {

System.***out***.println("Animals exist in different classes of diet: Herbivores | Carnivores | Omnivores ");

}

**public** **void** canClimb() {

System.***out***.println("A few animals are climb trees");

}

**public** Animal() {

**super**();

}

**public** **static** **void** main(String[] args) {

Lion lion =**new** Lion("ABC",140,19);

System.out.print("Color Information : ");

lion.getColor();

System.out.print("Age Information : ");

lion.getAge();

System.out.print("Weight Information : ");

lion.getWeight();

System.out.print("Capability to climb : ");

lion.canClimb();

System.out.print("Vegetarian or not : ");

lion.isVegetarian();

System.out.print("Animal sound : ");

lion.sound();

Tiger tiger =**new** Tiger("Orange",140,19);

System.out.print("Color Information : ");

tiger.getColor();

System.out.print("Age Information : ");

tiger.getAge();

System.out.print("Weight Information : ");

tiger.getWeight();

System.out.print("Capability to climb : ");

tiger.canClimb();

System.out.print("Vegetarian or not : ");

tiger.isVegetarian();

System.out.print("Animal sound : ");

tiger.sound();

Deer deer =**new** Deer("Ochre",50,22);

System.out.print("Color Information : ");

deer.getColor();

System.out.print("Age Information : ");

deer.getAge();

System.out.print("Weight Information : ");

deer.getWeight();

System.out.print("Capability to climb : ");

deer.canClimb();

System.out.print("Vegetarian or not : ");

deer.isVegetarian();

System.out.print("Animal sound : ");

deer.sound();

}

**Lab Exercise No:**39

**Exercise Objective(s):***Polymorphism*

**Exercise:***Create a class called Worker. Write classes DailyWorker and SalariedWorker that inherit from*

*Worker.Every worker has a name and a salaryrate. Write method Pay (int hours) to compute*

*the week pay of every worker. A Daily worker is paid on the basis of the number of days*

*she/he works.The salaried worker gets paid the wage for 40 hours a week no matter what the*

*actual hours are. Test this program to calculate the pay of workers.*

**Recommended duration:** *20 Mins*

**Solution Code:**

**package** pack.day3.com;

**import** java.util.Scanner;

**public** **class** Worker {

String name;

**double** salaryRate;

**public** String getName() {

**return** name;

}

**public** **void** setName(String name) {

**this**.name = name;

}

**public** **double** getSalaryRate() {

**return** salaryRate;

}

**public** **void** setSalaryRate(**double** salaryRate) {

**this**.salaryRate = salaryRate;

}

**public** **static** **void** main(String[] args) {

// **TODO** Auto-generated method stub

DailyWorker dailyWorker = **new** DailyWorker();

dailyWorker.pay();

SalariedWorker salariedWorker = **new** SalariedWorker();

salariedWorker.pay();

}

}

**class** DailyWorker **extends** Worker {

Scanner scnr = **new** Scanner(System.***in***);

**public** DailyWorker(String name, **double** salaryRate) {

// **TODO** Auto-generated constructor stub

**super**();

**this**.name = name;

**this**.salaryRate = salaryRate;

}

**public** DailyWorker() {

**super**();

}

**void** pay () {

System.***out***.println("Daily Worker Salary \nEnter Your Name and Per Day Salary ");

DailyWorker dailyWorker = **new** DailyWorker(scnr.next(), scnr.nextDouble());

System.***out***.println("Enter total working days : ");

**int** days = scnr.nextInt();

System.***out***.println("Total Salary of "+ days + " days of " + dailyWorker.getName() + " is " + (days\*dailyWorker.getSalaryRate()));

System.***out***.println();

}

}

**class** SalariedWorker **extends** Worker{

Scanner scnr = **new** Scanner(System.***in***);

**public** SalariedWorker(String name, **double** salaryPerHr) {

// **TODO** Auto-generated constructor stub

**super**();

**this**.setSalaryRate(salaryPerHr);

**this**.setName(name);

}

**public** SalariedWorker() {

**super**();

}

**void** pay () {

System.***out***.println("Salaried Worker Salary \nEnter Your Name and Per Hour Salary");

SalariedWorker salariedWorker = **new** SalariedWorker(scnr.next() , scnr.nextDouble());

System.***out***.println("Total Weekly Salary of " + salariedWorker.getName() + " is " + (40\*salariedWorker.getSalaryRate()));

}

}

**Lab Exercise No:**40

**Exercise Objective(s):***Polymorphism*

**Exercise:***ModifyLab Exercise 38 by creating intermediate Super classes called WildAnimals and*

*DomesticAnimals and create corresponding subclasses for the same. Create generic*

*methods in the super class and display the details of wild animals, domestic animals in*

*general separately and also display the details of each animal separately.*

**Recommended duration:** *20 Mins*

**Solution Code:**

**package** org.animals;

**final** **class** Tiger {

String color;

**int** weight, age;

**public** Tiger(String color, **int** weight, **int** age) {

**super**();

System.***out***.println("This is a tiger");

**this**.color = color;

**this**.weight = weight;

**this**.age = age;

}

**public** **void** getColor() {

System.***out***.println(**this**.color);

}

**public** **void** getWeight() {

System.***out***.println(**this**.weight + " kgs.");

}

**public** **void** getAge() {

System.***out***.println(**this**.age);

}

**public** **void** isVegetarian() {

System.***out***.println("Tiger is not vegetarian");

}

**public** **void** canClimb() {

System.***out***.println("Tiger can climb trees");

}

**public** **void** sound() {

System.***out***.println("Tigers growls");

}

}

**final** **class** Lion {

String color;

**int** weight,age;

**public** Lion(String color, **int** weight, **int** age) {

**super**();

System.***out***.println("This is a lion");

