Object, Class & Encapsulation

Pertemuan 3

Topics

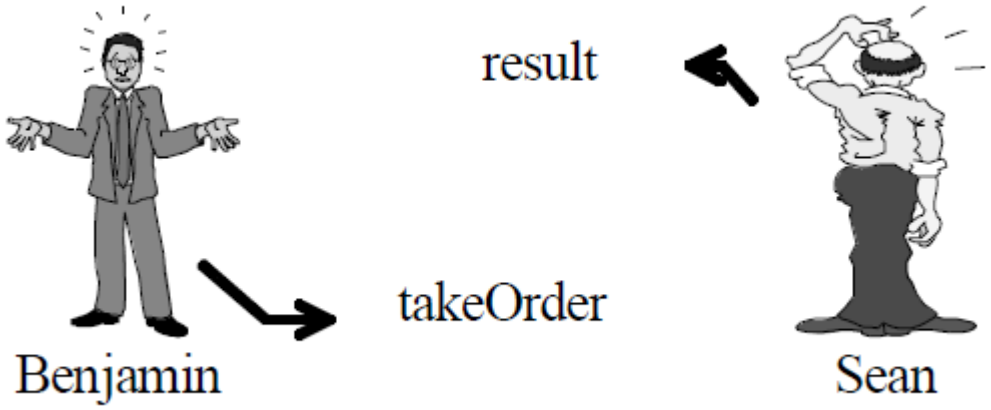
1. Object
2. Class
3. Messages
4. Encapsulation

1. Object

- Objek merupakan sesuatu (tangible / intangible) yang memiliki state (attributes) dan behaviour (methods).
- Objek disebut juga "instance of class" atau representasi dari sebuah kelas.
- Interaksi antar objek dilakukan melalui "sending message".

