Objects and Classes

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1 Introduction to Object-Oriented Programming

What is Object-Oriented Programming:
Programming with several **objects**, each object has a specific functionality which exposed to its users, but a hidden implementation

Two Ways of thinking:

- Traditional: algorithms → data structures
  Note: fine for small problems but *cannot* handle large problems.
- Morden: data structures → algorithms
  Note: More efficient to **store** data first then **m**anipulate them

1.1 Classes

Class $\xrightarrow{Construct}$ Instance $\xleftarrow{Use}$ program

Encapsulation is the key of OOP:

- **Definition**: It is combining data and behavior in one package and hiding the implementation detail from the users of the object
- **How**: methods *never* directly access instance field in a class than its own i.e. "Black Box behaviour"

1.2 Objects

Three characteristics:

- behaviour: what can it do + what can be done to it
- state: how does the object react when use its method
- identity: how is the object distinguish from others

1.3 Identifying Classes

A Common begin of OOP design: Identify the classes and Add methods to sperate classes

Rule of Naming:

- Class Name: Nouns → What it is
- Method Names: Verbs → What can it do

1.4 Relationships between classes

Common Relations are:

dependence "uses-a" Express a relationship one class manipulates another class

aggregation "has-a" Express a relationship specifying the whole and its parts

inheritance "is-a" Express a relationship between a more special and a more general class

UML(Unified Modeling Language) notations aree used to expressed the relationship by diagram
Ref: p.131 Core Java, COMP0004 Note

2 Using Predefined Classes

2.1 Objects and Object Variables

A constructor is a **special method** whose purpose is to construct and initialize objects

Key facts between Object Variables and Objects:

- a variable called "deadline" with type "Date" is not a object but a variable
- object variables need to be initialized
- object variables doesen't contains an object, but it only *refers* to an object
- Explicitly, an object variable to **null** to indicate that it currently refers to no object

Two ways of INIT:

- *deadline = new Date();* refers to newly constructed object
- *deadline = birthdate;* refers to an existing object

2.2 The 'LocalDate' Class of the Java Library

Ref: pp. 135-137 Core Java

2.3 Mututator and Accessor Methods

Definitions:

- Mutator method: method which will change its own original value and return
- Accessor method: method which will **not** modify its original value