CS 31 Discussion 1A, Week 1

Zengwen Yuan (zyuan [at] cs.ucla.edu)
Humanities A65, Friday 10:00—11:50

TA

- Zengwen Yuan (zyuan [at] cs.ucla.edu)
- 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

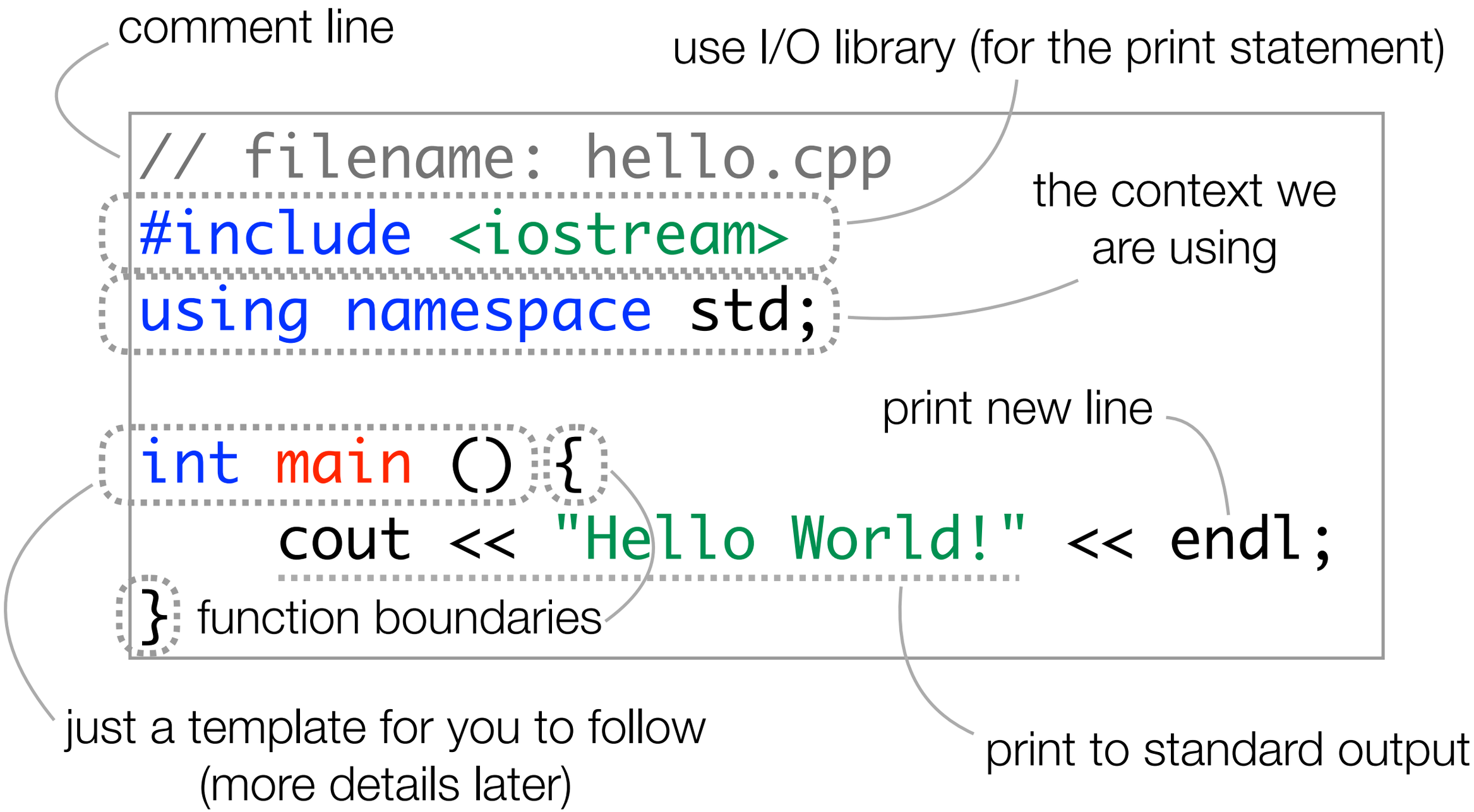
- What is high-level language?
  - (Analogy) Natural language:
    - English: “Hello!”
    - Voice: 
- Programming:
  - C++: std::cout << “Hello!” << std::endl
  - Machine code: 0110011110101110… (I made this up)

