Software Development Practice 1 (Section RSP)

Linux Environments for Software Development

Objective

- Learn how to install and configure Linux environments.
- Learn how to use the VS Code IDE under Linux (local and remote).
- Learn basic Bash shell commands on Linux.

Expected Learning Outcomes

- Students will be able to install, configure, and operate Linux environments to perform basic system administration tasks.
- Students will be able to develop, build, and deploy software in Linux environments.

Task 1: WSL2 + Ubuntu 24.04 on Microsoft Windows

- Install and configure **Ubuntu 24.04** on the your native OS using **WSL2**.
- Refer to **"*How to install Linux on Windows with WSL*"** (Update: 11/20/2024)
  - 🔗 https://learn.microsoft.com/en-us/windows/wsl/install
- Write a summary of the installation process and
- Capture some screenshots during software installation process for inclusion in the lab report.
  - Any problems encountered and their solutions should be included in the report.

Task 2: Oracle VirtualBox VM + Linux

- Install and configure **Linux distributions** on **virtual machines (Vms)**.
  - For example: **Ubuntu**, **Debian**, etc.
- Refer to "***VirtualBox + VirtualBox Extension Pack Downloads (for personal and educational use)***"
  - 🔗 https://www.virtualbox.org/wiki/Downloads
- ***"VirtualBox Online Manuals"***
  - 🔗 https://www.virtualbox.org/manual/ch01.html
  - 🔗 https://www.virtualbox.org/manual/ch02.html
- Make sure that your Ubuntu VM can access the Internet to update software package using “sudo apt update && sudo apt upgrade”.
- Write a summary of the installation process and capture some screenshots during software installation process for inclusion in the lab report.
  - Any problems encountered and their solutions should be included in the report.
- **Question**: How do you configure your **Ubuntu VM and VirtualBox network settings** so that it can be accessed via an SSH client from Windows 11? Describe the steps required to complete this task in detail.

Task 3: Basic & Useful Linux Commands

- Run the following **Linux commands in a Linux bash shell** and observe the text output.
- Compare the outputs on both **Ubuntu VM and WSL2 Ubuntu** platforms.
- Explain the purpose or function of each command. Write a short comment for each command.

Commands for Linux / Ubuntu

```
$ sudo apt update && sudo apt upgrade -y && sudo apt dist-upgrade -y
$ uname -a
$ cat /etc/os-release | head -5
$ lsb_release -all
$ df -h
$ free -h
$ hostname
$ whoami
$ echo $USER
$ ip addr show dev eth0
$ ip route
$ lscpu | grep -e "^CPU(s):" | awk '{print "CPU cores: " $2}'
$ lsblk
$ uptime
$ ping -c 10 8.8.8.8
$ python3 -V
$ which pyhon3
$ sudo apt install python3 python3-pip \
  python3-venv python3-setuptools python3-dev
$ which nvidia-smi && "$(which nvidia-smi)"
$ sudo reboot -h now
```

Commands for WSL2 Ubuntu

```
$ /mnt/c/WINDOWS/System32/wsl.exe --version
$ /mnt/c/WINDOWS/System32/wsl.exe --list
$ /mnt/c/WINDOWS/System32/wsl.exe --ubuntu
```

Questions

- Which command is used to determine the disk storage capacity?
- Which command is used to find the number of CPU cores available?
- Which command is used to find the IPv4 address of the Ubuntu machine?
- Explain the purpose or function of the ~/.bashrc file.

