Object-Oriented Programming (CS F213)

Module I: Object-Oriented and Java Basics

CS F213 RL 3.2: Access Modifiers in Java

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CS F213 RL 3.2 : Topics

- Access Modifiers in Java (https://docs.oracle.com/javase/tutorial/java/javaOO/accesscontrol.html)

What are Access Modifiers

- Helps the programmer to decide access levels for the instance fields and methods of the class
- Encapsulation is supported via Access Modifiers
- Scope/Visibility/Access Privileges of the 'Instance Fields' and 'Methods' of a class is determined via their Access Modifiers
- Java Provides following
  1. public (Highest Access/Privilege Level)
  2. protected
  3. private (Least Privilege Level)
  4. package-private (Default Modifier – if no access modifier is used)

Note: package-private is not a Java Keyword.

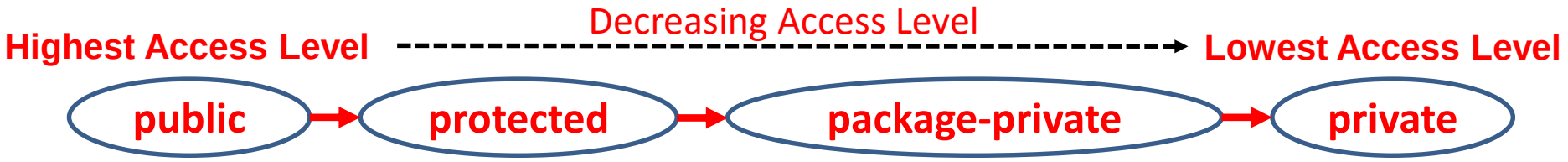
A Simple Example

```
class Student
{
    private         String      name;     // name of student (Access Level : private)
                    int         age;      // age of student (Access Level: package-private)
    protected       String      idno;     // id number of student ( Access Level : protected)

    public String   getName()
    {
            return name;
    }

    public void     display()
    {
            System.out.println("Name :"+ name);
            System.out.println("Age : "+ age);
    }

}// End of class Student
```



Access Locations

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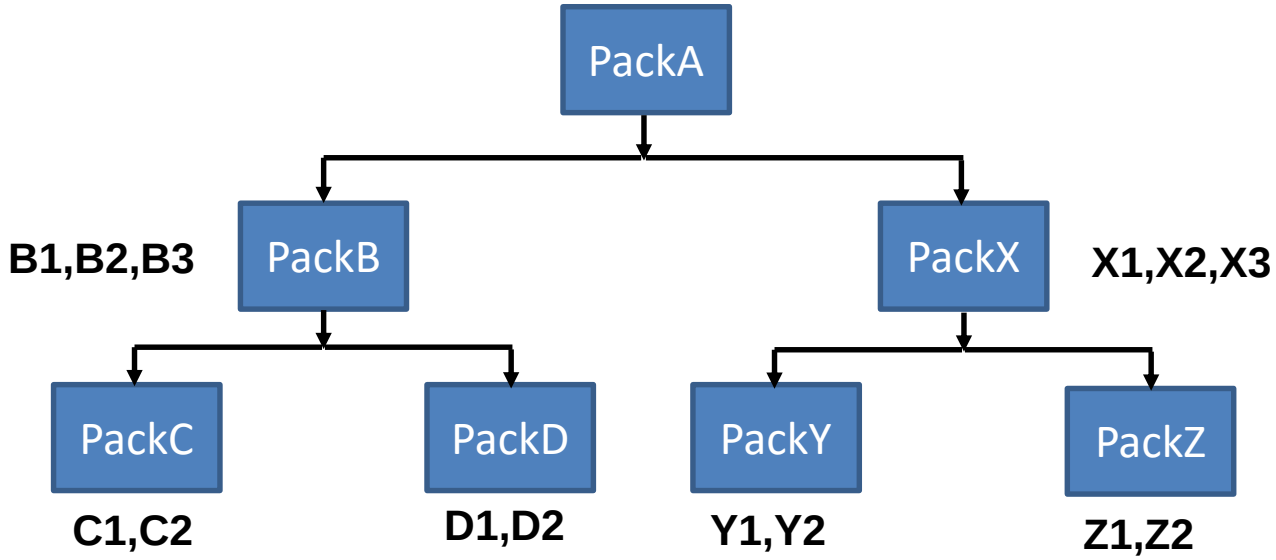
- Places from where a member of class can be accessed/referenced
- Five Possible Access Locations
  1. From within a class itself
  2. From other classes in the same package
  3. From sub-classes defined with-in the same package
  4. From sub-classes defined in some other packages
  5. From classes defined in other packages

