

Package

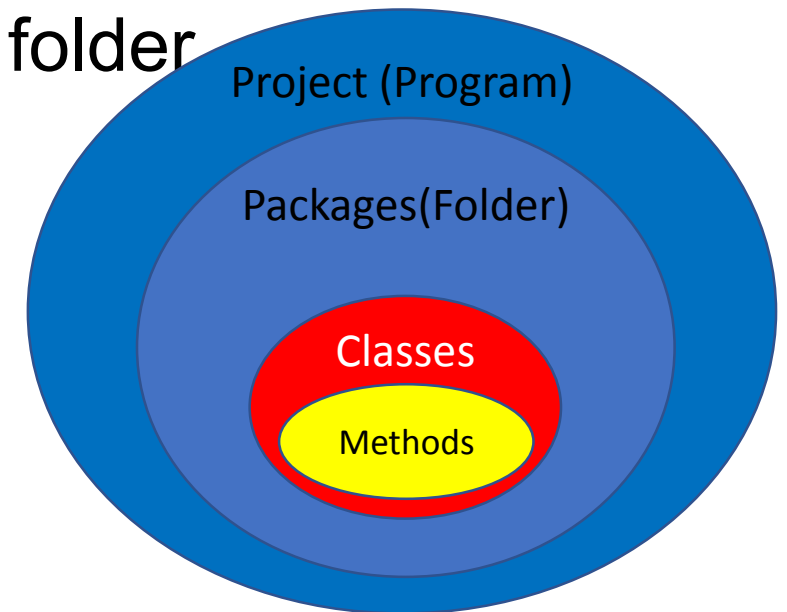
Sungchul Lee

Learning Object

- Package
- User define packages
- Built-in Packages

Package

- In the real world, we have used a **folder** to manage a bunch of files, pictures and so on
- **Package** in Java is a mechanism to encapsulate **a group of classes, sub packages** and interfaces
- Managing multiple classes using Package folder
- **Import** keyword
 - ❑ To use classes in the other packages folder



Why use Package?

➤ Preventing naming conflicts

☐ The file/class name can be the same, if it is in a different folder.

➤ Easy searching/locating and usage of classes

➤ Providing controlled access: protected and default have package level access control.

➤ Packages can be considered as data encapsulation (or data-hiding)

☐ Name

☒ Control Statement

☐ ☒ Data Type

☒ OOP

Organized

☐ Name

☒ .metadata
☒ .recommenders
☒ ArithmeticPractice1
☐ cs172-2
☒ eclipse-workspace
☒ eclipse-workspace1
☒ Example
☒ File_12_1
☒ File_12_1_Input
☒ File_13_1
☒ File_13_2
☒ File_13_2_Parse
☒ File_13_2_Scanner
☒ FinalTest
☒ Finaltest1
☒ Game
☒ Game_9_1
☒ Game_9_1_1
☒ Game_9_1_2
☒ Game_9_2
☒ Game_10_1
☒ Game_13_1
☒ Game_13_2
☒ Game2
☒ Game2_War
☒ Homework 6A
☒ Homework3and4
☒ Inner 10 2

Types of packages

- User-defined packages
- Built-in Packages (Java API)

