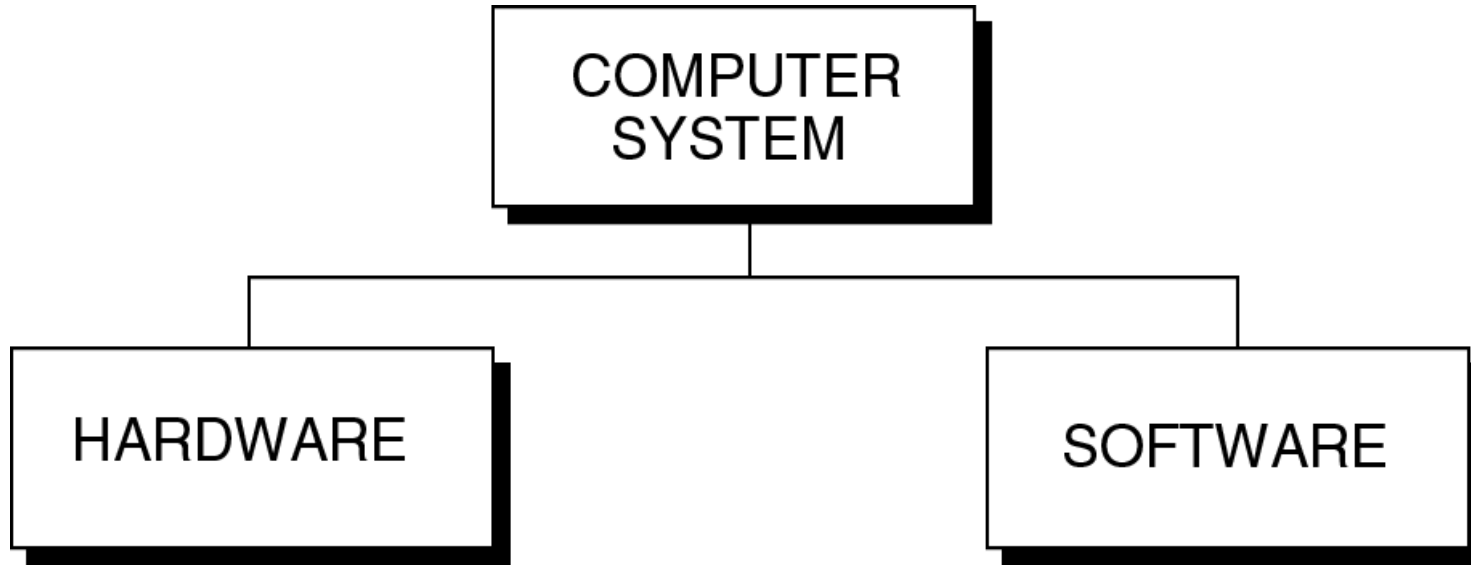


Introduction to Computer, Programming and C++

Spring 2018

Introduction to Computer



Terminologies

- Computer Program
 - A sequence of instructions
- Programmer
 - Specifies the order actions
- Computer hardware
 - Keyboard, screen, mouse, hard disks, memory, drives, and processing units
- Moore's Law
 - Every two years, the capacities of computer will double

Input/Output

- Input
 - Obtain information from input devices (keyboard, mouse, etc.) and make it available for processing
- Output
 - Take the information, process it, and place the result on various output devices (screen display, printer, etc.)
- Network
 - Computer can read and/or send to other computers

Computer Organization

- Memory Unit
 - Retain the information for processing
- Arithmetic and Logic Unit (ALU)
 - Perform calculations, logical operations and decision making
- Central Processing Unit (CPU)
 - Coordinate and control the operations of all computer components such as input, output, ALU and memory
- Secondary Storage
 - Usually hard drives or solid-state drive (SSD)

