CS 31 Discussion 1A, Week 1

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Humanities A65, Friday 10:00—11:50
TA

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• Discussion session (1A):
  • Humanities A65
  • Friday 10:00 – 11:50

• Office hours:
  • BH 2432
  • Tuesday 11:30 – 12:30
  • Thursday 8:30 – 10:30
  • By appointment

• Class website: http://web.cs.ucla.edu/classes/fall16/cs31/
Course Review Basics
Introduction to Programming

• What is high-level language?

• (Analogy) Natural language:
  • English: “Hello!”
  • Voice: 
  • Programming:
    • C++: std::cout << “Hello!” << std::endl
    • Machine code: 0110011110101110… (I made this up)
A first look at a C++ program

```cpp
// filename: hello.cpp
#include <iostream>
using namespace std;

int main () {
    cout << "Hello World!" << endl;
}
```
A first look at a C++ program

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

int main () {
    cout << "Hello World!" << endl;
}
```

- comment line
- use I/O library (for the print statement)
- the context we are using
- print new line
- function boundaries
- just a template for you to follow (more details later)
- print to standard output
How to run a program

• Compilation — compiled language
  • C++, C, Java, …
  • the compiler will translate the program directly into machine code that is specific to the target machine
  • source code -> (compiler) -> executable

• Interpretation — interpreted language
  • Python, Bash, …
  • The source code is not directly run by the target machine. The interpreter reads and then executes the original source code.
Compilation

source code
(hello.cpp)

compiler
(Visual C++ / clang++ / g++)

executable
(hello)
Environment Setup

- Visual C++
  - Remote connection: see http://www.seasnet.ucla.edu/terminal-server/
  - Caveat: use UCLA_WIFI or CSD; use UCLA VPN if you are working from home
- Xcode
- g++ with Linux server
Live demo
Errors (are bound to happen…)

• Compilation error (syntax error)
  • Errors in which the programmer has violated a portion of the language syntax (the language structure).
  • These will prevent source code from compiling into program/executable.

• Runtime error (logic error)
  • Your source code might compile successfully, but encounter an error during runtime that either causes the program to break or produces unexpected (wrong) results.
Quiz: list some compilation errors

- Missing semicolons at ends of statements
- Missing brackets around blocks
- Missing namespace or #include definitions
- Misspelled variables or names
Quiz: list some runtime errors

• Division by 0

• Overflow (e.g. trying to hold a really big number in an int variable that exceeds its bounds)
  • int range: -2,147,483,648 — 2,147,483,647 (32-bit)
Quiz: what’s wrong? (1)

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

double main () {
    cout << "Hello World!" << endl;
}
```
Quiz: what’s wrong? (2)

/ filename: quiz.cpp
#include <iostream>

int main () {
    cout << "Hello World!"
    cout << endl;
}

Project Hints
General project requirement

- READ THE SPEC
- http://web.cs.ucla.edu/classes/fall16/cs31/requirements.html
- Make sure your code works with two compilers:
  - g++ with Linux
  - Visual C++ 2015 or clang++ (Xcode)
- Submit single zip file, with correct file extension name
Project 1 spec

• a. get the environment set up

• b. original.cpp — get the demo cpp program working

• c. logic_error.cpp — modify the code such that it compiles but gives the wrong output

• d. compile_error.cpp — introduce two distinct types of errors which make the code fail to compile

• e. write your report
Submission requirements

• Time due: 9:00 PM Tuesday, October 4

• A compressed file in zip format containing exactly four files mentioned

• The zip file itself may be named whatever you like

• Do not include anything else in the zip file

• Submission links will be available by October 3
Best practice

• Comments
• Indentation
A more complex example

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

int main()
{
    cout << "How many hours did you work? ";
    double hoursWorked;
    cin >> hoursWorked;
    cout << "What is your hourly rate of pay? ";
    double payRate;
    cin >> payRate;
    double amtEarned = hoursWorked * payRate;
    cout.setf(ios::fixed);
    cout.precision(2);
    cout << "You earned $" << amtEarned << endl;
    cout << "$" << (0.10 * amtEarned) << " will be withheld." << endl;
}
```
Quiz: what’s wrong? (3)

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

int main () {
    int worldPopulation = 7500000000;
    cout << "The world population is " ;
    cout << worldPopulation << endl;
}
```
The code snippet contains a program to calculate the volume of a cylinder. The problem with the code is that the variable names are not corresponding to the problem description. The problem statement asks to calculate the volume of a cylinder, but the code calculates the volume of a cone instead.

Here is the corrected code:

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

int main () {
    double PI = 3.14;
    int r, h;
    cout << "Enter values of r and h: "
    cin >> r, h;
    v = PI * r * r * h;
    cout << "Volume = " << v;
}
```