

OS Report DEF

by Ethan Furbert

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1. Introduction

Operating Systems (OS) are fundamental components of modern computing, acting as intermediaries between hardware and software. They provide an essential framework for managing computing resources, executing applications, and facilitating user interaction with devices. OS play a crucial role in ensuring stability, security, and efficiency, making them a cornerstone of IT infrastructure in both personal and enterprise environments (Silberschatz et al., 2020).

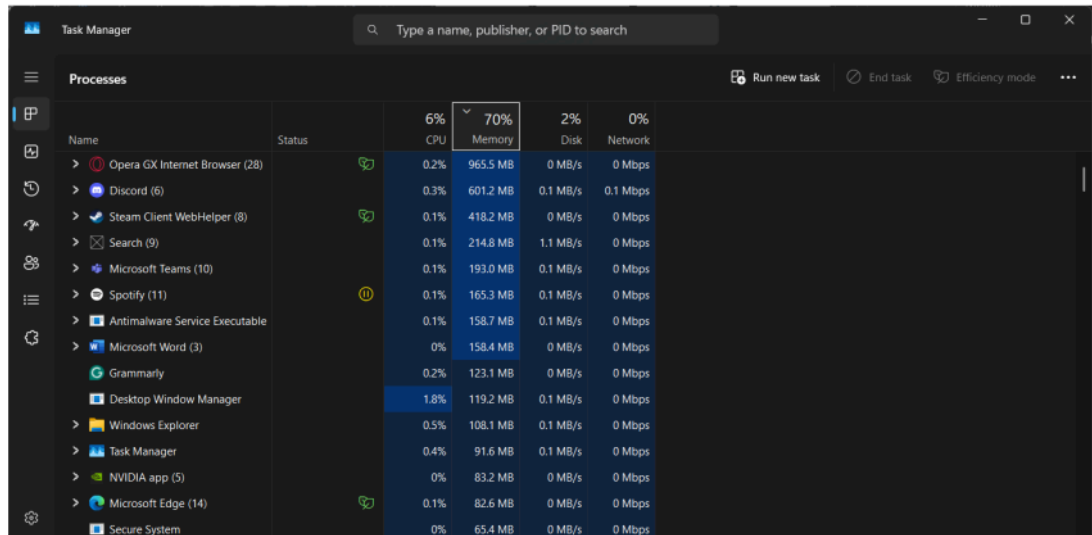
This report examines key OS functions, explores the usage of command-line interfaces (CLI) in Windows and Linux, and delves into scripting techniques for automation. The objective is to provide a comprehensive understanding of how these tools enable system administrators and users to manage, optimize, and automate system processes effectively. The report is supplemented with practical demonstrations, including screenshots and script examples.

2. Key Functions of General Operating Systems

Operating Systems perform several critical functions to ensure efficient system operation. These include:

- **Process Management:** The OS manages processes by scheduling tasks, allocating CPU time, and handling process synchronization. Efficient process

management ensures smooth multitasking and system stability (Silberschatz et al., 2020). For example, using the Task Manager on Windows or the top command on Linux provides insights into CPU and memory utilization by each process.



The screenshot shows the Windows Task Manager window with the 'Processes' tab selected. A search bar at the top allows filtering by name, publisher, or PID. The main area displays a list of running processes with columns for Name, Status, CPU usage, Memory usage, Disk usage, and Network usage. The 'CPU' column is currently selected, showing a range from 0% to 70%. The 'Memory' column shows usage from 65.4 MB to 965.5 MB. The 'Disk' column shows usage from 0 MB/s to 1.1 MB/s. The 'Network' column shows usage from 0 Mbps to 0.1 Mbps. The 'Status' column shows icons for each process, such as a green checkmark for responsive processes and a yellow warning icon for unresponsive ones.

Name	Status	CPU	Memory	Disk	Network
Opera GX Internet Browser (28)	Responsive	0.2%	965.5 MB	0 MB/s	0 Mbps
Discord (6)	Responsive	0.3%	601.2 MB	0.1 MB/s	0.1 Mbps
Steam Client WebHelper (8)	Responsive	0.1%	418.2 MB	0 MB/s	0 Mbps
Search (9)	Responsive	0.1%	214.8 MB	1.1 MB/s	0 Mbps
Microsoft Teams (10)	Responsive	0.1%	193.0 MB	0.1 MB/s	0 Mbps
Spotify (11)	Unresponsive	0.1%	165.3 MB	0.1 MB/s	0 Mbps
Antimalware Service Executable	Responsive	0.1%	158.7 MB	0.1 MB/s	0 Mbps
Microsoft Word (3)	Responsive	0%	158.4 MB	0 MB/s	0 Mbps
Grammarly	Responsive	0.2%	123.1 MB	0 MB/s	0 Mbps
Desktop Window Manager	Responsive	1.8%	119.2 MB	0.1 MB/s	0 Mbps
Windows Explorer	Responsive	0.5%	108.1 MB	0.1 MB/s	0 Mbps
Task Manager	Responsive	0.4%	91.6 MB	0.1 MB/s	0 Mbps
NVIDIA app (5)	Responsive	0%	83.2 MB	0 MB/s	0 Mbps
Microsoft Edge (14)	Responsive	0.1%	82.6 MB	0 MB/s	0 Mbps
Secure System	Responsive	0%	65.4 MB	0 MB/s	0 Mbps

Task Manager Summary

Task Manager is a built-in Windows tool that shows what apps, processes, and services are currently running on your computer. It's helpful for:

- Monitoring performance (CPU, memory, disk, network usage)
- Closing unresponsive programs
- Managing startup programs
- Checking what's running in the background
- Viewing user sessions and system resource usage

How to Open Task Manager

Methods:

1. **Keyboard shortcut:**
Ctrl + Shift + Esc
2. **Right-click taskbar:**
Select **Task Manager**

