Object Construction and Usage

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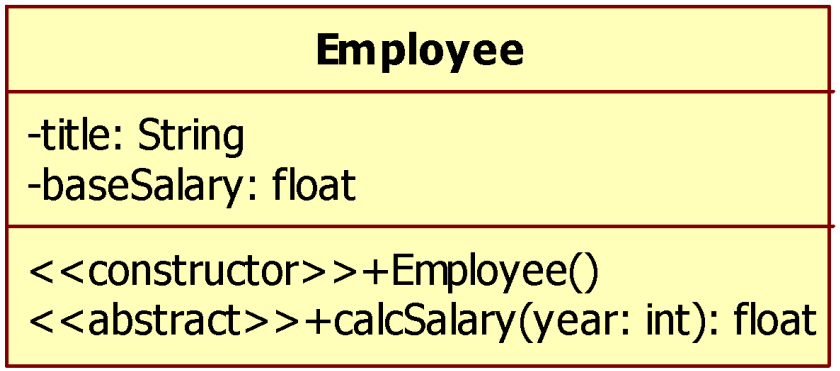
Topics

- Describe classes in UML
- Define classes
- Initiate and use objects
- Access modifiers

Class

- Defines the set of common objects that have same the same attributes, operations, relationships, and semantics
- Represents a thing
- Notation



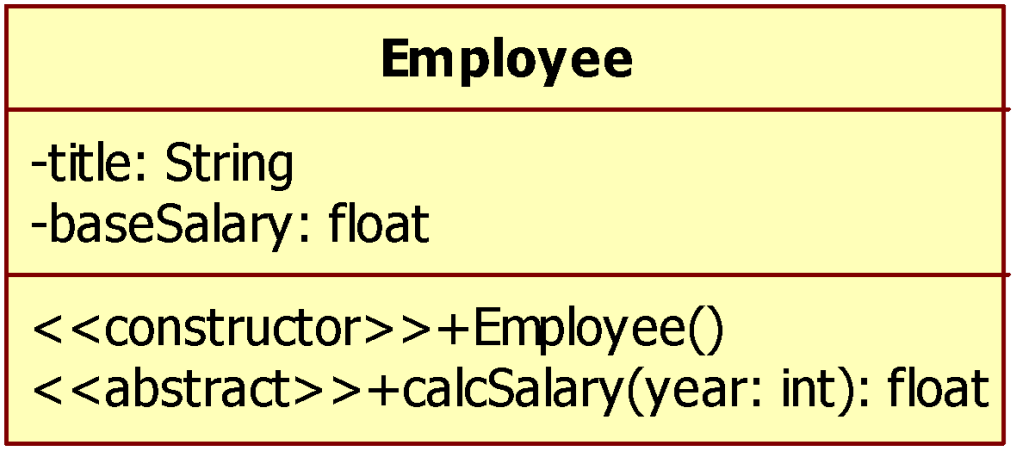
Name: must be unique within its group

Attributes

Operations

Attribute

- Defines data that characterize a class
- An abstraction of the kind of data or object
  - *title* is an attribute of the kind of *String* object
- Data type is specified by a semicolon ":"