**this**.color = color;

**this**.weight = weight;

**this**.age = age;

}

**public** **void** getColor() {

System.***out***.println(**this**.color);

}

**public** **void** getWeight() {

System.***out***.println(**this**.weight + " kgs.");

}

**public** **void** getAge() {

System.***out***.println(**this**.age);

}

**public** **void** isVegetarian() {

System.***out***.println("Lion is not vegetarian");

}

**public** **void** canClimb() {

System.***out***.println("Lions cannot climb trees");

}

**public** **void** sound() {

System.***out***.println("Lion roars");

}

}

**final** **class** Deer {

String color;

**int** weight, age;

**public** Deer(String color, **int** weight, **int** age) {

**super**();

System.***out***.println("This is a deer");

**this**.color = color;

**this**.weight = weight;

**this**.age = age;

}

**public** **void** getColor() {

System.***out***.println(**this**.color);

}

**public** **void** getWeight() {

System.***out***.println(**this**.weight + " kgs.");

}

**public** **void** getAge() {

System.***out***.println(**this**.age);

}

**public** **void** isVegetarian() {

System.***out***.println("Deers are vegetarians");

}

**public** **void** canClimb() {

System.***out***.println("Deers cannot climb trees");

}

**public** **void** sound() {

System.***out***.println("Deer grunts");

}

}

**public** **class** Animal {

**public** **void** isVegetarian() {

System.***out***.println("Animals exist in different classes of diet: Herbivores | Carnivores | Omnivores ");

}

**public** **void** canClimb() {

System.***out***.println("A few animals are climb trees");

}

**public** Animal() {

**super**();

}

**public** **static** **void** main(String[] args) {

Lion lion =**new** Lion("ABC",140,19);

System.out.print("Color Information : ");

lion.getColor();

System.out.print("Age Information : ");

lion.getAge();

System.out.print("Weight Information : ");

lion.getWeight();

System.out.print("Capability to climb : ");

lion.canClimb();

System.out.print("Vegetarian or not : ");

lion.isVegetarian();

System.out.print("Animal sound : ");

lion.sound();

Tiger tiger =**new** Tiger("Orange",140,19);

System.out.print("Color Information : ");

tiger.getColor();

System.out.print("Age Information : ");

tiger.getAge();

System.out.print("Weight Information : ");

tiger.getWeight();

System.out.print("Capability to climb : ");

tiger.canClimb();

System.out.print("Vegetarian or not : ");

tiger.isVegetarian();

System.out.print("Animal sound : ");

tiger.sound();

Deer deer =**new** Deer("Ochre",50,22);

System.out.print("Color Information : ");

deer.getColor();

System.out.print("Age Information : ");

deer.getAge();

System.out.print("Weight Information : ");

deer.getWeight();

System.out.print("Capability to climb : ");

deer.canClimb();

System.out.print("Vegetarian or not : ");

deer.isVegetarian();

System.out.print("Animal sound : ");

deer.sound();

}

**Lab Exercise No:**41

**Exercise Objective(s):***abstract classes*

**Exercise:***Create a class called Shape3D with the following method signatures alone, volume () and*

*surfaceArea (). Then create subclasses like Cylinder, Sphere, and Cubeetc and implement*

*these methods.*

**Recommended duration:** *20 Mins*

**Solution Code:**

**package** pack.day3.com;

**import** java.io.\*;

**public** **class** Solution41 {

**public** **static** **void** main(String [] args) **throws** IOException{

Sphere spr=**new** Sphere();

spr.accept();

spr.display();

Cone cone=**new** Cone();

cone.accept();

cone.display();

Cylinder cylinder=**new** Cylinder();

cylinder.accept();

cylinder.display();

Box b=**new** Box();

box.accept();

box.display();

}

}

**abstract** **class** Shape{ //abstract class

**abstract** **public** **void** surfaceArea();

**abstract** **public** **void** Volume();

**final** **float** pie=3.14f;

}

**class** Sphere **extends** Shape{

**double** r;

**private** **double** area;

**private** **double** volume;

**public** **void** accept() **throws** IOException { // accept() to take input

System.***out***.println("Enter the radius of the Sphere: ");

BufferedReader br=**new** BufferedReader(**new** InputStreamReader(System.***in***));

r=Double.*parseDouble*(br.readLine());

}

**public** **void** surfaceArea(){

area=pie\*r\*r;

}

**public** **void** Volume(){

volume=4/3\*pie\*r\*r\*r; // Volume formula

}

**public** **void** display(){

surfaceArea();

Volume();

System.***out***.println("The area of sphere is: "+area);

System.***out***.println("The volume of sphere is: "+volume);

}

}

**class** Cone **extends** Shape{

**double** h,r,area,volume;

**public** **void** accept() **throws** IOException{

System.***out***.println("Enter radius and height of the Cone: ");

BufferedReader br=**new** BufferedReader(**new** InputStreamReader(System.***in***));

r=Double.*parseDouble*(br.readLine());

h=Double.*parseDouble*(br.readLine());

}

**public** **void** surfaceArea(){

**double** sq=h\*h+r\*r;

area=pie\*r\*(r+java.lang.Math.*sqrt*(sq));

}

**public** **void** Volume(){

**double** d=h/3;

volume=pie\*r\*r\*d;

}

**public** **void** display(){

surfaceArea();

Volume();

System.***out***.println("The area of Cone is: "+area);

System.***out***.println("The volume of Cone is: "+volume);

}

}

**class** Cylinder **extends** Shape{

**double** r,h,area,volume;

**public** **void** accept() **throws** IOException{

System.***out***.println("Enter radius and height of the Cylinder: ");

BufferedReader br=**new** BufferedReader(**new** InputStreamReader(System.***in***));

r=Double.*parseDouble*(br.readLine());

h=Double.*parseDouble*(br.readLine());

