

Host Management

CH4

Hosts Management

- ▶ Host management is an essential task for any organization that relies on computer systems. By effectively managing its hosts, an organization can improve its **performance, security, and productivity**.
- ▶ Here are some of the benefits of host management:
- ▶ **Improved system performance**: Host management can help to improve system performance by identifying and resolving performance bottlenecks.
- ▶ **Increased security**: Host management can help to increase security by ensuring that the system is properly configured and patched.
- ▶ **Reduced downtime**: Host management can help to reduce downtime by identifying and resolving problems before they cause outages.
- ▶ **Increased productivity**: Host management can help to increase productivity by ensuring that the system is available when users need it.

Initial setup of a host

- ▶ Decisions made during host installation can significantly impact the ease or difficulty of life later on. There are a few options for the initial setup:
 1. Following the **OS designer's recommended setup**, although this may not be sufficient for specific purposes.
 2. Creating a **custom setup tailored to specific needs**. This option gives you the most flexibility, but it also requires the most knowledge and effort. It is a good option if you have specific requirements that need to be met.
 3. **Making all machines uniform**, which can simplify management and troubleshooting.
 4. **Making all machines unique**, which may be necessary for certain requirements.

4.2 Physical considerations of server room

- ▶ **What are the considerations that should be in a server room?**
- ▶ **Class activity**

4.2 Physical considerations of server room

- ▶ Some considerations that should be taken into account when setting up a server room include:
- ▶ **Physical security:** A server room should have a lockable door, anti-theft protection, and limited access to authorized personnel only. Visitors should present photo ID and be prevented from bringing anything into the building.
- ▶ **Temperature control:** The server room should have cooling or ventilation equipment to prevent the temperature from rising above a certain level (usually around 20 degrees Celsius).
- ▶ **Backup and redundancy:** Backup tapes should not be stored in the same room as the hosts they contain data from, and duplicate servers are best placed in different physical locations to prevent natural disasters or physical attacks from wiping out all equipment at the same time.
- ▶ **Power supply:** A reliable, uninterruptable power supply is necessary for essential equipment to prevent downtime.
- ▶ **Network infrastructure:** Single points of failure, such as network cables, should be avoided, and hot standby equipment should be available for minimal loss of uptime in case of failure.
- ▶ **Data protection:** Replaceable hard disks should be considered with RAID protection for continuity, and protection from natural disasters like fire and floods should be secured.

4.3 Computer startup and shutdown

- ▶ Why are we needing to a safe shutdown?
- ▶ A safe shutdown avoids damage to disks by mechanical interruption, but it also synchronizes hardware and memory caches, making sure that no operation is left incomplete.
- ▶ **Data loss:** If you have any unsaved data, it may be lost when you forcefully shut down your computer.
- ▶ **File corruption:** If you are working on a file and you forcefully shut down your computer, the file may become corrupted.
- ▶ **System instability:** If you forcefully shut down your computer regularly, it can cause system instability. This can lead to unexpected errors and crashes.
- ▶ **Hardware damage:** In some cases, forcefully shutting down your computer can damage the hardware. This is more likely to happen if you do it frequently.

4.3.1 Booting Unix

- ▶ Unix systems can boot in different modes or run levels, including multi-user mode and single-user mode.
- ▶ Single-user mode is used to give the system administrator exclusive access to the system, without interference from other users.
- ▶ It allows you to access the system without any of the other users or processes interfering. This can be helpful if you are troubleshooting a problem and you need to make changes to the system without affecting other users.
- ▶ It allows you to view the system logs, which can be helpful for troubleshooting problems.
- ▶ It allows you to mount filesystems, which can be helpful if you need to access files that are not accessible in normal mode.

4.3.1 Booting Unix

- ▶ Find out how to boot in single-user mode on our system (Unix), in case we need to repair a disk at some point.
- ▶ Class activity

4.3.2 Shutting down Unix

- ▶ Anyone can start a Unix-like system, but we have to be an administrator or 'superuser' to shut one down correctly.
- ▶ The correct way to shut down a Unix system is to run one of the following programs.
 - ▶ **halt:** Stops the system immediately and without warning. All processes are killed with the TERM-inated signal 15 and disks are synchronized.
 - ▶ **reboot:** As halt, but the system reboots in the default manner immediately.
 - ▶ **shutdown:** This program is the recommended way of shutting down the system.
- ▶ Here are some examples of the shutdown command. The first is from BSD Unix:
 - ▶ `shutdown -h +3 "System halting in three minutes, please log out"`
 - ▶ `shutdown -r +4 "System rebooting in four minutes"`


4.3.3 Booting and shutting down Windows

- ▶ To boot the system, it is simply a matter of switching on the power. To shut it down, one chooses shutdown from the Start Menu.
- ▶ When do we use the safe mode?
- ▶ The Master Boot Record (MBR) is a small piece of code that is stored at the beginning of a hard drive or other storage device. It is responsible for loading the operating system when the computer starts up.
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- ▶ The MBR is typically 512 bytes long and is divided into two parts:
 - ▶ The first part is the bootloader, which is a small program that loads the operating system.
 - ▶ The second part is the partition table, which stores information about the partitions on the hard drive.

4.4 Configuring and personalizing workstations

Network Sharing and Local Disks

- ▶ Network sharing is the process of making disk space available to all hosts on a network, using protocols like NFS, Netware, or DFS. While sharing has advantages like resource optimization and easy backup, it also has some drawbacks.
- ▶ If sharing was a perfect solution, then local disks would not be necessary. However, diskless workstations, network computers, and X-terminals that aimed to centralize all disk resources have been largely unsuccessful due to poor performance, higher costs, and network bandwidth wastage.
- ▶ Certain files like the operating system and temporary scratch files that are used frequently are better placed on a local disk to improve performance. Hence, it is essential to strike a balance between network sharing and local disks for optimal resource utilization.



