

USING "WINDOWS SUBSYSTEM FOR LINUX"

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SUMMARY

"Window Subsystem for Linux", also known as "WSL" lets you run some Linux distributions inside a Windows 10.. or Windows 11.. computer.

"WSL" is therefore an option for running Linux from inside a Windows.. computer, if you do not have enough RAM to run a full-fledged copy of Linux inside a virtual machine.

TOPICS

- Historical Backgroup for "WSL"
- "Windows Terminal" has three modes: "Powershell", "command prompt", and "Windows Subsystem for Linux"
- Installing "WSL" Into A "Windows 11" or "Windows 10" computer
- Installing a "XFCE" Linux desktop inside "WSL"
- Installing And Running Linux apps into "WSL"

HISTORICAL BACKGROUND FOR "WSL"

- August 2016:
"Windows Subsystem for Linux" is also known as "WSL" or "WSL 1" was an "add-on" to Windows "Terminal (Admin)" that only ran command-line Linux apps
- June 2019:
"WSL 2" which is now also known as "WSL"
- May 2021:
"WSLg" was added to "WSL 2" to make it capable of running graphical Linux apps.
"g" stands for "graphical"

BIG STEPS FOR INSTALLING "WSL"

- BIG STEP 100:
Prepare your Windows 10 or Windows 11 computer for WSL
- BIG STEP 200:
Install "WSL" and "Ubuntu" from the Microsoft Store
- BIG STEP 300:
Install Linux apps from the "WSL" command line
- BIG STEP 400:
Install the XFCE "Desktop" GUI into "WSL" (which breaks "BIG STEP 300")

BIG STEPS FOR INSTALLING "WSL"

- BIG STEP 500:
Remove "WSL" and re-install WSL (to get the Linux apps that you installed in "BIG STEP 300" working again
- BIG STEP 600:
Remove the "Ubuntu" Linux distribution from "WSL", if you want to do so

BIG STEPS FOR INSTALLING "WSL"

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- BIG STEP 300:
Install Linux apps from the "WSL" command line
- BIG STEP 400:
Install the XFCE "Desktop" GUI into "WSL" (which breaks "BIG STEP 300")
- BIG STEP 500:
Remove "WSL" and re-install WSL.

BIG STEP 100 (PREPARE..)

- STEP 101:
Go to "Programs and Features" in the "Control Panel"
- STEP 102:
Go to "Turn Windows features on or off"
- STEP 103:
Enable "Virtual Machine Platform"
- STEP 104:
Enable "Windows Subsystem for Linux"
- STEP 105:
Restart the "Windows.." operating system

BIG STEP 200 (..MICROSOFT STORE..)

- STEP 201:
Get into the "Microsoft Store" app
- STEP 202:
Locate the "Windows Subsystem for Linux" app
- STEP 203:
Install it
- STEP 204:
Restart the "Windows.." operating system
(The above steps installs "WSL" which is also known as "WSL 2".)

BIG STEP 200 (..MICROSOFT STORE..)

- STEP 205:
Get into the "Microsoft Store" app
- STEP 206:
Locate the "Ubuntu" app
- STEP 207:
Install it
- STEP 208:
Restart the "Windows.." operating system
(The above steps installs "Ubuntu" which is actually "Ubuntu rolling release for WSL".)

BIG STEP 200 (..MICROSOFT STORE..) (continued)

- STEP 209:
Get into Windows "Terminal (Admin)" by right-clicking on the "Start" button of "Windows.."
- STEP 210:
Type
wsl
in lower case to get into "WSL terminal" version of Windows "Terminal (Admin)"

BIG STEP 200 (..MICROSOFT STORE..) (continued)

- STEP 211:
Type in or copy in
`cat /etc/*-release`
to determine the exact version of the
Linux distro that is currently running inside
WSL

BIG STEP 200 (..MICROSOFT STORE..) (continued)

- STEP 212:
Type or copy in
`uname -a`
to determine the exact version of the
Linux kernel that is currently running
inside WSL

BIG STEP 300 (..LINUX APPS INSTALLATION FROM THE WSL PROMPT IN "WINDOWS TERMINAL..)

- STEP 301:
Use a right-click on the Windows "Start Button" to get into "Terminal (Admin)"
- STEP 302:
Learn about the three modes of the "Terminal.." app:
"Powershell mode", "Command Prompt mode", and "wsl mode":

BIG STEP 300 (..LINUX APPS INSTALLATION FROM THE WSL PROMPT IN "WINDOWS TERMINAL..)

