

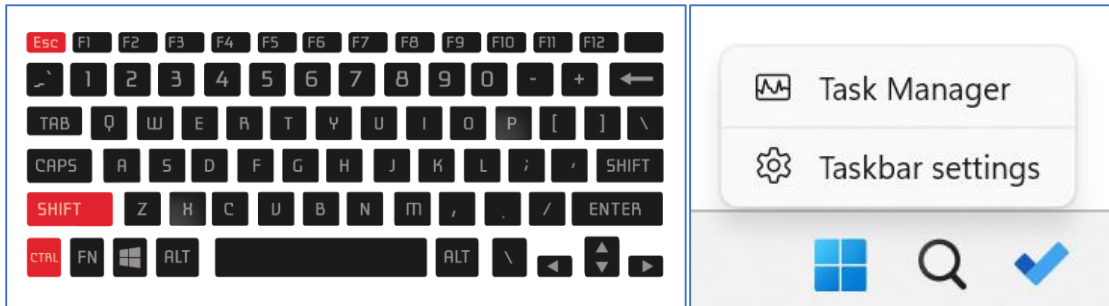
Exercise: Operating Systems

Problems for exercises and homework for the ["Software Technologies" course @ Software University.](#)

1. Working with Windows Task Manager

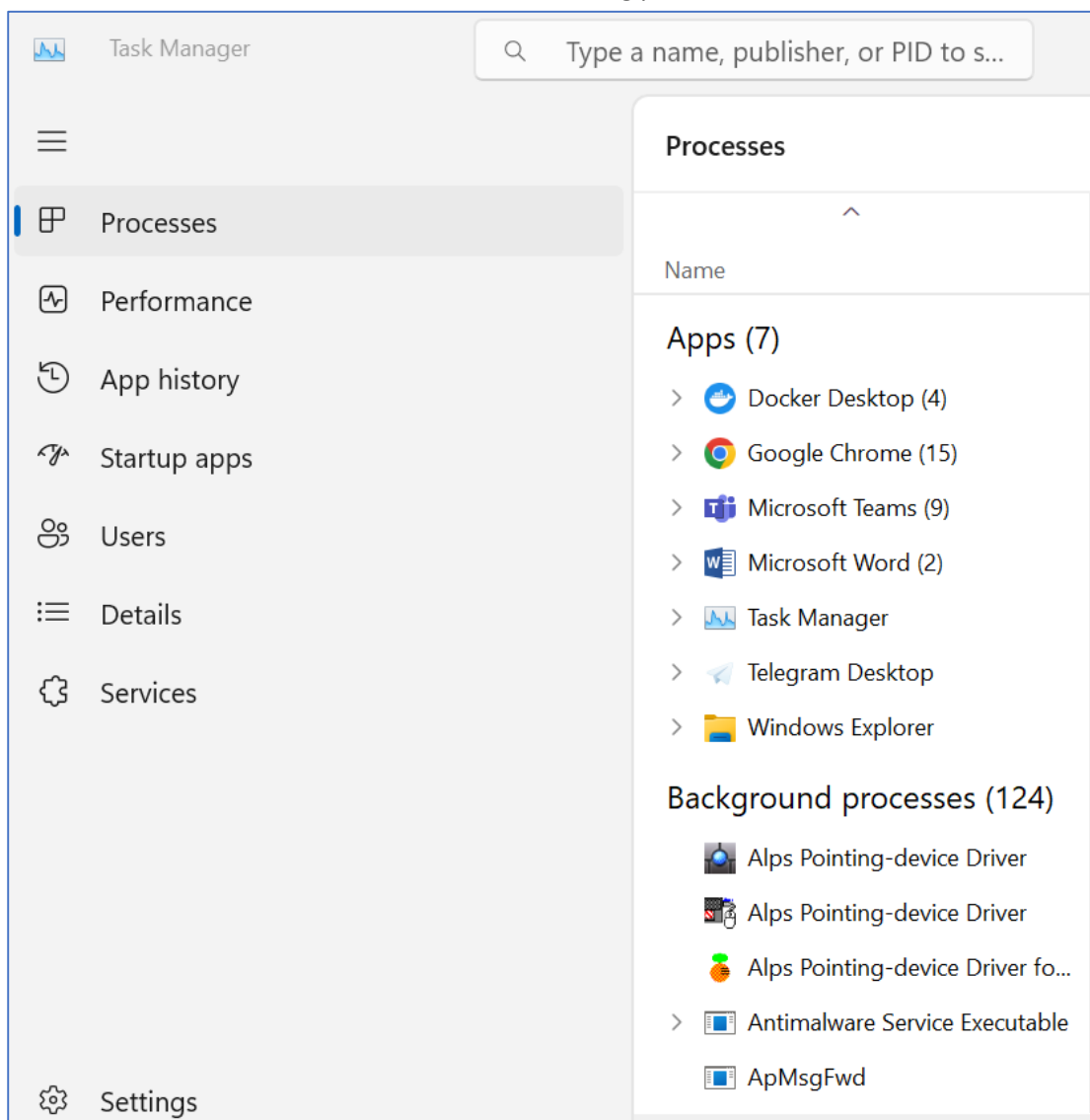
1. Open Windows Task Manager:

- Press "Ctrl+Shift+Esc" on your keyboard or right-click the taskbar and select "Task Manager."



2. View Processes:

- Click on the "Processes" tab to see a list of all running processes.

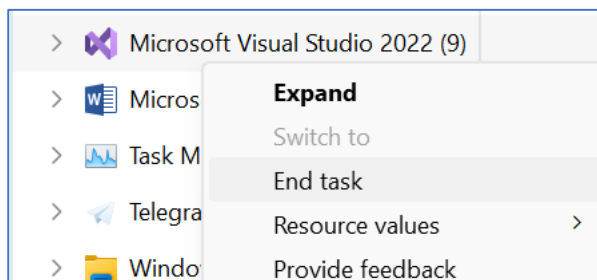


- Identify some processes that are currently running on your system, and make a note of their names and the amount of CPU and RAM they are using.