What is Temporary scratch files ?

CLASS ACTIVITY

Temporary scratch files

- ▶ Temporary scratch files are temporary files created during the processing of data. They are usually created to store intermediate results or to hold data temporarily while it is being processed. Once the data processing is complete, the temporary scratch files are typically deleted. These files can be useful for optimizing local performance and minimizing the use of network resources. They are often stored on local disks rather than shared disks to ensure faster access and avoid potential network latency

4.4.1 Organizing Disk Space

- ▶ In organizing disk space, it is important to make the best use of available resources. The following are some key considerations for managing disk space effectively:
 1. **Space for the Operating System** It is essential to allocate a separate space for the operating system, which should be reserved exclusively for its use.
 2. **Shared Space** It is beneficial to allocate a shared space that can be made available for all hosts. This shared space can be accessed by all the hosts on the network and used for collaborative projects.
 3. **Local Work Optimization Space** should be designated for optimizing local work, such as temporary scratch space. This space can be used to optimize local performance and avoid slow networking.
 4. **Distributed Backups** Another important consideration is to designate space for making distributed backups. This allows for multiple redundancies and ensures that critical data is protected in case of any system failures.

4.4.2 Partitioning

- ▶ Partitioning Disks in Operating Systems
- ▶ Disks can be divided into partitions to separate areas on the disk surface.
- ▶ Partitions cannot be accessed in parallel, unlike multiple separate disks.
- ▶ Partitioning reserves a fixed amount of space for a specific purpose.
- ▶ It allows better management of disk space and optimized performance.
- ▶ Consideration should be given to the intended use of each partition when sizing it appropriately.

4.4.2 Partitioning

- ▶ Why the partitioned disks should not overlap?
- ▶ How can do the partition of the disk in Windows and Unix?

4.4.3 Formatting and building filesystems

- ▶ Disk formatting organizes and provides a way to access the surface of a disk.
- ▶ Formatting is called making a filesystem in Unix and regroups and labels data on the disk.
- ▶ A filesystem sets up the infrastructure for naming files and directories and provides functionality.
- ▶ A damaged filesystem can result in data loss, and filesystem checking programs like fsck can be used to repair the operating system's map of a disk.
- ▶ Low-level formatting: This is the most basic type of formatting and it erases all of the data on the device. It is also the fastest type of formatting.
- ▶ High-level formatting: This type of formatting creates a file system on the device. It is slower than low-level formatting, but it is more flexible.
- ▶ Quick formatting: This is a faster version of high-level formatting. It does not erase all of the data on the device, but it does erase the file system.

Class activity

- ▶ Describe these commands
- ▶ Newfs (Unix)
- ▶ Mkfs (Unix)
- ▶ Format (Windows)

4.4.4 Swap space

- ▶ In Windows, virtual memory uses filesystem space to store data that does not fit in physical memory (RAM).
- ▶ In Unix-like systems, a dedicated, unformatted partition is typically used for virtual memory, known as the swap partition.
- ▶ The swap partition is used for paging, which involves moving pages of memory between RAM and disk as needed to free up space in RAM.
- ▶ The swap partition allows for direct disk access and is used as virtual memory scratch space.
- ▶ Properly configuring virtual memory settings, including the size and location of the swap partition, can greatly impact system performance.

4.4.5 Filesystem layout

- ▶ The layout of software and support files in an operating system cannot be changed.
- ▶ User registration, software installation, and network integration can change the initial state of the host.
- ▶ Data that are separate from the operating system should be kept in a separate directory tree.
- ▶ Preferably, data should be stored on a separate disk partition.
- ▶ Mixing data with the operating system file tree can make reinstallation or upgrade of the operating system difficult.

4.5.1 mount and umount

- ▶ Class activity
- ▶ Describe two commands

4.6 Installation of the operating system

- ▶ **Naming the machine:** Every computer on a network needs a unique name to be identified. It's important to choose a name that is descriptive and easy to remember.
- ▶ **Obtaining an Internet address:** When setting up a new host, it's important to obtain an unused IP address for it to avoid conflicts with other devices.
- ▶ **Allocating virtual memory:** Virtual memory, also known as swap space, is an area on the hard disk that the operating system uses when the physical memory (RAM) becomes full. It's important to allocate enough virtual memory to ensure the system runs smoothly.
- ▶ **Knowing the local netmask and domain name:** The netmask is a binary pattern that is used to divide an IP address into network and host portions. It's important to know the local netmask when setting up network interfaces. The domain name is a label that identifies a group of devices on a network. It's important to set the domain name correctly to ensure proper name resolution.
- ▶ **Setting the local time zone:** The time zone determines the local time on the system. It's important to set the time zone correctly to ensure that timestamps are accurate and consistent across the network.

4.6.2 GNU/Linux

- ▶ Installing GNU/Linux is simply a case of inserting a CD-ROM and booting from it, then following the instructions. However, GNU/Linux is not one, but a family of operating systems. There are many distributions, maintained by different organizations and they are installed in different ways. Usually one balances ease of installation with flexibility of choice.
- ▶ Class activity
- ▶ Find the commands that use for installing GNU/Linux.

4.6.3 Windows

- ▶ One inserts a CD-ROM and boots. Here it is preferable, to begin with, an already partitioned hard drive.
- ▶ we choose the filesystem type for Windows to be installed on, either DOS or NTFS.
- ▶ There is clearly only one choice: installing on a DOS partition would be irresponsible with regard to security. Choose NTFS.
- ▶ Windows reboots several times during the installation procedure.