- STEP 302 (continued):

From inside the "Terminal (Admin")

app,

TYPE IN

cmd

and then depress the <Enter key>

to get into the "Command Prompt

mode"

BIG STEP 300 (..LINUX APPS INSTALLATION FROM THE WSL PROMPT IN "WINDOWS TERMINAL..)

- STEP 302 (continued):
From inside "Terminal (Admin)" app,
TYPE IN

powershell
and then depress the <Enter key>
to get into the "Powershell mode"

BIG STEP 300 (..LINUX APPS INSTALLATION FROM THE WSL PROMPT IN "WINDOWS TERMINAL..)

- STEP 302 (continued):

From inside "Terminal (Admin)" app,

TYPE IN

"wsl"

and then depress the <Enter key>
to get into the "WSL mode"

BIG STEP 300 (..LINUX APPS INSTALLATION FROM THE WSL PROMPT IN "WINDOWS TERMINAL..)

- STEP 302 (continued):

If the prompt says

C:\Users\<<your user name>

then you are in the

"Command Prompt mode"

BIG STEP 300 (..LINUX APPS INSTALLATION FROM THE WSL PROMPT IN "WINDOWS TERMINAL..)

- STEP 302 (continued):

If the prompt says

```
PS C:\Users\<<your user name>
```

then you are in the

"Powershell mode"

BIG STEP 300 (..LINUX APPS INSTALLATION FROM THE WSL PROMPT IN "WINDOWS TERMINAL..)

- STEP 302 (continued):

If the prompt says

<your user name>@

<name of computer>:

mnt/c/Users/<your user name>\$

then you are in the

"WSL mode"

BIG STEP 300 (..LINUX APPS INSTALLATION FROM THE WSL PROMPT IN "WINDOWS TERMINAL..)

- STEP 303 (INSTALL "ZOOM MEETINGS CLIENT"):

Using any Web browser running in either Windows.. or WSL, go to

https://support.zoom.us/hc/en-us/articles/204206269-Installing-or-updating-Zoom-on-Linux#h_89c268b4-2a68-4e4c-882f-441e374b87cb

Click on "Download center" and download the Zoom meetings client as a *.deb file

BIG STEP 300 (..LINUX APPS INSTALLATION FROM THE WSL PROMPT IN "WINDOWS TERMINAL..)

- STEP 303: (INSTALL "ZOOM MEETINGS CLIENT") (continued):
From inside "Terminal (Admin)" running in WSL mode,
use multiple renditions of the
cd
command
in lower case
to go to
`/mnt/c/Users/testuser/Downloads`

BIG STEP 300 (..LINUX APPS INSTALLATION FROM THE WSL PROMPT IN "WINDOWS TERMINAL..)

- STEP 303 (INSTALL "ZOOM MEETINGS CLIENT") (continued):
using "Terminal (Admin)" running in WSL mode,
type in
`sudo apt install ./<name of the .deb file>`
(in lower case) (note: the ./ is critical)
- STEP 304:
press the <Enter> key of the keyboard of your computer

BIG STEP 300 (..LINUX APPS INSTALLATION FROM THE WSL PROMPT IN "WINDOWS TERMINAL..)

- STEP 303 (INSTALL "ZOOM MEETINGS CLIENT") (continued):

If the previous command does not work:
using "Terminal (Admin)" running in WSL
mode:

use multiple cd commands to get to the
location where you downloaded the *.deb
file from the zoom.us Web site

```
sudo gdebi zoom_amd64.deb
```

<Enter> key of keyboard

BIG STEP 300 (..LINUX APPS INSTALLATION FROM THE WSL PROMPT IN "WINDOWS TERMINAL..)

- STEP 305 (DETERMINE APPS--BOTH THOSE BUNDLED INSIDE THE DISTRO OF LINUX AND THOSE THAT YOU HAVE INSTALLED):
using "Terminal (Admin)" running in WSL mode, type in
`apt list --installed`
in lower case
- STEP 306:
press the <Enter> key of the keyboard of your computer

BIG STEP 300 (..LINUX APPS INSTALLATION FROM THE WSL PROMPT IN "WINDOWS TERMINAL..)

