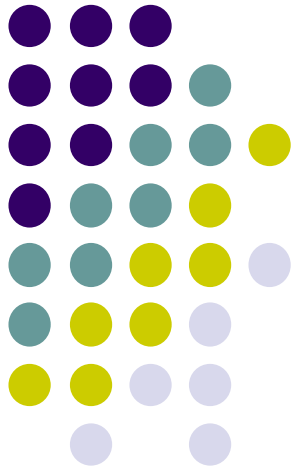
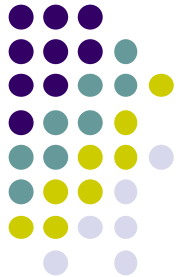
WIX1002
Fundamentals of Programming

Chapter 8

Class





Contents

- Introduction
- Constructor
- Instance Variables
- Static Variable
- Class method
- Encapsulation
- Method Overloading
- Wrapper Class
- Package

Introduction

- Java is an Object-oriented programming language (OOP).
- OOP is a programming methodology that views a program as similarly consisting of **objects** that interact with each other by means of **actions**.
- An object is a software bundle of related **state and behavior**. Software objects are often used to model the real-world objects in everyday life.
- Objects of the same kind are in the same **class**. Example, a Perodua Myvi white car and a Perodua Myvi blue car are belongs to the same class.
- The actions of an object are called **methods**.

Introduction

- Java consists of objects from various classes interacting with one another.
- A class is a prototype from which objects are created. It models the state and behavior of a real-world object.
- A class consists of **constructor**, data items (**instance variables**) and **methods**.
- To define a class

```
public class className {
    // instance variables
    // constructors
    // methods
}
```

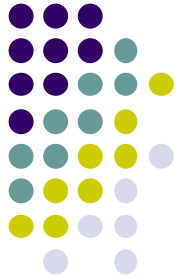
Introduction

- Once the class has been defined. The object of the class can be created in the tester program.
- To create the object of the class

  className obj = **new** className();

```
public class Test {
   public static void main(String[] args) {
        person p = new person();
        // ...
   }
}
```

Constructor



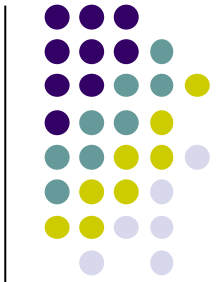
- Constructor is a special variety of method that used to initialize instance variable.
- Constructor must have the **same name as the class**.
- To define constructor

```
public className() {

}
public className(parameterType parameterName, …) {

}
```

Constructor

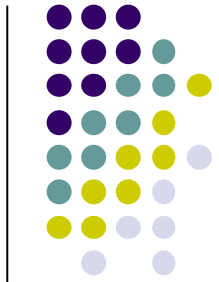


- Constructor without parameters is called no-argument constructor.
- Java will automatically creates a no-argument constructor if the class definition does not have a constructor.

Constructor

```
public person() {
        name = null;
        age = 0;
        gender='\0';
}
person p = new person();

public person(String n, int a, char g) {
        name = n;
        age = a;
        gender=g;
}
person p = new person("John", 30, 'M');
```



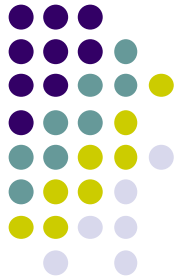
Constructor

- A copy constructor is a constructor with one parameter of the same type as the class. It creates an object that is separate, independent object with the instance variables are **exact copy of an argument object**.

```
public person(person p) {
   if (p==null)
      System.exit(0);

   name = p.getName();
   age = p.getAge();
   gender= p.getGender();
}
```

Instance Variables



- An object used instance variables to store its state.
- To declare instance variables

  accessSpecifier variableType variableName;

  private String name;

  private int age;

  private char gender;
- The accessSpecifier for instance variable is always private.
- Access specifiers consists of **private, protected and public**.

Instance Variables

- **public** means that there are no restrictions on where the instance variable can be used.
- **private** means that the instance variable is accessible only by methods of the same class.
- **protected** means that the instance variable is accessible by methods of the same class, subclass or class in the same package.
- A **package** is a namespace for organizing classes and interfaces in a **logical manner**. It makes large software projects easier to manage.

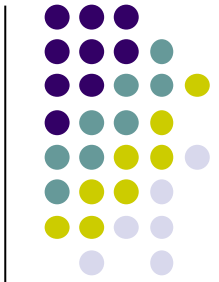
Instance Variables

Specifier	class	subclass	package	world
private	Y			
protected	Y	Y	Y	
public	Y	Y	Y	Y

Instance Variables

- In Java method definition, the **this** keyword can be used as the **calling object**.
- The this parameter refer to the **reference to the current object**, the object whose method or constructor is being called.

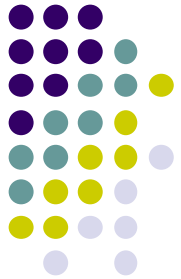
```
public void setName(String name) {
   this.name = name;
}
```



Static variable

- A static variable is a variable that belongs to the class. There is only **one copies of the static variable for all the objects**.
- A static variable can be used by **objects to communicate** between the objects.
- To declare a static variable
  - private static int counter;
- To declare a static constants
  - private static final int MAX = 100;
- **A static method can access the static variables but can't access the instance variables**.