3. **Start menu search:**
Type "**Task Manager**" and hit Enter
 4. **Ctrl + Alt + Delete** screen → Select **Task Manager**
-

How to Use Task Manager

1. Processes Tab

- View and end tasks/programs
- Right-click any process → **End task** to force close it
- Check what's using the most CPU, memory, or disk

2. Performance Tab

- Real-time graphs for CPU, Memory, Disk, GPU, and Network
- Useful for diagnosing slowdowns

3. App History Tab

- See resource usage over time for apps (mostly for Windows Store apps)

4. Startup Tab

- Manage programs that launch on boot
- Right-click → **Enable/Disable** to change startup behavior

5. Users Tab

- See logged-in users and their resource usage

6. Details Tab

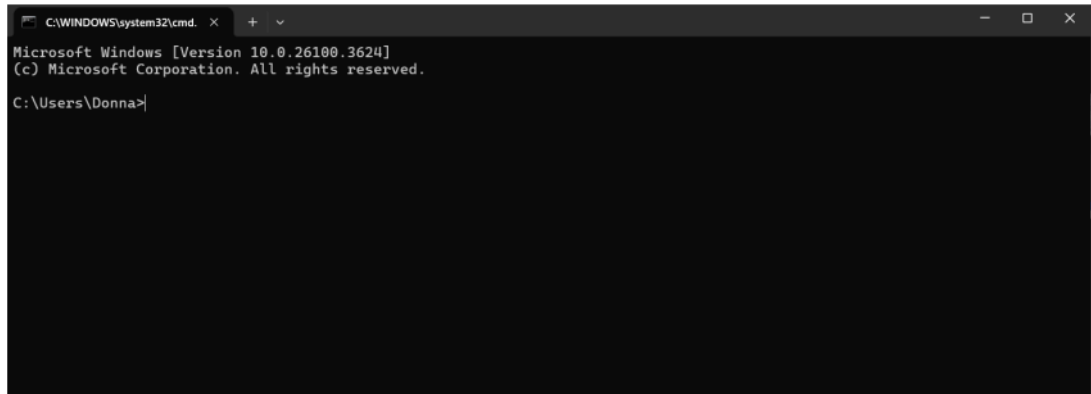
- Advanced info on each process (PID, status, CPU use)
- Right-click for more control like setting priority or affinity

7. Services Tab

- View running services
- Right-click to **Start**, **Stop**, or **Restart** a service

- **Memory Management:** It dynamically allocates and deallocates RAM to processes, manages virtual memory, and optimizes paging techniques to

enhance performance and prevent memory leaks (Tanenbaum & Bos, 2015). Virtual memory allows systems to compensate for shortages of physical memory by temporarily transferring data from RAM to disk storage.



Command Prompt (CMD) – Summary

Command Prompt, also known as **CMD**, is a command-line interpreter for Windows OS. It lets users interact with the system using text commands to perform various tasks like navigating files, running programs, or troubleshooting.

- **Launch it:**
Press Windows + R, type cmd, and hit **Enter**
OR search "Command Prompt" in the Start Menu.
- **Common Uses:**
 - File and folder navigation
 - Running scripts or programs
 - System diagnostics and repairs
 - Network commands

Basic CMD Commands – How To

1. Navigate Files and Folders

Command	What It Does
dir	Lists files/folders in current dir
cd foldername	Enters a folder

Command	What It Does
cd ..	Moves up one folder level
cd \	Goes to the root directory

2. Create, Delete, Rename Files/Folders

Command	What It Does
mkdir NewFolder	Creates a new folder
del filename.txt	Deletes a file
rmdir FolderName /s /q	Deletes folder & contents (careful!)
rename old.txt new.txt	Renames a file

3. System Info and Network

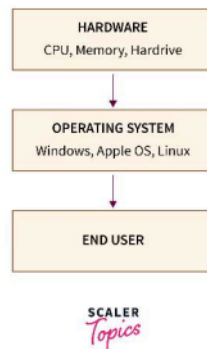
Command	What It Does
ipconfig	Shows IP address and network info
ping google.com	Checks if internet connection is active
systeminfo	Shows detailed PC info
tasklist	Lists running processes
chkdsk	Checks disk for errors

4. Useful Tools

Command	What It Does
cls	Clears the screen
exit	Closes Command Prompt
help	Lists all available commands

Command	What It Does
command /?	Shows help for a specific command

- **File System Management:** The OS organizes data through hierarchical directory structures, manages file permissions, and provides access control to prevent unauthorized modifications (Stallings, 2018). File Explorer in Windows and the ls -l command in Linux show file details, ownership, and permissions.



File Management – Summary

File management is the process of handling, organizing, and maintaining files and folders on a computer or digital system. It helps keep data accessible, secure, and efficient to retrieve and use.

Key Concepts:

- **Files:** Individual documents, images, videos, programs, etc.
- **Folders (Directories):** Containers to organize multiple files and subfolders.
- **File Paths:** The location of a file or folder (e.g., C:\Users\Name\Documents\File.txt)
- **File Extensions:** Suffixes that define file types (e.g., .docx, .jpg, .pdf)
- **Storage Options:** Local drives, cloud storage (Google Drive, OneDrive), external drives.

How To: Manage Files Effectively

1. Organize with Folders

- Create a clear folder structure based on categories like work, personal, school, media, etc.
- Use subfolders for specific projects or topics (e.g., Work > Project_A > Reports).

2. Name Files Clearly

- Use descriptive names that make files easy to find (e.g., Invoice_2025_April.pdf)
- Avoid vague names like doc1.docx or image123.jpg.

3. Use Consistent Naming Conventions

- Date format: YYYY-MM-DD (e.g., 2025-04-07_MeetingNotes)
- Use underscores or dashes instead of spaces for better compatibility across systems.

4. Regularly Backup Your Files

- Use cloud services like Google Drive, Dropbox, or OneDrive.
- Or, backup to external hard drives or USBs.

