

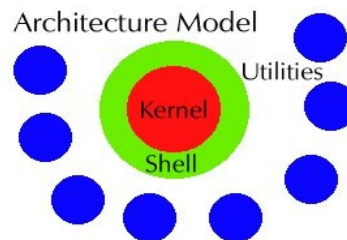
# The UNIX Operating System

## UNIX Overview

- ◆ Provides a rich and complete multiuser timesharing environment.
- ◆ Mature, reliable software based on well-accepted operating system design principles.
- ◆ Wealth of development tools.
- ◆ Portable operating system available on many architectures.
- ◆ Steadily growing source of third-party software.

## The Kernel: The Resource Manager

- ◆ Memory management
- ◆ Process management
- ◆ File management



## System Calls and Kernel Features

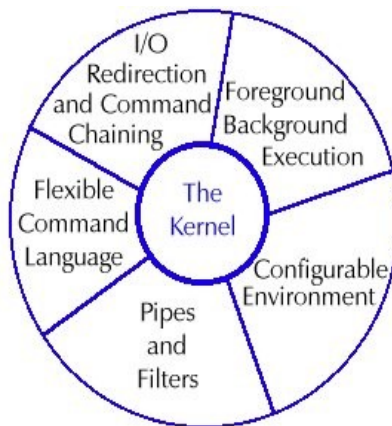
- ◆ Record and file locking
- ◆ Semaphores for process synchronization
- ◆ Shared memory regions
- ◆ Automatic file systems update

## The UNIX File System

HIERARCHICAL	Lets you organize the data the way you think it should be ordered.
SECURE	Multiuser file system is protected to let users assign read, write and execute privileges to any subset of users.
COMPLETE	Just about every command you want to manage a file system.

## The Shell: A Superhuman Command Interpreter

- ◆ Executes series of commands stored in files
- ◆ Jobs may be run in interactive or batch mode
- ◆ High-level constructs
- ◆ Flexible data flow control
- ◆ Add, modify and customize commands



## Data Flow Control

Each UNIX command can get its input from any data source and send its output to any data destination.

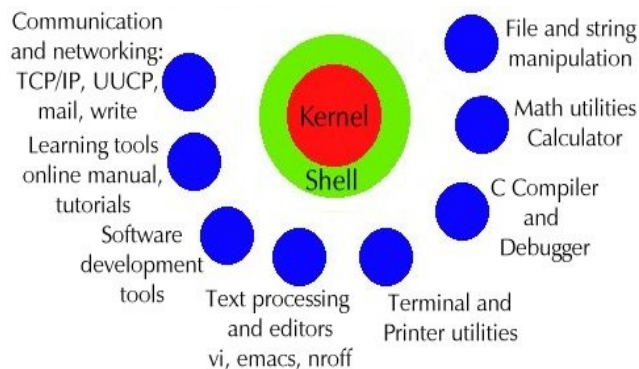
## I/O Redirection, Filters, Pipes

Example:

From a list of employees, find all the engineers, alphabetize, and print the list.

```
grep "enr" employees | sort | lp
```

## Hundreds of Utilities from 35 years of Enhancements



## Utilities and Commands

- ◆ Shells
- ◆ Termcaps
- ◆ *vi*
- ◆ Automatic file system recovery (*fsck*)

## The Importance of Memory Management and Protection

- ◆ UNIX relies heavily on effective memory management.
- ◆ Each process requires a variable amount of memory to execute.
- ◆ The kernel allocates and frees memory for each process.
- ◆ Users must not be allowed to corrupt other users' programs.
- ◆ Users must not be allowed to corrupt the operating system.

### The Memory Management Unit (MMU) Maps Logical Memory to Physical