- ❑ java.lang

- ❖ primitive data types, math operations

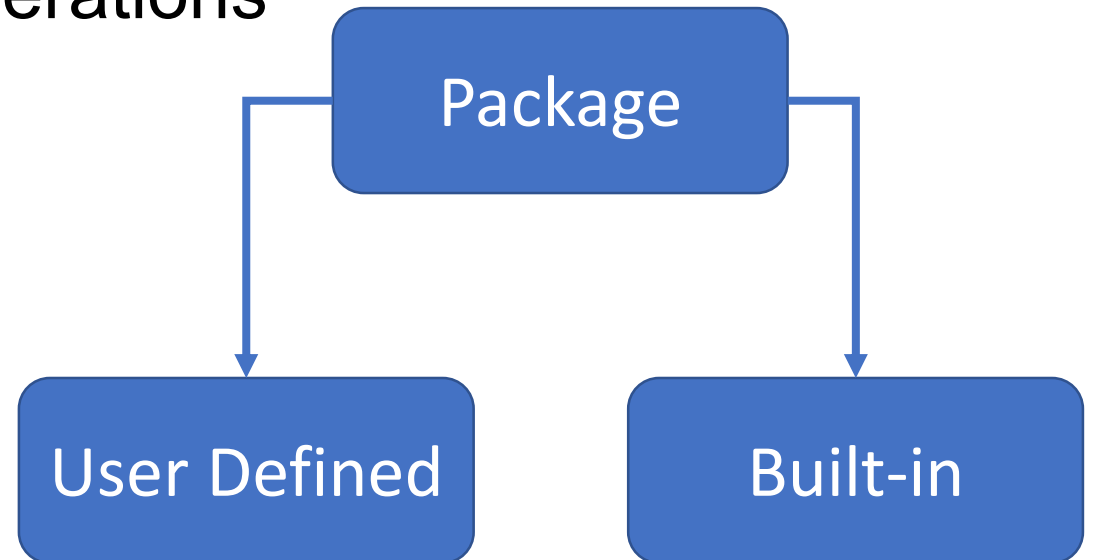
- ❑ java.io

- ❖ input/output operations

- ❑ java.util

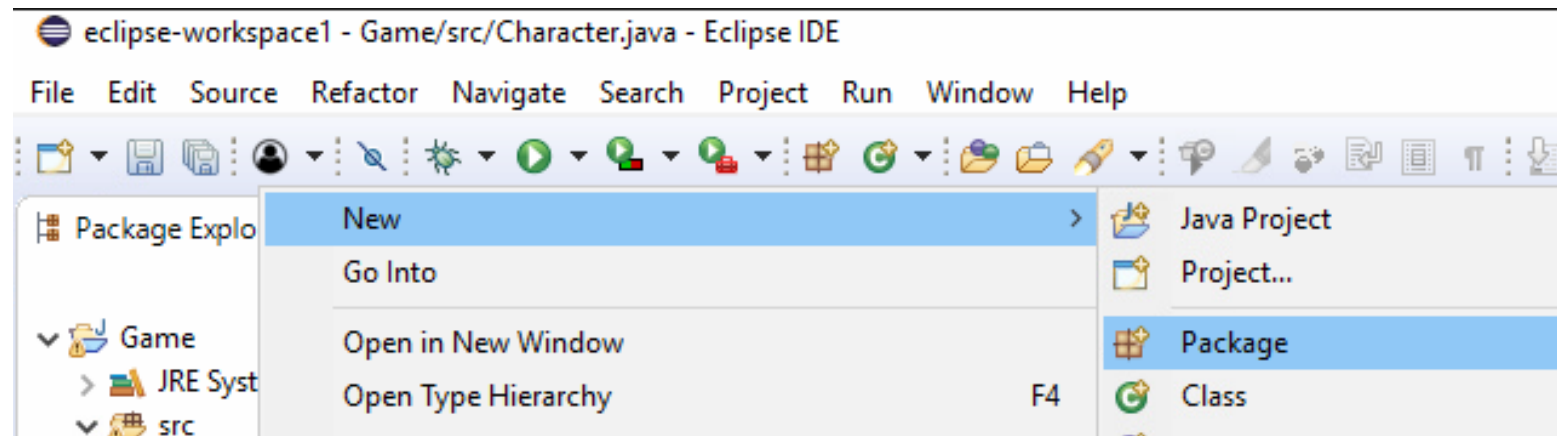
- ❖ Date/time

- ❖ Random



How to make User Define Package

➤ Click mouse' right button on Project



Practice – continue from Package

1. Make a new project (Reference: Create Project and Class File)
 - ☐ Project name: Package
2. Create new Packages
 - ☐ Package name: Car
 - ☐ Package name: Animal
3. Create three Class Files
 - ☐ Car class under Car package
 - ☐ Animal class under Animal package
 - ☐ Main class under default package

Practice – Coding (Animal)

```
package Animal;
public class Animal {
    public String name;
    public int age;

    public Animal(String name){
        this.setName(name);
        this.setAge(0);
    }
    public Animal(int age, String name){
        this.setName(name);
        this.setAge(age);
    }
}
```

```
private void setName(String name) {
    this.name = name;
}
public void setAge(int age) {
    this.age = age;
}
public String getName() {
    return name;
}
public int getAge() {
    return age;
}
}
```


Practice – Coding (Car)

```
package Car;
public class Car {
    String name;
    String country = "USA";

    public Car (String name){
        this.name = name;
        this.setCountry("USA");
    }
    public Car (String name, String country ){
        this.setName(name);
        this.country = country;
    }
}
```

```
    public String getName() {
        return name;
    }
    private void setName(String name) {
        this.name = name;
    }
    private void setCountry(String country)
    {
        this.country = country;
    }
    public String getCountry() {
        return country;
    }
}
```

