Operating Systems
CS 53201, 43201

Unit background and administrivia

Why are OSes important?

History of Computers and Operating Systems

The Aim of the Subject.

WILL NOT TEACH YOU HOW TO USE AN OPERATING SYSTEM.

It will examine

- **the way in which an OS works**
- **the algorithms and data structures inside an OS**
- **the problems, solutions and trade offs in designing an OS**

TO ACHIEVE AN UNDERSTANDING OF HOW AN OPERATING SYSTEM WORKS.

General Information

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Book:

Operating System Concepts,
5th Ed, Silberscertz and Gavin

More information on the Web:

http://www.mcs.kent.edu/~javed/class-in98m/index.html

What's expected of you

At least 12 hours per week (to pass)

Learning by doing

- **questions and exercises**
- **reading textbook**
- **asking questions**
- **taking part in discussions**

Read/Listen Think Do Ask

What is an OS?

- **An Interface between the user (students, teachers, programmers, hackers, system administrator, application programs, virus) and the bare hardware.**
- **A resource mediator (must be efficient, fair, user friendly)**
- **A virtual machine to its users (with many faces).**
- **A complex program**

Other Operating Systems

A Magician

provides each user with the illusion of a dedicated machine with infinite memory and CPU time

A Government

Allocated resources efficiently and fairly, protects users from each other, provides safe and secure communication (manager)

A Parent

Always there when you need, never breaks, always succeeds (helpful, robust)

Why Study OS?

Base Platform: **The operating system is the foundation upon which all computing work is performed.**

Primary Intersection Point: **OS is the point where hardware, software, programming languages, data structure and algorithms all come together.**

Knowledge of the internals of an OS is essential to achieve efficiency in

- **building software applications**
- **deciding upon a computing platform**

Curiosity- "look under the hood"

History of OS

Phase 0: hardware is very expensive experiment; no operating systems exists

1792-1871	**Analytical Engine**
1940's	**Eniac, Mark-II, Collosus**

History of OS (continued..2)

Phase 1: hardware is expensive, humans are cheap

1955-65 **Transistors**
IBM 1401, IBM 7094
Fortran Monitor, IBSYS

Innovations: simple batch; separate programmer, operator, designer, builder; overlapped CPU & I/O operation, spooling

History of OS (continued..3)

Phase 2: hardware is expensive, but sharable, humans are cheap

1965-80 **IBM System 360, DEC PDP-1**
OS/360, MULTICS

Innovations: Multiprogramming, time-sharing, protection

Bad news: Too complicated! MULTICS announced in 1963, delivered in 1969. OS 360 released with 1000 known bugs!

History of OS (continued..4)

Phase 3: hardware is cheap, humans are expensive

1980-90 **PDP-11, PC's**
UNIX, DOS, XENIX

Innovations: modular design, interactive time sharing, personal computing, return of simplicity

New Era!

Phase 5: Networking arrives!

1990-97 **Cheap local network+**
SPARC, SGI, X86
Solaris, IRIX, Windows 95, OS/2,
MAC OS, WIN NT

Innovations: microkernel, thread, distributed OS, graphical user friendly uniform interface, return of 60's complexity!

History Lessons

- **None of these OS were particularly bad; each depended on tradeoffs made at that point in time and the change in technology.**
- **Since 1953, there has been about 9 order of magnitude of change in almost every computer system component.**
- **Unprecedented; in past 200 years gone from horseback (10mph) to concorde(1000mph), only 2 order of magnitude.**

	1981	1997	factor
MIPS	1	400	400
price/MIPS	$1M	$50	2000
memory	128 KByte	64Mbyte	500
disk	10MB	10GB	1000
network	9600MB/s	600Mb/s	60000
address bits	16	64	4
users	10s	1	.1

New Era!

1997- Pentium Pro, Java Machine, DCE,Windows 98

Innovations: virtual ubiquitous platform, software and information portability