

CS 354 Spring 2018 (Park)

WHAT CS 354 IS ABOUT

1. What is an operating system?

An OS (or kernel) is software that manages an underlying hardware (i.e., computing system).

Manages for whom? Apps and humans.

What computing systems? Desktops, servers, smart phones and other handheld systems, routers, special purpose embedded systems, super computers, etc.

Why? Shield apps/humans from complex hardware details. Hardware tends to be a shared resource, i.e., shared across apps and users. It helps to have a third party (i.e., manager) to mediate.

2. Computing system landscape relevant for us

CPU types: CISC and RISC

XINU lab: Intel x86-compatible Galileo boards equipped with Quark X1000 processors, Linksys E2100L wireless router that houses RISC based MIPS CPU (Atheros 9130). We will be using the x86-compatible backend machines.

Overall landscape: x86 Intel/AMD, ARM, etc.

Additional in-class discussion.

3. What do we cover in CS 354?

CS 354 slides (Comer) are XINU specific and cover about 60% of course material. The rest require in-class note taking.

We will cover design, implementation, and evaluation of modern operating systems. XINU, a simplified OS that you can fully understand at the code level, serves as our implementation platform.

We will also cover important components of commercial operating systems (UNIX/Linux, Windows, Mobile OS).

Lab assignments will focus on dedicated Intel x86 backend machines.

We will also cover other multi-core and other hardware features.

Lab projects are technically challenging and very time consuming.
Important to not overload (check your schedule) and be proactive.

4. Why not just do system programming (in UNIX, Linux or Windows) and learn about OS concepts without actually coding a kernel?

It's not the same.

5. When coding kernels, why not use virtual machines instead of real hardware?

It's not the same.

6. Why not use Linux for kernel coding?

Pros/cons. Linux pro: Popular production kernel so can be very useful in work environments. Con: Code base, even with trimming, is large and complex. Introduces significant overhead and difficult to know all parts of the system.

XINU pro: Very compact kernel, you will get to see (almost) all of the source code and understand it (as needed for lab assignments). Con: Not a wide-spread kernel in use compared to Linux.

5 years ago the dept. did consider switching to Linux in CS 503. We decided against it by carefully weighing pros/cons.

7. Overall

CS 354 will cover design and performance of modern operating systems on today's computing systems. The scope applies to operating systems such as UNIX, Linux, Windows, Mobile OS (Android, iOS), etc. And hardware platforms such as x86, MIPS/ARM, specialized embedded systems, etc.