11. Access Modifiers in java

There are two types of modifiers in java: **access modifiers** and **non-access modifiers**.

The access modifiers in java specifies accessibility (scope) of a data member, method, constructor or class.

There are 4 types of java access modifiers:

1. private
2. default
3. protected
4. public

There are many non-access modifiers such as static, abstract, synchronized, native, volatile, transient etc. Here, we will learn access modifiers.

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1) private access modifier

The private access modifier is accessible only within class.

Simple example of private access modifier

In this example, we have created two classes A and Simple. A class contains private data member and private method. We are accessing these private members from outside the class, so there is compile time error.

```
1. class A{
2. private int data=40;
3. private void msg(){System.out.println("Hello java");}
4. }
5.
6. public class Simple{
7.  public static void main(String args[]){
8.    A obj=new A();
9.    System.out.println(obj.data);//Compile Time Error
10.   obj.msg();//Compile Time Error
11.   }
12. }
```

➢ Role of Private Constructor

If you make any class constructor private, you cannot create the instance of that class from outside the class. For example:

```
1. class A{
2. private A(){}//private constructor
3. void msg(){System.out.println("Hello java");}
4. }
5. public class Simple{
6.  public static void main(String args[]){
7.    A obj=new A();//Compile Time Error
8.  }
9. }
```

Note: A class cannot be private or protected except nested class.

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2) default access modifier

If you don't use any modifier, it is treated as **default** bydefault. The default modifier is accessible only within package.

Example of default access modifier

In this example, we have created two packages pack and mypack. We are accessing the A class from outside its package, since A class is not public, so it cannot be accessed from outside the package.

```
1. //save by A.java
2. package pack;
3. class A{
4.   void msg(){System.out.println("Hello");}
5. }
1. //save by B.java
2. package mypack;
3. import pack.*;
4. class B{
5.   public static void main(String args[]){
6.    A obj = new A();//Compile Time Error
7.    obj.msg();//Compile Time Error
8.   }
```

```
9. }
```

In the above example, the scope of class A and its method msg() is default so it cannot be accessed from outside the package.

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3) protected access modifier

The **protected access modifier** is accessible within package and outside the package but through inheritance only.

The protected access modifier can be applied on the data member, method and constructor. It can't be applied on the class.

Example of protected access modifier

In this example, we have created the two packages pack and mypack. The A class of pack package is public, so can be accessed from outside the package. But msg method of this package is declared as protected, so it can be accessed from outside the class only through inheritance.

```
1. //save by A.java
2. package pack;
3. public class A{
4. protected void msg(){System.out.println("Hello");}
5. }
```

```
1. //save by B.java
2. package mypack;
3. import pack.*;
4.
5. class B extends A{
6.   public static void main(String args[]){
7.    B obj = new B();
8.    obj.msg();
9.   }
10. }
```

Output: Hello

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4) public access modifier

The **public access modifier** is accessible everywhere. It has the widest scope among all other modifiers.

Example of public access modifier

```
1. //save by A.java
2.
3. package pack;
4. public class A{
5. public void msg(){System.out.println("Hello");}
6. }
1. //save by B.java
2.
3. package mypack;
4. import pack.*;
5.
6. class B{
7.   public static void main(String args[]){
8.    A obj = new A();
9.    obj.msg();
10.  }
11. }
```

Output: Hello

❖ Understanding all java access modifiers

Let's understand the access modifiers by a simple table.

Access Modifier	within class	within package	outside package by subclass only	outside package
Private	Y	N	N	N
Default	Y	Y	N	N
Protected	Y	Y	Y	N
Public	Y	Y	Y	Y

➢ **Java access modifiers with method overriding**

- The Overridden method should have the **same** Access Specifier of the Parent method. (or) There can be increase in the access privileage also.

Parent	Child
Public	Public
Protected	Public Protected
Default	Public Protected Default
Private	**X**

Access Privileage Reduces

Public
Protected
Default
Private

If you are overriding any method, overridden method (i.e. declared in subclass) must not be more restrictive.

```
1. class A{
2. protected void msg(){System.out.println("Hello java");}
3. }
4.
5. public class Simple extends A{
6. void msg(){System.out.println("Hello java");}//C.T.Error
7.  public static void main(String args[]){
8.    Simple obj=new Simple();
9.    obj.msg();
10.   }
11.}
```

The default modifier is more restrictive than protected. That is why there is compile time error.