Task 4: VS Code IDE on Linux

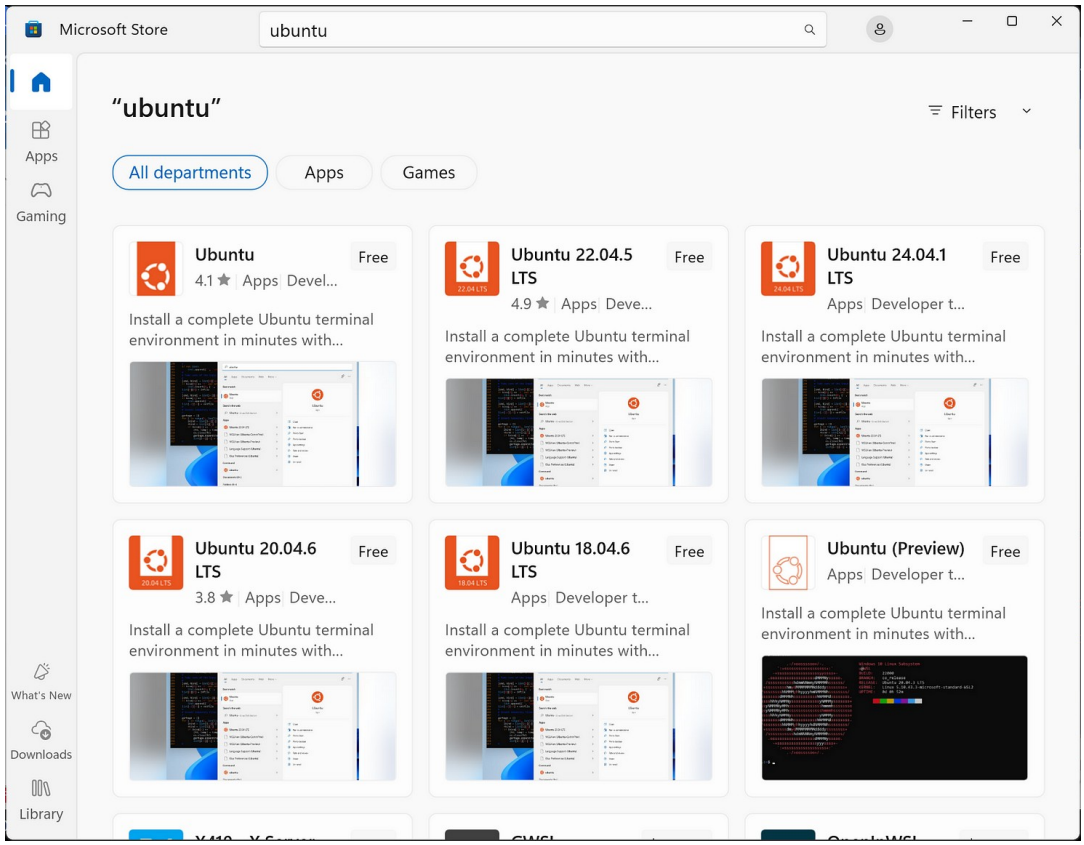
- Install **VS Code IDE** and the **"Microsoft Python Extension Pack"** on the following platforms.
  1. WSL2 Ubuntu 24.04 on Windows
  2. Ubuntu 24.04 / Virtual Box VM (remote access via SSH).
- Examples of extensions: **Python Formatter**
  - 🔗 https://code.visualstudio.com/docs/python/formatting
- Write Python scripts and run them **on Ubuntu remote machine while running the VS Code IDE on a local machine.**
- Install packages such as `matplotlib` and `numpy` (under a **Python virtual environment**).
  - Write **Python test scripts** that utilize these packages.
  - Demonstrate your work to the lab instructor for both **WSL2 Ubuntu 24.04** and **Ubuntu 24.04 / Virtual Box VM**.

