User Guide

Ayla-Related Virtualization User Guide

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Ayla Networks

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1 Introduction

This guide describes the steps needed to successfully create a Windows or Ubuntu virtual machine (VM) for Ayla related purposes.

NOTE	This document is not sanctioned by Ayla Networks, Inc. It is provided as a general guide for developers who are interested in building applications on a Virtual Machine (VM).

1.1 Audience

This document is written for all developers who create applications for IoT.

1.2 Related Documentation

- Design Kit - Hello World! (AY006GHW2)
- Design Kit - USB and TTL Serial Communication User Guide (AY006TTL2)
- Boot Loader Framework User Guide (AY006UBL3)
- Device OEM Domain Transfer User Guide (AY006UDT3)

1.3 Requirements

This document assumes you have the following hardware and software. If you have any questions or concerns with these pre-requisites, please contact Ayla Support.

1.3.1 Hardware

A workstation grade computer with the following configuration:

- Windows based: **8 GB RAM** and **256 GB storage** or better, preferable SSD based storage for best performance.
- Apple based: **8 GB RAM** and **256 GB storage** or better.

1.3.2 Software

Workstation on the metal OS:

- Windows 7 Pro or better (Windows 10 Pro version 1511 or better)

NOTE	If new to Windows 10, use the Settings > App to find the build and version. Or, navigate to *System > About* and scroll down to see the Version and Build numbers.

- Mac OS (OS X 10.11.6 or better)

1.4 Glossary

- ISO image –an archive file of an optical disc, a type of disk image composed of the data contents from every written sector on an optical disc, including the optical disc file system. ISO image files usually have a file extension of ".iso". For more information, see:

  https://en.wikipedia.org/wiki/ISO_image

- Virtual disk – virtual disk and virtual drive are software components that emulate an actual disk storage device. For more information, see:

  https://en.wikipedia.org/wiki/Virtual_disk

- Guest virtual machine (guest VM) – the software component of a virtual machine (VM) - an independent instance of an operating system and associated software and information.

2 Introduction to Hypervisor Technology

A hypervisor or VM monitor (VMM) is a piece of computer software, firmware or hardware that creates and runs VMs.

For a general introduction to hypervisors:

https://en.wikipedia.org/wiki/Hypervisor

For a description of VMware based hypervisor usage:

https://en.wikipedia.org/wiki/Hypervisor

For a performance comparison of VMware hypervisors:

http://www.cc.iitd.ernet.in/misc/cloud/hypervisor_performance.pdf

For hypervisors and Virtual Machines implementation insights on the x86 Architecture:

https://www.usenix.org/system/files/login/articles/105498-Revelle.pdf

Comparison of platform virtualization software:

https://en.wikipedia.org/wiki/Comparison_of_platform_virtualization_software

Eight Common Pitfalls of VDI and How to Avoid Them:

www.vmware.com/VDI_Pitfalls

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3 Install Hypervisor on Host Machine

The Ayla Design Kit-related toolset used in this document is Microsoft Windows-based. A Mac or Linux-based workstation with a hypervisor installed to host a virtual Windows instance can also be used.

Regardless of the on the metal OS, the development environment should be installed on a virtual machine (VM). Benefits include:

- Share VM setup work among local and remote colleagues
- Test various utilities and other tests with snapshots for possible image change reversion
- Work on multiple base lines at the same time
- Release environment freeze with snapshots
- Facilitate cost effective escrow management

The development toolset can be installed directly on a Windows-based machine.

3.1 Apple Mac Workstation Host Environments

For Apple Mac-based machines, use a MacBook Pro running OS X v10.11.6 with minimum 8 GB RAM and 256 GB storage (SSD-based for best performance).

Ayla has tested VMware Fusion v8.1+.

1. Download VMware Fusion:

   http://www.vmware.com/products/fusion/fusion-evaluation.html

Figure 1 – VMware Fushion Welcome page

3.2 Microsoft Windows Workstation Based Host Environments

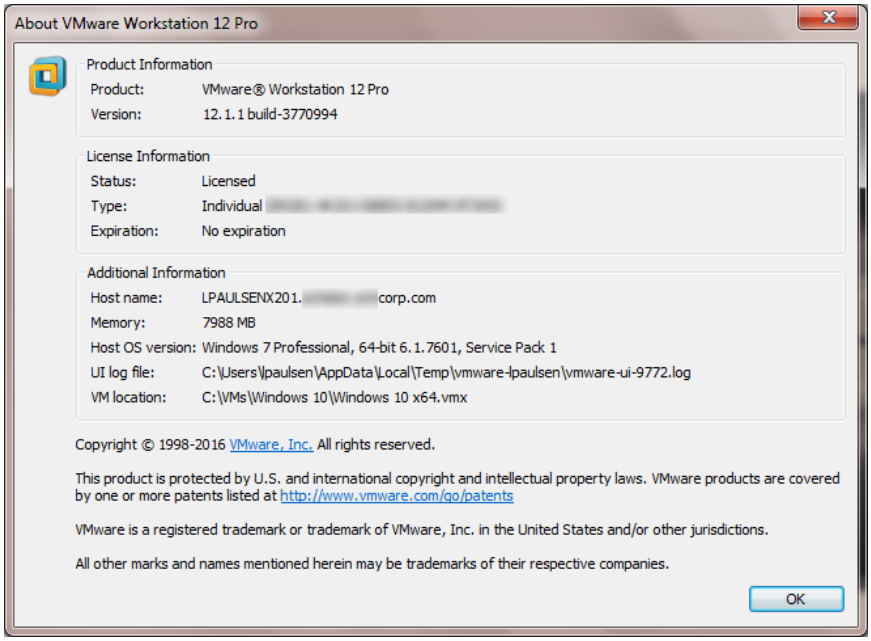
For Microsoft Windows-based machines, Ayla uses Windows 10 Pro (0x64 version) with minimum 8 GB RAM and 256 GB storage (SSD-based for best performance).

For Windows hypervisors, Ayla has tested VMware Workstation Pro v12.1 (or greater).

1. Download VMware Workstation:

   www.vmware.com/products/workstation/workstation-evaluation.html

Figure 2 – VMware Workstation details



3.3 Microsoft Windows-based Guest Environments

Ayla has tested **Windows 10 Pro 0x64**, for the virtual Design Kit Development **Guest OS**.

1. Download IOS format:

   https://www.microsoft.com/en-us/software-download/windows10ISO

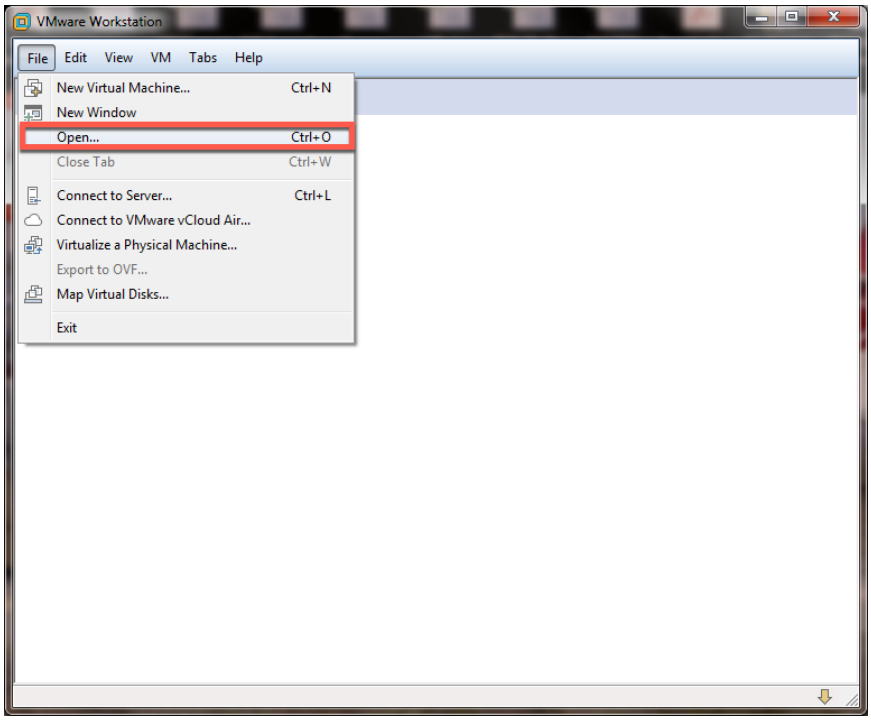
NOTE	If the guest OS is configured with less than the recommended storage capacity, this may be exhausted for later installations (recommended in this document).

For directions, see section Install Windows Inside the VM.

