

OS Assignment

by Drew McClennon

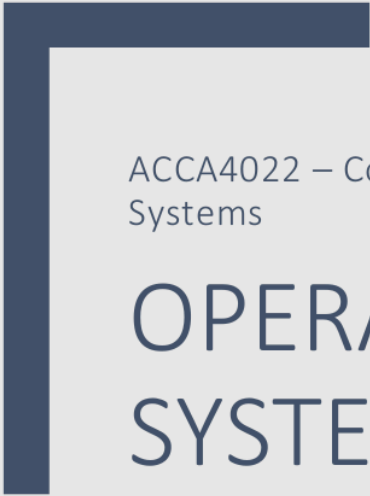
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ACCA4022 – Computer Architecture and Operating
Systems

OPERATING SYSTEMS

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Introduction

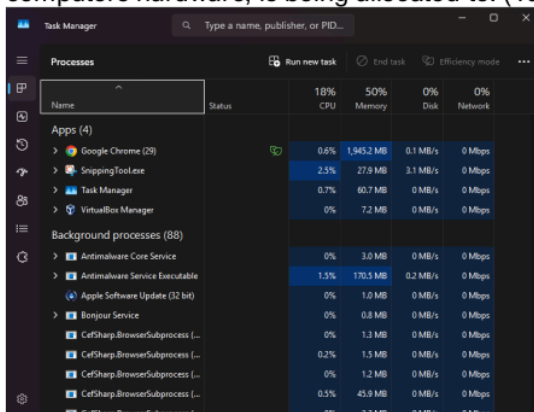
In this report I aim to provide an overview of key functionalities that Microsoft's Windows operating system (OS) and the open-source Linux OS contains. This will include the use of the command-line interface (CLI) and scripting functionalities in both Windows and Linux. These functionalities will be demonstrated with the use of screenshots throughout the report, documenting my work.

Key Functions of general operating systems

The operating system (OS) is the piece of software that almost everyone that has used a computer will have interacted with. It is a program whose job is to turn a command line interface (CLI) into a user-friendly interface known as a Graphical User Interface (GUI). It manages the computer's hardware, allocating its resources as and where they are needed. In this section I will cover 'Process Management', 'Memory Management', 'File system Management', 'Device Management', 'Security and Access Control', and 'User Interface'.

Process Management -

One of the core functions of an OS is the ability to manage the execution of processes. (A process being a running instance of a program). What the OS will do is handle the creation of said process (opening the .exe), scheduling it (ensuring it is kept running by providing the process with the hardware and software resources it needs). And lastly, the termination of the program (quitting the application). Windows provides a tool called 'Task Manager' which will outline all of the processes that are currently running on your computer whilst also showing you the percentage of your computer's hardware, is being allocated to. (Task Manager shown below)



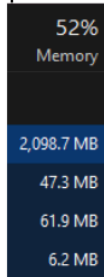
The screenshot shows the Windows Task Manager application. The 'Processes' tab is selected, displaying a list of running applications and background processes. The columns show the process name, status, and resource usage (CPU, Memory, Disk, and Network). The 'Apps (4)' section lists Google Chrome (29), ShippingTool.exe, Task Manager, and VirtualBox Manager. The 'Background processes (88)' section lists various system services and updates.

Name	Status	CPU	Memory	Disk	Network
Google Chrome (29)	Running	0.6%	1,945.2 MB	0.1 MB/s	0 MBps
ShippingTool.exe	Running	2.5%	27.9 MB	3.1 MB/s	0 MBps
Task Manager	Running	0.7%	60.7 MB	0 MB/s	0 MBps
VirtualBox Manager	Running	0%	7.2 MB	0 MB/s	0 MBps
Antimalware Core Service	Running	0%	3.0 MB	0 MB/s	0 MBps
Antimalware Service Executable	Running	1.5%	170.5 MB	0.2 MB/s	0 MBps
Apple Software Update (32 bit)	Running	0%	1.0 MB	0 MB/s	0 MBps
Bonjour Service	Running	0%	0.8 MB	0 MB/s	0 MBps
CellSharp.BrowserSubprocess (...)	Running	0%	1.3 MB	0 MB/s	0 MBps
CellSharp.BrowserSubprocess (...)	Running	0.2%	1.5 MB	0 MB/s	0 MBps
CellSharp.BrowserSubprocess (...)	Running	0%	1.2 MB	0 MB/s	0 MBps
CellSharp.BrowserSubprocess (...)	Running	0.5%	45.9 MB	0 MB/s	0 MBps
CellSharp.BrowserSubprocess (...)	Running	0%	1.2 MB	0 MB/s	0 MBps

