

Class and Object

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Learning Object

- Class and Object
 - ❑ Concept of Class and Object
 - ❑ Class and Object – Example
- Class Member
 - ❑ **Instance Variable (Data Member)**
 - ❖ Instance Variable Declaration
 - ❑ Methods (Next class)
- Modifier
 - ❑ Visibility Modifiers

Class and Object

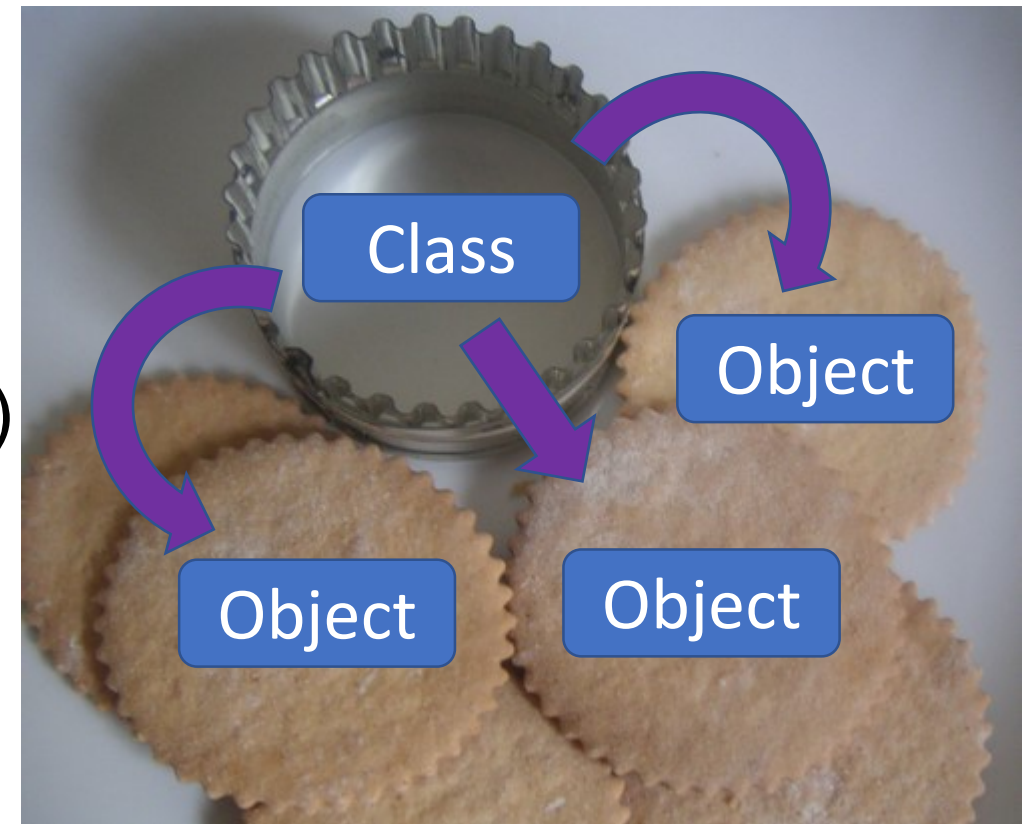
➤ A class is a blueprint for the object.

❑ Class contains essential components for program

❖ Variables, Methods, etc.