5. Delete or Archive Old Files

- Remove duplicates or outdated versions.
- Archive important files into ZIP folders or move to an "Archive" folder.

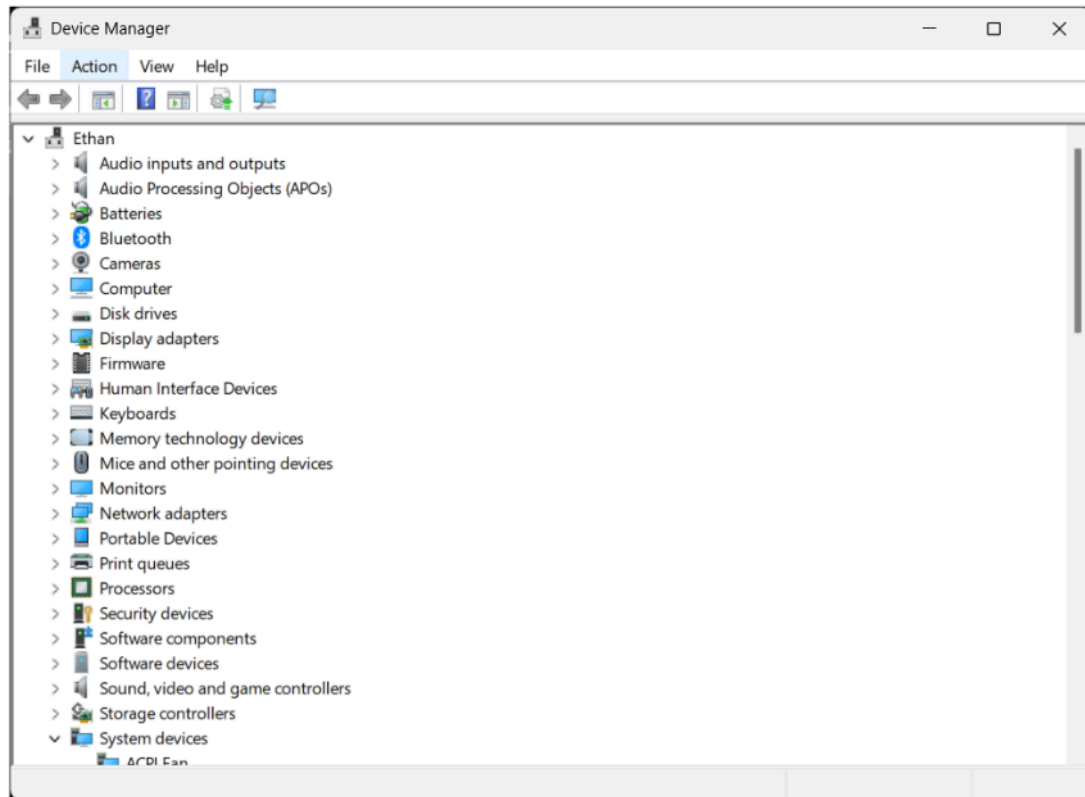
6. Search and Tag (Optional)

- Use built-in OS tools to search by name, type, or date.
- Some systems allow tagging files for quicker categorization.

Bonus Tips:

- Set a weekly or monthly time to clean and organize.
- Use software tools like file managers (e.g., **Windows Explorer**, **macOS Finder**, or apps like **Total Commander** or **FileZilla**).
- Use version control tools (like **Git**) for coding or document tracking.

- **Device Management:** It facilitates communication between software and hardware components via device drivers. The OS ensures that peripherals such as printers, USB drives, and network cards function correctly within the system (Russinovich et al., 2021). For instance, the Device Manager in Windows shows all installed hardware and associated drivers.



Summary of Device Manager

Device Manager is a built-in Windows tool that lets you view and manage the hardware connected to your computer. It shows a categorized list of all recognized devices—like keyboards, mice, network adapters, display drivers, and more.

You can use it to:

- Check if hardware is working properly
- Update drivers
- Enable or disable devices
- Uninstall or roll back drivers

- View hardware properties and details
-

How To Use Device Manager

1. Open Device Manager

- Press **Windows Key + X** and select **Device Manager**
 - OR: Press **Windows Key + R**, type devmgmt.msc, and hit **Enter**
-

2. View Devices

- You'll see a list organized by hardware category (e.g., Display adapters, Network adapters).
 - Click the > arrow next to a category to expand it.
-

3. Check Device Status

- Right-click a device > **Properties**
 - Under the **General** tab, check the **Device status** box for any issues.
-

4. Update Drivers

- Right-click a device > **Update driver**
 - Choose:
 - **Search automatically** (lets Windows find drivers online)
 - **Browse my computer** (for manual installation)
-

5. Enable / Disable a Device

- Right-click the device > select **Enable device** or **Disable device**
-

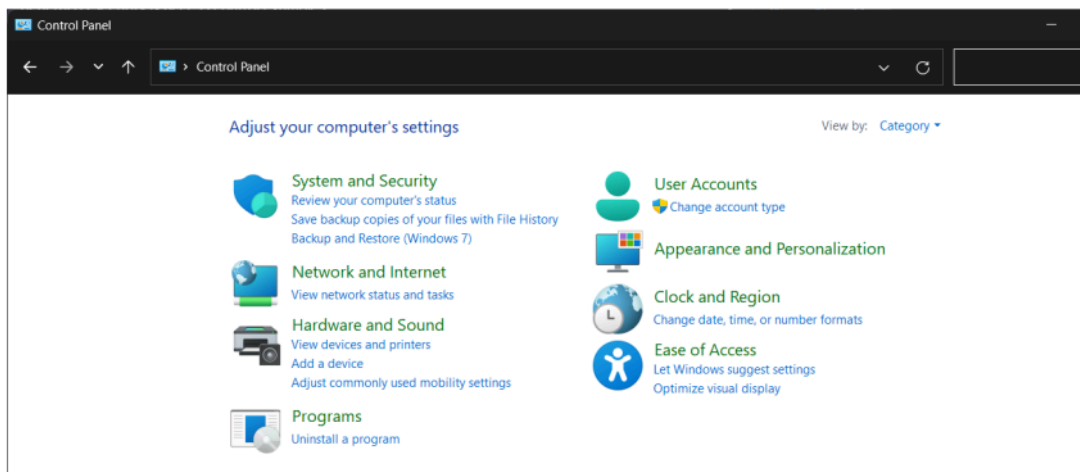
6. Uninstall a Device

- Right-click > **Uninstall device**

- For a clean reinstall, check **Delete the driver software for this device** if available

