

Computer Architecture and Operating Systems Assignment

by Collette Owen

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University of Wales Trinity St David

Computing (Data & Information)

Assignment

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Introduction

Here in this assignment are evidence of practice of commands and online learning. Learning to better understand the fundamentals of commands and their uses. In addition, taking an online learning course to deepen my understand and expanding my knowledge on this subject.

Task 1

Memory & Process Management

Memory

Some key functions of Memory management are:

- Memory allocation
- Allocation and deallocation
- Isolation and protection#
- Virtual memory management

A process cannot exist without memory; it needs RAM to store its code and stack data. Conversely, memory is useless without process management to execute the instructions stored.

"All the runnable software on the computer, sometimes including the operating system, is organized into a number of sequential processes, or just processes for short. A process is just an instance of an executing program, including the current values of the program counter, registers, and variables" (Tanenbaum, 2015, p. 85). [1]

Process

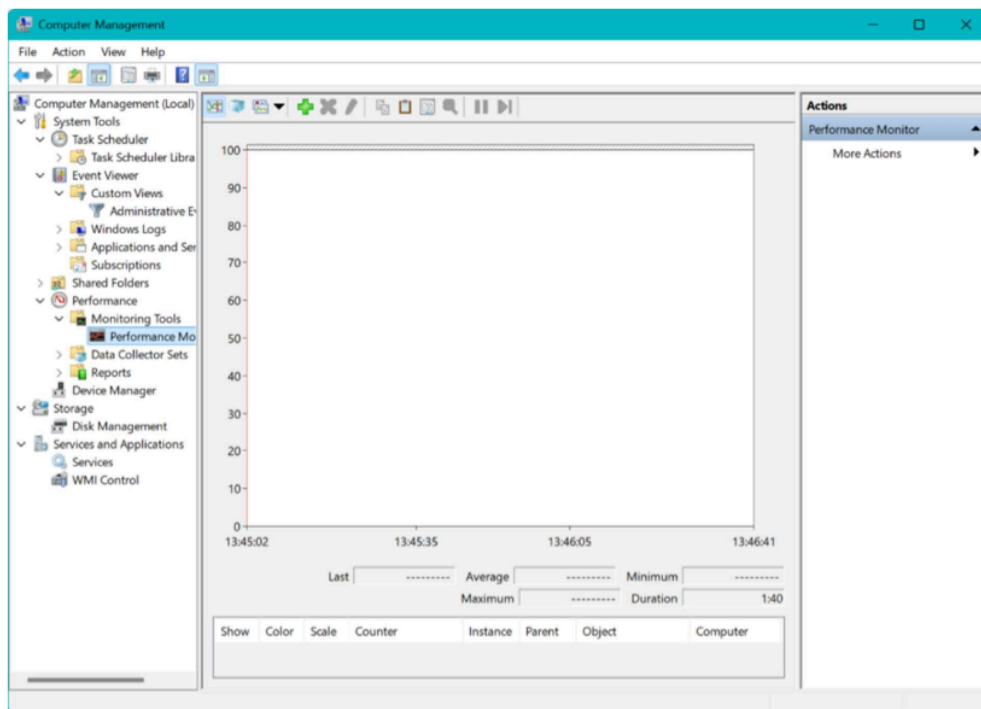
Process management involves an array of key points:

- Process Creation/Termination.
- CPU Scheduling
- Context Switching
- Synchronisation
- Deadlock handling

For process creation, a request will begin with a user's instructions in order to use a program or application.

"When an operating system is booted, typically numerous processes are created. Some of these are foreground processes, that is, processes that interact with (human) users and perform work for them" (Tanenbaum, 2015, p. 88). [2]

CPU scheduling as part of the process management process, allows for tasks to be carried out in a timely way using algorithms.



The screenshot shows the Windows Task Manager application. The 'Processes' tab is active, displaying a list of running applications. The columns are: Name, Status, PID, Command line, CPU, Memory, Disk, and Network. The data is as follows:

Name	Status	PID	Command line	CPU	Memory	Disk	Network
Apps (9)							
Google Chrome (10)	Running			0%	325.2 MB	0 MB/s	0 Mbps
Microsoft Edge (18)	Running			0%	2,220.3 MB	0.1 MB/s	0 Mbps
Microsoft PowerPoint	Running	24608	"C:\Program Files\Microsoft Office\Root\Offi...	0%	47.5 MB	0 MB/s	0 Mbps
Microsoft Word	Running	25580	"C:\Program Files\Microsoft Office\root\Offic...	0%	119.8 MB	0 MB/s	0 Mbps
Notepad.exe	Running	11732	"C:\Program Files\WindowsApps\Microsoft...	0%	30.2 MB	0 MB/s	0 Mbps
Settings	Running			0%	54.2 MB	0 MB/s	0 Mbps
Spotify Launcher (11)	Running			0%	357.6 MB	0.1 MB/s	0 Mbps
Task Manager	Running	1636	"C:\WINDOWS\System32\taskmgr.exe" /f	0%	64.9 MB	0 MB/s	0 Mbps
Windows Explorer	Running	27380	C:\WINDOWS\Explorer.EXE	0%	71.6 MB	0.1 MB/s	0 Mbps

Device Management: I/O Devices.

Device drivers: act as translators between the operating system and hardware peripherals, enabling applications to successfully execute user instructions.

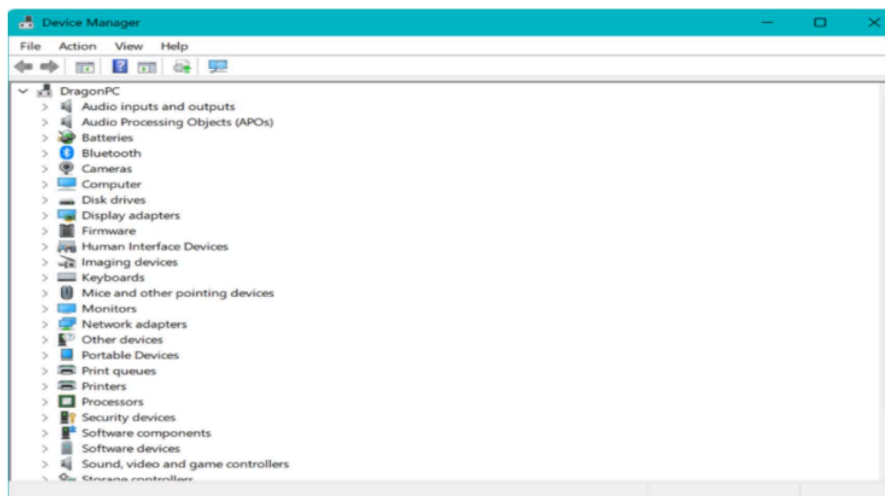
“When the processor is executing a program and encounters an instruction relating to I/O, it executes that instruction by issuing a command to the appropriate I/O module.” (Stallings, 2005, p. 34). [3]

The function of a device driver is to connect the bridge between the OS and I/O device to allow for correct operation as the OS does not have a local instruction for an external device.

Tracking Device Status: Monitors connected hardware to determine whether a device is currently available or disconnected.

Device Allocation and Deallocation:

- **Allocation:** It grants temporary exclusive or shared access to the I/O device.
- **Deallocation:** Once the process finishes or closes, the device manager instantly revokes access and releases the hardware so other applications can use it.



File & Directory Management

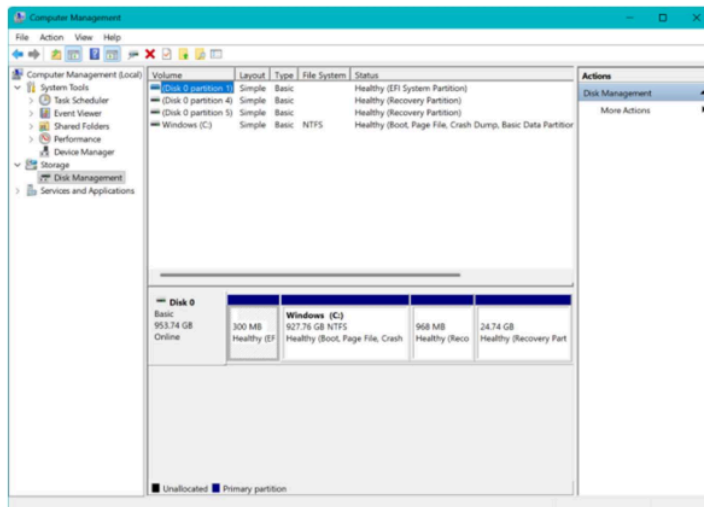
File Abstraction and Naming – This process defines how files are named, formatted (e.g., .docx, .pdf), and logically organised. It maps out paths and locations, making it easy to access stored data regardless of the physical hardware.

“A file is an abstraction mechanism. It provides a way to store information on the disk and read it back later. This must be done in such a way as to shield the user from the details of how and where the information is stored, and how the disks actually work.” (Tanenbaum and Bos, 2014, p. 265). [4]

Directory Structure and Hierarchy - Most modern operating systems use a hierarchy (tree) directory structure.

Storage Allocation and Tracking - Files grow, shrink, and get deleted constantly. The file system uses specific allocation methods to locate data.

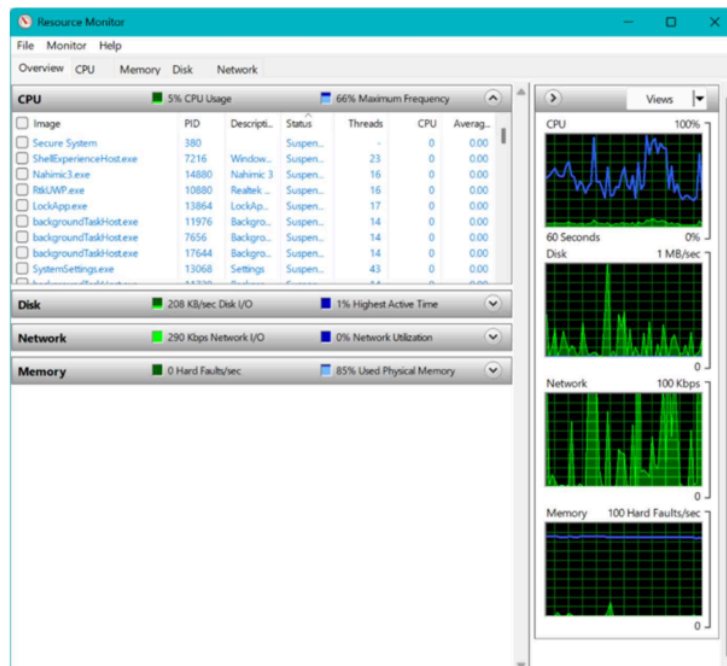
Access Control and Security - The file manager carries out security measures through Access Control Lists (ACLs). Whenever a process requests to open, modify, or delete a file, the file manager validates the permissions of the user.



System Performance Monitoring

Metrics Collection: Gathers real-time performance data from the CPU, memory, disk, and network, tracking specifics like CPU utilisation and used-to-available memory ratios.

Thresholding & Alerting: Triggers immediate alerts (via logs, emails, or flags) when a metric crosses a safe limit—such as 95% RAM usage or critical CPU heat—allowing users or the OS to intervene before a crash.

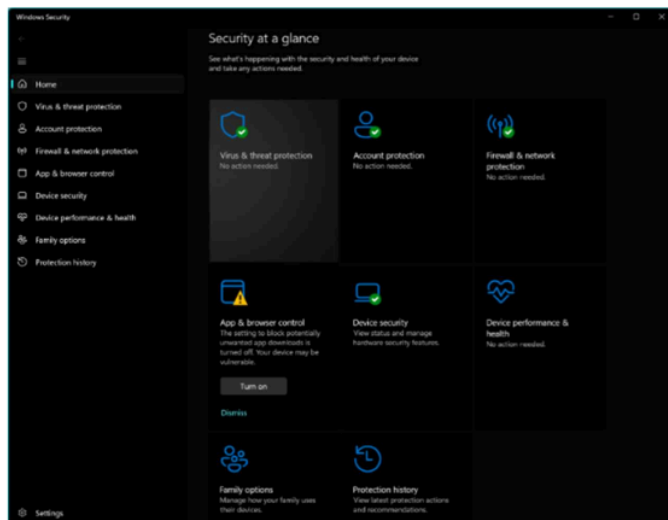


System Security

Authentication & Identification: Verifies user/process identity via three factors: what you know (passwords/PINs), what you have (tokens/apps), or what you are (biometrics).