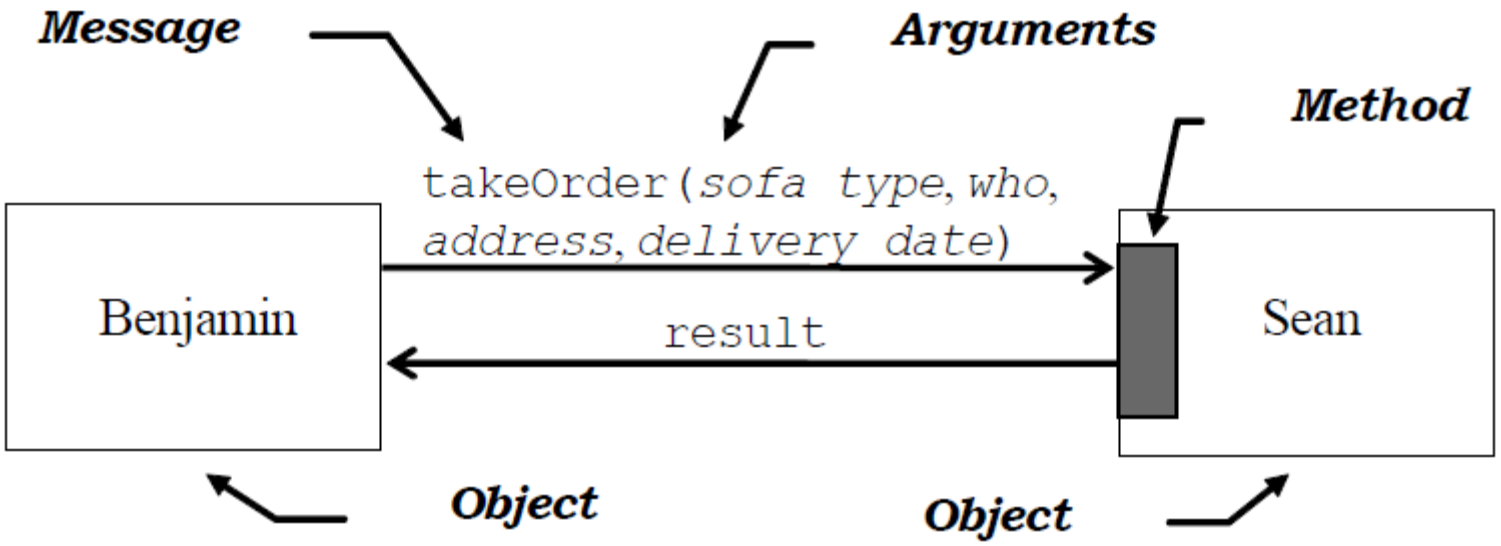
Contoh interaksi antar objek

- Benjamin ingin memesan kursi sofa warna hijau, 5 seater-set, dan dikirimkan pada hari rabu.
- Sean merupakan sales dar i toko furniture.
- Bean mengirimkan pesan "takeOrder", lalu Sean akan mengembalikan "result" sesuai pesanan.



Contd..

- Pesan : takeOrder(sofa type, who, address, delivery date)



Karakteristik Objek

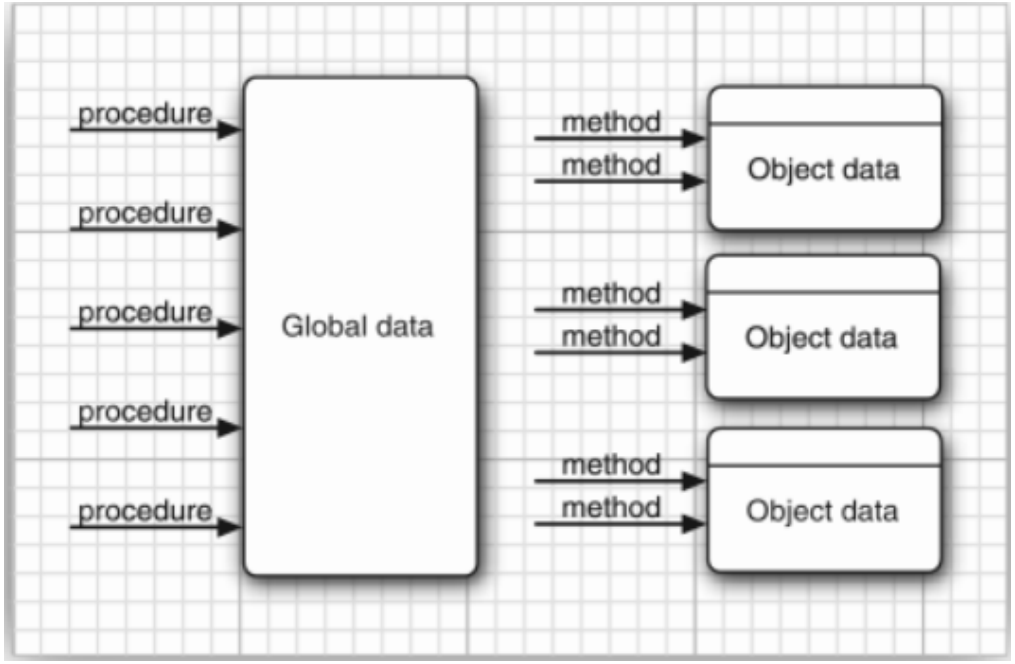
- Objects Behavior – What can you do w/ this object, or what method can you apply it ?
- Objects State – How does the object react when you invoke those method ?
- Objects Identity – How is the object distinguished from others ?

2. Class

- Class merupakan suatu blueprint dari objek.
- Class is a "definition of template for structuring and creating objects with the same attributes and same methods".

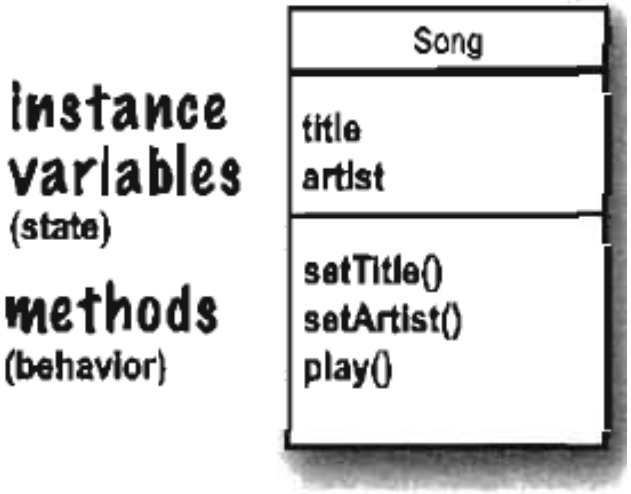
Prosedural vs OOP

- Problem Solving
- Maintainability
- Modularity



Contd..