7. Roll Back a Driver

- If an update caused issues:
 - Right-click > **Properties** > **Driver tab** > **Roll Back Driver** (only if available)
- **Security & Access Control:** Modern OS employs authentication protocols, encryption, and firewall mechanisms to protect against malware, data breaches, and cyber threats. These security features play a vital role in system integrity and user data protection (Nemeth, 2017). Linux utilizes user groups and permission flags, while Windows provides centralized access control via Active Directory.



Control Panel – Summary

The **Control Panel** in Windows is a central hub for managing system settings and configurations. It allows users to customize the appearance and functionality of their computer, manage hardware, install or uninstall programs, and control user accounts and system security.

How to Open Control Panel

Method 1: Search

1. Click the **Start** button or press the **Windows key**.
2. Type “**Control Panel**” in the search box.
3. Click the **Control Panel** app from the results.

Method 2: Run Command

1. Press **Windows + R** to open the Run dialog.
2. Type control and press **Enter**.

Method 3: File Explorer

1. Open **File Explorer**.
2. In the address bar, type Control Panel and press **Enter**.

Key Features in Control Panel

Feature	Description
System and Security	Manage system settings, Windows updates, and firewall.
Network and Internet	Set up network connections, Wi-Fi, and internet options.
Hardware and Sound	Manage printers, devices, sound settings, and power options.
Programs	Uninstall or change installed programs and Windows features.
User Accounts	Change account types, passwords, and manage family settings.
Appearance and Personalization	Adjust screen resolution, themes, and taskbar settings.
Clock and Region	Set time, date, and regional formats.
Ease of Access	Accessibility options for easier computer use.

Tips

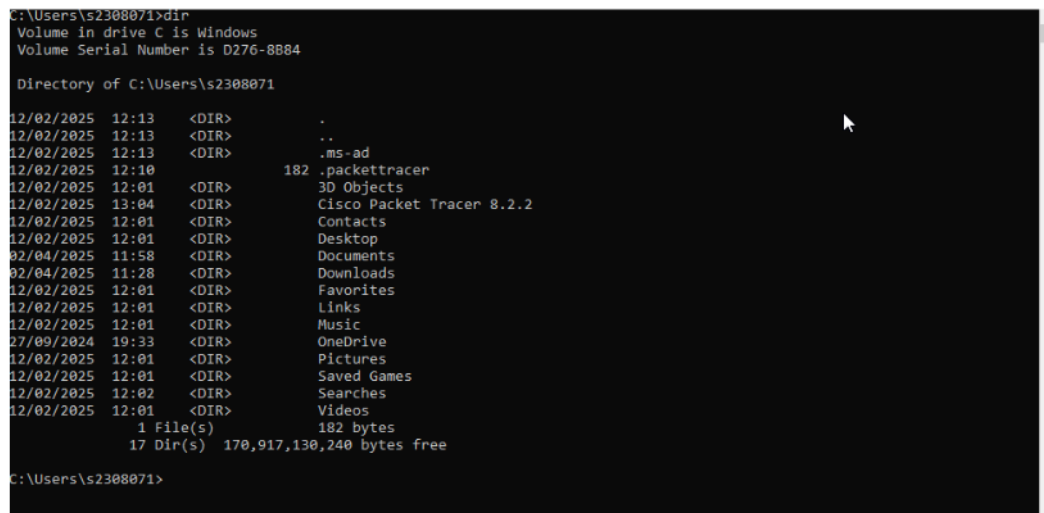
- Use the **View by:** dropdown (top right corner) to switch between **Category**, **Large icons**, or **Small icons** for easier navigation.
- Consider using **Settings** (the newer interface) in Windows 10/11 for modern features.

Screenshots demonstrated by Task Manager, File Explorer, and Command Prompt functionalities will be included to illustrate these key functions in real-world scenarios.

3. Use of Windows OS CLI Commands

The Windows Command Line Interface (CLI) is an essential tool for administrators and advanced users, offering powerful system management capabilities beyond the graphical interface. CLI commands are used for troubleshooting, configuration, and automation. Some essential Windows CLI commands include:

1. `dir` - Lists directory contents, showing file and folder details.



```
C:\Users\s2308071>dir
Volume in drive C is Windows
Volume Serial Number is D276-8B84

Directory of C:\Users\s2308071

12/02/2025  12:13    <DIR>          .
12/02/2025  12:13    <DIR>          ..
12/02/2025  12:13    <DIR>          .ms-ad
12/02/2025  12:10    <DIR>          182 .packettracer
12/02/2025  12:01    <DIR>          3D Objects
12/02/2025  13:04    <DIR>          Cisco Packet Tracer 8.2.2
12/02/2025  12:01    <DIR>          Contacts
12/02/2025  12:01    <DIR>          Desktop
02/04/2025  11:58    <DIR>          Documents
02/04/2025  11:28    <DIR>          Downloads
12/02/2025  12:01    <DIR>          Favorites
12/02/2025  12:01    <DIR>          Links
12/02/2025  12:01    <DIR>          Music
27/09/2024  19:33    <DIR>          OneDrive
12/02/2025  12:01    <DIR>          Pictures
12/02/2025  12:01    <DIR>          Saved Games
12/02/2025  12:02    <DIR>          Searches
12/02/2025  12:01    <DIR>          Videos
               1 File(s)          182 bytes
               17 Dir(s) 170,917,130,240 bytes free

C:\Users\s2308071>
```

2. `cd` - Changes the current directory, allowing navigation through the file system.
3. `ipconfig` - Displays network configuration details, including IP addresses and default gateways.
4. `ping` - Tests connectivity to other network devices or websites.

```
C:\Users\s2308071>ping

Usage: ping [-t] [-a] [-n count] [-l size] [-f] [-i TTL] [-v TOS]
          [-r count] [-s count] [[-j host-list] | [-k host-list]]
          [-w timeout] [-R] [-S srcaddr] [-c compartment] [-p]
          [-4] [-6] target_name

Options:
  -t          Ping the specified host until stopped.
              To see statistics and continue - type Control-Break;
              To stop - type Control-C.
  -a          Resolve addresses to hostnames.
  -n count    Number of echo requests to send.
  -l size     Send buffer size.
  -f          Set Don't Fragment flag in packet (IPv4-only).
  -i TTL      Time To Live.
  -v TOS      Type Of Service (IPv4-only. This setting has been deprecated
              and has no effect on the type of service field in the IP
              Header).
  -r count    Record route for count hops (IPv4-only).
  -s count    Timestamp for count hops (IPv4-only).
  -j host-list Loose source route along host-list (IPv4-only).
  -k host-list Strict source route along host-list (IPv4-only).
  -w timeout  Timeout in milliseconds to wait for each reply.
  -R          Use routing header to test reverse route also (IPv6-only).
              Per RFC 5095 the use of this routing header has been
              deprecated. Some systems may drop echo requests if
              this header is used.
  -S srcaddr  Source address to use.
  -c compartment Routing compartment identifier.
```

5. tasklist - Displays all active processes running on the system.
6. taskkill - Terminates specific processes by name or process ID.
7. systeminfo - Provides comprehensive OS details, including installed updates.
8. netstat - Displays active network connections and their status.

```
C:\Users\s2308071>netstat

Active Connections

Proto Local Address          Foreign Address         State
TCP    127.0.0.1:22350         SC-IQ205-22:61680      ESTABLISHED
TCP    127.0.0.1:61680        SC-IQ205-22:22350      ESTABLISHED
TCP    172.29.1.249:7680      SC-IQ206-08:59717      ESTABLISHED
TCP    172.29.1.249:7680      SC-IQ206-01:63740      ESTABLISHED
TCP    172.29.1.249:7680      SC-IQ208-01:56151      TIME_WAIT
TCP    172.29.1.249:7680      SC-IQ205-19:58563      TIME_WAIT
TCP    172.29.1.249:7680      WINDOWS-FJEEBUX:51973  ESTABLISHED
TCP    172.29.1.249:7680      SC-IQ205-10:61799      ESTABLISHED
TCP    172.29.1.249:7680      SC-IQ205-18:49866      ESTABLISHED
TCP    172.29.1.249:7680      SC-IQ208-02:61697      TIME_WAIT
TCP    172.29.1.249:7680      SC-IQ208-14:61346      TIME_WAIT
TCP    172.29.1.249:7680      SC-IQ208-23:56921      TIME_WAIT
TCP    172.29.1.249:7680      SC-IQ209-LECT:57843    TIME_WAIT
TCP    172.29.1.249:7680      SC-IQ208-20:57534      TIME_WAIT
TCP    172.29.1.249:7680      SC-IQ004-06:51511      TIME_WAIT
TCP    172.29.1.249:50056     SC-IQ206-18:ms-do      ESTABLISHED
TCP    172.29.1.249:52993     SC-IQ208-14:ms-do      ESTABLISHED
TCP    172.29.1.249:53978     SC-IQ205-20:ms-do      ESTABLISHED
TCP    172.29.1.249:54032     SC-IQ205-25:ms-do      ESTABLISHED
TCP    172.29.1.249:54140     SC-IQ205-20:ms-do      ESTABLISHED
TCP    172.29.1.249:54275     SC-IQ206-17:ms-do      ESTABLISHED
TCP    172.29.1.249:54543     SC-IQ206-17:ms-do      ESTABLISHED
TCP    172.29.1.249:58860     a88-221-134-2:https     ESTABLISHED
TCP    172.29.1.249:58865     a2-19-252-134:https     ESTABLISHED
TCP    172.29.1.249:58872     a2-16-34-112:https     CLOSE_WAIT
```

9. chkdsk - Scans and repairs disk errors, ensuring data integrity.
- 10.shutdown - Automates system shutdown and restart functions.
- 11.wmic - Displays system information.

12.sc query - Displays the status of system services.

13.getmac - Shows MAC address of network interfaces.

14.fsutil - Manages file system tasks.

```
C:\Users\s2308071>fsutil
---- Commands Supported ----
8dot3name      8dot3name management
behavior        Control file system behavior
dax             Dax volume management
dirty          Manage volume dirty bit
file           File specific commands
fsInfo         File system information
hardlink       Hardlink management
objectID       Object ID management
quota          Quota management
repair         Self healing management
reparsePoint   Reparse point management
storageReserve Storage Reserve management
resource       Transactional Resource Manager management
sparse         Sparse file control
tiering        Storage tiering property management
transaction    Transaction management
usn            USN management
volume         Volume management
wim            Transparent wim hosting management

C:\Users\s2308071>
```

Each command plays a role in managing system resources, enhancing troubleshooting, and ensuring network stability (Minasi, 2017). Screenshots will be provided to demonstrate these commands in action, showcasing both the command syntax and the resulting output.

4. Use of Linux OS CLI Commands

The Linux CLI provides a powerful environment for managing files, monitoring system performance, and executing administrative tasks. Linux commands are particularly useful in server environments, where graphical interfaces are not always available (Nemeth, 2017). Some frequently used Linux commands include:

1. ls - Lists contents of a directory, showing file permissions and sizes.

```
localhost:~# ls
bench.py  hello.c  hello.js  readme.txt
localhost:~#
```

2. cd - Navigates through directory structures.

3. pwd - Displays the current working directory.

4. grep - Searches for specific text patterns within files.
5. cat - Displays file contents or merges multiple files.
6. ps - Lists active processes running on the system.

```
localhost:~# ps
PID   USER     TIME   COMMAND
  1  root      0:01   {init} /bin/sh /sbin/init
  2  root      0:00   [kthreadd]
  3  root      0:00   [kworker/0:0]
  4  root      0:00   [kworker/0:0H]
  5  root      0:00   [kworker/u2:0]
  6  root      0:00   [mm_percpu_wq]
  7  root      0:00   [ksoftirqd/0]
  8  root      0:00   [kdevtmpfs]
  9  root      0:00   [oom_reaper]
 10  root      0:00   [writeback]
 11  root      0:00   [kcompactd0]
 12  root      0:00   [crypto]
 13  root      0:00   [bioset]
 14  root      0:00   [kblockd]
 15  root      0:00   [kworker/0:1]
 16  root      0:00   [kswapd0]
 17  root      0:00   [bioset]
 34  root      0:00   [khvcd]
 35  root      0:00   [bioset]
 36  root      0:00   [bioset]
 37  root      0:00   [bioset]
 38  root      0:00   [bioset]
 39  root      0:00   [bioset]
 40  root      0:00   [bioset]
 41  root      0:00   [bioset]
 42  root      0:00   [bioset]
 55  root      0:00   settime -d /
 56  root      0:00   dhcpcd -q
```

7. kill - Terminates specified processes.
8. df - Displays available disk space and usage statistics.
9. top - Monitors real-time system resource usage, including CPU and RAM.
10. chmod - Modifies file and directory permissions for access control.
11. uptime - Displays system uptime.

```
localhost:~# uptime
12:22:33 up 1 min,  load average: 0.00, 0.00, 0.00
```

12. htop - Interactive process viewer (Ubuntu users may need to install it).
13. lscpu - Displays CPU architecture information.

14. du - Shows disk usage statistics.

```
localhost:~# du
4      ./cache/mozilla/firefox/yshb6sxi.default
588    ./cache/mozilla/firefox/j4k7jsk5.default-default/cache2/entries
592    ./cache/mozilla/firefox/j4k7jsk5.default-default/cache2
12012  ./cache/mozilla/firefox/j4k7jsk5.default-default/startupCache
260    ./cache/mozilla/firefox/j4k7jsk5.default-default/OfflineCache
4      ./cache/mozilla/firefox/j4k7jsk5.default-default/thumbnails
4      ./cache/mozilla/firefox/j4k7jsk5.default-default/safebrowsing/google4
844    ./cache/mozilla/firefox/j4k7jsk5.default-default/safebrowsing
13716  ./cache/mozilla/firefox/j4k7jsk5.default-default
13724  ./cache/mozilla/firefox
13728  ./cache/mozilla
13732  ./cache
4      ./mozilla/systemextensionsdev
4      ./mozilla/extensions
8      ./mozilla/firefox/yshb6sxi.default
20     ./mozilla/firefox/j4k7jsk5.default-default/sessionstore-backups
4      ./mozilla/firefox/j4k7jsk5.default-default/saved-telemetry-pings
4      I ./mozilla/firefox/j4k7jsk5.default-default/bookmarkbackups
4      ./mozilla/firefox/j4k7jsk5.default-default/extensions
4      ./mozilla/firefox/j4k7jsk5.default-default/storage/permanent/chrome/idb
/3870112724rsegmnoittet-es.files
4      ./mozilla/firefox/j4k7jsk5.default-default/storage/permanent/chrome/idb
/3561288849sdhlie.files
4      ./mozilla/firefox/j4k7jsk5.default-default/storage/permanent/chrome/idb
/1657114595AmcateirvtiSty.files
4      ./mozilla/firefox/j4k7jsk5.default-default/storage/permanent/chrome/idb
/1451318868ntouromlalnodry--epcr.files
1076   ./mozilla/firefox/j4k7jsk5.default-default/storage/permanent/chrome/idb
1084   ./mozilla/firefox/j4k7jsk5.default-default/storage/permanent/chrome
```

15. whoami - Displays the current user.

These commands empower Linux users to maintain system efficiency, automate tasks, and troubleshoot issues (Shotts, 2019). Screenshots illustrating command execution and output will be included.

5. Use of Windows OS Scripts

Windows scripting, through Batch and PowerShell, enhances system administration by automating repetitive tasks. PowerShell is particularly powerful, offering advanced scripting capabilities and deep integration with Windows API (Minasi, 2017). Example PowerShell scripts include:

```
# Get system information
Get-ComputerInfo | Select-Object OSName, OSVersion, WindowsBuild

# List all services
Get-Service | Select-Object DisplayName, Status

# Check disk space
Get-PSDrive -PSProvider FileSystem

# Display network adapter information
Get-NetAdapter

# Search for specific events in event log
Get-EventLog -LogName System -Newest 5
```

These scripts can be run individually or combined into larger workflows. For example, a system maintenance script might collect system info, check service status, and log disk space usage into a file. Adding error handling and conditional logic (e.g., using if statements) further increases script robustness.

Screenshots showcasing script execution will be provided, along with commentary on each script's purpose and output.

6. Use of Linux OS Scripts

Bash scripting is a powerful tool for automating tasks in Linux. Scripts can be used for system monitoring, task automation, and configuration management (Shotts, 2019).

Example Bash scripts:

```
#!/bin/bash
# Display system uptime
echo "System Uptime:"
uptime

#!/bin/bash
# Check disk usage
df -h

#!/bin/bash
# List active network connections
netstat -tulnp

#!/bin/bash
# Monitor memory usage
echo "Memory Usage:"
free -h

#!/bin/bash
# Backup a directory
tar -czvf backup_$(date +%F).tar.gz /home/user/Documents
```

```
Welcome to Fedora 33 (riscv64)

[root@localhost ~]# #!/bin/bash
[root@localhost ~]# ls
bench.py  hello.c
[root@localhost ~]# poolTest.go
sh: poolTest.go: command not found
[root@localhost ~]# mkdir linux
[root@localhost ~]# ls
bench.py  hello.c  linux
[root@localhost ~]#
```

7. Conclusion

This report has provided an in-depth analysis of key Operating System functions, command-line utilities, and scripting techniques in Windows and Linux. Through CLI

commands, users can efficiently manage files, processes, and network configurations. Scripting enhances automation, reduces manual workload, and improves system reliability. Understanding OS functions, CLI commands, and scripting languages is crucial for IT professionals, as these tools empower them to optimize system performance, automate tasks, and troubleshoot issues effectively.

Looking ahead, these skills form the foundation of more advanced fields such as cloud computing, cybersecurity, and DevOps, where automation and system control are essential. Continued practice with CLI and scripting not only improves technical proficiency but also prepares individuals for more complex real-world IT scenarios.

8. Bibliography

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 - [2] A. G. P. B. & G. G. Silberschatz, Operating System Concepts, John Wiley & Sons, Inc., 2020.
 - [3] W. Stallings, Operating Systems: Internals and Design Principles, Pearson., 2018.
 - [4] M. S. D. & I. A. Russinovich, Windows Internals, Part 1, Microsoft Press., 2021.
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 - [6] M. Minasi, Mastering Windows PowerShell Scripting, Packt Publishing., 2017.
 - [7] W. E. Shotts, The Linux Command Line: A Complete Introduction, No Starch Press., 2019.
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9. Appendices

- **Appendix A: Tutorial Activity – OS Types from OS Tutorial 1.**

[OS Tutorial Activities Log](#)

OS Tutorial Activities

Tutorial 1

1. How will AI And Quantum computing change the world?

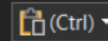
"Quantum AI could help scientists discover new drugs faster, predict market trends more accurately, and even create better climate models. But it also brings challenges: job displacement, ethical concerns about surveillance, and even breaking today's encryption methods." – Google

2. Research and define different types of OS's used today. 300 – 400 words (This goes into the appendix of the report)

Conventional desktop and laptop computers are the main devices that run general operating systems like Windows or MacOS. The GUI is designed to work with point-and-click devices like keyboards and mice.

Mostly seen on smartphones and tablets, mobile operating systems like iOS and Android are small and light. The GUI was designed with touch-based input in mind.

Linux and other network operating systems provide a high degree of scalability, security, and dependability. It is capable of operating for a long time without requiring a reset. Free to use, open-source software permits customization and alteration. integration and compatibility with a large variety of hardware and software systems.



Tutorial 2

1. Viewing Currently running processes

Using Task Manager:

Task Manager		Type a name, publisher, or PID to search			
Processes		19%	80%	1%	0%
Name	Status	CPU	Memory	Disk	Network
Opera GX Internet Browser (28)		0.3%	1,334.3 MB	0.1 MB/s	0.1 Mbps
Steam Client WebHelper (8)		0.1%	541.9 MB	0.1 MB/s	0 Mbps
Microsoft Teams (10)		0.1%	461.5 MB	0.1 MB/s	0 Mbps
Spotify (11)		2.0%	455.4 MB	0.1 MB/s	0 Mbps
Discord (6)		0.2%	357.9 MB	0 MB/s	0.1 Mbps
Search (5)		3.3%	247.8 MB	0.5 MB/s	0.7 Mbps
Antimalware Service Executable		0.6%	162.8 MB	0.1 MB/s	0 Mbps

- Appendix B: Lecture Activities – Answers and activity logs.

[OS Lecture Activity log](#)

Lecture Activity log Lecture 1 What is an operating system? - High level software - Graphical user interface (GUI) - E.g Windows, Linux, MacOS, iOS, Android What does an Operating system do? - Interfaces with hardware - Manages the interaction between <u>users</u>, <u>software</u> and the <u>hardware</u> Typical functions: - Process and memory management - System performance - Device management - Error detection and system recovery - System security - File and directory management What is the Linux operating system? - Unix-like - Open source (free to download, use, modify) - Most popular <u>server</u> operating system worldwide Lecture 2 - The Kernel is the <u>core/essence</u> / the <u>centre</u>-most part of the operating system - The Kernel is an accessible program file - Tip: don't edit it if you don't know what you're doing! - Common functions: - Controlling hardware - Provide user interface - Managing processes - Managing memory - Managing I/O Devices - Managing file system - Managing Applications - Managing Security & privacy - Managing network protocols: HTTP, TCP, IP, FTP TASK 1*	The OS works with the CPU to create a <u>Schedule</u> of processes to execute and ensure completion. Manages swap, running, runnable and waiting processes. The OS will allocate and De-allocate memory for processes. In windows: Task <u>manager</u> can display these processes. /Tasklist in command prompt and Powershell. PID = Unique Process ID <u>kill</u> processes can be terminated either by name or PID. In Linux: Ctrl, ps, top or <u>htop</u> commands. A Deadlock (e.g BSOD) can occur when 2 programs are competing for memory, or if the same memory is allocated twice - <u>this</u> causes the system to crash. This is a <u>less</u> common event on modern, more capable computers. Threads Processes are divided into 'Threads'. A thread is a basic execution unit. Managed by the scheduler program. Context switching is when the OS runs 2 or more threads <u>seemingly</u> simultaneously. 'Multitasking Operating Systems' Multi-threading occurs in multiple CPU cores simultaneously. Lecture 3 One function of the operating system is to <u>facilitate</u> System monitoring and management tools: - - File explorer - managing file system - Task manager - processes - performance <u>SystemInfo</u>: Process Explorer (Process monitoring tool) - Computer management: - Event Viewer - View system error logs - System - System Diagnostics (view all key system information / Diagnostics - Warnings - print reports) - WinDbg - system crashes - view / <u>analyse</u> 'dump' files - debugging - Resource Monitor - Reliability Monitor - Disk Management
- Network Management - Device Manager, System info - Group Policy Editor - Configure settings of <u>computer</u> and <u>network</u>. - Prevent users from <u>certain</u> accessing tools Windows Server OS has <u>additional</u> tools <u>available</u>. Lecture 4 Linux Subdirectories: /bin - essential system binary executables, required for system function /boot - contains necessary boot files: kernel image, boot loader /dev - files representing devices e.g. <u>hard drives</u>, <u>USB's</u> /etc - Configuration files / <u>settings</u> /home - User directory, for personal files /tmp - used for mounting temporary filesystems /sbin - system admin binaries, critical for system maintenance /usr - read only user data, <u>system wide</u> application binaries, libraries, documentation Lecture 5 *Key syntax areas of batch script (include in report)* - Batch scripts are a text file saved with a '.bat' extension - We can use '<u>Echo</u>' command to output text - We can use '<u>Pause</u>' command to keep the CMD window stays <u>open</u> - Use '<u>rem</u>' to add comments to the code VARIABLES Use '<u>set</u>' command to create a variable e.g. 'Set name=Yourname'	For numeric values (A switch) e.g. use 'set /A age=21' GO TO COMMAND The Interpreter can jump from one line to another, skipping lines of code IF ELSE STATEMENTS USER INPUT P switch to receive user input LOOPS bat uses <u>for</u> loops %Var declares a variable for a loop ARRAYS A row of indexed values e.g. 0,1,2,3,4... Set NameArray[0]=Mary Set NameArray[1]=Tony Typically used for Strings, but can be numerical FUNCTIONS Modular code - we can use the 'Call' command to call a function Lecture 6- Bash Scripting #! = Sha-bang Key Syntax areas: Variables User inputs (Read Command) if statements & if/else statements Loops - demonstrate 1 example for the assignment Arrays Case Statements

- Appendix C: Certified Course Evidence – Screenshots of completion from online courses.

Networking
cisco Academy

Operating Systems Basics

Course Outline

Resources

Search course outline

1.2.3 Windows File Systems

1.2.4 Alternate Data Streams

1.2.5 Windows Boot Process

1.2.6 Windows Startup

1.2.7 Windows Shutdown

1.2.8 Processes, Threads, and Services

1.2.9 Memory Allocation and Handles

1.2.10 The Windows Registry

1.2.11 Lab - Exploring Processes, Threads, Handles, and Windows Registry

1.2.12 Check Your Understanding - Identify the Windows Registry Hive

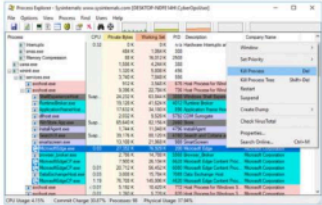
1.3. Windows Configuration and Monitoring

1.4. Windows Security

1.2.11 Lab - Exploring Processes, Threads, Handles, and Windows Registry

Download HTML

e. The Microsoft Edge process can be terminated in the Process Explorer. Right-click the selected process and select **Kill Process**. Click **OK** to continue.



What happened to the web browser window when the process is killed?

Answer Area

Web Browser tab closes

Networking
cisco Academy

Operating Systems Basics

Course Outline

Resources

Search course outline

Module 1: The Windows Operating System

100%

1.0. Introduction

1.1. Windows History

1.2. Windows Architecture and Operations

1.3. Windows Configuration and Monitoring

1.4. Windows Security

1.5. The Windows Operating System Summary

1.5.1 What Did I Learn in this Module?

1.5.2 Quiz: The Windows Operating System

1.5.2 Quiz: The Windows Operating System

87%

You've scored 87%.
Congratulations, you have passed the quiz.

OS Report DEF

GRADEMARK REPORT

FINAL GRADE

GENERAL COMMENTS

46/100

Total:		46
1. Engagement with Literature Skills:		
- No use of IEEE citations. + Formatted reference list.	20	7
2. Knowledge and Understanding Skills:		
Key functions: + Very good overview of key OS functions documented. + Screenshots showing where some of the functions can be seen/monitored/managed. + Supported by citations. Win Commands: + V. good overview of relevant commands that demonstrates an understanding of the language. Bash Commands: + V. good overview of relevant commands that demonstrates a sound understanding of the language. Win Scripts: - No knowledge of the scripting aspects of the language documented. Bash Scripts: - No knowledge of the scripting aspects of the language documented.	20	12
3. Cognitive and Intellectual Skills:		

+ Evidence of good analysis and understanding of OS functions; + Several screenshots showing where some of the functions can be seen/monitored/managed is documented. + Conclusion.	10	10
4. Practical Application Skills:		
1. Win Commands: + Some use of relevant Win. language commands. – could be extended to gain additional marks in this category. 2. Bash Commands: + Some use of relevant Bash commands. – could be extended to gain additional marks in this category. 3. Win Scripts: - No use of the scripting aspects of the language documented. 4. Bash Scripts: - No use of the scripting aspects of the language documented. - could be extended to use 1/2 additional commands. - could be extended in 1 syntax area (if). + Citations used to support the practical work.	40	8
5. Transferable Skills for Life and Professional Practice:		
+ Good report format, structure, and presentation.	10	9

+ Tutorial Activity 1 on OS Types: relevant supplementary information on OS types is included in the Appendix of the report. – 1/2 additional types could be included. + Evidence of engagement with a relevant CPD course documented in the appendix. + Lecture activity document.		
Plagiarism & On-time check:		/

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