Authorization & Access Control: Manages privileges by differentiating between Standard Users and Administrators.

Auditing, Logging, & Intrusion Detection: Logs failed logins, privilege changes, and network activity. Integrated Intrusion Detection Systems (IDS) flag suspicious patterns (e.g., rapid failed logins) to automatically block offending accounts or IPs.

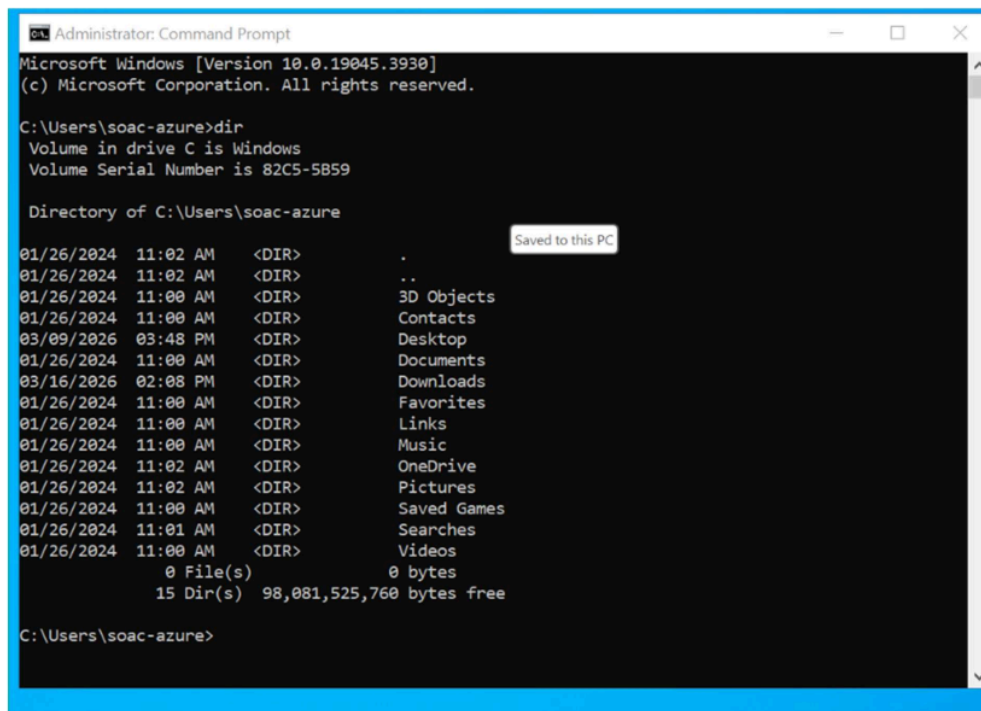


Task 2

File & directory management

Command '**dir**' listing the directories

The **dir** command was executed in the Windows Command Prompt to list all files and subdirectories within the current directory path.



The screenshot shows a Windows Command Prompt window titled "Administrator: Command Prompt". The command prompt displays the output of the `dir` command executed in the directory `C:\Users\soac-azure`. The output lists the contents of the directory, including subdirectories like 3D Objects, Contacts, Desktop, Documents, Downloads, Favorites, Links, Music, OneDrive, Pictures, Saved Games, Searches, and Videos. It also shows the total number of files and directories and the free space on the drive.

```
Administrator: Command Prompt
Microsoft Windows [Version 10.0.19045.3930]
(c) Microsoft Corporation. All rights reserved.

C:\Users\soac-azure>dir
Volume in drive C is Windows
Volume Serial Number is 82C5-5B59

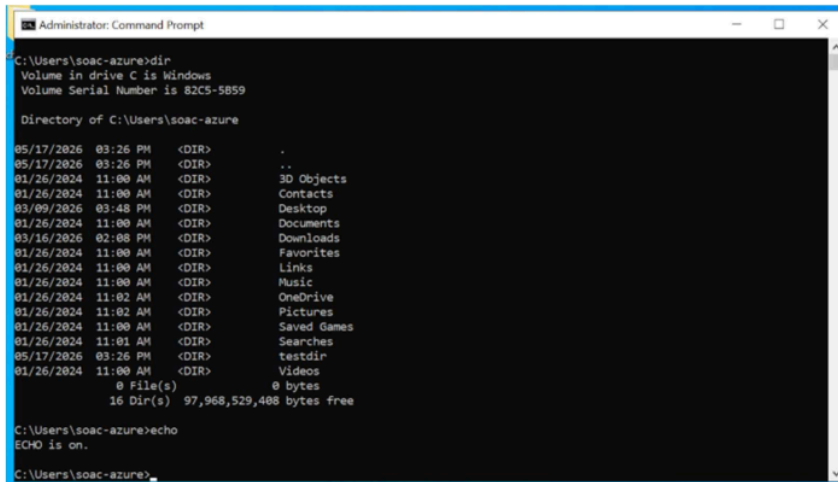
Directory of C:\Users\soac-azure

01/26/2024  11:02 AM  <DIR>          .
01/26/2024  11:02 AM  <DIR>          ..
01/26/2024  11:00 AM  <DIR>          3D Objects
01/26/2024  11:00 AM  <DIR>          Contacts
03/09/2026  03:48 PM  <DIR>          Desktop
01/26/2024  11:00 AM  <DIR>          Documents
03/16/2026  02:08 PM  <DIR>          Downloads
01/26/2024  11:00 AM  <DIR>          Favorites
01/26/2024  11:00 AM  <DIR>          Links
01/26/2024  11:00 AM  <DIR>          Music
01/26/2024  11:02 AM  <DIR>          OneDrive
01/26/2024  11:02 AM  <DIR>          Pictures
01/26/2024  11:00 AM  <DIR>          Saved Games
01/26/2024  11:01 AM  <DIR>          Searches
01/26/2024  11:00 AM  <DIR>          Videos
               0 File(s)              0 bytes
               15 Dir(s) 98,081,525,760 bytes free

C:\Users\soac-azure>
```

Command: **Echo** -

The **echo** command was run without any additional arguments to check the current state of command echoing in the console.



```
Administrator: Command Prompt
C:\Users\soac-azure>dir
Volume in drive C is Windows
Volume Serial Number is 82C5-5B59

Directory of C:\Users\soac-azure

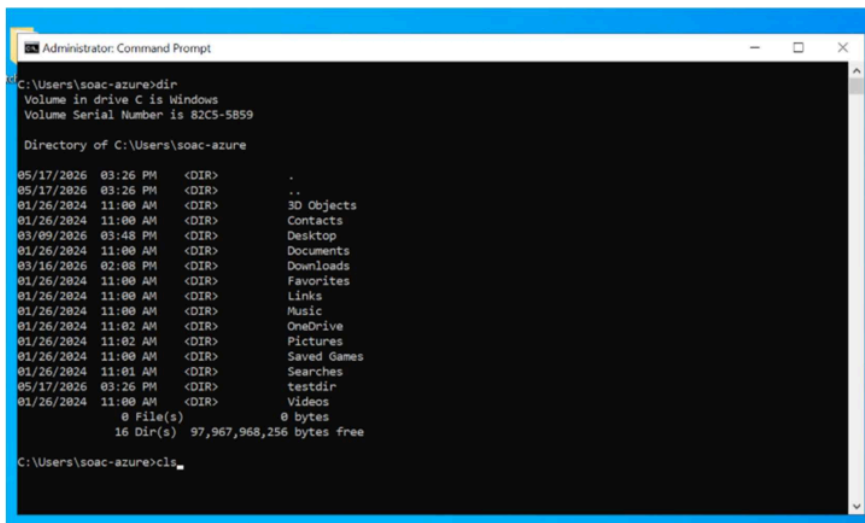
05/17/2026  03:26 PM    <DIR>        .
05/17/2026  03:26 PM    <DIR>        ..
01/26/2024  11:00 AM    <DIR>        3D Objects
01/26/2024  11:00 AM    <DIR>        Contacts
03/09/2026  03:48 PM    <DIR>        Desktop
01/26/2024  11:00 AM    <DIR>        Documents
03/16/2026  02:08 PM    <DIR>        Downloads
01/26/2024  11:00 AM    <DIR>        Favorites
01/26/2024  11:00 AM    <DIR>        Links
01/26/2024  11:00 AM    <DIR>        Music
01/26/2024  11:02 AM    <DIR>        OneDrive
01/26/2024  11:02 AM    <DIR>        Pictures
01/26/2024  11:00 AM    <DIR>        Saved Games
01/26/2024  11:01 AM    <DIR>        Searches
05/17/2026  03:26 PM    <DIR>        testdir
01/26/2024  11:00 AM    <DIR>        Videos
             0 File(s)            0 bytes
             16 Dir(s)  97,968,529,408 bytes free

C:\Users\soac-azure>echo
ECHO is on.

C:\Users\soac-azure>
```

Command **CLS**:

The **cls** (Clear Screen) command was entered into the command line.



```
Administrator: Command Prompt
C:\Users\soac-azure>dir
Volume in drive C is Windows
Volume Serial Number is 82C5-5B59

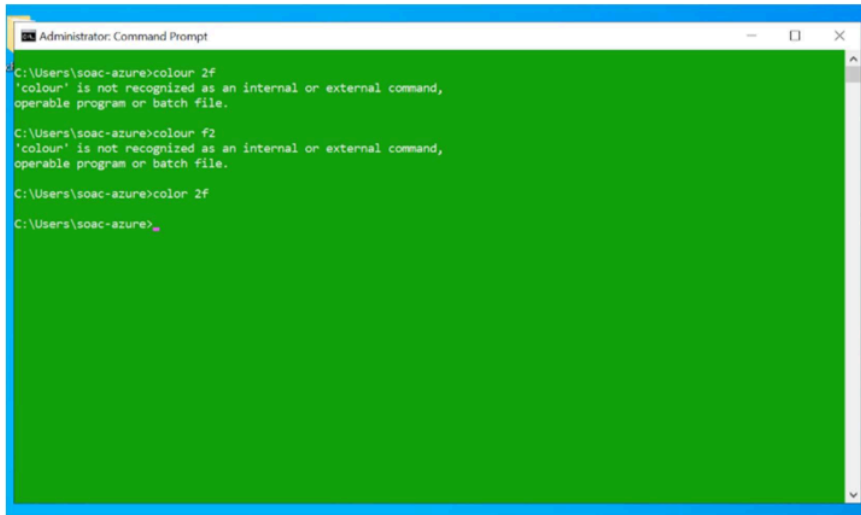
Directory of C:\Users\soac-azure

05/17/2026  03:26 PM    <DIR>        .
05/17/2026  03:26 PM    <DIR>        ..
01/26/2024  11:00 AM    <DIR>        3D Objects
01/26/2024  11:00 AM    <DIR>        Contacts
03/09/2026  03:48 PM    <DIR>        Desktop
01/26/2024  11:00 AM    <DIR>        Documents
03/16/2026  02:08 PM    <DIR>        Downloads
01/26/2024  11:00 AM    <DIR>        Favorites
01/26/2024  11:00 AM    <DIR>        Links
01/26/2024  11:00 AM    <DIR>        Music
01/26/2024  11:02 AM    <DIR>        OneDrive
01/26/2024  11:02 AM    <DIR>        Pictures
01/26/2024  11:00 AM    <DIR>        Saved Games
01/26/2024  11:01 AM    <DIR>        Searches
05/17/2026  03:26 PM    <DIR>        testdir
01/26/2024  11:00 AM    <DIR>        Videos
             0 File(s)            0 bytes
             16 Dir(s)  97,967,968,256 bytes free

C:\Users\soac-azure>cls
```