Memory Management -

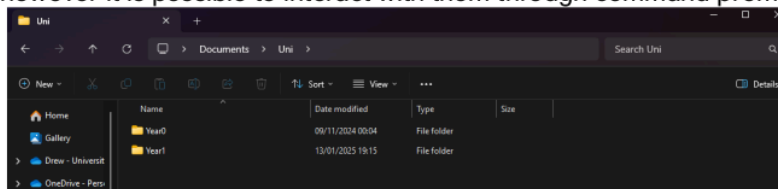
The operating system will control the computer's memory (RAM, Randomly Accessible Memory) and will allocate a certain percentage of the RAM to what process in order to ensure that the program runs smoothly. The RAM's job is to act as a buffer between the CPU (Central Processing Unit) and the HDD or SSD (Hard Disk Drive or Solid State Drive (The computer's main storage)). This is because it can

take some time to retrieve the required files over and over again from the main storage, in order to speed this up and keep the program running smoothly, all essential and frequently used files or assets will be kept in the RAM as it is much quicker to access. (Task Manager example of the RAM's utilization shown below).



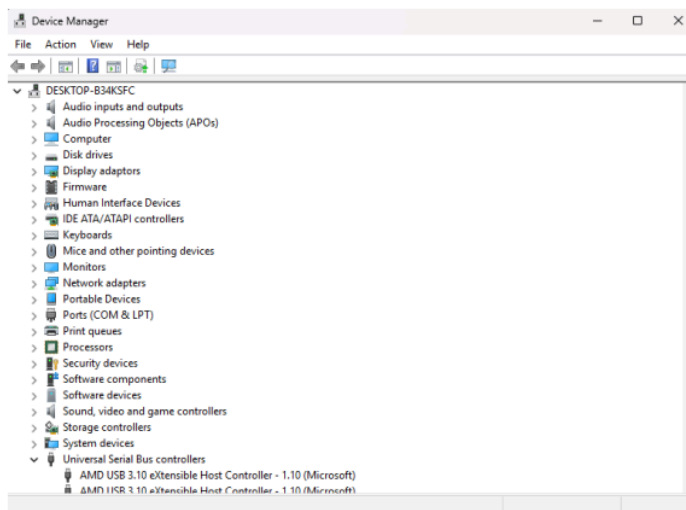
File Management System -

The file management system allows the user to organise, store and retrieve data. The OS's job is to ensure that it knows where to look when it needs to retrieve files for either its core operation, or upon request when the user wishes to open a file. Windows uses the NTFS (New Technology File System) format to store its data. The user will typically interact with their files through the 'File Manager' application however it is possible to interact with them through command prompt using the CLI.