}

**public** **void** surfaceArea(){

area=(2\*pie\*r\*h)+(2\*pie\*r\*r);

}

**public** **void** Volume(){

volume=pie\*r\*r\*h;

}

**public** **void** display(){

surfaceArea();

Volume();

System.***out***.println("The area of Cylinder is: "+area);

System.***out***.println("The volume of Cylinder is: "+volume);

}

}

**class** Box **extends** Shape{

**double** l,b,h,area,volume;

**public** **void** accept() **throws** IOException{

System.***out***.println("Enter length, breadth and height of the Box: ");

BufferedReader br=**new** BufferedReader(**new** InputStreamReader(System.***in***));

l=Double.*parseDouble*(br.readLine());

b=Double.*parseDouble*(br.readLine());

h=Double.*parseDouble*(br.readLine());

}

**public** **void** surfaceArea(){

area=(2\*l\*b)+(2\*b\*h)+(2\*l\*h);

}

**public** **void** Volume(){

volume=l\*b\*h;

}

**public** **void** display(){

surfaceArea();

Volume();

System.***out***.println("The area of Box is: "+area);

System.***out***.println("The volume of Box is: "+volume);

}

}

**Lab Exercise No:**42

**Exercise Objective(s):***abstract classes*

**Exercise:***Create the classes required to store data regarding different types of courses that employees*

*Ina company can enroll for. All courses have name and course fee. Courses are also either*

*classroom delivered or delivered online. Courses could also be full time or part time. The*

*program must be menu based input which enables the course coordinator to register*

*employees for courses, list out employees registered for specific courses, deregister employees*

*from a course.*

**Recommended duration:***30Mins*

**Solution Code:**

**package** pack.day3.com;

**import** java.util.Arrays;

**import** java.util.HashSet;

**import** java.util.Scanner;

**import** java.util.Set;

**public** **class** Solution42 **extends** Menu {

**static** Set<Integer> *set* = **new** HashSet<>(Arrays.*asList*()); //because of hashset we can remove element easily.

// static data of courses with empty employee set.

**static** Course[] *course* = {

**new** Course(1, "React", 2000, "Online", "Full-time" ),

**new** Course(2, "Angular", 3000, "Classroom", "Part-time" ) ,

**new** Course(3, "AWS", 4000, "Online", "Part-time" ),

**new** Course(4, "Java", 5000, "Online", "Full-time")

};

Employee[] employees = {

**new** Employee (1, "Ankit1"),

**new** Employee (2, "Ankit2"),

**new** Employee (3, "Ankit3"),

**new** Employee (4, "Ankit4"),

**new** Employee (5, "Ankit5")

};

**static** Solution42 *Solution* = **new** Solution42();

**public** **static** **void** main(String[] args) {

// **TODO** Auto-generated method stub

Scanner scnr = **new** Scanner(System.***in***);

// Menu option

System.***out***.println("1.To register for a course\r\n" +

"2.To deregister for a course\r\n" +

"3.To list the courses offered\r\n" +

"4.To list the employees registered for a specific course.");

System.***out***.println("Enter option number you want to go for : ");

**int** i = scnr.nextInt();

**int** eID = 0;

**int** cID = 0;

**switch** (i) {

**case** 1 :

System.***out***.println("Enter Course ID and Employee ID");

cID = scnr.nextInt();

eID = scnr.nextInt();

*Solution*.registerForCourse(cID-1, eID);

**break**;

**case** 2:

System.***out***.println("Enter Course ID");

cID = scnr.nextInt();

System.***out***.println(*course*[cID-1]);

System.***out***.println("Enter Employee ID");

eID = scnr.nextInt();

*Solution*.deregisterForCourse(cID-1, eID);

**break**;

**case** 3:

*Solution*.listOfferedCourse();

**break**;

**case** 4:

System.***out***.println("Enter Course number to find all Employees who is enrolled :");

*Solution*.listEmployeesOfCourse((scnr.nextInt()) - 1);

**break**;

}

*main*(args); // redirect to menu so that user can proceed further

scnr.close(); //scanner close

}

@Override

**void** registerForCourse(**int** courseID, **int** employeeID) {

// **TODO** Auto-generated method stub

*course*[courseID].employeeIDs.add(employeeID);

System.***out***.println("Updated Course Structure");

System.***out***.println(*course*[courseID]);

}

@Override

**void** deregisterForCourse(**int** courseID, **int** employeeID) {

// **TODO** Auto-generated method stub

*course*[courseID].employeeIDs.remove(employeeID);

System.***out***.println("Updated Course Structure");

System.***out***.println(*course*[courseID]);

}

@Override

String[] listOfferedCourse() {

// **TODO** Auto-generated method stub

**for**(Course curs : *course*) {

System.***out***.println(curs);

}

**return** **null**;

}

@Override

String[] listEmployeesOfCourse(**int** courseID) {

// **TODO** Auto-generated method stub

Set<Integer> emps = *course*[courseID].employeeIDs;

**if**(emps.size() != 0)

{

**for**(**int** empID : emps ) {

System.***out***.println(employees[empID-1].toString());

}

}

**else** {

System.***out***.println("No Employee is registered for this course");

}

**return** **null**;

}

}

**abstract** **class** Menu {

**abstract** **void** registerForCourse(**int** courseID, **int** employeeID);

**abstract** **void** deregisterForCourse(**int** courseID, **int** employeeID);

**abstract** String[] listOfferedCourse();

**abstract** String[] listEmployeesOfCourse(**int** courseID);

}

**class** Course{

**int** courseID;

String courseName;

**double** courseFee;

String courseDeliveryType;

String courseDurationType;