3.3.1 Run Existing Guest VM (Windows) with VMware Workstation

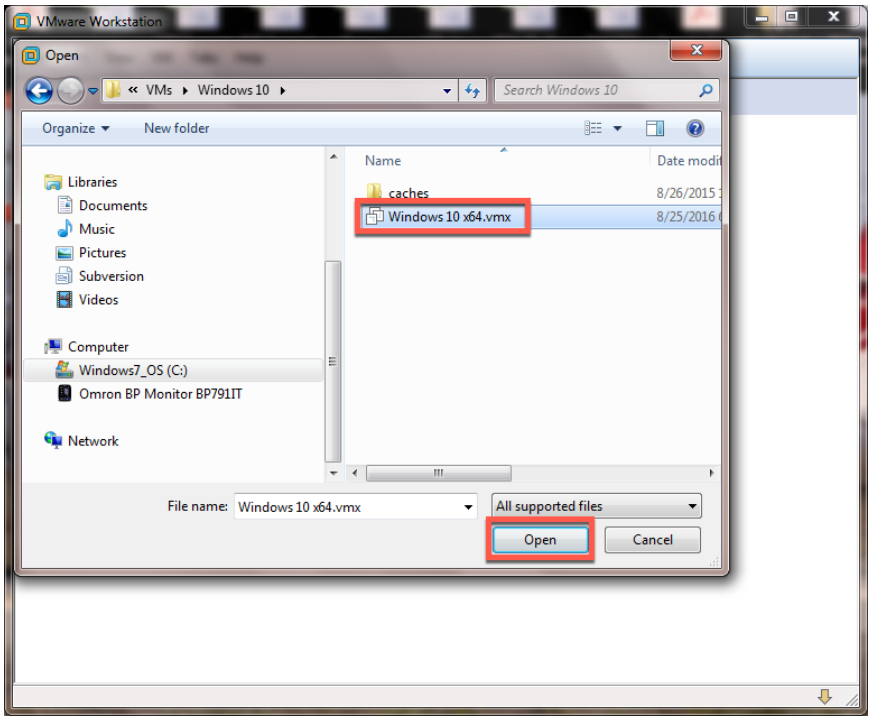
1. For an existing VM, on the File menu, launch **VMware Workstation** and click **Open...**

Figure 3 – Start VMware Workstation



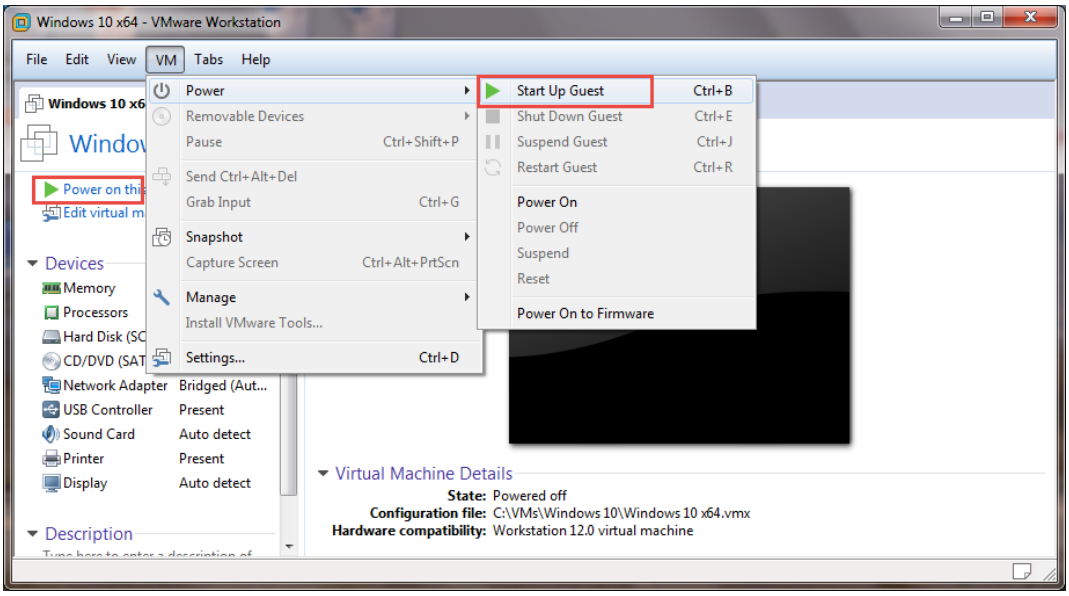
2. Browse to the file location, select the VM file, and click **Open**.

Figure 4 – Select VM file



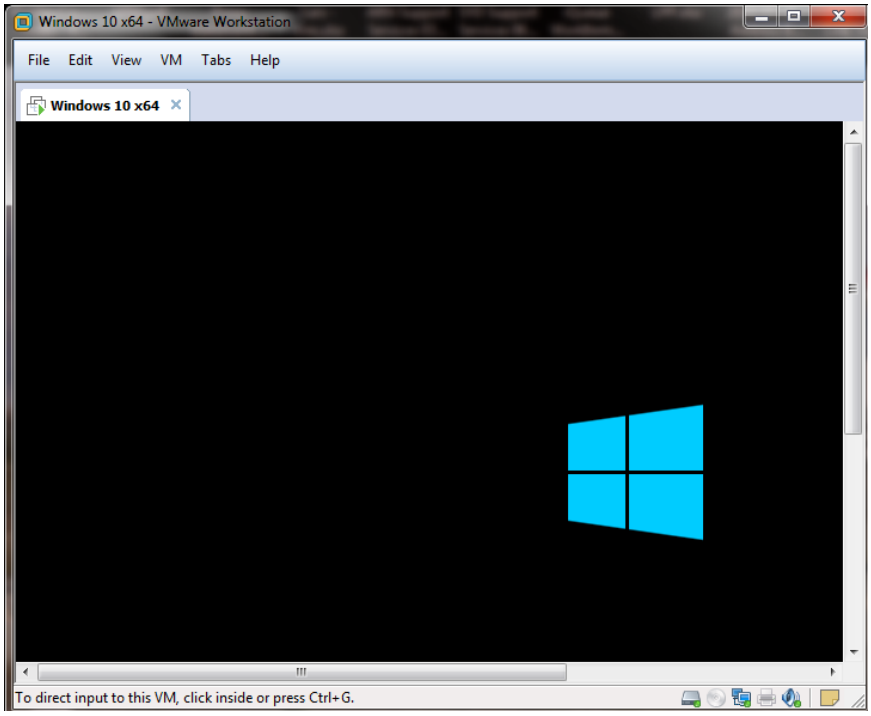
3. On the VM menu drop-down, go to Power sub-menu, and click **Start Up Guest** (or click the **Play** button).

Figure 5 – Startup Guest VM



4. On the new VM window, the boot-up sequence can be observed.

Figure 6 – Boot-up Sequence



5. Adjust the window size, as needed, and the VM is ready.

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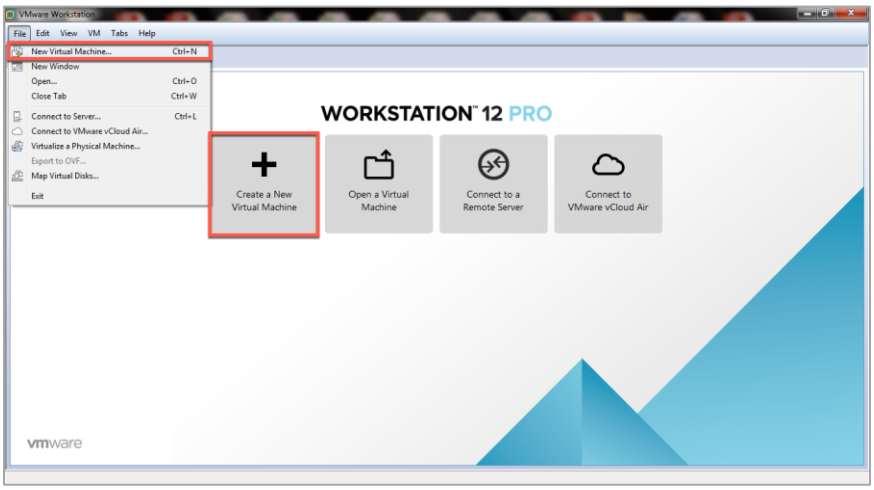
3.3.2 Create Windows 10 Pro Guest VM on a Windows Host machine

This is created with VMware Workstation 12 Pro. To create a new Virtual Machine:

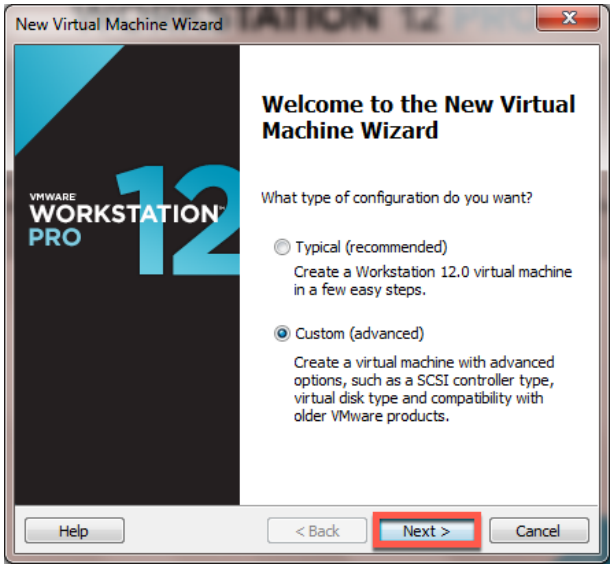
1. Launch VMware Workstation 12 Pro.
2. On File menu drop-down, select **New Virtual Machine…** (or on Home tab, click **Create a New Virtual Machine**).