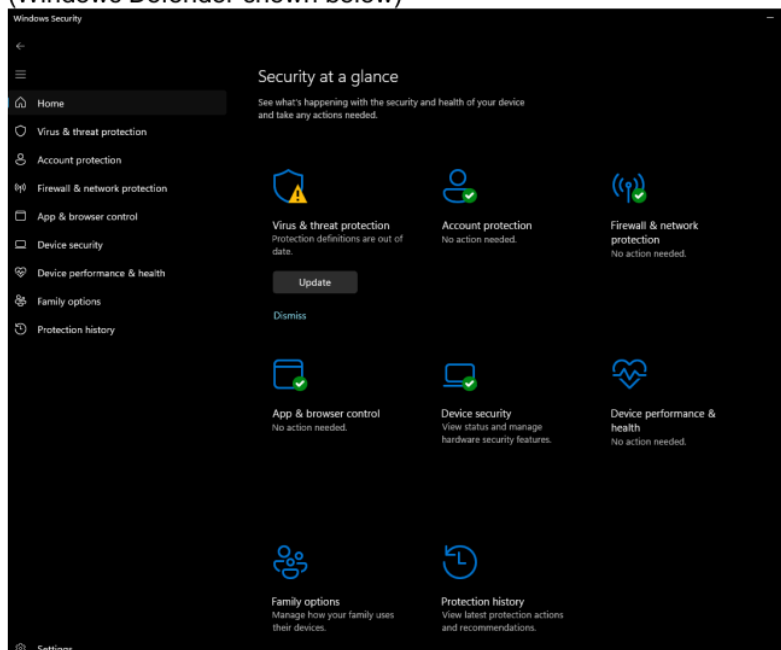
Device Management -

The OS also has to manage the hardware that the computer comprises of, whether this be the CPU and RAM or a USB mouse that has been plugged in. The OS has to know what it is and what to do with it. Windows has an application called 'Device Manager' which will list all of the devices that it can recognise and will also show which driver it is using to communicate with them. (Device Manager shown below).



Security Access and Control -

Modern operating systems such as Windows will often come preinstalled with their own security mechanisms to protect the system and the users data. A common example is called a 'firewall' or more specifically for Windows, it uses an application called 'Windows Defender'. Commonly also known as an anti-virus, its job is to prevent your computer and its files becoming compromised from a malware attack. (Windows Defender shown below)



User Interface -

As mentioned previously, the OS provides either a GUI (more common recently) or a CLI (typically used when computers were in the early stages of development and in very early consumer days). Windows 11 such as I am using primarily focuses on the GUI aspect of it. However should the user wish to interact with the computer through the CLI, Windows allows the use of command prompt to complete tasks and can sometimes actually be the ideal method depending on what the user aims to complete.

Use of Windows OS CLI commands

The CLI in Windows is a powerful tool which can be used for managing system operations. CLI is typically used by system administrators and power users for efficiency and automation. Below i shall provide 10 examples of CLI commands.

'ipconfig' -

The first command that I'd like to demonstrate is 'ipconfig'. Its purpose is to display the current connected networks configuration details. (I have purposely provided two screenshots as to not include my IP address for privacy reasons.

```
PS C:\Users\Drew> ipconfig

Windows IP Configuration

Wireless LAN adapter WiFi:

    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  . :

Ethernet adapter Ethernet 2:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix  . :
PS C:\Users\Drew>
```

'ping' -

Next I have chosen the 'ping' command. Its job is to test the network connectivity to another host.

```

PS C:\Users\Drew> ping www.google.com

Pinging www.google.com [172.217.169.68] with 32 bytes of data:
Reply from 172.217.169.68: bytes=32 time=13ms TTL=117
Reply from 172.217.169.68: bytes=32 time=13ms TTL=117
Reply from 172.217.169.68: bytes=32 time=13ms TTL=117
Reply from 172.217.169.68: bytes=32 time=13ms TTL=117

Ping statistics for 172.217.169.68:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 13ms, Maximum = 13ms, Average = 13ms
PS C:\Users\Drew>

```

'tasklist' -

The 'tasklist' command will display all active processes that are currently running on the system. The screenshot will be cropped as it is not worth showing the full result.

```

PS C:\Users\Drew> tasklist

```

Image Name	PID	Session Name	Session#	Mem Usage
System Idle Process	0	Services	0	8 K
System	4	Services	0	10,412 K
Secure System	188	Services	0	62,000 K
Registry	232	Services	0	33,376 K

'systeminfo' -

This command will provide detailed configuration information regarding the computer. Again, the screenshot is cropped as the full output isn't necessary to show its functionality.

```

PS C:\Users\Drew> systeminfo

