§1.16-2.8: Selection structure

17 January 2007
CMPT167
Dr. Sean Ho
Trinity Western University

TRINITY WESTERN UNIVERSITY

Review of last time

- Languages: machine, assembly, high-level
- Java code translation
- JDK vs. JRE
- A first Java program
- Comments and doc-comments
- Compiling and running a Java program

What's on for today

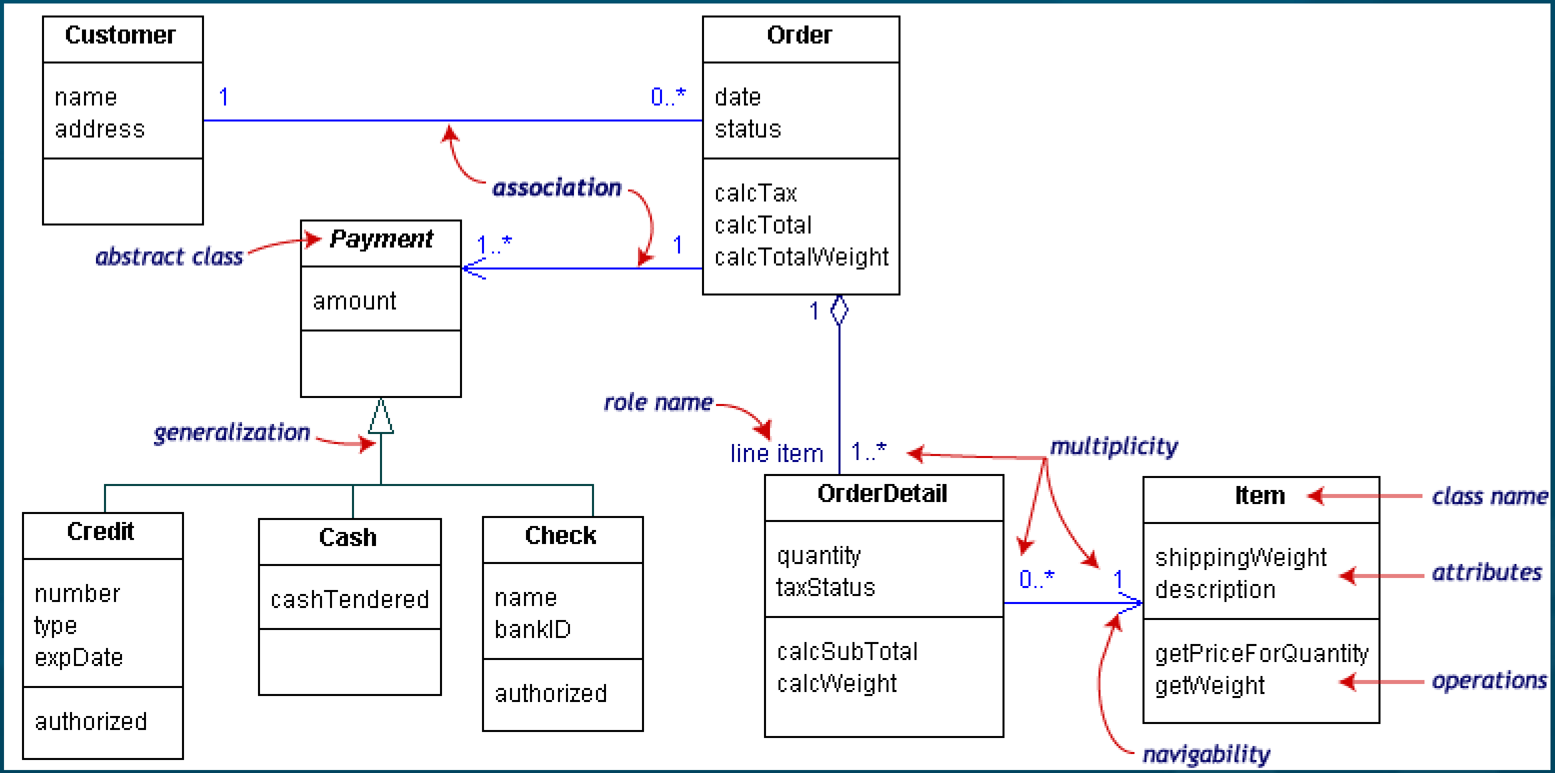
- UML: diagrams for software design
- Design patterns: not reinventing the wheel
- Java coding style, identifiers
- Booleans and the if statement
- Applets
- Swing

UML: Unified Modeling Language

- Diagrams for use in designing your programs
- Main diagram types:
  - Static: Class diagram, object, package
  - Dynamic: Use case diagram, sequence diagram, state chart
- Handy for diagramming by hand, or
- UML software tools, e.g., Visio, Sun JSEnterprise
- Developed by Booch, Rumbaugh, and Jacobson, of OMG (Object Management Group)
- Current version is 2.0: www.uml.org