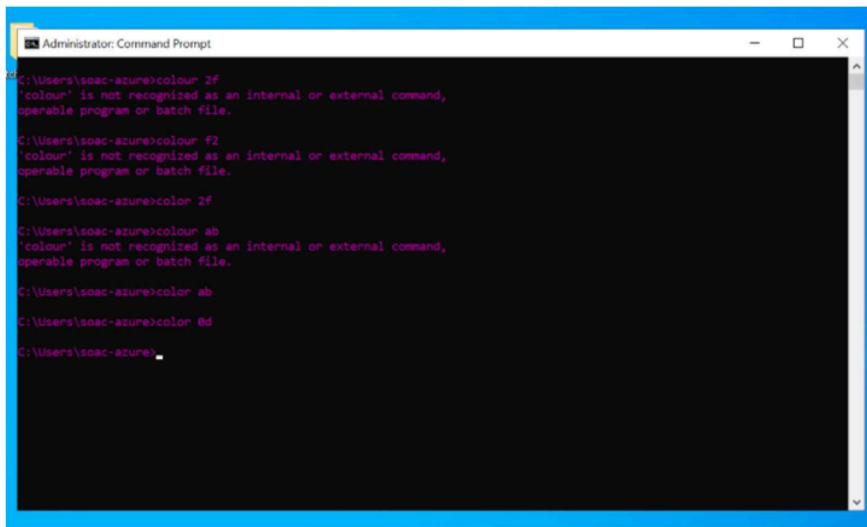
Command: Color xx:

The **color** command was used to modify the background and text colours of the Command Prompt interface. After an initial syntax error when trying to use an invalid utility name, I successfully amended the background and text colour.



```
Administrator: Command Prompt
C:\Users\soac-azure>color 2f
'colour' is not recognized as an internal or external command,
operable program or batch file.
C:\Users\soac-azure>color f2
'colour' is not recognized as an internal or external command,
operable program or batch file.
C:\Users\soac-azure>color 2f
C:\Users\soac-azure>
```

I continued to amend the colour to view the variations:

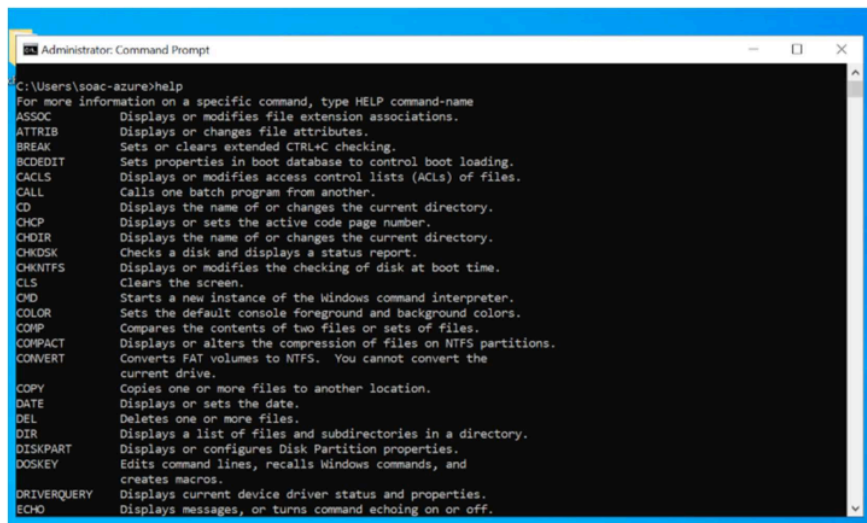


```
Administrator: Command Prompt
C:\Users\soac-azure>color 2f
'colour' is not recognized as an internal or external command,
operable program or batch file.
C:\Users\soac-azure>color f2
'colour' is not recognized as an internal or external command,
operable program or batch file.
C:\Users\soac-azure>color 2f
C:\Users\soac-azure>color ab
'colour' is not recognized as an internal or external command,
operable program or batch file.
C:\Users\soac-azure>color ab
C:\Users\soac-azure>color 8d
C:\Users\soac-azure>
```

Command: Help:

The **help** command was executed to pull up the system's built in reference manual for command line utilities. The command outputs an alphabetical list of standard Windows commands alongside a brief explanation of what each command does.

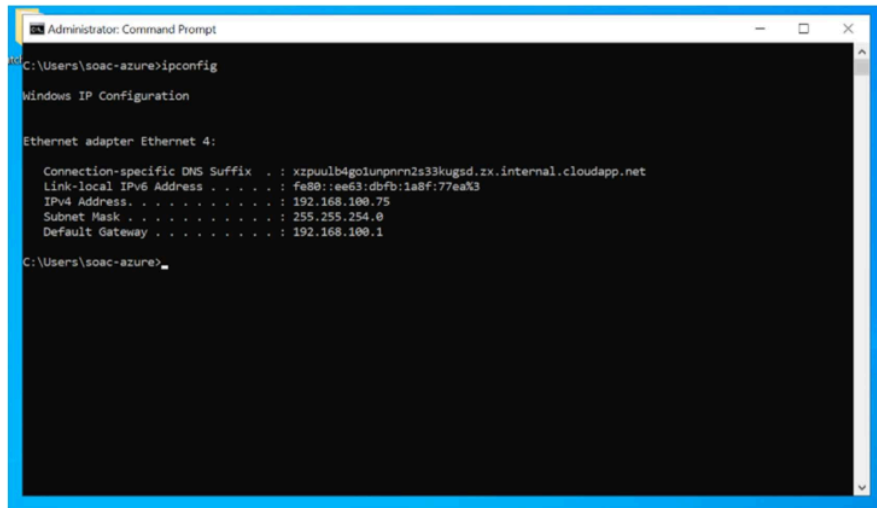
"Displays a list of the available commands or detailed help information on a specified command. If used without parameters, help lists and briefly describes every system command." (Microsoft, 2024). [5]



```
Administrator: Command Prompt
C:\Users\soac-azure>help
For more information on a specific command, type HELP command-name
ASSOC      Displays or modifies file extension associations.
ATTRIB     Displays or changes file attributes.
BREAK      Sets or clears extended CTRL+C checking.
BCDEDIT    Sets properties in boot database to control boot loading.
CACLS      Displays or modifies access control lists (ACLs) of files.
CALL       Calls one batch program from another.
CD          Displays the name of or changes the current directory.
CHKP       Displays or sets the active code page number.
CHDIR      Displays the name of or changes the current directory.
CHKDSK     Checks a disk and displays a status report.
CHKNTFS    Displays or modifies the checking of disk at boot time.
CLS        Clears the screen.
CMD        Starts a new instance of the Windows command interpreter.
COLOR      Sets the default console foreground and background colors.
COMP       Compares the contents of two files or sets of files.
COMPACT    Displays or alters the compression of files on NTFS partitions.
CONVERT    Converts FAT volumes to NTFS. You cannot convert the
            current drive.
COPY       Copies one or more files to another location.
DATE       Displays or sets the date.
DEL        Deletes one or more files.
DIR         Displays a list of files and subdirectories in a directory.
DISKPART   Displays or configures Disk Partition properties.
DOSKEY     Edits command lines, recalls Windows commands, and
            creates macros.
DRIVERQUERY Displays current device driver status and properties.
ECHO       Displays messages, or turns command echoing on or off.
```

Command: `ipconfig`:

The **ipconfig** utility was run to view the machine's current network interface settings. The output reveals the network parameters for the active Ethernet adapter, showing a Link-local IPv6 address, an IPv4 address of 192.168.100.75, a subnet mask of 255.255.254.0, and a default gateway of 192.168.100.1



```
Administrator: Command Prompt
C:\Users\soac-azure>ipconfig

Windows IP Configuration

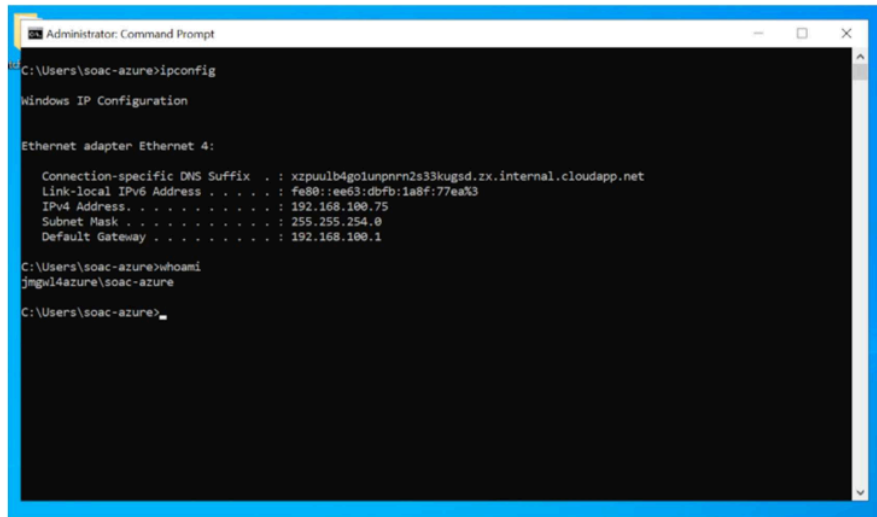
Ethernet adapter Ethernet 4:

    Connection-specific DNS Suffix  . : xzpuulb4go1unpnrn2s33kugsd.zx.internal.cloudapp.net
    Link-local IPv6 Address . . . . . : fe80::ee63:dbfb:1a8f:77ea%3
    IPv4 Address. . . . . : 192.168.100.75
    Subnet Mask . . . . . : 255.255.254.0
    Default Gateway . . . . . : 192.168.100.1

C:\Users\soac-azure>
```

Command: Whoami:

The **whoami** command was executed to retrieve the username and domain context of the currently logged-in network session.



```
Administrator: Command Prompt
C:\Users\soac-azure>ipconfig

Windows IP Configuration

Ethernet adapter Ethernet 4:

    Connection-specific DNS Suffix  . : xzpuulb4go1unpnrn2s33kugsd.zx.internal.cloudapp.net
    Link-local IPv6 Address . . . . . : fe80::ee63:dbfb:1a8f:77ea%3
    IPv4 Address. . . . . : 192.168.100.75
    Subnet Mask . . . . . : 255.255.254.0
    Default Gateway . . . . . : 192.168.100.1

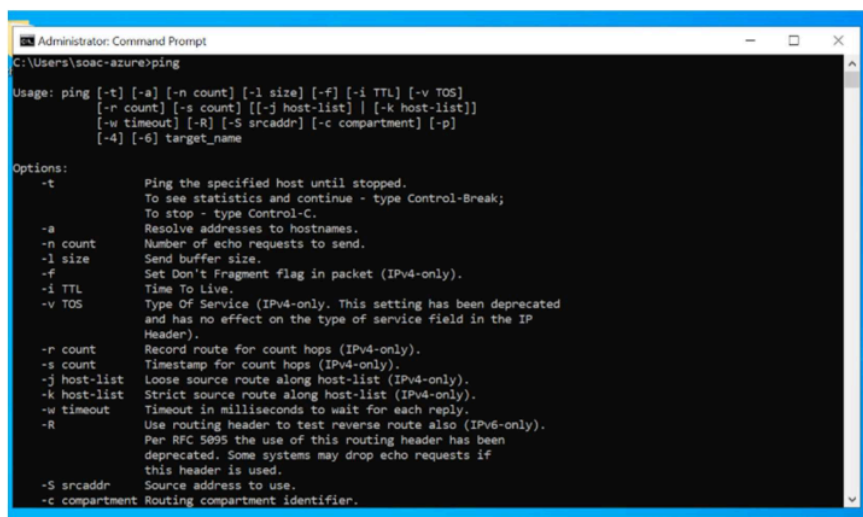
C:\Users\soac-azure>whoami
jmgwl4azure\soac-azure

C:\Users\soac-azure>
```