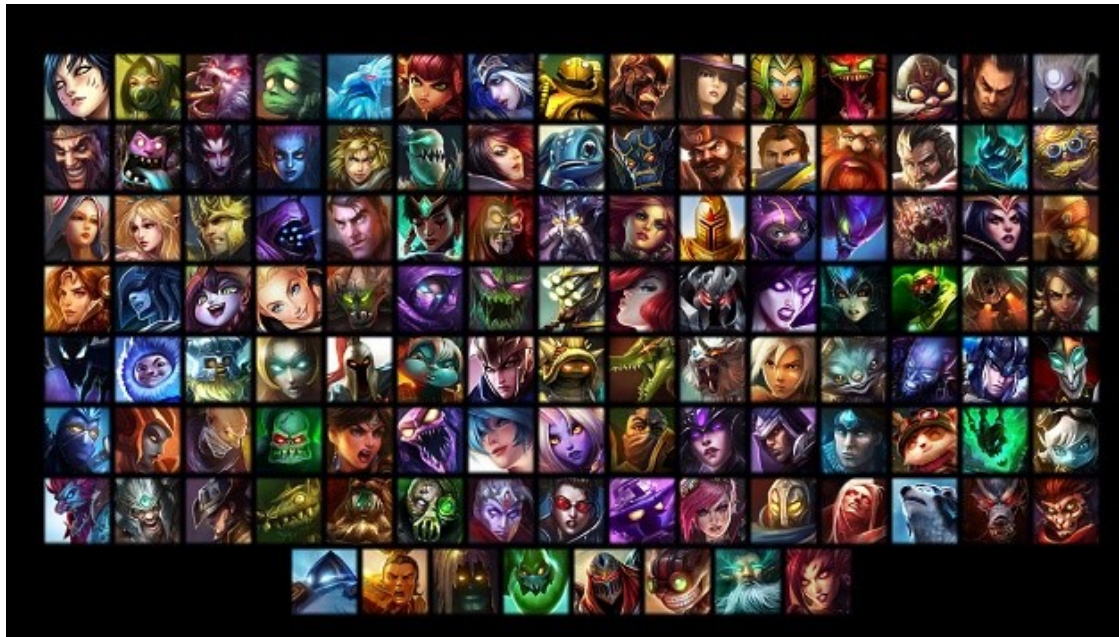
➤ Object have state and behavior

❑ Example: Dog (**object**) have name, color, breed, hungry (**state**) and barking, fetching, wagging tail (**behavior**).



Concept of Class and Object

- "Class" refers to a template or blueprint
 - Example: Character (LoL champions)
 - ❖ Character class -> Create Object -> each champion
 - ❖ HP, Power, Moving speed, (**state**), skills (**behavior**)



Make More than 100
Characters (Object) using
Character Class

Class and Object - Example

➤ Animal.java

```
public class Animal{  
  
}
```

➤ Create Object

```
Animal cat = new Animal( );
```

❑ new keyword: Generate object

We have used a class whenever we create a java(class) file

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

We have already used
String name = new String("Create Object");

Class Members

➤ A class have two kinds of members:

❑ **Data Member** (= ***Instance Variable*** or ***Attributes***): data variables which determine the **status** of the class or an object

❖ E.g.: HP, moving speed

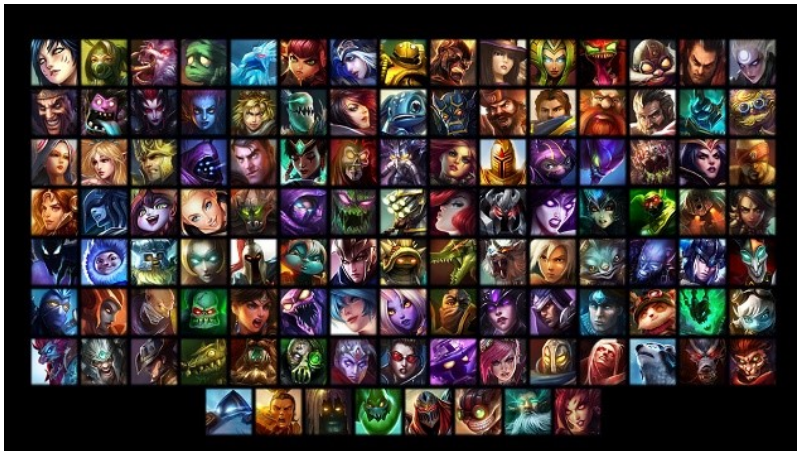
❑ **Methods**: executable code used to **manipulate /change the status** of an object or access the value of the data member

❖ Similar to functions in procedural languages

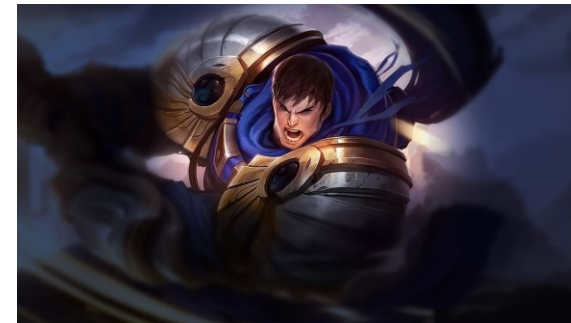
❖ E.g.: when your character hit an enemy, the enemy's HP will be reduced based on your hit points.