- STEP 307: TO INSTALL "BRAVE" SUPER SECURE BROWSER IN WSL:
SEE THE STEPS AT

<https://www.makeuseof.com/best-graphical-linux-browsers-install-wslg/#opera>

BIG STEP 300 (..LINUX APPS INSTALLATION FROM THE WSL PROMPT IN "WINDOWS TERMINAL..)

- STEP 308: TO INSTALL "FIREFOX" IN WSL:

See

<https://www.omgubuntu.co.uk/2022/04/how-to-install-firefox-deb-apt-ubuntu-22-04>

BIG STEP 300 (..LINUX APPS INSTALLATION FROM THE WSL PROMPT IN "WINDOWS TERMINAL..)

- STEP 309:

Since WSL is Linux, all commands are case sensitive and all commands need to be typed as lower-case letters, unless stated otherwise.

BIG STEP 300 (..LINUX APPS INSTALLATION FROM THE WSL PROMPT IN "WINDOWS TERMINAL..)

- STEP 309 (continued):

wsl is a Powershell command and not a Linux command:

When running Terminal (Admin) in "Powershell mode" or "Command prompt mode", wsl commands are usually typed in without the .exe

BIG STEP 300 (..LINUX APPS INSTALLATION FROM THE WSL PROMPT IN "WINDOWS TERMINAL..)

- STEP 309 (continued):

When running Terminal (Admin) in WSL mode, wsl commands have to be typed in as

wsl.exe

in lower case with the "exe

BIG STEP 300 (..LINUX APPS INSTALLATION FROM THE WSL PROMPT IN "WINDOWS TERMINAL..)

- STEP 310:

Microsoft's official list of wsl.exe commands is available at

<https://learn.microsoft.com/en-us/windows/wsl/basic-commands#list-installed-linux-distributions>

BIG STEP 300 (..LINUX APPS INSTALLATION FROM THE WSL PROMPT IN "WINDOWS TERMINAL..")

- STEP 311:

Additional commands and advice for WSL are located at

<https://devblogs.microsoft.com/commandline/the-windows-subsystem-for-linux-in-the-microsoft-store-is-now-generally-available-on-windows-10-and-11/>

BIG STEP 300 (..LINUX APPS INSTALLATION FROM THE WSL PROMPT IN "WINDOWS TERMINAL..)

- STEP 312 (to attach a USB thumb drive to WSL:)

Insert the USB flash drive into a USB port. Use "File Manager" or "File Explorer" to determine the drive letter of the USB flash drive

Get into WSL mode in "Windows Terminal (Admin)"

```
sudo mkdir /mnt/usb
```

```
<Enter key>
```

BIG STEP 300 (..LINUX APPS INSTALLATION FROM THE WSL PROMPT IN "WINDOWS TERMINAL..)

- STEP 312 (to attach a USB thumb drive to WSL:) (continued)

```
sudo mount -t drvfs E: /mnt/usb
```

<Enter key>

To see if the USB thumb drive is mounted into WSL's directory tree,

```
thunar
```

<Enter key>

BIG STEP 300 (..LINUX APPS INSTALLATION FROM THE WSL PROMPT IN "WINDOWS TERMINAL..)

- STEP 312:

To attach a USB thumb drive to WSL:

Insert the USB flash drive into a USB port.

Use "File Manager" or "File Explorer" to

determine the drive letter of the USB flash drive

Get into WSL mode in "Windows Terminal (Admin)"

```
sudo mkdir /mnt/usb
```

<Enter key>

```
sudo mount -t drvfs E: /mnt/usb
```

<Enter key>

BIG STEP 300 (..LINUX APPS INSTALLATION FROM THE WSL PROMPT IN "WINDOWS TERMINAL..)

- STEP 312 (continued):

The reference for the previous slide is

<https://www.technicalfeeder.com/2022/11/connect-a-usb-device-to-wsl-without-admin-privilege/>

To see if a USB device got attached to run
lsusb

and then hit the <Enter> key.

BIG STEP 300 (..LINUX APPS INSTALLATION FROM THE WSL PROMPT IN "WINDOWS TERMINAL..)

- STEP 312 (continued):

See also

<https://www.technicalfeeder.com/2022/11/connect-a-usb-device-to-wsl-without-admin-privilege/>

BIG STEP 300 (..LINUX APPS INSTALLATION FROM THE WSL PROMPT IN "WINDOWS TERMINAL..)