Practice - Main

- Package_Diagram Package_Diagram
 - src
 - (default package)
 - Main.java
 - Animal
 - Animal.java
 - Car
 - Car.java
 - JRE System Library [jre1.8

```
import Car.Car;  
import Animal.Animal;
```

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

```
        Car car = new Car("GM");  
        Animal cat = new Animal("Pcat");
```

```
        System.out.println("Car name: " + car.getName());  
        System.out.println("Country: " + car.getCountry());  
        System.out.println("Cat name: " + cat.getName());  
        System.out.println("Cat age: " + cat.getAge());  
    }
```

```
}
```

Practice – Code and Result

```
1 import Car.Car;
2 import Animal.Animal;
3
4 public class Main {
5     public static void main(String[] args) {
6         Car car = new Car("GM");
7         Animal cat = new Animal("Pcat");
8
9         System.out.println("Car name: " + car.getName());
10        System.out.println("Country: " + car.getCountry());
11        System.out.println("Cat name: " + cat.getName());
12        System.out.println("Cat age: " + cat.getAge());
13    }
14 }
```

```
1 package Car;
2 public class Car {
3     String name;
4     String country = "USA";
5
6     public Car (String name){
7         this.name = name;
8         this.setCountry("USA");
9     }
10    public Car (String name, String country) {
11        this.setName(name);
12        this.country = country;
13    }
14    public String getName() {
15        return name;
16    }
17    private void setName(String name) {
18        this.name = name;
19    }
20    private void setCountry(String country) {
21        this.country = country;
22    }
23    public String getCountry() {
24        return country;
25    }
26 }
```

```
1 package Animal;
2 public class Animal {
3     public String name;
4     public int age;
5
6     public Animal(String name){
7         this.setName(name);
8         this.setAge(0);
9     }
10    public Animal(int age, String name){
11        this.setName(name);
12        this.setAge(age);
13    }
14    private void setName(String name) {
15        this.name = name;
16    }
17    public void setAge(int age) {
18        this.age = age;
19    }
20    public String getName() {
21        return name;
22    }
23    public int getAge() {
24        return age;
25    }
26 }
```

