CS120 – Computer Science I

Instructor: Jia Song

Instructor Contact Information

Instructor: Dr. Jia Song
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Phone: (208) 885-1710
Office: JEB 240 (CSDS Security Lab)
JEB 340

Office Hour:

MTW 2:30pm – 3:30pm
Schedule an appointment by Email

- Use "**CS120** YOUR SUBJECT HERE" in the subject field.
- Look for a response email (in 24 hours) if you send documents to me.

About this course

- **Time and Location:**

Lecture: WMF 12:30pm – 1:20 pm (MCCL 209)

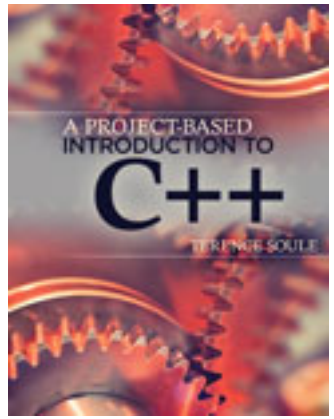
Labs: Section 1 – T 10:30am – 12:20pm (JEB 321)
Section 2 – T 12:30pm – 2:20pm (JEB 321)
Section 3 – R 2:30pm – 4:20pm (JEB 321)

Learning Outcomes

After successfully completing this course, each student will have learned how to do the following:

- Apply knowledge of computing and mathematics appropriate to the program's student outcomes and to the discipline (ABET student outcome A (introduce))
- Design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs (ABET student outcome C (introduce))
- Function effectively on teams to accomplish a common goal (ABET student outcome D (introduce))
- Communicate effectively with a range of audiences (ABET student outcome F (introduce))
- Use current techniques, skills, and tools necessary for computing practice (ABET student outcome I (introduce))
- Apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates an understanding of the tradeoffs involved in design choices (ABET student outcome J (introduce))
- Apply design and development principles in the construction of software systems of varying complexity (ABET student outcome K (introduce))

Textbook

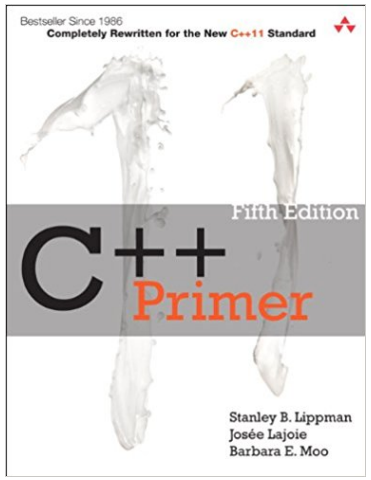


- A Project Based Introduction to C++, Terence Soule, Kendall-Hunt, 2014 (ISBN 9781465251145)

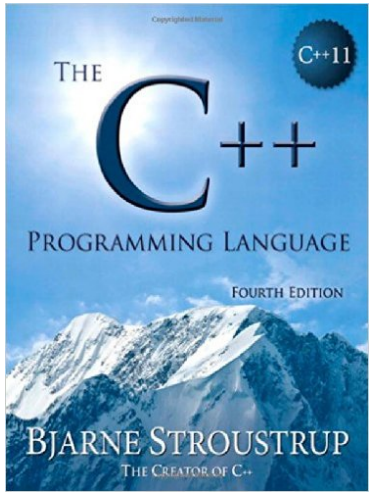
- http://www.kendallhunt.com/store-product.aspx?id=268763

Recommended C++ books

- C++ Primer (Stanley B. Lippman, Josee Lajoie, Barbara E. Moo)

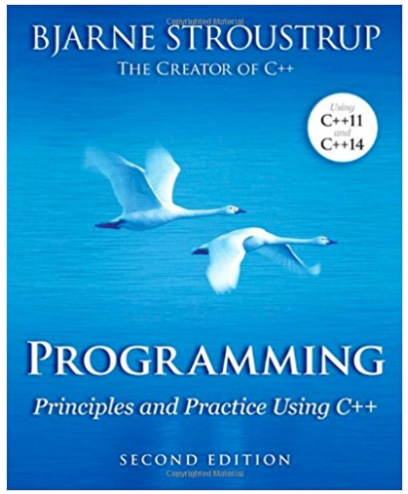


- The C++ Programming Language (Bjarne Stroustrup)

