Package

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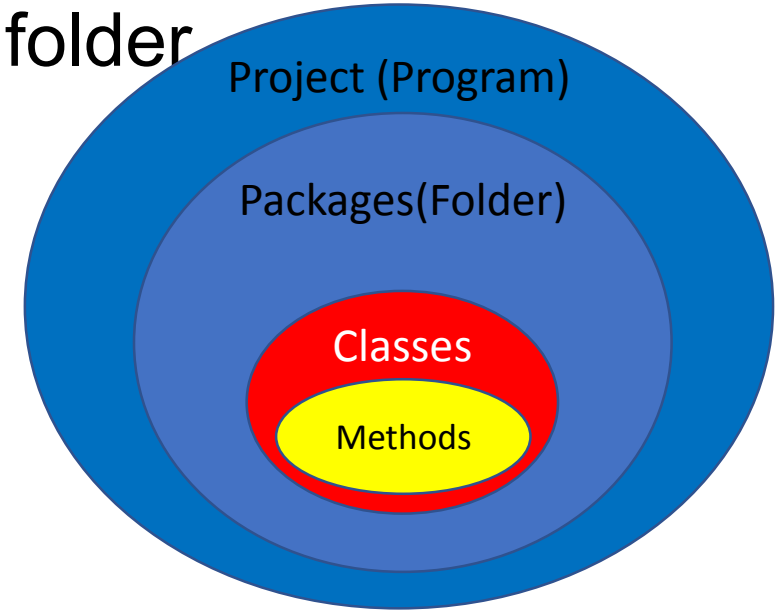
Learning Object

- Package
- User define packages
- Built-in Packages

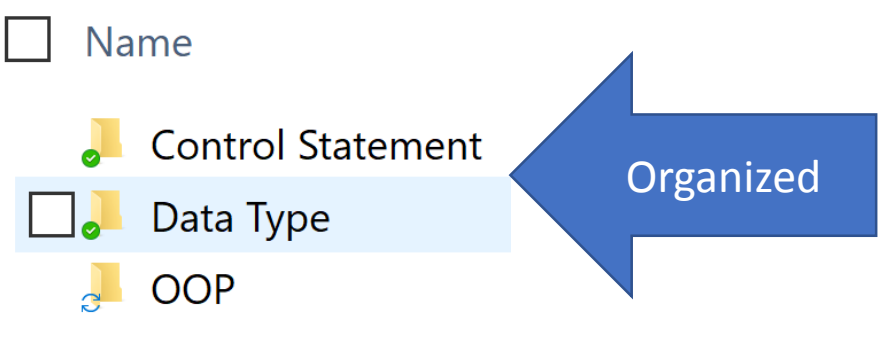
Package

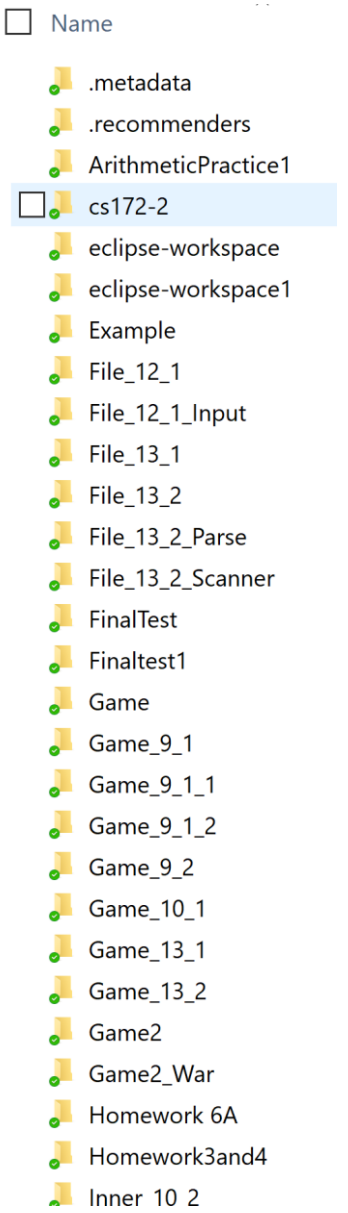
- In the real world, we have used a **folder** to manage a bunch of files, pictures and so on
- **Package** in Java is a mechanism to encapsulate a group of classes, sub packages and interfaces
- Managing multiple classes using Package folder
- **Import** keyword
  - To use classes in the other packages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



Why use Package?

