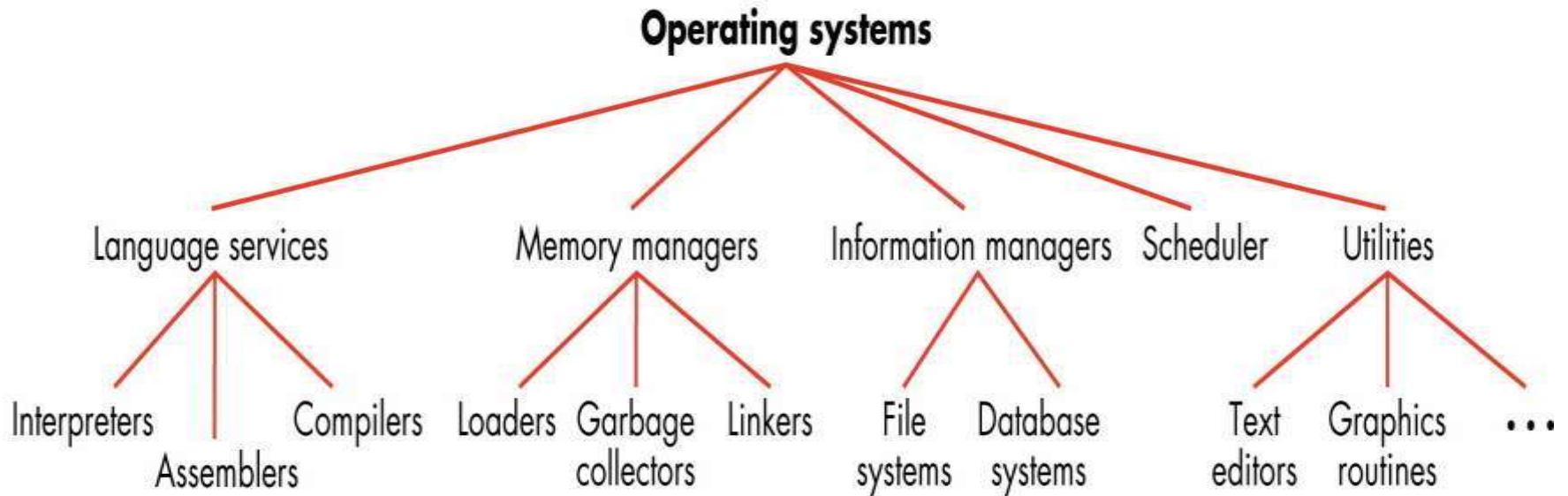


# CMPE 220

## Class 24 – Managing System Software

# Core System Software



# Utilities

- Utility software is system software designed to help analyze, configure, optimize or maintain a computer
- A single piece of utility software is usually called a utility or tool
- Utility software usually focuses on how the computer infrastructure (including the computer hardware, operating system, application software and data storage) operates
- *Not essential*

# Utilities versus Applications

- Utilities typically depend on knowledge of, or access to, the operating system, instruction set, or hardware
- Cannot be moved to another system simply by recompiling

# System Utilities – File System

- **Backup/restore** utilities can make a copy of all information stored on a disk, and restore either the entire disk (e.g. in an event of disk failure) or selected files (e.g. in an event of accidental deletion).
- **Data compression** utilities output a shorter stream or a smaller file when provided with a stream or file.
- **Disk checkers** can scan and repair operating hard drive (fsck).
- **Disk cleaners** can find files that are unnecessary to computer operation, or take up considerable amounts of space. Disk cleaner helps the user to decide what to delete when their hard disk is full.
- **Disk defragmentation** utilities reorganize file segments of disk to optimize future accesses.
- **Disk compression** utilities can transparently compress/uncompress the contents of a disk, increasing the capacity of the disk.