- STEP 312 (continued):

If you run `lsusb` and the USB device does not work inside an app running inside WSL and you want it to work, you will have to run Linux inside a virtual machine, instead of inside WSL, in order to get the USB device to work.

Unlike Linux distributions running inside Microsoft's Hyper-V "virtual machine program", WSL has a Pulse Audio sound applet which usually works for Linux apps that require audio support.

BIG STEP 300 (..LINUX APPS INSTALLATION FROM THE WSL PROMPT IN "WINDOWS TERMINAL..)

- STEP 313:

You can install GIMP, Nautilus, Gedit, VLC, X11 apps (xcalc, xclock, etc) and Google Chrome into WSL by following the instructions at

<https://learn.microsoft.com/en-us/windows/wsl/tutorials/gui-apps>

BIG STEP 400 (..XFCE LINUX DESKTOP GUI..)

- "BIG STEP 400" lets you to get a GUI "XFCE" desktop for WSL, however IT BREAKS MOST OF THE APPS THAT YOU INSTALLED IN "BIG STEP 300". IF YOU INSTALL "BIG STEP 400" AND YOU THEN WANT TO USE THE APPS THAT YOU INSTALLED IN "BIG STEP 300", YOU WILL HAVE TO PERFORM "BIG STEP 500" TO GET THE VARIOUS APPS THAT YOU INSTALLED IN "BIG STEP 300" WORKING AGAIN!!!

BIG STEP 400 (..XFCE LINUX DESKTOP GUI..) (continued)

- STEP 401 to get a GUI desktop for WSL:
Follow the steps at
<https://hub.tcno.co/windows/wsl/desktop-gui/>
or
<https://medium.com/@riley.kao/wsl2-ubuntu20-04-gui-remote-desktop-connection-rdp-2bbd21d2fa71>

BIG STEP 400 (..XFCE LINUX DESKTOP GUI..)

(continued)

- To start Windows "Remote Desktop Connection":
Start button, "Windows Tools", "Remote Desktop Connection"

or mstsc from Start button, Run

or mstsc from "Command prompt"

or mstsc from "Powershell prompt"

or mstsc.exe from WSL command line



Remote Desktop Connection



Remote Desktop Connection

Computer:

localhost:3390



User name:

None specified

You will be asked for credentials when you connect.



Show Options

Connect

Help

BIG STEP 400 (..XFCE LINUX DESKTOP GUI..)

- STEP 402 (continued):
Apps that are launched from this XFCE Linux GUI will not have speaker sound or microphone audio because the Microsoft's "Remote Desktop Connection" app does not "pass through" audio to the XFCE Linux GUI.
In contrast, Apps that are launch from "Terminal (Admin)" running in WSL mode will usually have speaker sound and microphone audio because WSL has it's own PulseAudio applet.

BIG STEP 400 (..XFCE LINUX DESKTOP GUI..)

- STEP 402 (Starting the XFCE LINUX DESKTOP GUI in the future after completing STEP 401):
Use the RIGHT mouse button to click on the Windows "Start" button.
Click on "Terminal (Admin)" in the pop-up utility menu.
Type
wsl
Hit the <Enter> key of the keyboard.

BIG STEP 400 (..XFCE LINUX DESKTOP GUI..)

- STEP 402 (Starting the XFCE LINUX DESKTOP GUI in the future after completing STEP 401) (continued):

`sudo /etc/init.d/xrdp start`

Hit the <Enter> key of the keyboard. `sudo`

`mstsc.exe`

Hit the <Enter> key of the keyboard

Click on the "Connect" button twice.



Remote Desktop Connection



Remote Desktop Connection

Computer:

localhost:3390



User name:

None specified

You will be asked for credentials when you connect.



Show Options

Connect

Help



Remote Desktop Connection



Do you trust this remote connection?


This remote connection could harm your local or remote computer. Make sure that you trust the remote computer before you connect.



Type: Remote Desktop Connection

Remote computer: localhost

Don't ask me again for connections to this computer

 Show Details

Connect

Cancel



Remote Desktop Connection



The identity of the remote computer cannot be verified. Do you want to connect anyway?

This problem can occur if the remote computer is running a version of Windows that is earlier than Windows Vista, or if the remote computer is not configured to support server authentication.

For assistance, contact your network administrator or the owner of the remote computer.

