

Scotti-BYTE Enterprise Consulting Services

Windows Subsystem for Linux (WSL2)

Microsoft released the initial release of Windows Subsystem for Linux (WSL) in August of 2016. The first release of WSL provided a Linux-compatible kernel interface that Microsoft developed without Linux Kernel code which could run a GNU user space on top of it like Ubuntu, openSUSE, Debian, or Kali Linux. This user space could contain a Bash shell and native GNU command line tools, but not much else.

Beginning in WSL2, the architecture was redesigned to include a Linux kernel running in a lightweight virtual machine environment. WSL2 was announced in May 2019 and requires the 2004 release of Windows 10. WSL2 utilizes a new "lightweight" Hyper-V Virtual Machine technology for containerization where a virtualized kernel can make direct use of NT services on the host.

WSL2 is being marketed as a developer tool. WSL2 requires far fewer resources such as CPU, memory, and storage because of its "containerization" design as compared with a full-fledged VM. I think that so many developers at companies were either running a Linux VM or had completely moved to an OS such as Redhat, that Microsoft realized they were potentially losing market share for this important segment.

WSL1 was not capable of running all Linux software such as 32-bit binaries or anything that required specific kernel services. Due to this lack of essential infrastructure, access to devices was limited. In WSL2, a Linux distribution resides inside an EXT4 formatted filesystem inside of a virtual disk and the host file system is transparently accessible. This means that direct Linux binaries all run just fine.

Microsoft says that WSL 2 is a new version of the Windows Subsystem for Linux architecture that powers the Windows Subsystem for Linux to run ELF64 Linux binaries on Windows. Its primary goals are to increase file system performance, as well as adding full system call compatibility.

Installation of WSL2 is provided as an optional Windows 10 feature. The prerequisite to being able to run WSL2 is that you have Windows 10 Version 2004 installed.

To verify that you are on this version at a minimum, press START type "Settings" select "systems" in the settings window and scroll down and click "About". You should then see "Version 2004" in the Windows specifications section as in the screen shot to the left.

Device specifications

Device name	Win10-Puterroom
Processor	AMD A8-5600K APU with Radeon(tm) HD Graphics 3.60 GHz
Installed RAM	8.00 GB (7.46 GB usable)
Device ID	0552ECD0-C8FA-4817-8A75-C7D92D78DDB2
Product ID	00330-80102-11099-AA144
System type	64-bit operating system, x64-based processor
Pen and touch	No pen or touch input is available for this display

Rename this PC

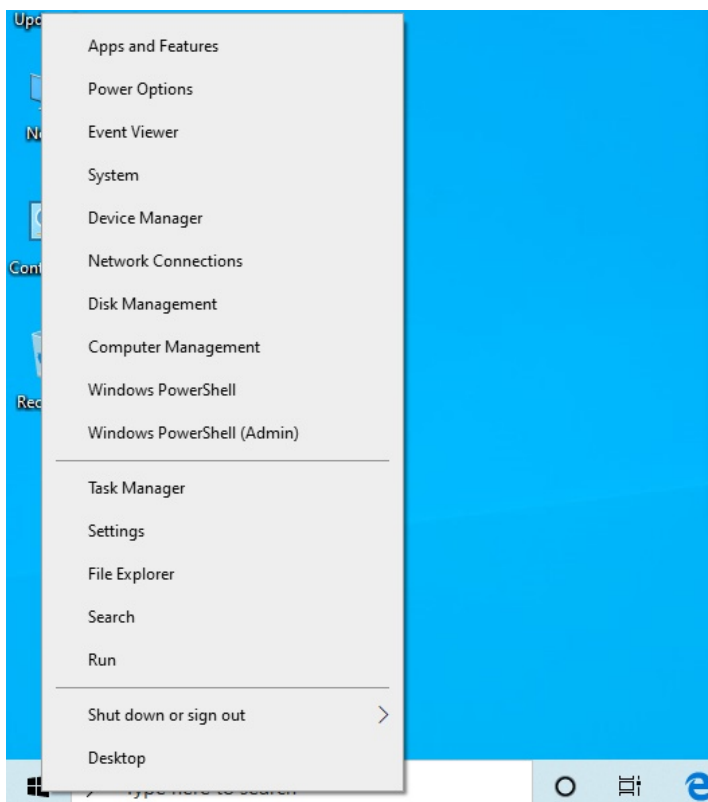
Windows specifications

Edition	Windows 10 Pro
Version	2004
Installed on	7/2/2020
OS build	19041.330
Experience	Windows Feature Experience Pack 120.2202.130.0

You can also press the Windows key +R and type winver and select OK. This will output a screen such as that below.