# System Utilities – Files

- **File catalog** utilities provide users with an index to the contents of a file system
- **File indexing and search** utilities allow users to search the contents of a file system
- **Data compression** utilities (tar, zip, gzip, rar) output a shorter stream or a smaller file when provided with a stream or file
- **Cryptographic (data encryption)** utilities encrypt and de-encrypt a stream or file
- **File display / edit** utilities allow users to directly access the contents of a file in low-level formats (e.g. hexadecimal or octal byte values)

# System Utilities – Remote Files

- **FTP** fetches and sends files using the File Transfer Protocol
- **Curl** – Client URL – transfers data to and from a server
- **Wget** downloads files and interacts with Representational State Transfer (REST) APIs
- **Installation** utilities download and install software
- **Auto-updaters** keep software current
- **Package managers** automate the process of installing, upgrading, configuring, and removing programs for a computer in a consistent manner

# System Utilities – Remote Files

- **Migration** utilities move user accounts, configuration information, files and applications between systems
- **Synchronization** utilities synchronize files across systems



# System Utilities – Version Control

- **Version control, revision control, source code control**
  - Manage versions and changes for a collection of files
  - Local or remote access
- Popular version control systems
  - Git / github
  - Apache subversion
  - Concurrent Versions System (CVS)
  - AWS CodeCommit
  - IBM Rational Clearcase
  - Azure DevOps Server
  - SourceForge

and dozens more

# System Utilities – Management

- **Firewalls and anti-virus** utilities block, scan for, and remove computer viruses.
- **Process/task managers** display, reprioritize, and delete processes.
- **System monitors** display system statistics, e.g.:
  - number and status of Process Control Blocks (PCBs)
  - number of I/O Control Blocks IOCBs
  - Performance Monitoring Counters (PMCs)
  - Instructions Per Cycle (IPC)
  - Tunable system parameters
- **System profilers** provide detailed information on system hardware and installed software

# System Utilities – Network

- **Ping** checks whether an IP address can be reached
- **Traceroute (tracert)** provides details on all the “hops” a packet goes through to get to the destination, including switches and routers, along with the IP address, DNS information, and latency of each
- **Netstat** displays the network connections for Transmission Control Protocol (TC) and User Datagram Protocol (UDP)
- **Nslookup** is used to query the domain name system (DNS) for domain name or IP address mapping, or to obtain other kinds of DNS records
- **IPconfig** used for displaying information on TCP/IP configuration and information pertaining to the DNS and Dynamic Host Configuration Protocol (DHCP).

# System Utilities – VPNs

- **Virtual Private Network (VPN)** - protects internet connections and privacy online
- VPNs:
  - create an encrypted tunnel for data
  - protect user's online identity by hiding their IP address
  - Mask the user's location

# System Utilities – Maintenance

- **Diagnostic Programs** – runs hardware tests
- **Active diagnostics** – diagnose hardware by monitoring in real time
  - **Self-Monitoring Analysis and Reporting Technology (SMART)** tracks statistics such as disk retries to predict disk failures
  - **Disk sector sparing** automatically drops bad disk sectors
  - **Memory sparing** automatically drops bad memory blocks
- **Log analyzers** display and analyze system logs
- **cron** utilities – schedule tasks for execution

# Linux Command Line

- **Command line shell** – interaction, scripting
  - Bourne shell (sh), C shell (csh), Bourne Again Shell (bash), tsh, tcsh, ksh, zsh, fish, etc
- **Make** – automates the program build process
- **ls** – lists files
- **cat** – concatenates (copies) files
- **find** – searches the file system
- **grep** – searches within files for regular expressions
- **ps** – lists processes and attributes

and > 100 more

# MS Windows - Registry

- What is the Registry?
  - A hierarchical database that stores low-level settings for the Windows operating system, and for applications that opt to use the registry
  - The kernel, device drivers, services, Security Accounts Manager, and user interfaces can all use the registry
- **Registry cleaner / editor** utilities remove redundant or unused registry entries, and may allow editing of registry parameters

# Miscellaneous User Utilities

- Screen savers
- Screen capture / snapshot
- Password managers
- Calendars
- GUI customization
- Font managers