Problems Javadoc Declaration Console

<terminated> Main (4) [Java Application] C:\f

name: GM
name: USA
name: Pcat
name: 0



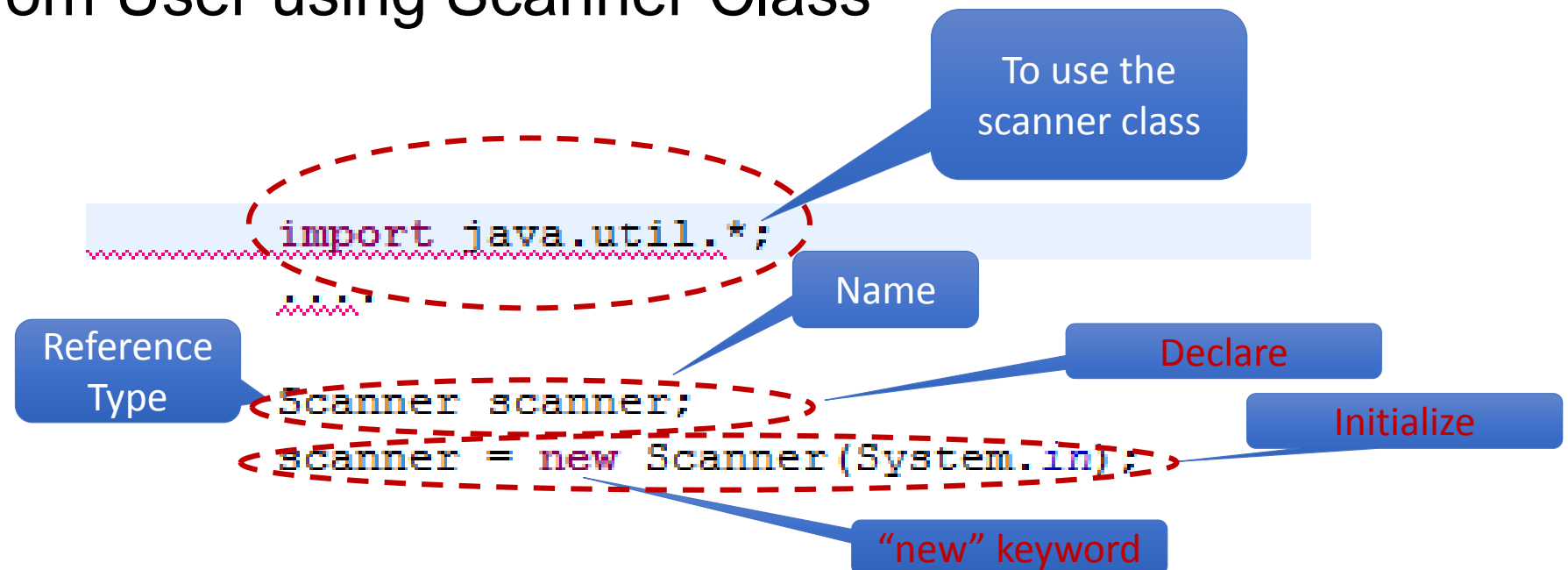
Result

Built-in Package

- System is a **final class** in **java.lang package**.
 - ❑ one exception to the import rule
 - ❖ **All classes in the java.lang package are imported by default.**
 - ❑ System.out is a `PrintStream` object
 - ❖ Used to print texts in the console window
- Two commonly used methods:
 - ❑ `System.out.println()`
 - ❖ Print out string and a newline
 - ❑ `System.out.print()`
 - ❖ Only print out string

Built-in Package (java.util package)

- Scanner Class is one of class in java.util package
- Provides an input facility to accommodate various input routine
 - ❑ E.g. input from keyboard (console)
- Get input from User using Scanner Class



Scanner Class - Example

- We use the **next** method of the Scanner class to input a **single** word
 - ❑ You end your input by clicking the “**Enter**” key

```
String name;  
name = scanner.next();  
  
System.out.println("My name is "+ name);
```

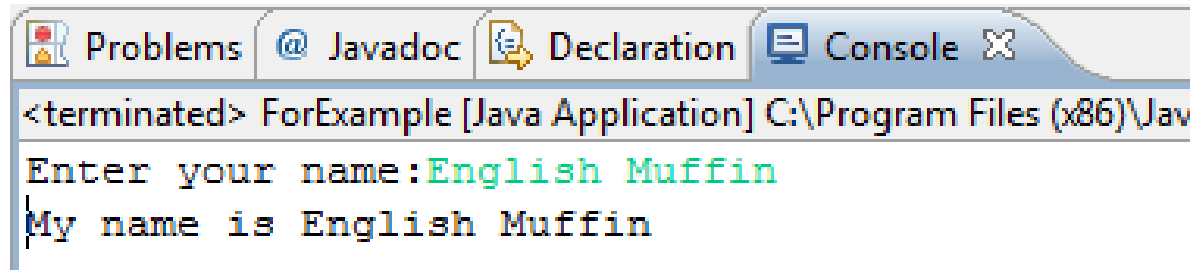
Get your keyboard
typing and store it
in “name”

```
<terminated> ForExample [Java Application] C:\Program Files (x86)\Jav  
Jamie  
My name is Jamie
```

Input Several Words

- You will find that you can only get one input word displayed
 - ❑ How to input several words at one time?
 - ❑ Using next method for multiple times

```
String firstName, lastName;  
  
System.out.print("Enter your name:");  
firstName = scanner.next();  
lastName = scanner.next();  
  
System.out.println("My name is " + firstName + " " + lastName);
```



The screenshot shows an IDE console window with tabs for Problems, Javadoc, Declaration, and Console. The Console tab is active, displaying the output of a Java application. The text in the console is as follows:

```
<terminated> ForExample [Java Application] C:\Program Files (x86)\Jav  
Enter your name:English Muffin  
My name is English Muffin
```

Input for Other Data Types

- For integer, using nextInt method

```
int j;  
j = scanner.nextInt();
```

- For double numbers, using nextDouble method

```
double y;  
y = scanner.nextDouble();
```

```
float z;  
z = scanner.nextFloat();
```


Practice – continue from Package

1. Make a new project (Reference: Create Project and Class File)
 - ☐ Project name: Package
2. Create new Packages
 - ☐ Package name: Car
 - ☐ Package name: Animal
3. Create three Class Files
 - ☐ Car class under Car package
 - ☐ Animal class under Animal package
 - ☐ Main class under default package