Set<Integer> employeeIDs = **new** HashSet<Integer>(); // hashset for employee who is enrolled for course

**public** Course(**int** courseID, String courseName, **double** courseFee, String courseDeliveryType,

String courseDurationType) {

**super**();

**this**.courseID = courseID;

**this**.courseName = courseName;

**this**.courseFee = courseFee;

**this**.courseDeliveryType = courseDeliveryType;

**this**.courseDurationType = courseDurationType;

**this**.employeeIDs = employeeIDs;

}

@Override

**public** String toString() {

**return** "Course [courseID=" + courseID + ", courseName=" + courseName + ", courseFee=" + courseFee

+ ", courseDeliveryType=" + courseDeliveryType + ", courseDurationType=" + courseDurationType

+ ", employeeIDs=" + employeeIDs + "]";

}

}

**class** Employee{

**int** empID;

String empName;

**public** Employee(**int** empID, String empName) {

**super**();

**this**.empID = empID;

**this**.empName = empName;

}

**public** Employee() {

**super**();

}

@Override

**public** String toString() {

**return** "Employee [empID=" + empID + ", empName=" + empName + "]";

}

}

**JAVA**

**Interface**

**Lab Exercise No:**43

**Exercise Objective(s):***Implementation of an interface*

**Exercise:***Implement Lab Exercise 41using Interfaces.*

**Recommended duration:** *20 Mins*

**Solution Code:**

**package** pack.day3.com;

**import** java.io.\*;

**interface** ICalculations {

**public** **void** surfaceArea();

**public** **void** Volume();

**public** **void** display();

**final** **float** ***pie***=3.14f;

}

**public** **class** Solution43 {

**public** **static** **void** main(String [] args) **throws** IOException{

Sphere s=**new** Sphere();

s.accept();

s.display();

Cone co=**new** Cone();

co.accept();

co.display();

Cylinder cy=**new** Cylinder();

cy.accept();

cy.display();

Box b=**new** Box();

b.accept();

b.display();

}

}

**class** Sphere43 **implements** ICalculations {

**double** r;

**private** **double** area;

**private** **double** volume;

**public** **void** accept() **throws** IOException { // accept() to take input

System.***out***.println("Enter the radius of the Sphere: ");

BufferedReader br=**new** BufferedReader(**new** InputStreamReader(System.***in***));

r=Double.*parseDouble*(br.readLine());

}

@Override

**public** **void** surfaceArea(){

area=***pie***\*r\*r;

}

@Override

**public** **void** Volume(){

volume=4/3\****pie***\*r\*r\*r;

}

@Override

**public** **void** display(){

surfaceArea();

Volume();

System.***out***.println("The area of sphere is: "+area);

System.***out***.println("The volume of sphere is: "+volume);

}

}

**class** Cone43 **implements** ICalculations{

**double** h,r,area,volume;

**public** **void** accept() **throws** IOException{

System.***out***.println("Enter radius and height of the Cone: ");

BufferedReader br=**new** BufferedReader(**new** InputStreamReader(System.***in***));

r=Double.*parseDouble*(br.readLine());

h=Double.*parseDouble*(br.readLine());

}

@Override

**public** **void** surfaceArea(){

**double** sq=h\*h+r\*r;

area=***pie***\*r\*(r+java.lang.Math.*sqrt*(sq));

}

@Override

**public** **void** Volume(){

**double** d=h/3;

volume=***pie***\*r\*r\*d;

}

@Override

**public** **void** display(){

surfaceArea();

Volume();

System.***out***.println("The area of Cone is: "+area);

System.***out***.println("The volume of Cone is: "+volume);

}

}

**class** Cylinder43 **implements** ICalculations{

**double** r,h,area,volume;

**public** **void** accept() **throws** IOException{

System.***out***.println("Enter radius and height of the Cylinder: ");

BufferedReader br=**new** BufferedReader(**new** InputStreamReader(System.***in***));

r=Double.*parseDouble*(br.readLine());

h=Double.*parseDouble*(br.readLine());

}

@Override

**public** **void** surfaceArea(){

area=(2\****pie***\*r\*h)+(2\****pie***\*r\*r);

}

@Override

**public** **void** Volume(){

volume=***pie***\*r\*r\*h;

}

@Override

**public** **void** display(){

surfaceArea();

Volume();

System.***out***.println("The area of Cylinder is: "+area);

System.***out***.println("The volume of Cylinder is: "+volume);

}

}

**class** Box43 **implements** ICalculations{

**double** l,b,h,area,volume;

**public** **void** accept() **throws** IOException{

System.***out***.println("Enter length, breadth and height of the Box: ");

BufferedReader br=**new** BufferedReader(**new** InputStreamReader(System.***in***));

l=Double.*parseDouble*(br.readLine());

b=Double.*parseDouble*(br.readLine());

h=Double.*parseDouble*(br.readLine());

}

@Override

**public** **void** surfaceArea() {

// **TODO** Auto-generated method stub

area=(2\*l\*b)+(2\*b\*h)+(2\*l\*h);

}

@Override

**public** **void** Volume() {

// **TODO** Auto-generated method stub

volume=l\*b\*h;

}

@Override

**public** **void** display() {

// **TODO** Auto-generated method stub

surfaceArea();

Volume();

System.***out***.println("The area of Box is: "+area);

System.***out***.println("The volume of Box is: "+volume);

}

}

**Lab Exercise No:**44

**Exercise Objective(s):***Implementingmore than one interface.*

**Exercise:***Create two interfaces namely Drawable and Fillable. Create class called Line, Circle, Square and*

*implement following methods through interface.*

*<I>Drawable ------ drawingColor(), thickness()*

*<I>Fillable ---------- fillingColor(), size()*

**Recommended duration:** *20 Mins*

**Solution Code:**

**package** pack.day3.com;

**public** **class** Solution44 {

**public** **static** **void** main(String[] args) {

// **TODO** Auto-generated method stub

Line line = **new** Line();

line.drawingColor();

line.fillingColor();

line.size();

line.thickness();

