



## Introduction

- 1 Introduction
- (2) Course's objectives
- (3) How to pass the course
  - 4 Binary Representation

### Instructors



# Stackoverflow

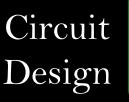


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## Course's objectives



Representing information









Memory System

Computer's components

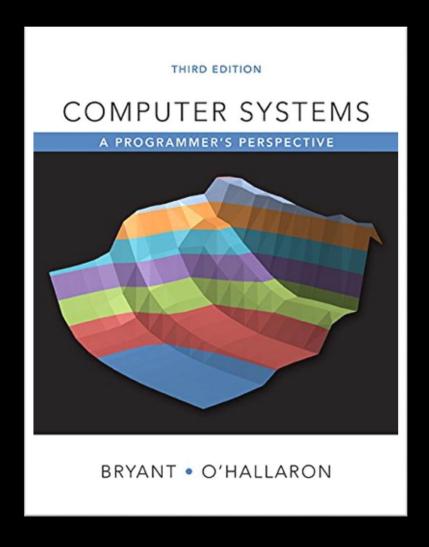
Optimizing
Program
Performance





Assembly Language

#### Textbooks



http://csapp.cs.cmu.edu/

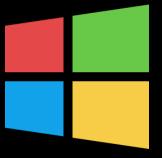
## Course's content

W	Topic	Textbook	Assign
1	Bits and Bytes	1.1-1.10, 2.1	Lab 1
2	Integers and Floating points	2.2-2.4	HW 1
3	Machine Programming	3.1-3.6	Lab 2
4	Machine Programming	3.7-3.9	HW 2
5	Machine Programming	3.10	Lab 3
6	Midterm		HW 3
7	The Memory Hierarchy	6.1-6.7	Lab 4
8	Virtual Memory	9.1-9.8	HW 4
9	Memory Allocation	9.9-9.13	Lab 5
10	Review		HW 5

