

Java Foundations

The import Declaration and Packages



Objectives

- This lesson covers the following objectives:
 - Access a class by using its fully qualified name
 - Describe the function of the import statement
 - Use the import statement to access a class in a package
 - Understand the purpose of an asterisk in an import statement
 - Identify packages that are automatically imported



Why Should You Reinvent the Wheel?

- Frequently, you may rewrite the same Java code for different programs
- As an alternative to rewriting the same code, you can use the Java-provided library, which organizes frequently used code
- This library is called as Java class library
- The Java class library documentation is available here:
 - <https://docs.oracle.com/javase/8/docs/api/>

Packages in the Java Class Library

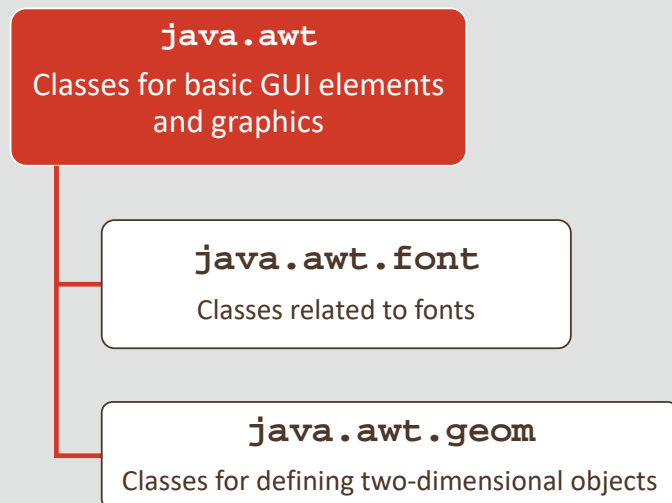
- The classes of the Java class library are organized into packages
- A package contains a group of related classes
- With a package, it becomes easier to locate the related classes

Packages in the Java Class Library

Package	Purpose
<code>java.lang</code>	Provides classes that are fundamental to the design of the Java language
<code>javax.swing</code>	Provides classes to build GUI components
<code>java.net</code>	Provides classes for networking applications
<code>java.time</code>	Provides classes for dates, times, instants, and durations

How Are the Packages Organized?


- The vast collection of classes are organized into a tree-like hierarchy, which allows packages to be divided into subpackages, like this:



Using a Class from a Package

- To use a class from a package in your program, you need to specify its fully qualified name
- For example, to use the Scanner class to read a keyboard input, the fully qualified name for the Scanner class, which is defined in the java.util package, is:

`java.util.Scanner`



Using the Fully Qualified Class Name

- As you can see, using the fully qualified name creates very long names for classes
- Long names reduce the readability of the code and also make coding difficult

```
public static void main(String[] args) { Fully Qualified Class Name
    int num;
    java.util.Scanner keyboard = new java.util.Scanner(System.in);
    System.out.print("Enter a number");
    num = keyboard.nextInt();
    System.out.print("The number you entered is" + num);
} //end method main
```

Is There an Alternative to the Fully Qualified Name?

- Suppose that you have a friend whose name is Santi Inez Luis Vidal
 - How tedious is it to call him by his full name every time?
 - If you could simply refer to him as “Santi,” it would be so much more convenient
- Similarly, accessing Java classes by using fully qualified names is equally tedious in your programs
- Let’s see if there’s a way to specify only the name of the class instead of its fully qualified name

Using the import Statement

- You can avoid the fully qualified class name by using the import statement
- You place the import statement above your class definition. It looks like this:
 - `import package.className`
 - Example:

```
import java.util.Scanner;

public class AddNums {
    //class code goes here
} //end class AddNums
```

Diagram labels:

- Package**: Points to `java` in `java.util.Scanner`
- Class Name**: Points to `util` in `java.util.Scanner`
- import Statement**: Points to the entire `import java.util.Scanner;` line
- Class Definition**: Points to the `public class AddNums { ... }` block

How Do You Import a Single Class?

