What Is an OS?

Resources
* Allocation
* Protection
* Reclamation
* Virtualization

Finite resources
Competing demands

Examples:
* CPU
* Memory
* Disk
* Network

What Is an OS?

Resources

* Allocation
* Protection
* Reclamation
* Virtualization

You can't hurt me

I can't hurt you

Implies some degree
of safety & security

What Is an OS?

"Code" that:

* Sits between programs & hardware
* Sits between different programs
* Sits betweens different users

But what does it do?

What Is an OS?

Resources

* Allocation
* Protection
* Reclamation
* Virtualization

Services

* Abstraction
* Simplification
* Convenience
* Standardization

Makes computers simpler

What Is an OS?

Resources

* Allocation
* Protection
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* Virtualization

The OS giveth

The OS taketh away

Voluntary at run time

Implied at termination

Involuntary

Cooperative

What Is an OS?

Resources

* Allocation

* Protection

* Reclamation

* Virtualization

Illusion of infinite, private resources

Memory versus disk

Timeshared CPU

More extreme cases possible (& exist)

Operating System Objectives

- Convenience
  - Makes the computer more convenient to use
- Efficiency
  - Allows computer system resources to be used in an efficient manner
- Ability to evolve
  - Permit effective development, testing, and introduction of new system functions without interfering with service
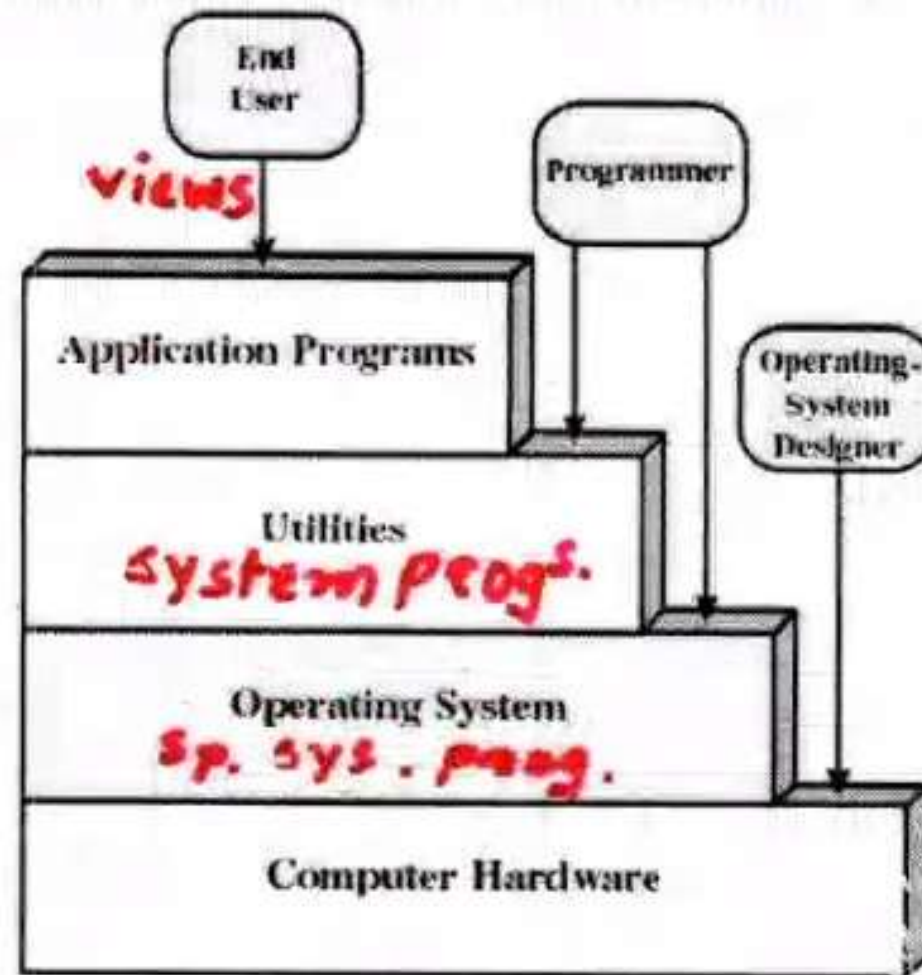
Layers of Computer System

Figure 2.1   Layers and Views of a Computer System

Services Provided by the Operating System

- Program development
  - Editors and debuggers *(i.e. utilities)*
- Program execution
- Access to I/O devices
- Controlled access to files
- System access

Operating System

- Error detection and response
  - internal and external hardware errors
    - memory error
    - device failure
  - software errors
    - arithmetic overflow
    - access forbidden memory locations
  - operating system cannot grant request of application

Services Provided by the Operating System

- Accounting
  - collect statistics
  - monitor performance *(such as response time)*
  - used to anticipate future enhancements
  - used for billing users *(On a multiuser sys)*

Operating System

- Functions same way as ordinary computer software
  - It is program that is executed
- Operating system relinquishes control of the processor to execute other programs

Kernel

- Portion of operating system that is in main memory

- Contains most-frequently used functions

- Also called the nucleus