Computer Parts

Computer

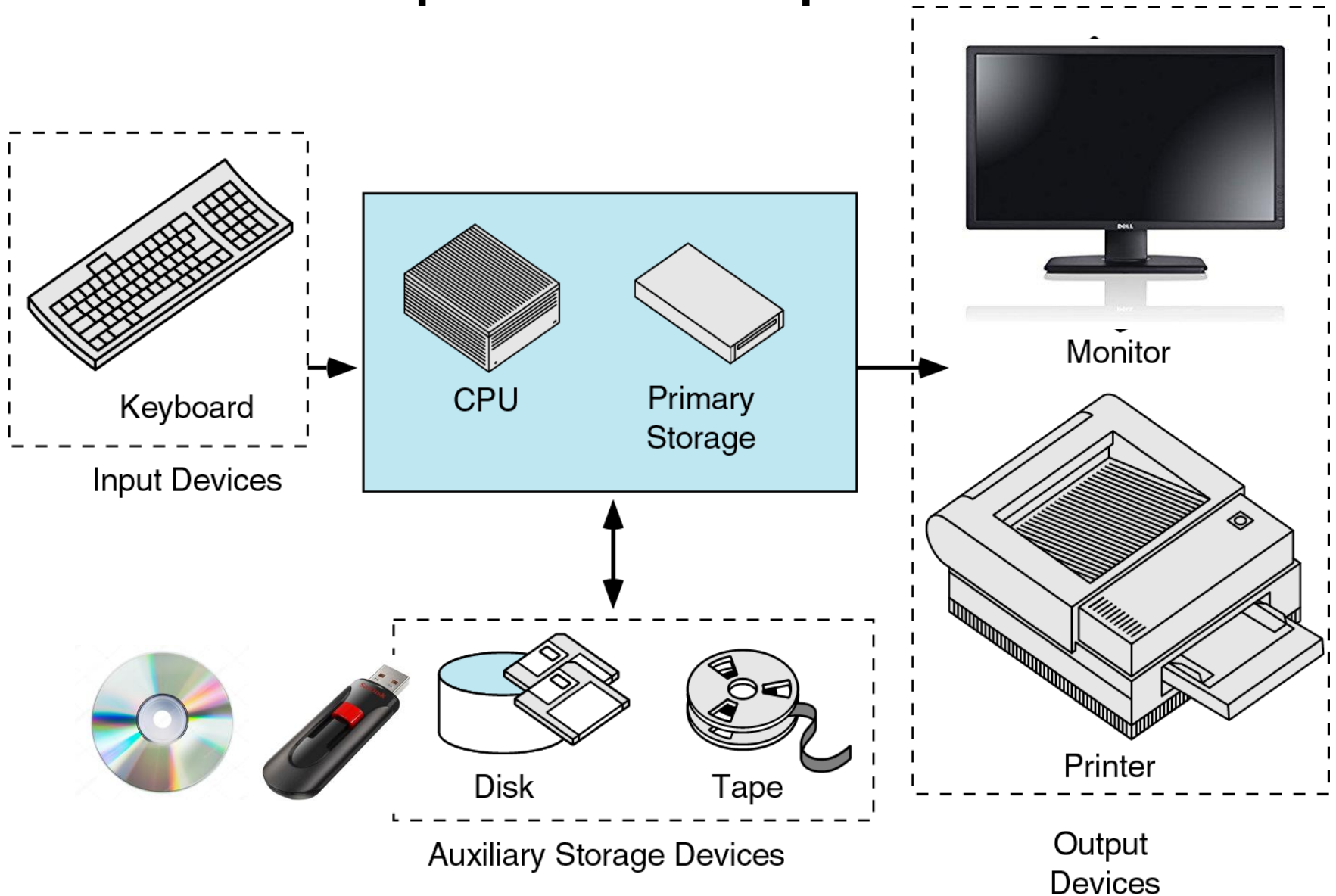


Computer Parts



Where is the
system unit?
speaker?

Computer Components



Software

- Operating System
 - Provide services to run applications concurrently and users to interact and perform tasks
- Windows by Microsoft
 - Operating system for personal computers consists of user interface and commands
- Linux
 - Open source operating system
- iOS by Apple
- Android by Google

