S.B. JAIN INSTITUTE OF TECHNOLOGY MANAGEMENT & RESEARCH, NAGPUR

Practical 02

Aim: To understand and demonstrate the use of basic commands in different operating systems (Windows, Linux, and UNIX) for managing files, directories, permissions, and user interactions through a terminal or command-line interface.

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Date of Performance:

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❖ **Aim:** To understand and demonstrate the use of basic commands in different operating systems (Windows, Linux, and UNIX) for managing files, directories, permissions, and user interactions through a terminal or command-line interface.

❖ Objectives:

1. To learn and practice fundamental command-line operations for file and directory management.
2. To explore and utilize user and permission management commands effectively.
3. To enhance system administration skills by working with commands across different operating systems.

❖ Requirements:

Hardware Requirements:

- **Processor**: Multi-core CPU, Intel Core i3 (3.0 GHz) or higher
- **RAM**: Minimum 4 GB (8 GB recommended for optimal performance)
- **Storage**: 100 GB HDD or SSD (Solid State Drive) for faster access
- **Network Interface**: Ethernet or Wi-Fi adapter for connectivity

Software Requirements:

- **Operating System**: Windows 10/11, Linux (Ubuntu 20.04/CentOS 8), UNIX-based OS
- **Command-line Interface**: PowerShell or Command Prompt (Windows), Terminal (Linux/UNIX)
- **Text Editor**: Nano, Vim, or Visual Studio Code for file editing
- **Administrative Privileges**: Superuser (Linux/UNIX) or Administrator (Windows) access

❖ Theory:

In system administration, command-line interfaces (CLI) are essential tools for managing and interacting with operating systems like Windows, Linux, and UNIX. Commands allow users to perform various tasks such as navigating directories, managing files, controlling permissions, and monitoring system performance. Each operating system provides a set of built-in commands, such as ‘man’, ‘ls’, ‘cd’, ‘mkdir’, and ‘chmod’, to facilitate efficient system management. Understanding these commands and their syntax is crucial for automating tasks, enhancing security, and ensuring optimal system functionality. This practical aims to develop foundational skills in executing and applying basic commands across different platforms.

❖ **Commands:**

1. **Display User Manual of a Command**
   - Functionality: Shows the manual page with details about a command's usage, options, and arguments.
   - Syntax: man <command>
   - Example: man ls

2. **Change Current Working Directory**.
   - Functionality: Changes the terminal's current working directory.
   - Syntax: cd <directory-path>
   - Example: cd /home/user/Documents.

3. **List Contents of the Current Directory.**
   - Functionality: Lists all files and directories in the current location.
   - Syntax: ls
   - Example: ls

4. **Read/Modify/Concatenate Text Files.**
   - Functionality: Displays or manipulates file content.
   - Syntax:
     - Read: cat <filename>
     - Modify: 'nano <filename>
     - Concatenate: cat <file1> <file2> > <outputfile>

5. **Create a New Directory**.
   - Functionality: Creates a new directory at the specified path.
   - Syntax: mkdir <directory-name
   - Example: mkdir newdir

6. **Display Current Working Directory.**
   - Functionality: Prints the current directory path.
   - Syntax: pwd
   - Example: pwd

7. **Write Arguments to Standard Output.**
   - Functionality: Prints the provided string or variables.
   - Syntax: echo <arguments>
   - Example: echo Hello World

8. **Remove a File**.
   - Functionality: Deletes a specified file.
   - Syntax: rm <filename>
   - Example: rm file.txt

9. **Delete a Directory.**
   - Functionality: Removes an empty directory.
   - Syntax: rmdir <directory-name>
   - Example: rmdir olddir

10. **Copy a File or Directory.**
    - Functionality: Copies a file or directory to a destination.
    - Syntax: cp <source> <destination>
    - Example: cp file.txt backup/

11. **Switch to Root User.**
    - Functionality: Gains root privileges temporarily.
    - Syntax: sudo su
    - Example: sudo s

12. **Move Files or Directories.**
    - Functionality: Moves or renames files and directories.
    -Syntax: mv <source> <destination>
    - Example: mv file.txt newdir/