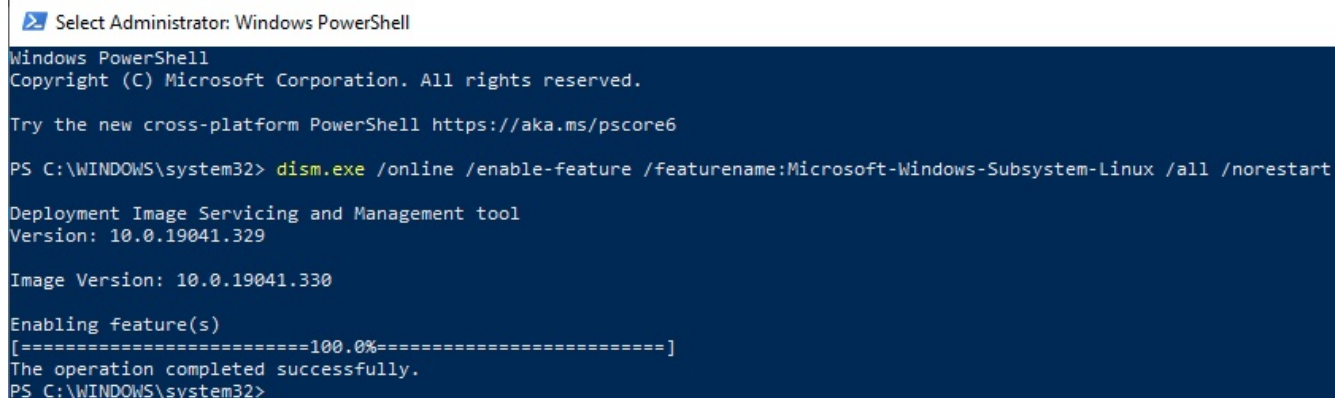


In order to install the WSL2 feature, open a Windows Powershell Admin prompt by right clicking the WINDOWS button and select "Windows PowerShell (Admin)".



In the power shell window, type the following command on one line:

```
dism.exe /online /enable-feature /featurename:Microsoft-Windows-Subsystem-Linux  
/all /norestart
```

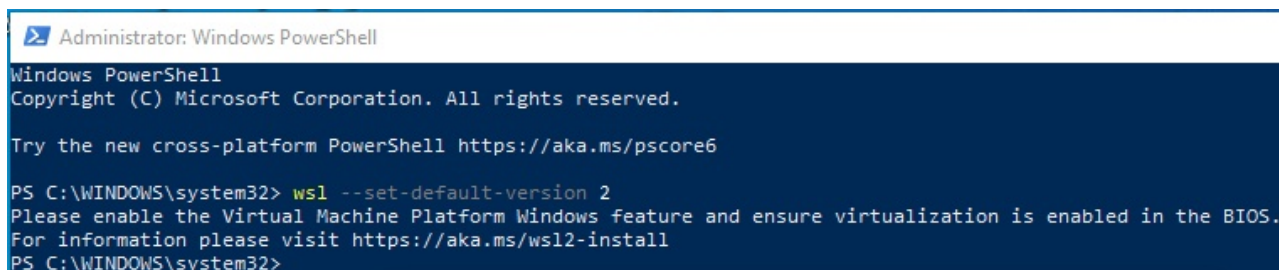


```
Select Administrator: Windows PowerShell  
Windows PowerShell  
Copyright (C) Microsoft Corporation. All rights reserved.  
  
Try the new cross-platform PowerShell https://aka.ms/pscore6  
  
PS C:\WINDOWS\system32> dism.exe /online /enable-feature /featurename:Microsoft-Windows-Subsystem-Linux /all /norestart  
  
Deployment Image Servicing and Management tool  
Version: 10.0.19041.329  
  
Image Version: 10.0.19041.330  
  
Enabling feature(s)  
[=====100.0%=====]  
The operation completed successfully.  
PS C:\WINDOWS\system32>
```