Figure 7 – New VM



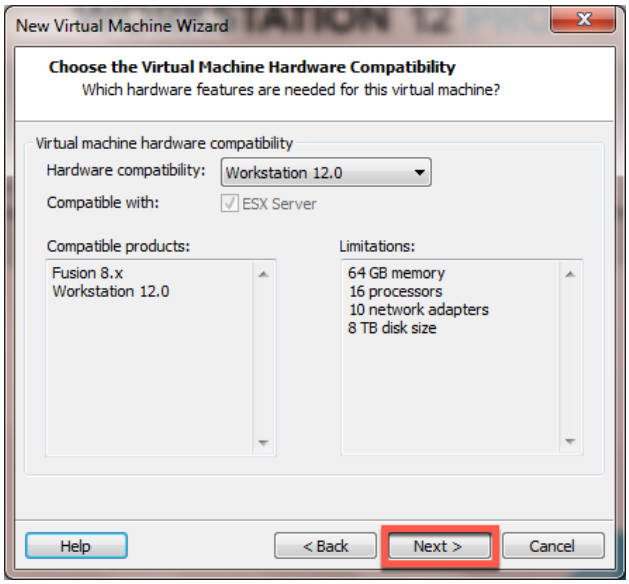
3. On the Welcome dialog, select **Custom (Advanced)** radio button, and click **Next**.

Figure 8 – Welcome dialog



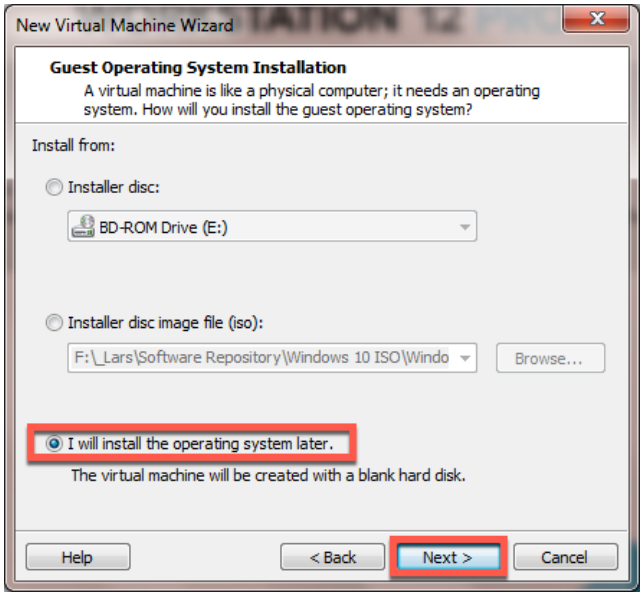
4. In the Choose dialog, accept all defaults, and click **Next**.

Figure 9 – Choose VM Hardware Compatibility dialog



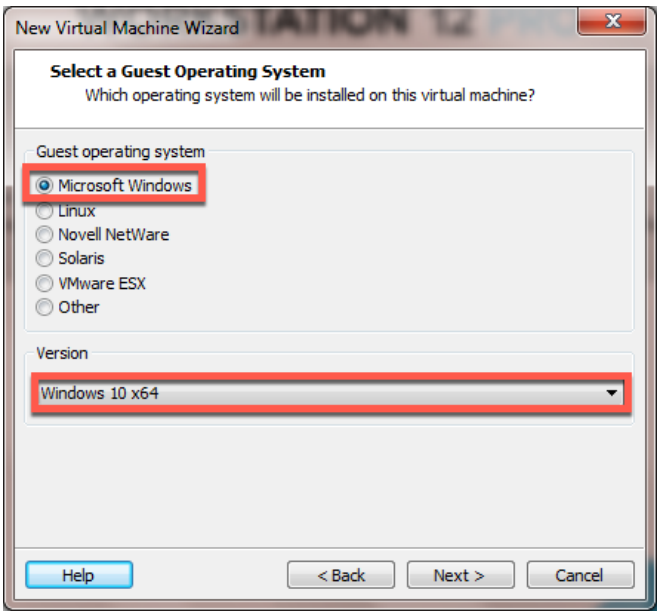
5. On Guest OS Install dialog, select **I will install the operating system later** radio button, and click **Next**.

Figure 10 – Guest OS Installation dialog



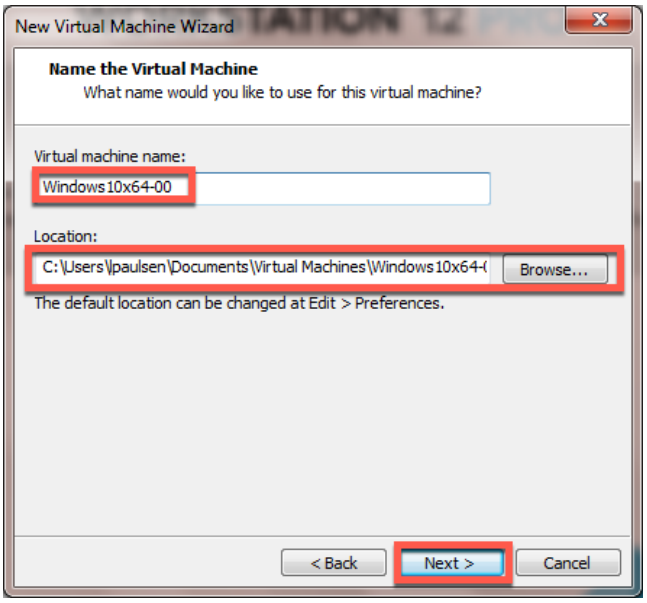
6. On Select a Guest OS dialog, select **Microsoft Windows** and **Windows 10 0x64**, and click **Next**.

Figure 11 – Select Guest OS dialog



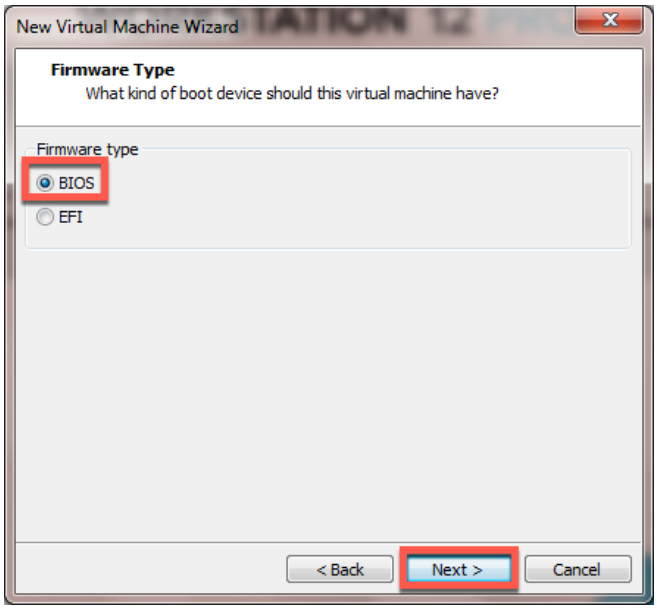
7. On Name the VM dialog, enter **Virtual Machine Name** and browse to the **Image File Location**, and then click **Next**.

Figure 12 – Name VM dialog



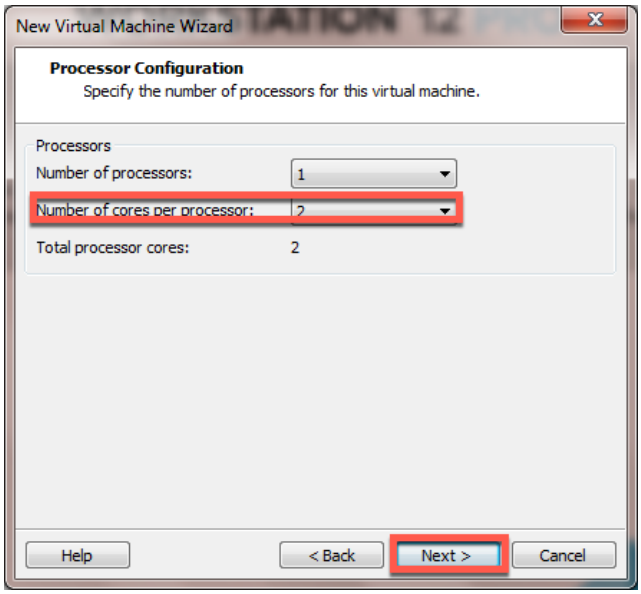
8. On Firmware Type dialog, select **BIOS**, and click **Next**.

Figure 13 – Firmware Type dialog



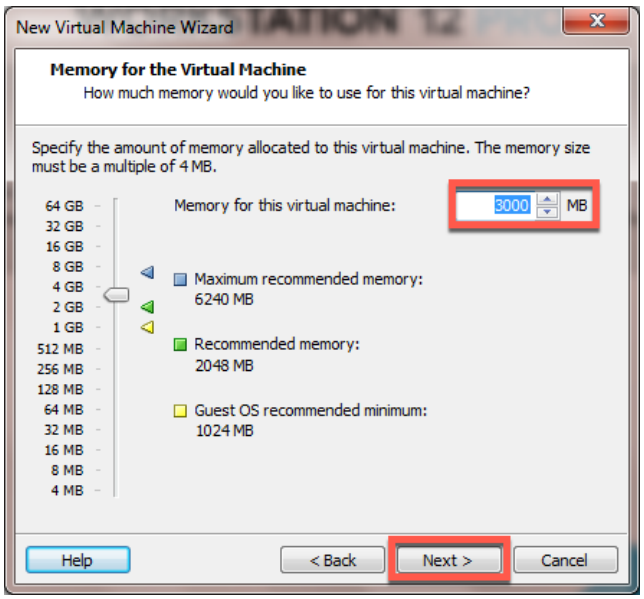
9. On Processor configuration dialog, accept defaults except select **2 Core Processors**, and click **Next**.