- You can import a single class or an entire package
- To import a single class into your program, you write an import statement like this:

```
import javax.swing.JOptionPane;
```

Package Name Class Name

import keyword followed
by the name of the
package dot, the name of
the class

javax.swing Package

- Java has an extensive library for constructing GUIs
- This library, called swing, can be imported into your program to give you access to Java's GUI functionality
- The swing library is in the javax.swing package

Accessing a Class from the swing Package

- The swing package has a JOptionPane class
- This class creates a pop-up window that can be used to display strings of text to the user
- To use the JOptionPane class, you must first import it into your class:

```
import javax.swing.JOptionPane;
```

```
public class Welcome {  
    //class code to go here  
} //end class Welcome
```

import statement that imports a single class, JOptionPane, from the swing package

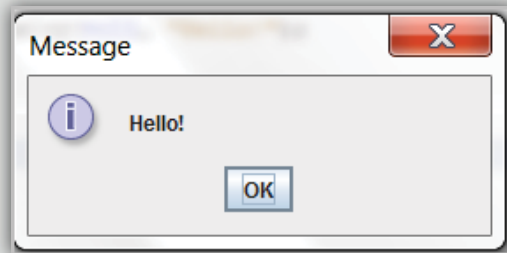
Importing the JOptionPane Class

- You can then use JOptionPane to display text by calling the showMessageDialog method inside the JOptionPane class

```
import javax.swing.JOptionPane;
```

```
public class Welcome {  
  
    public static void main(String[] args) {  
        JOptionPane.showMessageDialog(null, "Hello!");  
    } //end method main  
} //end class Welcome
```

Output Looks Like This!



How Do You Import All Classes in a Package?

- You can import all classes in a particular package by using the * wildcard character in the import statement

How Do You Import All Classes in a Package?

- Let's say you want to extend the previous example by creating an instance of the JFrame class and add its reference to JOptionPane, like this:

```
import javax.swing.JOptionPane;
import javax.swing.JFrame;

public class Welcome {

    public static void main(String[] args) {
        JFrame frame = new JFrame();
        JOptionPane.showMessageDialog(frame, "Hello!");
    } //end method main
} //end class Welcome
```

Importing 2 classes from the swing package

Accessing All Classes from the swing Package

- As you access more classes from the swing package in your program, the number of import statements also increases

Accessing All Classes from the swing Package

- To avoid this, you can import all classes from the swing package by using the * wildcard character in the import statement, like this:

```
import javax.swing.*;
```

Replace all import statements of the previous example with one import statement

```
public class Welcome {  
    public static void main(String[] args) {  
        JFrame frame = new JFrame();  
        JOptionPane.showMessageDialog(frame, "Hello!");  
    } //end method main  
} //end class Welcome
```

Including Multiple import Statements

- You can include multiple import statements in a Java program to access classes in the same package or in different packages
- For example:

```
import java.util.Date;  
import java.util.Calendar; }  
import javax.swing.*;
```

Importing classes from the same package

```
public class DisplayDate {  
    //class definition here  
} //end class DisplayDate
```

Importing classes from different packages

Identify Packages That Are Automatically Imported

- So far, you have used `System.out.println()` to print text to the console

```
public class DisplayOutput {  
    public static void main(String[] args) {  
        System.out.println("Hello, how are you today?");  
    } //end method main  
} //end class DisplayOutput
```

- However, you didn't import a package for using this method in your program
- So how does Java know what to do when you call it?

java.lang Package

- If you look at the Java library, you'll see that the `System` class is organized in the `java.lang` package
- By default, the `java.lang` package is automatically imported into all Java programs



Exercise 1

- Import and open the `ImportEx` project
- Examine `AddImport.java`
 - Perform the following:
 - Replace the fully qualified name to access the `JLabel` component with an import statement
 - To import classes from the `util` package, replace multiple import statements with a single import statement

Summary

- In this lesson, you should have learned how to:
 - Access a class by using its fully qualified name
 - Describe the function of the import statement
 - Use the import statement to access a class in a package
 - Understand the purpose of an asterisk in an import statement
 - Identify packages that are automatically imported

