**//single inheritance**

**//super constructor**

**//method overriding**

**import** java.util.Scanner;

**class** info

{

String name, rollno;

info() {

name="Nithish";

rollno="22EIR054";

}

info(String n, String r) {

name=n;

rollno=r;

}

info(info x) {

name=x.name;

rollno=x.rollno;

}

**void** display() {

System.*out*.println("Name: " + name);

System.*out*.println("Rollno: " + rollno);

}

}

**class** marks **extends** info{

**int** m1,m2,m3;

marks() {

m1=97;

m2=98;

m3=96;

}

marks(String n, String r, **int** a, **int** b, **int** c) {

**super**(n,r);

m1=a;

m2=b;

m3=c;

}

marks(marks y) {

**super**(y);

m1=y.m1;

m2=y.m2;

m3=y.m3;

}

**void** display() {

**super**.display();

System.*out*.println("Mark1: " + m1);

System.*out*.println("Mark2: " + m2);

System.*out*.println("Mark3: " + m3);

}

}

**public** **class** add {

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

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

marks obj1 = **new** marks();

obj1.display();

String name=sc.next();

String rollno=sc.next();

**int** x=sc.nextInt();

**int** y=sc.nextInt();

**int** z=sc.nextInt();

marks obj2 = **new** marks(name,rollno,x,y,z);

obj2.display();

marks obj3 = **new** marks(obj2);

obj3.display();

sc.close();

}

}

**//single inheritance**

**//super constructor**

**//method overriding**

**class** info

{

String name, rollno;

info() {

name="Nithish";

rollno="22EIR054";

}

info(String n, String r) {

name=n;

rollno=r;

}

info(info x) {

name=x.name;

rollno=x.rollno;

}

**void** display() {

System.*out*.println("Name: " + name);

System.*out*.println("Rollno: " + rollno);

}

}

**class** marks **extends** info{

**int** m1,m2,m3;

marks() {

m1=97;

m2=98;

m3=96;

}

marks(String n, String r, **int** a, **int** b, **int** c) {

**super**(n,r);

m1=a;

m2=b;

m3=c;

}

marks(marks y) {

**super**(y);

m1=y.m1;

m2=y.m2;

m3=y.m3;

}

**void** display() {

**super**.display();

System.*out*.println("Mark1: " + m1);

System.*out*.println("Mark2: " + m2);

System.*out*.println("Mark3: " + m3);

}

}

**public** **class** add {

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

marks obj1 = **new** marks();

obj1.display();

marks obj2 = **new** marks("Nivash","22EIR053",95,96,98);

obj2.display();

marks obj3 = **new** marks(obj2);

obj3.display();

}

}

//Dynamic Dispatch

**class** info

{

String name, rollno;

info(String n, String r) {

name=n;

rollno=r;

}

**void** display() {

System.*out*.println("Name: " + name);

System.*out*.println("Rollno: " + rollno);

}

}

**class** marks **extends** info{

**int** m1,m2,m3;

marks(String n, String r, **int** a, **int** b, **int** c) {

**super**(n,r);

m1=a;

m2=b;

m3=c;

}

**void** display() {

**super**.display();

System.*out*.println("Mark1: " + m1);

System.*out*.println("Mark2: " + m2);

System.*out*.println("Mark3: " + m3);

}

}

**class** activity **extends** marks{

**int** am;

**double** total, average;

activity(String n, String r, **int** a, **int** b, **int** c,**int** d) {

**super**(n,r,a,b,c);

am=d;

}

**void** display() {

**super**.display();

total=m1+m2+m3+am;

average=total/4;

System.*out*.println("Activity Mark: " + am);

System.*out*.println("Total: " + total);

System.*out*.println("Average: " + average);

}

}

**public** **class** add {

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

info obj1;

activity obj2 = **new** activity("Nivash","22EIR053",95,96,98,90);

obj1=obj2;

obj1.display();

marks obj3 = **new** marks("Nivash","22EIR053",95,96,98);

obj1=obj3;

obj1.display();

}

}

//Multilevel Hierarchy

**class** info

{

String name, rollno;

info() {

name="Nithish";

rollno="22EIR054";

}

info(String n, String r) {

name=n;

rollno=r;

}

info(info x) {

name=x.name;

rollno=x.rollno;

}

**void** display() {

System.*out*.println("Name: " + name);