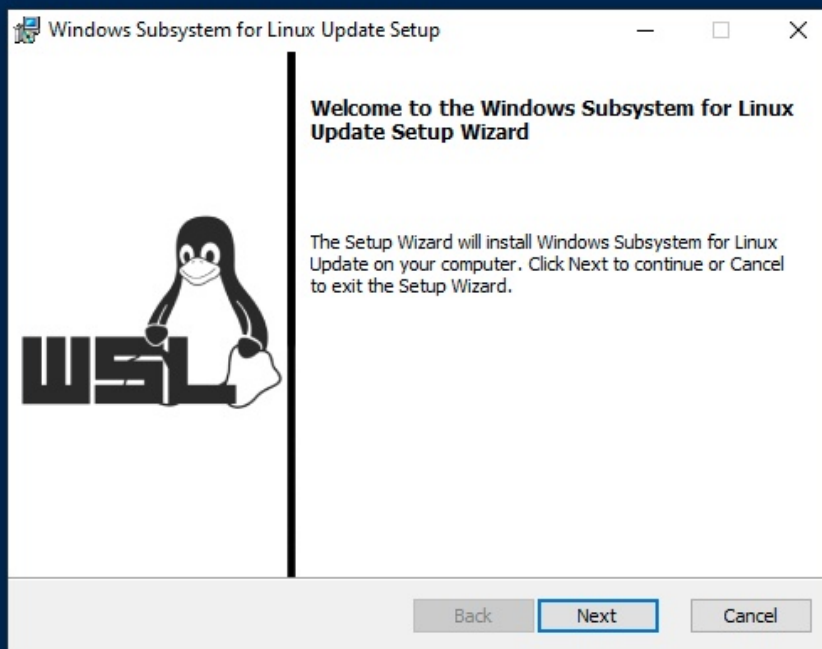
Next you need to reboot. After the system reboots, open the PowerShell admin again and type:

```
wsl --set-default-version 2
```

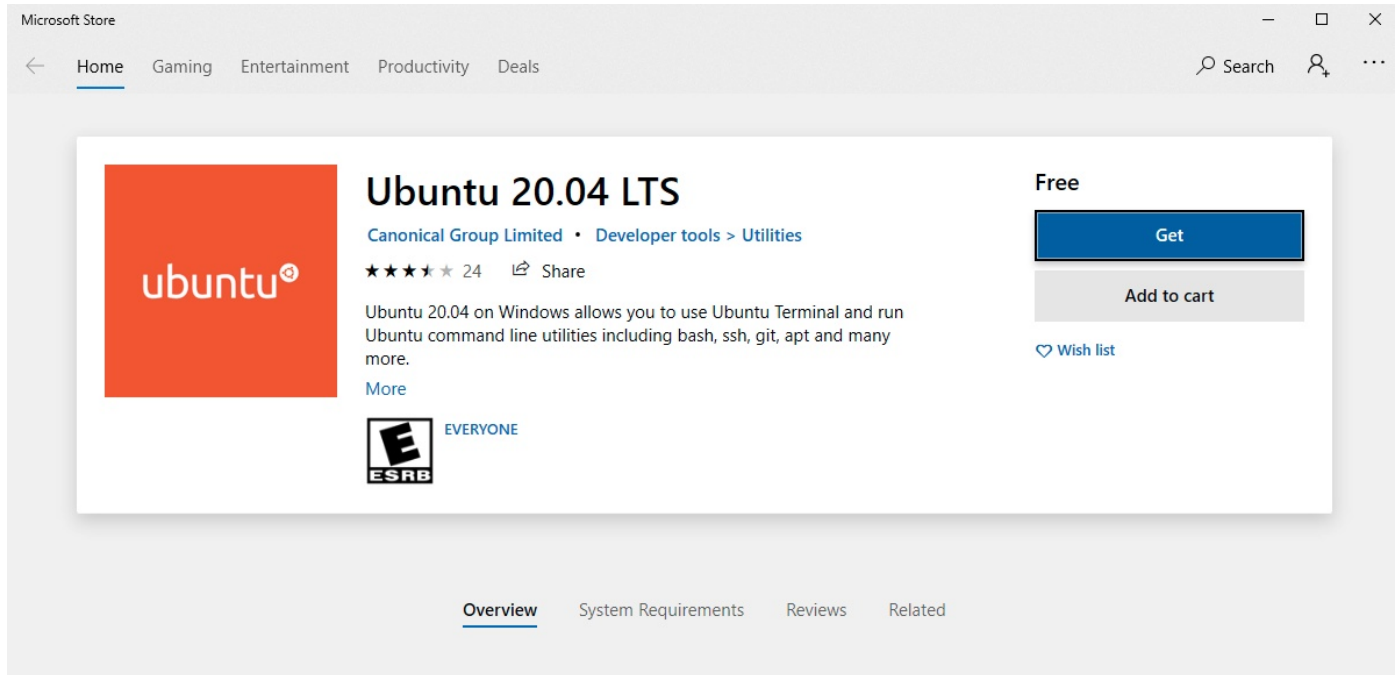
Now go to: "<https://aka.ms/wsl2kernel>" and follow the directions to download and install the kernel.



```
Administrator: Windows PowerShell  
Windows PowerShell  
Copyright (C) Microsoft Corporation. All rights reserved.  
  
Try the new cross-platform PowerShell https://aka.ms/pscore6  
  
PS C:\WINDOWS\system32> wsl --set-default-version 2  
Please enable the Virtual Machine Platform Windows feature and ensure virtualization is enabled in the BIOS.  
For information please visit https://aka.ms/wsl2-install  
PS C:\WINDOWS\system32>
```