13. **Search for a String in a File.**
    - Functionality: Searches for a specific word or pattern in a file.
    - Syntax: grep "<string>" <file>
    - Example: grep "error" log.txt

14. **Print Top N Lines of a File.**
    - Functionality: Displays the first N lines of a file.
    - Syntax: head -n <N> <file>
    - Example: ‘head -n 10 file.txt’

15. **Print Last N Lines of a File.**
    - Functionality: Displays the last N lines of a file.
    - Syntax: tail -n <N> <file>
    - Example: ‘tail -n 10 file.txt

16. **Remove Read Permission from Owner.**
    - Functionality: Revokes the owner's read permission for a file.
    - Syntax: chmod u-r <filename>
    - Example: chmod u-r file.txt

17. **Change Specific Permissions.**
    - Functionality: Sets or removes specific file permissions.
    -Syntax: chmod u+r,w-x,g+w <filename>
    - Example: chmod u+r,w-x,g+w file.txt

18. **Add Write Permission to Owner, None to Others**.
    -Functionality: Allows write access for the owner only.
    - Syntax: chmod u+w,o-rwx <filename>
    - Example: chmod u+w,o-rwx file.txt

19. **Assign Permissions to Users.**
    - Functionality: Modifies file access for users, groups, and others.
    - Syntax: chmod u+rwx,g+rx,o+r <filename>
    - Example: 'chmod u+rwx,g+rx,o+r file.txt

20. **Assign R/W/X to Others.**
    - Functionality: Gives read, write, and execute permissions to others.
    - Syntax: chmod o+rwx <filename>
    - Example: chmod o+rwx file.txt

21. **Remove All Permissions from All Users.**
    - Functionality: Clears all permissions on a file.
    - Syntax: 'chmod a-rwx <filename>
    - Example: 'chmod a-rwx file.txt

22. **Remove Read Permission Using Absolute Mode.**
    - Functionality: Uses numeric mode to restrict read access.
    - Syntax: chmod 700 <filename>
    - Example: chmod 700 file.txt

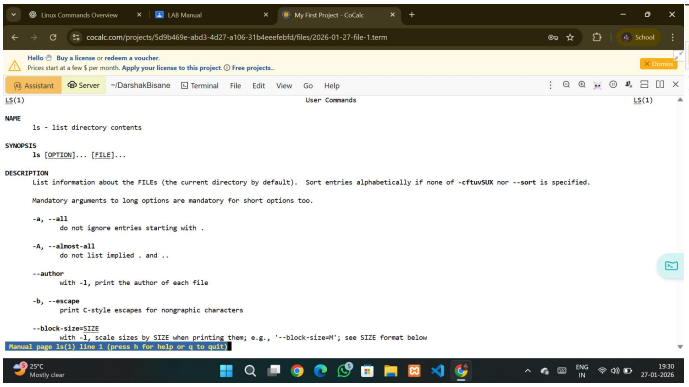
23. **Set R/W for Owner, None for Group/Other.**
    - Functionality: Assigns permissions in numeric mode.
    - Syntax: chmod 600 <filename>
    - Example: chmod 600 file.txt'

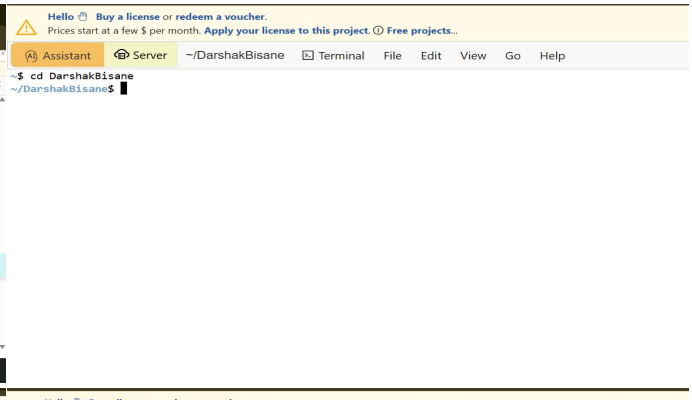
24. **Add Execute for Owner, Read for Group/Others.**
    - Functionality: Adds execution and read access.
    - Syntax: chmod u+x,g+r,o+r <filename>

