System Programming

Taesoo Kwon
(권태수)

Outline

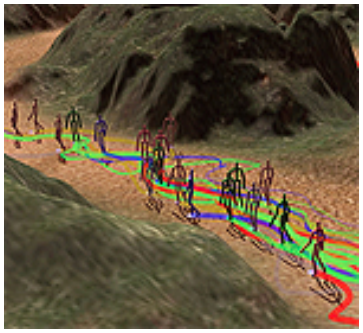
- About the instructor
- What you will learn in this class
- Homework

About the Instructor: Taesoo Kwon (assistant professor)

- Joined Hanyang Univ. at 2012
- B.S., M.S. at Seoul National Univ.
- 2 years' experience in the game industry
- Ph. D. at KAIST
- Postdoc at SNU and Carnegie Mellon University
- Contributed to/wrote many open source programs

Main Research Area

- Computer Graphics
- Character animation problems
- Papers and videos
  - calab.hanyang.ac.kr

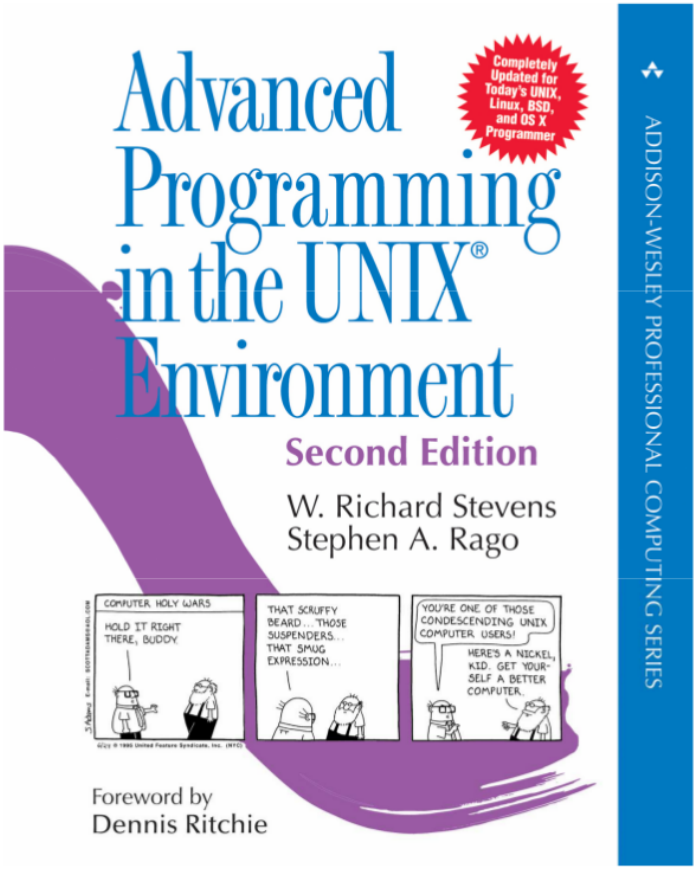
- Linux geek

Course Information

- Instructor: Taesoo Kwon
- E-mail: taesoo@hanyang.ac.kr
- Office: 401 IT/BT Bldg.
- Office hours: right after class time

Textbooks

- Advanced Programming in the Unix Environment

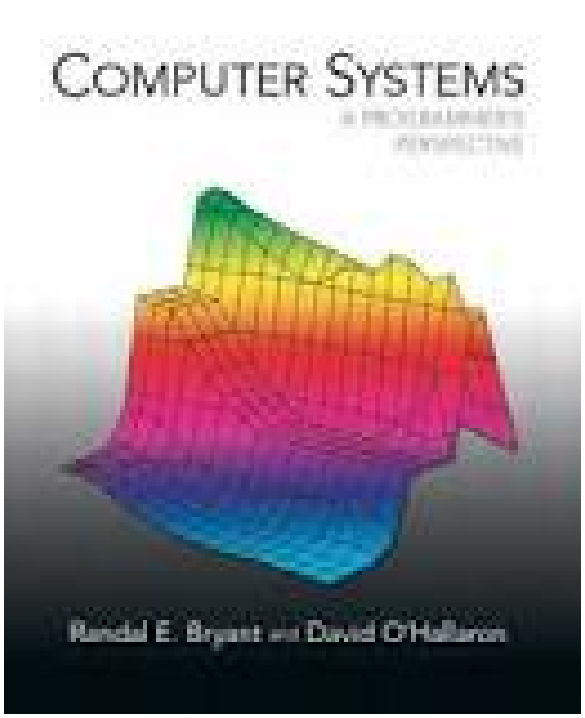


Textbooks

Randal E. Bryant and David R. O'Hallaron,

Computer Systems: A Programmer's Perspective, **Third Edition** (CS:APP3e), Pearson, 2016

http://csapp.cs.cmu.edu



Topics

Files and directories

Memory

Process

Threads

Thread synchronization

Network and Socket programming

Programs and Data

- Topics
  - Bits operations, arithmetic, assembly language programs
  - Representation of C control and data structures
  - Includes aspects of architecture and compilers

