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## Table of Contents

Operating System Lab 2 – Windows CMD.....	3
Lab Objective: .....	3
Execution of Windows CMD Commands: .....	3
Command 1: ipconfig .....	3
Command 2: ping .....	4
Command 3: tasklist.....	5
Command 4: cd .....	5
Command 5: dir .....	6
Command 6: echo My name > file.txt.....	7
Command 7: fc .....	8
Command 8: rename .....	9
Command 9: del.....	10
Command 10: tree .....	11
Command 11: mkdir.....	12
Command 12: rmdir .....	12
Theoretical Questions and Explanations.....	13
Lab Conclusion: .....	15

## Table of Figures

Figure 1: Command-1 Output Screenshot .....	3
Figure 2: Command-2 Output Screenshot .....	4
Figure 3: Command-3 Output Screenshot .....	5
Figure 4: Command-4 Output Screenshot .....	6
Figure 5: Command-5 Output Screenshot .....	7
Figure 6: Command-6 Output Screenshot .....	8
Figure 7: Command-7 Output Screenshot .....	9
Figure 8: Command-8 Output Screenshot .....	10
Figure 9: Command-9 Output Screenshot .....	10
Figure 10: Command-10 Output Screenshot .....	11
Figure 11: Command-11 Output Screenshot .....	12
Figure 12: Command-12 Output Screenshot .....	13

## Operating System Lab 2 – Windows CMD

### Lab Objective:

The objective of this lab is to understand and execute fundamental Command Prompt (CMD) commands in Windows. Through this activity, students will learn how to navigate directories, manage files, monitor network connectivity, and perform basic system operations using the command-line interface. This will help in developing practical skills for system management and troubleshooting.

### Execution of Windows CMD Commands:

#### Command 1: ipconfig

##### Purpose:

Displays the current IP configuration of your system, including IP address, subnet mask, and default gateway.

##### Explanation:

- Shows all active network adapters and their configurations.
- Useful for troubleshooting internet and local network connectivity.
- Provides DNS, DHCP, and physical (MAC) address details when used with /all.

##### Command Used:

*ipconfig*

```
C:\Users\hp>ipconfig

Windows IP Configuration

Unknown adapter Local Area Connection:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix  . : 

Wireless LAN adapter Local Area Connection* 1:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix  . : 

Wireless LAN adapter Local Area Connection* 2:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix  . : 

Wireless LAN adapter WiFi:

    Connection-specific DNS Suffix  . : bbrouter
    Link-local IPv6 Address . . . . . : fe80::1f16:c69d:be8f:d527%8
    IPv4 Address. . . . . : 192.168.1.4
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : 192.168.1.1

Ethernet adapter Bluetooth Network Connection:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix  . :
```

Figure 1: Command-1 Output Screenshot

**Output Explanation:**

Displays IPv4 and IPv6 addresses, default gateway, and subnet mask for each network adapter.

---

**Command 2: ping****Purpose:**

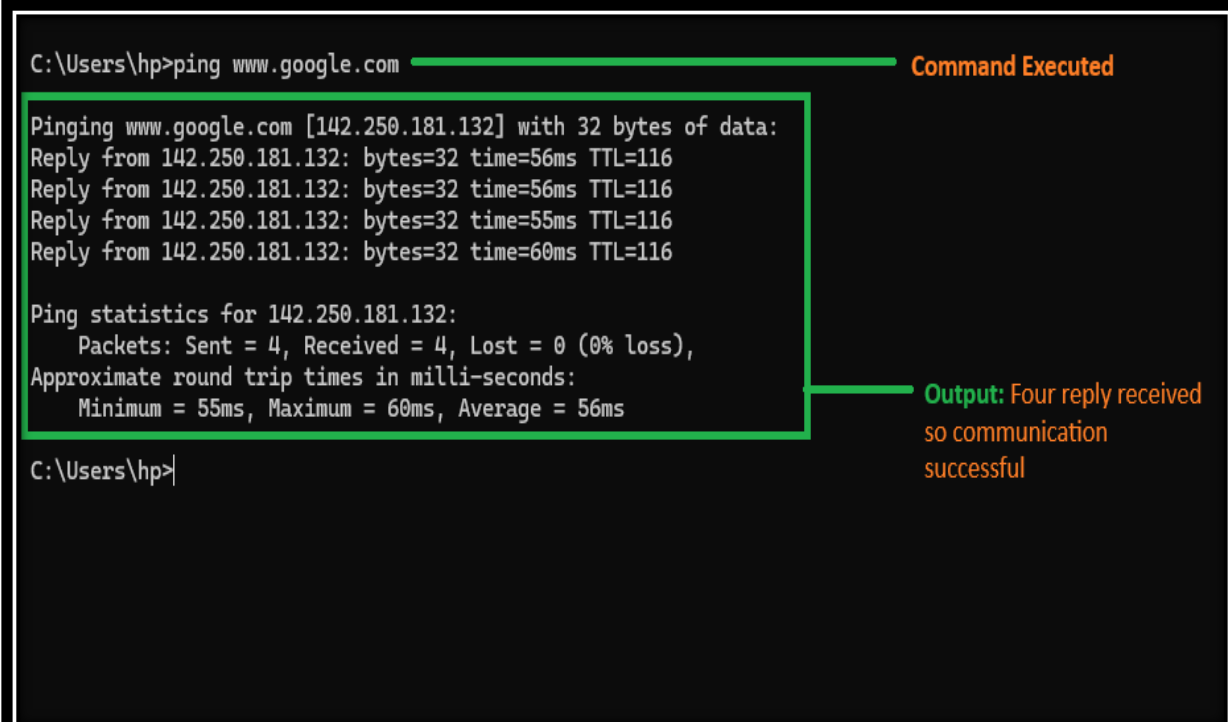
Tests network connectivity between your computer and another device or website.