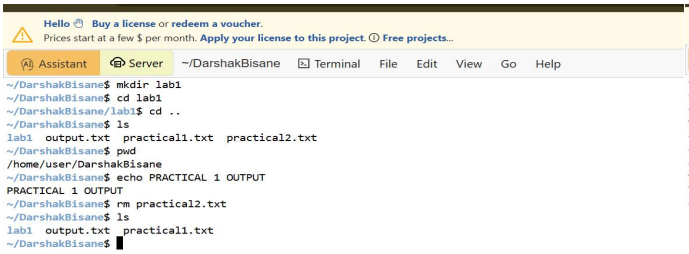
- Example: chmod u+x,g+r,o+r file.txt

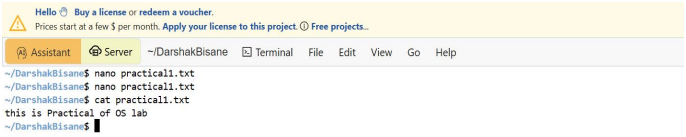
25. **Add Execute Permission to All Users.**
    - Functionality: Enables execution by everyone.
    - Syntax: chmod a+x <filename>
    - Example: chmod a+x script.sh

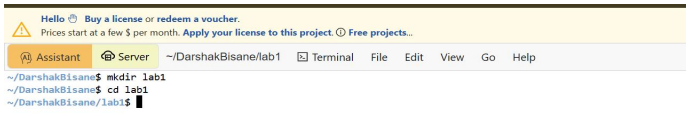
❖ Output:











```
~/DarshakBisane$ mkdir lab1
~/DarshakBisane$ cd lab1
~/DarshakBisane/lab1$ cd ..
~/DarshakBisane$ ls
lab1  output.txt  practical1.txt  practical2.txt
~/DarshakBisane$ pwd
/home/user/DarshakBisane
~/DarshakBisane$
```

```
~/DarshakBisane$ mkdir lab1
~/DarshakBisane$ cd lab1
~/DarshakBisane/lab1$ cd ..
~/DarshakBisane$ ls
lab1  output.txt  practical1.txt  practical2.txt
~/DarshakBisane$ pwd
/home/user/DarshakBisane
~/DarshakBisane$ echo PRACTICAL 1 OUTPUT
PRACTICAL 1 OUTPUT
~/DarshakBisane$
```

```
GNU nano 7.2                    practical1.txt
This is Practical of OS lab
```

```
~/DarshakBisane$ mkdir lab1
~/DarshakBisane$ cd lab1
~/DarshakBisane/lab1$ cd ..
~/DarshakBisane$ ls
lab1  output.txt  practical1.txt  practical2.txt
~/DarshakBisane$ pwd
/home/user/DarshakBisane
~/DarshakBisane$ echo PRACTICAL 1 OUTPUT
PRACTICAL 1 OUTPUT
~/DarshakBisane$ rm practical2.txt
~/DarshakBisane$ ls
lab1  output.txt  practical1.txt
~/DarshakBisane$ rm lab1
rm: cannot remove 'lab1': Is a directory
~/DarshakBisane$ ls
lab1  output.txt  practical1.txt
~/DarshakBisane$ rmdir lab1
~/DarshakBisane$ ls
output.txt  practical1.txt
~/DarshakBisane$
```

```
~/DarshakBisane$ ls
backup_file  output.txt  practical1.txt
~/DarshakBisane$ cp output.txt backup_file/
~/DarshakBisane$ ls
backup_file  output.txt  practical1.txt
~/DarshakBisane$ ls backup_file
output.txt
~/DarshakBisane$
```