```

Host Name:	DESKTOP-B34KSFC
OS Name:	Microsoft Windows 11 Home
OS Version:	10.0.26100 N/A Build 26100
OS Manufacturer:	Microsoft Corporation
OS Configuration:	Standalone Workstation
OS Build Type:	Multiprocessor Free
Registered Owner:	Drew

'chkdsk' -

This is a tool that you can use within CLI that will check the integrity (health) of your storage devices.

```
PS C:\Users\Drew> chkdsk
The type of the file system is NTFS.

WARNING! /F parameter not specified.
Running CHKDSK in read-only mode.

Stage 1: Examining basic file system structure ...
1478400 file records processed.
File verification completed.
Phase duration (File record verification): 8.80 seconds.
17901 large file records processed.
Phase duration (Orphan file record recovery): 8.05 milliseconds.
0 bad file records processed.
Phase duration (Bad file record checking): 0.37 milliseconds.

Stage 2: Examining file name linkage ...
Progress: 511201 of 1703704 done; Stage: 30%; Total: 41%; ETA: 0:00:17 ..
```

'netstat' -

This command will display active network connections and listening ports. Again, i have used separate screenshots to hide my IP address.

	Foreign Address	State
	20.90.156.32:https	ESTABLISHED
	20.90.156.32:https	ESTABLISHED
	wa-in-f188:5228	ESTABLISHED
	20.108.130.246:https	ESTABLISHED
	a23-204-232-117:https	CLOSE_WAIT
	a104-78-173-167:http	CLOSE_WAIT
	52.111.242.31:https	ESTABLISHED
	52.108.52.22:https	ESTABLISHED
	52.111.236.19:https	ESTABLISHED
	52.108.9.12:https	ESTABLISHED
	52.108.240.5:https	ESTABLISHED
	20.108.130.201:https	ESTABLISHED
	52.108.9.12:https	ESTABLISHED
	172.64.155.209:https	ESTABLISHED
	172.64.155.209:https	ESTABLISHED
	20.50.201.201:https	ESTABLISHED
	52.108.24.0:https	ESTABLISHED
	13.107.136.10:https	ESTABLISHED
	13.69.239.79:https	ESTABLISHED
	172.64.147.238:https	ESTABLISHED
	52.182.143.208:https	ESTABLISHED

```
PS C:\Users\Drew> netstat
Active Connections
```

'dir' -

'dir' is short for directory and will list the contents of a chosen directory.

```
PS C:\Users\Drew> dir
```

Directory: C:\Users\Drew

Mode		LastWriteTime	Length	Name
d-----		09/01/2025 16:44		.dotnet
d-----		09/01/2025 16:49		.templateengine
d-----		17/04/2025 19:26		.VirtualBox
d-----		09/01/2025 19:48		.vscode
d-r----		09/09/2023 21:35		3D Objects
d-----		10/09/2023 16:40		ansel
d-r----		15/01/2025 13:15		Contacts

'clear' -

This one is self-explanatory, it will clear the terminal.

```
PS C:\Users\Drew>
```

```
PS C:\Users\Drew> clear
```

'shutdown' -

As above, this one too is self explanatory, once executed, the system will shutdown. (before and after provided).

```
PS C:\Users\Drew> shutdown
```

'sfc' -

Similar to 'chldsk' this is another hard disk related command that scans your storage. However, this command is used to check for and repair any corrupted system files.

```
PS C:\Users\Drew> sfc /scannow
```

```
Beginning system scan. This process will take some time.
```

```
Beginning verification phase of system scan.
```

```
Verification 2% complete.
```

Use of Linux OS CLI commands

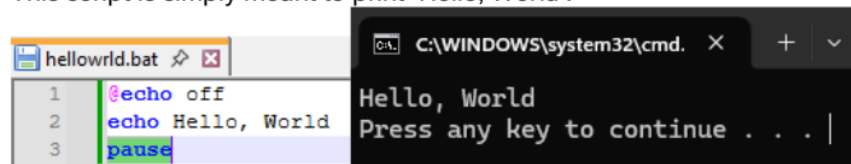
No matter what i tried, when loading Ubuntu on my VM it would cause my PC to bluescreen.