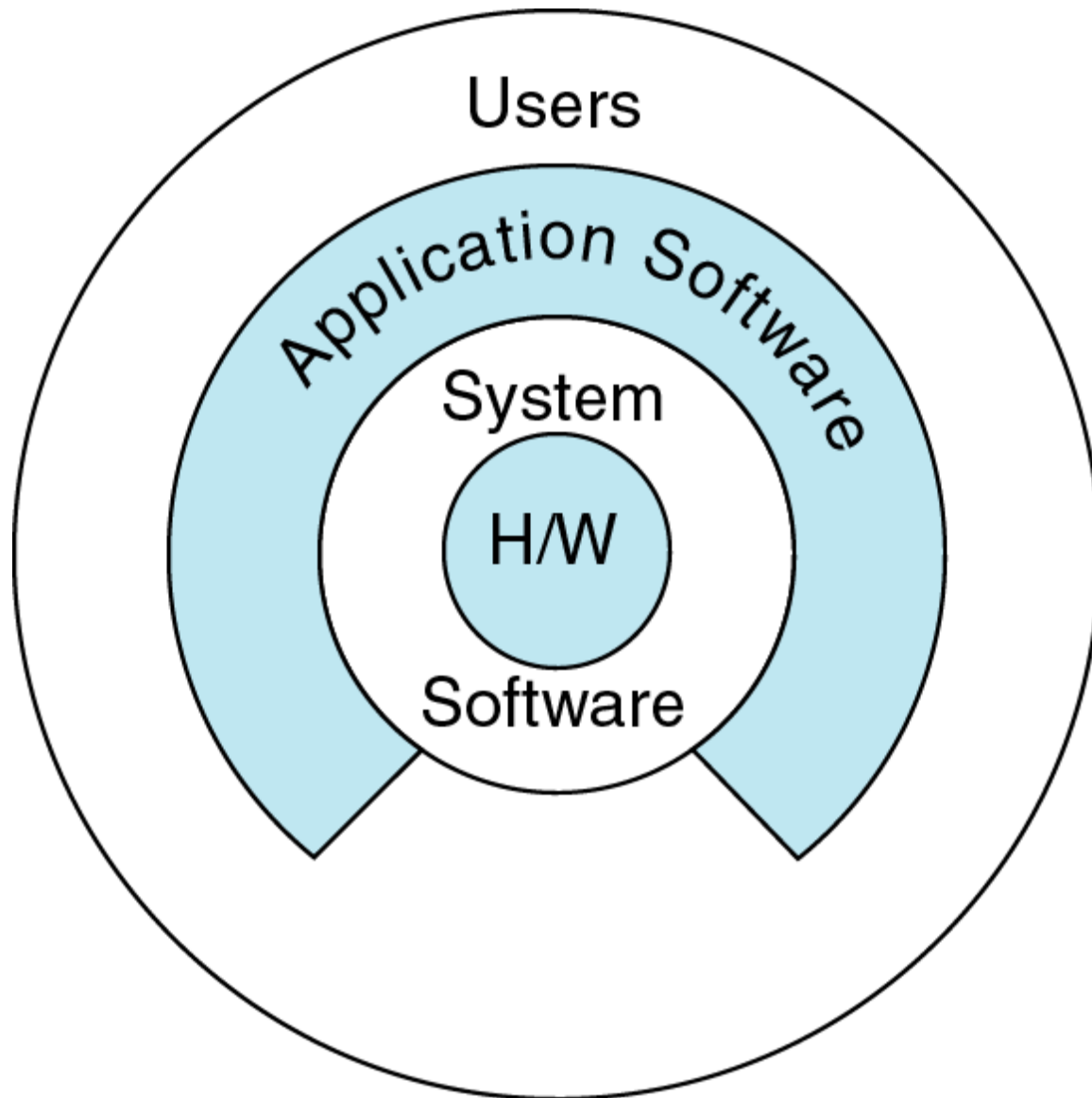
More Software Terms

- Ajax
 - Web 2.0 software technologies makes it easy to transfer data and update screen
- Agile Software Development
 - Smaller and faster iterative implementation
- Refactoring
 - Rework and re-architect the application for better, easier and clearer support and enhancement
- LAMP
 - Linux, Apache, MySQL and PHP
- SDK
 - Software Development Kit includes tools and documentation used to develop applications