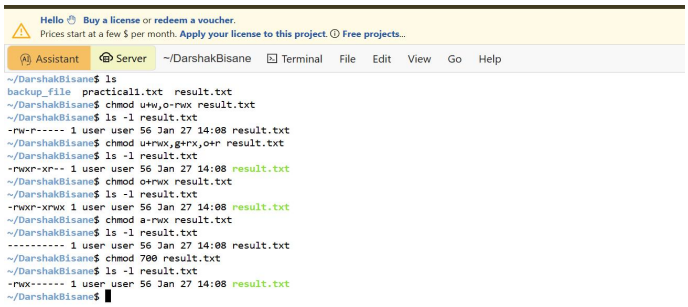
```
~/DarshakBisane$ whoami
user
~/DarshakBisane$ mv output.txt result.txt
~/DarshakBisane$ ls
backup_file  practical1.txt  result.txt
~/DarshakBisane$
```

```
~/DarshakBisane$ whoami
user
~/DarshakBisane$ mv output.txt result.txt
~/DarshakBisane$ ls
backup_file  practical1.txt  result.txt
~/DarshakBisane$ grep "This" result.txt
This another file Of OS Lab
~/DarshakBisane$
```

```
~/DarshakBisane$ ls
backup_file  practical1.txt  result.txt
~/DarshakBisane$ head -n 1 practical1.txt
this is Practical of OS lab
~/DarshakBisane$
```

```
~/DarshakBisane$ ls
backup_file  practical1.txt  result.txt
~/DarshakBisane$ head -n 1 practical1.txt
this is Practical of OS lab
~/DarshakBisane$ tail -n 1 result.txt
This another file Of OS Lab
~/DarshakBisane$
```

```
~/DarshakBisane$ ls
backup_file  practical1.txt  result.txt
~/DarshakBisane$ head -n 1 practical1.txt
this is Practical of OS lab
~/DarshakBisane$ tail -n 1 result.txt
This another file Of OS Lab
~/DarshakBisane$ chmod u-r result.txt
~/DarshakBisane$ ls -l result.txt
--w-r--r-- 1 user user 56 Jan 27 14:08 result.txt
~/DarshakBisane$
```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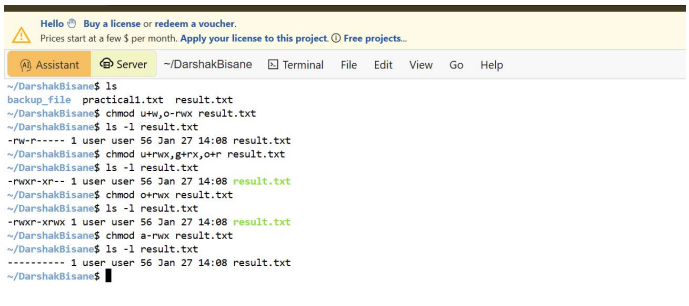
~/DarshakBisane$ ls
backup_file practical1.txt result.txt
~/DarshakBisane$ chmod u+w,o-rwx result.txt
~/DarshakBisane$ ls -l result.txt
-rw-r----- 1 user user 56 Jan 27 14:08 result.txt
~/DarshakBisane$ chmod u+rwx,g+rx,o+r result.txt
~/DarshakBisane$ ls -l result.txt
-rwxr-xr-- 1 user user 56 Jan 27 14:08 result.txt
~/DarshakBisane$ chmod o+rwx result.txt
~/DarshakBisane$ ls -l result.txt
-rwxr-xrwx 1 user user 56 Jan 27 14:08 result.txt
~/DarshakBisane$ chmod a-rwx result.txt
~/DarshakBisane$ ls -l result.txt
---------- 1 user user 56 Jan 27 14:08 result.txt
~/DarshakBisane$ chmod 700 result.txt
~/DarshakBisane$ ls -l result.txt
-rwx------ 1 user user 56 Jan 27 14:08 result.txt
~/DarshakBisane$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~/DarshakBisane$ chmod u+w,o-rwx result.txt
~/DarshakBisane$ ls -l result.txt
-rw-r----- 1 user user 56 Jan 27 14:08 result.txt
~/DarshakBisane$ chmod u+rwx,g+rx,o+r result.txt
~/DarshakBisane$ ls -l result.txt
-rwxr-xr-- 1 user user 56 Jan 27 14:08 result.txt
~/DarshakBisane$ chmod o+rwx result.txt
~/DarshakBisane$ ls -l result.txt
-rwxr-xrwx 1 user user 56 Jan 27 14:08 result.txt
~/DarshakBisane$ chmod a-rwx result.txt
~/DarshakBisane$ ls -l result.txt
---------- 1 user user 56 Jan 27 14:08 result.txt
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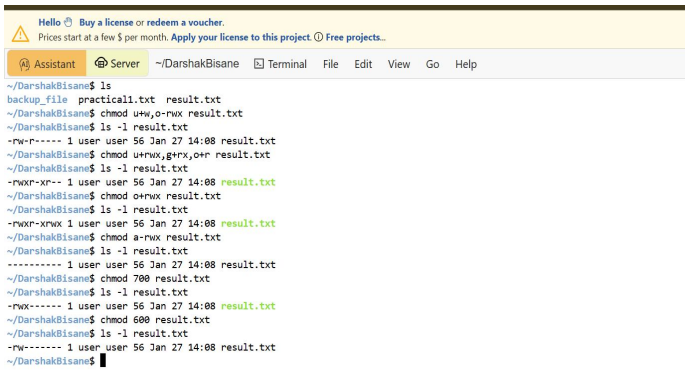
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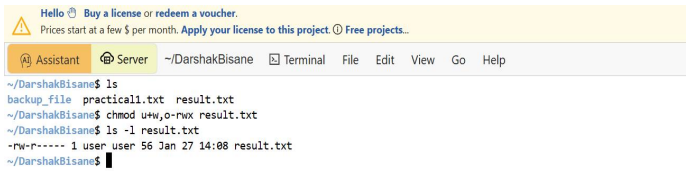
~/DarshakBisane$ ls
backup_file practical1.txt result.txt
~/DarshakBisane$ chmod u+w,o-rwx result.txt
~/DarshakBisane$ ls -l result.txt
-rw-r----- 1 user user 56 Jan 27 14:08 result.txt
~/DarshakBisane$ chmod u+rwx,g+rx,o+r result.txt
~/DarshakBisane$ ls -l result.txt
-rwxr-xr-- 1 user user 56 Jan 27 14:08 result.txt
~/DarshakBisane$ chmod o+rwx result.txt
~/DarshakBisane$ ls -l result.txt
-rwxr-xrwx 1 user user 56 Jan 27 14:08 result.txt
~/DarshakBisane$ chmod a-rwx result.txt
~/DarshakBisane$ ls -l result.txt
---------- 1 user user 56 Jan 27 14:08 result.txt
~/DarshakBisane$ chmod 700 result.txt
~/DarshakBisane$ ls -l result.txt
-rwx------ 1 user user 56 Jan 27 14:08 result.txt
~/DarshakBisane$ chmod 600 result.txt
~/DarshakBisane$ ls -l result.txt
-rw------- 1 user user 56 Jan 27 14:08 result.txt
~/DarshakBisane$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~/DarshakBisane$ ls
backup_file practical1.txt result.txt
~/DarshakBisane$ chmod u+w,o-rwx result.txt
~/DarshakBisane$ ls -l result.txt
-rw-r----- 1 user user 56 Jan 27 14:08 result.txt
~/DarshakBisane$