Use of Windows OS scripts

Using scripts in windows is a powerful way to automate tasks and managing system configurations. Windows supports scripting through batch operations (.bat) and also through PowerShell (.ps1) files. For this section I will be using batch script within notepad++. I will be starting each script with '@echo off' to prevent the command being shown as its being executed.

Hello World Script -

This script is simply meant to print 'Hello, World'.

The image shows a side-by-side comparison of a batch script and its execution. On the left, a Notepad++ window titled 'helloworld.bat' contains three lines of code: 1. @echo off, 2. echo Hello, World, and 3. pause. On the right, a Windows Command Prompt window titled 'C:\WINDOWS\system32\cmd.' shows the output of the script: 'Hello, World' followed by 'Press any key to continue . . . |'.

Display SysInfo Script -

Similar to the CLI command, this script will display the computers information.

```
sysinfo.bat
1 @echo off
2 systeminfo
3 pause
```

```
C:\WINDOWS\system32\cmd. X + v

Host Name:                DESKTOP-B34KSFC
OS Name:                  Microsoft Windows 11 Home
OS Version:               10.0.26100 N/A Build 26100
OS Manufacturer:         Microsoft Corporation
OS Configuration:        Standalone Workstation
OS Build Type:             Multiprocessor Free
Registered Owner:         Drew
```

List running processes script -

As mentioned previously, this script will list all running processes.

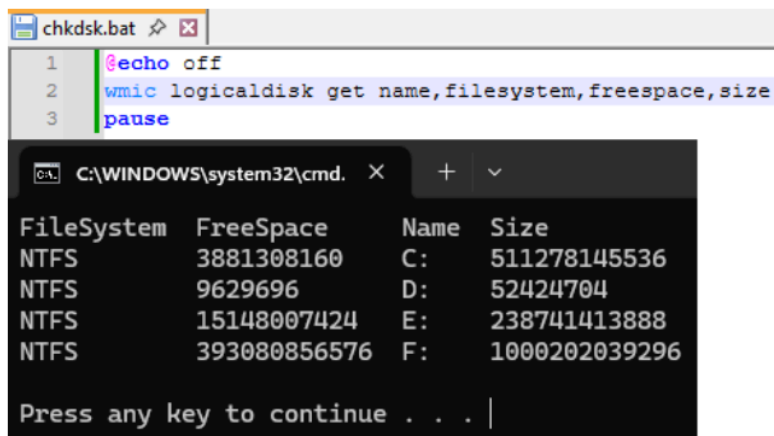
```
tasklst.bat
1 @echo off
2 tasklist
3 pause
```

```
C:\WINDOWS\system32\cmd. X + v

Image Name                PID Session Name        Session#    Mem Usage
=====
System Idle Process        0 Services             0           8 K
System                    4 Services             0          1,684 K
Secure System             188 Services           0          61,948 K
Registry                  232 Services           0          58,008 K
smss.exe                   700 Services           0           1,560 K
csrss.exe                  1048 Services          0           6,236 K
csrss.exe                  1144 Console              1           6,728 K
wininit.exe                1164 Services           0           7,756 K
winlogon.exe               1248 Console             1          13,140 K
```

Check Disk Space Script -

This script will check the disk space on all disks that I have connected.