Command: PING:

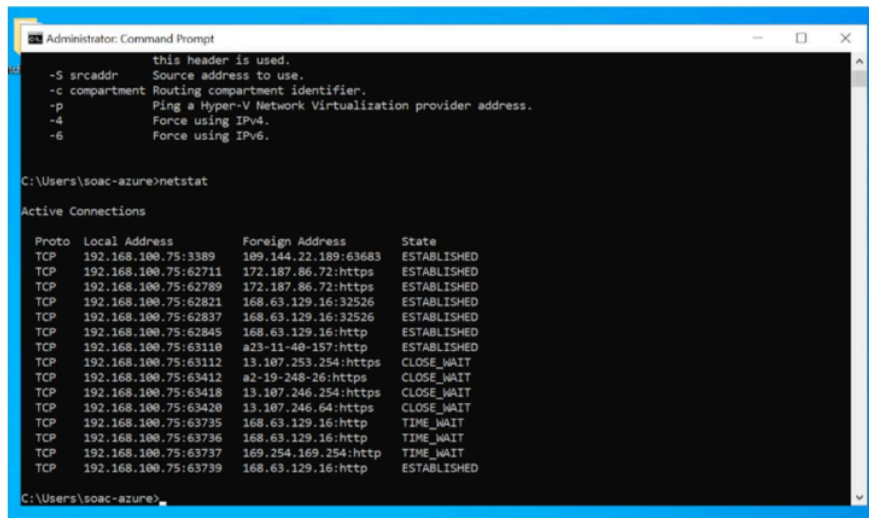
The **ping** command was initiated without a target host, which prompts the system to display its syntax documentation, usage flags, and configuration options.

“Verifies IP-level connectivity to another TCP/IP computer by sending Internet Control Message Protocol (ICMP) echo Request messages. The receipt of the corresponding echo Reply messages is displayed, along with round-trip times. ping is the primary TCP/IP command used to troubleshoot connectivity, reachability, and name resolution. Used without parameters, this command displays Help content.” (Microsoft, 2024). [6]

A screenshot of a Windows Command Prompt window titled "Administrator: Command Prompt". The window shows the command prompt at "C:\Users\soac-azure>ping". Below the command, the help text for the ping command is displayed. The text includes the usage syntax for various options like [-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], and [-p]. It also lists several options with their descriptions, such as -t (Ping until stopped), -a (Resolve addresses), -n count (Number of echo requests), -l size (Send buffer size), -f (Set Don't Fragment flag), -i TTL (Time To Live), -v TOS (Type Of Service), -r count (Record route), -s count (Timestamp), -j host-list (Loose source route), -k host-list (Strict source route), -w timeout (Timeout in milliseconds), -R (Use routing header), -S srcaddr (Source address), and -c compartment (Routing compartment identifier).

Command: **Netstat:**

The **netstat** (Network Statistics) command was run to display all active inbound and outbound network connections.



```
Administrator: Command Prompt
this header is used.
-S srcaddr      Source address to use.
-c compartment  Routing compartment identifier.
-p             Ping a Hyper-V Network Virtualization provider address.
-4             Force using IPv4.
-6             Force using IPv6.

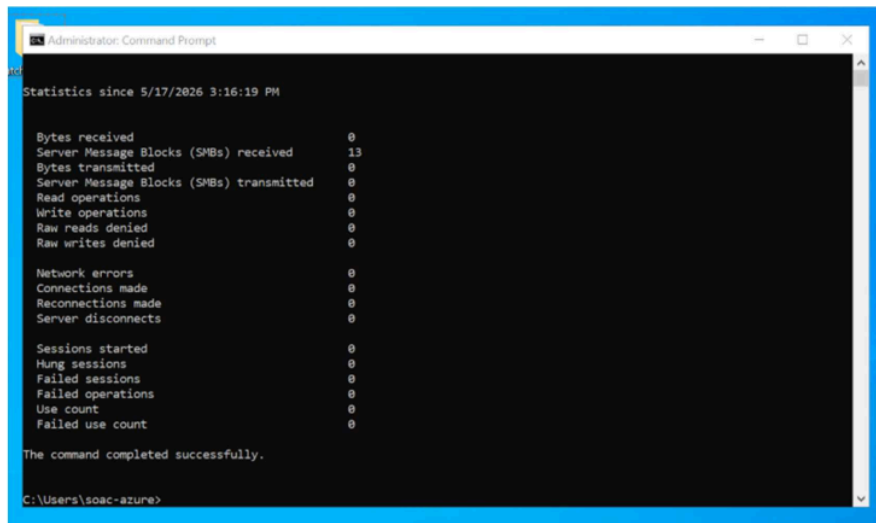
C:\Users\soac-azure>netstat

Active Connections

Proto Local Address           Foreign Address         State
TCP 192.168.100.75:3389      109.144.22.189:63683    ESTABLISHED
TCP 192.168.100.75:62711    172.187.86.72:https     ESTABLISHED
TCP 192.168.100.75:62789    172.187.86.72:https     ESTABLISHED
TCP 192.168.100.75:62821    168.63.129.16:32526     ESTABLISHED
TCP 192.168.100.75:62837    168.63.129.16:32526     ESTABLISHED
TCP 192.168.100.75:62845    168.63.129.16:http      ESTABLISHED
TCP 192.168.100.75:63110    a23-11-40-157:http      ESTABLISHED
TCP 192.168.100.75:63112    13.107.253.254:https     CLOSE_WAIT
TCP 192.168.100.75:63412    a2-19-248-26:https      CLOSE_WAIT
TCP 192.168.100.75:63418    13.107.246.254:https     CLOSE_WAIT
TCP 192.168.100.75:63420    13.107.246.64:https      CLOSE_WAIT
TCP 192.168.100.75:63735    168.63.129.16:http      TIME_WAIT
TCP 192.168.100.75:63736    168.63.129.16:http      TIME_WAIT
TCP 192.168.100.75:63737    169.254.169.254:http     TIME_WAIT
TCP 192.168.100.75:63739    168.63.129.16:http      ESTABLISHED

C:\Users\soac-azure>
```

Command: **net statistics workstation**



The screenshot shows a Windows Command Prompt window titled "Administrator: Command Prompt". The output of the command "net statistics workstation" is displayed, showing statistics since 5/17/2026 3:16:19 PM. The statistics are as follows:

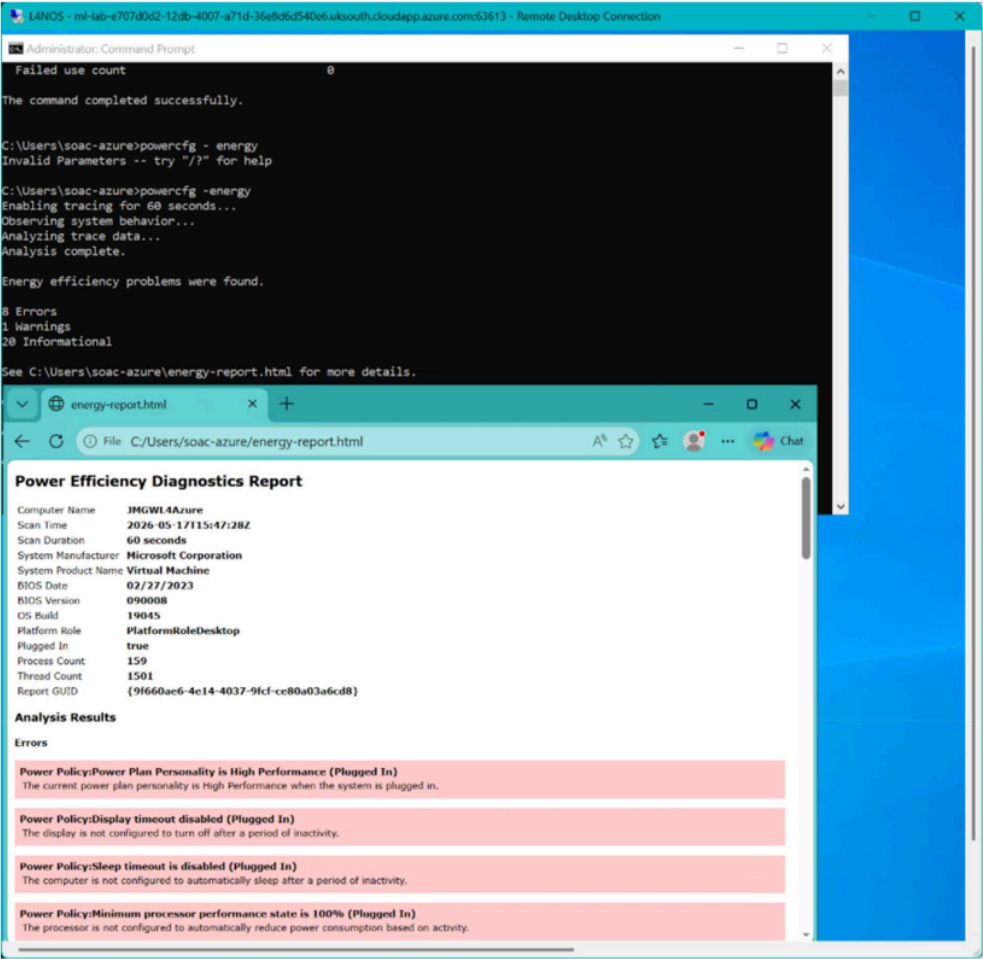
Category	Value
Bytes received	0
Server Message Blocks (SMBs) received	13
Bytes transmitted	0
Server Message Blocks (SMBs) transmitted	0
Read operations	0
Write operations	0
Raw reads denied	0
Raw writes denied	0
Network errors	0
Connections made	0
Reconnections made	0
Server disconnects	0
Sessions started	0
Hung sessions	0
Failed sessions	0
Failed operations	0
Use count	0
Failed use count	0

The command completed successfully.

C:\Users\soac-azure>

Command: `Powercfg -energy` & `energy-report.html`

The `powercfg -energy` utility was executed to run a 60 second background evaluation of the system's power management behaviours.



Commands:

net user username password /add

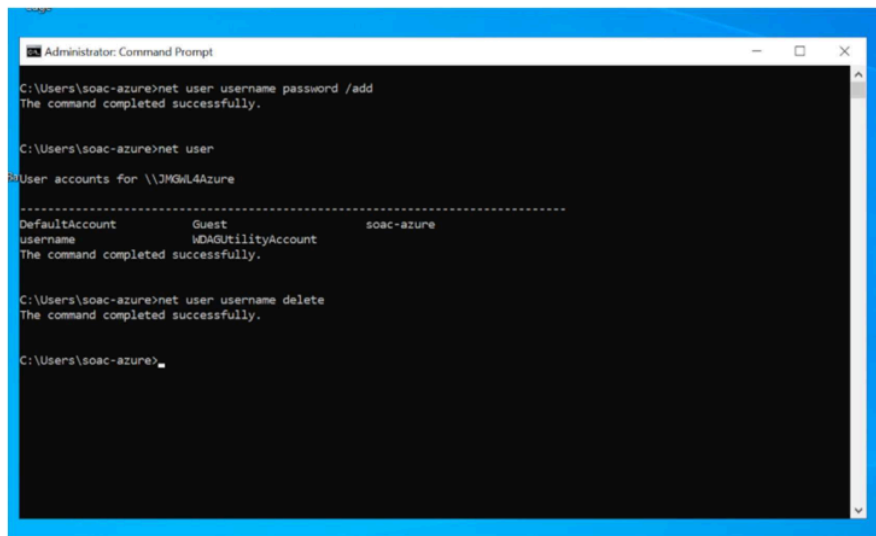
net user

net user username /delete

A demonstration of adding a user in managing profiles. Firstly, a new profile was successfully created using **net user username password /add**

Next, **net user** was run to list all active accounts.