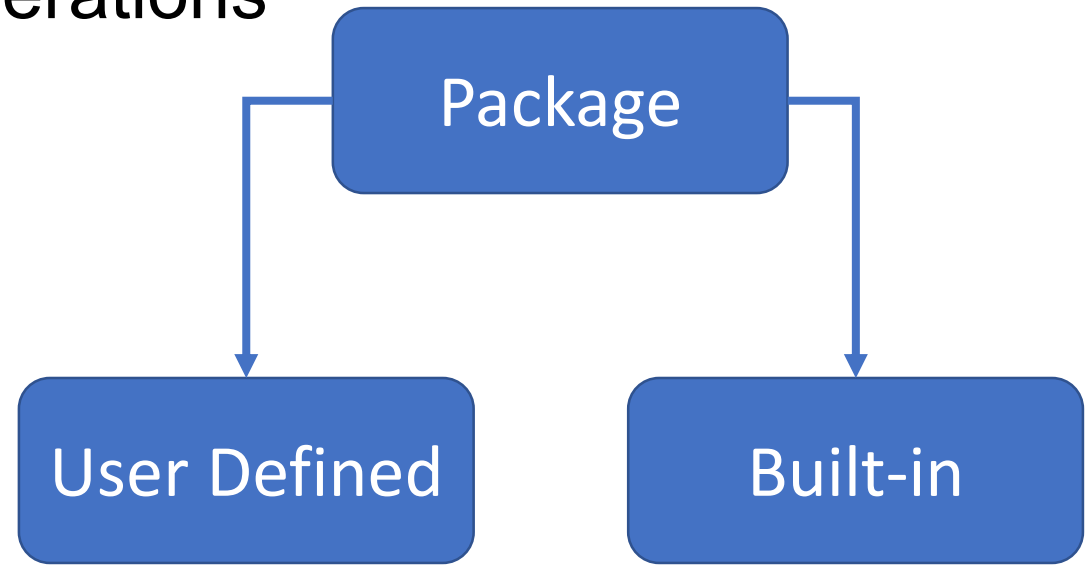
- Preventing naming conflicts
  - The file/class name can be the same, if it is in a different folder.
- Easy searching/locating and usage of classes
- Providing controlled access: protected and default have package level access control.
- Packages can be considered as data encapsulation (or data-hiding)