- Struktur kelas terdiri dua, yakni
  1. State (instance variables)
  2. Behaviour (methods)



Contoh struktur objek :

```
Benjamin as an Object
  Attributes:
    name = "Benjamin"
    address = "1, Robinson Road"
    budget = "2000"
  Methods:
    purchase()    {send a purchase request to a salesperson}
    getBudget()   {return budget}
Bernie as an Object
  Attributes:
    name = "Bernie"
    address = "18, Sophia Road"
    budget = "1000"
  Methods:
    purchase()    {send a purchase request to a salesperson}
    getBudget()   {return budget}
```


Contoh desain kelasnya :

```
Class Customer
  Attributes:
    name
    address
    budget
  Methods:
    purchase()    {send a purchase request to a salesperson}
    getBudget()   {return budget}
```

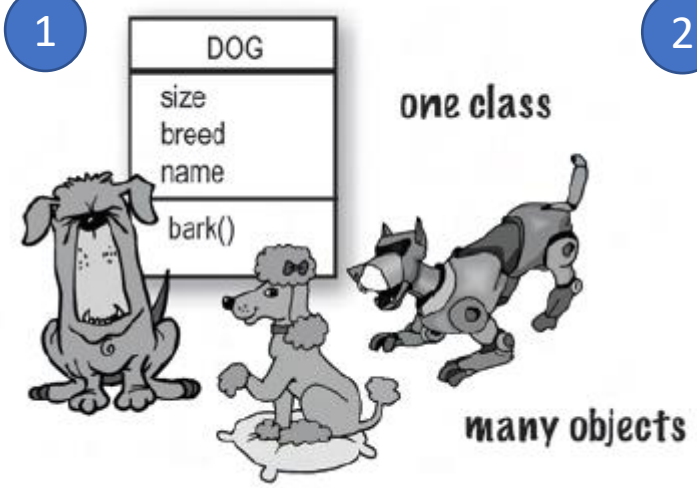

Identifying Classes

- Class -> Look for nouns in the problem analysis.
- Method -> corresponds to Verbs

Contoh Implementasi Class :

Abstraksi kelas

1



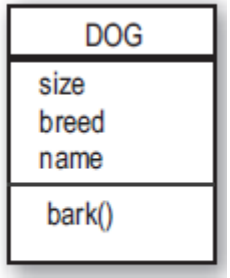
Implementasi kelas

2

```
class Dog {

  int size;
  String breed;
  String name;

  void bark() {
    System.out.println("Ruff! Ruff!");
  }
```

instance variables

a method



3

Instansiasi Objek

```
class DogTestDrive {
  public static void main (String[] args) {
    Dog d = new Dog();
    d.size = 40;
    d.bark();
  }
}
```

make a Dog object

use the dot operator (.) to set the size of the Dog

and to call its bark() method

dot operator

3. Message

- Message merupakan suatu pemanggilan method (method call) dari pengirim pesan (sender) kepada penerima pesan (receiver).
- Informasi tambahan yang dikirimkan melalui "method call" disebut arguments.

Message Component

1. Object identifier : objek yang menerima pesan (receiver)
2. Method name : nama method yang dipanggil
3. Arguments : informasi tambahan yang dikirimkan melalui method, biasanya berupa input parameter.

Contd..

```
Benjamin as an Object
  Attributes:
    name = "Benjamin"
    address = "1, Robinson Road"
    budget = "2000"
  Methods:
    purchase() {
      Sean.takeOrder("Benjamin", "sofa", "1, Robinson Road",
                     "12 November")
    }
    getBudget()      {return budget}
```

The message `Sean.takeOrder(who, stock, address, date)` is interpreted as follows:

- Sean is the receiver of the message;
- `takeOrder` is a method call on Sean;
- `"Benjamin","stock","address","date"` are arguments of the message.

