Logical Machine Organization

Figure 1.4
Hardware organization of a typical system. CPU: Central Processing Unit, ALU: Arithmetic/Logic Unit, PC: Program counter, USB: Universal Serial Bus.
Physically How do they look today?
A Modern CPU
Physically How do they look today?

DRAM
Physically How do they look today?  
Motherboard
Simple hello world Program

• What is C?  A High Level Language

• What is Assembly?

• What is Machine Code?
Simple hello world Program in the C Programming Language

#include <stdio.h>  // Preprocessor directive

int main(int argc, char* argv[]){  // Execution starts with main

    printf("Hello CS354 Students! Welcome to the first class !");

    return 0;  // Return code for main tells whether program executed successfully or not

}
Compilation Process Overview

Figure 1.3  The compilation system.
#include <stdio.h>

int main(int argc, char* argv[])
{
    push %ebp
    mov %esp,%ebp
    and $0xffffffff0,%esp
    sub $0x10,%esp
    printf("Hello CS354 Students! Welcome to the first class!\n");
    movl $0x8048494, (%esp)
    call 80482f0 <puts@plt>
    return 0;
}
What Happens when you execute it? At a high level...

Shell program reads the command

“./helloworld.o” character by character first into register and then into memory
Shell interprets your command
What Happens when you execute it? At a high level…

Once I hit enter key, shell program loads “helloworld” program from hard disk into memory and executes it
Shell loads helloworld program into memory from disk
What Happens when you execute it? At a high level…

While executing, hello world program transfers the string

“Hello CS534 Students! Welcome to the first class!”

to the display device.

Processors do this in a really really fast loop:

• load instruction,
• execute it
helloworld displays welcome message to the display device
See you in Next Lecture

• See you in Next Lecture

• Try to read the reading materials before class

• Read the Chapter 1 in Textbook 1: Computer System: A programmer’s perspective if you have not already done so.

• Try to read Assignment 0 and start early! Don’t procrastinate!