CS 213 : Software Methodology

Spring 2017

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Lecture 1: Jan 17
Overview

Resources

http://sakai.rutgers.edu
(CS 213 – Spring 2017)

No Required Textbook

Lecture Notes + Pointers to Online Resources

Topics

- Object-Oriented Programming and Design
  - Classes, objects, members, encapsulation
  - Inheritance, interfaces, abstract classes, polymorphism
- Unified Modeling Language (UML) to represent OOD
- Graphical User Interfaces (GUI) with Java FX 8
- Design patterns
- Android Programming
- Multithreading
- Lambdas and Streams (Java 8)

Grading

- OOD/OOP assignment : 12.5%
- GUI assignment: 5%
- MVC Project: 22.5%
- Android Project: 20%

DO stuff!
Working in pairs

- Exam 1: 10% (80 mins)
- Exam 2: 12% (80 mins)
- Exam 3: 18% (120 mins, during finals)

Know concepts

A Brief History of Object-Oriented Programming Languages

Which was the first object-oriented programming language?

When?

Simula-67

Ole Johan Dahl and
Kristen Nygaard (Norway)

Simula Sample http://staff.um.edu.mt/jskl1/talk.html

Declaration:

```
Class Rectangle (Width, Height); Real Width, Height;
                                 ! Class with two parameters;
 Begin
    Real Area, Perimeter;   ! Attributes;

    Procedure Update;       ! Methods (Can be Virtual);
    Begin
      Area := Width * Height;
      Perimeter := 2*(Width + Height)
    End of Update;

    Boolean Procedure IsSquare;
      IsSquare := Width=Height;

    Update;                 ! Life of rectangle started at creation;
    OutText("Rectangle created: "); OutFix(Width,2,6);
    OutFix(Height,2,6); OutImage
 End of Rectangle;
```

Simula Sample http://staff.um.edu.mt/jskl1/talk.html

Object Generation:

Ref(Rectangle) R; (Class reference variable)

...

R :- New Rectangle(50, 40); Activities involved in this object generation:

```
Memory allocation, reference stored to R.
Copying values to parameters (value passing only).
Starting the object's body (life rules).
```

The next big OOPL

Smalltalk-80

Product of research led by
Alan Kay at Xerox PARC in the 70s

(Other versions of Smalltalk
preceded Smalltalk-80, but
weren't publicly released).

ALAN KAY

United States – 2003

CITATION

For pioneering many of the ideas at the root of contemporary object-oriented programming languages, leading the team that developed Smalltalk, and for fundamental contributions to personal computing.

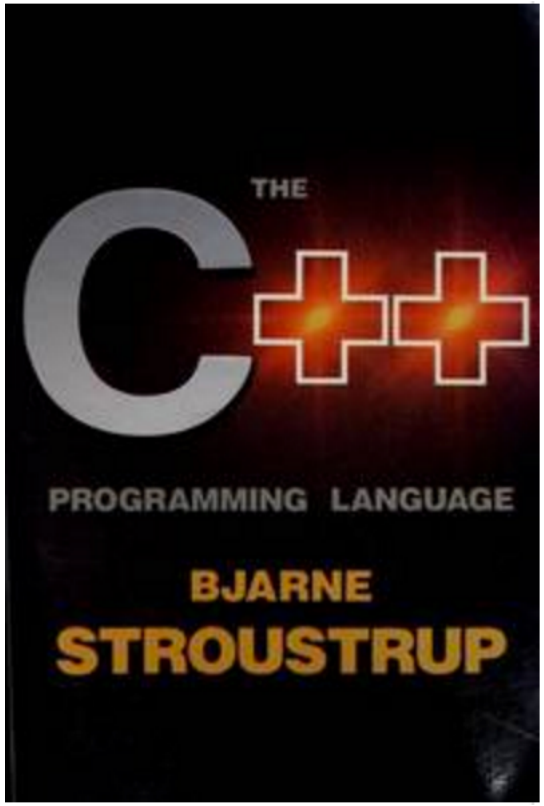
Smalltalk-80 Sample

```
Object subclass: #Server
  instanceVariableNames: 'serverSocket socketHandler'
  classVariableNames: ''
  poolDictionaries: ''
  category: ''!

!Server class methodsFor: 'instance creation'!

new: aServerSocket handler: aHandler
  | simpleServer |
  simpleServer := super new.
  simpleServer socket: aServerSocket.
  simpleServer handler: aHandler.
  simpleServer init.
  ^simpleServer
!!
```

C++

Bjarne Stroustrup
(AT&T)

Originally implemented in 1982 under the name "C with classes". First commercial compilers appeared in 1988



C++ Sample

```
class X {
private:                    // the representation (implementation) is private
      int m;
public:                     // the user interface is public
      X(int i =0) :m{i} { } // a constructor (initialize the data member m)

      int mf(int i)         // a member function
      {
            int old = m;
            m = i;          // set a new value
            return old;     // return the old value
      }
};

X var {7}; // a variable of type X, initialized to 7

int user(X var, X* ptr)
{
      int x = var.mf(7);        // access using . (dot)
      int y = ptr->mf(9);       // access using -> (arrow)
      int z = var.m;            // error: cannot access private member
}
```

C++ was inspired by features of Simula, but built on top of C syntax.

The C foundation makes C++ a hybrid language: you can use a C++ compiler to compile strictly C code without any objects

Java

James Gosling (SUN Microsystems)

Originally (early 90s) conceived as a
hardware independent software platform
to be used in consumer electronics

WORA – Write Once Run Anywhere

Java 1.0 released in 1996.

JVMs available for SPARC Solaris, Windows NT, Windows 95, and Linux.

Supported by Netscape Navigator 2.0 browser.

Jave SE Platform at a Glance