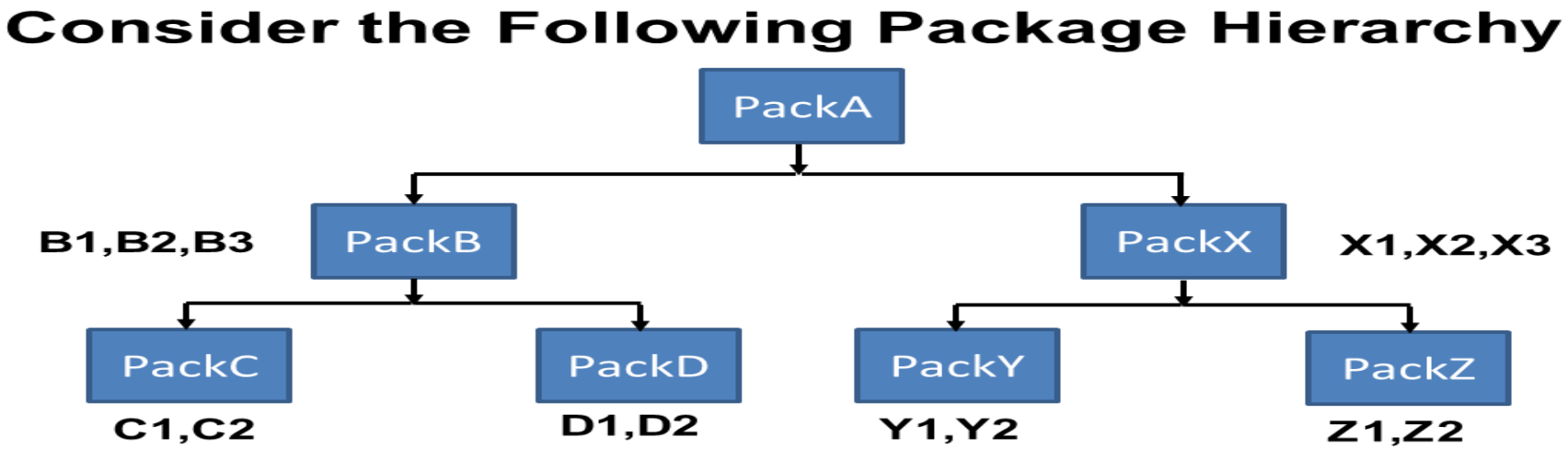
Access Locations : Example

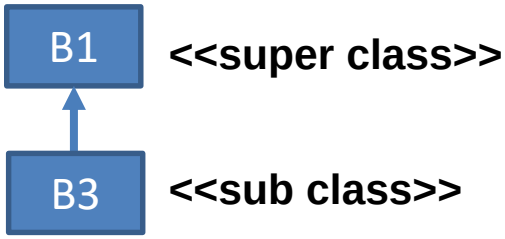
Consider the Following Package Hierarchy