**Explanation:**

- Sends small data packets (ICMP Echo Requests) to the target.
- Measures response time to determine connection quality.
- Useful for verifying if a website or IP address is reachable.

**Command Used:**

ping [www.google.com](http://www.google.com)



```
C:\Users\hp>ping www.google.com

Pinging www.google.com [142.250.181.132] with 32 bytes of data:
Reply from 142.250.181.132: bytes=32 time=56ms TTL=116
Reply from 142.250.181.132: bytes=32 time=56ms TTL=116
Reply from 142.250.181.132: bytes=32 time=55ms TTL=116
Reply from 142.250.181.132: bytes=32 time=60ms TTL=116

Ping statistics for 142.250.181.132:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 55ms, Maximum = 60ms, Average = 56ms

C:\Users\hp>
```

Command Executed

Output: Four reply received so communication successful

Figure 2: Command-2 Output Screenshot

**Output Explanation:**

Displays the time (in milliseconds) each packet took to travel, along with packet loss statistics.

### Command 3: tasklist

#### Purpose:

Displays all currently running programs and background processes.

#### Explanation:

- Lists process names, IDs (PIDs), session names, and memory usage.
- Helps identify which programs are using the most system resources.
- Useful for monitoring or troubleshooting performance issues.

#### Command Used:

tasklist

```
C:\Users\hp>tasklist
```

Image Name	PID	Session Name	Session#	Mem Usage
System Idle Process	0	Services	0	8 K
System	4	Services	0	176 K
Secure System	140	Services	0	106,608 K
Registry	184	Services	0	61,240 K
smss.exe	592	Services	0	1,736 K
csrss.exe	936	Services	0	6,880 K
wininit.exe	1016	Services	0	8,716 K
csrss.exe	676	Console	1	8,060 K
winlogon.exe	1028	Console	1	15,492 K
services.exe	1088	Services	0	12,608 K
LsaIso.exe	1108	Services	0	4,124 K
lsass.exe	1116	Services	0	34,296 K
svchost.exe	1244	Services	0	42,360 K
fontdrvhost.exe	1264	Console	1	8,288 K
fontdrvhost.exe	1272	Services	0	4,956 K
WUDFHost.exe	1356	Services	0	25,388 K
svchost.exe	1416	Services	0	19,724 K
svchost.exe	1456	Services	0	14,108 K
WUDFHost.exe	1544	Services	0	7,796 K
dwm.exe	1608	Console	1	176,708 K
svchost.exe	1764	Services	0	8,224 K
svchost.exe	1772	Services	0	7,080 K
svchost.exe	1788	Services	0	12,144 K
svchost.exe	1816	Services	0	11,784 K
svchost.exe	1828	Services	0	20,556 K
svchost.exe	1856	Services	0	17,308 K
svchost.exe	1964	Services	0	14,640 K
svchost.exe	1988	Services	0	15,528 K
svchost.exe	2024	Services	0	10,756 K
WUDFHost.exe	1072	Services	0	14,712 K
svchost.exe	1508	Services	0	17,392 K
svchost.exe	2084	Services	0	11,560 K
svchost.exe	2136	Services	0	13,992 K
IntelCpHDCPSvc.exe	2172	Services	0	10,124 K
svchost.exe	2224	Services	0	21,908 K
svchost.exe	2232	Services	0	11,884 K
svchost.exe	2202	Services	0	7,828 K
svchost.exe	2344	Services	0	10,680 K
svchost.exe	2404	Services	0	13,068 K
svchost.exe	2488	Services	0	22,140 K
svchost.exe	2520	Services	0	9,256 K