Processes			
Name	Status	31% CPU	50% Memory
Apps (8)			
> Docker Desktop (4)		0%	409.9 MB
> Google Chrome (15)		0%	843.1 MB
> Microsoft Teams (10)		0.2%	394.2 MB
> Microsoft Visual Studio 2022 (9)		0.2%	597.7 MB
> Microsoft Word (2)		0%	161.3 MB
> Task Manager		0.3%	70.1 MB

3. Kill a Process:

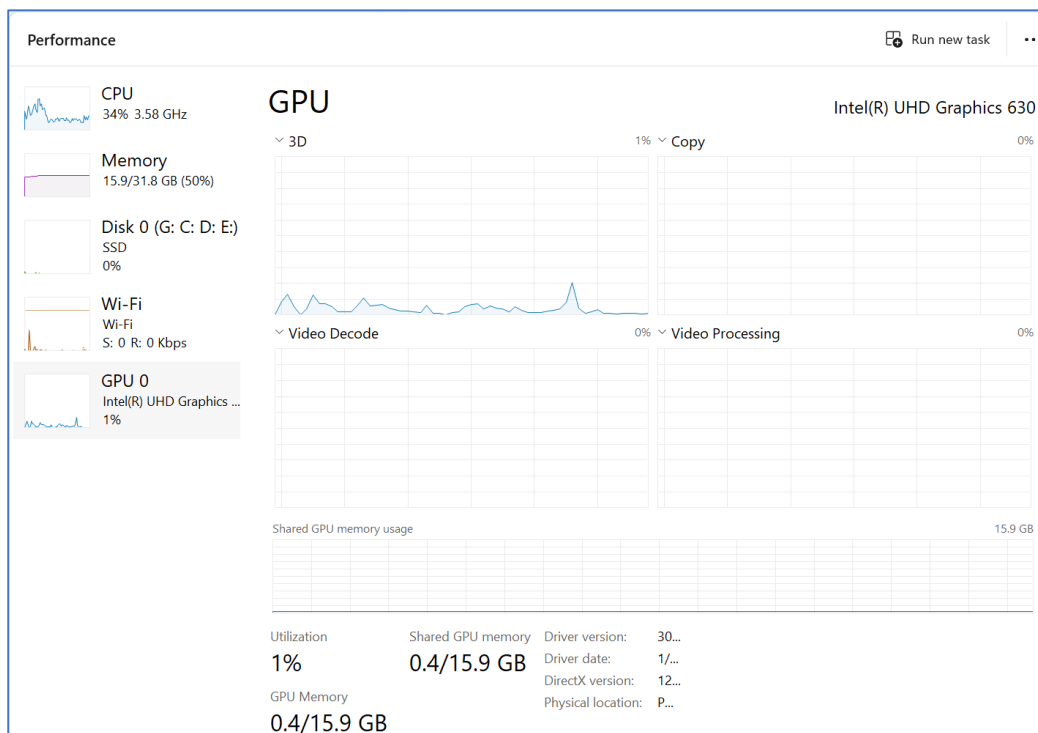
- Select a process that you want to stop or close. Right-click on the process and select "End Task" or click on the "End Task" button at the corner of the Task Manager window.



- Confirm the action by clicking on "End Process" on the pop-up window.

4. View CPU and RAM Usage:

- Switch to the "Performance" tab to see real-time graphs of your system's CPU, memory, disk, and network usage. Observe the graphs to see how your system's resources are being used.



5. Try the Details Tab:

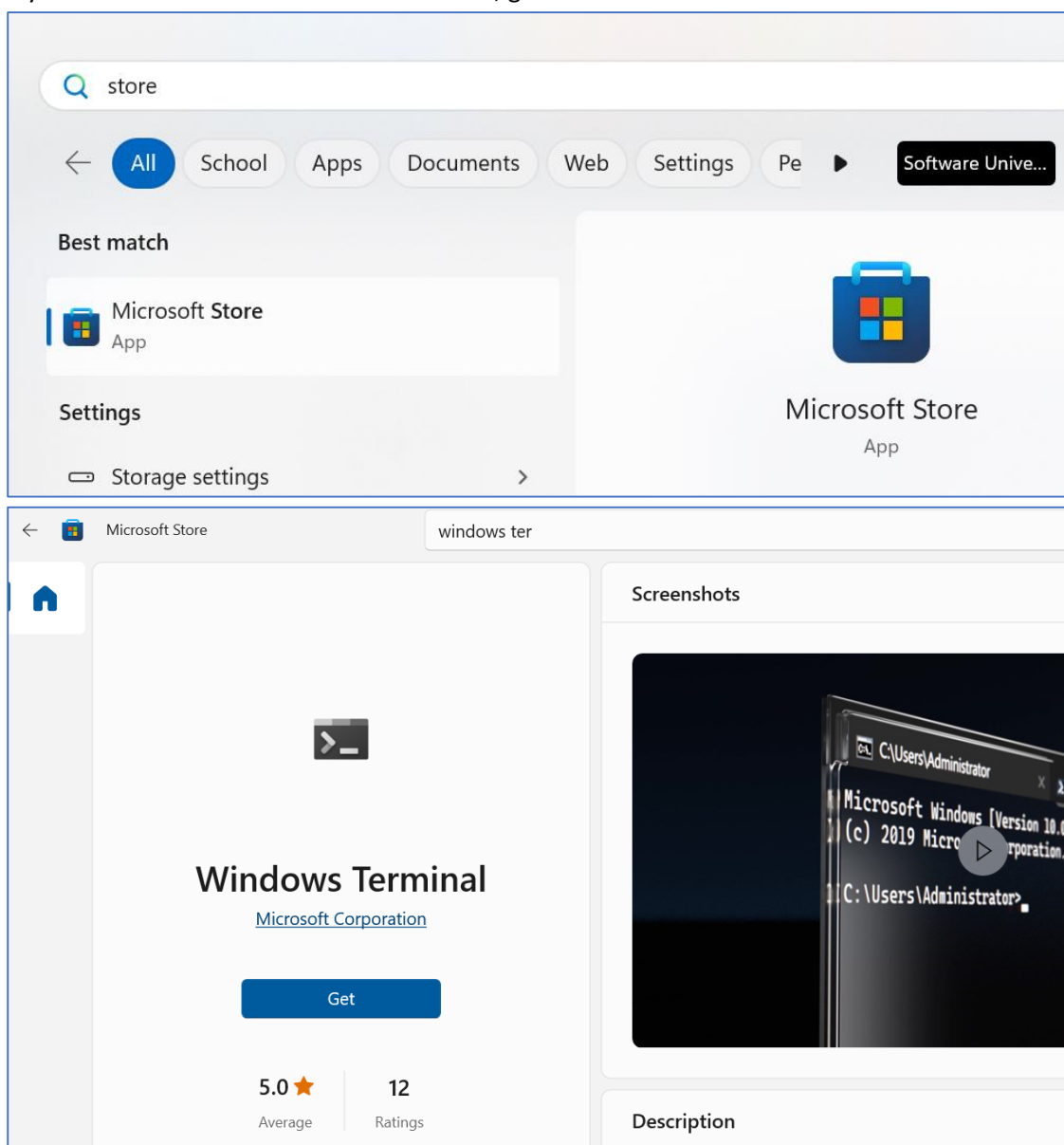
- In the details tab, you will find more specific information about every single process.