Finally, the profile was deleted by using **net user username /delete**



```
Administrator: Command Prompt
C:\Users\soac-azure>net user username password /add
The command completed successfully.

C:\Users\soac-azure>net user
User accounts for \\JHGWL4Azure
-----
DefaultAccount      Guest              soac-azure
username            WDAGUtilityAccount
The command completed successfully.

C:\Users\soac-azure>net user username delete
The command completed successfully.

C:\Users\soac-azure>
```

Task 3

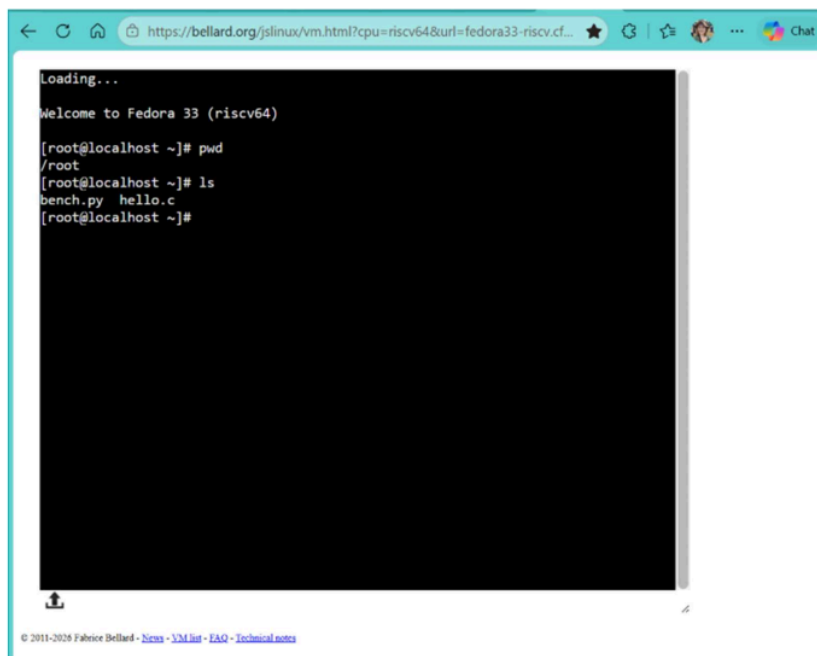
Commands: **pwd** and **ls**

Print Work Directory: States where the current location is in the system hierarchy.

List: This shows me the folder I am currently in. Giving me insight into the directory contents.

"Linux sysadmins need to move around the file system, [set up directories](#), locate files and collect information on files. The following commands will be needed:

- *cd, pwd and ls – to navigate the file systems and view directory contents"* (Stocker, 2025) [7]



The screenshot shows a web browser window with the address bar displaying `https://bellard.org/jslinux/vm.html?cpu=riscv64&url=fedora33-riscv.cf...`. The main content area is a terminal window with a black background and white text. The terminal output is as follows:

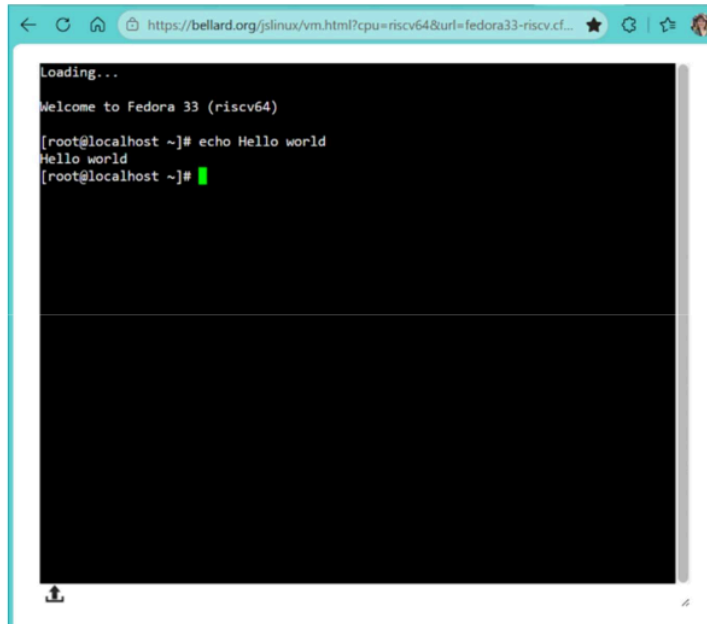
```
Loading...
Welcome to Fedora 33 (riscv64)
[root@localhost ~]# pwd
/root
[root@localhost ~]# ls
bench.py  hello.c
[root@localhost ~]#
```

At the bottom of the terminal window, there is a small icon of a person and a copyright notice: `© 2011-2026 Fabrice Bellard - News - VM list - FAQ - Technical notes`.

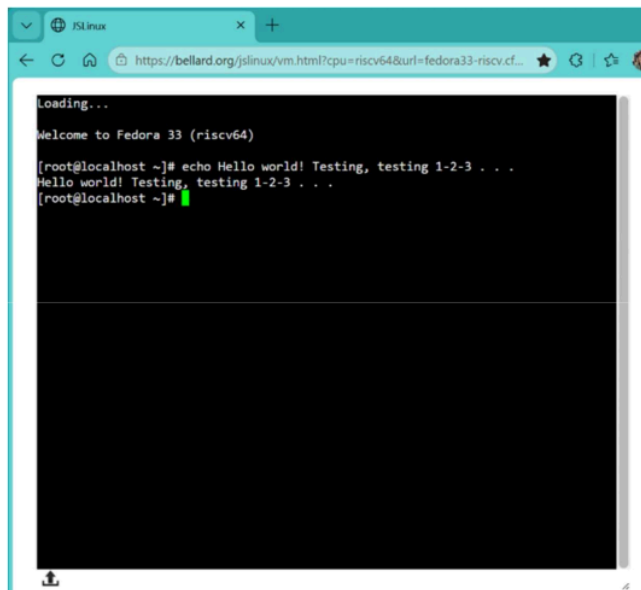
Command: **Echo**

Prints the text following the command. Below are 2 demonstrations of the echo command:

1. Hello World!
2. Hello World! Testing, testing, 1-2-3 . . .



A screenshot of a web browser window displaying a terminal interface. The browser's address bar shows the URL <https://bellard.org/jslinux/vm.html?cpu=riscv64&url=fedora33-riscv.cf...>. The terminal window has a black background with white text. It starts with "Loading..." and "Welcome to Fedora 33 (riscv64)". The user enters the command `[root@localhost ~]# echo Hello world`, and the terminal outputs `Hello world`. The prompt `[root@localhost ~]#` is followed by a green cursor.

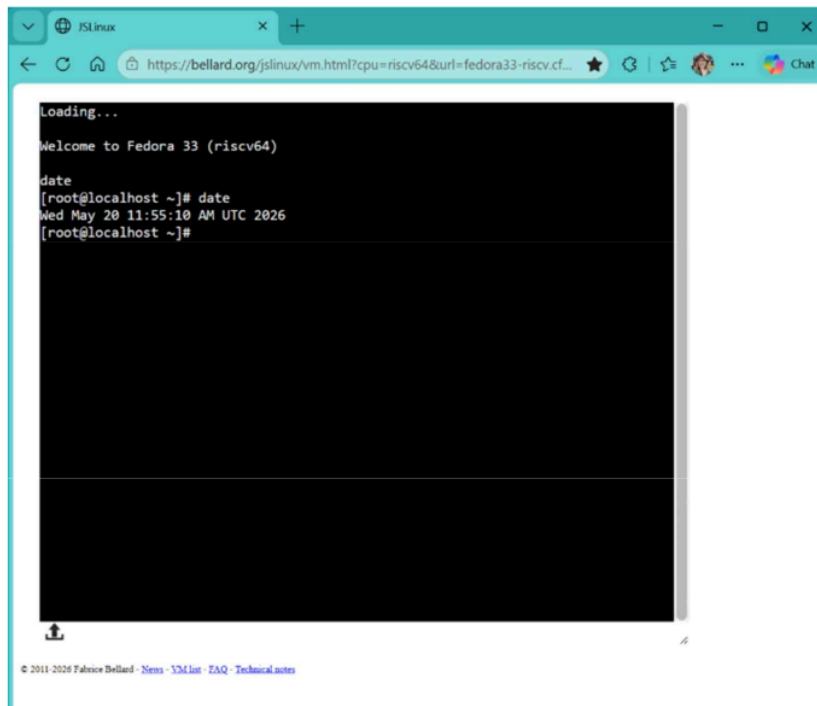


A screenshot of a web browser window displaying a terminal interface, similar to the one above. The browser's address bar shows the same URL. The terminal window shows the user entering the command `[root@localhost ~]# echo Hello world! Testing, testing 1-2-3 . . .`, and the terminal outputs `Hello world! Testing, testing 1-2-3 . . .`. The prompt `[root@localhost ~]#` is followed by a green cursor.

Command: **Date**

This displays the date. It will include the day of the week, day of the month, time and the world time zone.

"The exact result of many of these codes is locale specific and depends upon your language setting, particularly the LANG environment variable." Siever, E. (2009). [8]



The screenshot shows a web browser window with the title "JSlinux". The address bar displays the URL "https://bellard.org/jslinux/vm.html?cpu=riscv64&url=fedora33-riscv.cf...". The main content area is a terminal window with a black background and white text. The terminal output is as follows:

```
Loading...
Welcome to Fedora 33 (riscv64)

date
[root@localhost ~]# date
Wed May 20 11:55:10 AM UTC 2026
[root@localhost ~]#
```

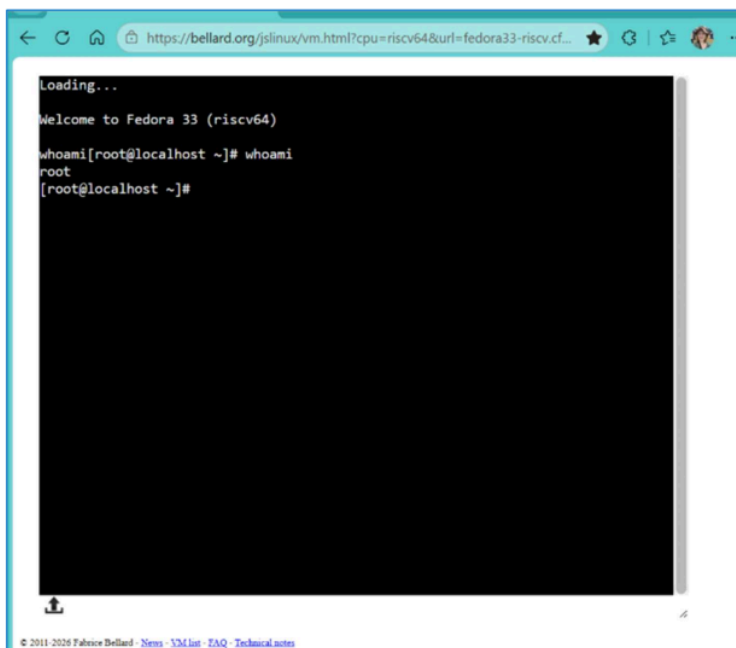
At the bottom of the terminal window, there is a small icon of a person and a link to "© 2011-2026 Fabrice Bellard - News - VM list - FAQ - Technical notes".

Command: **whoami**

This shows the account name that is running. A useful command if you wish to identify the user account you are in if you are using a shared device. It didn't work in the version I sued so I used the same command in PowerShell as pictured below.

"The 'whoami' command is a simple yet powerful utility designed to reveal the current username associated with the active user session. When executed, it provides a swift response by outputting the username associated with the user who issued the command."