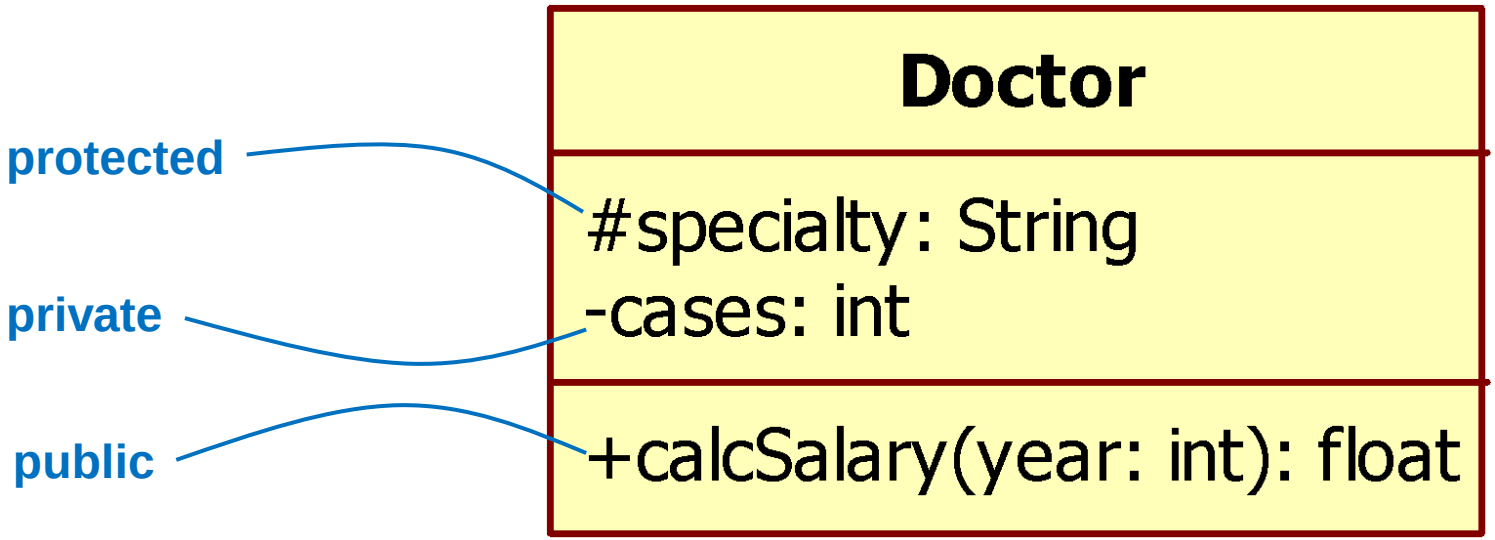


Title and *baseSalary* are two attributes of *String* and *float* data types, respectively

Operation

- An operation specifies a service that can be requested from objects of the class

- Attribute and operation visibility



A simple scenario

- Bob is a farmer. He grows and produces a lot of delicious bananas, and he wanted to sell some. He went to an agricultural e-commerce website name hailua.com.vn. He post his bananas to sell.
- Alice is a software programmer who spends most of her time on computer. She does not have time for shopping, she decided to buy some bananas from hailua.com.vn. She ended up buying the ones from Bob. Bob then shipped the product to Alice. One day later, she received it.

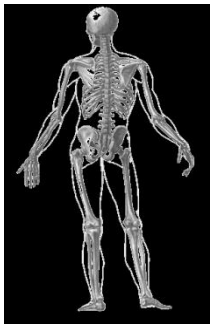
Modeling the scenario

- Using the concepts discussed to form
  - Object model
  - Class diagram

Object and class

- Class concept
  - Variable ~ Type
  - Object ~ Class
    - Class is object type
    - A description of
      - Attributes
      - Methods

Person:



Name.
Age.
Hair Color.
Eat( ).
Work( ).

Person1:

Name: Peter.
Age: 25.
Hair Color: Brown.
Eat().
Work().

Person2:

Name: Thomas.
Age: 50.
Hair Color: White.
Eat( ).
Work( ).

Define a class in Java

- Usage
  - Declare class

```
<scope> class <Class Name> {
        <Attribtes>;
        <Methods>;
}
```

    - Implement methods the same as functions

  - Declare the main method within a class

    - **public static void** main(String agrs[])

Class naming

Package

- Package is like a folder containing classes and child packages
- It is used to organize classes and packages
- Declaration
  - package <name>
  - package <name>.<name>

Package

- Naming convention
  - Lowercase ASCII letters
  - Top-level domain: com, edu, gov, mil, net, org, <country>
  - Subsequent components are organizations' names, departments, etc.