The Memory Hierarchy

- Topics
  - Memory technology, memory hierarchy, caches, disks, locality
  - Includes aspects of architecture and OS

Exceptional Control Flow

- Topics
  - Hardware exceptions, processes, process control, Unix signals, nonlocal jumps
  - Includes aspects of compilers, OS, and architecture

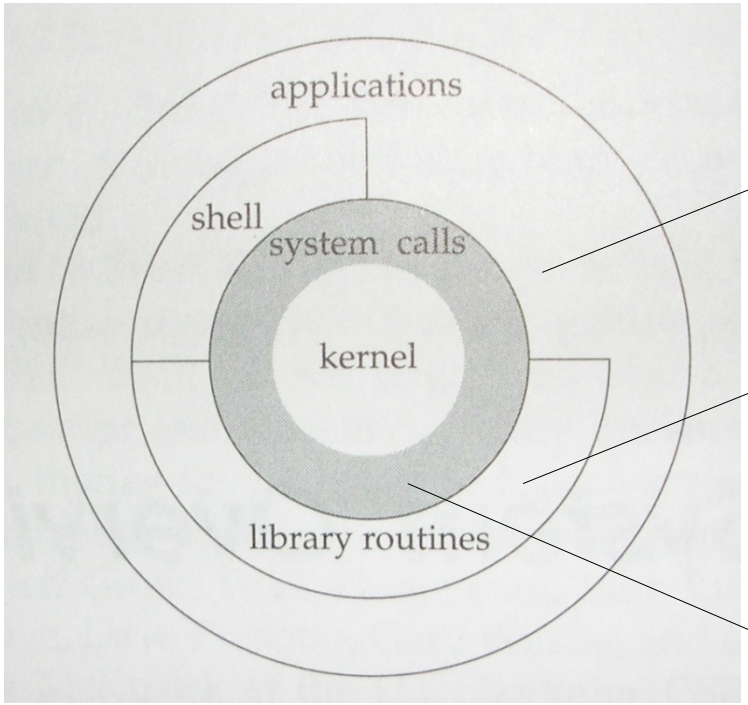
Virtual Memory

- Topics
  - Virtual memory, address translation, dynamic storage allocation
  - Includes aspects of architecture and OS

Networking, and Concurrency

- Topics
  - High level and low-level I/O, network programming
  - Internet services, Web servers
  - concurrency, concurrent server design, threads
  - I/O multiplexing with select
  - Includes aspects of networking, OS, and architecture

Introduction



Operating System
(UNIX)

System programs:
gcc, ls, grep, ...

Library routines:
fprintf, printf, malloc,
realloc,
GTK, qt,...

System calls:
open, read, write

Introduction

- System Software consists of a variety of programs that support the operation of a computer.

  e.g. text editor, compiler, loader or linker, debugger

- How can we use or write such programs

- OS dependent

- Unix is the standard

Practice Topics

Editor(vim), compiler(gcc), Makefile, cmake, ctags/etags

Debugger(gdb), version management(git), IDE(eclipse), document(doxygen)

Homework

- Install Ubuntu linux on your laptop
  - 방법 1: 듀얼 부팅
    - 윈도우 파티션의 크기를 줄인후 , 남는 공간에 리눅스 설치
  - 방법 2: 가상 머신
    - 윈도우나 맥 안에 가상머신 프로그램 (virtualbox 등) 을 설치 후 , 가상 머신 만들어서 그 안에 리눅스 설치
  - 방법 3: you can simply download a pre-installed virtual-box disk
    - http://calab.hanyang.ac.kr/courses/SP_taesoo/LinuxConsole.zip
    - Put this in a usb stick, and bring it to the next class

Homework

방법 1, 2: Download the latest LTS release

(Ubutu 16.04 desktop AMD64)

and install it on your laptop!

방법 1,2:

- Install gcc, cmake, header files, vim in a unix-like operating system
- In case of Ubuntu, you can type in a terminal
  - sudo apt-get install gcc cmake build-essentials vim
- 더 자세한 내용은 다음장 참고

Linux installation

VirtualBox 에 Ubuntu 12.04 LTS 설치

- Ubuntu Desktop 최신 버전 받기 (32-bit)
  http://www.ubuntu.com/getubuntu/download
- VirtualBox 에서 우분투 (Ubuntu) 용 가상머신 만들기
  - http://www.psychocats.net/ubuntu/virtualbox
  - http://www.deltalounge.net/wpress/2012/06/virtualbox-install-ubuntu-12-04/
- 기본설정에서는 가상 머신의 해상도가 데스크탑 해상도와 다름
  - 해결 방법
  - Download the guest edition for your virtualbox version!
    - visit http://download.virtualbox.org/virtualbox/4.1.20/
    - download VBoxGuestAdditions_4.1.20.iso
  - 게스트 에디션 설치
  - http://www.dedoimedo.com/computers/virtualbox-guest-addons.html
  - (see “Install Guest Additions on Linux guest” section)