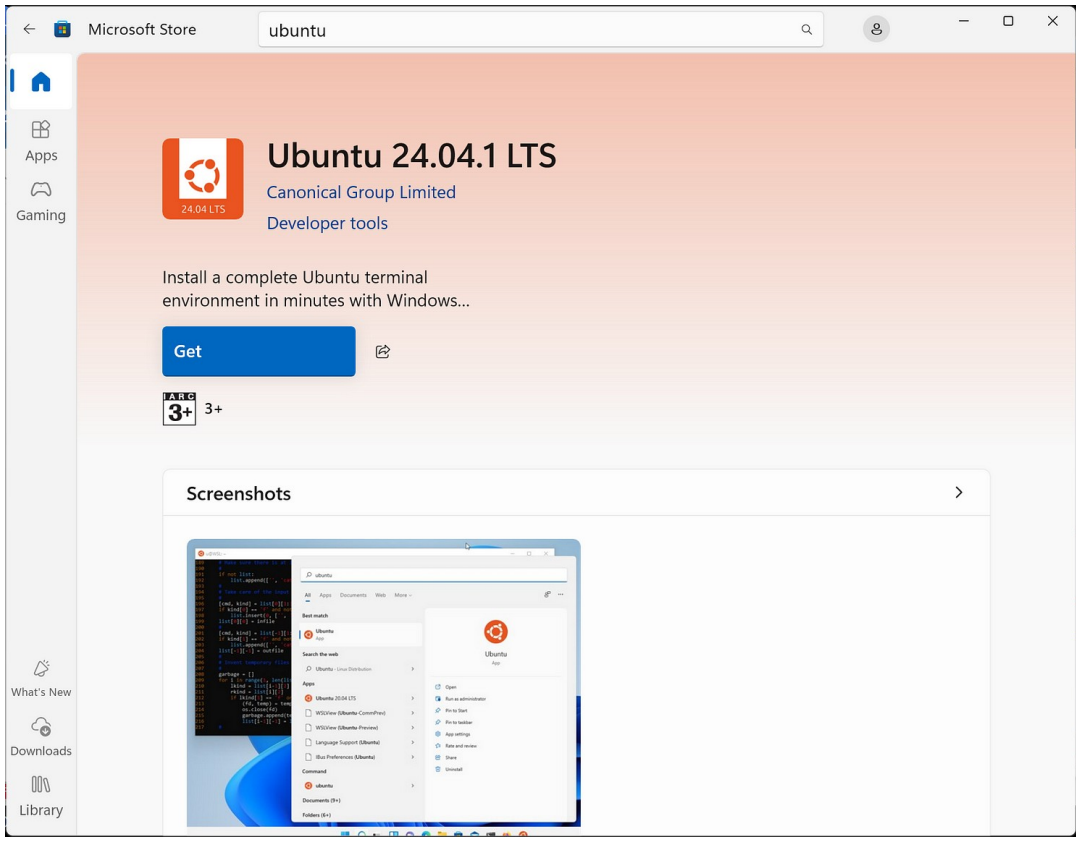
Useful online documentations

- https://iot-kmutnb.github.io/blogs/teaching/sw_dev_2024-1/handout-1_2024-06-29.pdf
- https://iot-kmutnb.github.io/blogs/teaching/sw_dev_2024-1/handout-2_2024-06-29.pdf
- https://iot-kmutnb.github.io/blogs/teaching/sw_dev_2024-1/handout-3_2024-07-05.pdf