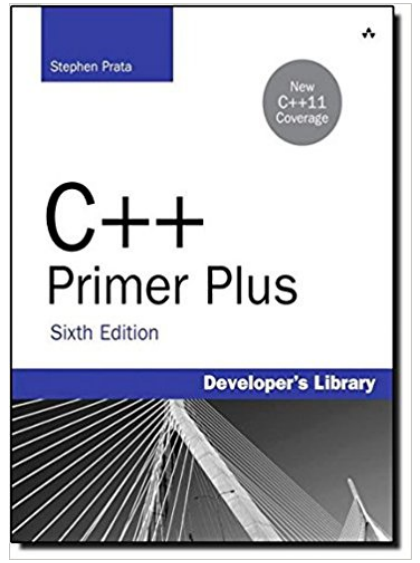


Recommended C++ books

- Programming: Principles and Practice Using C++ (Bjarne Stroustrup)



- C++ Primer Plus (Stephen Prata)



Course website

- http://www2.cs.uidaho.edu/~jsong/cs120spring2018.html

Course Schedule

Week	Date	Topics	Chapters
1	Jan 10 – Jan 12	Introduction to Computers and programming	1
2	Jan 15 – Jan 19	Variables, basic I/O, conditionals, libraries ***Idaho Human Rights Day Jan 15 (No classes) ***	2
3	Jan 22 – Jan 26	Conditionals, loops, random numbers	3
4	Jan 29 – Feb 2	More Loops	3
5	Feb 5 – Feb 9	Functions	4
6	Feb 12 – Feb 16	Classes ***short exam #1 Fri Feb 16***	5
7	Feb 19 – Feb 23	More classes ***Presidents Day Feb 19 (No classes)***	5

Course Schedule

8	Feb 26 – Mar 2	Software design and engineering	5
9	Mar 5 – Mar 9	Passing arrays to functions, binary, hex	6
10	Mar 12 – Mar 16	***Spring break – No classes***	
11	Mar 19 – Mar 23	Arrays	6
12	Mar 26 – Mar 30	Two-dimensional arrays ***short exam #2 Fri Mar 30***	7
13	Apr 2 – Apr 6	Pointers	7
14	Apr 9 – Apr 13	More pointers	7
15	Apr 16 – Apr 20	Linked lists	8
16	Apr 23 – Apr 27	Recursion	8
17	Apr 30 – May 4	Final Exam Review	
18	May 7 – May 11	Final Exam	

Grading

Two 50-minutes exams	20%
Final exam	20%
Assignments	30%
Quizzes	15%
Labs	15%

Score	Grade
90 - 100	A
80 - 89	B
70 - 79	C
60 - 69	D
0 - 59	F

How to learn a programming language?

- Practice, practice and practice! (Homework, Lab)
- Review what you have learned before! (Quiz, exam)
- Ask for help when you need! Don’t wait!
  - Ask me
  - Ask TA in the lab
  - Stop by CSAC (Computer Science Assistance Center) located in JEB211D

Terms and Conditions

You are responsible for:

- Reading and Understanding the course material.
- Turning in your homework, lab reports and other assignments **ON TIME.**

  Weekly homework will be due every Sunday 11:59pm.

  (Late homework: 1 day – 70%, 2 days – 50%, more than 2 days – 0)
- Attending the class and pay attention in class.
- Finding out the exam times (2 short exams and 1 final exam) and being there.
- No cheating! Cheating will result in failing the class.

Terms and Conditions

- Group work

  Homework and labs can be conducted in groups. I encourage working in group and sharing the knowledge. However, **you must understand the materials and turn in your individual copy of homework and lab report.**

- No group work on exams.

- Questions?

Programming

- **Programming** is the process of writing a program that a computer can run.
- A **programming language** is a specific set of basic instructions that can be combined to create a program.