A first look at a C++ program

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

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

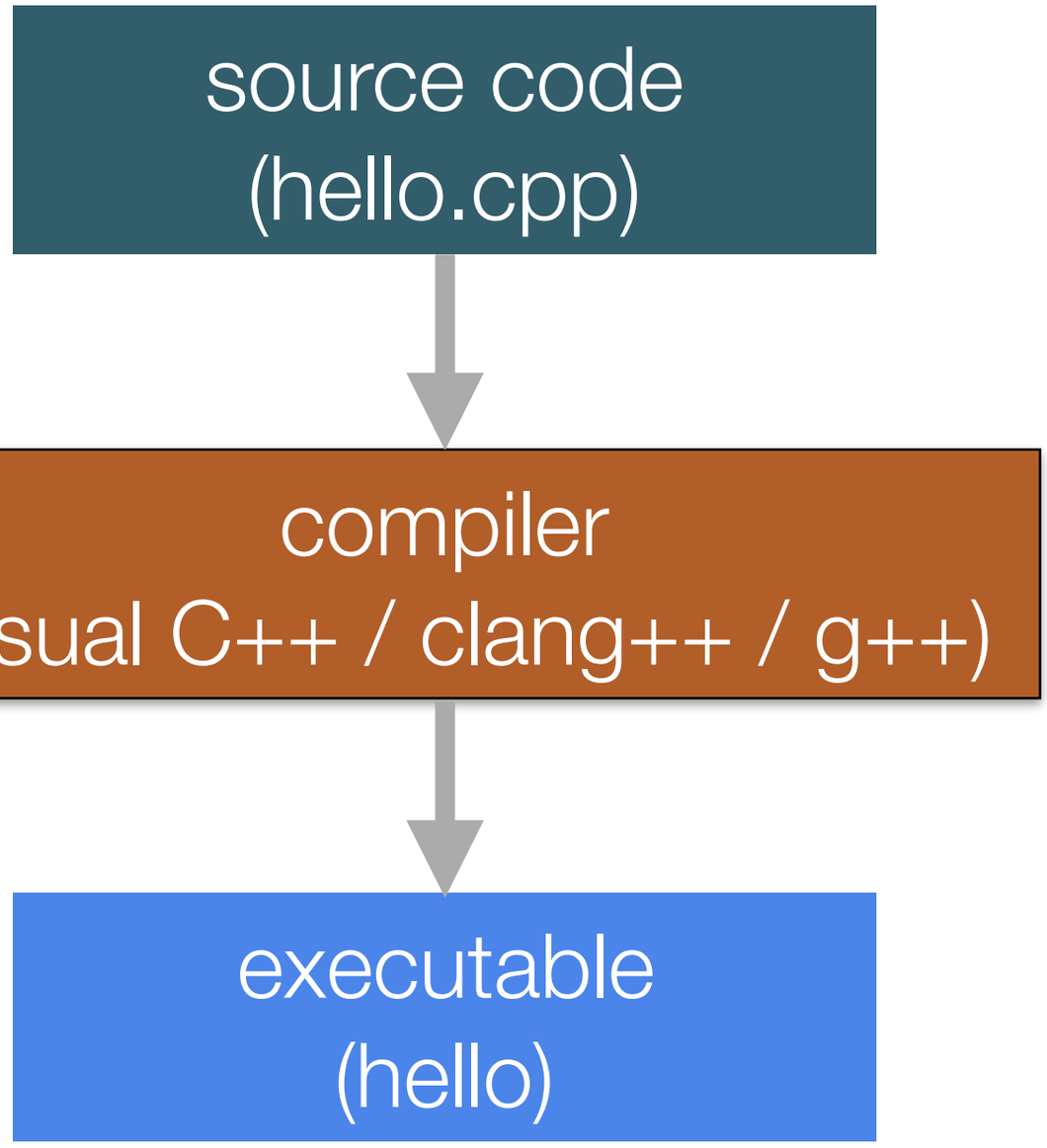
A first look at a C++ program



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



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)

```
// filename: hello.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

Project 1

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

```
#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)

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

int main () {
    int worldPopulation = 7500000000;
    cout << "The world population is ";
    cout << worldPopulation << endl;
}
```

Quiz: what's wrong? (4)

```
#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;
}
```