Details Run new task							
Name	PID	Status	User name	CPU	Memory (ac...	Architec...	Description
vmmemWSL	17224	Running	44DAC2E9-...	00	3,416,676 K	x64	VmmemWSL
devenv.exe	11548	Running	krass	00	383,604 K	x64	Microsoft Visual Studio 2022
MsMpEng.exe	4928	Running	SYSTEM	00	216,632 K	x64	Antimalware Service Executable
com.docker.backend...	1532	Running	krass	00	193,972 K	x64	Docker Desktop Backend
WINWORD.EXE	8536	Running	krass	00	189,268 K	x64	Microsoft Word
Docker Desktop.exe	12960	Running	krass	00	189,204 K	x64	Docker Desktop
Telegram.exe	21820	Running	krass	00	182,612 K	x64	Telegram Desktop
Teams.exe	15536	Running	krass	00	177,404 K	x64	Microsoft Teams
Grammarly.Desktop.e...	13680	Running	krass	00	169,336 K	x64	Grammarly

2. Play with Windows Terminal

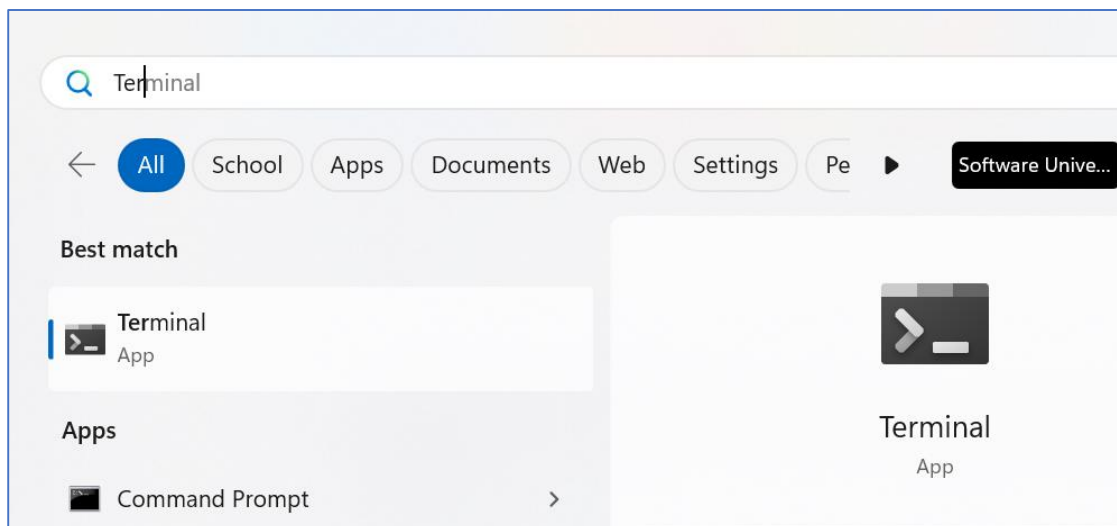
1. Install Windows Terminal:

- If you have not installed Windows Terminal, go to the Microsoft Store and download and install it.



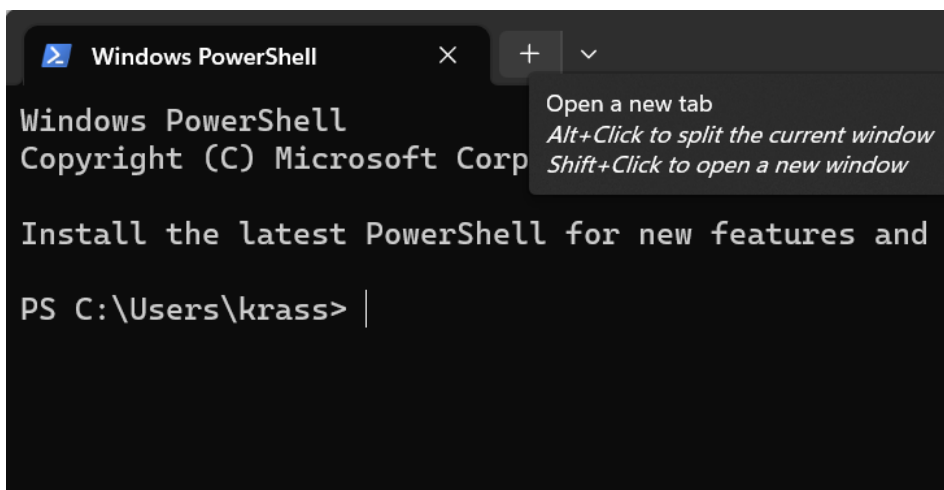
2. Open Windows Terminal:

- Open the Windows Terminal by searching for it in the Windows Start Menu.



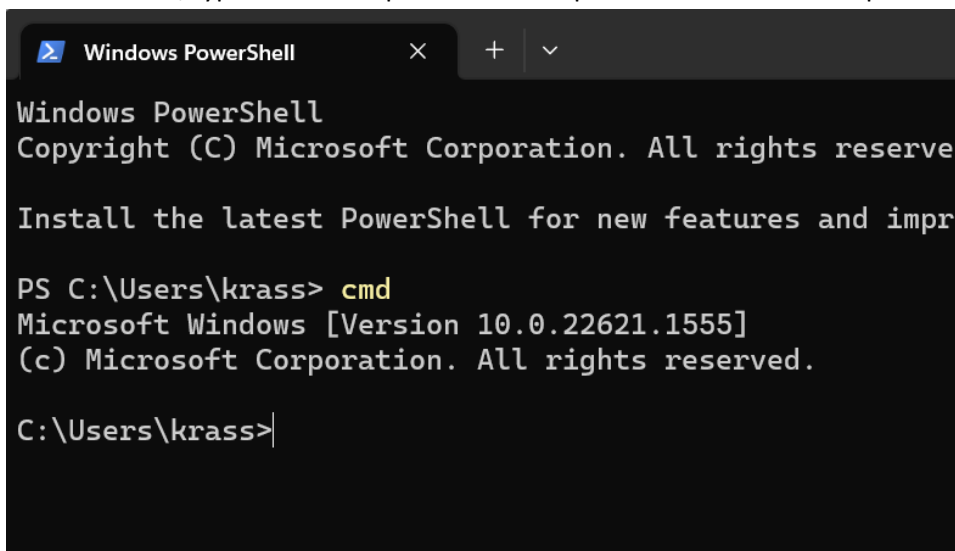
3. Create a New Tab:

- Click on the "+" icon in the tab bar to create a new tab.