System.***out***.println();

Circle circle = **new** Circle();

circle.drawingColor();

circle.fillingColor();

circle.size();

circle.thickness();

System.***out***.println();

Square square = **new** Square();

square.drawingColor();

square.fillingColor();

square.size();

square.thickness();

}

}

// interface 1

**interface** IDrawable {

**void** drawingColor();

**void** thickness();

}

// interface 2

**interface** IFillable{

**void** fillingColor();

**void** size();

}

**class** Line **implements** IDrawable, IFillable {

// multiple interface files => Multiple Inheritance

@Override

**public** **void** fillingColor() {

// **TODO** Auto-generated method stub

System.***out***.println("fillingColor in Line");

}

@Override

**public** **void** size() {

// **TODO** Auto-generated method stub

System.***out***.println("size in Line");

}

@Override

**public** **void** drawingColor() {

// **TODO** Auto-generated method stub

System.***out***.println("drawingColor in Line");

}

@Override

**public** **void** thickness() {

// **TODO** Auto-generated method stub

System.***out***.println("thickness in Line");

}

}

**class** Circle **implements** IDrawable, IFillable {

@Override

**public** **void** fillingColor() {

// **TODO** Auto-generated method stub

System.***out***.println("fillingColor in Circle");

}

@Override

**public** **void** size() {

// **TODO** Auto-generated method stub

System.***out***.println("size in Circle");

}

@Override

**public** **void** drawingColor() {

// **TODO** Auto-generated method stub

System.***out***.println("drawingColor in Circle");

}

@Override

**public** **void** thickness() {

// **TODO** Auto-generated method stub

System.***out***.println("thickness in Circle");

}

}

**class** Square **implements** IDrawable, IFillable {

@Override

**public** **void** fillingColor() {

// **TODO** Auto-generated method stub

System.***out***.println("fillingColor in Square");

}

@Override

**public** **void** size() {

// **TODO** Auto-generated method stub

System.***out***.println("size in Square");

}

@Override

**public** **void** drawingColor() {

// **TODO** Auto-generated method stub

System.***out***.println("drawingColor in Square");

}

@Override

**public** **void** thickness() {

// **TODO** Auto-generated method stub

System.***out***.println("thickness in Square");

}

}

**Lab Exercise No:**45

**Exercise Objective(s):***Implementation of an interface*

**Exercise:***In Lab Exercise 39, create a package called finance and within it create an interface called*

*Payable.It should define the getPayInfo() methodthat all the worker classeswillimplement.*

*Now display the details of the monthly pay of the workers.*

**Recommended duration:** *20 Mins*

**Solution Code:**

**\*\*\*\*\*\*\*\*\*\*\*\*\*\***IPayable.java\*\*\*\*\*\*\*\*\*\*\*\*\*

**package** finance;

**public** **interface** IPayable {

**void** getPayInfo();

}

\*\*\*\*\*\*\*\*\*\*\*\*\*\*Worker45.java\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

**package** pack.day3.com;

**import** java.util.Scanner;

**import** finance.IPayable;

**public** **class** Worker45 {

String name;

**double** salaryRate;

**public** String getName() {

**return** name;

}

**public** **void** setName(String name) {

**this**.name = name;

}

**public** **double** getSalaryRate() {

**return** salaryRate;

}

**public** **void** setSalaryRate(**double** salaryRate) {

**this**.salaryRate = salaryRate;

}

**public** **static** **void** main(String[] args) {

// **TODO** Auto-generated method stub

DailyWorker45 dailyWorker = **new** DailyWorker45();

dailyWorker.getPayInfo();

SalariedWorker45 salariedWorker = **new** SalariedWorker45();

salariedWorker.getPayInfo();

}

}

**class** DailyWorker45 **extends** Worker **implements** IPayable {

Scanner scnr = **new** Scanner(System.***in***);

**public** DailyWorker45(String name, **double** salaryRate) {

// **TODO** Auto-generated constructor stub

**super**();

**this**.name = name;

**this**.salaryRate = salaryRate;

}

**public** DailyWorker45() {

**super**();

}

@Override

**public** **void** getPayInfo() {

// **TODO** Auto-generated method stub

System.***out***.println("Daily Worker Salary \nEnter Your Name and Per Day Salary ");

DailyWorker45 dailyWorker = **new** DailyWorker45(scnr.next(), scnr.nextDouble());

System.***out***.println("Enter total working days : ");

**int** days = scnr.nextInt();

System.***out***.println("Total Salary of "+ days + " days of " + dailyWorker.getName() + " is " + (days\*dailyWorker.getSalaryRate()));

System.***out***.println();

}

}

**class** SalariedWorker45 **extends** Worker **implements** IPayable {

Scanner scnr = **new** Scanner(System.***in***);

**public** SalariedWorker45(String name, **double** salaryPerHr) {

// **TODO** Auto-generated constructor stub

**super**();

**this**.setSalaryRate(salaryPerHr);

**this**.setName(name);

}

**public** SalariedWorker45() {

**super**();

}

@Override

**public** **void** getPayInfo() {

// **TODO** Auto-generated method stub

System.***out***.println("Salaried Worker Salary \nEnter Your Name and Per Hour Salary");

SalariedWorker45 salariedWorker = **new** SalariedWorker45(scnr.next() , scnr.nextDouble());

System.***out***.println("Total Monthly Salary of " + salariedWorker.getName() + " is " + (4\*40\*salariedWorker.getSalaryRate()));