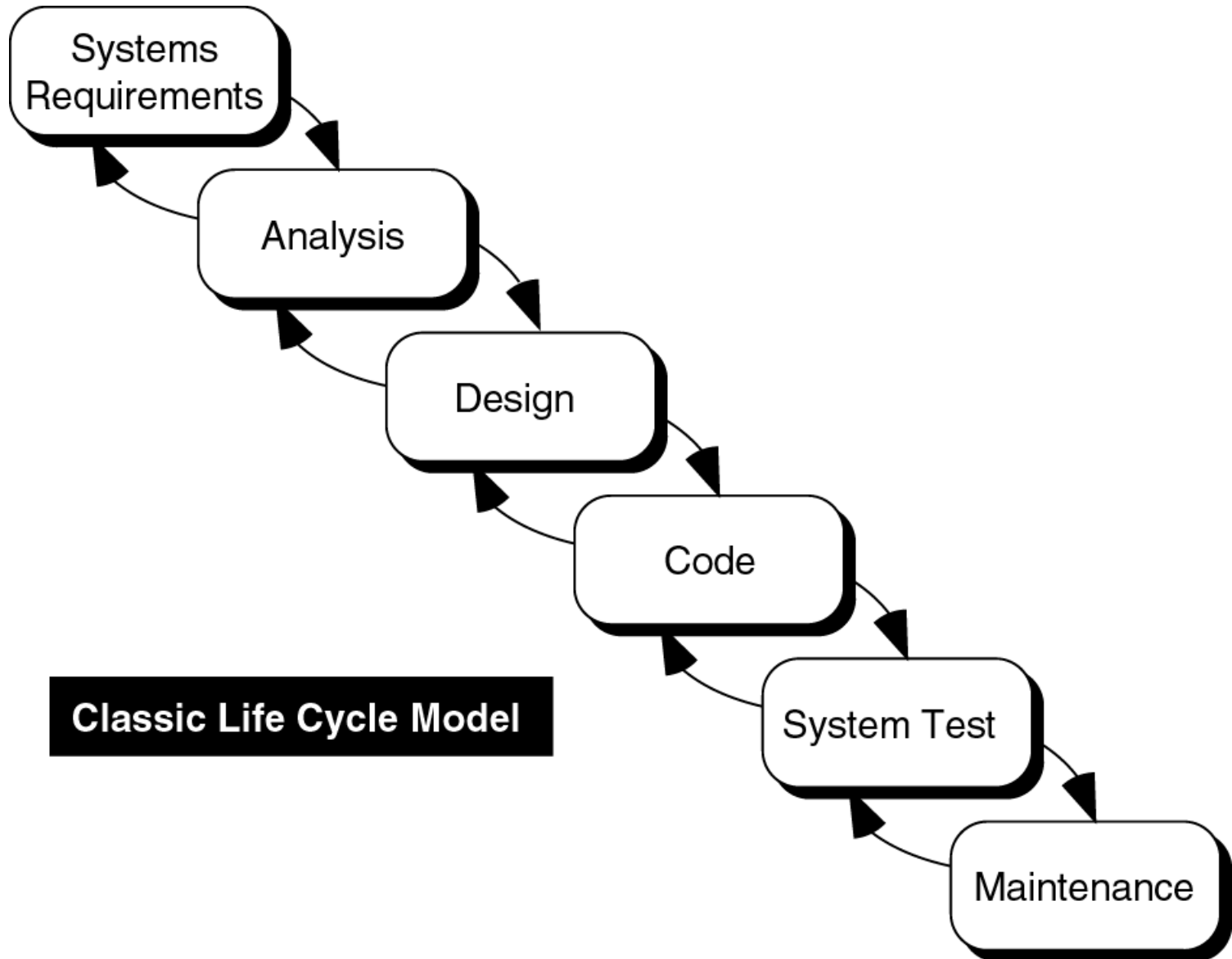
Introduction to the Internet

- World Wide Web (www)
- Uniform Resource Locator (URL)
- Transmission Control Protocol (TCP)/Internet Protocol (IP)
 - Set of rules and format for routing message from sender to receiver
- HyperText Markup Language (HTML)
- HyperText Transfer Protocol (HTTP)
- HyperText Transfer Protocol Secure (HTTPS)

Software Layers



Software Life Cycle



High Level Languages

- Syntax is more English-like
- Each instruction can accomplish a good task unit
- Need a compiler to translate high-level language into machine language or interpreter to execute directly
- Popular high-level languages
 - C++
 - Java
 - C#
 - Visual basic
 - Javascript
 - Perl
 - Python
 - Ruby
 - Etc.