4. Open Command Prompt:

- In the new tab, type "cmd" and press Enter to open the Command Prompt.



5. Run a Command:

- Type "dir" in the Command Prompt and press Enter to display a list of files and folders in the current directory.

```
Windows PowerShell
PS C:\Users\krass> cmd
Microsoft Windows [Version 10.0.22621.1555]
(c) Microsoft Corporation. All rights reserved.

C:\Users\krass>dir
Volume in drive C has no label.
Volume Serial Number is 80D4-1EA6

Directory of C:\Users\krass

10/27/2022  01:00 PM    <DIR>          .3T
11/26/2021  05:00 PM    <DIR>          .android
10/06/2022  09:52 AM    <DIR>          .azuredatastudio
10/27/2022  12:22 PM    <DIR>          .cache
05/10/2022  09:14 AM    <DIR>          .config
10/05/2022  11:39 AM    <DIR>          .docker
04/12/2023  07:38 AM    <DIR>          .dotnet
```

- Type "cd" in the Command Prompt. This command changes the current directory. For example, "cd C:\Users\" will take you to the Users directory.

```
PS C:\Users\krass> cmd
Microsoft Windows [Version 10.0.22621.1555]
(c) Microsoft Corporation. All rights reserved.

C:\Users\krass>cd C:\Users\

C:\Users>|
```

- "mkdir": This command creates a new directory. For example, "mkdir My-Folder" will create a folder named "My-Folder" in the current directory.

```
PS C:\Users\krass> mkdir My-Folder

Directory: C:\Users\krass

Mode                LastWriteTime         Length Name
----                -
d-----          5/6/2023   8:23 AM              My-Folder

PS C:\Users\krass> |
```

- "echo": This command displays text on the console. For example, echo "Hello, World!" will display the text "Hello, World!" on the console.

```
C:\Users\krass>echo "Hello, World!"
"Hello, World!"

C:\Users\krass>|
```

- "ping": This command tests network connectivity by sending packets to a specified network host. For example, ping google.com will test the connectivity to the Google website.

```
C:\Users\krass>ping google.com

Pinging google.com [142.251.141.46] with 32 bytes of data:
Reply from 142.251.141.46: bytes=32 time=14ms TTL=117
Reply from 142.251.141.46: bytes=32 time=9ms TTL=117
Reply from 142.251.141.46: bytes=32 time=8ms TTL=117
Reply from 142.251.141.46: bytes=32 time=8ms TTL=117

Ping statistics for 142.251.141.46:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 8ms, Maximum = 14ms, Average = 9ms
```

- "ipconfig": This command displays the current IP configuration of your network adapters.

```
C:\Users\krass>ipconfig

Windows IP Configuration

Ethernet adapter Ethernet:

    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* 10:

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

Wireless LAN adapter Wi-Fi:

    Connection-specific DNS Suffix  . :
    Link-local IPv6 Address . . . . . : fe80::5389:1021:c22c:172a%17
    IPv4 Address. . . . . : 192.168.199.100
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : 192.168.199.254
```

- "tasklist": This command displays a list of running processes on your computer.

```
C:\Users\krass>tasklist
```

Image Name	PID	Session Name	Session#	Mem Usage
System Idle Process	0	Services	0	8 K
System	4	Services	0	164 K
Secure System	140	Services	0	73,552 K
Registry	184	Services	0	26,308 K
smss.exe	692	Services	0	1,132 K
csrss.exe	180	Services	0	4,756 K
wininit.exe	808	Services	0	5,684 K
csrss.exe	8	Console	1	6,492 K
services.exe	1064	Services	0	15,064 K
LsaIso.exe	1084	Services	0	3,728 K

- "taskkill": This command terminates a specified process. For example, "taskkill /im notepad.exe" will terminate the Notepad process.

```
C:\Users\krass>taskkill /im notepad.exe
SUCCESS: Sent termination signal to the process "Notepad.exe" with PID 10344.
```

- "systeminfo": This command displays detailed system information about your computer.

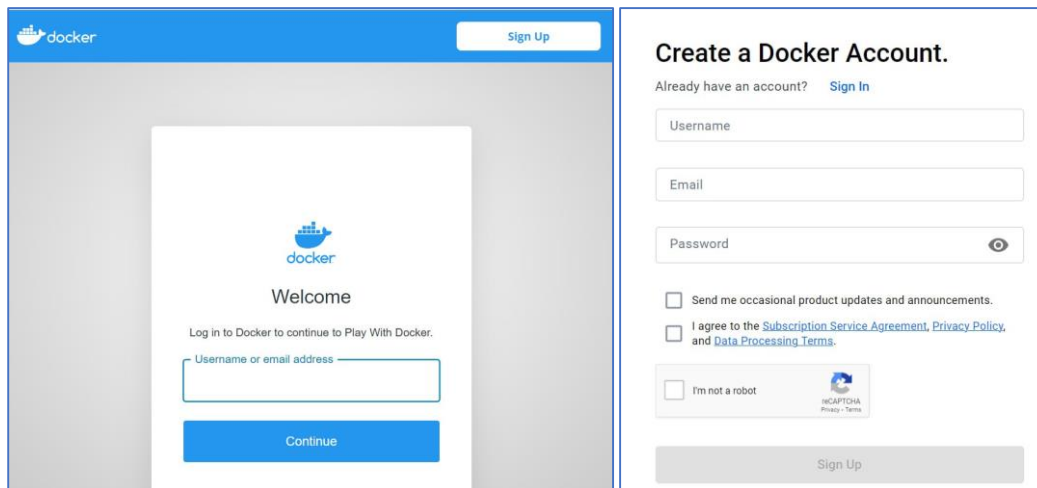
```
C:\Users\krass>systeminfo
```

```
Host Name:                TSANEFF
OS Name:                  Microsoft Windows 11 Pro
OS Version:               10.0.22621 N/A Build 22621
OS Manufacturer:         Microsoft Corporation
OS Configuration:        Standalone Workstation
OS Build Type:             Multiprocessor Free
Registered Owner:         krassytsaneff@gmail.com
Registered Organization:   N/A
Product ID:                00330-52892-70267-AAOEM
Original Install Date:     2/3/2023, 2:44:37 AM
System Boot Time:          5/4/2023, 11:41:34 AM
System Manufacturer:       Dell Inc.
System Model:              Latitude 5401
System Type:               x64-based PC
Processor(s):              1 Processor(s) Installed.
                           [01]: Intel64 Family 6 Model 158
```