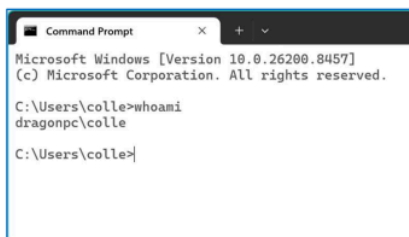
(GeeksforGeeks, 2025). [9]



A screenshot of a terminal window within a web browser. The browser's address bar shows a URL from bellard.org. The terminal text is as follows:

```
Loading...
Welcome to Fedora 33 (riscv64)
whoami[root@localhost ~]# whoami
root
[root@localhost ~]#
```

At the bottom of the terminal window, there is a copyright notice: © 2011-2020 Fabrice Bellard - News - VM list - FAQ - Technical notes.



A screenshot of a Windows Command Prompt window. The title bar reads "Command Prompt". The text inside the window is:

```
Microsoft Windows [Version 10.0.26200.8457]
(c) Microsoft Corporation. All rights reserved.

C:\Users\colle>whoami
dragonpc\colle

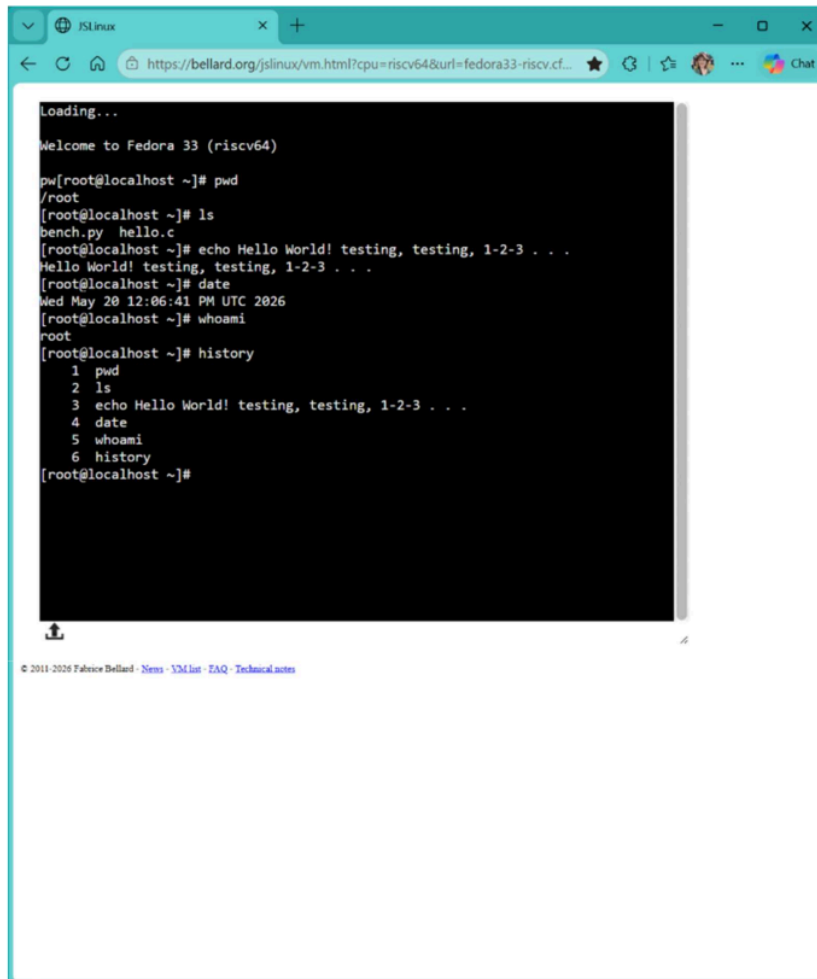
C:\Users\colle>
```

Command: **history**

I was able to review my previous commands I had used by using the command: history

This listed my previously used commands for this session. Additionally looking at if a command was successful or not.

The list gives a clean chronological log of your commands and their outcomes.

A screenshot of a web browser window displaying a terminal session. The browser's address bar shows the URL 'https://bellard.org/jslinux/vm.html?cpu=riscv64&url=fedora33-riscv.cf...'. The terminal window has a black background with white text. It starts with 'Loading...' and 'Welcome to Fedora 33 (riscv64)'. The user is in a shell as root at localhost. The commands entered are: 'pwd' (output: /root), 'ls' (output: bench.py hello.c), 'echo Hello World! testing, testing, 1-2-3 . . .', 'date' (output: Wed May 20 12:06:41 PM UTC 2026), 'whoami' (output: root), and 'history' (output: a numbered list of the previous commands).

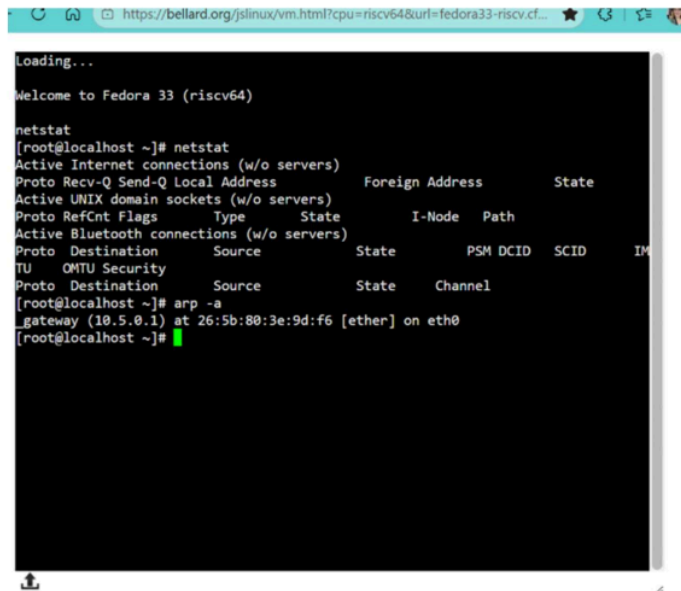
```
Loading...
Welcome to Fedora 33 (riscv64)

pw[root@localhost ~]# pwd
/root
[root@localhost ~]# ls
bench.py  hello.c
[root@localhost ~]# echo Hello World! testing, testing, 1-2-3 . . .
Hello World! testing, testing, 1-2-3 . . .
[root@localhost ~]# date
Wed May 20 12:06:41 PM UTC 2026
[root@localhost ~]# whoami
root
[root@localhost ~]# history
 1  pwd
 2  ls
 3  echo Hello World! testing, testing, 1-2-3 . . .
 4  date
 5  whoami
 6  history
[root@localhost ~]#
```

Command: **Netstat & arp -a**

Network Statistics reveals the data around active inbound and outbound network traffic on the system.

Arp -a (Address Resolution Protocol): Below using this command revealed the MAC address and gateway number.

A screenshot of a terminal window with a black background and white text. The window title bar shows a URL: https://bellard.org/jslinux/vm.html?cpu=riscv64&url=fedora33-riscv.cf... The terminal output shows the following: 'Loading...' followed by 'Welcome to Fedora 33 (riscv64)'. Then, the user enters 'netstat', which produces a detailed output for active Internet connections, UNIX domain sockets, and Bluetooth connections. Next, the user enters 'arp -a', which shows the gateway at 10.5.0.1 with MAC address 26:5b:80:3e:9d:f6 on the eth0 interface. The prompt '[root@localhost ~]#' is visible at the end of each command line.

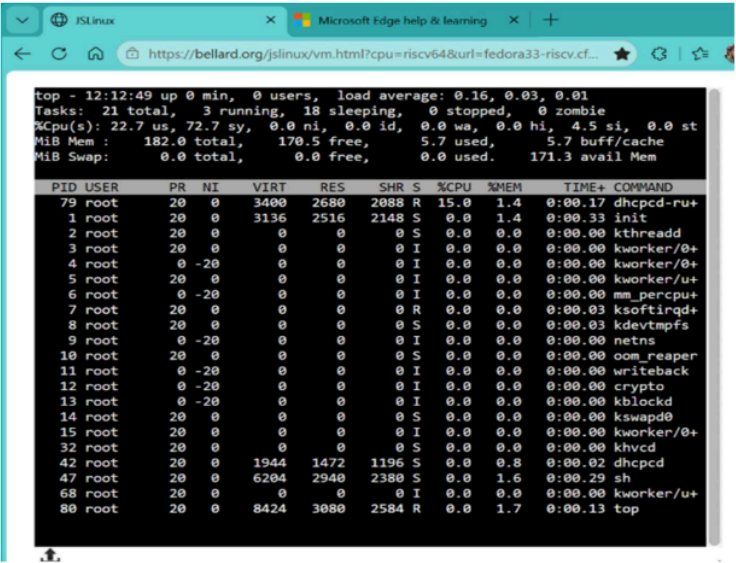
```
Loading...
Welcome to Fedora 33 (riscv64)

netstat
[root@localhost ~]# netstat
Active Internet connections (w/o servers)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
Active UNIX domain sockets (w/o servers)
Proto RefCnt Flags   Type       State           I-Node  Path
Active Bluetooth connections (w/o servers)
Proto Destination Source        State      PSM DCID  SCID  IM
TU      OMTU Security Source        State      Channel
Proto Destination Source        State      Channel
[root@localhost ~]# arp -a
_gateway (10.5.0.1) at 26:5b:80:3e:9d:f6 [ether] on eth0
[root@localhost ~]#
```

Command: **top** and **htop**:

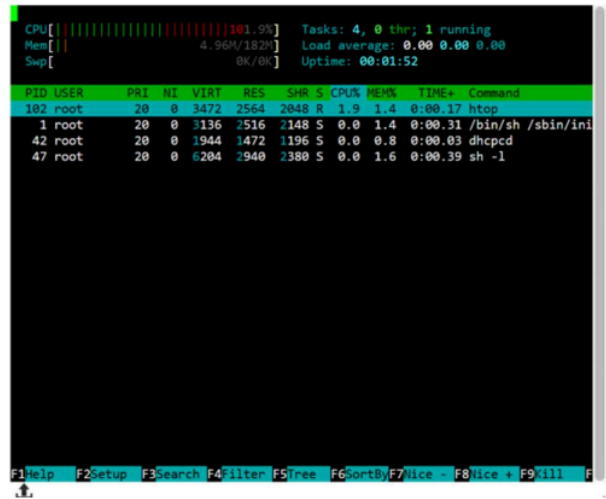
Top: (Table of Process) - system monitor tool used present me with data on CPU usage, RAM usage and along with summarising the number of tasks in place. this dashboard displays the usage place at time of the command.

