Experiment 1

Install WSL, virtualbox, create virtual machine with linux os like ubuntu, linuxmint, or debian

Part 1: Installing and Enabling WSL (Ubuntu) on Windows

Windows Subsystem for Linux (WSL) lets you run a GNU/Linux environment directly on Windows.

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Step 1: Enable WSL and Virtualization Features

1. **Open PowerShell as Administrator**: Press `Win + X` and select "Windows PowerShell (Admin)" or "Terminal (Admin)".
2. **Run the WSL Installation Command**: `powershell wsl --install -d ubuntu` This single command does the following:
   - Enables the required **"Virtual Machine Platform"** and **"Windows Subsystem for Linux"** optional components.
   - Downloads and installs the latest **Ubuntu** Linux distribution by default.
   - Requests a reboot.
3. **Reboot your computer** when prompted.

Step 2: Set Up Your Ubuntu Distribution

1. After rebooting, a terminal window will open for Ubuntu. If it doesn't, open your Start Menu and launch "Ubuntu".
2. Wait for the installation to finish. You will be asked to create a **New UNIX username** and **password**. This is separate from your Windows login.

Troubleshooting WSL Installation:

- **If `wsl --install -d ubuntu` fails or the command is not recognized:**
  - **Enable features manually:** Open "Turn Windows features on or off" in the Start Menu. Check the boxes for **"Virtual Machine Platform"** and **"Windows Subsystem for Linux"**. Click OK, reboot, and then run `wsl --install` again.
- **Error: "The virtual machine could not be started because a required feature is not installed."**
  - This almost always means **hardware virtualization is disabled in your BIOS/UEFI**.

Step 3: Enable Virtualization in BIOS/UEFI

1. **Check if it's enabled:**

- Press `Ctrl + Shift + Esc` to open Task Manager.
- Go to the "Performance" tab.
- Look at the bottom right. **"Virtualization"** should say **Enabled**.

2. **If it's Disabled:**
   - **Reboot your computer** and enter the BIOS/UEFI setup. The key to press is usually `Delete`, `F2`, `F10`, `F12`, or `Esc`. It flashes on the screen during boot.
   - Navigate the BIOS menus (often under **Advanced**, **CPU Configuration**, or **Security** settings).
   - Find the setting for **Virtualization Technology**. It might be called:
     - Intel Virtualization Technology (**Intel VT-x**)
     - AMD-V (for AMD CPUs)
     - SVM Mode
   - **Enable** the setting.
   - **Save and Exit** (usually `F10`). Your computer will reboot.

After enabling virtualization, Windows should automatically enable the **Hypervisor** (Windows Hypervisor Platform). WSL will now work.

Verify WSL is working: Open a new PowerShell or Command Prompt and type:

```
wsl -l -v
```

This should list your installed Ubuntu distribution and its version.

Part 2: Installing VirtualBox

VirtualBox is a traditional Type 2 hypervisor for running full-fledged virtual machines.

Step 1: Download and Install VirtualBox

1. Go to the official VirtualBox download page.
2. Under "VirtualBox platform packages", click **"Windows hosts"** to download the installer.
3. Run the downloaded `.exe` file.
4. Follow the installation wizard. You can accept all default settings. It's safe to install all features (network interfaces, etc.).
5. You will likely get a warning about installing device software. Click **"Install"** to proceed.

Step 2: (Optional) Install the Microsoft Visual C++ Redistributable

- This is sometimes required for VirtualBox to function correctly, especially if you see related errors.

- Download the latest **Visual Studio 2019 Redistributable** from the official Microsoft site.
- Download and run the `vc_redist.x64.exe` file.
- Follow the prompts to install it. A reboot is recommended afterward.

Part 3: Creating a Virtual Machine with Linux Mint

Step 1: Download Linux Mint

1. Go to the Linux Mint (cinnamon) download page.
2. Choose the edition you prefer (**Cinnamon** is the most feature-complete). Choose **64-bit**.
3. Download the ISO file. This is a disk image that VirtualBox will use as the installation source.

Step 2: Create a New Virtual Machine in VirtualBox

1. Open **Oracle VM VirtualBox**.
2. Click the **"New"** button (blue star).
3. **Name and Operating System:**
   - **Name:** `Linux Mint` (this will auto-fill other fields).
   - **ISO Image:** Click the folder icon and browse to select the Linux Mint ISO you downloaded.
   - **Type: Linux**
   - **Version: Ubuntu (64-bit)** (Linux Mint is Ubuntu-based, so this is the best match).
   - Click **Next**.
4. **Hardware Resources:**
   - **Memory (RAM):** Allocate at least **4096 MB (4 GB)** if you have 8+ GB of physical RAM. Do not give it all your RAM.
   - **Processors:** Allocate **2 or more CPUs** if your system has multiple cores.
   - Click **Next**.
5. **Hard Disk:**
   - **"Create a virtual hard disk now"** should be selected. Click **Create**.
   - **Hard disk file type: VDI (VirtualBox Disk Image)**.
   - **Storage on physical hard disk: Dynamically allocated** (uses space only as needed).
   - **File location and size:** The default location is fine. Allocate at least **25 GB** for the disk. Click **Create**.

Step 3: Install Linux Mint on the Virtual Machine

1. With your new "Linux Mint" VM selected in the VirtualBox Manager, click the **"Start"** (green arrow) button.

2. The VM will boot from the ISO into the Linux Mint live environment.
3. **Double-click "Install Linux Mint"** on the desktop.
4. Follow the installation wizard:
    - Select your language and keyboard layout.
    - Connect to a WiFi network if desired.
    - **Installation type:** You can choose the default **"Erase disk and install Linux Mint"**. *This only erases the virtual hard disk you created, not your actual physical drive.*
    - Select your time zone.
    - Create your user account (name, computer name, username, password).
5. The installation will run. Once finished, you will be prompted to **restart the computer**.
6. When it asks you to "Please remove the installation medium", you can press `Enter`. VirtualBox will automatically eject the ISO on shutdown.
7. The VM will reboot into your freshly installed Linux Mint OS.

Step 4: Install Guest Additions (Highly Recommended) Guest Additions provide better screen resolution, shared clipboard, file sharing, and much better overall performance. 1. Inside your running Linux Mint VM, go to the VirtualBox menu: **Devices > Insert Guest Additions CD image...** 2. A CD icon will appear on the desktop. Open it. 3. Right-click in the folder and select **"Open in Terminal"**. 4. In the terminal that opens, run: `bash sudo ./VBoxLinuxAdditions.run` 5. Enter your password and wait for the installation to complete. 6. Reboot the VM from the Linux Mint menu for the changes to take full effect.