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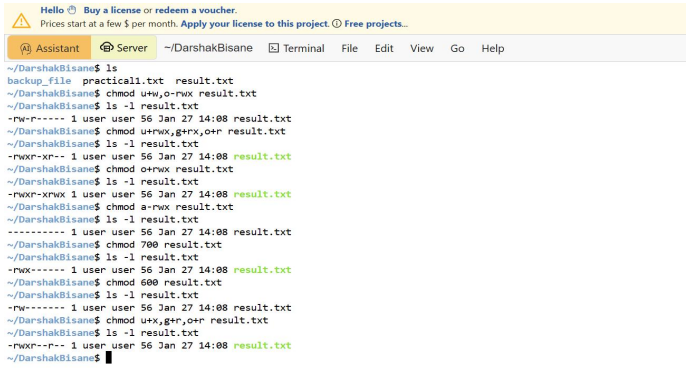
~/DarshakBisane$ ls
backup_file practical1.txt result.txt
~/DarshakBisane$ chmod u+w,o-rwx result.txt
~/DarshakBisane$ ls -l result.txt
-rw-r----- 1 user user 56 Jan 27 14:08 result.txt
~/DarshakBisane$ chmod u+rwx,g+rx,o+r result.txt
~/DarshakBisane$ ls -l result.txt
-rwxr-xr-- 1 user user 56 Jan 27 14:08 result.txt
~/DarshakBisane$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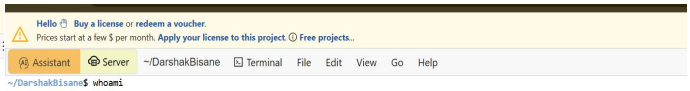
~/DarshakBisane$ ls
backup_file practical1.txt result.txt
~/DarshakBisane$ chmod u+w,o-rwx result.txt
~/DarshakBisane$ ls -l result.txt
-rw-r----- 1 user user 56 Jan 27 14:08 result.txt
~/DarshakBisane$ chmod u+rwx,g+rx,o+r result.txt
~/DarshakBisane$ ls -l result.txt
-rwxr-xr-- 1 user user 56 Jan 27 14:08 result.txt
~/DarshakBisane$ chmod o+rwx result.txt
~/DarshakBisane$ ls -l result.txt
-rwxr-xrwx 1 user user 56 Jan 27 14:08 result.txt
~/DarshakBisane$ chmod a-rwx result.txt
~/DarshakBisane$ ls -l result.txt
---------- 1 user user 56 Jan 27 14:08 result.txt
~/DarshakBisane$ chmod 700 result.txt
~/DarshakBisane$ ls -l result.txt
-rwx------ 1 user user 56 Jan 27 14:08 result.txt
~/DarshakBisane$ chmod 600 result.txt
~/DarshakBisane$ ls -l result.txt
-rw------- 1 user user 56 Jan 27 14:08 result.txt
~/DarshakBisane$ chmod u+x,g+r,o+r result.txt
~/DarshakBisane$ ls -l result.txt
-rwxr--r-- 1 user user 56 Jan 27 14:08 result.txt
~/DarshakBisane$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~/DarshakBisane$ whoami
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- **Conclusion:** In conclusion, understanding and using essential operating system commands like **'ls', 'cd', 'cp', 'mv', and 'chmod'** enables efficient file management, navigation, and permission control. Tools like **'grep', 'head', and 'tail'** enhance data processing. Mastery of these commands improves system administration, task automation, and overall system security and performance.