Instance Variable

- **Instance** variable in **Java** is used by Objects to store their states.
 - ❑ Example: User select champion/character and the character's hp, power (**instance variable**) will be changed by items and by level. Object is store the states



Select
your
Champion



Object

HP: 900
Power: 210

Instance
Variable

Instance Variable Declaration

➤ Syntax:

```
<modifiers> <data type> <name> ;
```

Modifiers



`private`

Data Type



`String`

Name



`name;`

➤ If skip Modifier, the variable is a 'protected' Modifiers

Instance Variable - Example

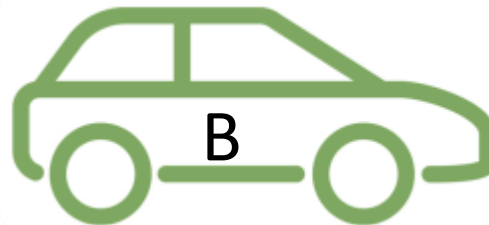
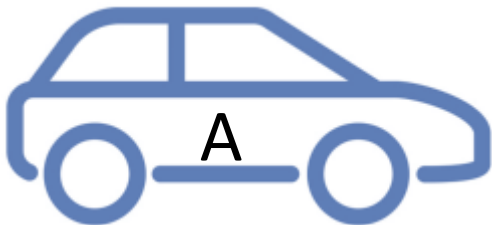
➤ Instance Variable in Class

```
public class Animal {  
    String name;  
}
```

- Access instance variable using dot(.)
 - ❑ Syntax: object.variable_name

Object Variables

- Generate object by new keyword and class
- Object variable is not shared
 - ❑ If the object variable's name is different, then the object is different like variable (`int a != int b`)
 - ❖ E.g. Owner of your Toyota car (**object**) and your friend's Toyota car (**object**) are different, but, the cars (**class**) are made in the same company.



Object Variables - Example

```
//Animal.java
public class Animal {
    public String name;
    public void setName(String name) {
        this.name = name;
    }
}
```

```
//Main.java
public class Main {
    public static void main(String[] args) {
        Animal cat = new Animal();
        cat.name = "Pcat";

        Animal dog = new Animal();
        dog.name = "Pdog";

        System.out.println(cat.name); // Pcat
        System.out.println(dog.name); // Pdog
    }
}
```

Visibility Modifiers

- The modifiers *public* and *private* designate the accessibility of data members and methods.
- If a class component is declared public, client classes can access it.

Modifier	Same Class	Same Package	Subclass	Universe
<i>private</i>	Yes			
<i>default</i>	Yes	Yes		
<i>protected</i>	Yes	Yes	Yes	
<i>public</i>	Yes	Yes	Yes	Yes

Information Hiding

- If a class component (data member or method) is declared **private**, client classes **cannot access** it
 - ❑ You can not read the value
 - ❑ You can not modify the value
- Internal details of a class are declared private and hidden from the clients
 - ❑ This is **information hiding**

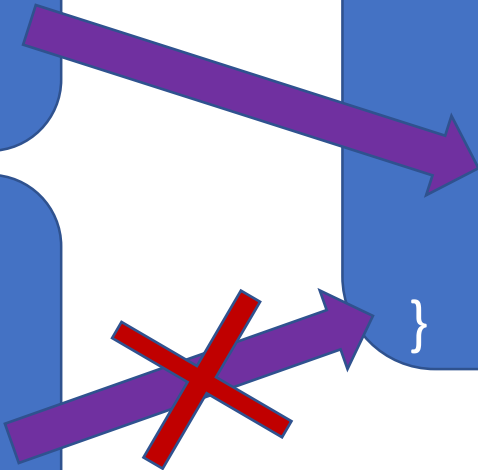
Modifiers - Example

➤ Two different class (files)

```
//Animal.java  
public class Animal {  
    public String name;  
}
```

```
//Animal.java  
public class Animal {  
    private String name;  
}
```

```
//Main.java  
public class Main {  
    public static void main(String[] args) {  
        Animal cat = new Animal();  
        System.out.println(cat.name); // null  
    }  
}
```



