**501 – LINUX OPERATING SYSTEM (LOS)**

**Assignment – 1**

**Q1) Explain different types of file systems supported by Linux with brief descriptions.**

**Answer:**  
Linux supports multiple file systems for storage and compatibility:

1. **ext2 (Second Extended File System):**
   * Old default Linux file system.
   * Does not support journaling.
2. **ext3 (Third Extended File System):**
   * Extension of ext2 with **journaling** (reduces data corruption).
3. **ext4 (Fourth Extended File System):**
   * Default in modern Linux.
   * Supports large files, backward compatible with ext2/ext3.
4. **XFS:**
   * High-performance journaling file system.
   * Best for large files and servers.
5. **Btrfs (B-Tree File System):**
   * Modern file system with **snapshots, checksums, compression**.
6. **FAT32/exFAT/NTFS:**
   * Used for compatibility with Windows.

➡️ Linux provides flexibility by supporting both native and non-native file systems.

**Q2) Define the term ‘Kernel’ in Linux.**

**Answer:**

* The **Kernel** is the **core component of Linux OS**.
* It manages hardware resources and acts as a bridge between **hardware and applications**.

**Functions of Kernel:**

1. **Process Management** – Scheduling, execution, multitasking.
2. **Memory Management** – Allocating and freeing memory.
3. **Device Management** – Communication with hardware using drivers.
4. **File System Management** – Reading/writing files.
5. **System Calls Interface** – Provides services to applications.

➡️ Without Kernel, Linux OS cannot interact with hardware.

**Assignment – 2**

**Q1) Explain the usage and features of the ‘vi’ editor.**

**Answer:**  
**vi editor** is a powerful text editor in Linux.

* **Modes in vi:**
  1. **Command Mode** – Default, used for navigation and commands.
  2. **Insert Mode** – For inserting text (press i, a, o).
  3. **Last Line Mode** – For saving and exiting (type :wq, :q!).
* **Features:**
  1. Lightweight, fast, available by default in Linux.
  2. Supports search & replace (/word, :s/old/new/).
  3. Copy (yy), Paste (p), Delete (dd).
  4. Undo (u).

➡️ vi is widely used for editing config files and coding.

**Q2) Demonstrate how to use text processing commands like ‘sed’ and ‘cut’ with suitable examples.**

**Answer:**

1. **sed (Stream Editor):** Used for search, replace, and editing.
2. sed 's/Linux/Ubuntu/' file.txt

(Replaces first occurrence of "Linux" with "Ubuntu").

1. **cut:** Used to extract specific columns/fields.
2. cut -d ":" -f1 /etc/passwd

(Displays only usernames from /etc/passwd).

➡️ These commands are useful for automation and log processing.

**Assignment – 3**

**Q1) Compare and demonstrate with examples the different types of command redirection and piping in Linux.**

**Answer:**

* **Redirection:**
  1. Output Redirection (>):
  2. ls > files.txt

(Stores output of ls into files.txt).

* 1. Append (>>):
  2. echo "Hello" >> log.txt
  3. Input Redirection (<):
  4. wc -l < file.txt

(Counts lines in file).

* 1. Error Redirection (2>):
  2. ls xyz 2> error.log
* **Piping (|):** Sends output of one command to another.
* ls -l | grep ".txt"

(Lists only .txt files).

➡️ Redirection controls input/output files, while piping connects commands.

**Q2) Discuss the importance and usage of shell variables with examples.**

**Answer:**

* **Shell variables** store values and are used in shell scripting.
* **Types:**
  1. **Local Variables:** Available in current shell.
  2. **Environment Variables:** Inherited by child processes (PATH, HOME).

**Example:**

name="Zack"

echo "Hello $name"

**Environment Variable Example:**

echo $PATH

export EDITOR=vi

➡️ Shell variables are crucial for automation and environment configuration.

**Assignment – 4**

**Q1) Explain File system Hierarchy Standard (FHS) in Linux.**

**Answer:**  
FHS defines the standard **directory structure** in Linux.

* / – Root directory
* /bin – Essential binaries (ls, cp, mv)
* /etc – Configuration files
* /home – User directories
* /var – Variable data (logs, mail)
* /usr – User applications and libraries
* /tmp – Temporary files
* /dev – Device files
* /boot – Bootloader files

➡️ FHS ensures consistency across all Linux distributions.

**Q2) Differentiate between ‘for’ and ‘while’ loops in shell scripting with example.**

**Answer:**

* **for loop:** Used when number of iterations is known.
* for i in 1 2 3 4 5
* do
* echo "Number $i"
* done
* **while loop:** Used when condition is checked repeatedly.
* count=1
* while [ $count -le 5 ]
* do
* echo "Number $count"
* count=$((count+1))
* done

➡️ Use **for** for fixed iterations, and **while** for conditional repetition.