3. Use Remote VM Instances: Docker Playground

1. Docker Account:

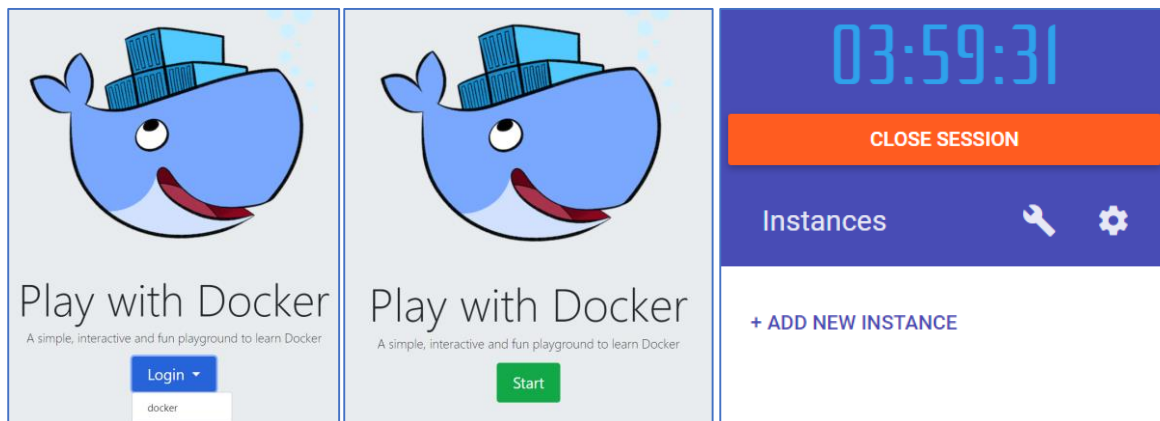
- Go to the Docker Playground [website](#) and sign up for an account if you haven't already.



The screenshot shows the Docker Playground sign-up interface. On the left, a 'Welcome' message prompts the user to log in or continue. On the right, the 'Create a Docker Account' form includes fields for Username, Email, and Password, along with checkboxes for product updates, terms agreement, and a CAPTCHA verification.

2. New VM Instance:

- Once you're signed in, you'll see the Docker Playground dashboard. Click the "Add New Instance" button to get started.



3. Running a Container:

- You'll be presented with a terminal interface that allows you to run Docker commands. Try running the following command to download and run the "hello-world" container:

```
#####
#                               #
#      WARNING!!!!             #
# This is a sandbox environment. Using personal credentials         #
# is HIGHLY! discouraged. Any consequences of doing so are         #
# completely the user's responsibilities.                             #
#                                                                     #
# The PWD team.                                                      #
#####
[model] (local) root@192.168.0.8 ~
$ docker run hello-world
Unable to find image 'hello-world:latest' locally
latest: Pulling from library/hello-world
719385e32844: Pull complete
Digest: sha256:9eabfcf6034695c4f6208296be9090b0a3487e20fb6a5cb056525242621cf73d
Status: Downloaded newer image for hello-world:latest

Hello from Docker!
This message shows that your installation appears to be working correctly.

To generate this message, Docker took the following steps:
 1. The Docker client contacted the Docker daemon.
 2. The Docker daemon pulled the "hello-world" image from the Docker Hub.
    (amd64)
```


- This command should download the "hello-world" container image from Docker Hub and run it on your local machine. You should see a message in the terminal confirming that the container ran successfully.
- *When an operator executes "docker run", the container process that runs is isolated in that it has its own file system, its own networking, and its own isolated process tree separate from the host.*
- Use the "docker ps -a" command to list all running containers.

```
[node2] (local) root@192.168.0.7 ~
$ docker ps -a
CONTAINER ID   IMAGE          COMMAND                  CREATED        STATUS              PORTS          NAMES
0c9e26940c1c   hello-world    "/hello"                 14 seconds ago Exited (0) 12 seconds ago           recursing_bell
[node2] (local) root@192.168.0.7 ~
$
```

6. Play with Docker - Now that you've run your first container, try running some other Docker commands to explore the features of Docker Playground:

- Start by creating a new environment in Docker Playground.
- Once your environment is ready, use the "docker run -d -p 8080:80 nginx" command to create a new container using the **nginx** image:

```
$ docker run -d -p 8080:80 nginx
Unable to find image 'nginx:latest' locally
latest: Pulling from library/nginx
9e3ea8720c6d: Pull complete
bf36b6466679: Pull complete
15a97cf85bb8: Pull complete
9c2d6be5a61d: Pull complete
6b7e4a5c7c7a: Pull complete
8db4caa19df8: Pull complete
Digest: sha256:480868e8c8c797794257e2abd88d0f9a8809b2fe956cbfbc05dcc0bca1f7cd43
Status: Downloaded newer image for nginx:latest
2236d8bb9b0dff44021c028ff62868620bb733ecd3362f1250103845d1a9e4bb
[node2] (local) root@192.168.0.7 ~
$
```

- This command will download the **nginx** image from Docker Hub and create a new container running that image. The **-d** option tells Docker to run the container in detached mode, meaning it will run in the background. The **-p** option maps **port 8080** on your local machine to port 80 inside the container, allowing you to access the web server running inside the container.
- Use the "docker ps" command to verify that the container is running:

```
$ docker ps
CONTAINER ID   IMAGE     COMMAND                  CREATED        STATUS              PORTS          NAMES
fe8774082300   nginx    "/docker-entrypoint..." 17 seconds ago Up 14 seconds    0.0.0.0:8080->80/tcp   compassionate_allen
[node3] (local) root@192.168.0.6 ~
$
```

- To stop a running Docker container, you can use the "docker stop" command followed by the container ID or name. For example, to stop a container with the name "compassionate_allen", you can use the following command:

```
$ docker stop compassionate_allen
compassionate_allen
[node3] (local) root@192.168.0.6 ~
$ docker ps
CONTAINER ID   IMAGE     COMMAND                  CREATED        STATUS              PORTS          NAMES
[node3] (local) root@192.168.0.6 ~
$
```