Hello world! in different languages

- Assembly language

```
    global  _main
    extern  _printf

    section .text
_main:
    push    message
    call    _printf
    add     esp, 4
    ret
message:
    db  'Hello, World', 10, 0
```

- BASH (UNIX SHELL)

```
#!/bin/bash
STR="Hello World!"
echo $STR
```

- Applescript

```
say "Hello, world!"
```

From: https://excelwithbusiness.com/blog/say-hello-world-in-28-different-programming-languages/

Hello world! in different languages

- C

```c
#include <stdio.h>

int main(void)
{
    printf("hello, world\n");
}
```

- C++

```cpp
#include <iostream>

int main()
{
    std::cout << "Hello, world!\n";
    return 0;
}
```

- FORTRAN

```
program helloworld
     print *, "Hello world!"
end program helloworld
```

- JAVA

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

    }
}
```

Hello world! in different languages

- MACHINE CODE

```
b8    21 0a 00 00   #moving "!\n" into eax
a3    0c 10 00 06   #moving eax into first memory location
b8    6f 72 6c 64   #moving "orld" into eax
a3    08 10 00 06   #moving eax into next memory location
b8    6f 2c 20 57   #moving "o, W" into eax
a3    04 10 00 06   #moving eax into next memory location
b8    48 65 6c 6c   #moving "Hell" into eax
a3    00 10 00 06   #moving eax into next memory location
b9    00 10 00 06   #moving pointer to start of memory location into
ecx
ba    10 00 00 00   #moving string size into edx
bb    01 00 00 00   #moving "stdout" number to ebx
b8    04 00 00 00   #moving "print out" syscall number to eax
cd    80            #calling the linux kernel to execute our print to
stdout
b8    01 00 00 00   #moving "sys_exit" call number to eax
cd    80            #executing it via linux sys_call
```

High-level languages vs Low-level languages

- High-level languages:
  - human readable
  - hard for computer to understand