4. Enkapsulasi (pembungkusan)

- Enkapsulasi merupakan salah satu konsep OOP yang digunakan untuk membungkus (bundling) sekumpulan attributes and methods kedalam satu objek dan menyembunyikan (information hiding) detail implementasinya dari objek lain.
- Enkapsulasi terdiri dari dua konsep, yaitu :
  1. Bundling
  2. Information Hiding

Keuntungan Enkapsulasi

- Memudahkan proses maintenance (maintainability)
- Perubahan kode bersifat independent
- Meningkatkan usability
- Meningkatkan extensibility

To achieve encapsulation in Java

- Declare variable of class as private.
- Provide public setter and getter methods to modify and view variables values.

Contoh Enkapsulasi :

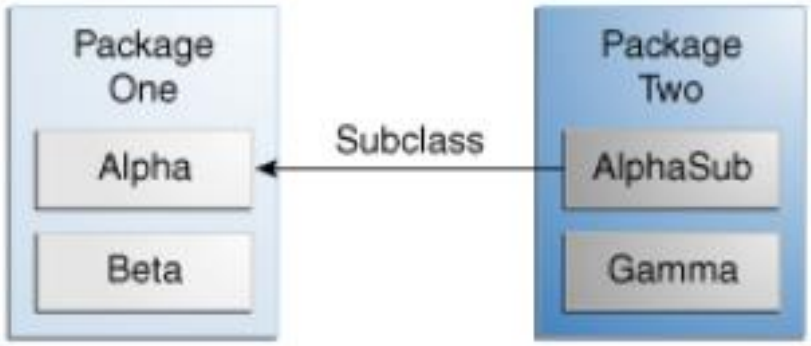
```
/* File name : EncapTest.java */
public class EncapTest {
   private String name;
   private String idNum;
   private int age;

   public int getAge() {
      return age;
   }

   public String getName() {
      return name;
   }

   public String getIdNum() {
      return idNum;
   }

   public void setAge( int newAge) {
      age = newAge;
   }

   public void setName(String newName) {
      name = newName;
   }

   public void setIdNum( String newId) {
      idNum = newId;
   }
}
```

Visibility (Access Modifier)

Access Levels

Modifier	Class	Package	Subclass	World
`public`	Y	Y	Y	Y
`protected`	Y	Y	Y	N
no modifier	Y	Y	N	N
`private`	Y	N	N	N

Contoh implementasi Access Modifier



Visibility

Modifier	Alpha	Beta	Alphasub	Gamma
`public`	Y	Y	Y	Y
`protected`	Y	Y	Y	N
no modifier	Y	Y	N	N
`private`	Y	N	N	N

Demo Aplikasi

- Demo Aplikasi pada Eclipse

Kesimpulan :

- Object merupakan sesuatu yang nyata / tidak nyata yang memiliki state (attributes) dan behaviour (methods).
- Komunikasi antar objek dilakukan dengan pertukaran pesan (sending message).
- Class merupakan blueprint dari sebuah objek
- Message merupakan suatu pemanggilan method (method call) dari pengirim pesan (sender) kepada penerima pesan (receiver).
- Enkapsulasi merupakan suatu konsep OOP yang memiliki dua konsep, yaitu (1) bundling dan (2) information hiding.

Questions

References :

1. Object oriented programming and Java 2nd Edition – Chapter 1 & 2
2. Head First Java 2nd Edition

Quiz Lisan

Tugas 2

Object, Class & Encapsulation

Tugas 2 :

- Buatlah sebuah implementasi kelas pada java di Netbeans / Eclipse.
  - (catatan : tema kelas bebas, boleh mengambil dari kasus nyata / tidak nyata, contoh : game, kampus, toko, dll)
- Gunakan enkapsulasi untuk membungkus attributes-nya !
- Copykan source code & screenshoot hasil implementasi-nya pada word

Contd..

- Beri nama file "tugas02_npm_nama.pdf".
- Kumpulkan pada link dropbox berikut paling lambat 1 hari sebelum perkuliahan berikutnya.