Don't ask me again for connections to this computer

Yes

No

BIG STEP 400 (..XFCE LINUX DESKTOP GUI..)

- STEP 402 (Starting the XFCE LINUX DESKTOP GUI in the future after completing STEP 401) (continued):


Use your WSL username and password to log into the XFCE LINUX DESKTOP GUI



localhost:3390 - Remote Desktop Connection



Login to MSI1-Pro



Just connecting

Session

username

password

Login to MSi1-Pro



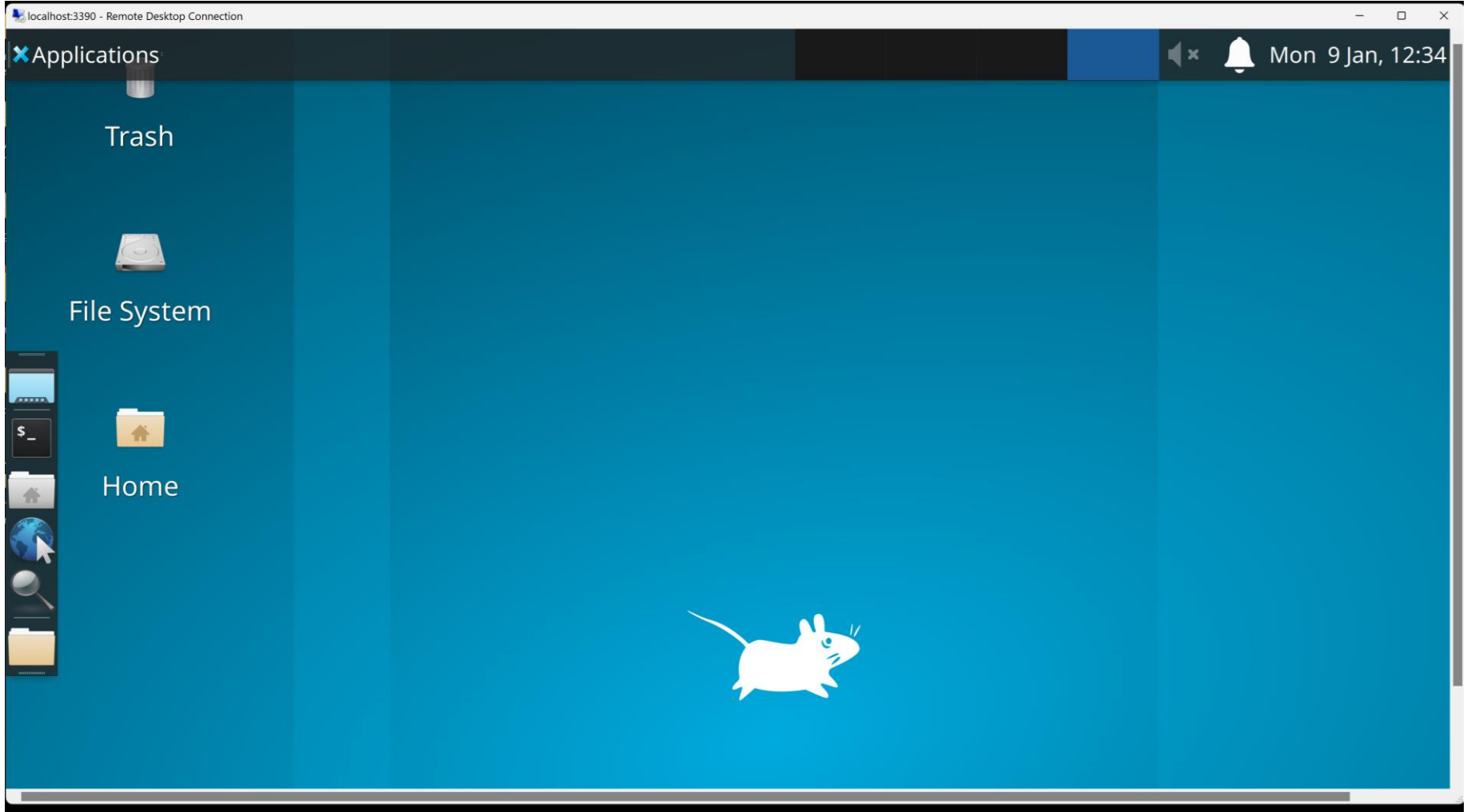
Session

username

password

OK

Cancel



BIG STEP 400 (..XFCE LINUX DESKTOP GUI..)