  - eg: Java, C, C++, Python, …
- Low-level languages:
  - hard for people to understand
  - easy for computers to understand
  - eg: Assembly language

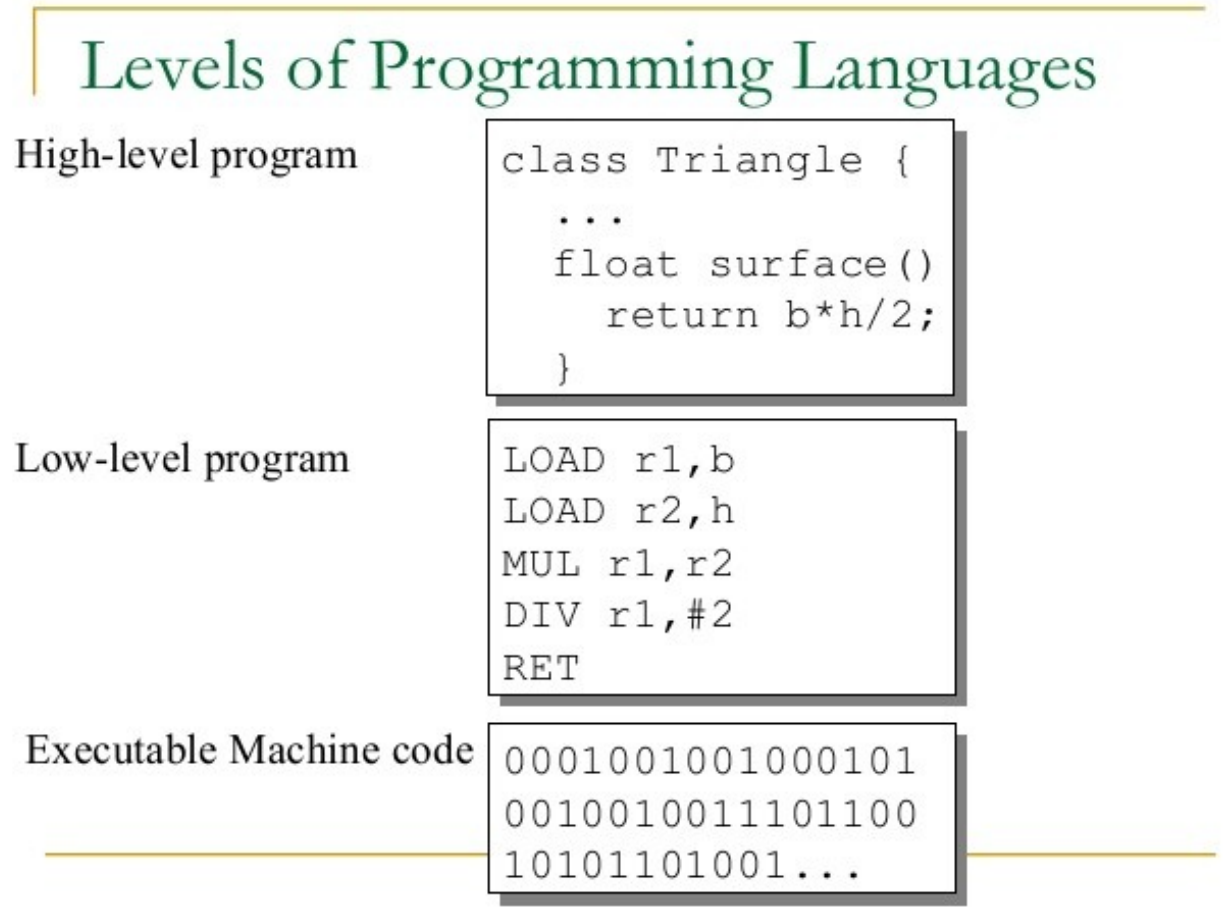
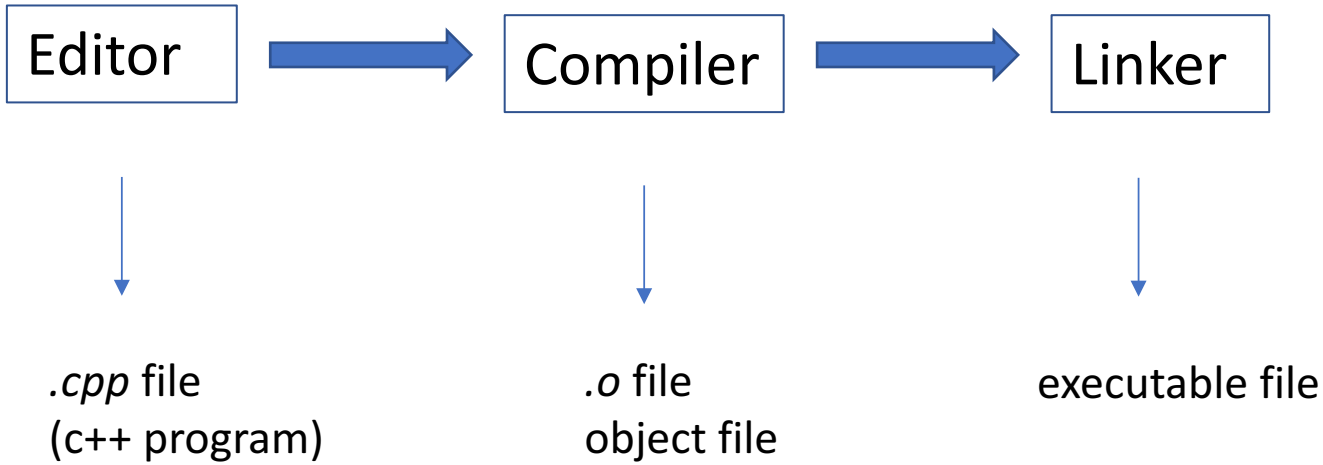


Image from mathworks.com

C++ Environment

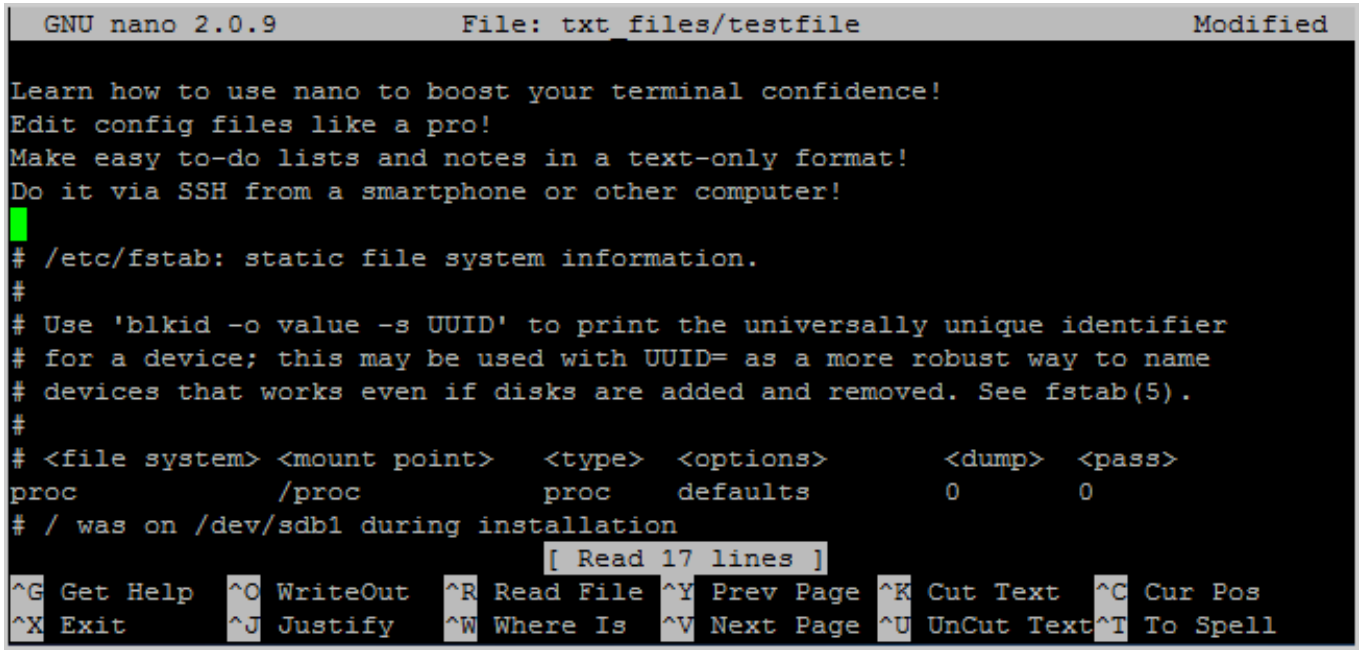
- Because computers cannot directly execute a program written in a high-level language… -- Compiler & interpreter

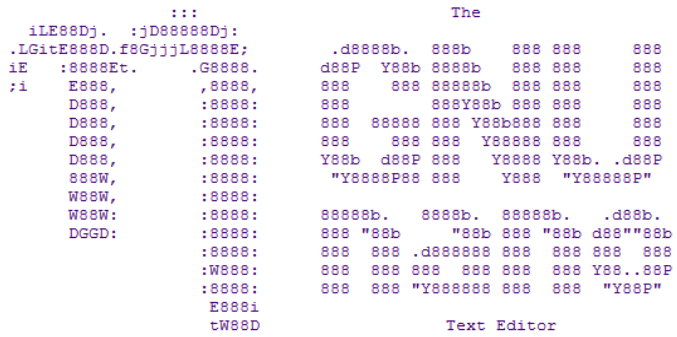


- Compiler – translates the entire program
- Interpreter – translates a program one line at a time, as the computer is running the program.

IDE (Integrated Development Environment)

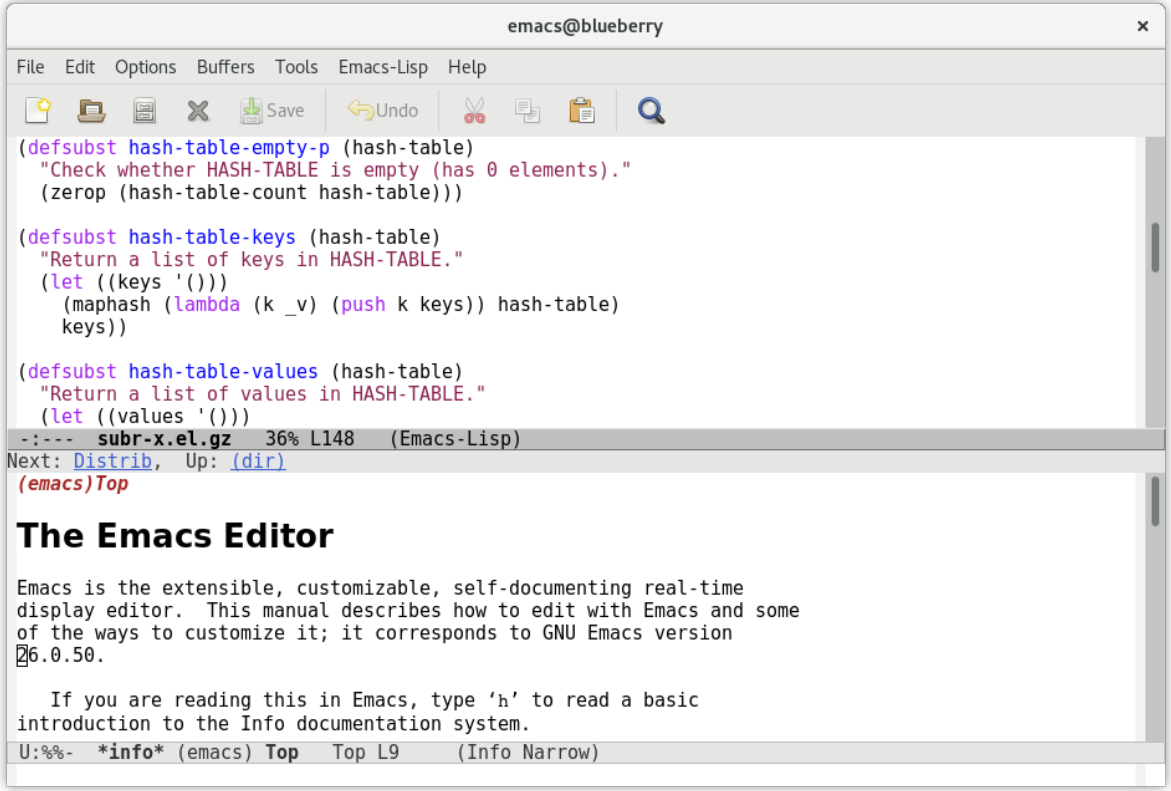
- GNU nano
  - https://www.nano-editor.org/





IDE (Integrated Development Environment)

- https://www.gnu.org/software/emacs/emacs.html



- Assignment #0 (Do not need to turn in)
  - Set up the environment
  - login to cs server (wormulon.cs.uidaho.edu)
  - type, compile and run your first c++ program

- No class on Monday Jan 15
- Will have labs next week

History of C and C++

History of C:

- C is a programming language developed in the 1970's alongside the UNIX operating system.
- Evolved from two other programming languages
  - BCPL and B
- Dennis Ritchie (Bell Laboratories)
  - Added data typing, other features
- C provides a comprehensive set of features for handling a wide variety of applications, such as systems development and scientific computation.

History of C and C++

History of C++:

- Extension of C
- Early 1980s: Bjarne Stroustrup (Bell Laboratories)
- Provides capabilities for object-oriented programming
  - Objects: reusable software components
    - Model items in real world
  - Object-oriented programs
    - Easy to understand, correct and modify

Vedio: Bjarne Stroustrup: Why I Created C++

https://www.youtube.com/watch?v=JBjjnqG0BP8