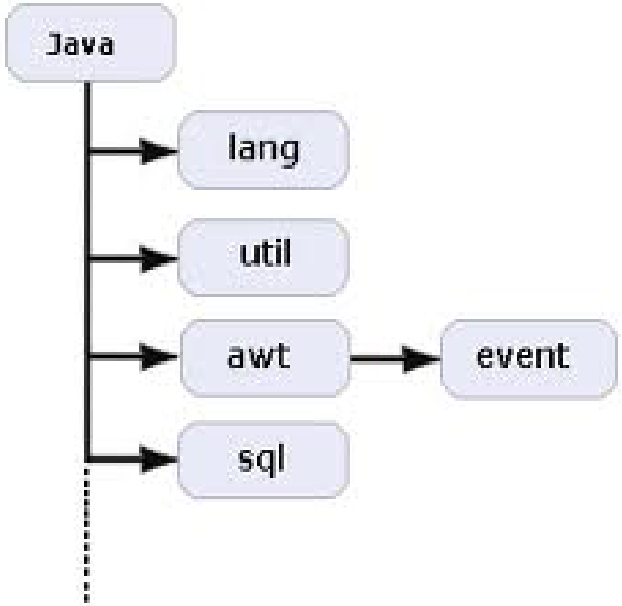
Packages in java

- A package is the grouping of related types providing access protection and named space management.
- Packages are created by using the keyword “package” and it should be first line of the source file.
- In order to use classes of other packages we have to use “import” statements.



Using import to access packages

```
package package1;

public class demoTest {
public void go()
{
System.out.println("in different package");
}
}
import package1.*;
public class Test {
int x = 6;
public static void main(String[] args)
{
demoTest t = new demoTest();
t.go();
}
}
```

```
package first;

public class ClassInFirst {
public void go()
{
System.out.println("in first package");
}
}
```

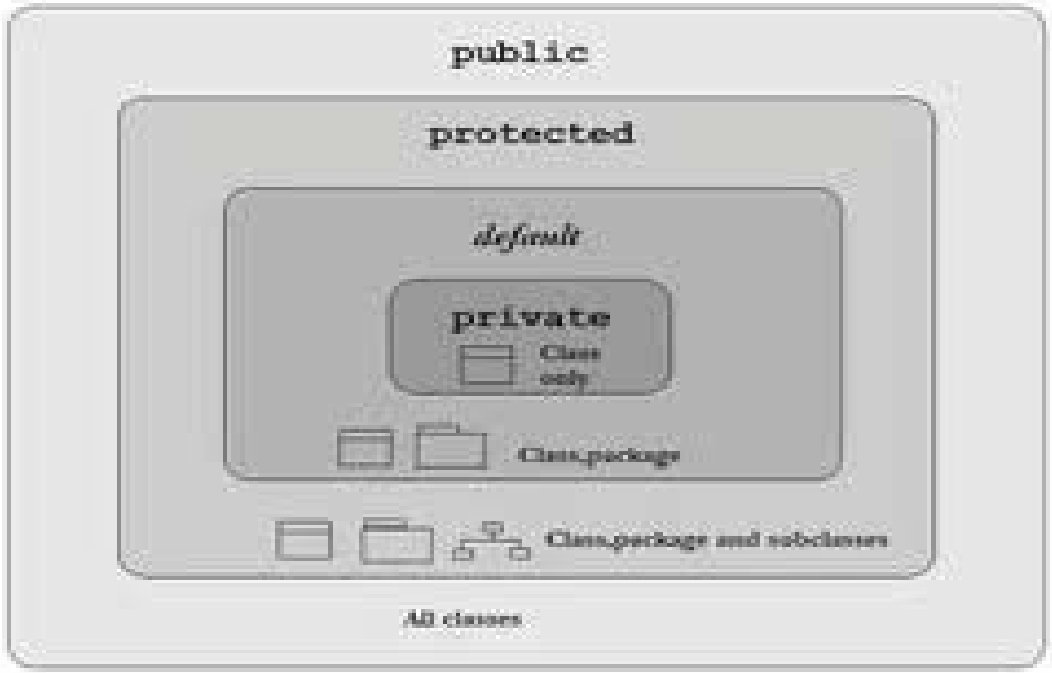
```
package first.second;

public class ClassInSecond {

public void go()
{
System.out.println("in second package");;
}
}
```

```
package third;

import first.second.*;
import first.*;

public class ClassInThird {
public static void main(String[] args)
{
ClassInFirst c = new ClassInFirst();
ClassInSecond d = new ClassInSecond();
c.go();
d.go();
}
}
```

Access Modifiers in java

- Access modifiers specifies access level of a java component.
- Access modifiers can be divided into two categories:

1) Class level
2) Member level



Class level access modifiers

- Public :

If a class is marked as public then it is accessible anywhere in java world.

