Step-by-Step Guide to Install WSL, Ubuntu, Python3, and pip on Windows

1 Introduction

This guide provides a comprehensive, step-by-step approach to installing Windows Subsystem for Linux (WSL) on a Windows system, followed by the installation of Ubuntu, Python3, and pip within the WSL environment. The instructions are tailored for Windows 10 (version 2004 or higher) or Windows 11, with administrator privileges required.

2 Installing WSL on Windows

2.1 Check System Requirements

- Ensure your Windows version supports WSL:

    - Open Settings > System > About, and check the "OS build" under Windows specifications.

    - For WSL 2 (recommended), you need Windows 10 version 19041 or higher, or Windows 11.

- Enable virtualization in BIOS/UEFI if not already enabled:

    - Restart your PC, enter BIOS setup (usually Del, F2, or F10).

    - Enable Intel VT-x or AMD-V.

2.2 Enable WSL Feature

1. Open PowerShell as Administrator:

    - Search for "PowerShell" in the Start menu, right-click, and select "Run as administrator."

2. Run the following command to enable WSL:

    ```
    wsl --install
    ```

- This enables required features, downloads the latest Linux kernel, and sets WSL 2 as the default.

- Restart your computer if prompted.

3. If the command fails, enable the feature manually:

    - Go to Settings > Apps > Optional features (or search for "Turn Windows features on or off").

    - Check "Windows Subsystem for Linux" and "Virtual Machine Platform."

    - Restart your computer.

2.3 Install Ubuntu on WSL

1. After restarting, open PowerShell as Administrator again.

2. Install Ubuntu (the default distribution) with:

```
wsl --install -d Ubuntu
```

- This downloads and installs Ubuntu from the Microsoft Store.

3. Alternatively, install via the Microsoft Store:

    - Open the Microsoft Store app.

    - Search for "Ubuntu" (e.g., Ubuntu 22.04 or the latest LTS version).

    - Click "Get" or "Install."

    - Launch Ubuntu from the Start menu.

4. When Ubuntu launches for the first time:

    - It will take a few minutes to unpack.

    - Set up a UNIX username and password (separate from Windows credentials). Note: The password won't display as you type.

2.4 Verify WSL Installation

1. Open PowerShell or Command Prompt.

2. Run:

```
wsl -l -v
```

- This lists installed distributions and their WSL version (should show Ubuntu on version 2).

3. To enter the Ubuntu shell:

```
wsl
```

- Or specify: `wsl -d Ubuntu`.

2.5 Update Ubuntu Packages

1. In the Ubuntu terminal (WSL shell), run:

```
sudo apt update && sudo apt upgrade -y
```

- Enter your UNIX password when prompted.
- This updates the package list and upgrades installed packages.

3 Installing Python3 and pip on WSL Ubuntu

3.1 Install Python3 (if not already present)

1. In the Ubuntu terminal, check if Python3 is installed:

```
python3 --version
```

- If it returns a version (e.g., Python 3.10.x), proceed to the next section.

2. If not, install it:

```
sudo apt install python3 -y
```

3.2 Install pip

1. Check if pip is installed:

```
pip3 --version
```

- If it works, skip to the next step.

2. If not, install it:

```
sudo apt install python3-pip -y
```

3. Optionally, update pip to the latest version:

```
python3 -m pip install --upgrade pip
```

3.3 Verify Installations

1. Run:

```
python3 --version
pip3 --version
```

- Both should display their versions.

2. Test Python with a simple script:

```
python3 -c "print('Hello from WSL!')"
```

4 Additional Tips

- **Accessing Files**: Windows drives are mounted under `/mnt/` (e.g., C: is `/mnt/c`). Use `cd /mnt/c` to navigate.

- **Switching WSL Versions**: Set WSL 2 for Ubuntu if needed: `wsl –set-version Ubuntu 2`.

- **Uninstalling**: Remove Ubuntu with `wsl –unregister Ubuntu`. Disable WSL with `wsl –shutdown` or uninstall via Settings.

- **Troubleshooting**: For errors like "WSL 2 requires an update," run `wsl –update` in PowerShell. Ensure no VPN interference for network issues.

- **VS Code Integration**: Install the "Remote - WSL" extension in Visual Studio Code for seamless development.

5 Conclusion

Following these steps should take approximately 10–20 minutes, depending on your internet speed. If you encounter issues, note the error messages and consult relevant documentation or support channels. For further details, visit https://learn.microsoft.com/en-us/windows/wsl/.