// 1 month is counted as 4 week and 40 hrs per week

}

}

**Lab Exercise No:**46

**Exercise Objective(s):***Implementation of an interface*

**Exercise:***Createa package called bank with the following Interfaces.*

*<Interface> Account*

*<Interface>DepositAcc <Interface>LoanAcc*

*<Interface> Interest*

*<Interface>CreditInterest <Interface>DebitInterest*

1. *<Interface> Account*

*Data members: Four String variables to hold the account type “Savings, Fixed,PersonalLoan,*

*HousingLoan”*

*Methods: createAcc()*

1. *<Interface>DepositAcc*

*Methods: withdraw (), deposit(),getBalance()*

1. *<Interface>LoanAcc*

*Methods: repayPrincipal (),payInterest (),payPartialPrincipal ()*

1. *<Interface>Interest*

*Data members: Four double variables to hold the interest percentage of Savings account, Fixed*

*deposit account,PersonalLoan account and HousingLoan account.*

*Methods: calcInt()*

1. *<Interface>CreditInterest*

*Methods: addMonthlyInt(),addHalfYrlyInt(),addAnnualInt()*

1. *<Interface>DebitInterest*

*Methods: deductMonthlyInt(),deductHalfYrlyInt(),deductAnnualInt()*

*Create a package called BankImpl and create the following classes in it.*

1. *SavingsAcc which implements DepositAcc and CreditInterest*
2. *FDAcc which implements DepositAcc and CreditInterest*
3. *PersonalLoanAcc which implements LoanAcc and DebitInterest*
4. *HousingLoanAcc which implements LoanAcc and DebitInterest*

*Now create a class called MyAccount and create instances of all the accounts and generate appropriate output.*

**Recommended duration:***40Mins*

**Solution Code:**

**------------------------***Package bank START-----------------------*

*\*\*\*\*\*\*\*\*\*\*\*\*\*\*package bank\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\**

*\*\*\*\*\*\*\*\*\*\*\*\*\*\**IAccount.java\*\*\*\*\*\*\*\*\**\*\*\*\*\*\**

**package** bank;

**public** **interface** IAccount {

String ***accountSavings*** = "Savings";

String ***accountFixed*** = "Fixed";

String ***accountPersonalLoan*** = "Personal Loan";

String ***accountHousingLoan*** = "Housing Loan";

**void** createAcc();

}

*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\**

*\*\*\*\*\*\*\*\*\**ICreditInterest.java*\*\*\*\*\*\*\*\*\**

**package** bank;

**public** **interface** ICreditInterest **extends** IInterest {

**void** addMonthlyInt();

**void** addHalfYrlyInt();

**void** addAnnualInt();

}

*\*\*\*\*\*\*\*\*\*\**IDebitInterest.java\*\*\*\*\*\*\*\*\*\*

**package** bank;

**public** **interface** IDebitInterest **extends** IInterest {

**void** deductMonthlyInt();

**void** deductHalfYrlyInt();

**void** deductAnnualInt();

}

*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\**

*\*\*\*\*\*\*\*\*\*\*\*\**IDepositAcc.java\*\*\*\*\*\*\*\*\*\*

**package** bank;

**public** **interface** IDepositAcc **extends** IAccount {

**void** withdraw();

**void** deposit();

**void** getBalance();

}

*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\**

*\*\*\*\*\*\*\*\*\*\*\**IInterest.java\*\*\*\*\*\*\*\*\*\*\*\*

**package** bank;

**public** **interface** IInterest {

**double** ***interestSavings*** = 3.00;

**double** ***interestFixed*** = 5.50;

**double** ***interestPersonalLoan*** = 14.30;

**double** ***interestHousingLoan*** = 8.7;

**void** calcInt();

}

*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\**

*\*\*\*\*\*\*\*\*\*\*\*\**ILoanAcc.java\*\*\*\*\*\*\*\*\*\*\*\*

**package** bank;

**public** **interface** ILoanAcc **extends** IAccount {

**void** repayPrincipal ();

**void** payInterest ();

**void** payPartialPrincipal ();

}

*----------------------package bank OVER------------------------------------*

*----------------------package bankImpl START-----------------------------*

*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\**SavingsAcc.java\*\*\*\*\*\*\*\*\*\*\*\*\*\*

**package** bankImpl;

**import** bank.ICreditInterest;

**import** bank.IDepositAcc;

**public** **class** SavingsAcc **implements** IDepositAcc, ICreditInterest {

**public** **static** **void** main(String[] args) {

// **TODO** Auto-generated method stub

}

@Override

**public** **void** createAcc() {

// **TODO** Auto-generated method stub

System.***out***.println("Savings Account -> Create Account");

}

@Override

**public** **void** calcInt() {

// **TODO** Auto-generated method stub

System.***out***.println("Savings Account -> Calculate Interest");

}

@Override

**public** **void** addMonthlyInt() {

// **TODO** Auto-generated method stub

System.***out***.println("Savings Account -> Add Monthly Interest");

}

@Override

**public** **void** addHalfYrlyInt() {

// **TODO** Auto-generated method stub

System.***out***.println("Savings Account -> Add Half Yearly Interest");

}

@Override

**public** **void** addAnnualInt() {

// **TODO** Auto-generated method stub

System.***out***.println("Savings Account -> Add Annual Interest");

}

@Override

**public** **void** withdraw() {

// **TODO** Auto-generated method stub

System.***out***.println("Savings Account -> Withdraw");

}

@Override

**public** **void** deposit() {

// **TODO** Auto-generated method stub

System.***out***.println("Savings Account -> Deposit");

}

@Override

**public** **void** getBalance() {

// **TODO** Auto-generated method stub

System.***out***.println("Savings Account -> Get Balance");

}

}

*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\**

*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\**FDAcc.java\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