Figure 14 – Processor Configuration dialog



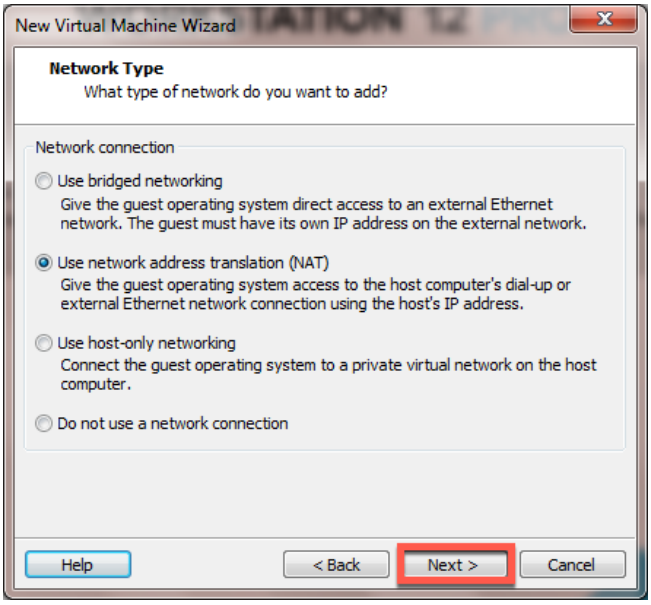
10. On Memory for the VM dialog, select **3000 MB** of memory, and click **Next**.

Figure 15 – Memory for VM dialog



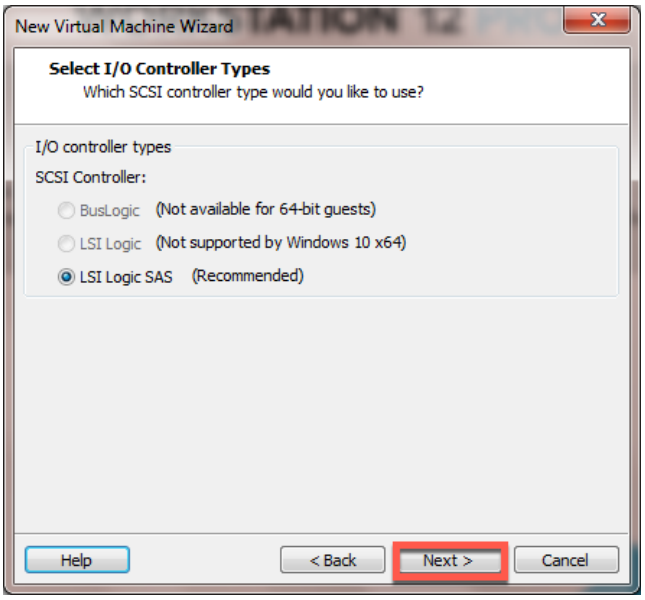
11. On Network Type dialog, accept all defaults, and click **Next**.

Figure 16 – Network Type dialog



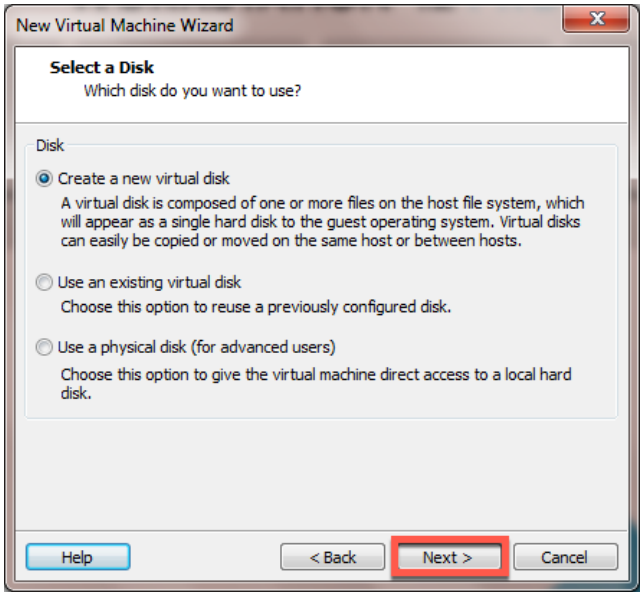
12. On Select I/O Controller Types dialog, accept all defaults and click **Next**.

Figure 17 – Select I/O Controller Types dialog



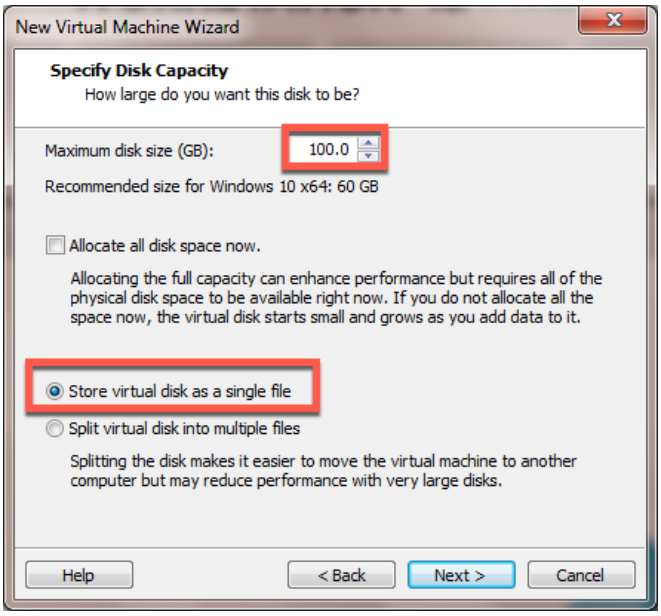
13. On Select a Disk dialog, accept defaults, and click **Next**.

Figure 18 – Select a Disk dialog



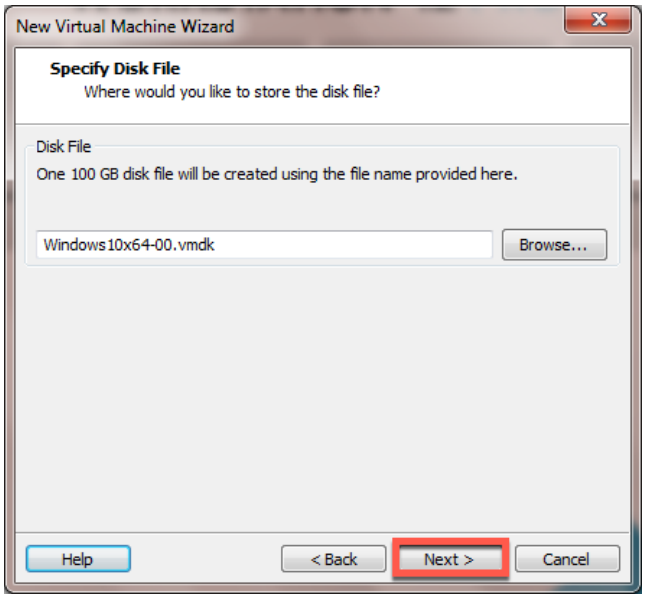
14. On Specify Disk Capacity dialog, accept defaults, except select **Store virtual disk as a single file**, and click **Next**.

Figure 19 – Specify Disk Capacity dialog



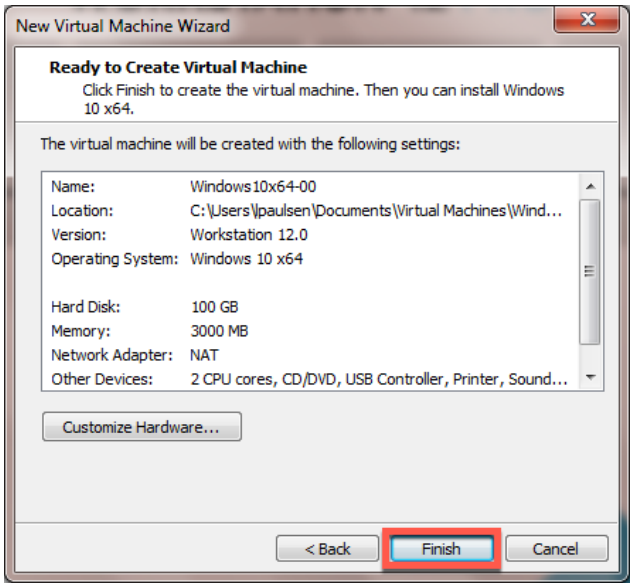
15. On Specify Disk File dialog, accept defaults, and click **Next**.