C++ History

- C was developed by Dennis Ritchie at Bell Lab
- C++ is an extension of C
 - C++ provides Object-Oriented Programming
- C11 is the latest ANSI standard for C

About C++

- C++ contains 2 parts
 - C++ language reference
 - C++ standard library

Introduction to Object Oriented Programming

- Class
- Object
- Member Functions, Member Function Calls
- Instantiation
- Attributes and Data Members
- Data Encapsulation
- Inheritance
- Object-Oriented Analysis and Design (OOAD)
- Unified Modeling Language (UML)

C++ Development Steps

1. Create and edit a program
2. Preprocess
 - Perform manipulation based on the given preprocessing directives
3. Compile
 - Translate C++ into machine language instructions (e.g. produce object code)
4. Link
 - Combine all object codes and libraries together to produce an executable program
5. Load
 - Take executable image and transfer it to memory
6. Execute
 - Run the program one instruction at a time

C++ Resources

- C++ Reference

- <http://www.cplusplus.com/reference/>
- <http://www.deitel.com/cplusplus>
- <http://en.cppreference.com/w/>
- <https://msdn.microsoft.com/en-us/library/3bstk3k5.aspx>

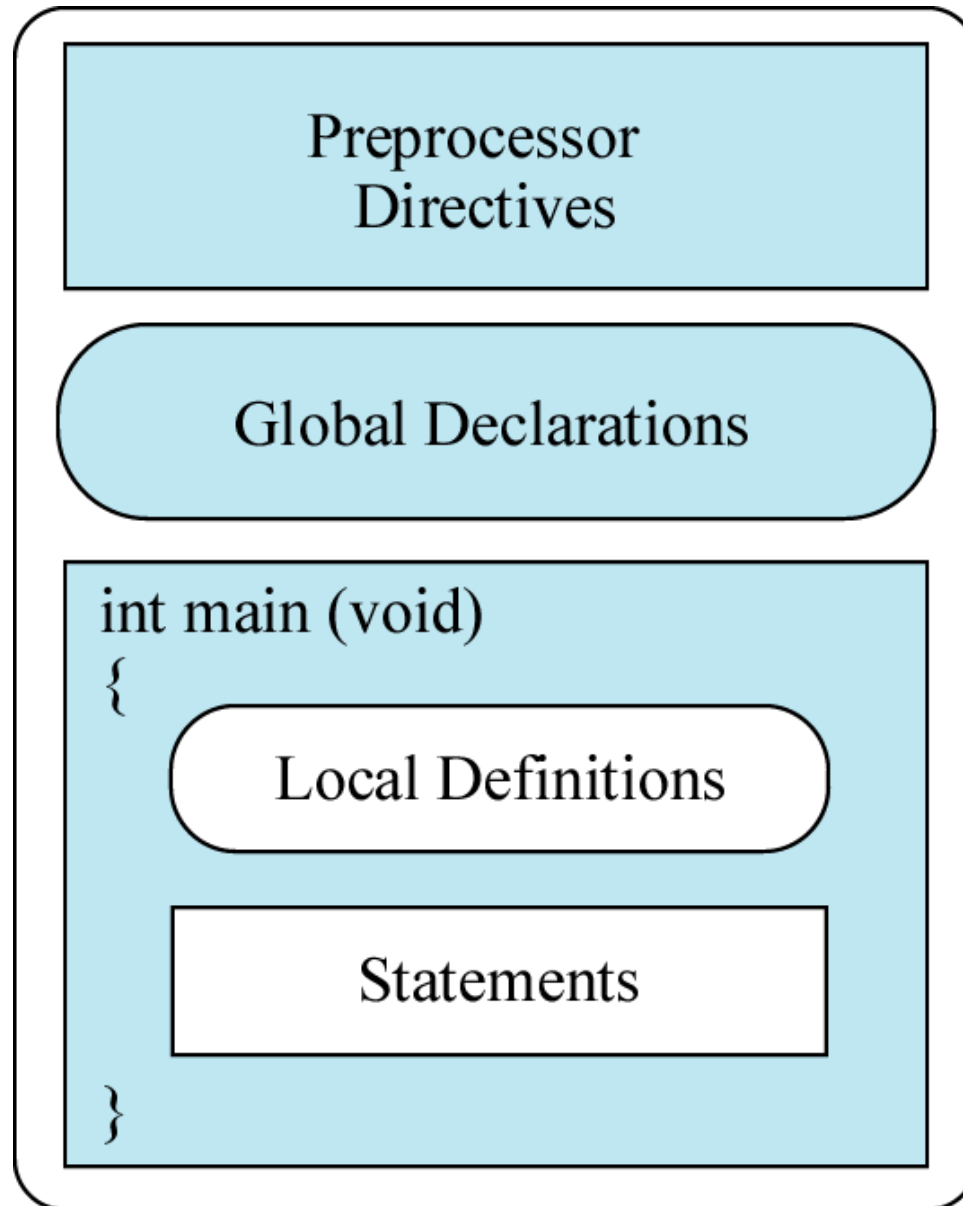
- Free C++ Compiler

- <http://www.codeblocks.org/>
- <https://beta.visualstudio.com/vs/community/>

Program and Algorithm

- Algorithm
 - A sequence of steps that is unambiguous, executable, and terminating
- Pseudo code
 - Not a program, just an easy-to-understand algorithm in free format and readable by human readers

C++ Program Structure



Run your first program

1. Create the “SayHello.cpp” program as follows:

```
#include <iostream>
using namespace std ;
int main()
{
    cout << "Welcome to my first C++ program" << endl ;
    return 0 ;
}
```

2. Open a command prompt window, and compile the program and generate the executable file

```
cl SayHello.cpp
```

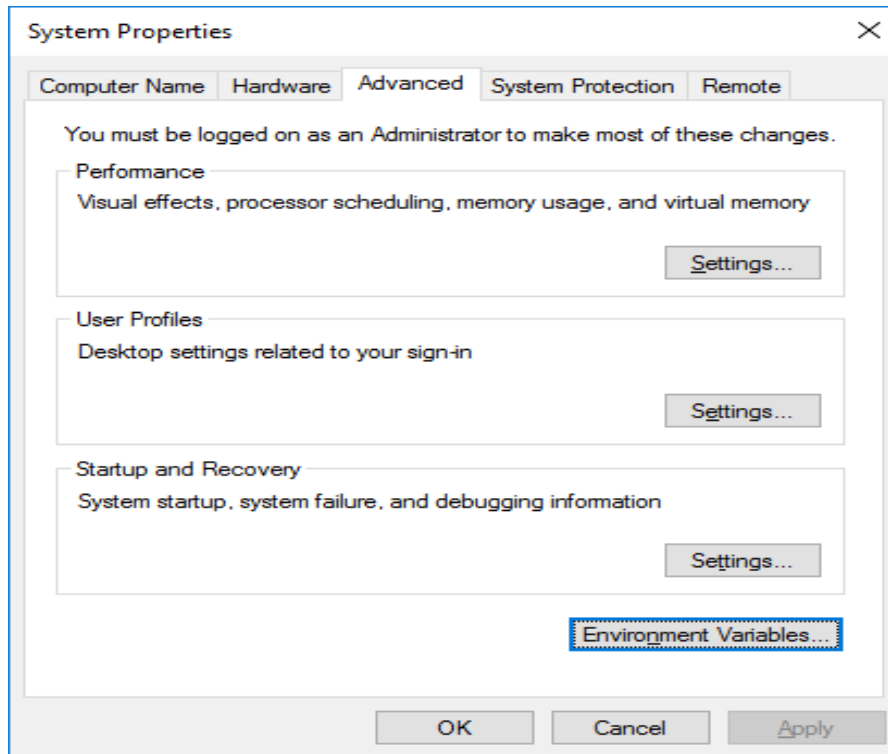
3. Run the program

```
SayHello.exe
```