Public class demo {}

- Default:

If a class have no modifier, then it will be marked as ‘default’ implicitly, then it is accessible in it’s package only

Class demo()

Class Member level access modifier

- Public:

If a member is marked as public then it is accessible in whole java world.

- Default:

If a member have no modifier, then it will be marked as ‘default’ implicitly, and accessible in it’s package only.

- Protected:

If a member is marked as protected then it is accessible in it’s package. It is also accessible outside the package but through “inheritance” only.(????)

- Private:

If a member is marked as private then it is accessible in it’s class only.

Creating and Using Jar files

- In Eclipse IDE, the jar file of any project can be created by using it's 'Export' feature in JAR format.
- To export any project in JAR format, In Eclipse go to File→export→java→jarFile→Finish.
- It will store our jar files in a specified location.

- Similarly in order to use the jar file in our project, following steps is to be taken :

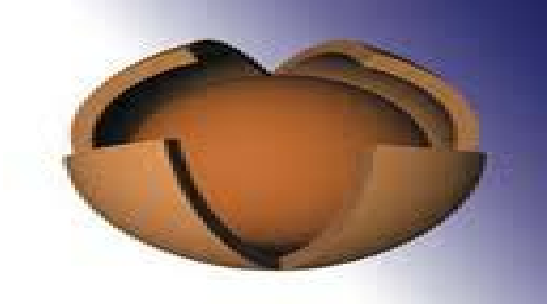
➢ Right click on any project in which we want to add the jar file.

➢ BuildPath>Configure BuildPath>Libraries>Add External Jars>select the file which we need to add.

Object Orientation

- Any language is said to be object oriented if it supports following object properties:

1. Encapsulation
2. Inheritance
3. Polymorphism
4. Data abstraction (or interfaces)



Encapsulation

- Encapsulation can be described as the mechanism in which we *"encapsulate"* our code in such a way that it can not be randomly accessed by other code outside the class.
- If we want to include encapsulation in our code then we have to do following things:

1. Always make instance variable private.
2. Always make public accessor methods and force calling code to use these methods instead of directly calling the instance variables.
3. Use naming convention set() and get() for these methods.

Problem scenario without encapsulation

- **public class Duck {**
- **private int size;**
- **public void display()**
- {
- **if (size<0)**
- System.*out.println("incorrect size");*
- **else if(size>10)**
- System.*out.println("bigger duck!!!");*
- **else if (size < 10)**
- System.*out.println("smaller duck!!");*

}

}

- public class Test {
- public static void main(String[] args)
- {
- Duck d = new Duck();

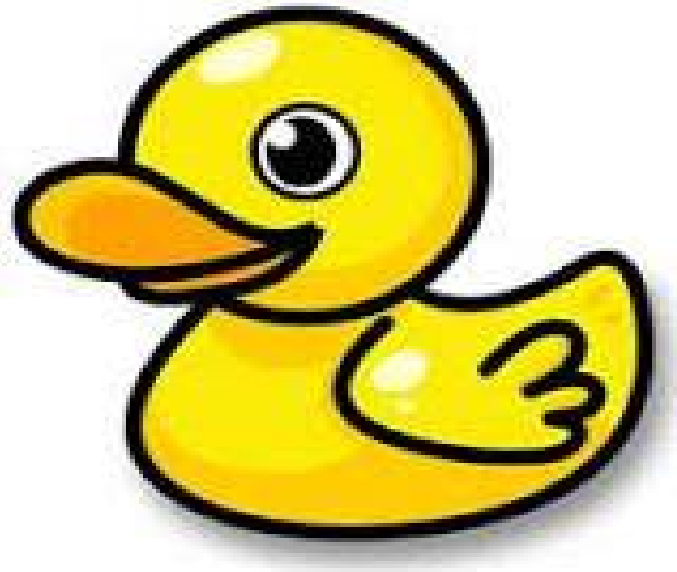
- d.size = 45;
- d.display();
- }
- }

Getters and Setters

- Getters and Setters are nothing but the methods which are used to “set” and “get” the value of instance variables.
- **Setters** **:** Setters catch the “value” of instance variable in it’s parameter and “set” or assign this value to the instance variable. Setters have always parameters and no return.
- **Getters:** Getters returns the value of a instance variable to it’s “caller”. It only returns the already set value of a instance variable. Getters don’t have parameters and always return something.

```
public class Duck {
private int size = 12;

public void setSize(int x)
{
if (x<=0);
else if(x>=25);
else
size = x;
}
public int getSize()
{
return size;
}
public void display()
{
if(size>10)
System.out.println("bigger duck!!!");
else if (size < 10)
System.out.println("smaller duck!!");
}
}
```

```
public class Test {
public static void main(String[] args)
{
Duck d = new Duck();

d.setSize(45);
System.out.println("the encapsulated size" +
d.getSize());
d.display();
}
}
```



Benefits of Encapsulation

- Code becomes more maintainable and flexible.
- In future we can change our code, without breaking some other code, which depends on our code.
- The class have total control over what is going to be stored over it’s fields.
- The user of the class don’t know how class stores the data.