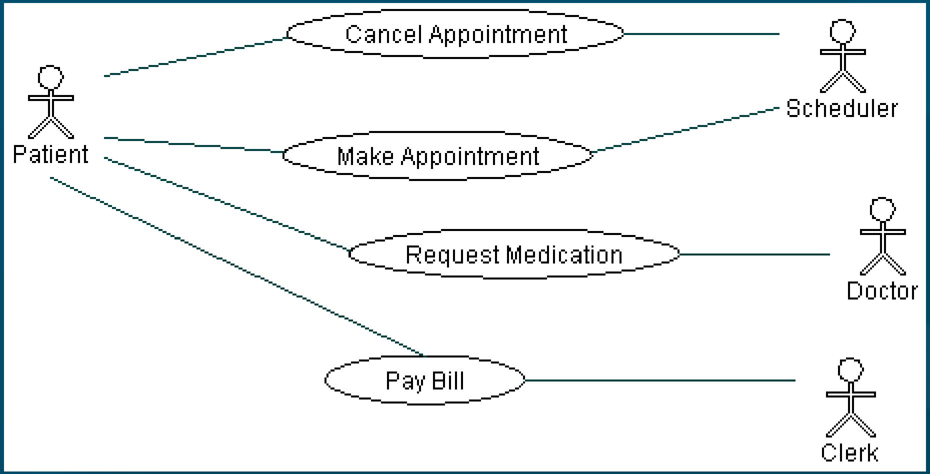
UML: Class diagram

- Each box represents a class (type)
  - Name, attributes, methods
- Lines show relationships between classes



UML: Use case diagram

- Describes relationships between actors:
  - Patient calls the clinic to make an appointment
  - Receptionist books timeslot
  - Patient sees doctor and requests medication
  - Patient pays bill to clerk



- See Borland's UML tutorial for more details

Design patterns

- Commonly used software designs
- Not reinventing the wheel
  - Similar to libraries, but for program design
- Similar to architectural elements: arch, column
- "Gang of Four" standard reference (1995):
  - Gamma, Helm, Johnson, Vlissides, "Design Patterns: Elements of Reusable OO Software"
  - Creational patterns: e.g., abstract factory
  - Structural patterns: e.g., proxy
  - Behavioural patterns: e.g., observer

Java coding style: HelloWorld.java

```
public class HelloWorld {
    public static void main( String args[] ) {
        System.out.println( "Hello, World!" );
    }
}
```

- Class names are nouns in CamelCase
- Method names are usually verbs in lowercase:
  - useLowerCamelCase() or use_underscores()
- Local variable names are also lowercase
- Legal identifiers: alphanumeric, _, $
  - Cannot start with a digit

Selection structure: if, Booleans

- if (*condition*) *statement*;
- Condition is of type boolean
  - Literals: true, false
  - Binary operators: ==, !=, <, >, <=, >=,
  - Boolean operators (shortcut): &&, ||
- Compound statement using {}:

```
if (condition) {
    statement1;
    statement2;
}
```

Selection: if … else …

```
if (condition)
    statement1;
else
    statement2;
```

- How to do elif?

```
if (condition)
    statement1;
else if (condition2)
    statement2;
```

The “dangling else” problem

```
if (cond1)
    if (cond2)
        statement1;
else
    statement2;
```

- Which if is the else attached to?
- Solution: always use braces

```
if (cond1) {
    if (cond2) {
        statement1;
    }
} else {
    statement2;
}
```

Java user interfaces

- Command line
  - HelloWorld example (java/ dir)
  - System.out.print()
  - System.in exists, but reading lines is harder
- Applets
  - Addition example ("Lab0")
  - TextField, Label
- Swing
  - SayHello example (java/ dir)
  - JOptionPane

Text output: System.out

- System is a class in the java.lang library
- java.lang is automatically imported
  - Can import other libraries with import
- System.out is the standard output file object
- Its methods include print and println:
  - System.out.println(“Hello!”);
  - System.out.print(“Hello!\n”);
- Other escape characters:
  - Tab (\t), backslash (\\), quote (\")

Java Applets

- Applets are small applications designed to be within a webpage
- GUI components: text input boxes, buttons, etc.
- See the "Lab0" (Addition) template lab
    - import java.applet.Applet;
    - public class MyClass extends Applet { ...

Java Swing

- Swing is Java's built-in GUI toolkit
- Can build stand-alone GUI programs
- See "SayHello" example (cmpt167.seanho.com/java)
  - import javax.swing.*;
  - Input dialog: JOptionPane.showInputDialog()
  - Output: JOptionPane.showMessageDialog()
- See Sun's tutorial for more details

- Lab1 can be done in either Swing or an applet

TODO

- Lab1a due next week Wed 24Jan:
  - Selection structure
  - Swing program: see "SayHello" example, or
  - Java Applet: see "Lab0" (Addition) template
- Lab1b due Wed 31Jan:
  - Repetition structure