Common problems

1. If Windows complains “cl” command not found. Edit your PATH environment variable:

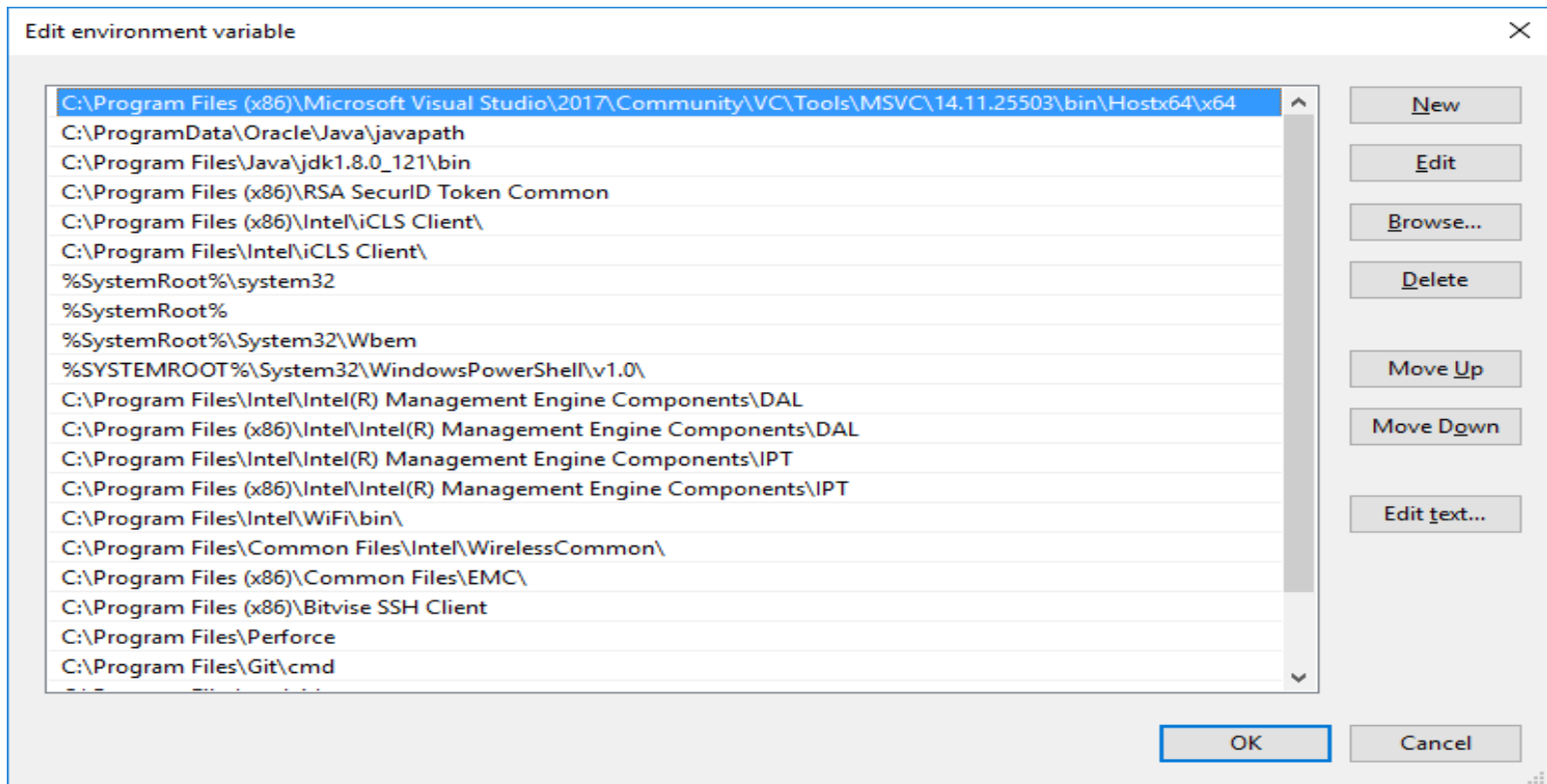
Go to Control Panel->System Properties [Advanced] tab
Click “Environment Variable”