Figure 20 – Specify Disk File dialog



16. On Ready to Create VM dialog, click **Finish**.

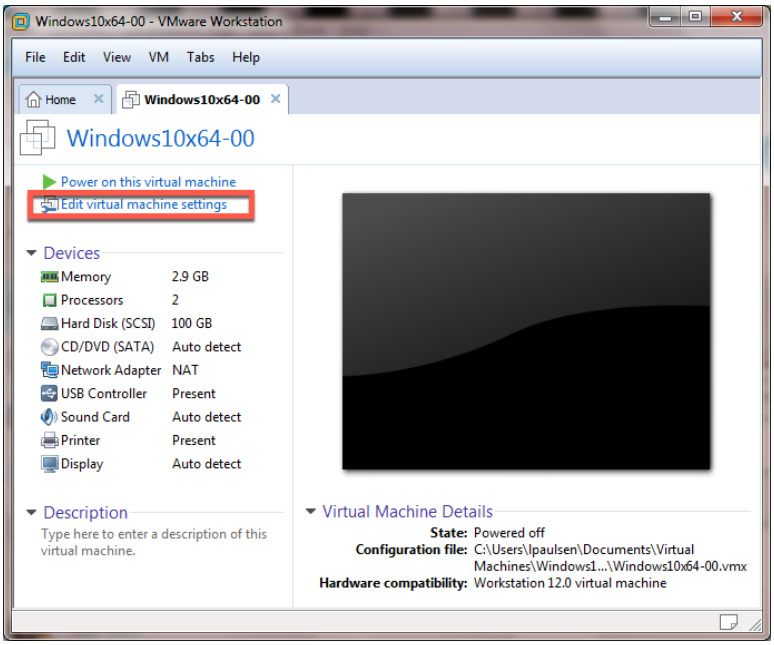
Figure 21 – Ready to Create VM dialog



Your VM is created.

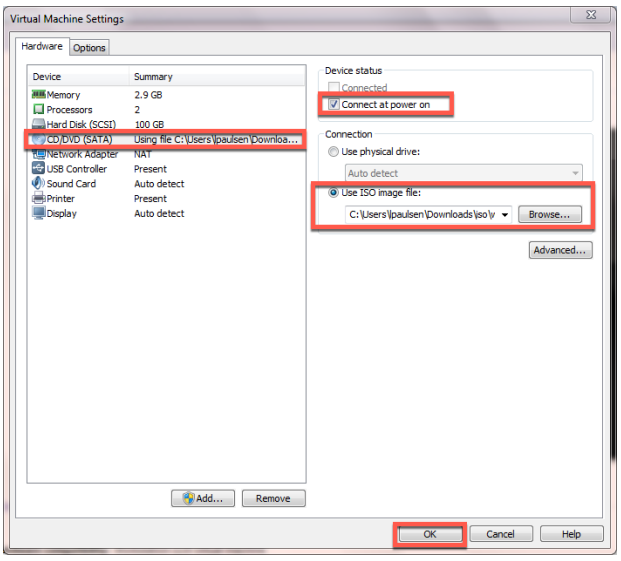
17. On the Windows 10x64 tab, click **Edit virtual machine settings**.

Figure 22 – Edit VM dialog



18. On VM Settings dialog:

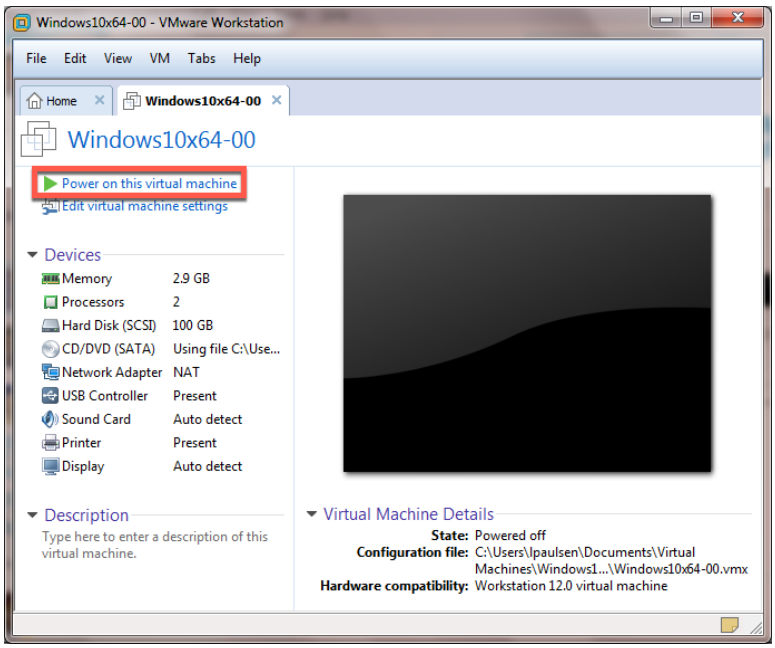
Figure 23 – Selection on VM Settings



- Select **Connect at power on** checkbox.
- Select **ISO Image File** radio button.
- Browse and select the previously downloaded Windows 10 Pro ISO Image file.
- Click **OK**.

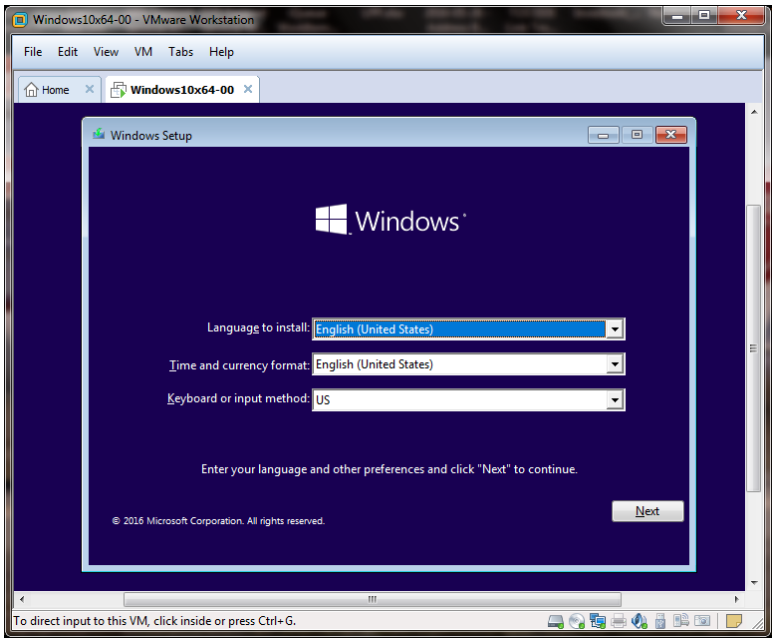
19. To start the VM, go to the VM menu or click the **Play** button.

Figure 24 – Power up VM



The standard Microsoft Windows installation dialog sequence should now be shown in the VM.

Figure 25 – Windows VM page



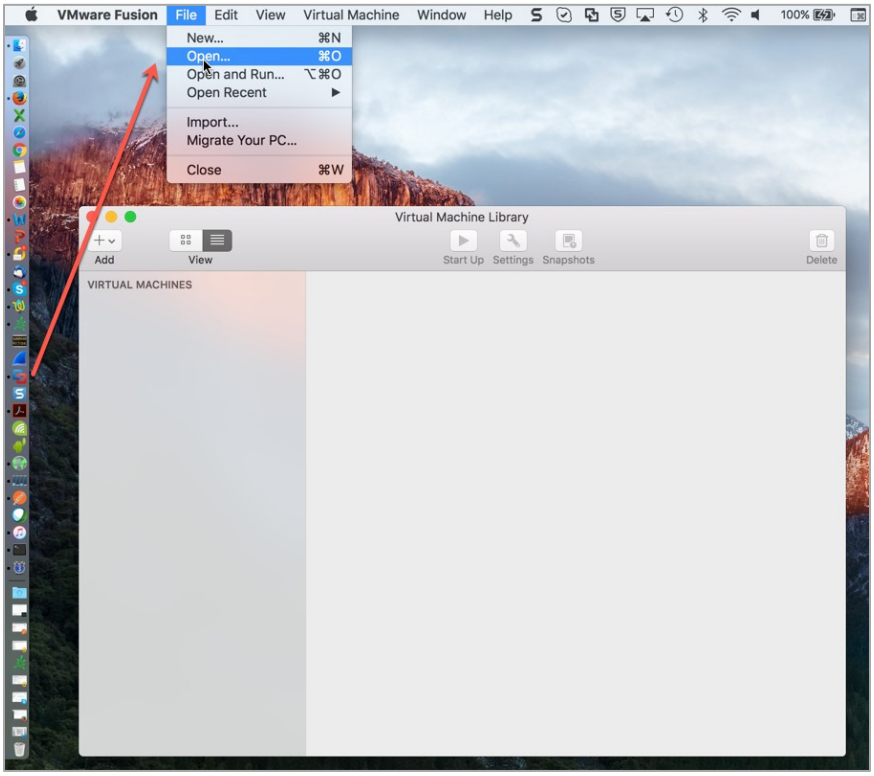
For directions of how to install Windows, see section Install Windows inside the VM.