Inheritance

- Inheritance can be defined as the process in which one object acquires the properties of others.
- By using inheritance the information becomes more manageable and in a hierarchical order.
- In other word we can say the Inheritance is the relationship between super class and subclass.

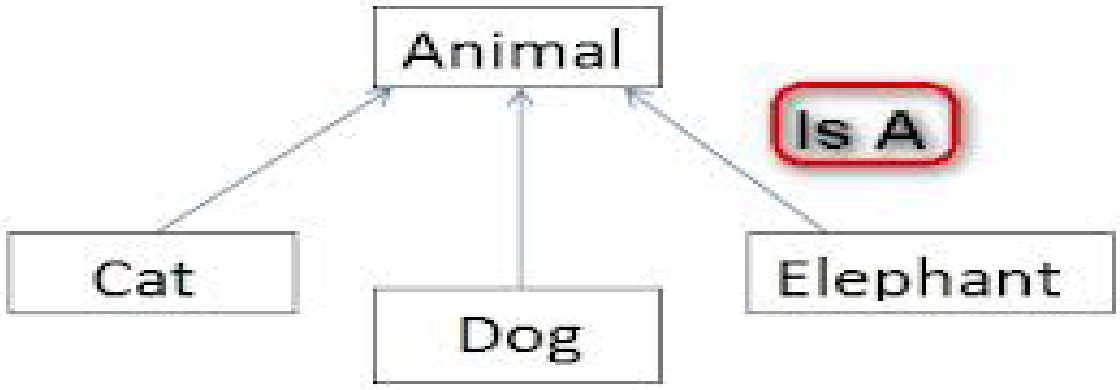
Super class vs. Sub class

- Super class:

This is the class which contains common features of all subclasses.

- Sub class:

This is the class which inherits all the features of super class.



Using Inheritance

- Inheritance relationship is created by using the keyword “extends”.

public class Animal {} // as superclass

- public class Dog extends Animal {} // Dog is subclass of Animal
- public class Cat extends Dog {} // Cat is subclass of Animal

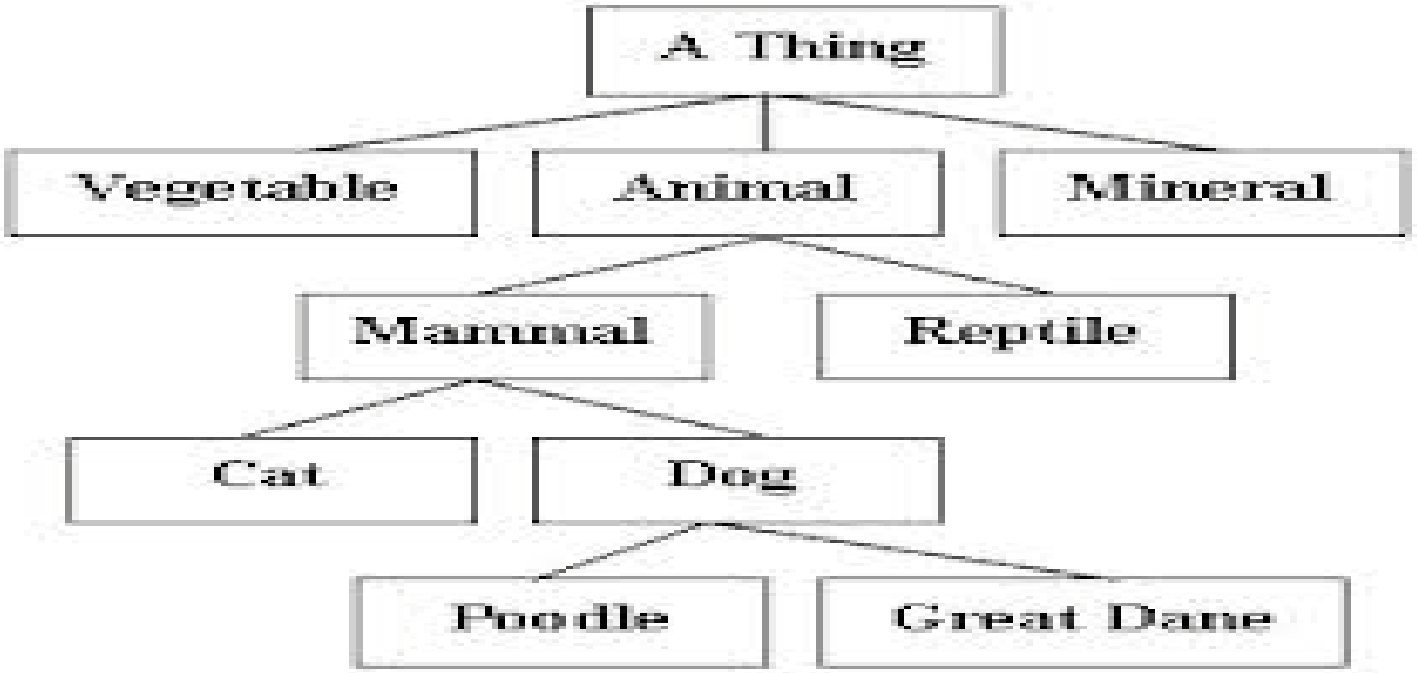
```
public class Animal {

public void eat()
{
System.out.println("eating habit");
}
public void roam()
{
System.out.println("raoming habit");
}
}
```

```
public class Cat extends Animal{

public void sound()
{
System.out.println("meow meow!!!");
}
}
```

```
public class Dog extends Animal{

public void sound()
{
System.out.println("woof woof!!!");
}
}
```