**package** bankImpl;

**import** bank.ICreditInterest;

**import** bank.IDepositAcc;

**public** **class** FDAcc **implements** IDepositAcc, ICreditInterest {

**public** **static** **void** main(String[] args) {

// **TODO** Auto-generated method stub

}

@Override

**public** **void** createAcc() {

// **TODO** Auto-generated method stub

System.***out***.println("FD Account -> Create Account");

}

@Override

**public** **void** calcInt() {

// **TODO** Auto-generated method stub

System.***out***.println("FD Account -> Calculate Interest");

}

@Override

**public** **void** addMonthlyInt() {

// **TODO** Auto-generated method stub

System.***out***.println("FD Account -> Add Monthly Interest");

}

@Override

**public** **void** addHalfYrlyInt() {

// **TODO** Auto-generated method stub

System.***out***.println("FD Account -> Add Half Yearly Interest");

}

@Override

**public** **void** addAnnualInt() {

// **TODO** Auto-generated method stub

System.***out***.println("FD Account -> Add Annual Interest");

}

@Override

**public** **void** withdraw() {

// **TODO** Auto-generated method stub

System.***out***.println("FD Account -> Withdraw");

}

@Override

**public** **void** deposit() {

// **TODO** Auto-generated method stub

System.***out***.println("FD Account -> Deposit");

}

@Override

**public** **void** getBalance() {

// **TODO** Auto-generated method stub

System.***out***.println("FD Account -> Get Balance");

}

}

*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\**

*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\**PersonalLoanAcc.java\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

**package** bankImpl;

**import** bank.IDebitInterest;

**import** bank.ILoanAcc;

**public** **class** PersonalLoanAcc **implements** ILoanAcc, IDebitInterest {

**public** **static** **void** main(String[] args) {

// **TODO** Auto-generated method stub

}

@Override

**public** **void** createAcc() {

// **TODO** Auto-generated method stub

System.***out***.println("Personal Loan Acoount -> Create Account");

}

@Override

**public** **void** calcInt() {

// **TODO** Auto-generated method stub

System.***out***.println("Personal Loan Acoount -> Calculate Interest");

}

@Override

**public** **void** deductMonthlyInt() {

// **TODO** Auto-generated method stub

System.***out***.println("Personal Loan Acoount -> Deduct Monthly Interest");

}

@Override

**public** **void** deductHalfYrlyInt() {

// **TODO** Auto-generated method stub

System.***out***.println("Personal Loan Acoount -> Deduct Half Yearly Interest");

}

@Override

**public** **void** deductAnnualInt() {

// **TODO** Auto-generated method stub

System.***out***.println("Personal Loan Acoount -> Deduct Annual Interest");

}

@Override

**public** **void** repayPrincipal() {

// **TODO** Auto-generated method stub

System.***out***.println("Personal Loan Acoount -> Repay Principal");

}

@Override

**public** **void** payInterest() {

// **TODO** Auto-generated method stub

System.***out***.println("Personal Loan Acoount -> Pay Interest");

}

@Override

**public** **void** payPartialPrincipal() {

// **TODO** Auto-generated method stub

System.***out***.println("Personal Loan Acoount -> Pay Partial Interest");

}

}

*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\**

*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\**HousingLoanAcc.java\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

**package** bankImpl;

**import** bank.IDebitInterest;

**import** bank.ILoanAcc;

**public** **class** HousingLoanAcc **implements** ILoanAcc, IDebitInterest {

**public** **static** **void** main(String[] args) {

// **TODO** Auto-generated method stub

}

@Override

**public** **void** createAcc() {

// **TODO** Auto-generated method stub

System.***out***.println("Housing Loan Acoount -> Create Account");

}

@Override

**public** **void** calcInt() {

// **TODO** Auto-generated method stub

System.***out***.println("Housing Loan Acoount -> Calculate Interest");

}

@Override

**public** **void** deductMonthlyInt() {

// **TODO** Auto-generated method stub

System.***out***.println("Housing Loan Acoount -> Deduct Monthly Interest");

}

@Override

**public** **void** deductHalfYrlyInt() {

// **TODO** Auto-generated method stub

System.***out***.println("Housing Loan Acoount -> Deduct Half Yearly Interest");

}

@Override

**public** **void** deductAnnualInt() {

// **TODO** Auto-generated method stub

System.***out***.println("Housing Loan Acoount -> Deduct Annual Interest");

}

@Override

**public** **void** repayPrincipal() {

// **TODO** Auto-generated method stub

System.***out***.println("Housing Loan Acoount -> Repay Principal");

}

@Override

**public** **void** payInterest() {

// **TODO** Auto-generated method stub

System.***out***.println("Housing Loan Acoount -> Pay Interest");

}

@Override

**public** **void** payPartialPrincipal() {

// **TODO** Auto-generated method stub

System.***out***.println("Housing Loan Acoount -> Pay Partial Interest");

}

}

*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\**

*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\**MyAccount.java\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

**package** bankImpl;

**public** **class** MyAccount {

**public** **static** **void** main(String[] args) {

// **TODO** Auto-generated method stub

SavingsAcc savingsAcc = **new** SavingsAcc();

FDAcc fdAcc = **new** FDAcc();

PersonalLoanAcc personalLoanAcc = **new** PersonalLoanAcc();

HousingLoanAcc housingLoanAcc = **new** HousingLoanAcc();

savingsAcc.createAcc();

savingsAcc.deposit();

savingsAcc.getBalance();

System.***out***.println();

fdAcc.createAcc();

fdAcc.addHalfYrlyInt();

fdAcc.addAnnualInt();

System.***out***.println();

personalLoanAcc.createAcc();

personalLoanAcc.deductMonthlyInt();

personalLoanAcc.calcInt();