- STEP 402 (Starting the XFCE LINUX DESKTOP GUI in the future after completing STEP 401) (continued):
BUG LIST:
No PulseAudio sound so Zoom and YouTube videos have no sound.
If you shut down or exist out of WSL, you have to re-start the xfce desktop app prior to running the RDP app to get into the XFCE Desktop GUI.

- BIG STEP 400 (..XFCE LINUX DESKTOP GUI..) STEP 402 (Starting the XFCE LINUX DESKTOP GUI in the future after completing STEP 401) (continued):
BUG LIST (continued):
No "Ubuntu Store App" inside the GUI desktop so all software apps have to be installed from the WSL terminal inside Windows.. "Terminal (Admin)".
Bottom Line:
The "XFCE GUI Desktop" is just for learning about how to adjust the XFCE GUI Desktop's settings; It is not for doing real work.

BIG STEP 500 (..REMOVE AND RE-INSTALL WSL)

- "BIG STEP 400" gives you a partially-working XFCE DESKTOP GUI for you to play with. However it inactivates most of the Linux apps that you installed in "BIG STEP 300". To re-activate the Linux apps that you installed in "BIG STEP 300", you have to remove and re-install WSL as follows:
("BIG STEP 500" restores most of the Linux apps that you installed in "BIG STEP 300" but it will inactivate the XFCE DESKTOP GUI that you installed in "BIG STEP 300".)

BIG STEP 500 (..REMOVE AND RE-INSTALL WSL) (continued)

- STEP 501:
Use the left mouse button to click on the Windows "Start" button
- STEP 502:
click on "All apps" if you are running "Windows 11". (Skip this step if you are running "Windows 10.")
- STEP 502:
Locate "Windows Subsystem for Linux" and use the RIGHT mouse button to click on it

BIG STEP 500 (..REMOVE AND RE-INSTALL WSL) (continued)

- STEP 503:
Use the LEFT mouse button to click on "Uninstall" twice
- STEP 504:
Get into the "Microsoft Store" app
- STEP 505:
Locate the "Windows Subsystem for Linux" app

BIG STEP 500 (..REMOVE AND RE-INSTALL WSL) (continued)

- STEP 506:
Install it
- STEP 507:
Restart the "Windows.." operating system

(The above steps re-installs "WSL" which is also known as "WSL 2".)

BIG STEP 600 REMOVE "UBUNTU"

- "UBUNTU" show up in the Windows "Start Menu" has both a menu item called "Ubuntu" and as a folder called "Ubuntu". If you wish to remove the "Ubuntu" distribution from "WSL" completely: the menu item called "Ubuntu" and the folder called "Ubuntu" have to be removed as separate procedures as follows:

BIG STEP 600 REMOVE "UBUNTU" (continued)

- STEP 601:
Use the LEFT mouse button to click on the Windows "Start" button
- STEP 602:
The Windows "Start Menu" will be displayed
- STEP 603:
Click on "All apps" if you are running "Windows 11". If you are running "Windows 10", ignore this step

BIG STEP 600 REMOVE "UBUNTU" (continued)

- STEP 604:
Move vertically downward in the "Start Menu" until you locate the "Ubuntu" menu option and the folder called "Ubuntu"
- STEP 605:
Use the RIGHT mouse button to click on the "Ubuntu" menu item, NOT the Ubuntu folder
- STEP 606:
Use the LEFT mouse button to click on "Uninstall"

BIG STEP 600 REMOVE "UBUNTU" (continued)

- STEP 607:
Click on the Okay button
- STEP 608:
Close the "Start Menu" by clicking on the "Start" button
- STEP 609:
Start the Windows "File Explorer"

BIG STEP 600 REMOVE "UBUNTU" (continued)

- STEP 610:
From inside the C: drive, go to
C:\Windows\ProgramData\Microsoft\Win
dows\Start Menu\
- STEP 611:
Use the LEFT mouse button to open up the
"Ubuntu" folder
- STEP 612:
Use the RIGHT mouse button to remove all
menu items and folders inside the
"Ubuntu" folder

BIG STEP 600 REMOVE "UBUNTU" (continued)

- STEP 613:
Use the RIGHT mouse button to remove all the "Ubuntu" folder
- STEP 614:
Reboot the computer