CMSC 202 Introduction

CMSC 202

Spring 2014

Instructors & Lecture Sections

- Mr. Max Morawski
  - Section 01: Tu/Th 10:00—11:15 AM, Physics 101
  - Section 16: Tu/Th 5:30—6:45 PM, Sondheim 101
- Mr. Ross Romano
  - Section 06: M/W 5:30—6:45 PM, ITE 102
- Mr. John Park
  - Section 11: Tu/Th 2:30—3:45 PM, ITE 102

What is CMSC 202?

- An introduction to
  - ***Object-oriented programming*** (OOP) and ***object-oriented design*** (OOD)
  - Basic ***software engineering*** techniques
- Strong emphasis on *proper program design* and *maintainability*
- Tools
  - C++ programming language, GCC (Gnu C Compiler)
  - Linux (GL system)
  - [Optionally: Eclipse integrated development environment (IDE)]

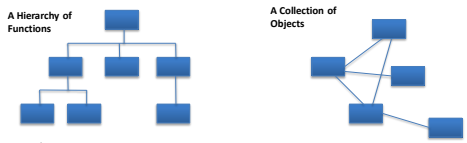
Course Web Site

www.cs.umbc.edu/courses/undergraduate/202/spring14

Procedural vs. OO Programming

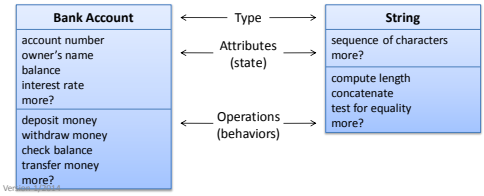
Procedural
- Modular units: functions
- Program structure: hierarchical
- Data and operations are not bound to each other
- Examples:
  - C, Pascal, Basic, Python

Object-Oriented (OO)
- Modular units: objects
- Program structure: a graph
- Data and operations are bound to each other
- Examples:
  - C++, Java, Python (huh?!)



What's an ***Object***?

- Must first define a ***class***
  - A ***data type*** containing:
    - Attributes – make up the object's ***state***
    - Operations – define the object's ***behaviors***



So, an Object is…

- a particular ***instance*** of a class

Morawski's Account	Romano's Account	Park's Account
12-345-6 Max Morawski $1,250.86 1.5%	65-432-1 Ross Romano $5.50 2.7%	43-261-5 John Park $825.50 2.5%

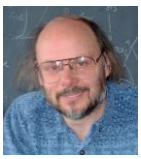
For any of these accounts, one can…

- Deposit money
- Withdraw money
- Check the balance
- Transfer money

Why C++ for 202?

- Popular modern OO language
- Wide industry usage
- Used in many types of applications
- Desirable features
  - Object-oriented
  - Portable (not as much as Java, but fairly so)
  - Widespread use in industry
  - Efficient
  - Retains much of its C origins

Some C++ Background

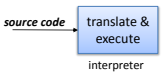


Bjarne Stroustrup
(image from home page)

- Created in 1979 by Bjarne Stroustrup of Bell Labs (home of UNIX and C)
- added object-oriented features to C (called "C with Classes" at first)
- Shortly renamed to "C++" in honor of C's auto-increment operator.
- Later standardized with several ISO specifications (most recently 2011)
- Greatly influenced Java development (1991)

Interpreters, Compilers, and Hybrids

Interpreted Languages (e.g. JavaScript, Perl, Ruby)

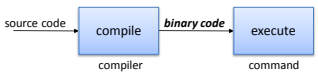


Interpreter translates source into binary and executes it

Small, easy to write

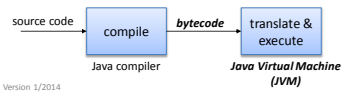
Interpreter is unique to each ***platform (operating system)***

Compiled Languages (e.g. C, C++)



Compiler is platform dependent

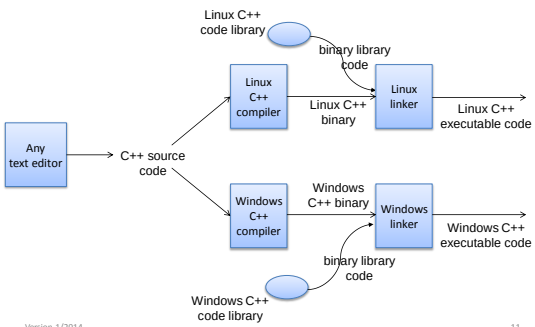
Many other models: e.g., Java (Python is stranger still):



Bytecode is platform independent

JVM is an interpreter that is platform dependent

Sample C++ Compilation & Linkage



A Peek at Python vs. C++ Syntax

Python

```
print "Hello, world"
quotient = 3 / 4
if quotient == 0:
    print "3/4 == 0",
    print "in Python"
else:
    print "3/4 != 0"
```

C++

```
#include <iostream>
using namespace std;

int main() {
  int quotient;
  cout << "Hello, world";
  quotient = 3 / 4;
  if (quotient == 0) {
    cout << "3/4 == 0";
    cout << " in C++";
  } else {
    cout << "3/4 != 0";
  }
  return 0;
}
```

Some things to note regarding C++ syntax:

- Has elements of procedural and OOP
- We need a "main()" function
- Statements end with ";"
- Variables must be declared
- "if/else" syntax different
- Statement blocks demarcated by "{...}"
- Much that is similar

Development Environment

- We will use the GL systems and GCC (GNU Compiler Collection) suite for development
- You will learn to be semi-literate in UNIX (Linux) and shell usage
- You should learn Emacs (important for later courses)
- We might provide instructions for using Eclipse, but support might be limited

A Peek at the Eclipse IDE

- ***Integrated Development Environment*** (IDE) for writing programs in various languages. Contains:
  - text editor
  - Integration environment for:
    - debugger
    - C++ compiler
- Free download for Windows/Linux/Mac
  - See course "Resources" page on the CMSC 202 web site
- Available in all OIT labs around campus
  - We'll show you more in Lab 1