3.3.3 Run an existing guest VM on a Mac Host machine

This uses VMware Fusion. To run an existing VM:

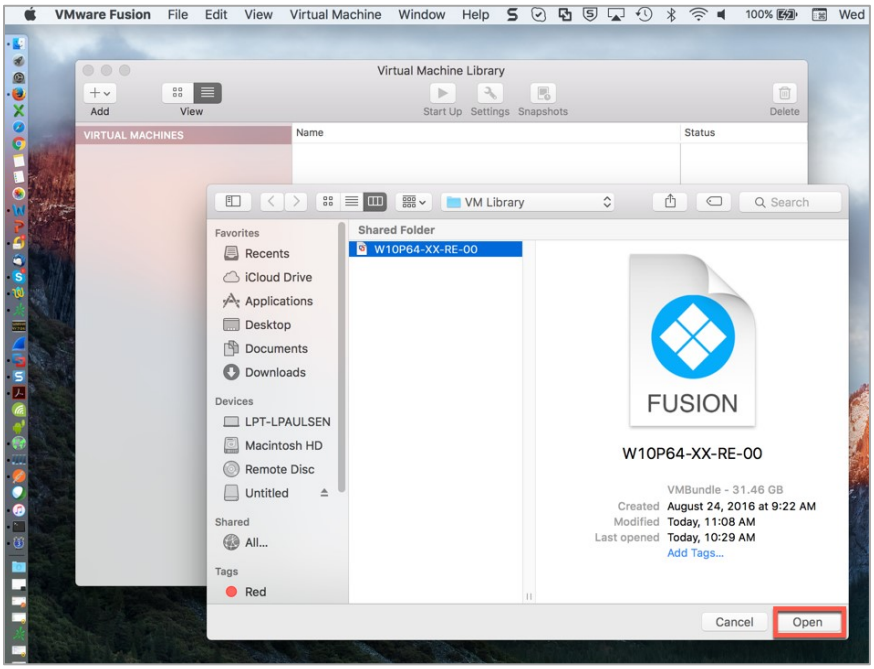
1. On the File menu, select **VMware Fusion** and click **Open...**

Figure 26 – Open dialog



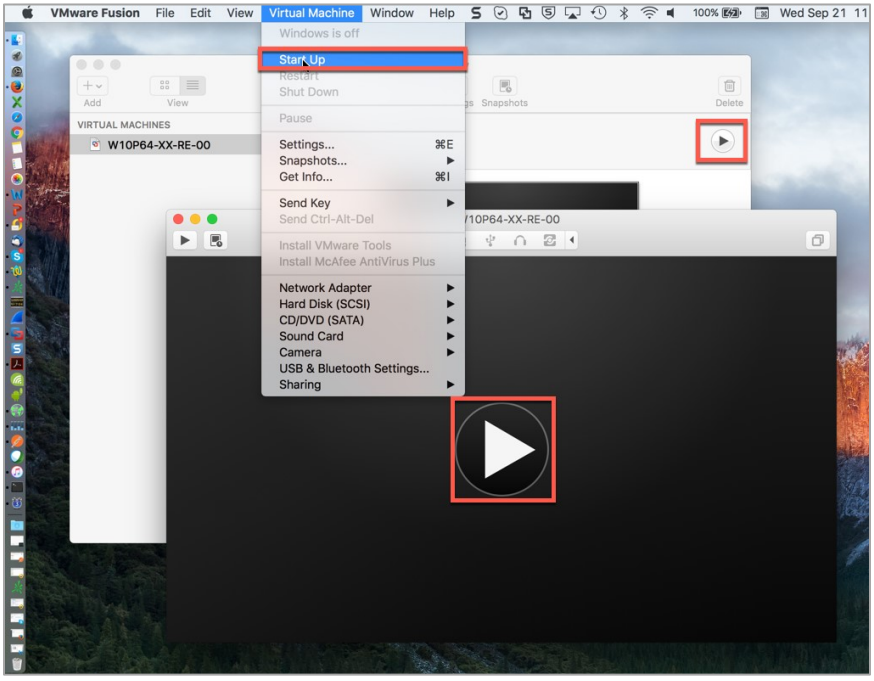
2. Browse to the existing VM file and click on the **Open** button.

Figure 27 – Locate and open VM file



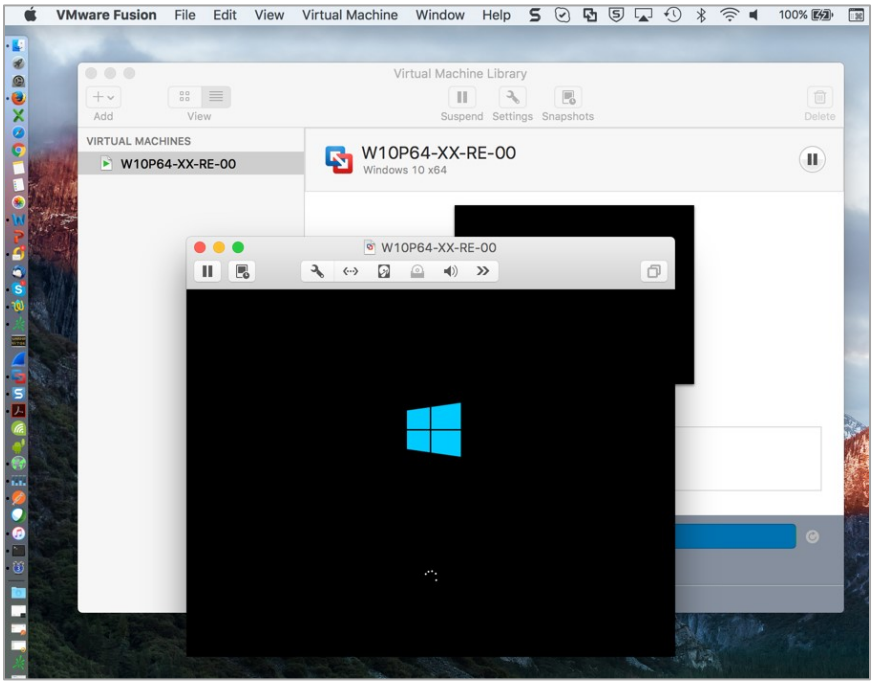
3. To start the VM, on Virtual Machine menu, click **Start Up** or click the **Play** button.

Figure 28



4. The VM window displays the boot-up sequence.

Figure 29 – VM window boot-up



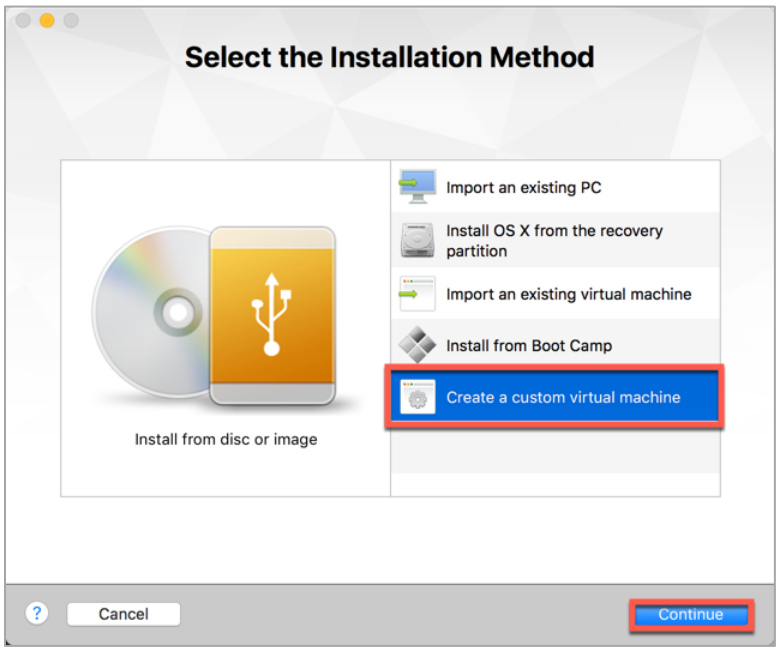
5. Adjust the screen size as needed. The VM is ready for use.

3.3.4 Create a Windows 10 Pro guest VM on Apple Mac Host machine

This uses VMware Fusion 8.1.1

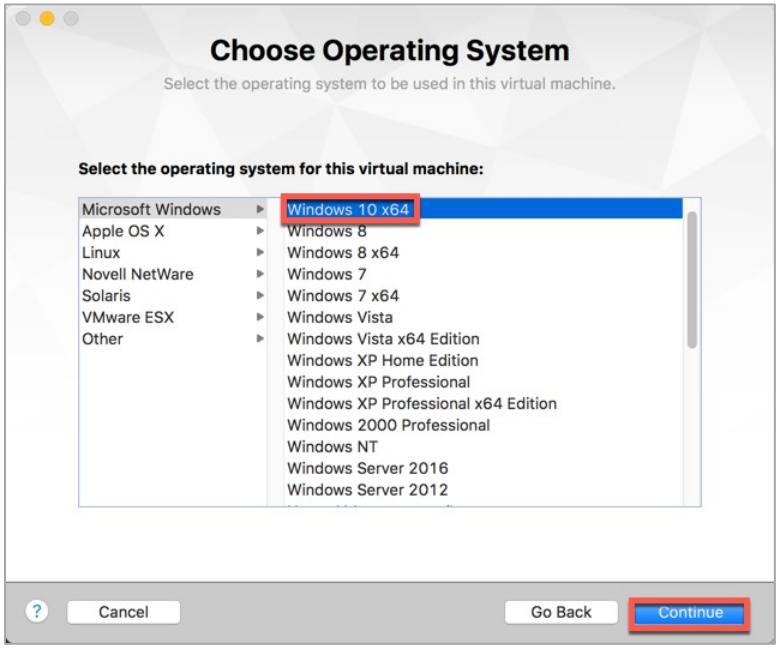
1. Launch VMware Fusion. On File menu, click **New...**
2. On Select the Installation Method dialog, select **Create a custom virtual machine**, and click **Continue**.