  - Examples
    - com.ibm.rational
    - edu.fuv.cs

Let's define several classes in the scenario

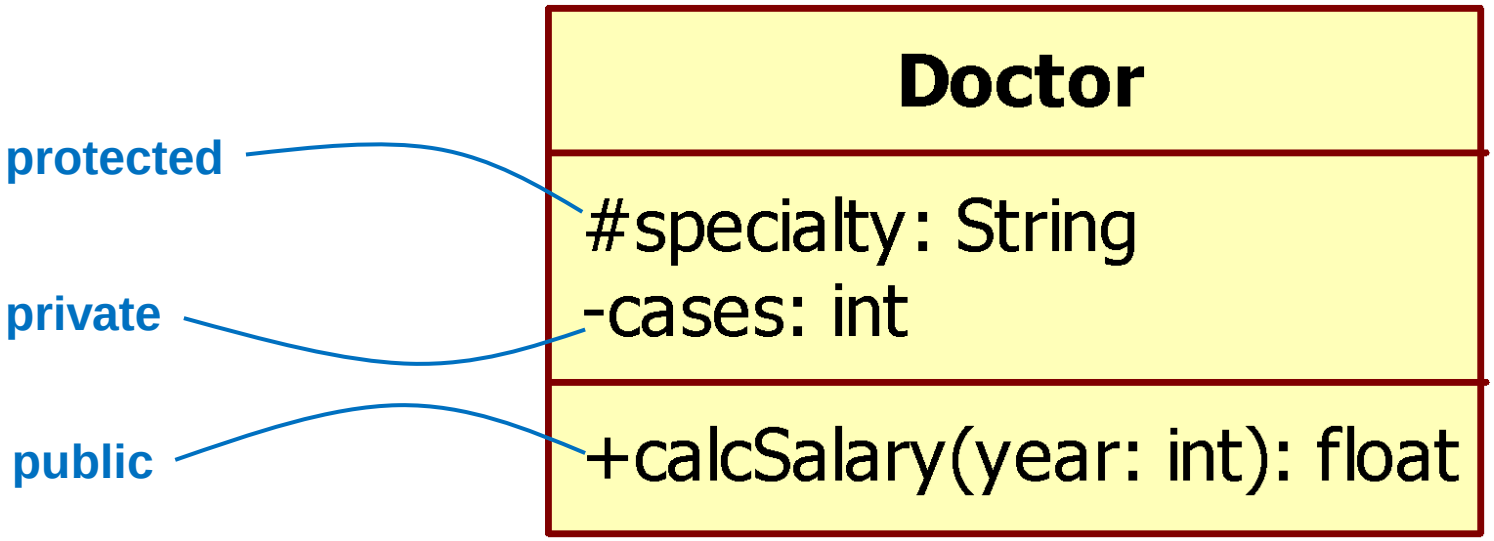
- Seller
- Buyer
- Product

Product class

```
public class Product
{
        private String   name;
        private String   description;
        private float  weight;
        private float   price;

        public void setPrice(float newPrice) {...}

        public static void main(String agrs[])  {
                ...
        }
}
```

Scope/Visibility

- Attribute and operation visibility



Scope

- Scope concept
  - Working range:
    - Variable — Declared block
    - Class — Within class
    - Method — Within method
- In Java, everything has to be within classes
- Scope control

Keyword	Scope
private	Inside class only
public	Inside and outside class
protected	Inside class and child classes

Scope

- Example: private vs. public.

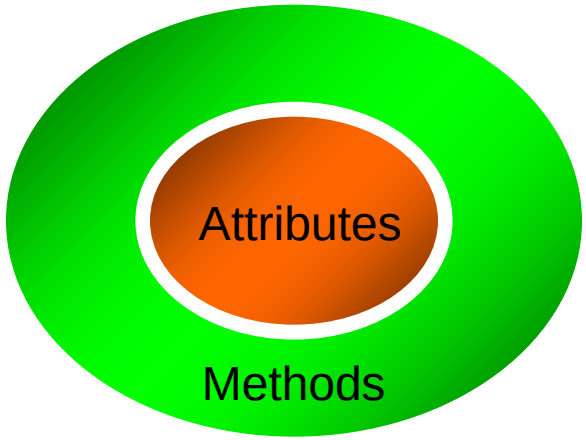
```
class A
{
        private int    x;
        public int    y;
        private void calculate() {};
        public int getX() {};
}
```

```
public class B {
    public static void main(String args[])
    {
            A    obj = new A();

            int    x = obj.x;       // Wrong
            obj.x = 1;              // Wrong

            int    y = obj.y;       // Right
            obj.y = 2;              // Right

            int    t = obj.getX( ); // Right
            obj.calculate( );     // Wrong
    }
}
```

Scope

- General rule
  - Attributes: use **private** to hide inside
  - Methods: use **public** to provide functions

```
class Product {
    private String name;
    private float  price;
    public void setPrice(float newPrice);
}
```



Naming conventions

- Class
  - Class names should be nouns
  - Mixed case with the first letter of each word capitalized

- Package
  - Lowercase ASCII letters
  - Top-level domain: com, edu, gov, mil, net, org, <country>
  - Subsequent components are organizations' names, departments, etc.
  - Examples
    - com.ibm.rational
    - edu.fuv.cs

Naming conventions

- Variable
  - Lowercase first letter
  - Internal words start with capital letters
  - Should be short and meaningful
  - One letter word should be avoided except for temporary "throwaway" variables
  - Examples
    - age
    - myAge
    - length
    - customerName

Naming conventions

- Method
  - Should be verbs
  - Mixed case with the first letter lowercase
  - Internal words with the first letter capitalized
  - Examples
    - getAge
    - setAge
    - getLength
    - getCustomerName