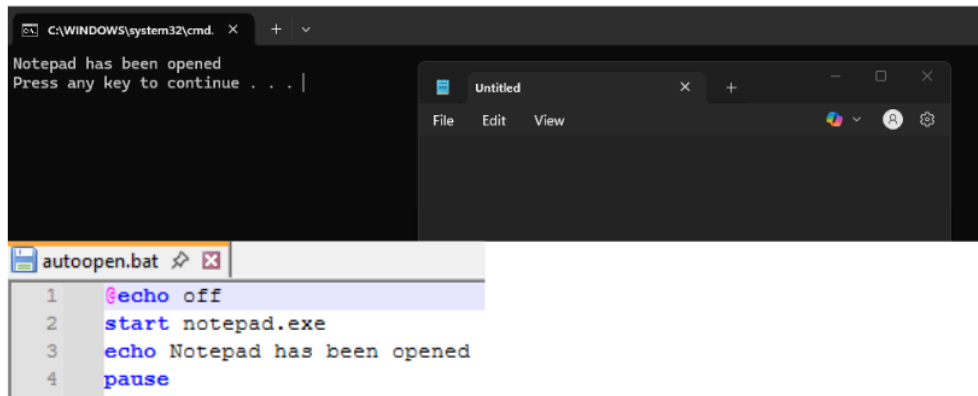
```
chkdisk.bat
1 @echo off
2 wmic logicaldisk get name, filesystem, freespace, size
3 pause
```

FileSystem	FreeSpace	Name	Size
NTFS	3881308160	C:	511278145536
NTFS	9629696	D:	52424704
NTFS	15148007424	E:	238741413888
NTFS	393080856576	F:	1000202039296

Press any key to continue . . . |

Auto-Open Script -

This script will simply open notepad ready for me to use.



```
autoopen.bat
1 @echo off
2 start notepad.exe
3 echo Notepad has been opened
4 pause
```

Use of Linux OS scripts

No matter what I tried, when loading Ubuntu on my VM it would cause my PC to bluescreen.

Conclusion

This report has covered key operating system functions and I have demonstrated multiple Windows CLI commands and Batch scripts. Through hands on examples, i have demonstrated how automation and CLI tools have simplified system management and also improved efficiency as to how people can complete said tasks.

Unfortunately, I have not been able to demonstrate the Linux CLI and scripts due to issues that I faced with my Ubuntu virtual machine that caused my computer to blue screen countless times. Despite this set back I believe that I have engaged well with the content and have gained a solid knowledge with the concepts.

OS Assignment

GRADEMARK REPORT

FINAL GRADE

GENERAL COMMENTS

29 / 100

Total:		29
1. Engagement with Literature Skills:		
- No use of citations. - No formatted reference list.	20	0
2. Knowledge and Understanding Skills:		
Key functions: + Good overview of key OS functions documented. + Screenshots showing where some of the functions can be seen/monitored/managed are documented. Win Commands: + Good overview of relevant commands that demonstrate an understanding of the language. Bash Commands: - Not documented. Bluescreen issue: WSL, Bellard or other Bash through the browser options, or Git for Windows could be used, as shown. See the slides on Moodle for more information and links on these options. Win Scripts: + .bat files described. - Script syntax areas of a win OS language not described. Bash Scripts: + V. good overview of the syntax that demonstrates a clear understanding of the scripting aspect of the language.	20	6

- Could be supported by some citations.		
3. Cognitive and Intellectual Skills:		
+ Evidence of good analysis and understanding of OS functions. + Screenshots showing where some of the functions can be seen/monitored/managed are included in the analysis. + Conclusion. - not supported by some citations.	10	8
4. Practical Application Skills:		
1. Win Commands: + V. good use of relevant Win. language commands. 2. Bash Commands: - Not documented. 3. Win Scripts: + .bat files created. - Script syntax areas of a win OS language not documented. 4. Bash Scripts: - Not documented. Bluescreen issue: WSL, Bellard or other Bash through the browser options, or Git for Windows could be used, as shown. See the slides on Moodle for more information and links on these options.	40	12
5. Transferable Skills for Life and Professional Practice:		
+ Overall, report format, structure, and presentation quite good.	10	3

- Report sections could be numbered. - Tutorial Activity 1 on OS Types: relevant supplementary information on OS types not included in the Appendix of the report. - Evidence of engagement with a relevant CPD course not documented in the appendix. - Lecture activity evidence not documented.		
Plagiarism & On-time check:		/

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