Figure 30 – Select Install Method dialog



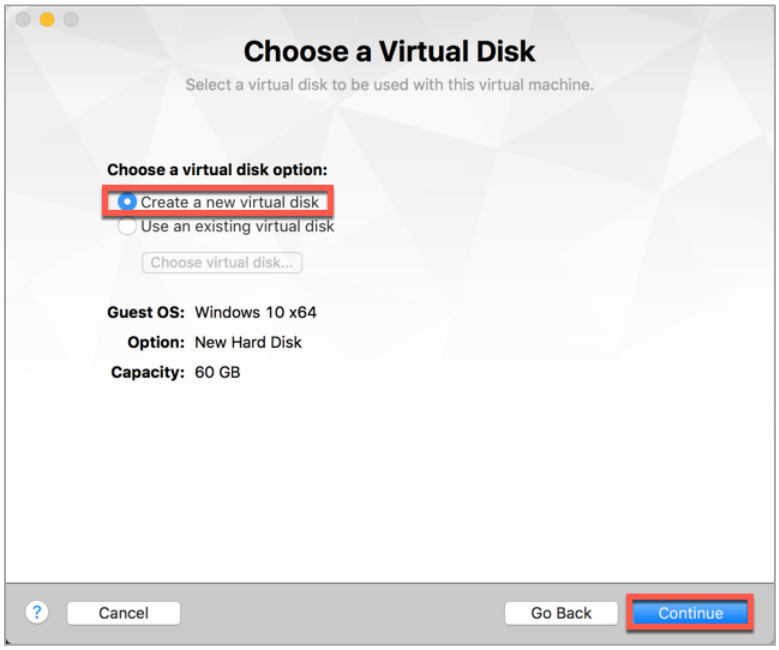
3. On Choose OS dialog, select **Windows 10 x64**, and click **Continue**.

Figure 31 – Choose OS dialog



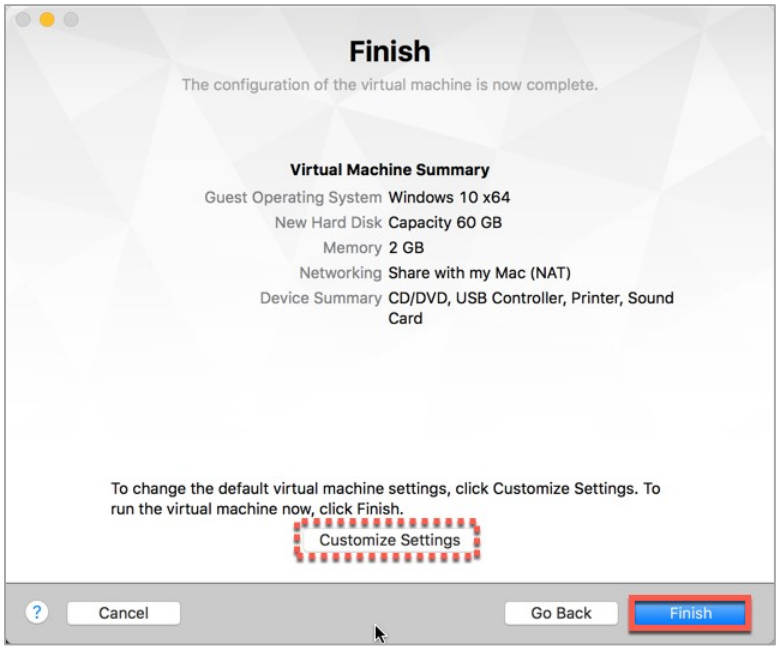
4. On Choose a Virtual Disk dialog, select **Create a new virtual disk**, and click **Continue**.

Figure 32 – Choose Virtual Disk dialog



5. Make any custom changes as needed. For example, set disk name to **Windows10x64-00** (or another user-friendly name).

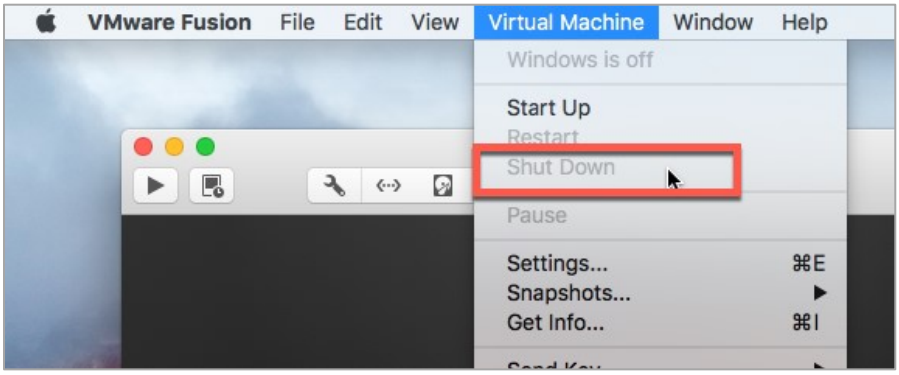
Figure 33 – Finish dialog



6. Click **Finish**.
7. Use **Save As...** dialog (saves the VM with a preferred name and location).

   After the image VM is created, make sure the VM is not running.
8. On the Virtual Machine drop-down menu, confirm that **Shut Down** is grayed out.

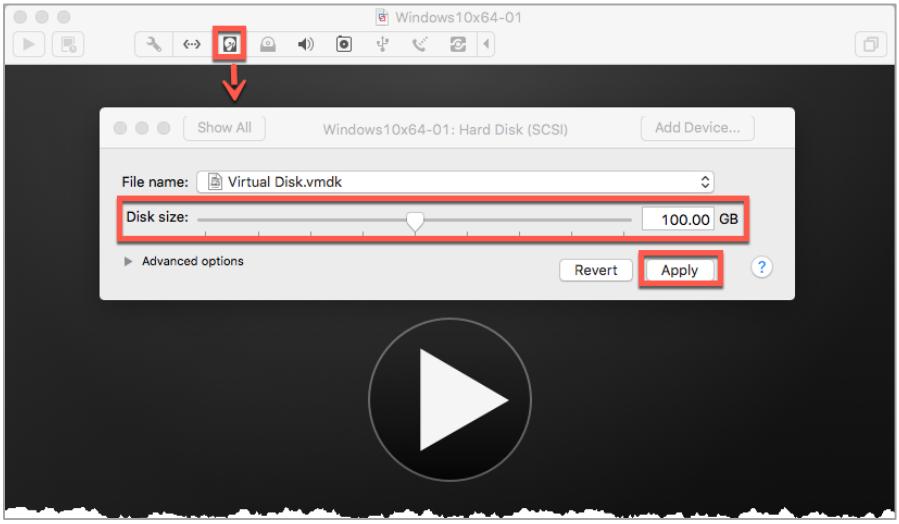
Figure 34 – Shut down VM



9. Make any custom adjustments to the VM, as needed.

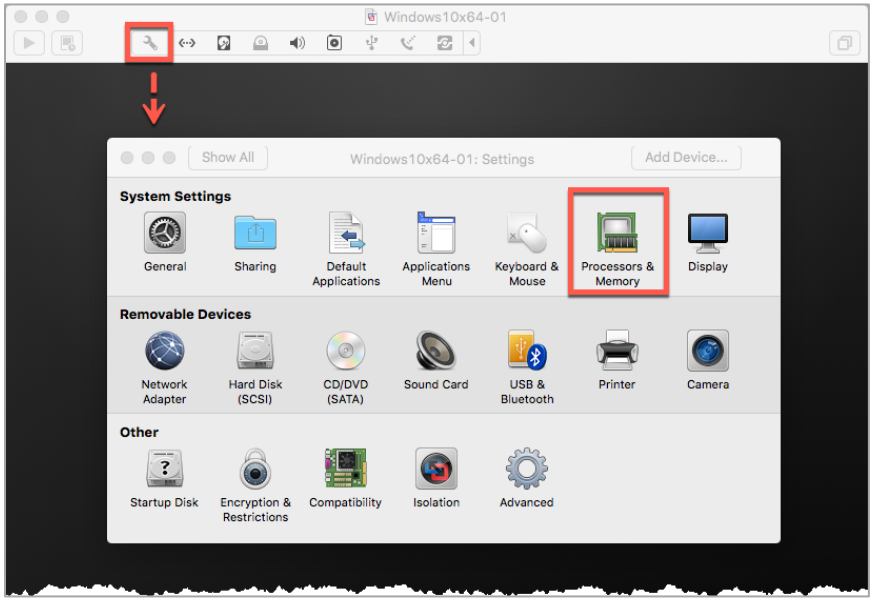
10. To adjust the **Disk size** to **100GB**, click the Disk drive icon and move the Disk size slider.

Figure 35 – Set Disk Size dialog



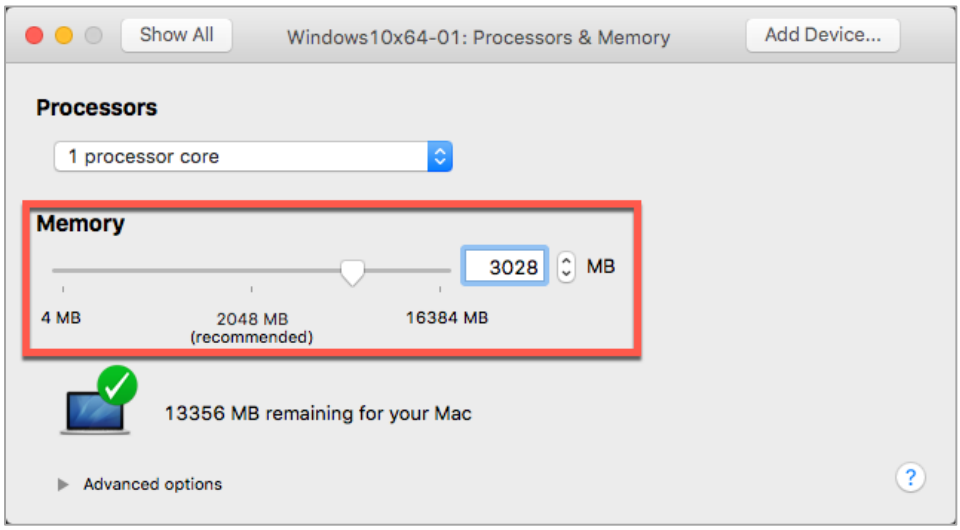
11. To adjust **Memory**, click the Memory icon and click **Processes & Memory** button.