Htop: This dashboard is more colourful but showing similar core data as top. If a computer is running slowly, I would use this tool to gather information to diagnose the issue.



```
top - 12:12:49 up 0 min, 0 users, load average: 0.16, 0.03, 0.01
Tasks: 21 total, 3 running, 18 sleeping, 0 stopped, 0 zombie
%Cpu(s): 22.7 us, 72.7 sy, 0.0 ni, 0.0 id, 0.0 wa, 0.0 hi, 4.5 si, 0.0 st
MiB Mem : 182.0 total, 170.5 free, 5.7 used, 5.7 buff/cache
MiB Swap: 0.0 total, 0.0 free, 0.0 used, 171.3 avail Mem

  PID USER      PR  NI  VIRT  RES  SHR  S  %CPU  %MEM    TIME+  COMMAND
    79 root        20   0   3400  2680 2088  R   15.0   1.4   0:00.17 dhcpcd-ru+
    1 root        20   0   3136  2516 2148  S    0.0   1.4   0:00.33 init
    2 root        20   0      0      0      0  S    0.0   0.0   0:00.00 kthreadd
    3 root        20   0      0      0      0  I    0.0   0.0   0:00.00 kworker/0+
    4 root        0 -20      0      0      0  I    0.0   0.0   0:00.00 kworker/0+
    5 root        20   0      0      0      0  I    0.0   0.0   0:00.00 kworker/u+
    6 root        0 -20      0      0      0  I    0.0   0.0   0:00.00 mm_percpu+
    7 root        20   0      0      0      0  R    0.0   0.0   0:00.03 ksoftirqd+
    8 root        20   0      0      0      0  S    0.0   0.0   0:00.03 kdevtmpfs
    9 root        0 -20      0      0      0  I    0.0   0.0   0:00.00 netns
   10 root        20   0      0      0      0  S    0.0   0.0   0:00.00 oom_reaper
   11 root        0 -20      0      0      0  I    0.0   0.0   0:00.00 writeback
   12 root        0 -20      0      0      0  I    0.0   0.0   0:00.00 crypto
   13 root        0 -20      0      0      0  I    0.0   0.0   0:00.00 kblockd
   14 root        20   0      0      0      0  S    0.0   0.0   0:00.00 kswapd0
   15 root        20   0      0      0      0  I    0.0   0.0   0:00.00 kworker/0+
   32 root        20   0      0      0      0  S    0.0   0.0   0:00.00 khvcd
   42 root        20   0   1944  1472 1196  S    0.0   0.8   0:00.02 dhcpcd
   47 root        20   0   6204  2940 2380  S    0.0   1.6   0:00.29 sh
   68 root        20   0      0      0      0  I    0.0   0.0   0:00.00 kworker/u+
   80 root        20   0   8424  3080 2584  R    0.0   1.7   0:00.13 top
```



```
CPU[|||||] 101.9% Tasks: 4, 0 thr; 1 running
Mem[|||] 4.96M/182M Load average: 0.00 0.00 0.00
Swp[ ] 0K/0K Uptime: 00:01:52

  PID USER      PRI  NI  VIRT  RES  SHR  S  CPU%  MEM%    TIME+  Command
 102 root        20   0  3472  2564 2048  R   1.9   1.4   0:00.17 htop
   1 root        20   0   3136  2516 2148  S    0.0   1.4   0:00.31 /bin/sh /sbin/init
   42 root        20   0   1944  1472 1196  S    0.0   0.8   0:00.03 dhcpcd
   47 root        20   0   6204  2940 2380  S    0.0   1.6   0:00.39 sh -l
```

Conclusion

I have learned many practical elements of the basics of operating systems and it's uses. Testing various system monitoring tools, commands using a variety of methods via Microsoft and Linux I have gained deeper understanding of the differences and benefits to each method.

I have limited prior learning on these subjects so all that i have learned so far has been very beneficial and enlightening.

I found that Microsoft offers a more structured environment with easy pathways to follow. Being easy to access and use I learned a lot about the variety of the commands available and their uses.

For Linux, learned that there is an extensive array of commands to be used even within one command. For example, the date format, whilst dependant on the setting of your system, can be displayed according to your preference using the relevant commands.

I feel the modular way in which Linux is built gives more room for learning and engaging learning to which I will be exploring more int he near future.

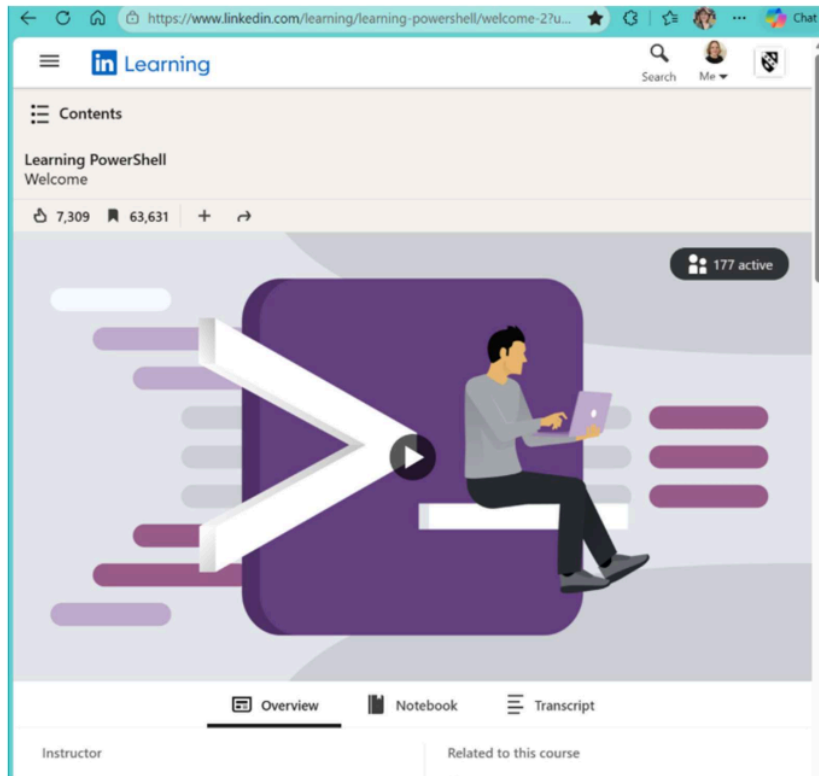
I have gained a deeper understanding of the information I can obtain or use via the command prompts and how to manage

References

- [1] pg: 86 section 2.1.1. Tanenbaum, A. S., & Bos, H. (2014). Modern operating systems (Global edition, Fourth edition.). Pearson.
- [2] pg 88 section 2.1.2 Tanenbaum, A. S., & Bos, H. (2014). Modern operating systems (Global edition, Fourth edition.). Pearson.
- [3] pg 34 section 1.7 I/O Communication Stallings, W. (2005). Operating systems : internals and design principles (5th ed, [international ed.]). Pearson Prentice Hall.
- [4] pg: 265 section 4.1.1. Tanenbaum, A. S., & Bos, H. (2014). Modern operating systems (Global edition, Fourth edition.). Pearson.
- [5] Microsoft. (2024). Ping Command. <https://Learn.Microsoft.Com>.
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- [8] Siever, E. (2009). Linux in a nutshell (6th ed.). O'Reilly.
- [9] GEEKSFORGEES, 2025. *How to Display the current Username in Linux | whoami Command*. GeeksforGeeks. Available from: <https://www.geeksforgeeks.org/linux-unix/whoami-command-linux-example/> [Accessed 20 May 2026].
- [10]

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0:08 / 1:33 1x

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but I don't want you to limit your thinking

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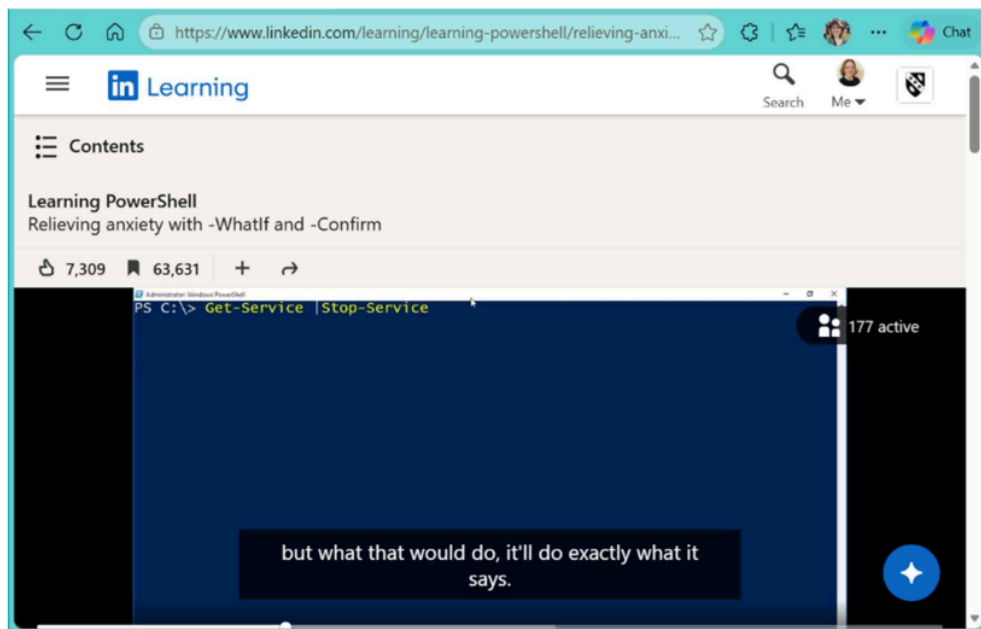
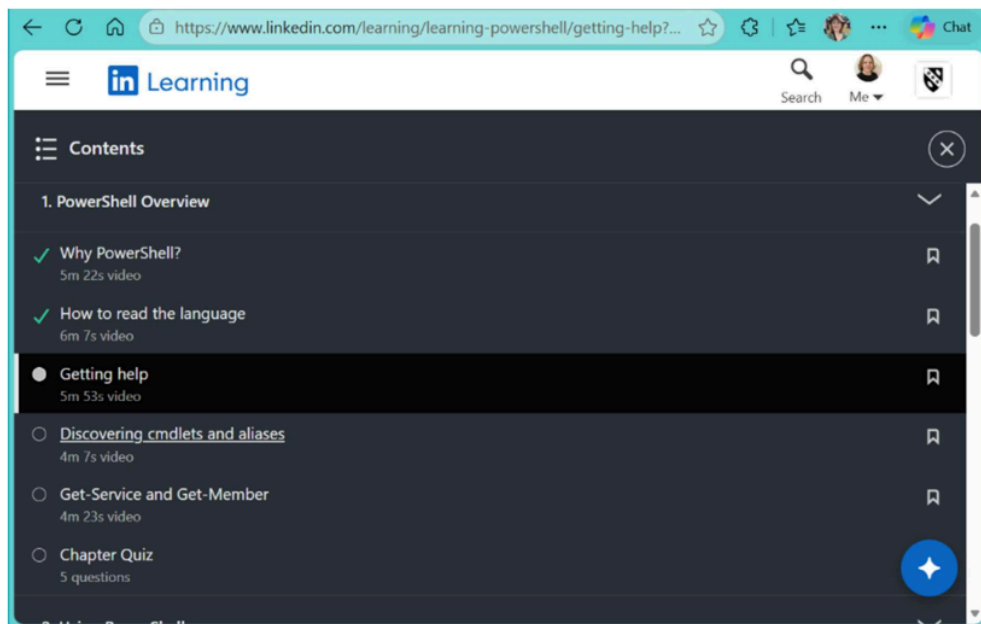
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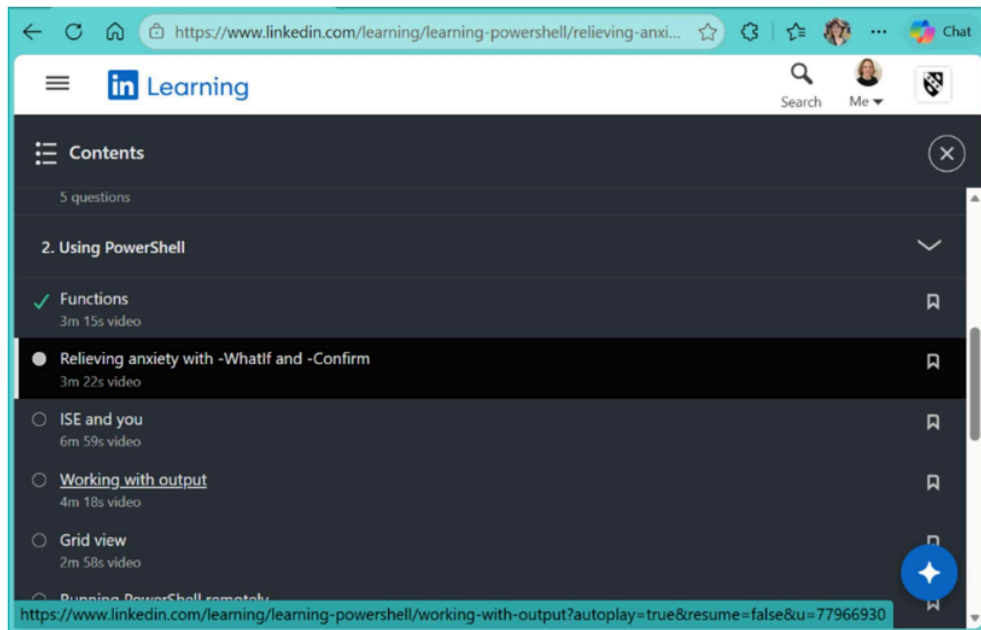
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True	True	True	Active Directory Web Services	0	ADWS	0	SafeServiceHandle	Running	Win32OwnProcess	Auto
False	False	False	Application Experience	0	AeLookupS...	0	SafeServiceHandle	Stopped	Win32ShareProc...	Manu...
False	False	False	Application Layer Gateway...	0	ALG	0	SafeServiceHandle	Stopped	Win32OwnProcess	Manu...
False	False	False	Application Identity	0	AppIDSvc	(RpcSs, CryptSvc, A...	SafeServiceHandle	Stopped	Win32ShareProc...	Manu...
False	False	False	Application Information	0	AppInfo	(RpcSs, ProfSvc)	SafeServiceHandle	Stopped	Win32ShareProc...	Manu...
False	True	False	Application Management	0	AppMgmt	0	SafeServiceHandle	Running	Win32ShareProc...	Manu...
False	False	False	App Readiness	0	AppReadin...	0	SafeServiceHandle	Stopped	Win32ShareProc...	Manu...
False	False	False	AppX Deployment Service (...)	0	AppXSvc	(rpcss)	SafeServiceHandle	Stopped	Win32ShareProc...	Manu...
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True	True	True	Cryptographic Services	0	CryptSvc	(RpcSs)	SafeServiceHandle	Running	Win32ShareProc...	Auto
False	False	False	DCOM Server Process Laun...	0	DcomLaunch	0	SafeServiceHandle	Running	Win32ShareProc...	Auto
False	False	False	Optimize drives	0	defragvsc	(RPCSS)	SafeServiceHandle	Stopped	Win32OwnProcess	Manu...
False	False	False	Device Association Service	0	DeviceAss...	0	SafeServiceHandle	Stopped	Win32ShareProc...	Manu...
False	False	False	Device Install Service	0	DeviceInst...	0	SafeServiceHandle	Stopped	Win32ShareProc...	Manu...
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True	True	True	DFS Replication	0	DFSRA	(EventSystem, RpcS...	SafeServiceHandle	Running	Win32OwnProcess	Auto
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True	True	True	Diagnostics Tracking Service	0	DiagTrack	(RpcSs)	SafeServiceHandle	Running	Win32OwnProcess	Auto
True	True	True	DNS Server	0	DNS	(AM, Tcip, NTDS, R...	SafeServiceHandle	Running	Win32OwnProcess	Auto
False	False	True	DNS Client	0	Dnscache	(net, Td...	SafeServiceHandle	Running	Win32ShareProc...	Auto
False	False	False	Wired AutoConfig	0	dot3svc	(RpcSs, Eaphost, Nd...	SafeServiceHandle	Stopped	Win32ShareProc...	Manu...
True	True	True	Diagnostic Policy Service	0	DPS	0	SafeServiceHandle	Running	Win32ShareProc...	Auto