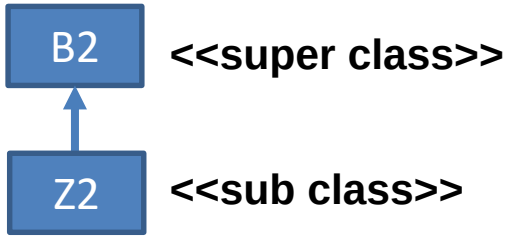
- B1,B2 and B3 are classes in package PackB. Similarly classes X1,X2 and X3 belongs to package PackX. C1,C2 classes belongs to PackC. D1,D2 classes belongs to PackD.Y1,Y2 classes belongs to PackY. Z1,Z2 and Z3 classes belongs to classes PackZ.
- Assume class B3 (package PackB) is a sub-class of B1 (package PackB).
- Assume class Z2 (package PackZ) is a sub-class of B2 (package PackB).

Access Locations : Example





B1 and B3 belongs to
Same Package PackB



B2 belongs to Package Pack B
Z2 belongs to Package PackZ

Visibility of Fields/Methods

Access Modifiers

Access Locations

	public	protected	package- private	private
With in the Same Class				
Sub-Classes in same package				
Other Classes in same package				
Subclasses in other packages				
Non-subclasses in other packages				

Visibility of Fields/Methods

Access Modifiers

Access Locations

	public	protected	package- private	private
With in the Same Class	Yes	Yes	Yes	Yes
Sub-Classes in same package				
Other Classes in same package				
Subclasses in other packages				
Non-subclasses in other packages				

Visibility of Fields/Methods

Access Modifiers

Access Locations

	public	protected	package- private	private
With in the Same Class	Yes	Yes	Yes	Yes
Sub-Classes in same package	Yes	Yes	Yes	No
Other Classes in same package				
Subclasses in other packages				
Non-subclasses in other packages				

Visibility of Fields/Methods

Access Modifiers

Access Locations

	public	protected	package- private	private
With in the Same Class	Yes	Yes	Yes	Yes
Sub-Classes in same package	Yes	Yes	Yes	No
Other Classes in same package	Yes	Yes	Yes	No
Subclasses in other packages				
Non-subclasses in other packages				

Visibility of Fields/Methods

Access Modifiers

Access Locations

	public	protected	package- private	private
With in the Same Class	Yes	Yes	Yes	Yes
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Other Classes in same package	Yes	Yes	Yes	No
Subclasses in other packages	Yes	Yes	No	No
Non-subclasses in other packages				

Visibility of Fields/Methods

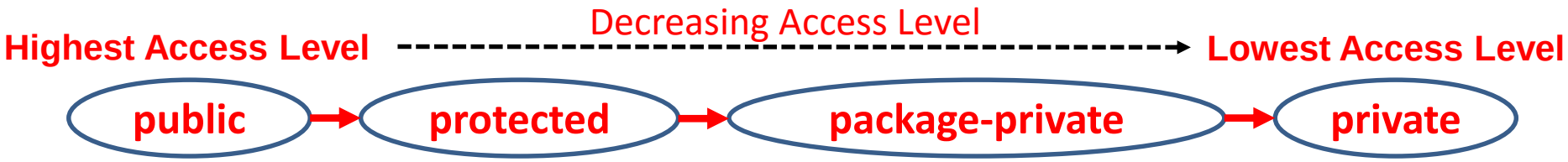
Access Modifiers

Access Locations

	public	protected	package- private	private
With in the Same Class	Yes	Yes	Yes	Yes
Sub-Classes in same package	Yes	Yes	Yes	No
Other Classes in same package	Yes	Yes	Yes	No
Subclasses in other packages	Yes	Yes	No	No
Non-subclasses in other packages	Yes	No	No	No

Access Modifiers : Summary

- <<private> members of a class say ‘C’ are visible only in side the class ‘C’
- <<package-private>> members of class ‘C’ are visible in the all the classes of the package to which the class ‘C’ belongs
- <<protected>> members of class ‘C’ are visible in (i) all the classes of the package to which the class ‘C’ belongs and (ii) all the sub-classes of ‘C’
- <<public>> members of class ‘C’ are visible to every other class belonging to the same or any other package



Thank You