Practice – Coding (Animal)

```
package Animal;
public class Animal {
    public String name;
    public int age;

    public Animal(String name){
        this.setName(name);
        this.setAge(0);
    }
    public Animal(int age, String name){
        this.setName(name);
        this.setAge(age);
    }
}
```

```
private void setName(String name) {
    this.name = name;
}
public void setAge(int age) {
    this.age = age;
}
public String getName() {
    return name;
}
public int getAge() {
    return age;
}
}
```

Practice – Coding (Car)

```
package Car;
public class Car {
    String name;
    String country = "USA";

    public Car (String name){
        this.name = name;
        this.setCountry("USA");
    }
    public Car (String name, String country ){
        this.setName(name);
        this.country = country;
    }
}
```

```
    public String getName() {
        return name;
    }
    private void setName(String name) {
        this.name = name;
    }
    private void setCountry(String country)
    {
        this.country = country;
    }
    public String getCountry() {
        return country;
    }
}
```

Practice - Main

```
import Car.Car;
import Animal.Animal;
import java.util.Scanner;

public class Main {
    public static void main(String[] args) {
        Scanner scanner = new Scanner (System.in);

        System.out.print("Input car name: ");
        String car_name= scanner.next();//string
        System.out.print("Input cat name: ");
        String cat_name= scanner.next(); //string
        System.out.print("Input cat age: ");
        int cat_age= scanner.nextInt(); // int
        System.out.println(); // new line
```

```
        Car car = new Car(car_name);
        Animal cat = new Animal(cat_age,cat_name);

        System.out.println("Car name: "+ car.getName());
        System.out.println("Country: "+ car.getCountry());
        System.out.println("Cat name: "+ cat.getName());
        System.out.println("Cat age: "+ cat.getAge());
    }
}
```

Practice – Code

*Main2.java :

```
1 import Car.Car;
2 import Animal.Animal;
3 import java.util.Scanner;
4
5 public class Main {
6     public static void main(String[] args) {
7         Scanner scanner = new Scanner (System.in);
8
9         System.out.print("Input car name: ");
10        String car_name= scanner.next();//string
11        System.out.print("Input cat name: ");
12        String cat_name= scanner.next(); //string
13        System.out.print("Input cat age: ");
14        int cat_age= scanner.nextInt(); // int
15        System.out.println(); // new line
16
17        Car car = new Car(car_name);
18        Animal cat = new Animal(cat_age,cat_name);
19
20        System.out.println("Car name: "+ car.getName());
21        System.out.println("Country: "+ car.getCountry());
22        System.out.println("Cat name: "+ cat.getName());
23        System.out.println("Cat age: "+ cat.getAge());
24    }
25 }
```

@ Car.java :

```
1 package Car;
2 public class Car {
3     String name;
4     String country = "USA";
5
6     public Car (String name){
7         this.name = name;
8         this.setCountry("USA");
9     }
10    public Car (String name, String country ) {
11        this.setName(name);
12        this.country = country;
13    }
14    public String getName() {
15        return name;
16    }
17    private void setName(String name) {
18        this.name = name;
19    }
20    private void setCountry(String country) {
21        this.country = country;
22    }
23    public String getCountry() {
24        return country;
25    }
26 }
```

@ Animal.java :

```
1 package Animal;
2 public class Animal {
3     public String name;
4     public int age;
5
6     public Animal(String name){
7         this.setName(name);
8         this.setAge(0);
9     }
10    public Animal(int age, String name) {
11        this.setName(name);
12        this.setAge(age);
13    }
14    private void setName(String name) {
15        this.name = name;
16    }
17    public void setAge(int age) {
18        this.age = age;
19    }
20    public String getName() {
21        return name;
22    }
23    public int getAge() {
24        return age;
25    }
26 }
```

Practice – Result

- Result will be changed based on user input
 - ❑ Dynamic program

```
Problems @ Javadoc Declaration Console
<terminated> Main2 [Java Application] C:\Pr
Input car name: Optimus
Input cat name: Dog
Input cat age: 4

Car name: Optimus
Country: USA
Cat name: Dog
Cat age: 4
```



Summary

- Package
- User define packages
- Built-in Packages
 - ❑ java.lang package
 - ❖ System.out
 - ❑ java.util package
 - ❖ Scanner Class
- Import package name

