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OS Lab

Assignment 1

Basic of Unix

**1. What is Unix?**

* **Unix** is a powerful, multiuser, multitasking operating system initially developed in the 1970s.
* It serves as the foundation for many modern operating systems like Linux, macOS, and BSD.
* It is known for its simplicity, portability, and robust command-line interface.

**2. Core Concepts**

**a. Filesystem**

* Everything in Unix is treated as a **file**, including hardware devices.
* The filesystem is hierarchical, starting from the root directory /.

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/

├── bin # Essential binaries (commands like ls, cp, etc.)

├── etc # Configuration files

├── home # User home directories

├── var # Variable data like logs

├── tmp # Temporary files

└── dev # Device files

**b. Shell**

* The shell is a command-line interpreter that allows users to interact with the system.
* Common shells:
  + **Bash** (Bourne Again Shell): Default on Linux.
  + **Zsh**: Feature-rich alternative.
  + **Ksh**, **Tcsh**, and others.

**c. Processes**

* A process is a running instance of a program.
* Each process has a **Process ID (PID)**.

**d. Users and Permissions**

* Unix is a **multiuser system**, meaning multiple users can log in and work simultaneously.
* File permissions determine who can **read (r)**, **write (w)**, or **execute (x)** a file.

**3. Unix Command Basics**

* **Syntax:**

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command [options] [arguments]

**a. File and Directory Commands**

* **ls**: List files and directories.
* **cd**: Change directory.
* **pwd**: Show the current directory.
* **touch**: Create a new file.
* **mkdir**: Create a directory.
* **rm**: Delete a file or directory.
* **cp**: Copy files.
* **mv**: Move or rename files.

**b. Viewing and Editing Files**

* **cat**: View the content of a file.
* **less**: View file content page by page.
* **nano**, **vim**, or **emacs**: Edit files.

**c. File Permissions**

* Use chmod to change permissions:

bash

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chmod 755 file.txt # rwxr-xr-x

* Use chown to change ownership:

bash

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sudo chown user:group file.txt

**d. Process Management**

* **ps**: View running processes.
* **top**: Monitor system activity.
* **kill**: Terminate a process.

**e. Networking**

* **ping**: Check network connectivity.
* **curl**: Fetch data from a URL.

**4. Unix Philosophy**

Unix follows these design principles:

1. **Do one thing well**: Each tool is specialized for a specific task.
2. **Chain tools together**: Tools can be combined using pipes (|).
3. **Text-based processing**: Text is the universal interface.

**5. Common Commands**

| **Command** | **Description** |
| --- | --- |
| whoami | Show current user. |
| uname -a | Show system information. |
| man command | Show the manual for a command. |
| df -h | Show disk space usage. |
| du -sh folder | Show folder size. |
| find | Search for files. |
| grep | Search within files. |
| tar | Compress or extract files. |
| scp | Copy files over SSH. |

**6. Text Processing**

* Combine commands with pipes:

bash

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cat file.txt | grep "pattern" | sort | uniq

* Use redirection:

bash

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command > output.txt # Redirect output to a file

command >> output.txt # Append output to a file

command < input.txt # Use file as input

**7. Basic Administration**

* **User Management:**

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adduser username # Add a new user

passwd username # Set a password for a user

* **Package Management:**
  + **Debian/Ubuntu**: apt
  + **Red Hat/Fedora**: dnf or yum

**8. Learning More**

* Use **man** to learn about commands:

bash

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man ls