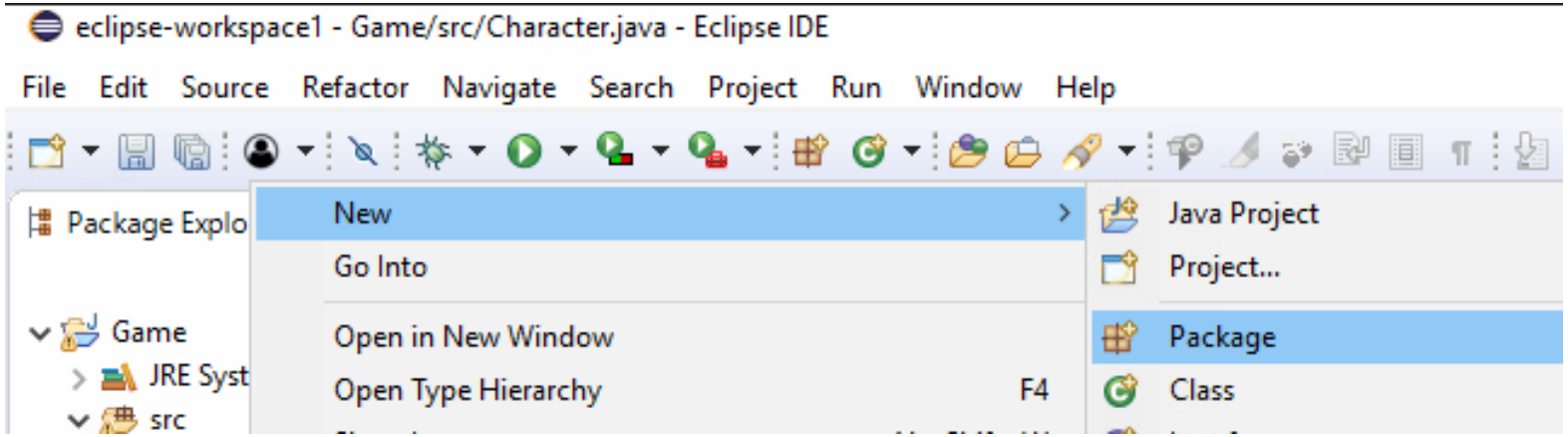
Types of packages

- 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);
	}
```

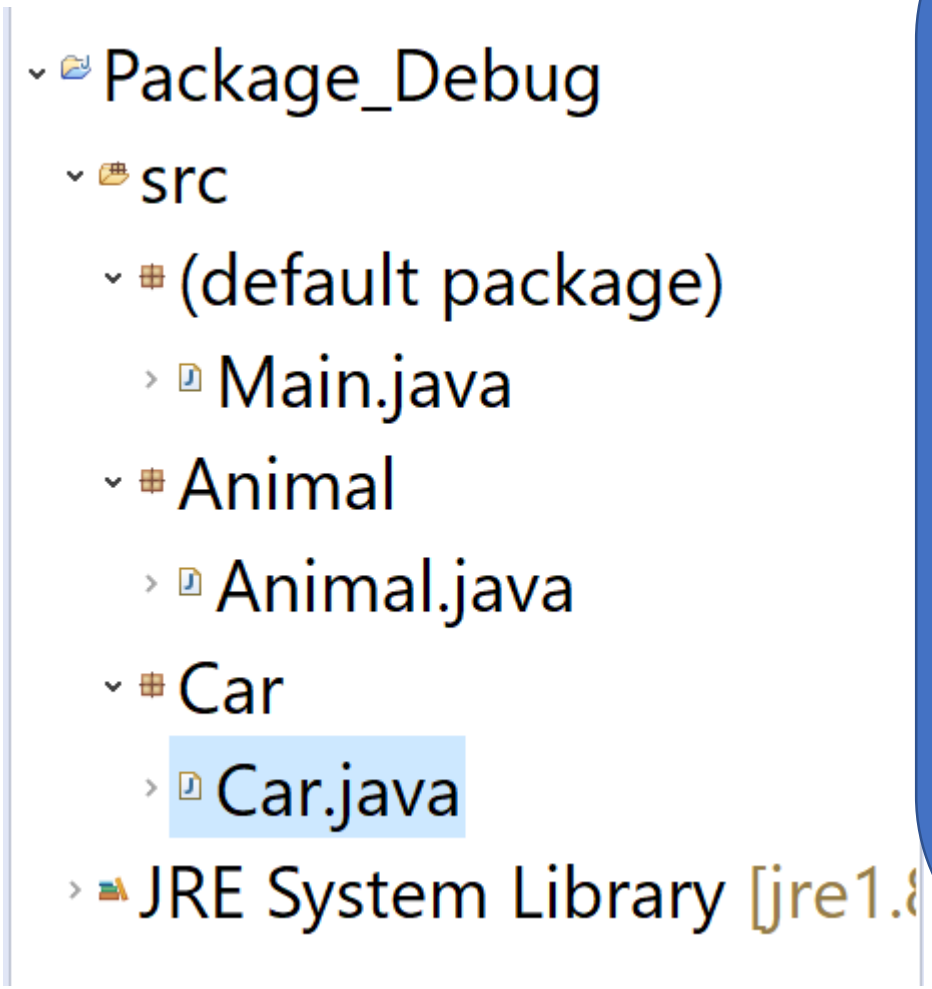
```
	private void setName(String name) {
		this.name = name;
	}
	public void setAge(int age) {
		this.age = age;
	}
	public String getName() {
		return name;
	}
	public int getAge() {
		return age;
	}
}
```

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




```
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

Main.java

```java
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());
    }
}
```

Problems Javadoc Declaration Console

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

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

Result

Car.java

```java
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;
    }
}
```

Animal.java

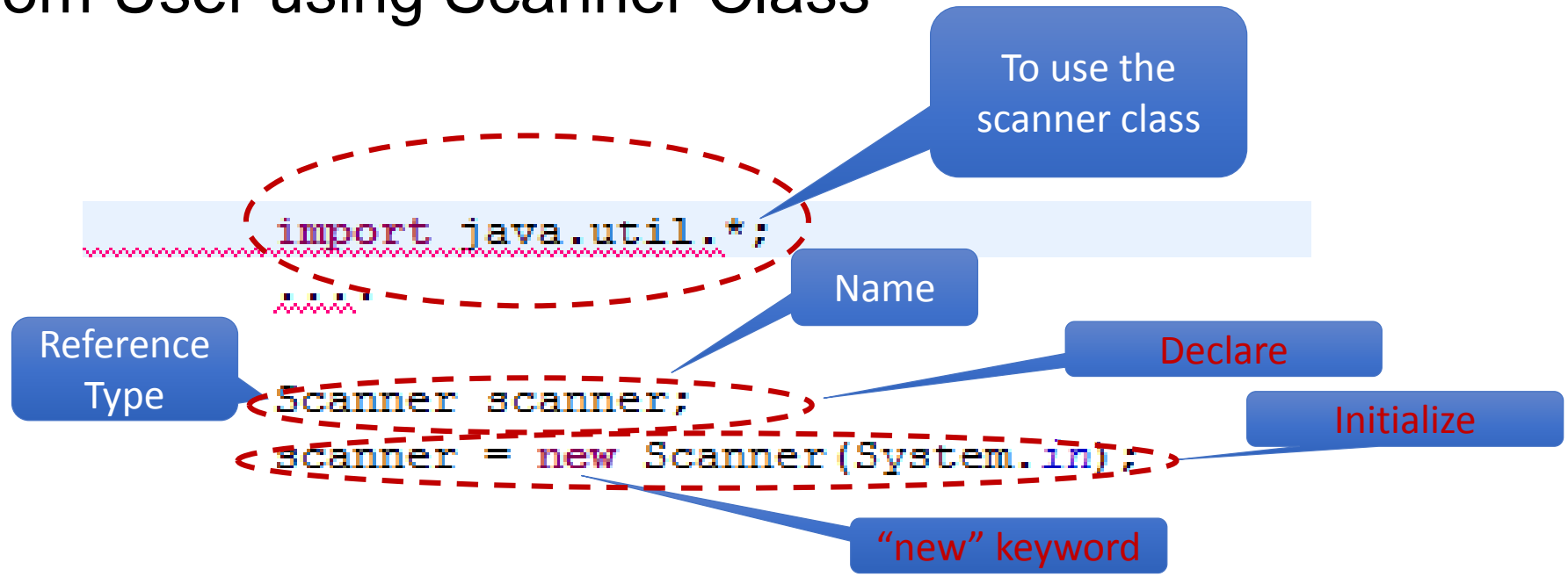
```java
package Animal;
public class Animal {
    public String name;
    public int age;

    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;
    }
}
```