Class Method



- **Accessor method** are used to **get the value** of instances variable

  public String getName() }

  return name;

  }

- **Mutator method** are used to **set or modify** the instances variable.

  public void setName(String n) {

  name = n;

  }

Class Method

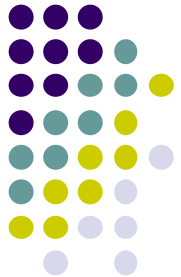
```
public class Test {
   public static void main(String[] args) {
        person p = new person();
        p.setName("Alvin");
        System.out.println("The name is " + p.getName());
   }
}
```

Class Method

- In Java, the class definition usually contains the **equals method** and the **toString method**.
- An equals method compare the calling object to another object and return true if both objects are equal.

```
public boolean equals(Person p) {
   if (name.equals(p.getName())
      return true;
   else
      return false;
}
```

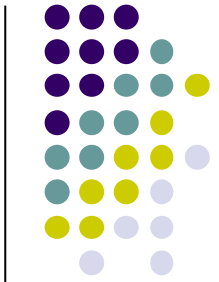
Class Method



- The toString method return a string representation of the data in the calling object.

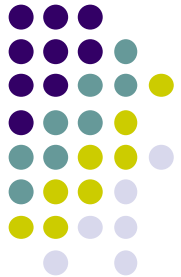
```
public String toString() {
   return "Name is " + this.name;
}
```

Encapsulation



- **Encapsulation** means that the data and actions are combined into a single item which is a Class.
- It is used to group software into a unit that is easy to use with the simple interface.
- By defining the **Application Programming Interface (API)**, programmer can use it for any implementation.

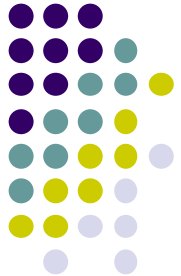
Method Overloading



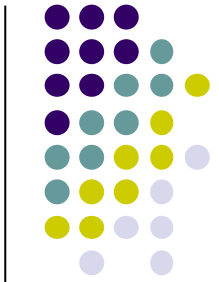
- **Method overloading** allows one class to have more than one definitions of a single method name.
- When a method is overloading, the definition must have different signatures either in **different number of parameters** or **some parameter position must be of differing types**.
- Java does not support **operator overloading**.

Method Overloading

```
public void setValue(String n) {
   name = n;
}
public void setValue(String n, int a) {
   name = n;
   age = a;
}
public void setValue(String n, int a, char g) {
   name = n;
   age = a;
   gender = g
}
```



Wrapper Class



- Every Java primitive type has a corresponding wrapper class.
- The wrapper class contains useful predefined constant and static methods.
- Create object of a wrapper class

  Integer num = new Integer(100);

  Integer num1 = 50;

  Double price = 10.59;

  Character grade = 'C';

Wrapper Class

- Each wrapper class contains the instance variable for maximum and minimum value

  Integer.MAX_VALUE

  Integer.MIN_VALUE
- The wrapper class also contains the method to convert String value to their type or from their type to String value.
- Integer.parseInt(String) // convert String to integer
- Double.parseDouble(String) // convert String to double
- Integer.toString(intValue) // convert integer to String

Wrapper Class

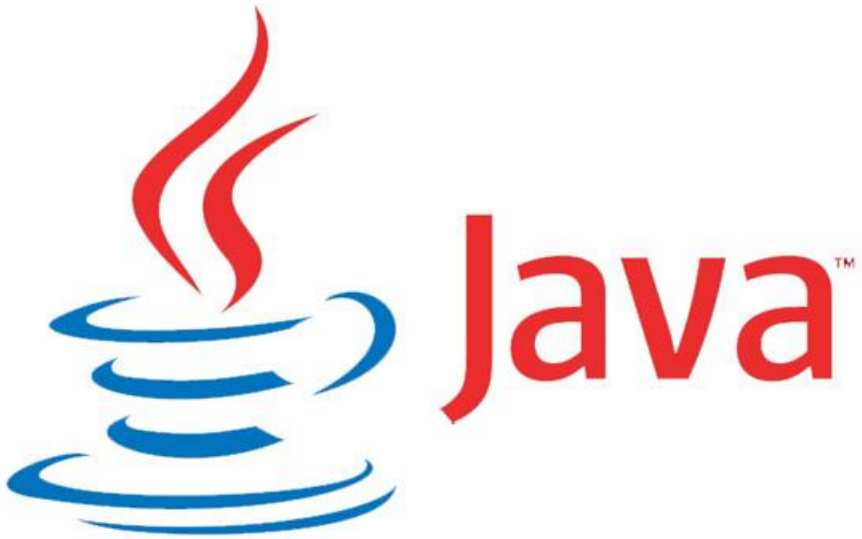
- Character Wrapper Class
  - .toUpperCase(charVariable);
  - .toLowerCase(charVariable);
  - .isUpperCase(charVariable);
  - .isLowerCase(charVariable);
  - .isWhitespace(charVariable);
  - .isLetter(charVariable);
  - .isDigit(charVariable);
  - .isLetterOrDigit(charVariable);

Package

- A package is a collection of classes that have been grouped together into a directory.
- Each package is given a package name. The package name is the path name to the directory containing the classes in the package.
- In Java, the CLASSPATH variable is used to locate Java packages. The new package will store in the directory **CLASSPATH/packName** folder.
- Each file in the same package must contain the same package name.
  - package packageName;

Package

- Whenever a package is import, it does not import the subdirectory packages.
- All the classes in the current directory are called default package. The current directory of the default package is the CLASSPATH
- When compiling a Java file, Java use the default CLASSPATH. In order to use different CLASSPATH for compiling a Java file
  - javac **-classpath .;newClassPathDirectory** fileName.java
  - **. refer to current directory**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