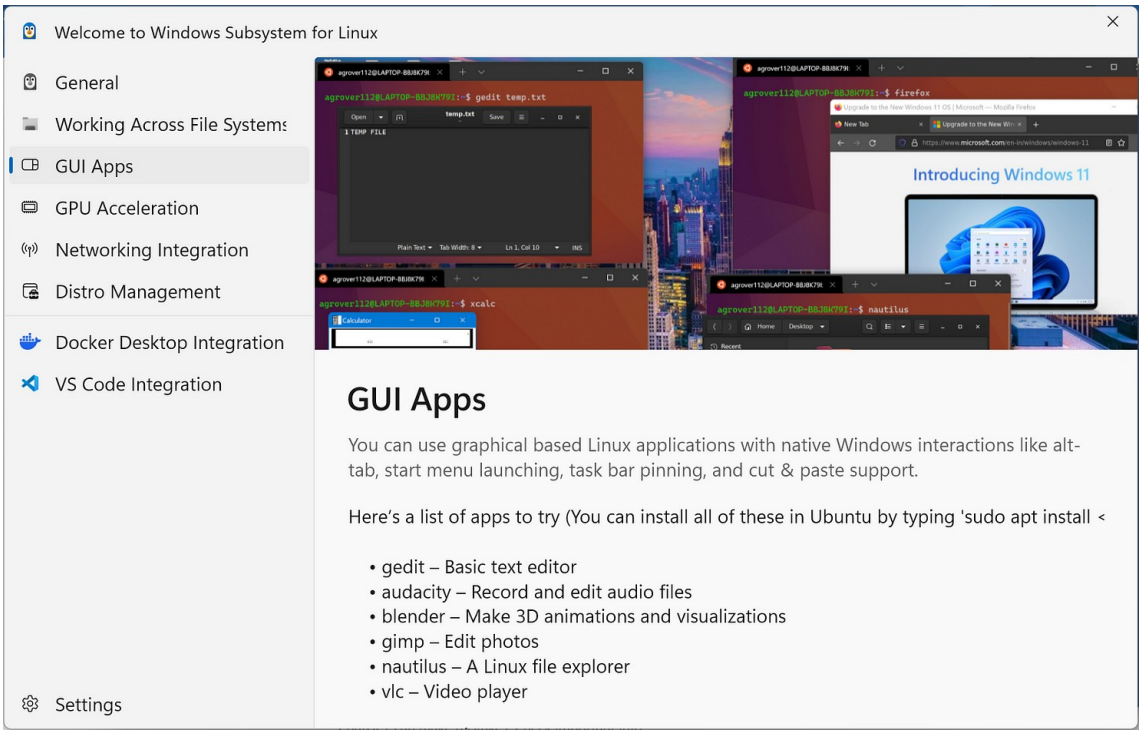
Last update: 2025-06-23

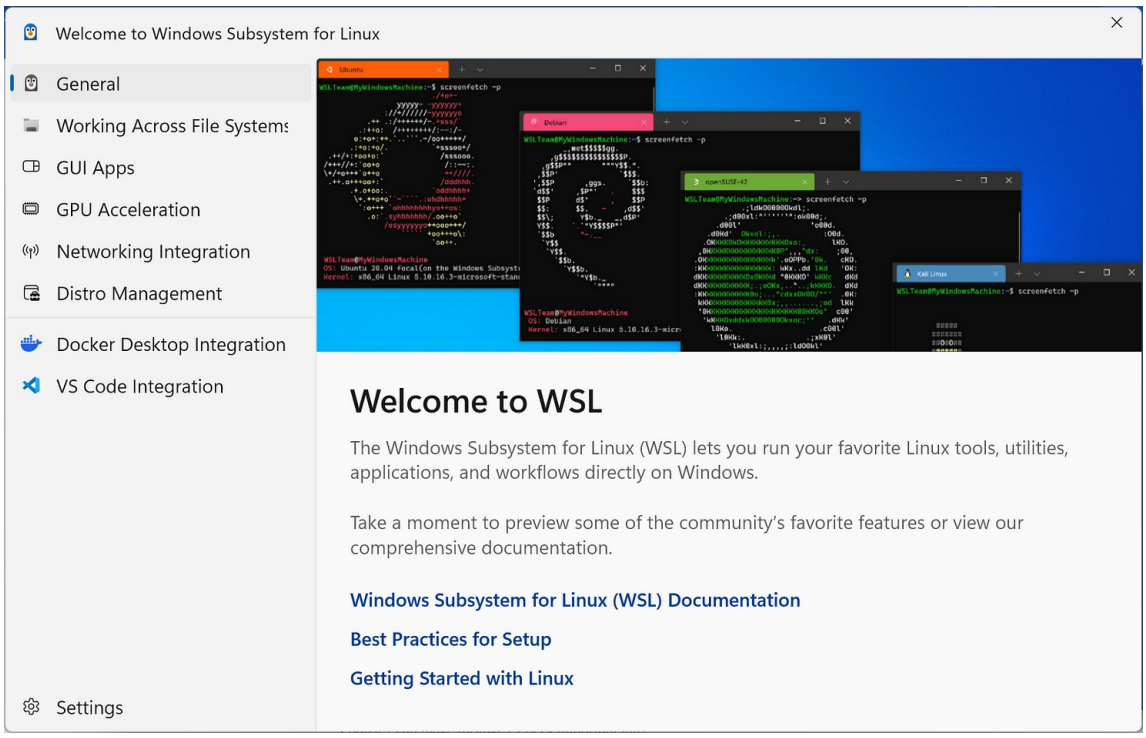
MS Store on Windows 11: Ubuntu Distributions for WSL 2