Inheritance Tree

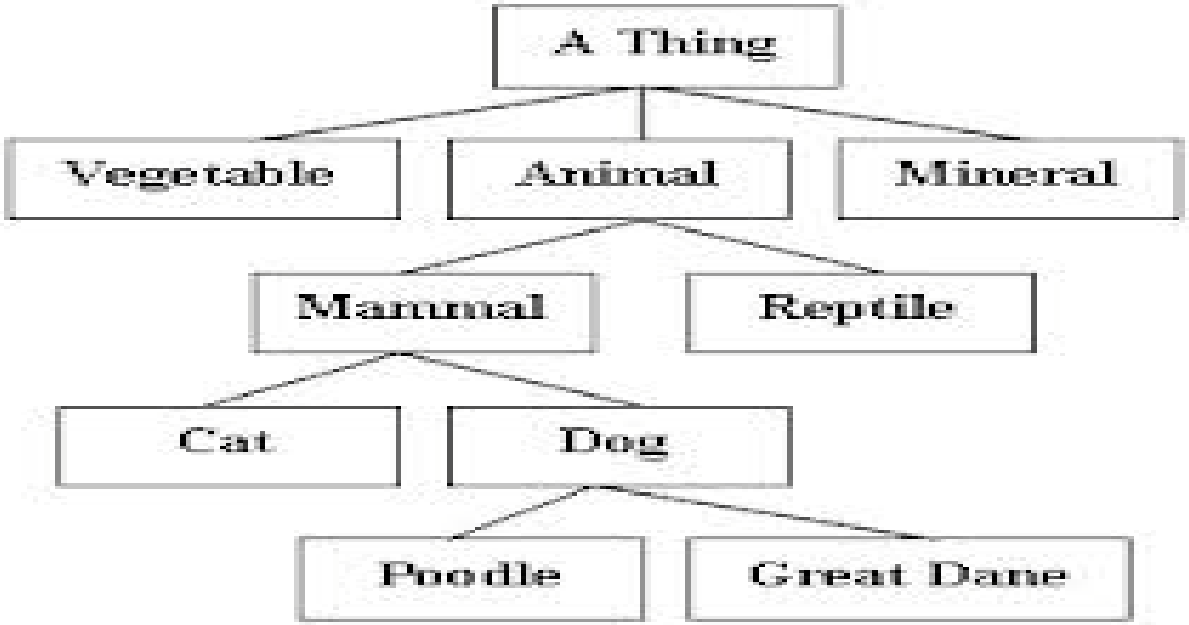
- Inheritance Tree is basically a tree structure (upside down) that maps inheritance hierarchies of the classes.



Method calling in Inheritance tree

- In inheritance tree the method calling is started from the lowest class in the tree.

e.g. if we call eat() method of “poddle” class then it starts searching from “Poddle” to “A Thing”.



Method Overriding

- Method Overriding is basically a ability to define a behavior which is specific to that sub class.
- Method Overriding RULES:

1. The arguments and the return type must be same as of superclass method.
2. The access level can’t be decreased.