Command Executed

Displayed a list of all currently running processes and services on the computer.

Figure 3: Command-3 Output Screenshot

#### Output Explanation:

Shows all active processes running on the system, including applications and services.

### Command 4: cd

#### Purpose:

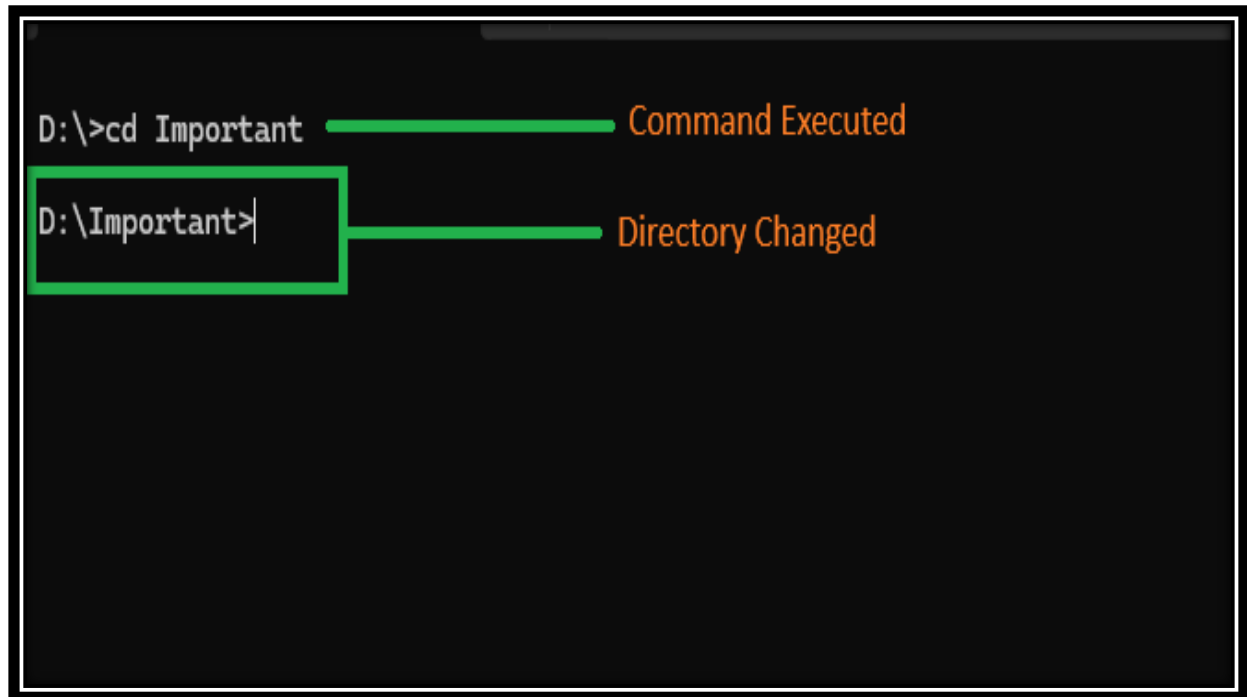
Used to navigate between directories (folders) in the file system.

**Explanation:**

- `cd foldername` moves into a specific folder.
- `cd ..` moves up one directory level.
- Helps organize file operations efficiently.

**Command Used:**

`cd Important`



*Figure 4: Command-4 Output Screenshot*

**Output Explanation:**

Changes the current directory path, which is shown before the command prompt cursor.

---

**Command 5: dir****Purpose:**

Lists all files and folders in the current directory.

**Explanation:**

- Displays filenames, sizes, and modification dates.
- Helps verify which files exist before performing file operations.