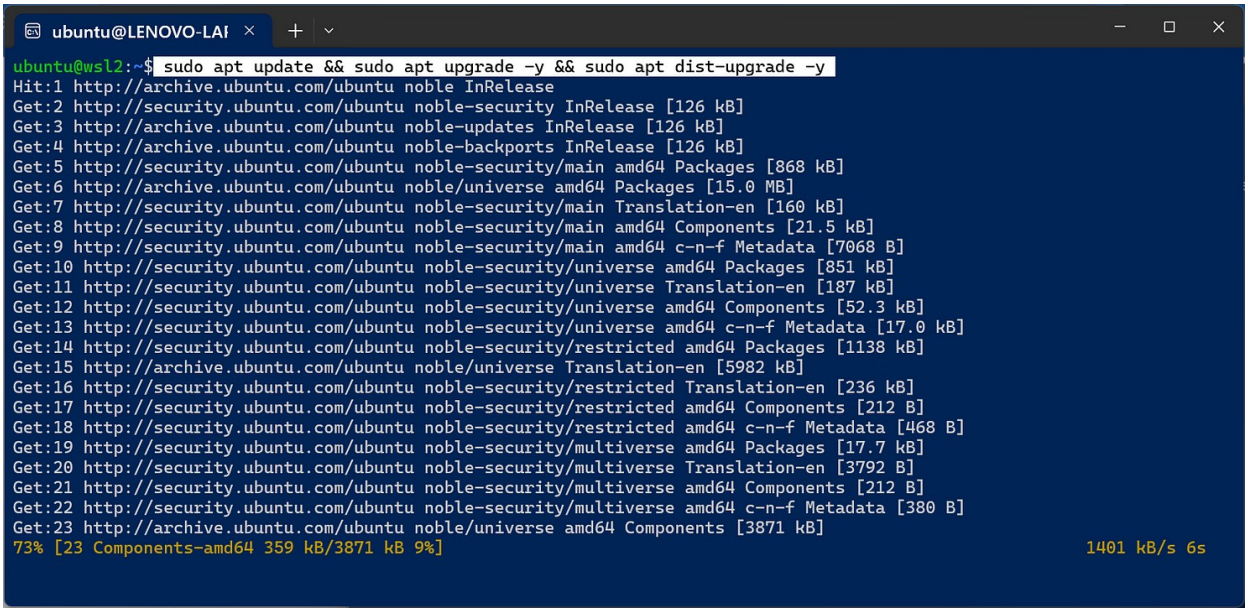


Note that WSL2 Ubuntu also support GUI-based applications.