- To list all running and stopped Docker containers on your system, you can use the "**docker ps -a**" command.

```
$ docker ps -a
CONTAINER ID   IMAGE     COMMAND                  CREATED        STATUS        PORTS          NAMES
fe8774082300   nginx    "/docker-entrypoint..." 5 minutes ago   Exited (0)    2 minutes ago   compassionate_allen
[node3] (local) root@192.168.0.6 ~
$
```

- To remove a Docker container, you can use the "**docker rm**" command followed by the container ID or name. For example, to remove a container with the name "compassionate_allen", you can use the following command:

```
$ docker rm compassionate_allen
compassionate_allen
[node3] (local) root@192.168.0.6 ~
$ docker ps -a
CONTAINER ID   IMAGE     COMMAND                  CREATED        STATUS        PORTS          NAMES
[node3] (local) root@192.168.0.6 ~
$
```

7. Extract information on from JSON with "jq" command:

- The "**jq**" command is used to transform JSON data into a more readable format and print it to the standard output on Linux.
- Start a new container with the bash shell by running the following command:

```
[node1] (local) root@192.168.0.13 ~
$ docker run -it --name my-container bash
```

- This command starts a new container with an interactive [bash](#) shell.
- Use the curl command to make an HTTP request to the Zippopotam.us API endpoint and pass the postal code as a parameter. For example, to get the location data for the postal code "1000", you can run:

```
[node1] (local) root@192.168.0.13 ~
$ curl -s https://api.zippopotam.us/bg/1000 | jq .
```

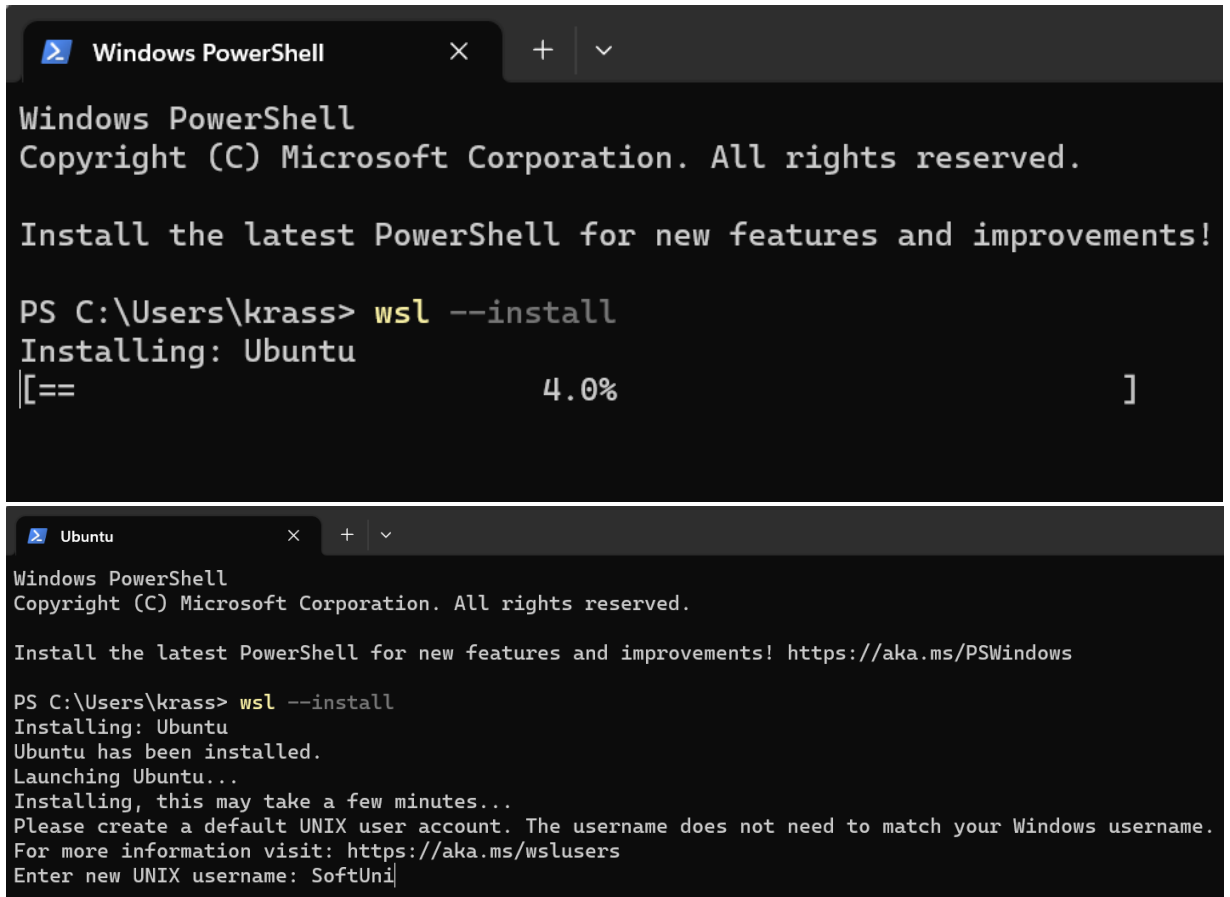
- This command makes an HTTP request to the API endpoint and pipes the response to the "**jq**" command, which extracts the JSON data from the response and prints it to the console.

```
$ curl -s https://api.zippopotam.us/bg/1000 | jq .
{
  "post code": "1000",
  "country": "Bulgaria",
  "country abbreviation": "BG",
  "places": [
    {
      "place name": "София / Sofija",
      "longitude": "23.3167",
      "state": "София (столица) / Sofija (stolica)",
      "state abbreviation": "SOF",
      "latitude": "42.6833"
    }
  ]
}
```

4. Play with Linux Shell

1. Install Windows Subsystem for Linux (WSL):

- Open PowerShell or Windows Command Prompt in **administrator mode** by right-clicking and selecting "Run as administrator", enter the "**wsl --install**" command.



```
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Install the latest PowerShell for new features and improvements!

PS C:\Users\krass> wsl --install
Installing: Ubuntu
[== 4.0% ]
```