- Can use /p to pause per screen or /w for wide listing.

```
D:\Important>dir
Volume in drive D has no label.
Volume Serial Number is C4CA-A0E0

Directory of D:\Important

08/17/2025  10:43 PM  <DIR>          .
06/19/2025  05:36 PM  <DIR>          book
12/24/2024  10:33 PM  <DIR>          Books
12/26/2024  09:28 PM  <DIR>          C++ COURSES
06/19/2025  05:35 PM  <DIR>          Coding Books
08/17/2025  10:46 PM  <DIR>          DataToBeCopied
12/26/2024  09:38 PM  <DIR>          Extra Notes
12/30/2024  02:06 PM  <DIR>          PortFolio
12/31/2024  07:31 PM  <DIR>          VS Code
10/12/2025  12:21 AM  <DIR>          WEB DEVELOPMENT
               0 File(s)              0 bytes
            10 Dir(s) 113,783,054,336 bytes free

D:\Important>
```

Command Executed

Listed all the files and Folders in the directory

Figure 5: Command-5 Output Screenshot

### Command Used:

dir

### Output Explanation:

Shows a detailed list of contents in the current directory, including folders and files.

---

### Command 6: echo My name > file.txt

#### Purpose:

Creates a new text file and writes content to it.

#### Explanation:

- echo displays text or messages.
- > operator redirects output to a file (creating or overwriting it).
- Commonly used in automation or for creating log files.

**Command Used:**

echo My name > file1.txt

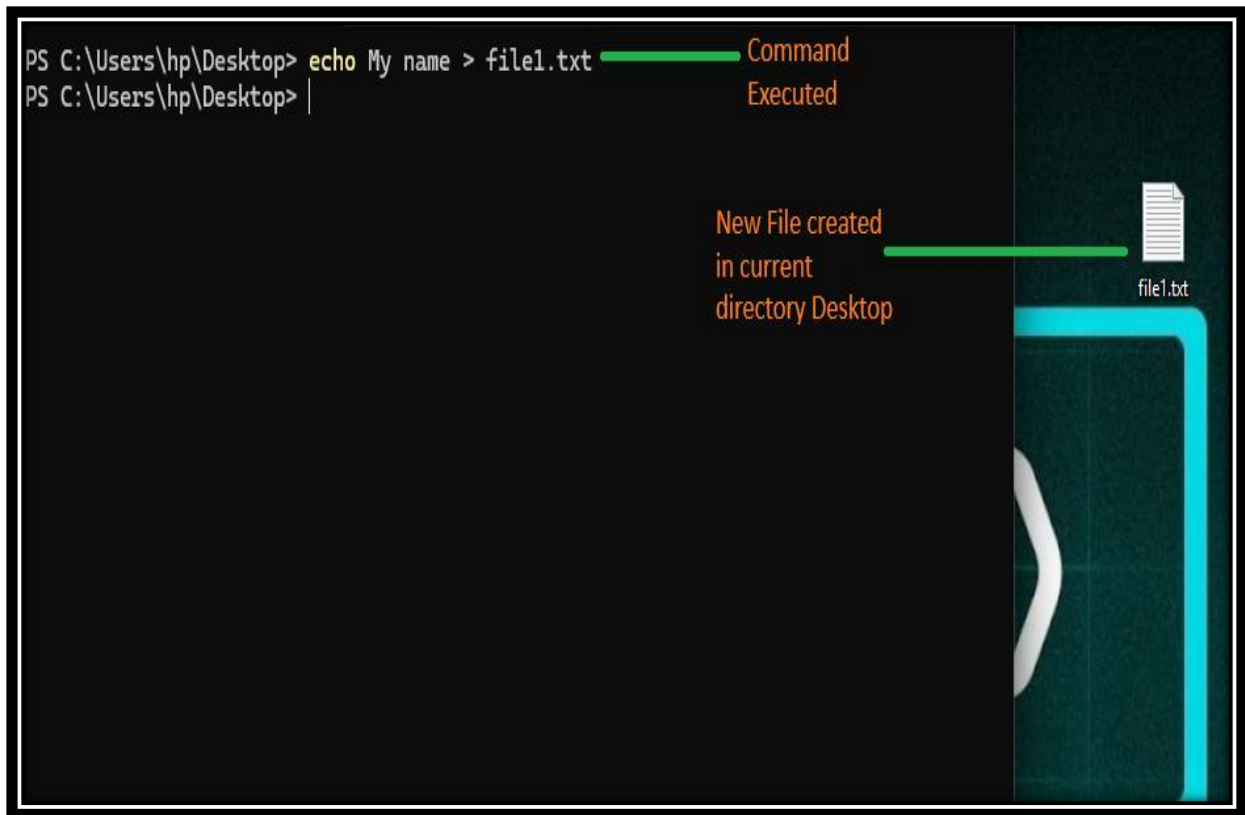


Figure 6: Command-6 Output Screenshot

**Output Explanation:**

Creates a new file named *file1.txt* containing the text “My name.”