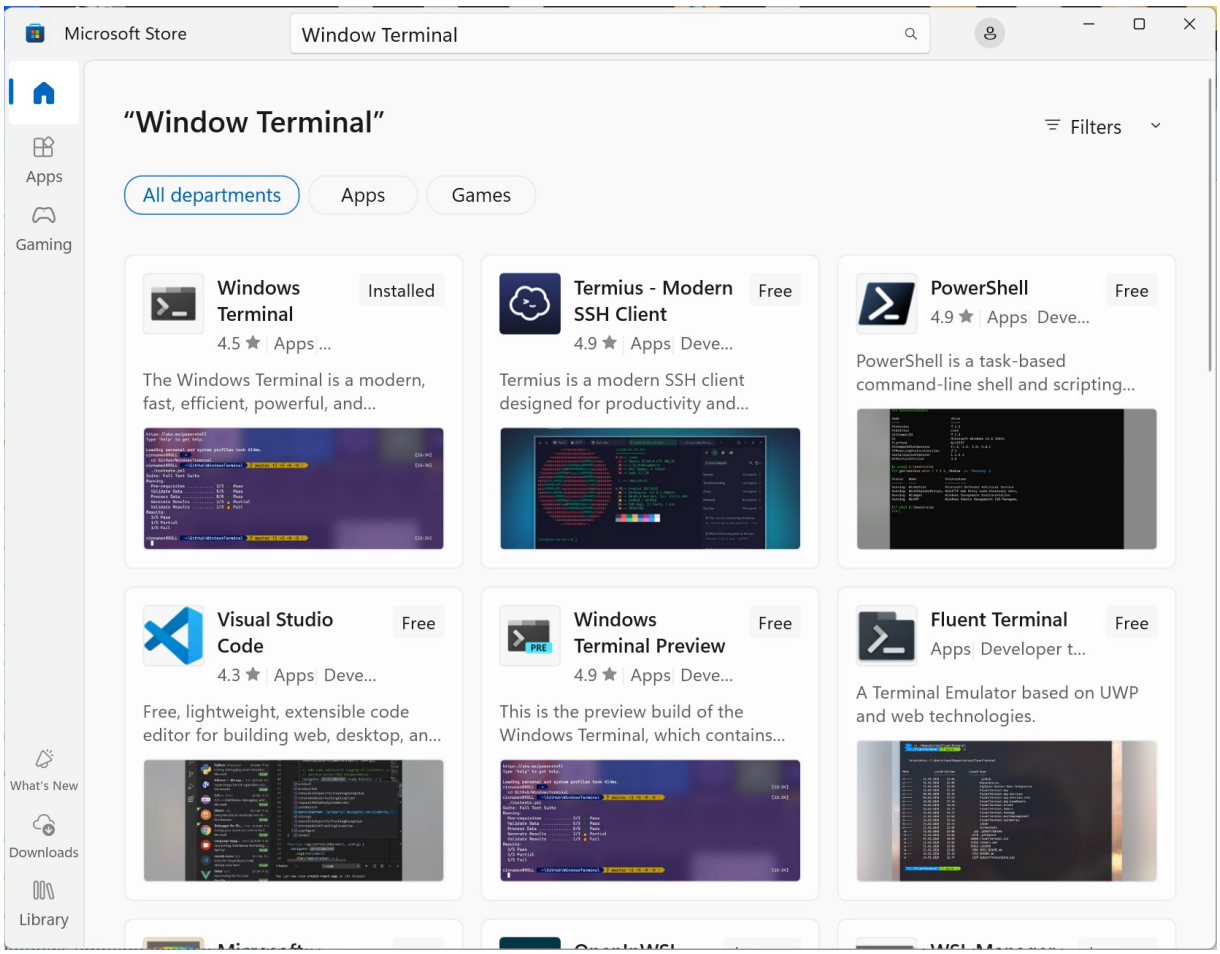
Linux commands to upgrade Ubuntu software packages