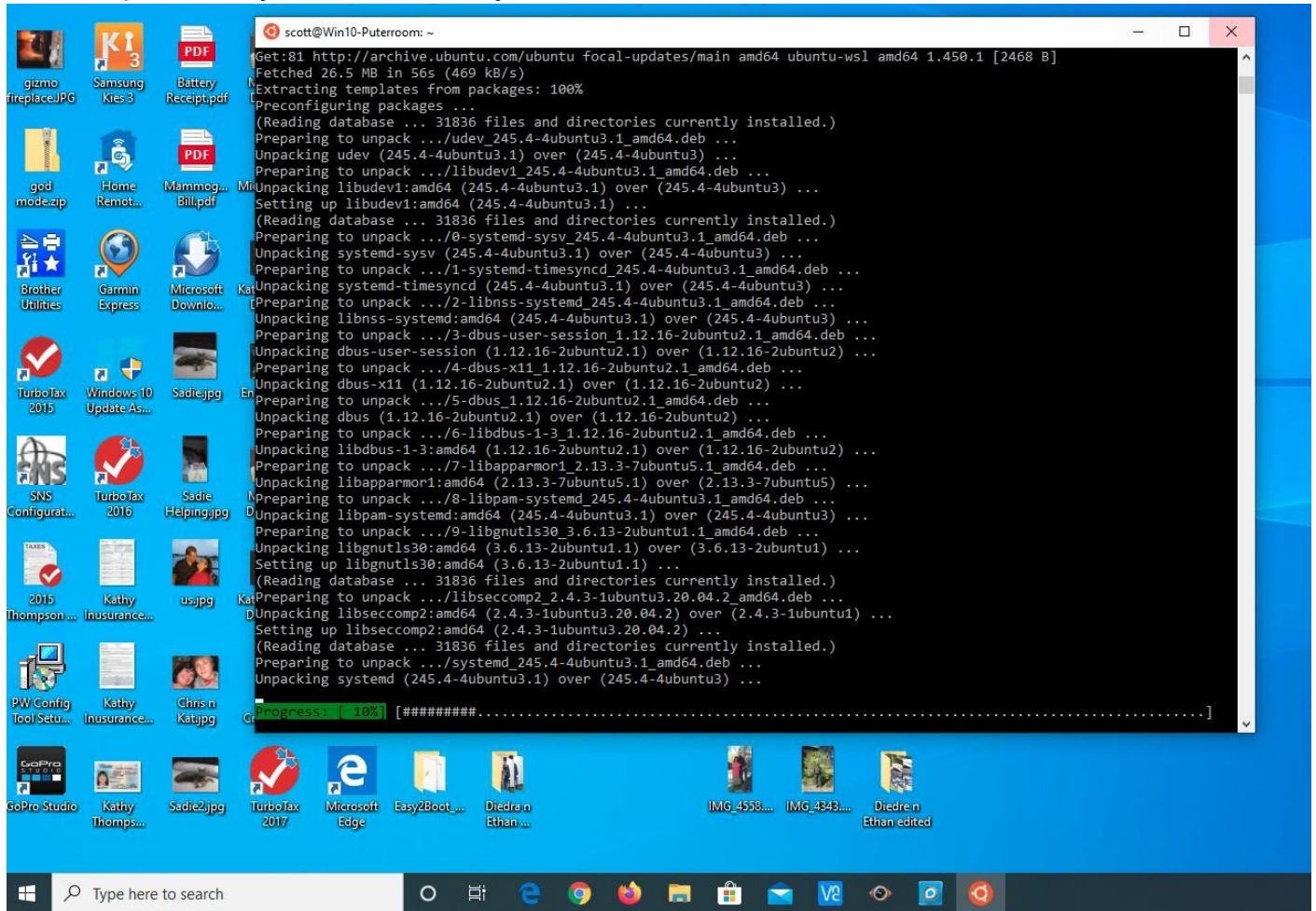
Once the Kernel is installed, open the Microsoft Store (<https://aka.ms/wslstore>) and install your Linux distribution of choice.



