Operating Systems Notes

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Contents

Course Outline

Information:

- CS:3620 Operating Systems

- Instructor: Guanpeng Li

- Location: 110 MacLean Hall

- Hours: Tuesday/Thursday, 8:00 AM - 9:15 AM

- Prerequesite: CS:2210, CS:2230, and CS:2630 with a minimum grade of C-

- TA: A K M Muhitul Islam

Modality:

- Lectures in person

- Office Hours: Tuesday/Thursday, 2:30 PM - 4:30 PM

- Location: IATL 340

Grading:

- Homework: 40%

  - 6-8 assignments

  - Programming tasks

- In-class activities: 20%

  - Quizzes:

    * Multiple-choice

    * Close book

  - Exercises:

    * Open questions

    * Individual or group

    * BYO laptop

- Final Exam: 40%

  - Technical interview

  - Written exam

Policy:

- 3 days late policy

- Cannot make up quizzes or exercises

- Can discuss homework with colleagues

- Cannot share code

- Cannot copy from internet

- If you copy code from StackOverflow, credit it

- When in doubt, ask the instructor/TA

1 Introduction to OS

What is an operating system?

An operating system (OS) is system software that manages computer hardware and software resources and provides common services for computer programs. (Wikipedia)

- Definition has changed over years

  - Originally, very bare bones

  - Evolved to include more

- Operating System (OS)

  - Interface between the user and the architecture

  - Implements a virtual machine that is easier to program than raw hardware

- Middleware between user programs and system hardware

- Manages hardware: CPU, main memory, I/O devices

OS: Traditional View:

- Interface between user and architecture

  - Hides architectural details

- Implements Virtual machine:

- Easier to program

- Illusionist

  - Bigger, faster, reliable

- Government

  - Divides resources

  - "Taxes" = overhead

New Developments in OS:

- Operating systems: active field of research

  - Demands on OS's growing

  - New application spaces (Web, Grid, Cloud)

  - Rapidly evolving hardware

- Open-source operating systems

  - Linux etc.

  - You can contribute to and develop OS's

  - Excellent research platform

OS: Salient Features

- Services: The OS provides standard services which the hardware implements

- Coordination: The OS coordinates multiple applications and users to achieve fairness and efficiency

- Design an OS so that the machine is convenient to use and efficient

Why study OS?

- Abstraction: How to get the OS to give users an illusion of infinite resources

- System Design: How to make tradeoffs between performance, convenience, simplicity, and functionality

- Basic Understanding: The OS provides the services that allow application programs to work at all

- System Intersection Point: The OS is the point where hardware and software meet

Not many operating systems are under development, so you are unlikely to get a job building an OS. However, understanding operating systems will enable you to use your computer more efficiently

Build Large Computer Systems

- OS as an example of large system design

- Goals: