



Prifysgol Cymru
Y Drindod Dewi Sant
University of Wales
Trinity Saint David

Assignment 2:

Operating Systems

CertHE Computing Skills for Workplace

Computer Architecture and Operating Systems.

ACCA4022_LON

DR. Redhwan Al-Amri (Lecturer)

University of Wales Trinity Saint David

(London Campus)

Student Name:

Student Number:

Group: 01

Date:

Table of Contents

Introduction	1
1. Key functions of general Operating Systems	1
Systems	1
1.1 Process and Processor Management	1
1.2 Memory Management	2
1.3 File System Management	2
1.4 Security and Protection	3
2. Use of Windows OS CLI commands.	4
3. Use of Linux OS CLI commands.	15
4. Use of Windows OS scripts.	9
Script: System Health Check	20
Key Features Demonstrated	22
5. Use of Linux OS scripts.	11
Script: Log File Analyzer	23
Key Features Demonstrated	25
Conclusion	11
References	12
Appendices	12
Tutorial Activity on OS Types from OS Tutorial 1	29
1. LinkedIn Learning course:	29
2. Cisco Network Academy:	30
3. Cisco Network Academy : Operating Systems Basics	32

Introduction

Operating systems (OS) are essential system software that manage computer hardware and software resources. They provide a platform for users and applications to interact with the computer efficiently. Popular operating systems such as Windows, Linux, and macOS perform key functions including process management, memory management, file system organisation, and system security. This report explores these functions and demonstrates practical command-line usage in both Windows and Linux environments.[4][5]

1. Key functions of general Operating Systems

1.1 Process and Processor Management

Process management refers to how the operating system handles running programs (processes). The OS ensures that each process receives enough CPU time to execute efficiently while allowing multiple applications to run simultaneously (multitasking). It schedules processes using algorithms to decide which process runs at a given time. [4][5]

For example, in Windows, the Task Manager allows users to view active processes, CPU usage, and terminate tasks if necessary. In Linux, commands such as `top` and `ps` are used to monitor and manage processes. This function is essential for maintaining system performance and preventing system crashes caused by overloaded processes.[4]

Task Manager

File Options View

Processes Performance App history Startup Users Details Services

Name	Status	64% CPU	87% Memory	64% Disk	0% Network	2% GPU	GPU engine	Power usage	Power usage t...
Desktop Window Manager		3.0%	48.5 MB	0.1 MB/s	0 Mbps	1.7%	GPU 0 - 3D	Very low	Very low
Client Server Runtime Process		0%	0.9 MB	0 MB/s	0 Mbps	0.1%	GPU 0 - 3D	Very low	Very low
Microsoft OneDrive Configurati...		0%	4.3 MB	0 MB/s	0 Mbps	0%		Very low	Very low
wusvcs		0%	1.2 MB	0 MB/s	0 Mbps	0%		Very low	Very low
wsappx		0%	24.0 MB	0 MB/s	0 Mbps	0%		Very low	Very low
wsappx		0%	2.1 MB	0 MB/s	0 Mbps	0%		Very low	Very low
Windows Start-Up Application		0%	0 MB	0 MB/s	0 Mbps	0%		Very low	Very low
Windows Session Manager		0%	0 MB	0 MB/s	0 Mbps	0%		Very low	Very low
Windows Log-on Application		0%	1.0 MB	0 MB/s	0 Mbps	0%		Very low	Very low
System interrupts		5.5%	0 MB	0 MB/s	0 Mbps	0%		Low	Very low
System		2.9%	0.1 MB	11.9 MB/s	0 Mbps	0%		Very low	Very low
Shell Infrastructure Host		0.7%	5.0 MB	0.1 MB/s	0 Mbps	0%		Very low	Very low
Services and Controller app		0%	2.9 MB	0.1 MB/s	0 Mbps	0%		Very low	Very low
Service Host: Workstation		0%	0.6 MB	0 MB/s	0 Mbps	0%		Very low	Very low
Service Host: WinHTTP Web Pro...		0%	1.2 MB	0 MB/s	0 Mbps	0%		Very low	Very low
Service Host: Windows Update		0%	31.9 MB	0 MB/s	0 Mbps	0%		Very low	Very low
Service Host: Windows Time		0%	0.2 MB	0 MB/s	0 Mbps	0%		Very low	Very low
Service Host: Windows Push No...		0%	5.6 MB	0 MB/s	0 Mbps	0%		Very low	Very low
Service Host: Windows Push No...		0%	2.5 MB	0 MB/s	0 Mbps	0%		Very low	Very low
Service Host: Windows Manage...		0%	6.2 MB	0 MB/s	0 Mbps	0%		Very low	Very low

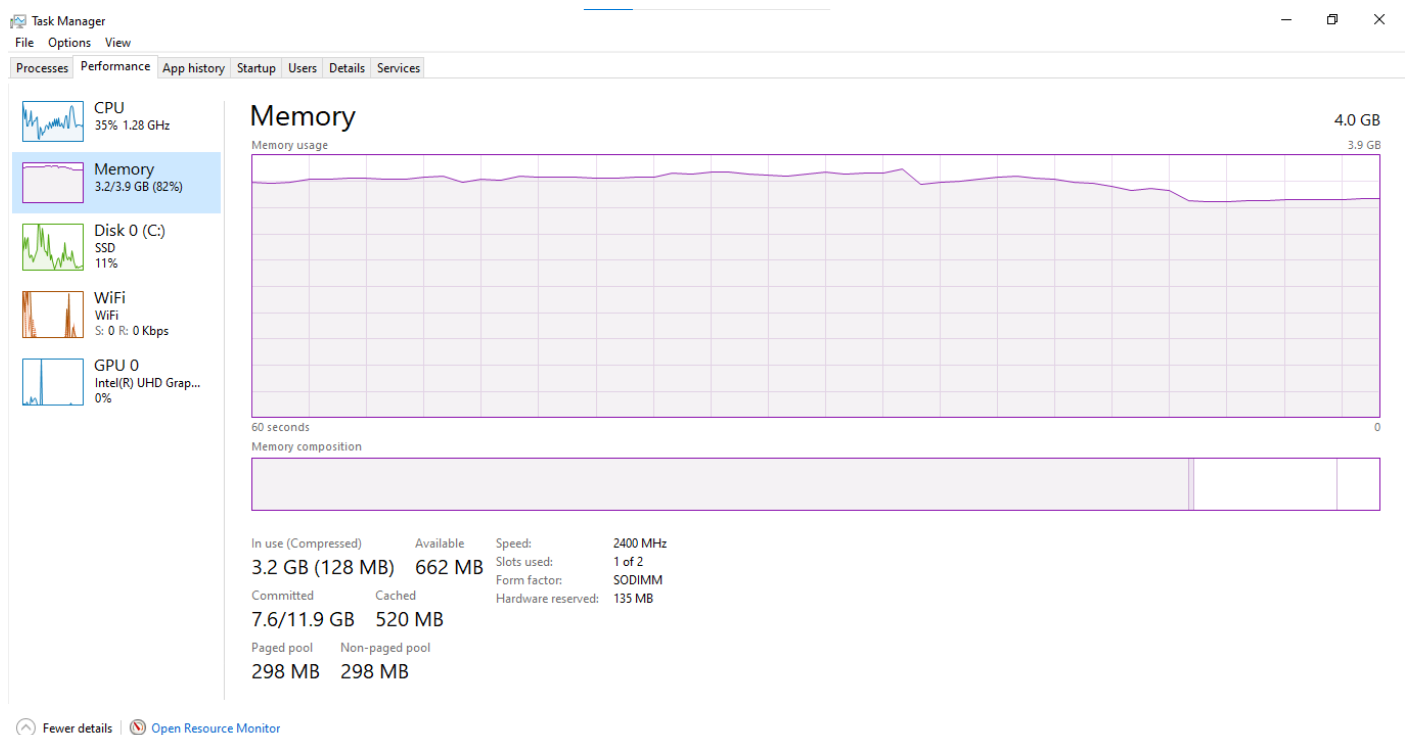
^ Fewer details

End task

1.2 Memory Management

Memory management involves the allocation and control of the computer's RAM. The operating system ensures that each program has sufficient memory to operate without interfering with other processes. It also manages memory allocation and deallocation dynamically.

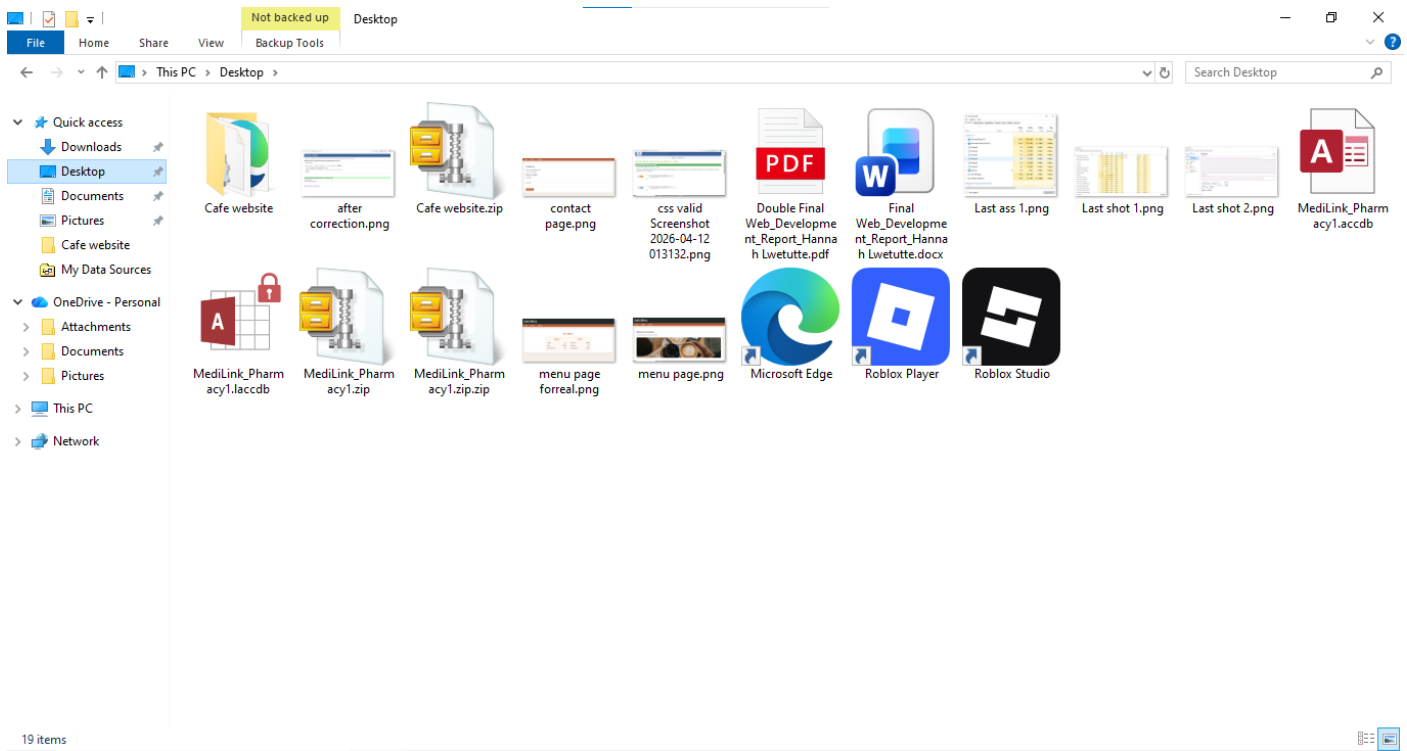
A key concept in memory management is virtual memory, where the OS uses part of the storage (hard drive or SSD) as additional memory when RAM is insufficient. In Windows, memory usage can be monitored using Task Manager, while in Linux, commands like `free` display memory statistics. Effective memory management improves system stability and performance. [4][5]



1.3 File System Management

File system management allows the operating system to organise and control how data is stored and accessed. Files are stored in directories (folders), making it easier for users to locate and manage data.

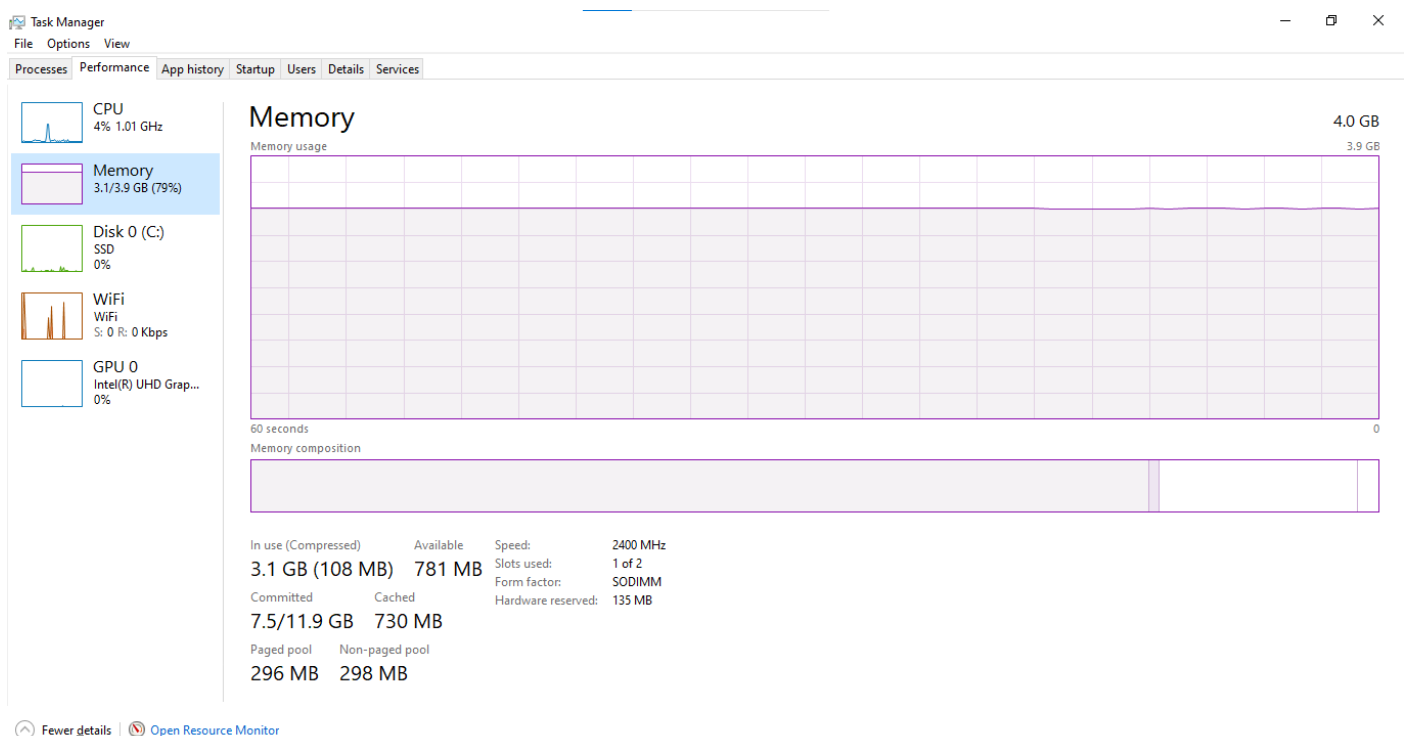
Operating systems provide tools such as Windows File Explorer and Linux command-line tools (`ls`, `cd`, `mkdir`) to navigate and manage files. The OS also controls file permissions, ensuring that only authorised users can access or modify specific files. This function is critical for maintaining data organisation and security. [4]



1.4 Security and Protection

Security and protection are essential functions of an operating system. The OS ensures that only authorised users can access system resources through authentication methods such as usernames and passwords.

Additionally, operating systems enforce permissions to restrict access to files and system functions. Features such as firewalls, encryption, and antivirus support help protect against malware and cyber threats. In both Windows and Linux, user accounts and permission levels are used to control access. This function helps maintain system integrity and protects sensitive data. [4][5]



2. Use of Windows OS CLI commands.

Command-line interfaces (CLI) in Windows allow users to interact directly with the operating system using text-based commands. These commands provide greater control compared to graphical interfaces and are widely used for system administration. CLI commands can be used to manage processes, files, network settings, and system information efficiently. Understanding these commands is important for troubleshooting and maintaining computer systems. [2][4]

```
Command Prompt
Microsoft Windows [Version 10.0.19045.6466]
(c) Microsoft Corporation. All rights reserved.

C:\Users\itshb>tasklist

Image Name                PID Session Name        Session#    Mem Usage
=====
System Idle Process        0 Services             0             8 K
System                     4 Services             0            136 K
Registry                   92 Services            0        26,916 K
smss.exe                   376 Services           0             280 K
csrss.exe                   576 Services           0         3,156 K
csrss.exe                   664 Console            1         3,580 K
wininit.exe                 672 Services           0             748 K
winlogon.exe                756 Console            1         5,684 K
services.exe               800 Services           0         6,372 K
lsass.exe                   808 Services           0        23,744 K
fontdrvhost.exe            916 Services           0         1,356 K
fontdrvhost.exe            920 Console            1         9,856 K
svchost.exe                 936 Services           0        22,676 K
svchost.exe                 392 Services           0        16,840 K
svchost.exe                 580 Services           0         4,264 K
dhm.exe                    1060 Console           1        81,152 K
svchost.exe                1076 Services           0         5,084 K
svchost.exe                1084 Services           0         5,960 K
svchost.exe                1092 Services           0         9,576 K
svchost.exe                1164 Services           0         6,472 K
svchost.exe                1184 Services           0         5,244 K
IntelCpHDPSvc.exe          1320 Services           0         2,088 K
svchost.exe                1388 Services           0         4,744 K
svchost.exe                1404 Services           0        11,424 K
svchost.exe                1480 Services           0         3,852 K
svchost.exe                1488 Services           0         4,328 K
svchost.exe                1496 Services           0         5,872 K
svchost.exe                1536 Services           0        10,992 K
svchost.exe                1584 Services           0         6,852 K
svchost.exe                1684 Services           0        14,556 K
IntelCpHeciSvc.exe         1740 Services           0         4,600 K
svchost.exe                1880 Services           0         8,184 K
svchost.exe                1928 Services           0         7,944 K
svchost.exe                1996 Services           0         6,368 K
igfxCUIService.exe        2028 Services           0         2,012 K
svchost.exe                1452 Services           0        15,240 K
svchost.exe                2052 Services           0         1,280 K
```

The `tasklist` command displays all running processes on the system, including their memory usage and process IDs. This helps monitor system performance and identify active applications. This command is commonly used to monitor system performance and identify unnecessary processes. [2]

```
Command Prompt
Microsoft Windows [Version 10.0.19045.6466]
(c) Microsoft Corporation. All rights reserved.

C:\Users\itshb>taskkill /IM notepad.exe /F
SUCCESS: The process "notepad.exe" with PID 7652 has been terminated.
SUCCESS: The process "notepad.exe" with PID 8748 has been terminated.
SUCCESS: The process "notepad.exe" with PID 7880 has been terminated.
SUCCESS: The process "notepad.exe" with PID 6592 has been terminated.
SUCCESS: The process "notepad.exe" with PID 2040 has been terminated.
SUCCESS: The process "notepad.exe" with PID 11636 has been terminated.
SUCCESS: The process "notepad.exe" with PID 16620 has been terminated.

C:\Users\itshb>
```

The `taskkill` command is used to terminate running processes. The `/IM` option specifies the process name, and `/F` forces the program to close. This is useful when applications become unresponsive. It is especially useful when applications freeze and cannot be closed normally.

```
Command Prompt
Microsoft Windows [Version 10.0.19045.6466]
(c) Microsoft Corporation. All rights reserved.

C:\Users\itshb>dir
Volume in drive C is TIH0550200A
Volume Serial Number is 78E3-188F

Directory of C:\Users\itshb

02/02/2026  04:11    <DIR>        .
02/02/2026  04:11    <DIR>        ..
28/05/2025  18:20    <DIR>        3D Objects
28/05/2025  18:20    <DIR>        Contacts
28/04/2026  23:15    <DIR>        Desktop
24/03/2026  10:01    <DIR>        Documents
24/04/2026  14:24    <DIR>        Downloads
28/05/2025  18:20    <DIR>        Favorites
28/05/2025  18:20    <DIR>        Links
28/05/2025  18:20    <DIR>        Music
11/09/2025  00:07    <DIR>        OneDrive
21/11/2025  06:46    <DIR>        Pictures
28/05/2025  18:20    <DIR>        Saved Games
28/05/2025  18:21    <DIR>        Searches
07/07/2025  19:46    <DIR>        Videos
             0 File(s)              0 bytes
             15 Dir(s)  46,790,610,944 bytes free

C:\Users\itshb>
```

The `dir` command displays a list of files and folders in the current directory. It allows users to view and manage files stored on the system. This command displays detailed information about the contents of a directory, including file size, date modified, and file type. It is useful for verifying stored data and managing files efficiently.

```
Command Prompt
Microsoft Windows [Version 10.0.19045.6466]
(c) Microsoft Corporation. All rights reserved.

C:\Users\itshb>cd Desktop

C:\Users\itshb\Desktop>
```

The `cd` command is used to change the current directory. It is essential for navigating through different folder locations when working in the command line environment.

```
Command Prompt
Microsoft Windows [Version 10.0.19045.6466]
(c) Microsoft Corporation. All rights reserved.

C:\Users\itshb>ping google.com

Pinging google.com [142.250.151.138] with 32 bytes of data:
Reply from 142.250.151.138: bytes=32 time=25ms TTL=113
Reply from 142.250.151.138: bytes=32 time=43ms TTL=113
Reply from 142.250.151.138: bytes=32 time=81ms TTL=113
Reply from 142.250.151.138: bytes=32 time=151ms TTL=113

Ping statistics for 142.250.151.138:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 25ms, Maximum = 151ms, Average = 75ms

C:\Users\itshb>
```

The `ping` command is used to test network connectivity between the computer and a website. It checks if the internet connection is working properly.[2]

```
Command Prompt

Ethernet adapter Ethernet 2:

    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  . : lan
    Link-local IPv6 Address . . . . . : fe80::4b3:add2:c71d:efb9%5
    IPv4 Address. . . . . : 192.168.1.240
    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  . :

C:\Users\itshb>
```

The `ipconfig` command displays network information such as IP address and connection details. It shows network configuration details such as IP address and default gateway.

```
Command Prompt

Microsoft Windows [Version 10.0.19045.6466]
(c) Microsoft Corporation. All rights reserved.

C:\Users\itshb>whoami
laptop-f6akkfsr\itshb

C:\Users\itshb>
```

The `whoami` command displays the current user logged into the system. It is useful for identifying user accounts.[2]

```
Command Prompt
Microsoft Windows [Version 10.0.19045.6466]
(c) Microsoft Corporation. All rights reserved.

C:\Users\itshb>systeminfo

Host Name:                LAPTOP-F6AKKFSR
OS Name:                  Microsoft Windows 10 Pro Education
OS Version:               10.0.19045 N/A Build 19045
OS Manufacturer:         Microsoft Corporation
OS Configuration:        Standalone Workstation
OS Build Type:             Multiprocessor Free
Registered Owner:         itshbesnetwork@outlook.com
Registered Organization:  N/A
Product ID:               00379-26135-86558-AAOEM
Original Install Date:    15/02/2021, 19:10:40
System Boot Time:         01/04/2026, 14:41:35
System Manufacturer:      Dynabook Inc.
System Model:              SATELLITE PRO C40-G-109
System Type:               x64-based PC
Processor(s):              1 Processor(s) Installed.
                          [01]: Intel64 Family 6 Model 142 Stepping 12 GenuineIntel ~1896 Mhz
BIOS Version:              American Megatrends Inc. CN16SV117, 03/11/2021
Windows Directory:        C:\Windows
System Directory:          C:\Windows\system32
Boot Device:               \Device\HarddiskVolume1
System Locale:              en-gb:English (United Kingdom)
Input Locale:              en-gb:English (United Kingdom)
Time Zone:                 (UTC+01:00) Amsterdam, Berlin, Bern, Rome, Stockholm, Vienna
Total Physical Memory:     3,961 MB
Available Physical Memory: 529 MB
Virtual Memory: Max Size: 12,153 MB
Virtual Memory: Available: 3,258 MB
Virtual Memory: In Use:    8,895 MB
Page File Location(s):     C:\pagefile.sys
Domain:                    \\LAPTOP-F6AKKFSR
Logon Server:              WORKGROUP
Hotfix(s):                 18 Hotfix(s) Installed.
                          [01]: KB5066130
                          [02]: KB5056577
                          [03]: KB4534170
                          [04]: KB4537759
                          [05]: KB4545706
                          [06]: KB4562830
                          [07]: KB4593175
```

The `systeminfo` command displays detailed information about the computer system, including operating system, memory, and hardware details.

```
Select Command Prompt

C:\Users\itshb>_
```

The `cls` command clears the Command Prompt screen. It is useful for removing previous commands and keeping the interface clean.[2]

These commands demonstrate how the Windows command line can be used to manage different areas of a system, including processes, files, networks, and user information. Using CLI tools allows users to perform tasks more efficiently and provides greater control over system operations. [2]

3. Use of Linux OS CLI commands.

Linux command-line interfaces are widely used for managing systems, especially in server environments. Unlike graphical interfaces, Linux CLI provides direct access to system operations, making it faster and more efficient for performing tasks such as file management, process monitoring, and network troubleshooting. Learning these commands is essential for IT professionals and system administrators. [3]

Command 1: ls

The `ls` command lists files and folders in a directory. It allows users to view all files and folders within a specific location[3].

Command 2: cd

The `cd` command is used to change directories. It enables users to move between different folders within the file system[3].

Command 3: pwd

The `pwd` command shows the current directory path. This helps users understand their exact location within the system[3].

Command 4: mkdir

The `mkdir` command creates a new folder. This allows users to organise files and manage data more effectively[3].

Command 5: rm

The `rm` command deletes files. The `rm` command is used to remove files or directories from the system. It helps free up storage space and manage unwanted data[3].

Command 6: top

The `top` command is used to display real-time information about running processes and overall system performance. It allows users to monitor CPU usage, memory usage, and active processes[3].

Command 7: ps

The `ps` command is used to display information about currently running processes. It provides details such as process IDs and the status of active programs[3].

Command 8: ping

The `ping` command is used to test network connectivity between the system and another device. It helps identify whether a connection is working correctly[3].

Command 9: chmod

The `chmod` command is used to modify file permissions. It allows users to control access to files by defining who can read, write, or execute them[3].

The `clear` command is used to remove all previous output from the terminal screen. This helps improve readability when working with multiple commands[3].

4. Use of Windows OS scripts.

Script 1: User Greeting Script

```
@echo off  
  
echo Enter your name:  
  
set /p name=  
  
echo Welcome %name%  
  
pause
```

This script prompts the user to enter their name and stores it in a variable. The script then displays a personalised message using the input provided. This demonstrates how user input and variables can be used in batch scripting. [2]

Script 2: Simple Addition Scrip

```
@echo off  
  
set /p num1=Enter first number:  
  
set /p num2=Enter second number:  
  
set /a result=%num1%+%num2%  
  
echo The result is %result%  
  
pause
```

This script allows the user to enter two numbers and performs a calculation using those values. It demonstrates the use of variables, user input, and arithmetic operations in batch scripting. [2]

5. Use of Linux OS scripts.

Linux scripts are written using Bash and are used to automate tasks within the operating system. These scripts allow users to perform operations such as processing input, performing calculations, and controlling system behaviour efficiently. [3]

Script 1: User Input Scrip

```
#!/bin/bash
```

```
echo "Enter your name:"
```

```
read name
```

```
echo "Welcome $name"
```

This script asks the user to enter their name and stores it in a variable. It then outputs a personalised message. This demonstrates how user input and variables are used in Bash scripting. [3]

Script 2: Simple Calculation Scrip

```
#!/bin/bash
```

```
echo "Enter first number:"
```

```
read num1
```

```
echo "Enter second number:"
```

```
read num2
```

```
result=$((num1 + num2))
```

```
echo "The result is $result"
```

This script takes two numbers as input and performs a calculation. It demonstrates the use of variables, arithmetic operations, and user interaction in Linux scripting. [3]

Conclusion

In conclusion, this report has demonstrated the key functions of operating systems, including process management, memory management, file system management, and security. It also explored the use of command-line interfaces in both Windows and Linux environments, showing how different commands can be used to manage processes, files, and network operations. In addition, scripting in both Windows and Linux was demonstrated to highlight how tasks can be automated using simple programs. Overall, understanding operating systems and command-line tools improves efficiency, system control, and problem-solving skills in computing environments. [1][2][3]

References

[1] OpenAI, *ChatGPT*, personal communication, 2026

[2] Microsoft, “Windows Commands,” <https://learn.microsoft.com/en-us/windows-server/administration/windows-commands>

[3] The Linux Foundation, “Introduction to Linux,” <https://www.linuxfoundation.org>

[4] LibreTexts, “Operating System Concepts,” <https://libretexts.org>

[5] University of Oxford, “Operating System Basics,” <https://eng.ox.ac.uk>

Appendices

Appendix 1: Operating System Types

Operating systems can be categorised into different types based on how they manage tasks and resources. These include batch operating systems, time-sharing operating systems, distributed operating systems, and real-time operating systems. Each type serves a different purpose depending on system requirements and user needs.

Appendix 2: Lecture Activity

During lectures, I learned how operating systems manage hardware and software resources. I also practiced using command-line interfaces in both Windows and Linux environments. These activities helped me understand how commands and scripts are used in real-world scenarios.

Appendix 3: Online Learning Engagement

I reviewed online learning materials related to operating systems and command-line usage. This helped improve my understanding of system management, scripting, and automation. The knowledge gained supported the completion of this assignment.