---

**Command 7: fc****Purpose:**

Compares the contents of two text files line by line.

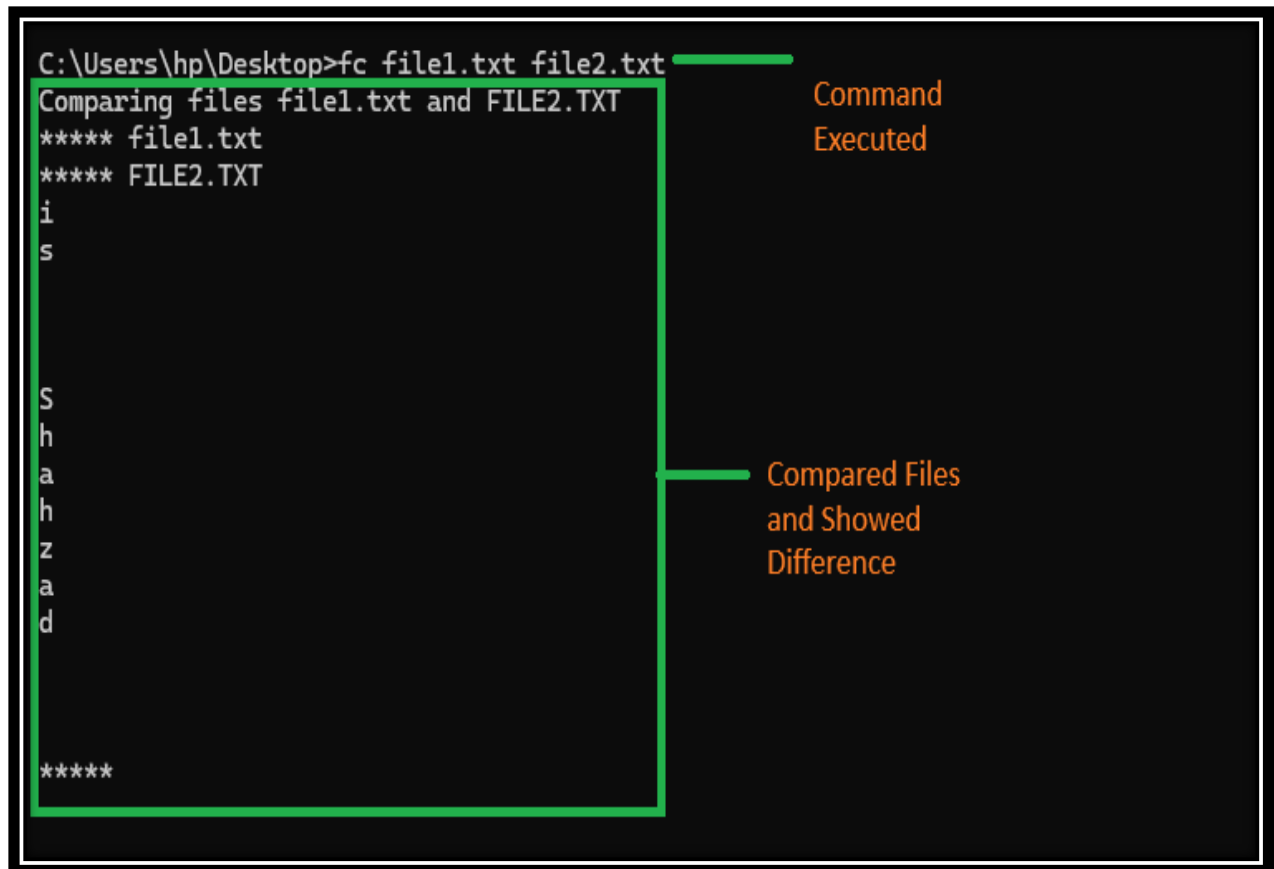
**Explanation:**

- Highlights differences between files.
- Useful for code comparison or verifying file changes.
- Shows which lines differ and where.
- Here file1.txt and file2.txt will be compared



**Command Used:**

fc file1.txt file2.txt



```
C:\Users\hp\Desktop>fc file1.txt file2.txt
Comparing files file1.txt and FILE2.TXT
***** file1.txt
***** FILE2.TXT
i
s

S
h
a
h
z
a
d

*****
```

Command Executed

Compared Files and Showed Difference

Figure 7: Command-7 Output Screenshot

**Output Explanation:**

Displays all differing lines between the two files, helping identify modifications.