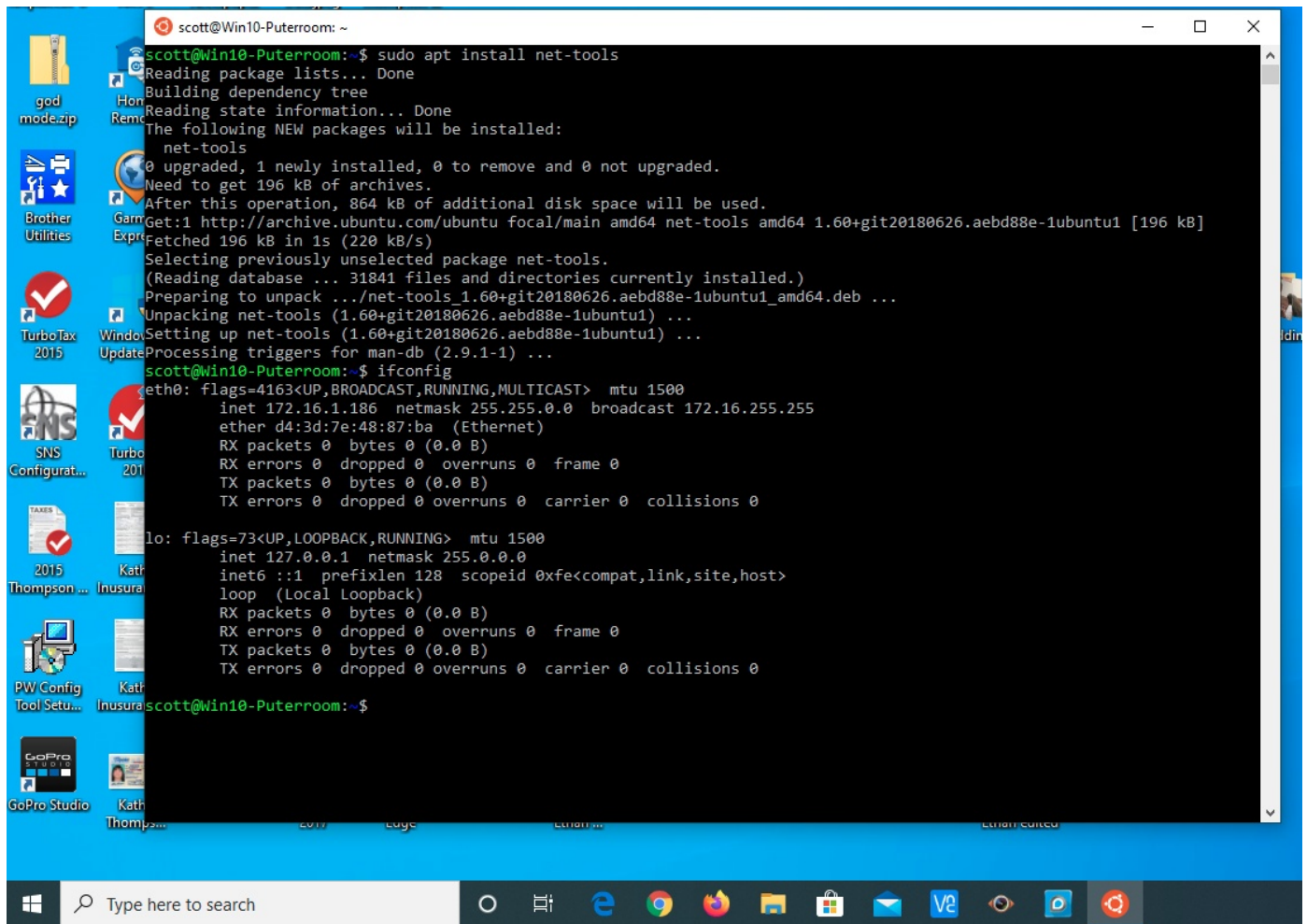
The installation will take a couple minutes and then you will be prompted for a username and a password you want to use for your Ubuntu. Make sure to write them down.

```
scott@Win10-puterroom: ~  
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: scott  
New password:  
Retype new password:  
passwd: password updated successfully  
Installation successful!  
To run a command as administrator (user "root"), use "sudo <command>".  
See "man sudo_root" for details.  
  
Welcome to Ubuntu 20.04 LTS (GNU/Linux 4.4.0-19041-Microsoft x86_64)  
  
* Documentation: https://help.ubuntu.com  
* Management: https://landscape.canonical.com  
* Support: https://ubuntu.com/advantage  
  
System information as of Thu Jul 2 00:40:43 CDT 2020  
  
System load: 0.52      Processes:            7  
Usage of /home: unknown  Users logged in:      0  
Memory usage: 32%      IPv4 address for eth0: 172.16.1.186  
Swap usage: 0%  
  
0 updates can be installed immediately.  
0 of these updates are security updates.  
  
The list of available updates is more than a week old.  
To check for new updates run: sudo apt update  
  
This message is shown once once a day. To disable it please create the  
/home/scott/.hushlogin file.  
scott@win10-puterroom:~$
```