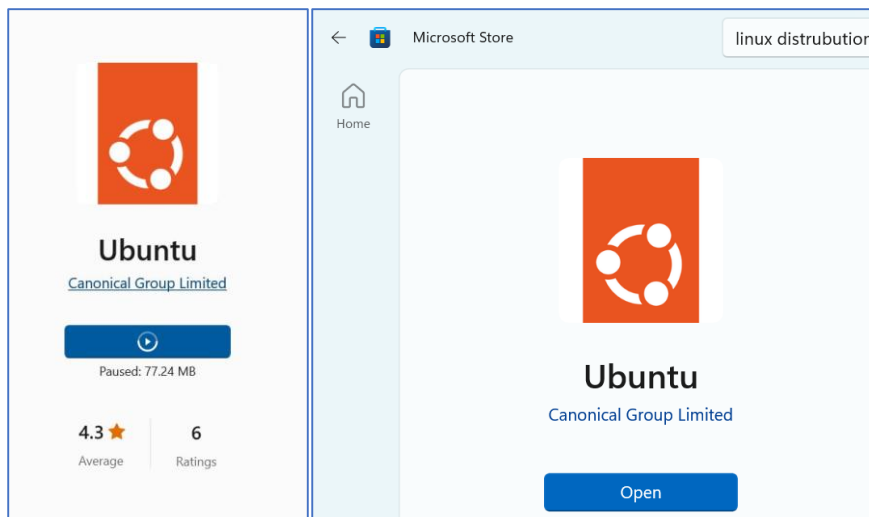
```
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Install the latest PowerShell for new features and improvements! https://aka.ms/PSWindows

PS C:\Users\krass> wsl --install
Installing: Ubuntu
Ubuntu has been installed.
Launching Ubuntu...
Installing, this may take a few minutes...
Please create a default UNIX user account. The username does not need to match your Windows username.
For more information visit: https://aka.ms/wslusers
Enter new UNIX username: SoftUni
```

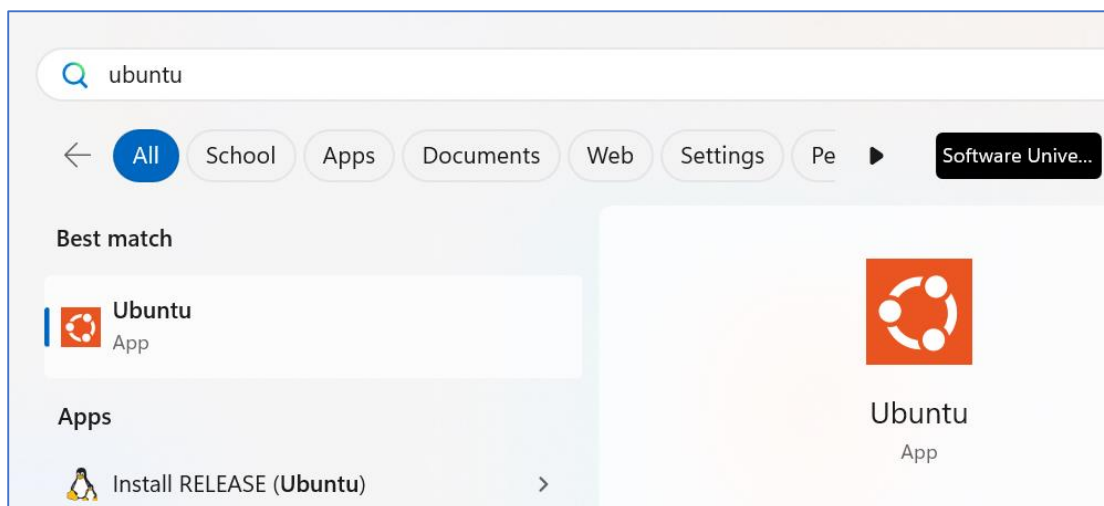
2. Install a Linux distribution:

- Once you have installed WSL, you need to install a Linux distribution of your choice.
- You can choose from a variety of distributions available on the Microsoft Store, such as Ubuntu, Debian, Fedora, and more.
- To install a Linux distribution, simply search for it on the Microsoft Store and install it like any other app.



3. Launch the Linux distribution:

- After installing the Linux distribution, you can launch it from the Start menu or by typing the distribution name in the Windows search bar.



4. Set up a user account:

- When you launch the Linux distribution for the first time, it will prompt you to set up a user account. Follow the instructions to set up a username and password.

```
Enter new UNIX username: softuni
New password:
Retype new password:
passwd: password updated successfully
Installation successful!
Windows Subsystem for Linux is now available in the Microsoft Store!
You can upgrade by running 'wsl.exe --update' or by visiting https://aka.ms/wslstorepage
Installing WSL from the Microsoft Store will give you the latest WSL updates, faster.
For more information please visit https://aka.ms/wslstoreinfo

To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.
```

5. Start using the Linux shell:

- Once you have set up a user account, you can start using the Linux shell by typing commands in the terminal.
- The Linux shell is similar to the Windows Command Prompt, but with a different syntax.
- You can use the Linux shell to navigate the file system, create and edit files, install packages, and run scripts.

6. Familiarize yourself with basic Linux commands:

- Here are some basic Linux commands that you should know:

- **ls**: List the contents of a directory
- **cd**: Change the current directory
- **mkdir**: Create a new directory

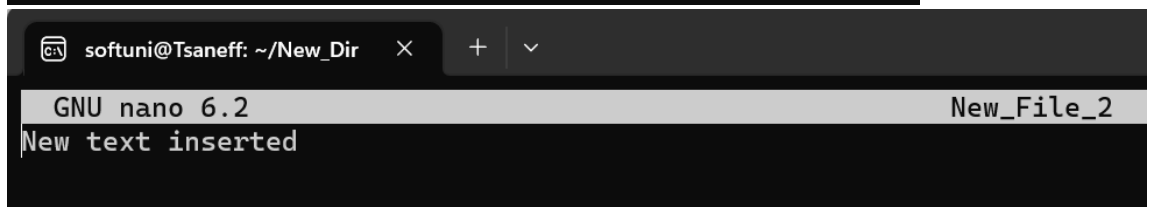
```
softuni@Tsaneff:~$ ls
softuni@Tsaneff:~$ mkdir New_Dir
softuni@Tsaneff:~$ ls
New_Dir
softuni@Tsaneff:~$ mkdir Home_Dir
softuni@Tsaneff:~$ ls
Home_Dir New_Dir
softuni@Tsaneff:~$ cd New_Dir
softuni@Tsaneff:~/New_Dir$ ls
softuni@Tsaneff:~/New_Dir$ |
```

- **touch**: Create a new file

```
softuni@Tsaneff:~/New_Dir$ touch New_File
softuni@Tsaneff:~/New_Dir$ ls
New_File
softuni@Tsaneff:~/New_Dir$ touch New_File_2
softuni@Tsaneff:~/New_Dir$ ls
New_File New_File_2
softuni@Tsaneff:~/New_Dir$ |
```