---

**Command 8: rename****Purpose:**

Renames a file or folder.

**Explanation:**

- Helps in organizing files properly.
- Syntax: rename oldname newname.
- Does not affect file content, only the name.

### Command Used:

rename file2.txt name.txt

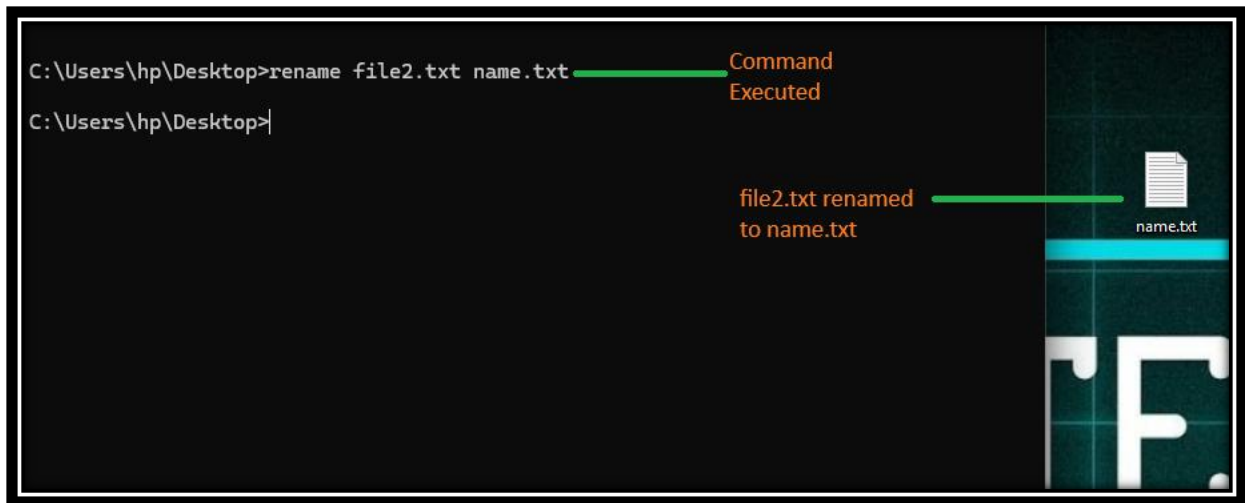


Figure 8: Command-8 Output Screenshot

### Output Explanation:

Changes the filename to *name.txt* in the same directory.

### Command 9: del

#### Purpose:

Deletes a file permanently from the system.

#### Explanation:

- Removes specified files from the current directory.
- Supports wildcards like \*.txt to delete multiple files.
- Does not send files to Recycle Bin.

