

## Chapter 5: Package

- Package is a group of similar types of classes, interfaces, and sub-packages .
- Using the package, the classes contained in the package of other programs can be reused.
- We can take an example as folder in Windows.
- Package in java is categorized in two types:
  1. Built-in package
  2. User-defined package.

### 1. Built in package

The predefined packages which contain large numbers of classes and interfaces that we used in java.

Types of Built in package:

- **java.lang**: This package is automatically imported in every Java program.
- It provides language support classes that are fundamental to the design of the Java programming language.
- Classes like System, Math, Integer, String etc. are part of this package.
- **java.util**: This package contains utility classes which implement data structures, date and time etc.
- **java.io**: This package provides classes for input/output operations like reading and writing to files or streams.  
Examples: FileInputStream, FileOutputStream ,BufferedReader etc.
- **java.applet**: this package is used for creating applets.

- **java.awt:** It is used to implement GUI components for desktop applications. It includes classes like buttons, textfields, labels etc.
- **java.net:** It includes classes for supporting networking operations like URL, Socket etc.
- Other packages like java.sql, java.security, java.awt.event, java.text etc are also built-in packages.
- Example:
  - Using lang package and String class.

### Example of java.lang package

```
public class Main {
    public static void main(String[] args) {
        String message = "Hello, World!"; // Using a class String from java.lang package
        System.out.println(message);
    }
}
```

### Example of java.io package

```
import java.io.FileWriter;
import java.io.IOException;

public class MainFilePackage {
    public static void main(String[] args) {
        try {
            FileWriter writer = new FileWriter("output.txt");
            writer.write("Text written to the file.");
            writer.close();
            System.out.println("Data written to file successfully.");
        } catch (IOException e) {
            System.out.println(e);
        }
    }
}
```

## 2. User-defined package

The packages which are defined by the user are called user-defined packages.

Syntax: `package package_name;`

Rules:

- Package statement must be in the first line of the program.
- Compilation is done as:

`>javac -d . Class_name.java`

Example:

Folder 1:

```
package Calculations;

public class MathOperation {
    // Function to add two numbers
    public static int add(int a, int b) {
        return a + b;
    }

    // Function to subtract two numbers
    public static int subtract(int a, int b) {
        return a - b;
    }
}
```

Note: To compile and run the program, make sure both MathOperation.java and MainPackage.java are in the same directory.

Folder 1:

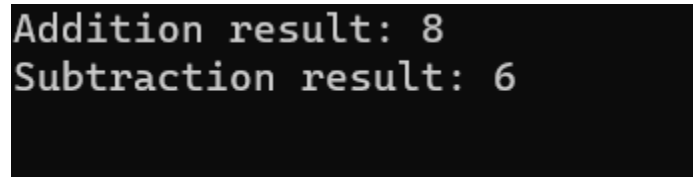
```
import Calculations.MathOperation;

public class MainPackage {
    public static void main(String[] args) {

        MathOperation m=new MathOperation();
        int resultAdd = m.add(5, 3);
        int resultSubtract = m.subtract(10, 4);

        System.out.println("Addition result: " + resultAdd);
        System.out.println("Subtraction result: " + resultSubtract);
    }
}
```

Output:

A screenshot of a terminal window with a black background and white text. It displays the output of the Java program: "Addition result: 8" on the first line and "Subtraction result: 6" on the second line.

```
Addition result: 8
Subtraction result: 6
```

Access modifiers in Java:

	PRIVATE	DEFAULT	PROTECTED	PUBLIC
Same class	Yes	Yes	Yes	Yes
Same package Subclass	No	Yes	Yes	Yes
Same package Non-subclass	No	Yes	Yes	Yes
Different package Subclass	No	No	Yes	Yes
Different package Non-subclass	No	No	No	Yes

Advantages of package:

1. Security:
2. Fast searching; can go to specific package of library.
3. Code reusability
4. Removal of naming conflict: can make same class name of different packages.
5. Data hiding: donot need to share whole source code to other .  
We can share through package.

Disadvantage:

The parameter cannot be passed.