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);
```

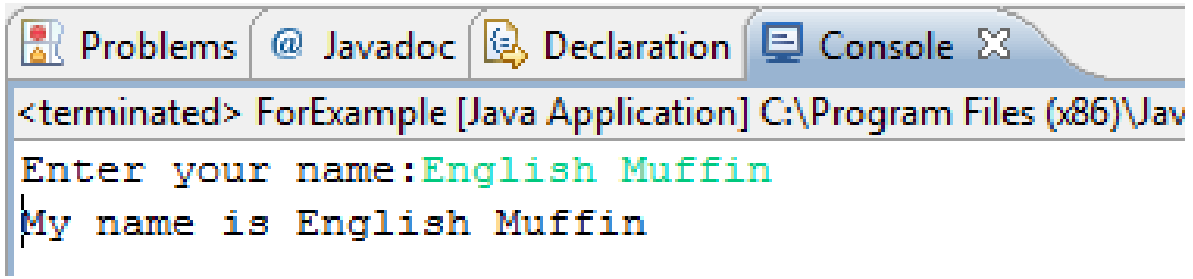
Get your keyboard typing and store it in "name"

```
<terminated> ForExample [Java Application] C:\Program Files (x86)\Ja
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);
```



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

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   - ❑Package name: Animal
3. Create three Class Files
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   - ❑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

```java
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());
    }
}
```

Car.java

```java
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;
    }
}
```

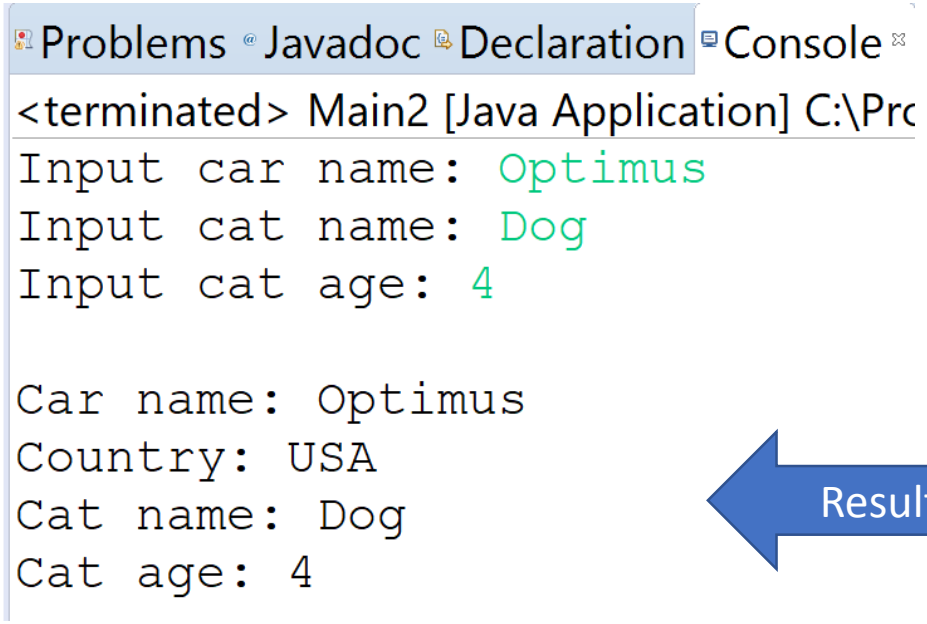
Animal.java

```java
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 – Result

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



Summary

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