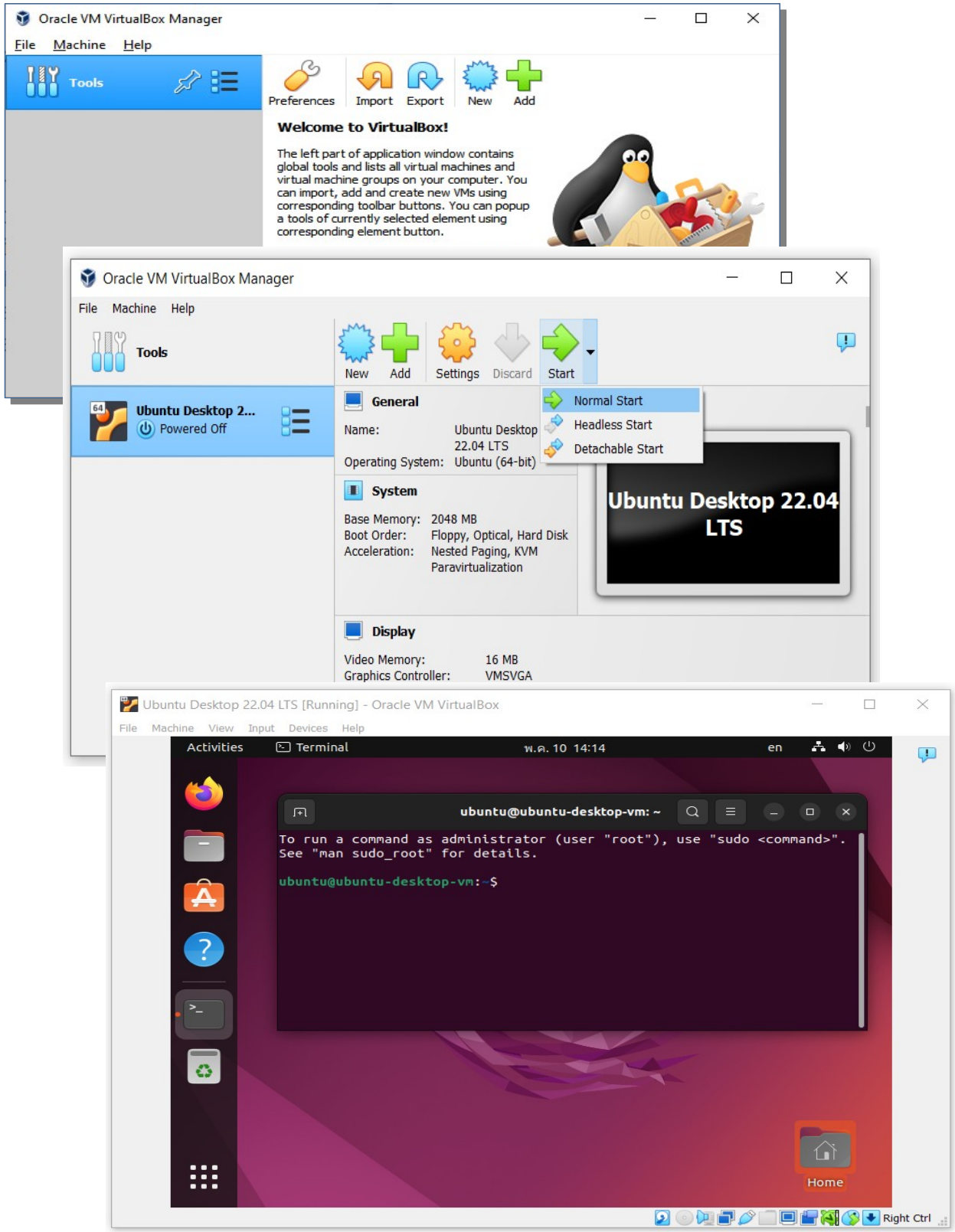
Linux commands for Creating a Python Virtual Environment

```
$ sudo apt install python3 python3-pip \
  python3-setuptools python3-venv python3-dev

$ python3 -m venv ~/.venv

$ source ~/.venv/bin/activate
```