- **nano**: Open a file for editing

```
softuni@Tsaneff:~/New_Dir$ ls
New_File New_File_2
softuni@Tsaneff:~/New_Dir$ nano New_File_2
softuni@Tsaneff:~/New_Dir$ |
```



- **sudo**: Run a command with administrative privileges
- **apt-get**: Install packages from the distribution's repository

7. Work with Nano Editor:

- Navigate the Nano editor:
 - Once the Nano editor is open, you can use the arrow keys to navigate through the file. You can also use the page up and page down keys to move through the file more quickly.
- Edit the file:
 - To edit the file, simply move the cursor to the location where you want to make a change and type in the new text.
 - You can also use the backspace key to delete text or the insert key to toggle between insert and overwrite modes.
- Save the changes:
 - Once you have made the necessary changes, you need to save the file.
 - To do this, press the Ctrl and O keys simultaneously.
 - This will prompt you to confirm the filename and location where you want to save the file.
 - Once you have confirmed this information, press Enter to save the file.
- Exit the Nano editor:
 - To exit the Nano editor, simply press the Ctrl and X keys simultaneously.
 - If you have made any changes to the file, you will be prompted to save them before exiting.

8. Install additional packages:

- Update the package list:
 - Before installing any software, it is always a good practice to update the package list.
 - Type the "**sudo apt-get update**" command in the terminal to update the package list:

```
softuni@Tsaneff:~/New_Dir$ sudo apt-get update
Get:1 http://security.ubuntu.com/ubuntu jammy-security InRelease [110 kB]
Hit:2 http://archive.ubuntu.com/ubuntu jammy InRelease
Get:3 http://archive.ubuntu.com/ubuntu jammy-updates InRelease [119 kB]
Get:4 http://security.ubuntu.com/ubuntu jammy-security/main amd64 Packages [804 kB]
Get:5 http://security.ubuntu.com/ubuntu jammy-security/main Translation-en [156 kB]
```

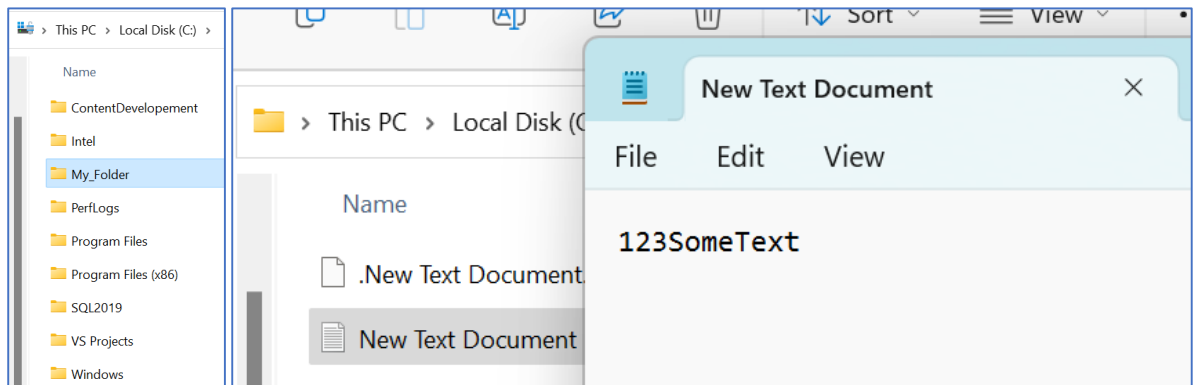
- One of the advantages of using the Linux shell in a Windows environment is that you can install a wide variety of packages and tools that are not available on Windows.
- To install additional packages, use the apt-get command followed by the package name.
- For example, to install the Python programming language, you can run the command "**sudo apt-get install python2**".

```
softuni@Tsaneff:~/New_Dir$ sudo apt-get install python2
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  libpython2-stdlib libpython2.7-minimal libpython2.7-stdlib
Suggested packages:
  python2-doc python-tk python2.7-doc binfmt-support
```

9. Use the Linux shell with Windows files:

- Identify the drive letter and path of the Windows file:
 - The first step is to identify the drive letter and path of the Windows file that you want to access.

- For example, if the file is located on the C: drive in a folder named "My_Folder", the path would be "C:\My_Folder".

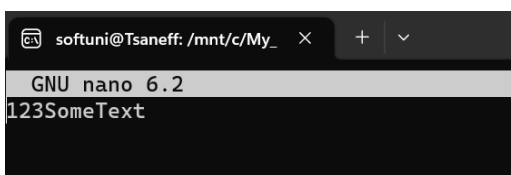


- Mount the Windows drive:
 - Next, you need to mount the Windows drive using the "**mount**" command.
 - Type the following command in the terminal, replacing "**drive_letter**" with the drive letter of the Windows drive (e.g. C) and "path/to/windows/files" with the path to the folder containing the files you want to access:

```
sudo mount -t drvfs drive_letter: /mnt/path/to/windows/files
```

```
softuni@Tsaneff:/mnt/c/My_Folder$ sudo mount -t drvfs C: /mnt/c
softuni@Tsaneff:/mnt/c/My_Folder$ ls
ls: cannot access 'DumpStack.log.tmp': Permission denied
ls: cannot access 'hiberfil.sys': Permission denied
ls: cannot access 'pagefile.sys': Permission denied
ls: cannot access 'swapfile.sys': Permission denied
'$Recycle.Bin'          DumpStack.log.tmp      PerfLogs
'$SysReset'             Intel                  'Program Files'
'$WinREAgent'           MSOCache               'Program Files (x86)'
ContentDevelopment      My_Folder              ProgramData
'Documents and Settings' OneDriveTemp            Recovery
softuni@Tsaneff:/mnt/c/My_Folder$ cd My_Folder
softuni@Tsaneff:/mnt/c/My_Folder/My_Folder$ ls
'New Text Document.txt'
softuni@Tsaneff:/mnt/c/My_Folder/My_Folder$ |
```

```
softuni@Tsaneff:/mnt/c/My_Folder/My_Folder$ ls
'New Text Document.txt'
softuni@Tsaneff:/mnt/c/My_Folder/My_Folder$ nano "New Text Document.txt"
```



10. Unmount the Windows drive:

- When you are finished working with the Windows files, you should unmount the Windows drive using the following command:

```
sudo umount /mnt/c
```