Van Neih Thawng
A+ Project
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Installing macOS on Windows Using a Virtual Machine

Introduction:

This project demonstrates how to install **macOS Big Sur** on a Windows computer using **Oracle VirtualBox**. Running macOS in a virtual machine allows users to explore and test the Mac operating system without purchasing Apple hardware. The following steps outline the installation process and necessary system configurations.

Step 1: Install Virtual Box

Download and install the VirtualBox package for Windows from https://www.virtualbox.org.

Step 2: Install the Extension Pack

Download and install the VirtualBox Extension Pack, which provides additional functionality (USB 3.0 support and disk encryption features)

Step 3: Obtain macOS ISO

Download the macOS Big Sur ISO file from https://www.archive.org *(Note: Big Sur is recommended because it runs more reliably on VirtualBox compared to newer macOS versions.)*

Step 4: Disable Memory Integrity

- Navigate to **Windows Security** → **Device Security** → **Core Isolation Details**
- Turn **Memory Integrity** off. *(Explanation: macOS guests require low-level VirtualBox drivers that may be blocked by Memory Integrity, unlike Windows or Linux VMs.)*

Step 5: Disable Hyper-V

Open **Command Prompt** as **Administrator**, then enter the following command:

“ bcdedit /set hypervisorlaunchtype off ”

Press Enter and restart your PC. *(This command disables Microsoft’s built-in Hyper-V hypervisor, allowing VirtualBox to access CPU virtualization features directly.)*

Step 6: Create a New Virtual Machine

- Launch VirtualBox and click **New**
- Name the VM as macOS
- Select the Big Sur ISO image
- Choose **Mac OS X** as the OS and **Mac OS X (64-bit)** as the version

Step 7: Configure Hardware

- **Base Memory**: 4 GB *(or more if available)*
- **Processor**: 2 CPU cores
- **Virtual Hard Disk**: 32 GB *(or larger for better performance)*

Step 8: Adjust VM Setting

- **System:** Enable *I/O APIC, Hardware Clock in UTC Time,* and *EFI*
- **Display:** Maximize video memory; enable *3D Acceleration* if available
- **Network:** Enable *Network Adapter;* choose *Bridged Adapter;* select your wireless adapter under Adapter 3

Step 9: Patch the Virtual Machine

Note: Patching makes VirtualBox appear like real Apple hardware so macOS can install successfully

- Close the VirtualBox and make sure it is not running on the background.
- Open CMD as administrator and run the following command. *(Note: change "macOS" into your machine name)*

```
cd "C:\Program Files\Oracle\VirtualBox\"

VBoxManage.exe modifyvm "macOS" --cpuidset 00000001 000106e5 00100800 0098e3fd bfebfbff

VBoxManage setextradata "macOS" "VBoxInternal/Devices/efi/0/Config/DmiSystemProduct" "iMac19,3"
```

VBoxManage setextradata "macOS" "VBoxInternal/Devices/efi/0/Config/DmiSystemVersion" "1.0"

VBoxManage setextradata "macOS" "VBoxInternal/Devices/efi/0/Config/DmiBoardProduct" "Iloveapple"

VBoxManage setextradata "macOS" "VBoxInternal/Devices/smc/0/Config/DeviceKey" "ourhardworkbythesewordsguardedpleasedontsteal(c)AppleComputerInc"

VBoxManage setextradata "macOS" "VBoxInternal/Devices/smc/0/Config/GetKeyFromRealSMC" 0

VBoxManage setextradata "macOS" "VBoxInternal/TM/TSCMode" "RealTSCOffset"

Step 10: Install macOS

- Start the VM and follow on-screen instructions
- in **Disk Utility**, erase *VBOX HARDDISK* and format it as **APFS** or **Mac OS Extended**
- Continue installation and personalize macOS as desired

Step 11: Change Screen Resolution

- Shut down the VM
- Open **Command Prompt (Admin)** and run the following command:

cd "C:\Program Files\Oracle\VirtualBox\"

VBoxManage setextradata “macOS” VBoxInternal2/EfiGraphicsResolution 1920x1080

Conclusion:

By following these steps, you can successfully run macOS Big Sur on a Windows computer using VirtualBox. This setup provides a safe environment for testing macOS features without requiring Apple hardware.