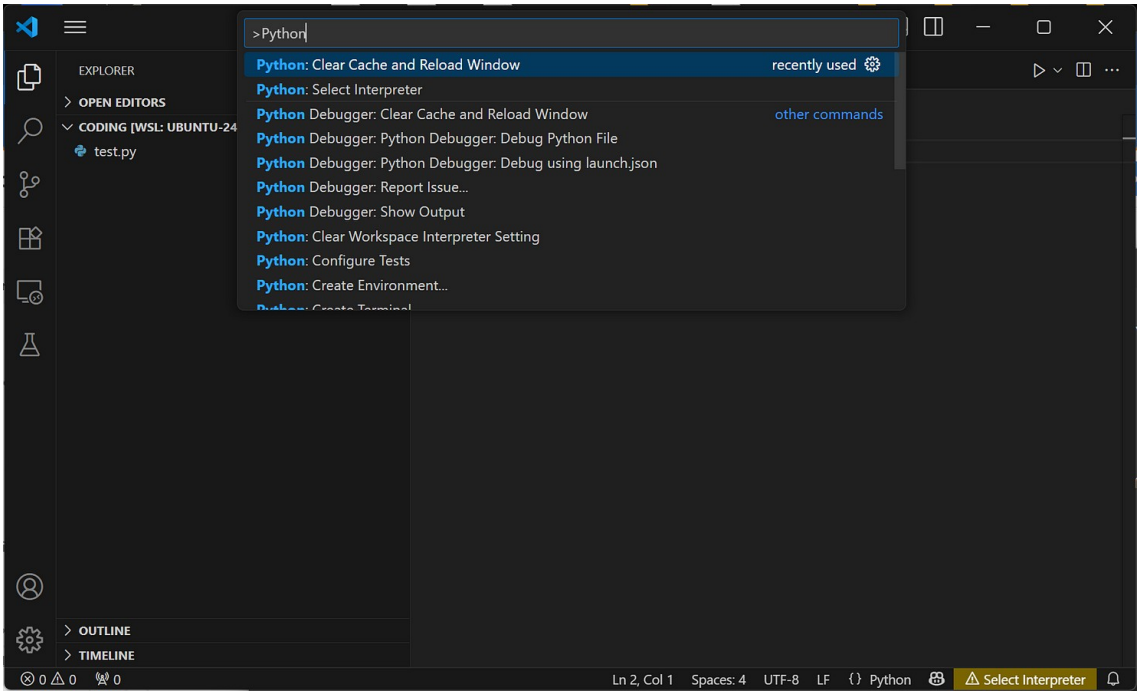
Installing Software via Microsoft Store

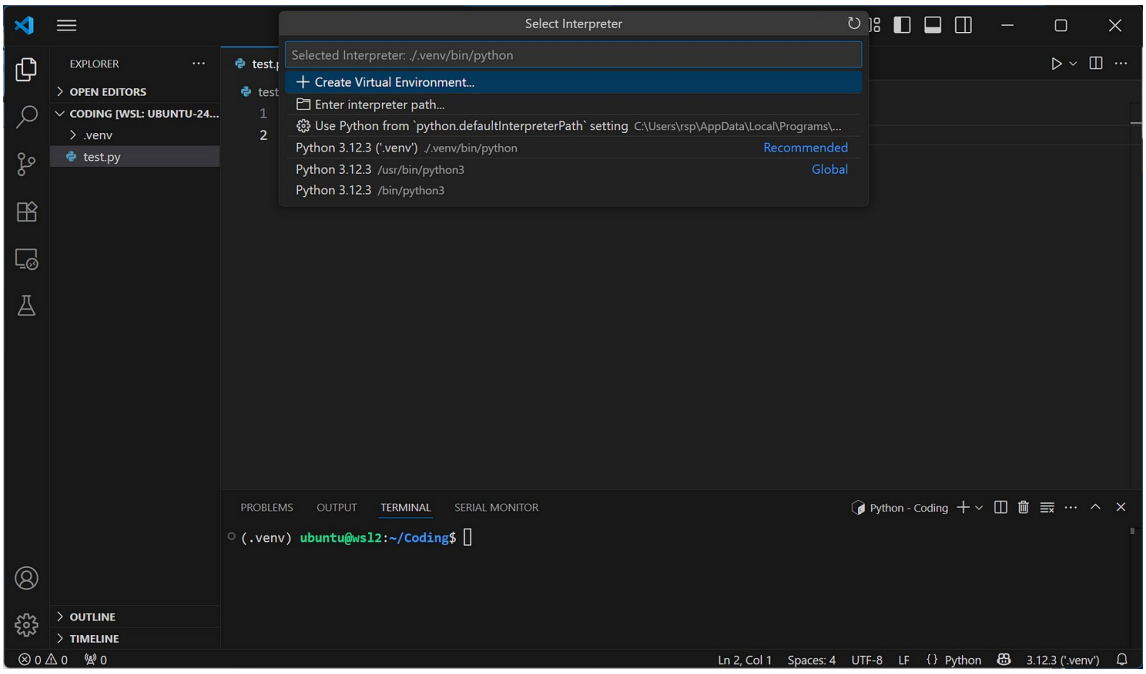


Ubuntu under Oracle VirtualBox



Creating Python Virtual Environment Under VS Code IDE (WSL2 Ubuntu).





Testing a Python script using VS Code IDE on WSL 2 Ubuntu