At this point, it is best to do a "sudo apt update" and "sudo apt upgrade" to update to the latest Ubuntu updates as you would with any Ubuntu installation.



At this point you can install and run any Linux programs.



```
scott@Win10-puterroom: ~  
scott@Win10-puterroom:~$ sudo apt install net-tools  
Reading package lists... Done  
Building dependency tree  
Reading state information... Done  
The following NEW packages will be installed:  
  net-tools  
0 upgraded, 1 newly installed, 0 to remove and 0 not upgraded.  
Need to get 196 kB of archives.  
After this operation, 864 kB of additional disk space will be used.  
Get:1 http://archive.ubuntu.com/ubuntu focal/main amd64 net-tools amd64 1.60+git20180626.aebd88e-1ubuntu1 [196 kB]  
Fetched 196 kB in 1s (220 kB/s)  
Selecting previously unselected package net-tools.  
(Reading database ... 31841 files and directories currently installed.)  
Preparing to unpack .../net-tools 1.60+git20180626.aebd88e-1ubuntu1_amd64.deb ...  
Unpacking net-tools (1.60+git20180626.aebd88e-1ubuntu1) ...  
Setting up net-tools (1.60+git20180626.aebd88e-1ubuntu1) ...  
Processing triggers for man-db (2.9.1-1) ...  
scott@Win10-puterroom:~$ ifconfig  
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500  
    inet 172.16.1.186 netmask 255.255.0.0 broadcast 172.16.255.255  
    ether d4:3d:7e:48:87:ba (Ethernet)  
    RX packets 0 bytes 0 (0.0 B)  
    RX errors 0 dropped 0 overruns 0 frame 0  
    TX packets 0 bytes 0 (0.0 B)  
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0  
  
lo: flags=73<UP,LOOPBACK,RUNNING> mtu 1500  
    inet 127.0.0.1 netmask 255.0.0.0  
    inet6 ::1 prefixlen 128 scopeid 0xfe<compat,link,site,host>  
    loop (Local Loopback)  
    RX packets 0 bytes 0 (0.0 B)  
    RX errors 0 dropped 0 overruns 0 frame 0  
    TX packets 0 bytes 0 (0.0 B)  
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0  
scott@Win10-puterroom:~$
```

To exit the WSL2 instance, simply type "exit" just as you would to log out of any Linux terminal. To access WSL again, just open a terminal and type "wsl".

WSL is clearly a nice addition to Windows and valuable for anyone wanting to use the linux command line. I think that simple linux commands like "ssh" are much easier to use rather than bringing up "Putty" for windows users. You can see that simple programs like "ifconfig" featured above bring simple and straight-forward commands to a functional interface.

The options here are unlimited. You could bring up a display manager such as VcXsrv (<https://sourceforge.net/projects/vcxsrv/>) on the Windows side which is an X11 Display manager for Windows. Then, WSL2 could launch and display GUI oriented apps in a Window on your Windows 10.

Microsoft says WSL2 is to allow seamless development of OpenSource Linux apps on Windows. Microsoft has never been about "open" anything. It is my opinion that WSL2 might well be a precursor to Microsoft scrapping Windows Internals and making a Windows looking GUI that has a Linux or a BSD Unix foundation like MacOS. Modern day Microsoft Windows is fundamentally still based on OS/2 and the follow on foundations from Windows NT. I believe Windows architecture as currently implemented is obsolete.