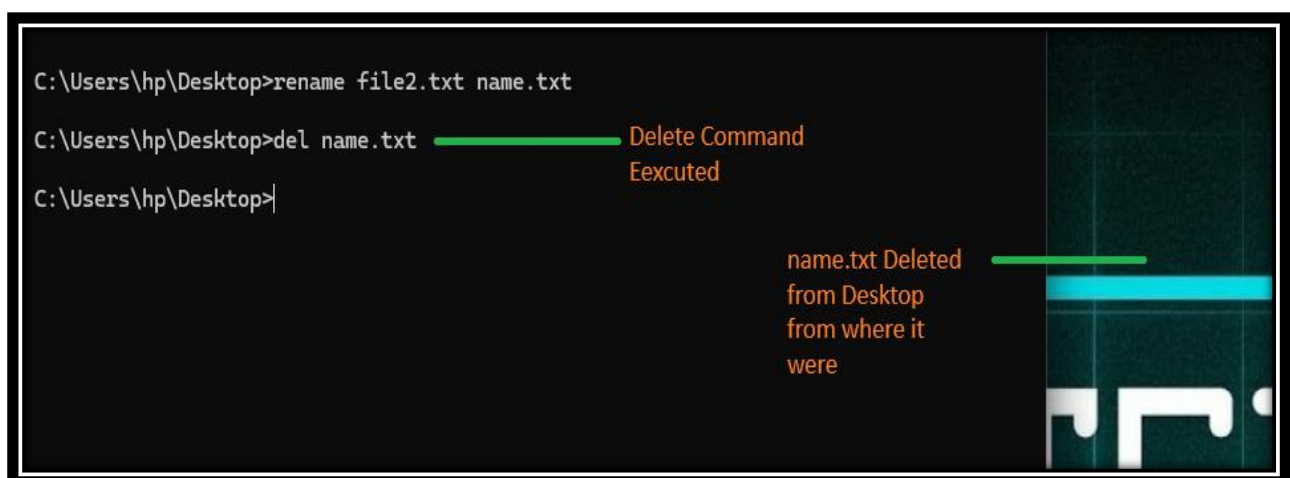


Figure 9: Command-9 Output Screenshot

**Command Used:**

del name.txt

**Output Explanation:**

Deletes the specified file and confirms successful removal in CMD.

---

**Command 10: tree****Purpose:**

Displays the folder structure of a drive or directory in a graphical tree-like format.

**Explanation:**

- Shows all directories and subdirectories hierarchically.
- Helps visualize folder organization.
- Adding /f also lists files within each directory.

**Command Used:**

tree

```
C:\Users\hp\Desktop\JavaScript Projects>tree /f
Folder PATH listing
Volume serial number is 0CC6-D210
C:..
|   Analog Clock - Dark & Light.zip
|   Analog Clock with Dark & White Mode.zip
|   Neumorphism-Calculator-Dark-Light.zip
|   show-hide-password-main.zip
|
|--- dist
|      index.html
|      script.js
|      style.css
|
|--- Show & Hide Passwords
|      Index.html
|      Script.Js
|      Style.Css
|
C:\Users\hp\Desktop\JavaScript Projects>
```

Command Executed

Showing the sub Folders and files of the current Folder Visually

Figure 10: Command-10 Output Screenshot

**Output Explanation:**

Displays a structured view of directories and subdirectories on the screen, giving a clear folder hierarchy.

### Command 11: mkdir

#### Purpose:

Creates a new directory (folder).

#### Explanation:

- Used to organize files by grouping them into folders.
- You can also create nested folders using the full path.
- Example: mkdir Projects\Lab2 creates both folders if they don't exist.