## Why?





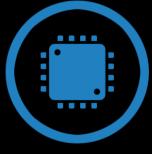


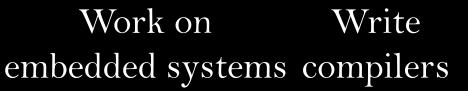


Understand Debug without security holes source code

Program OS

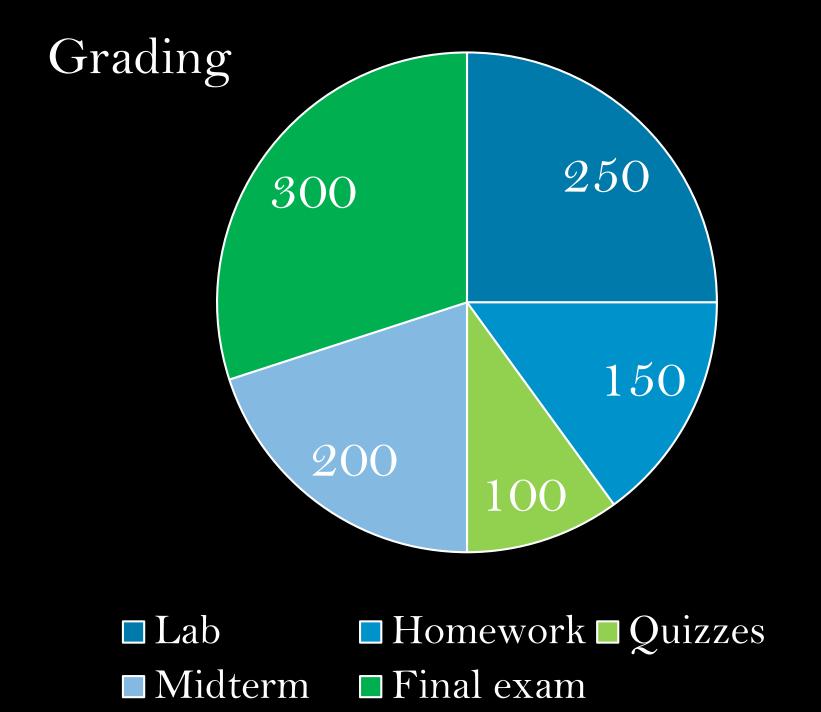
Control devices







Get higher payment



### How to pass the course?

## 500 points



#### How to fail the course?

## -50% points







Representation

Binary

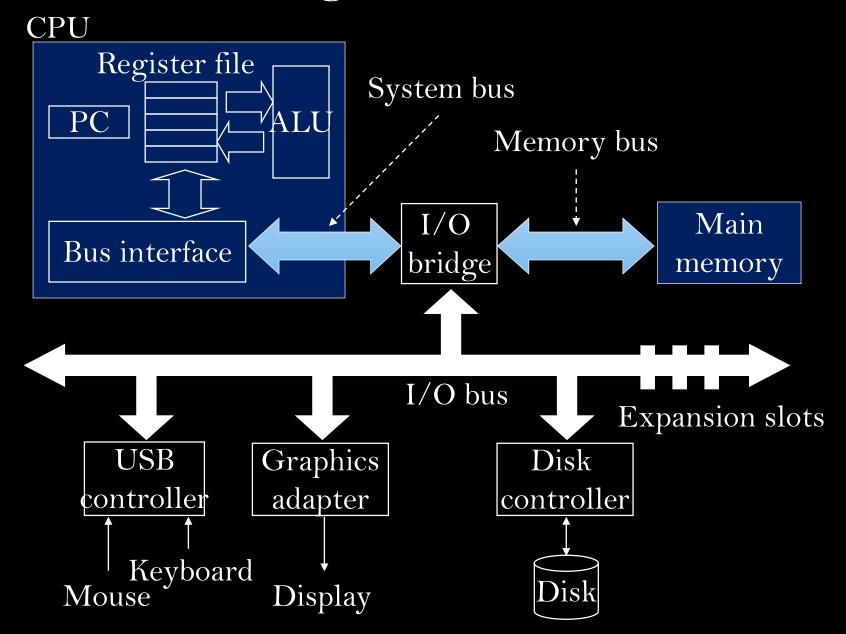
## Hardware: Physical View



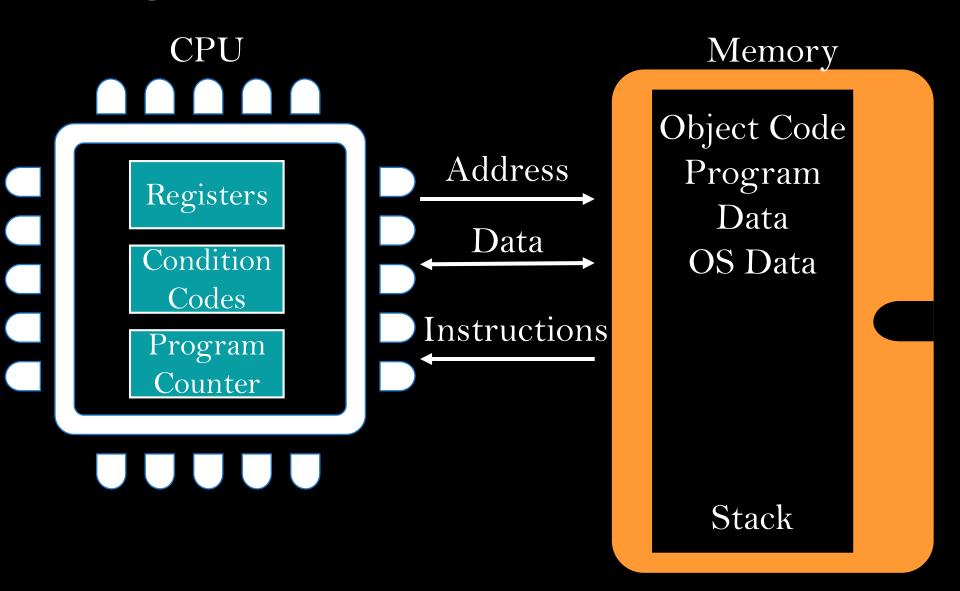


Hardware: semi-logical View 1x16 lanes PCI Express\* 3.0 Graphics OR 2x8 lanes PCI Express\* 3.0 Graphics DDR4/DDR3L OR Intel® Core™ Up to 2133/1600 MHz 1x8 and 2x4 lanes i7-6700K PCI Express\* 3.0 Graphics Processor DDR4/DDR3L Up to 2133/1600 MHz Intel® HD Graphics 530 Three Independent Displays Support Intel® High Definition Audio DMI 3.0 8 Gb/s each x1 Up to 20x PCI Express\* 3.0 6x SATA ports, eSATA; Port Disable Intel® Z170 Up to 6 Gb/s Up to 10x USB 3.0 Ports 14x USB 2.0 Ports Chipset XHCI; USB Port Disable Intel® Rapid Storage Technology for PCI Express Storage Intel® Integrated 10/100/1000 MAC Intel® Smart Sound Technology **SMBus** SPI PCle x1 Intel® ME 11 Firmware Intel® Ethernet Connection and BIOS Support Intel® Extreme Tuning **Utility Support** Intel® Device Protection **Technology with Boot Guard** 

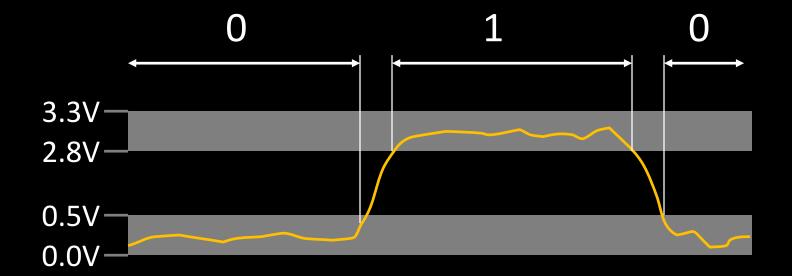
## Hardware: Logical View



## Programmer's View



## Binary Representation



Binary			y	Dec	Hex
0	0	0	0	0	0
0	0	0	1	1	1
0	0	1	0	2	2
0	0	1	1	3	3
0	1	0	0	4	4
0	1	0	1	<b>5</b>	<b>5</b>
0	1	1	0	6	6
0	1	1	1	7	7

Binary				Dec	Hex
1	0	0	0	8	8
1	0	0	1	9	9
1	0	1	0	10	A
1	0	1	1	11	В
1	1	0	0	12	C
1	1	0	1	13	D
1	1	1	0	14	$\mathbf{E}$
1	1	1	1	15	$\mathbf{F}$

#### To do

- 1. Read chapter 1 "A Tour of Computer System"
- 2. Watch the lectures in advance "Bits, Bytes, and Ints: Part 1"

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http://www.cs.cmu.edu/afs/cs/academic/class/15213-f15/www/schedule.html
```



#### Niklaus Wirth



software is getting slower more rapidly than hardware becomes faster