Practice

1. Make a new project (Reference: Create Project and Class File)

❑ Project name: Class_Object

2. Create two Class Files

❑ Class name: Animal

❑ Class name: Main

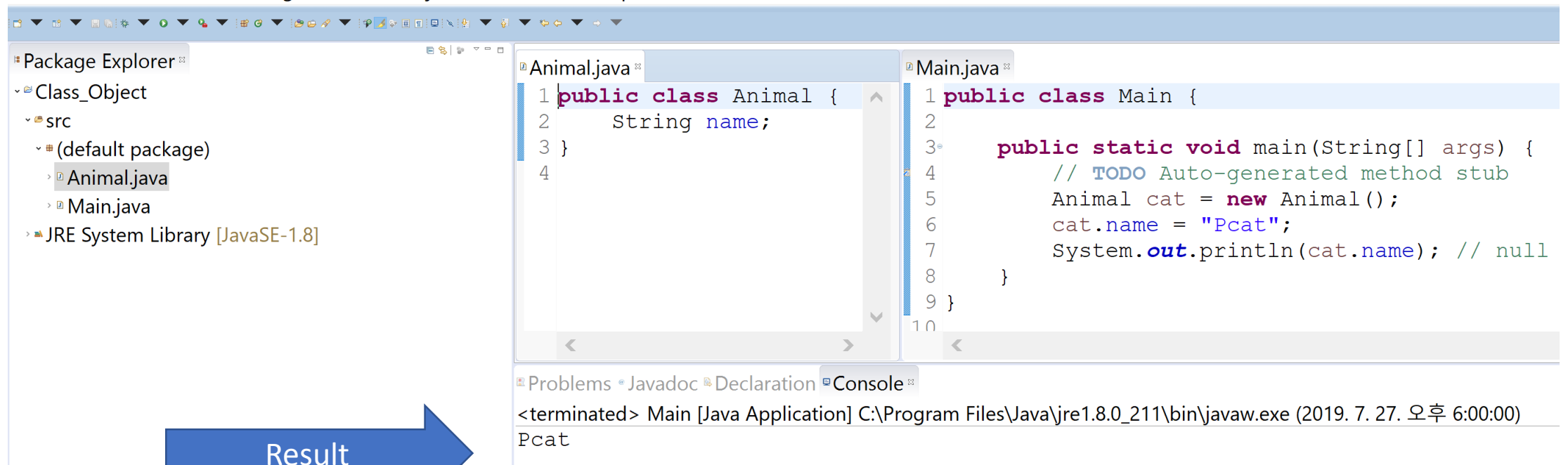
3. Coding:

```
//Animal.java
public class Animal {
    public String name;
}
```

```
//Main.java
public class Main {
    public static void main(String[] args) {
        Animal cat = new Animal();
        cat.name = "Pcat";
        System.out.println(cat.name); // null
    }
}
```

Practice – Code and Result

File Edit Source Refactor Navigate Search Project Run Window Help



The screenshot shows an IDE interface with the following components:

- Package Explorer:** Displays a project structure with a package named `Class_Object` containing a source folder `src`. Inside `src`, there is a default package containing `Animal.java` and `Main.java`. The JRE System Library [JavaSE-1.8] is also listed.
- Animal.java:**

```
1 public class Animal {
2     String name;
3 }
4
```
- Main.java:**

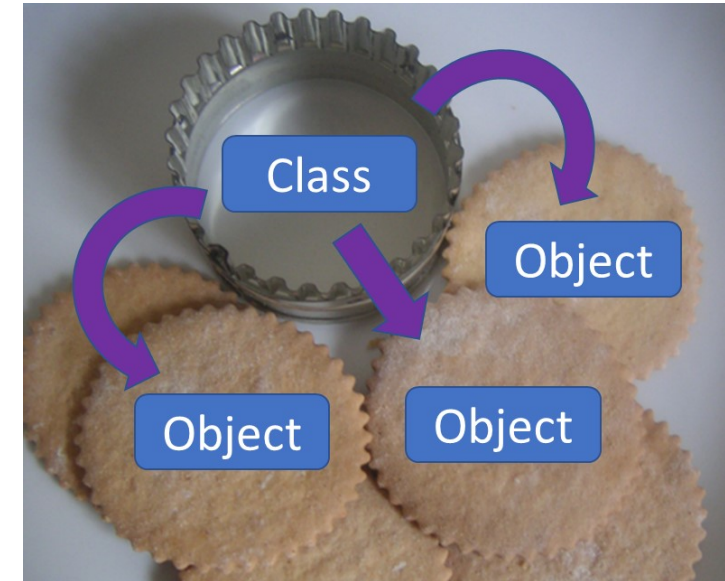
```
1 public class Main {
2
3     public static void main(String[] args) {
4         // TODO Auto-generated method stub
5         Animal cat = new Animal();
6         cat.name = "Pcat";
7         System.out.println(cat.name); // null
8     }
9 }
10
```
- Console:** Shows the output of the program:

```
<terminated> Main [Java Application] C:\Program Files\Java\jre1.8.0_211\bin\javaw.exe (2019. 7. 27. 오후 6:00:00)
Pcat
```

A large blue arrow labeled "Result" points from the Package Explorer towards the Console output.

Summary

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- Visibility Modifiers



```
*Animal.java
1 public class Animal {
2     public String name;
3 }
4

Main.java
1 public class Main {
2
3     public static void main(String[] args) {
4         // TODO Auto-generated method stub
5         Animal cat = new Animal();
6         cat.name = "Pcat";
7         System.out.println(cat.name); // null
8     }
9 }
```