- **Discussion Questions:**

1. **What is the significance of the pwd command in a Linux environment?**
   Answer: The pwd (print working directory) command displays the absolute path of the current working directory. It helps verify the user's present location in the file system. Syntax: pwd.

2. **Explain the function of the cp command and its common options.**
   Answer: The cp command copies files or directories. Syntax: cp <source> <destination>. Options like -r copy directories recursively, and -i prompts before overwriting.

3. **How does chmod 700 affect file permissions, and what does each digit represent?**
   Answer: chmod 700 grants full permissions (read, write, execute) to the owner and no permissions to others. The digits represent permissions for the owner, group, and others, respectively.

4. **Describe the difference between head and tail commands in Linux.**
   Answer: The head command displays the first N lines of a file, while tail shows the last N lines. Both accept the -n option to specify the number of lines.

5. **What is the purpose of the grep command, and how is it used with regular expressions?**
   Answer: The grep command searches for patterns within files using regular expressions. Syntax: grep <pattern> <file>. It supports options like -i for case-insensitive search and -v to invert the match.

❖ **References**:

https://ubuntu.com/tutorials/command-line-for-beginners#1-overview
https://www.geeksforgeeks.org/25-basic-ubuntu-commands/

Date:___/___/2026

Signature
Course Coordinator
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Sem: 4 / 2025-26