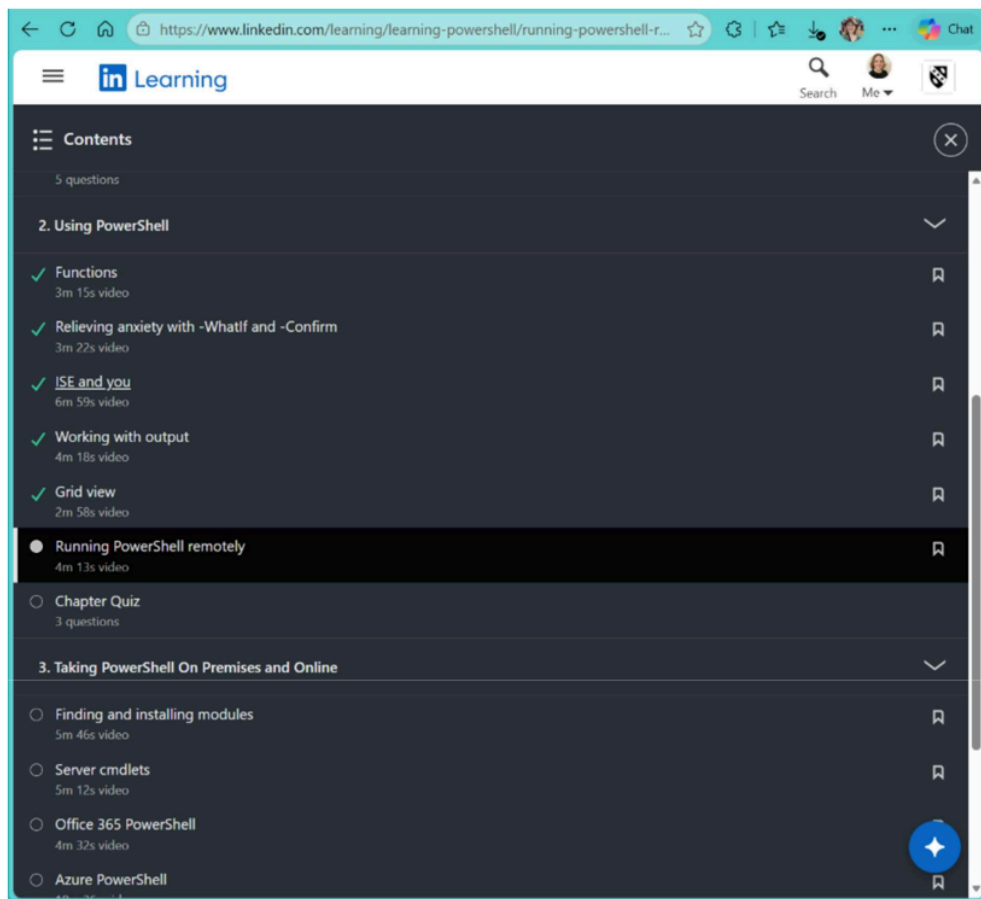
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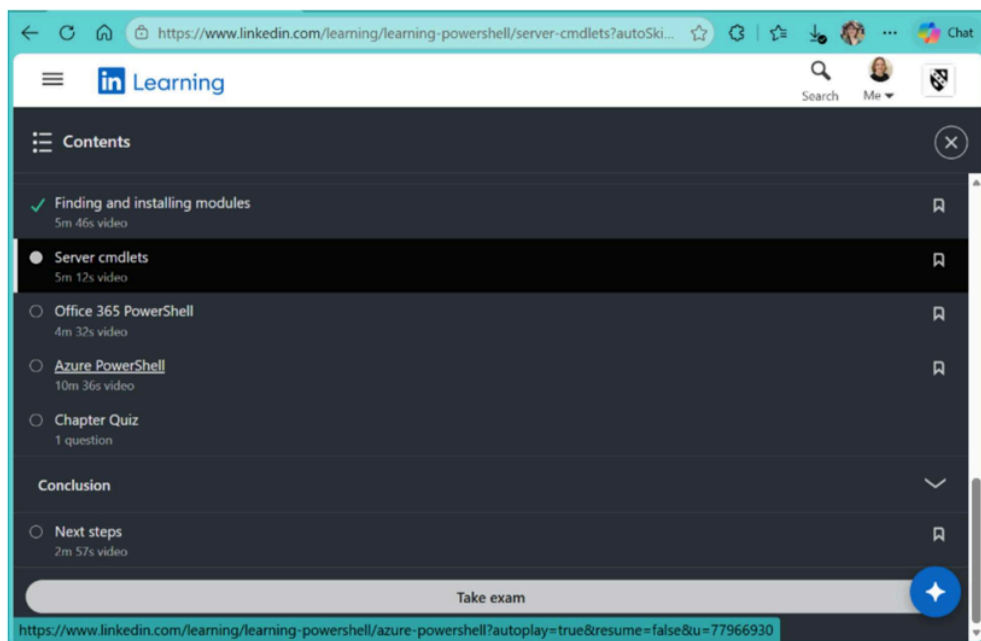
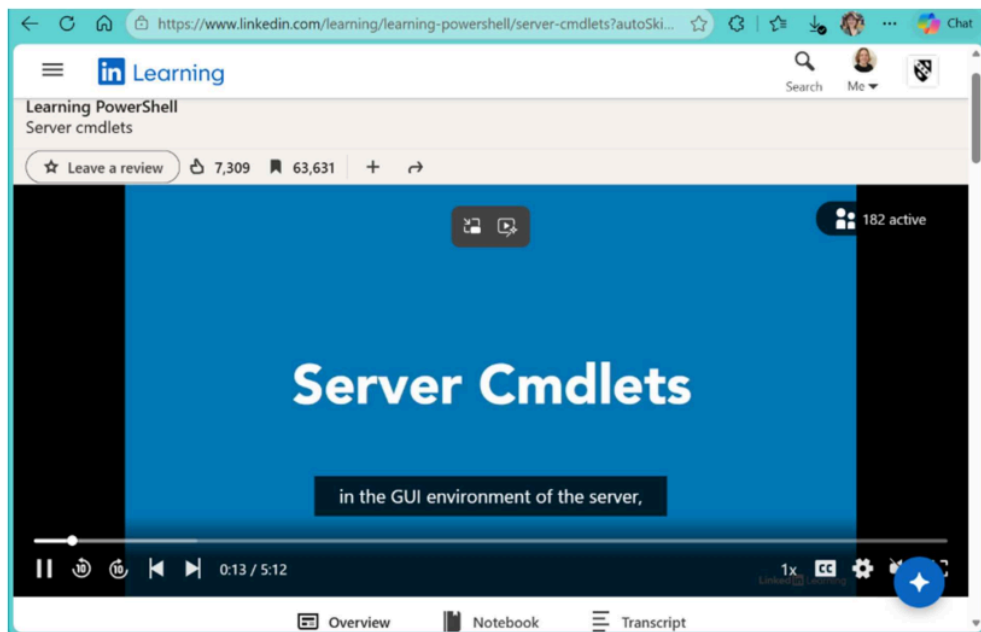
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Computer Architecture and Operating Systems Assignment

GRADEMARK REPORT

FINAL GRADE

GENERAL COMMENTS

58/100

Total: 58

**1. Engagement
with Literature Skills:**

+ Good 20 18
use of citations. + Well formatted IEEE
reference list.

**2. Knowledge
and Understanding Skills: 4e**

Key 20 10
functions: +
Good overview of **some** 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 demonstrates an understanding of
the
language.

Bash Commands: + Good overview of some relevant commands that demonstrates an understanding of the language.

Win Scripts: - Not documented.

Bash Scripts: - Not documented.

3. Cognitive and Intellectual Skills: 4+4+2

+ 10 8

Evidence of good analysis and understanding of some OS functions.

+ Screenshots showing where some of the functions can be seen/monitored/managed are included in the analysis.

+ Conclusion.

4. Practical Application Skills: 10e:

Comm.: 7e + 3 all areas.

Sc: 7 + 3 Citations, Customisation & combo.

1. 40 17

Win Commands: +

Good use of relevant Win. language commands that cover all relevant areas.

2. Bash Commands: + Some good use of relevant Bash commands.

3. Win Scripts: - Not documented.

4. Bash Scripts: - Not documented.

5. Transferable Skills for Life and Professional Practice:
4+2+2+1+2

+ Good 10 5
report format, structure, and presentation.

- Each report section could be briefly introduced.

- Screenshots could be cropped.

- Minor spelling/grammar errors.

- Tutorial Activity 1 on OS

Types: relevant supplementary information on OS types not included in the Appendix of the report.

- Lecture activity evidence not documented.

+ Evidence of engagement with a relevant CPD course documented in the appendix. Good.

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& On-time check:

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