Common problems

Hi-light PATH under your user name or system variables

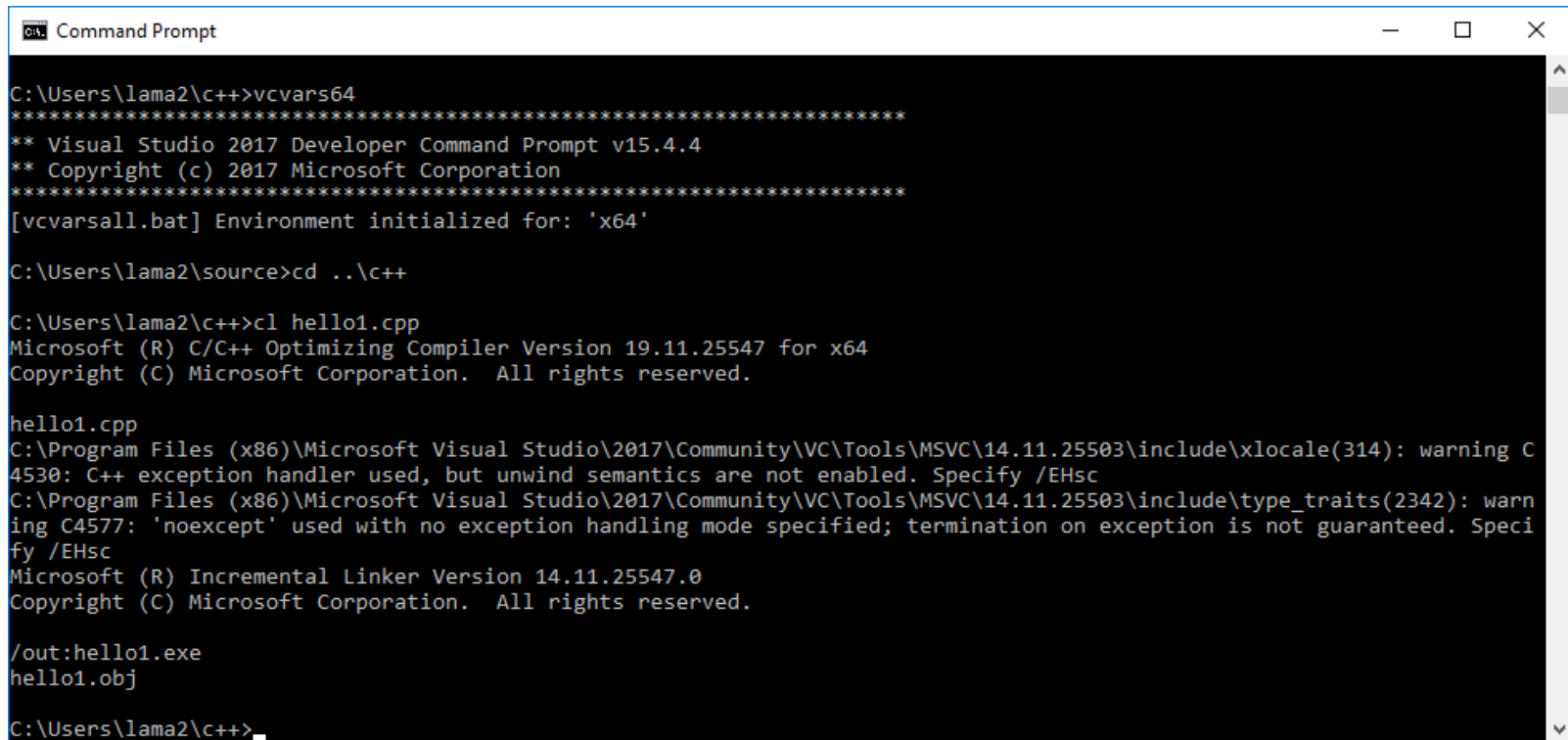
Click “New”, then enter the same value as hi-lighted (your VS installation directory). Make sure you don’t enclose double-quote “ in your PATH)



Common problems

2. If “cl” can’t find your standard header files:

Run “vcvars64” or “vcvars32” to set up your environment before compiling:



```
Command Prompt

C:\Users\lama2\c++>vcvars64
*****
** Visual Studio 2017 Developer Command Prompt v15.4.4
** Copyright (c) 2017 Microsoft Corporation
*****
[vcvarsall.bat] Environment initialized for: 'x64'

C:\Users\lama2\source>cd ..\c++

C:\Users\lama2\c++>cl hello1.cpp
Microsoft (R) C/C++ Optimizing Compiler Version 19.11.25547 for x64
Copyright (C) Microsoft Corporation. All rights reserved.

hello1.cpp
C:\Program Files (x86)\Microsoft Visual Studio\2017\Community\VC\Tools\MSVC\14.11.25503\include\xlocale(314): warning C
4530: C++ exception handler used, but unwind semantics are not enabled. Specify /EHsc
C:\Program Files (x86)\Microsoft Visual Studio\2017\Community\VC\Tools\MSVC\14.11.25503\include\type_traits(2342): warn
ing C4577: 'noexcept' used with no exception handling mode specified; termination on exception is not guaranteed. Speci
fy /EHsc
Microsoft (R) Incremental Linker Version 14.11.25547.0
Copyright (C) Microsoft Corporation. All rights reserved.

/out:hello1.exe
hello1.obj

C:\Users\lama2\c++>_
```