

**Topic:** Invocation and use of packages, use of import directive.

**OOP concepts involved:** Classes, Java Packages, Java CLASSPATH, Java PATH, Class Modifiers, Static Methods.

**Programming generic concepts involved:** Functions, Data Types, Variables, Access Modifiers.

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## ➤ Theoric introduction

### JAVA PACKAGE

A package is simply a container that groups related types (Java classes, interfaces, enumerations and annotations). For example, in core Java, the `ResultSet` interface belongs to `java.sql` package. The package contains all the related types that are needed for SQL query and database connection.

Packages help to reserve the class namespace and create maintainable code. The rule of thumb in Java programming is that, only one unique class name is allowed in a Java project.

There are two different types of packages in Java:

- *Built-in Packages*

Built-in packages are existing java packages that come along with the JDK. For example, `java.lang`, `java.util`, `java.io` etc.

- *User-defined Packages*

Java also allows you to create packages as per your need. These packages are called user-defined packages.

### HOW TO IMPORT PACKAGES IN JAVA?

Java has *import* statement that allows you to import an entire package (as in earlier examples), or use only certain classes and interfaces defined in the package.

The general form of *import* statement is:

```
import package.name.ClassName;    // To import a certain class only
import package.name.*             // To import the whole package
```

For example,

```
import java.util.Date; // imports only Date class
import java.io.*;      // imports everything inside java.io package
```

The import statement is optional in Java. If you want to use class/interface from a certain package, you can also use its *fully qualified name*, which includes its full package hierarchy.

Here is an example to import package using import statement.

```
import java.util.Date;

class MyClass implements Date {
    // body
}
```

The same task can be done using fully qualified name as follows:

```
class MyClass implements java.util.Date {
    //body
}
```

**Note:** In Java, *import* statement is written directly after the package statement (if it exists) and before the class definition.

For example,

```
package package.name;
import package.ClassName; // only import a Class

class MyClass {
    // body
}
```

- **SETTING CLASSPATH WITH THE THIRD WAY (CLASSPATH JAVA COMMAND)**

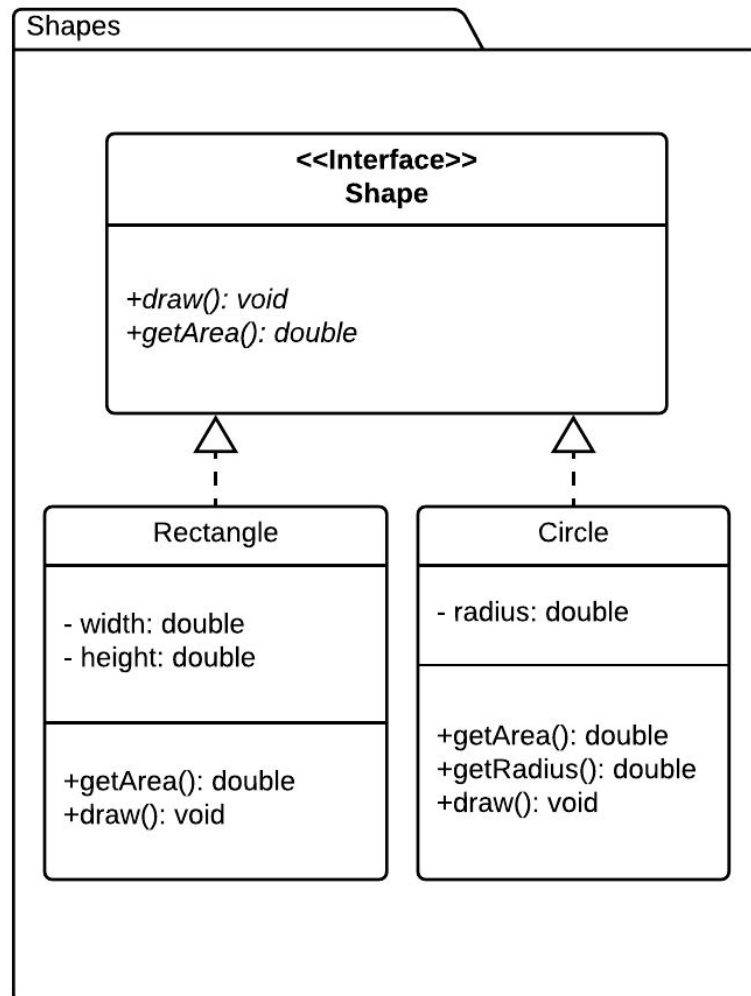
```
C:\javaproject\classes>java -cp C:\javaproject\classes com.figure.Circle
```

This is a circle!

## ➤ Statement

Develop a package containing two classes called Circle and Rectangle. Import that package into a class to create different shapes and obtain their areas using those classes.

## ➤ Class design (UML)



## ➤ Program Code

Shapes.java

```
package shapes;

public interface Shape{
    void draw();
}
```

```
        double getArea();  
    }
```

### Rectangle.java

```
package shapes;  
  
public class Rectangle implements Shape{  
  
    private double width;  
    private double height;  
  
    public Rectangle(double w, double h){  
        this.width=w;  
        this.height=h;  
    }  
  
    public void draw() {  
        System.out.println("Drawing Rectangle");  
    }  
  
    public double getArea() {  
        return this.height*this.width;  
    }  
}
```

### Circle.java

```
package shapes;  
  
public class Circle implements Shape{  
  
    private double radius;  
  
    public Circle(double r){  
        this.radius = r;  
    }  
  
    public void draw() {  
        System.out.println("Drawing Circle");  
    }  
  
    public double getArea() {  
        return Math.PI*this.radius*this.radius;  
    }  
  
    public double getRadius() {  
        return this.radius;  
    }  
}
```

## Main.java

```
import shapes.Circle;
import shapes.Rectangle;
import java.util.Scanner;
import java.lang.Integer;

public class Main {

    public static void main(String[] args) {
        Circle c1;
        Rectangle r1;
        double capture;

        Scanner sc = new Scanner(System.in);

        System.out.println("What's the circle radius?");
        c1 = new Circle(Double.parseDouble(sc.nextLine()));
        System.out.println("What's the Rectangle width?");
        capture = Double.parseDouble(sc.nextLine());
        System.out.println("What's the Rectangle height?");
        r1 = new Rectangle(capture, Double.parseDouble(sc.nextLine()));

        System.out.println("Circle Area: " + c1.getArea());
        System.out.println("Rectangle Area: " + r1.getArea());

        sc.close(); // Closing data flow
    }
}
```

### ➤ Program execution

After we have implemented the package, we can now use the utility it provides to rapidly create Shape Objects with a variety of sizes.

```
What's the circle radius?
12
What's the Rectangle width?
3
What's the Rectangle height?
4
Circle Area: 452.3893421169302
Rectangle Area: 12.0
```

## ➤ Conclusions

Using the Java ***import*** directive to add to our files the packages we will use to access their classes, interfaces, etc. it is a good practice, since it saves us the effort of using the Fully Qualified Package name every time we have to make any reference to the classes associated with the determined package.

The ***import*** directive serves as a short name to use our classes, interfaces, annotations, enumerations, ... without many repeated long words (all the package hierarchy).