CSCI 460—Operating Systems

Lecture 1

Textbook: Operating Systems — Internals and Design Principles (9th edition)
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0. About CSCI 460

- Course homepage for now: http://www.cs.montana.edu/bhz or http://www.cs.montana.edu/bhz/classes/fall-2021/csci460/
- Basic operating systems (roughly 67%) and advanced OS (33%)
- Basic operating systems: memory management, processor management, device management and file management
- Advanced operating system: threads, symmetric multiprocessing, multiprocessor scheduling, networking, security, public key cryptography
- For the lecture parts, I will mainly focus on concepts and algorithms (i.e., how OS works). I will use some C programs under the Unix/Linux environment to enhance your learning. You will have enough chance to work on programming assignments/project.
- The detailed contents (i.e., augmented lecture notes, solutions for tests, etc) will be posted on D2L.

- Evaluation:
  7 random pop-up tests (in class, written, 5 will be counted, 10%),
  5 homeworks through D2L (20%),
  3 in-class tests (30%),
  3 programming assignments (24%),
  and a final project (16%)

1. Name some operating systems (OS) you know of

- have coded on: iOS, Fedora, unix/linux, DOS
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- Android, IBM 360
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- Windows-95
- windows-98 (14M+ lines of source code)
- windows-XP
- windows-10
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2. What is OS?

- OS is the part of computing system managing all of the hardware and software.
- For example, it controls every file, device, section of memory, and every nanosecond of processing time.
- In the first part of this course, we will mainly focus on how OS works, the related concepts as well as algorithms.
- In the last twenty years, networks become more and more important in operating systems. This turns distributed computing and network operating systems into reality. We will cover some of this in the second part of the course.
- Some contents on computer architectures and hardware will be covered, if necessary. (Some will be learnt through D2L homeworks.)

- What will happen if you enter `a.out`?

Keyboard (Device Manager) → is it (a.out) in main memory (Memory M).

→ if not, fetch it (File M)

→ run it (Processor M) → output in screen, device M
→ output in file, (file M)

→ Is a.out changed or not? If so, update it (File M).

3. What is OS composed of?

- **1. Memory Manager**, which is in charge of main memory.
- **2. Processor Manager**, which decides how to allocate the Central Processing Unit (CPU).
- **3. Device Manager**, which monitors every device, channel and control unit.
- **4. File Manager**, which keeps track of every file in the system, including data files, assemblers, compilers and application programs.
- **5. Network Manager**, which becomes an inseparable part of OS since 1990s and handles network communications and protocols, etc.