System.*out*.println("Rollno: " + rollno);

}

}

**class** marks **extends** info{

**int** m1,m2,m3;

marks() {

m1=97;

m2=98;

m3=96;

}

marks(String n, String r, **int** a, **int** b, **int** c) {

**super**(n,r);

m1=a;

m2=b;

m3=c;

}

marks(marks y) {

**super**(y);

m1=y.m1;

m2=y.m2;

m3=y.m3;

}

**void** display() {

**super**.display();

System.*out*.println("Mark1: " + m1);

System.*out*.println("Mark2: " + m2);

System.*out*.println("Mark3: " + m3);

}

}

**class** activity **extends** marks{

**int** am;

**double** total, average;

activity() {

am=100;

}

activity(String n, String r, **int** a, **int** b, **int** c,**int** d) {

**super**(n,r,a,b,c);

am=d;

}

activity(activity y) {

**super**(y);

am=y.am;

}

**void** display() {

**super**.display();

total=m1+m2+m3+am;

average=total/4;

System.*out*.println("Activity Mark: " + am);

System.*out*.println("Total: " + total);

System.*out*.println("Average: " + average);

}

}

**public** **class** add {

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

activity obj1 = **new** activity();

obj1.display();

activity obj2 = **new** activity("Nivash","22EIR053",95,96,98,90);

obj2.display();

activity obj3 = **new** activity(obj2);

obj3.display();

}

}

**Dynamic Method Dispatch (Solution to method override)**

**class** A {

**void** display() {

System.*out*.println("Method A");

}

}

**class** B **extends** A {

**void** display() {

System.*out*.println("Method B");

}

}

**class** C **extends** B {

**void** display() {

System.*out*.println("Method C");

}

}

**public** **class** add {

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

A obja = **new** A();

B objb = **new** B();

C objc = **new** C();

A robj;

robj=obja;

robj.display();

robj=objb;

robj.display();

robj=objc;

robj.display();

}

}

**Solution to method override using super**

**class** A {

**void** display() {

System.*out*.println("Method A");

}

}

**class** B **extends** A {

**void** display() {

**super**.display();

System.*out*.println("Method B");

}

}

**class** C **extends** B {

**void** display() {

**super**.display();

System.*out*.println("Method C");

}

}

**public** **class** add {

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

C objc = **new** C();

objc.display();

}

}

**Final Keyword**

**class** A {

**int** a;

A()

{

a=10;

}

**void** display() {

System.*out*.println("Method A");

System.*out*.println("In Method A a="+ a);

}

}

**class** B **extends** A {

B(){

**super**();

}

**void** display() {

**super**.display();

a=a+10;

System.*out*.println("Method B");

System.*out*.println("In Method B a="+ a);

}

}

**class** C **extends** B {

C(){

**super**();

}

**void** display() {

**super**.display();

System.*out*.println("Method C");

}

}

**public** **class** add {

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

C objc = **new** C();

objc.display();

}

}

**//Final Variable**

**class** A {

**final** **int** a;

A()

{

a=10;

}

**void** display() {

System.*out*.println("Method A");

System.*out*.println("In Method A a="+ a);

}

}

**class** B **extends** A {

B(){

**super**();

}

**void** display() {

**super**.display();

a=a+10; //error

System.*out*.println("Method B");

System.*out*.println("In Method B a="+ a);

}

}

**class** C **extends** B {

C(){

**super**();

}

**void** display() {

**super**.display();

System.*out*.println("Method C");

}

}

**public** **class** add {

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

C objc = **new** C();

objc.display();

}

}

**//final method**

**class** A {

**void** display() {

System.*out*.println("Method A");

}

}

**class** B **extends** A {

final **void** display() {

super.display();

System.*out*.println("Method B"); }

}

}

**class** C **extends** B {

**void** display() { //error cannot override

super.display();

System.*out*.println("Method C");

}

}

**public** **class** add {

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

C objc = **new** C();

objc.display();

}

}

**//final class**

**class** A {

**void** display() {

System.*out*.println("Method A");

}

}

**final class** B **extends** A {

**void** display() {

super.display();

System.*out*.println("Method B"); }

}

}

**class** C **extends** B { //error cannot extend

**void** display() {

super.display();

System.*out*.println("Method C");

}

}

**public** **class** add {

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

C objc = **new** C();

objc.display();

}

}