#### Command Used:

mkdir hello

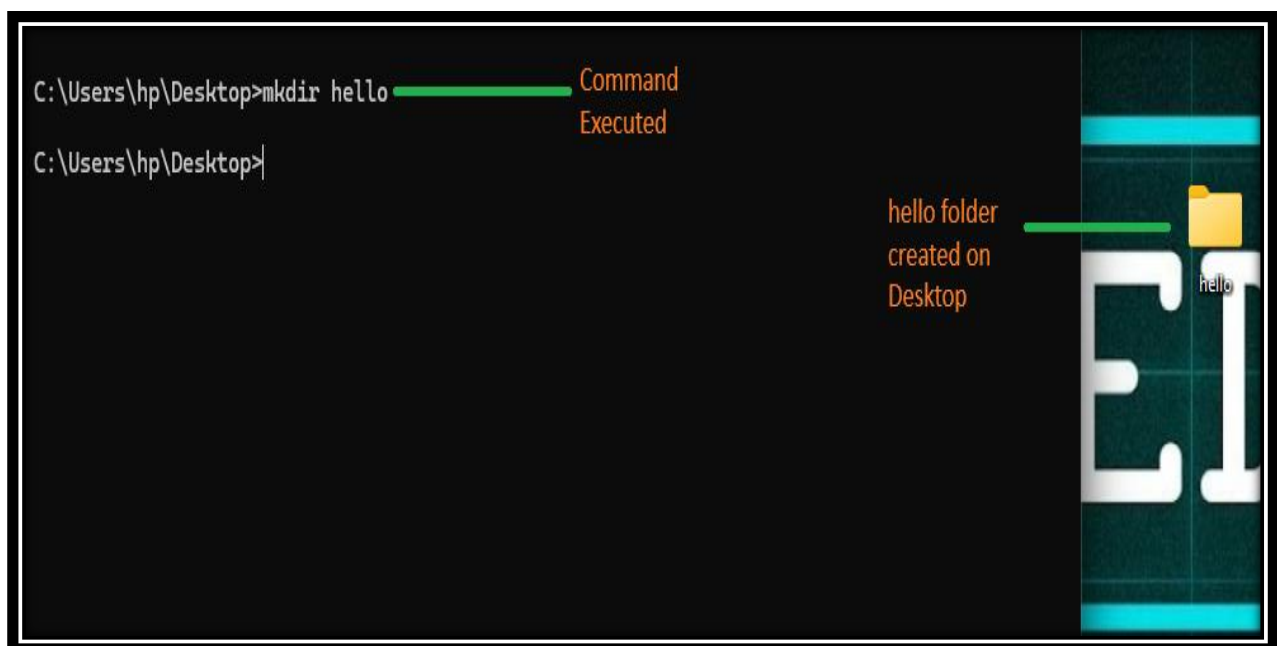


Figure 11: Command-11 Output Screenshot

#### Output Explanation:

Creates a new folder named *project* in the current directory.

---

### Command 12: rmdir

#### Purpose:

Removes (deletes) a directory.

#### Explanation:

- rmdir foldername deletes an empty folder.
- Use /s /q to delete a folder and all its contents quietly.
- Must be used carefully, as deletion is permanent.
-

**Command Used:**

rmmdir hello



Figure 12: Command-12 Output Screenshot

**Output Explanation:**

Deletes the folder *project* if it is empty.

---

## Theoretical Questions and Explanations

**Q1) What is the purpose of the Command Prompt in Windows?**

The Command Prompt serves as a command-line interpreter in Windows that allows users to interact directly with the operating system. It is used to execute commands that perform tasks such as file management, system configuration, and network troubleshooting. It provides more control and flexibility compared to the graphical user interface.

**Q2) Describe the steps to open Command Prompt as an Administrator.**

1. Click on the **Start Menu** and type “cmd” in the search bar.
2. Right-click on **Command Prompt** from the search results.
3. Select “**Run as Administrator**” from the context menu.
4. A **User Account Control (UAC)** window may appear; click “**Yes**” to grant permission.

This opens the Command Prompt with administrative privileges, allowing the execution of system-level commands.

**Q3) Explain the function of ten commands you executed.**

- **ipconfig:** Displays the network configuration details of your system such as IP address, subnet mask, and default gateway.
- **ping:** Tests the connectivity between your computer and another device or server on a network.
- **tasklist:** Shows all currently running processes on the system, including their process IDs and memory usage.
- **cd:** Changes the current directory, allowing you to navigate between folders.
- **dir:** Lists all files and subdirectories within the current directory.
- **echo:** Displays a message or writes text into a file.
- **fc:** Compares two files and displays the differences between them.
- **rename:** Changes the name of an existing file or folder.
- **del:** Deletes one or more files permanently from the specified directory.
- **tree:** Displays the folder structure of the current drive or directory in a hierarchical format.
- **mkdir:** Creates a new directory or folder in the specified location.
- **rmdir:** Removes an empty directory from the system.

**Q4) Which command is used to list active network connections and their ports?**

This command displays all active network connections along with their associated ports, protocols, and IP addresses. It helps in monitoring open connections and identifying potential security issues or active communications between devices.

**Q5) What information does the whoami /all command display?**

It provides detailed information about the current logged-in user, including username, domain, privileges, and security identifiers (SIDs). It is often used for auditing and verifying user access rights in a Windows environment.

**Q6) How can you check your Windows version using CMD? Write the command and explain the output.**

This command displays the version of the Windows operating system, along with build number and internal version details. It helps in verifying system compatibility or identifying the exact OS version when troubleshooting.

### **Q7) What precautions should be taken when running commands with administrative privileges?**

Running commands with administrative privileges should be done carefully, as such commands can make permanent changes to the system. It is important to:

- Ensure you understand what the command does before executing it.
- Avoid deleting or modifying system files.
- Run elevated commands only when absolutely necessary.
- Always keep backups of important data to prevent accidental loss.

---

### **Lab Conclusion:**

This lab provided hands-on experience with essential Windows Command Prompt (CMD) commands that are widely used for system navigation, file management, and network troubleshooting. By executing and analyzing each command, I gained a clearer understanding of how CMD interacts with the operating system at a deeper level. The exercise improved my confidence in using the command-line interface for performing real-life administrative and operational tasks efficiently. Overall, this practical exposure reinforced my foundational knowledge of operating systems and system-level control through CMD.