System.***out***.println();

housingLoanAcc.createAcc();

housingLoanAcc.calcInt();

housingLoanAcc.deductAnnualInt();

}

**JAVA**

**Inner class**

**Lab Exercise No:**47

**Exercise Objective(s):***Inner classes*

**Exercise:***Create a class called BankAccount with deposit (), withdraw () and getBalance () methods.*

*Create an inner class called InterestAdder and implement the interest calculations and add*

*the interest to the current balance.*

**Recommended duration:** *20 Mins*

**Solution Guidance (if applicable):** *Interest calculation for a month*

*(Current balance \* 12%)/12*

**Solution Code:**

**package** pack.day3.com;

**import** java.util.Scanner;

**public** **class** BankAccount47 {

String accName;

**double** accBalance;

**public** BankAccount47() {

**super**();

}

**public** BankAccount47(String accName, **double** accBalance) {

**super**();

**this**.accName = accName;

**this**.accBalance = accBalance;

}

**void** deposit(**double** depositAmount) {

**this**.accBalance += depositAmount;

}

**void** withdraw(**double** withdrawlAmount){

**this**.accBalance -= withdrawlAmount;

}

**void** getBalance(){

System.***out***.println("Current Balance is " + **this**.accName + " : " + **this**.accBalance);

}

**class** InterestAdder {

**void** interest(**int** month) {

**double** i = (**double**)((month \* accBalance \* 0.12)/12);

accBalance += i;

System.***out***.println("Balance after " + month + " month(s) interest is : " + accBalance);

}

}

**public** **static** **void** main(String[] args) {

// **TODO** Auto-generated method stub

BankAccount47 b = **new** BankAccount47("Ankit", 131300);

BankAccount47.InterestAdder intAdd = b.**new** InterestAdder();

Scanner scnr = **new** Scanner(System.***in***);

System.***out***.println("You have 131300 balance, to calculate the total value after interest, Enter Months : ");

**int** months = scnr.nextInt();

intAdd.interest(months);

}

}

**Lab Exercise No:**48

**Exercise Objective(s):***Local inner classes*

**Exercise:***Create a class called BankAccount with deposit (), withdraw () and getBalance () methods.*

*Create a local inner class inside the getBalance() method called InterestAdder and implement*

*the interest calculations and add the interest to the current balance.*

**Recommended duration:** *20 Mins*

**Solution Guidance (if applicable):** *Interest calculation for a month*

*(Current balance \* 12%)/12*

**Solution Code:**

**package** pack.day3.com;

**import** java.util.Scanner;

**public** **class** BankAccount48 {

String accName;

**double** accBalance;

**public** BankAccount48() {

**super**();

}

**public** BankAccount48(String accName, **double** accBalance) {

**super**();

**this**.accName = accName;

**this**.accBalance = accBalance;

}

**void** deposit(**double** depositAmount) {

**this**.accBalance += depositAmount;

}

**void** withdraw(**double** withdrawlAmount){

**this**.accBalance -= withdrawlAmount;

}

**void** getBalance() {

System.***out***.println("Your Balance is "+ accBalance);

}

**double** getBalanceInst(**int** months){

**class** InterestAdder {

**public** **double** interestAdder(**int** months) {

accBalance += (accBalance\* months \* 0.12 ) / 12;

**return** accBalance;

}

}

InterestAdder instAdd = **new** InterestAdder();

**return** instAdd.interestAdder(months);

}

**public** **static** **void** main(String[] args) {

// **TODO** Auto-generated method stub

BankAccount48 bankAccount = **new** BankAccount48("Ankit", 131300);

Scanner scnr = **new** Scanner(System.***in***);

System.***out***.println("You have 131300 balance, to calculate the total value after interest, Enter Months : ");

**int** months = scnr.nextInt();

System.***out***.println("Balance after " + months + " month(s) interest is : " + bankAccount.getBalanceInst(months));

}

}

**Lab Exercise No:**49

**Exercise Objective(s):***Anonymous inner classes*

**Exercise:***Create a class called BankAccount with deposit (), withdraw () and getBalance () methods.*

*Create an anonymous inner class in the getBalance() method to do the interest calculations*

*and add the interest to the current balance.*

**Recommended duration:** *20 Mins*

**Solution Guidance (if applicable):** *Interest calculation for a month*

*(Current balance \* 12%)/12*

**Solution Code:**

**package** pack.day3.com;

**import** java.util.Scanner;

**interface** IInterestAdder {

**double** interestAdd(**int** months);

}

**public** **class** BankAccount49 {

String accName;

**double** accBalance;

**public** BankAccount49() {

**super**();

}

**public** BankAccount49(String accName, **double** accBalance) {

**super**();

**this**.accName = accName;

**this**.accBalance = accBalance;

}

**void** deposit(**double** depositAmount) {

**this**.accBalance += depositAmount;

}

**void** withdraw(**double** withdrawlAmount){

**this**.accBalance -= withdrawlAmount;

}

**void** getBalance() {

System.***out***.println("Your Balance is "+ accBalance);

}

**double** getBalanceInst(){

IInterestAdder intAdd = **new** IInterestAdder() {

@Override

**public** **double** interestAdd(**int** months) {

accBalance += (accBalance\* months \* 0.12 ) / 12;

**return** accBalance;

}

};

Scanner scnr = **new** Scanner(System.***in***);

System.***out***.println("You have 131300 balance, to calculate the total value after interest, Enter Months : ");

**int** months = scnr.nextInt();

**return** intAdd.interestAdd(months); //month

}

**public** **static** **void** main(String[] args) {

// **TODO** Auto-generated method stub

BankAccount49 bankAccount = **new** BankAccount49("Ankit", 131300);

System.***out***.println(bankAccount.getBalanceInst());

}

}