Figure 36 – Memory selection



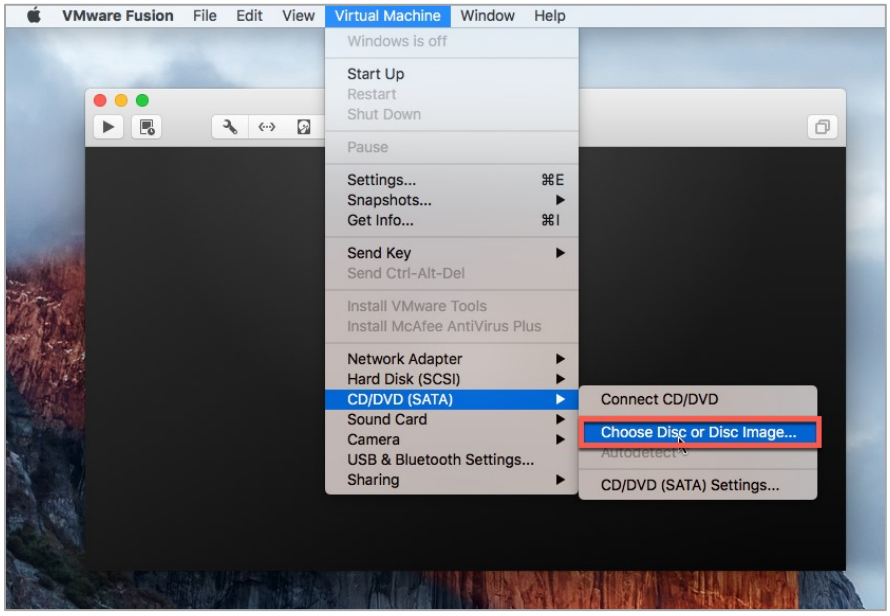
NOTE	The default minimum Memory requirement is **2GB**. Set this to a minimum of **3GB**.

Figure 37 – Adjust Memory dialog



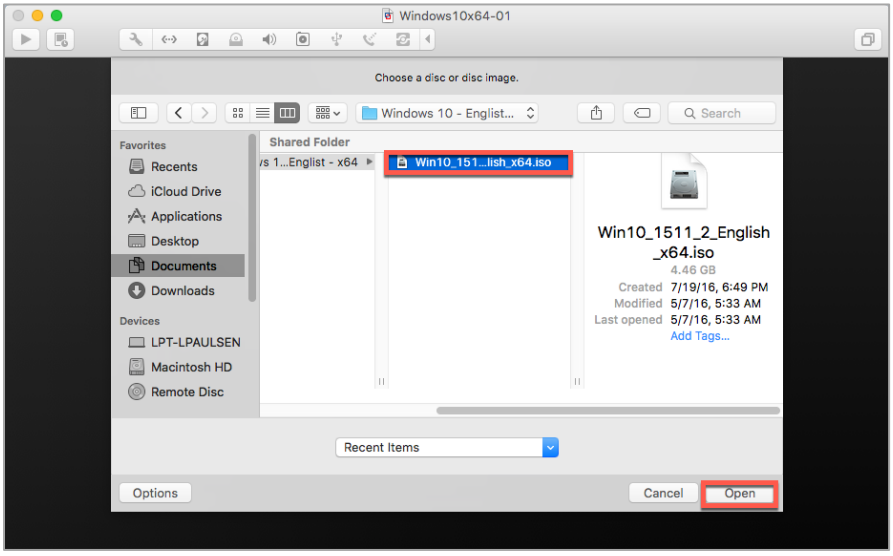
12. On the Virtual Machine drop-down menu, expand CD/DVD and select **Choose Disk or Disk Image...**

Figure 38 – VM menu selection



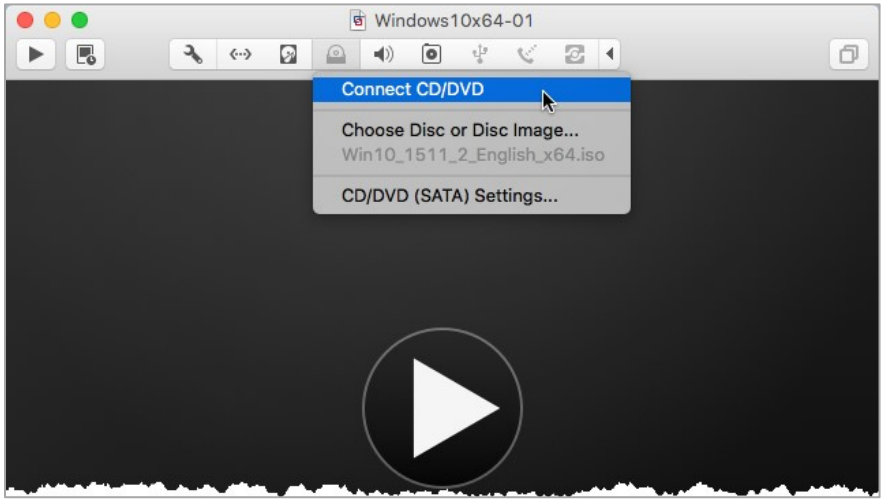
13. Locate and select the previously downloaded **Windows 10 Pro ISO Image** file.

Figure 39 – Select ISO image



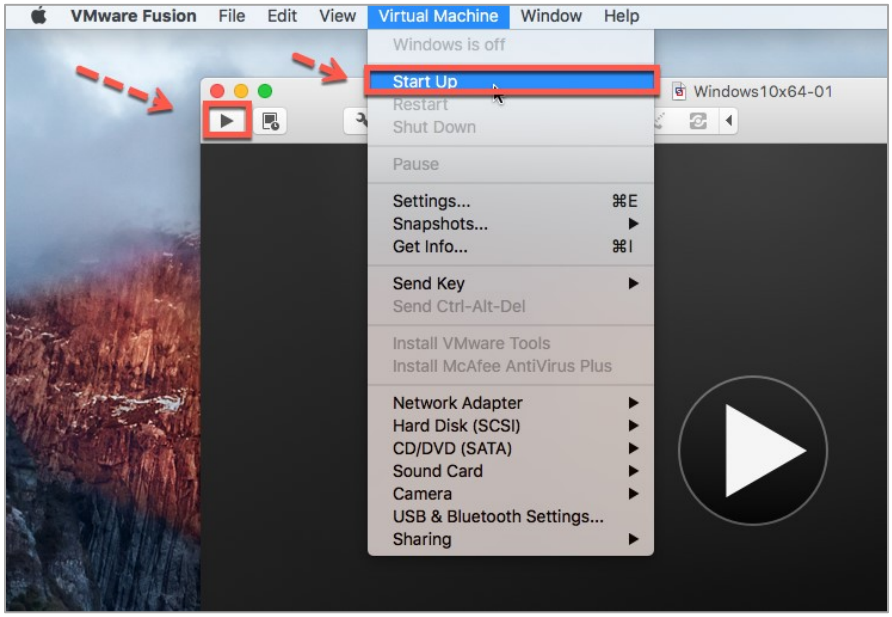
14. On Connect drop-down, click **Connect CD/DVD**.

Figure 40 – Connect drop-down



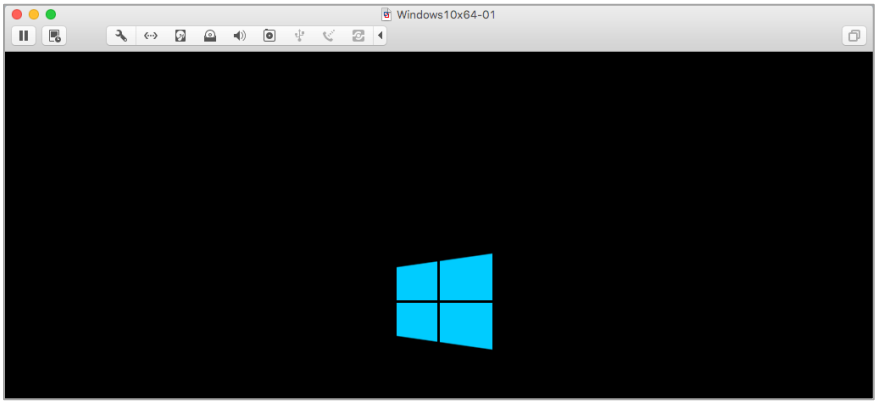
15. On Virtual Machine menu, click **Start Up** or click the **Play** button.

Figure 41 – Start-up VM



The VM window displays the standard Microsoft Windows installation dialog sequence.

Figure 42 – Windows VM page



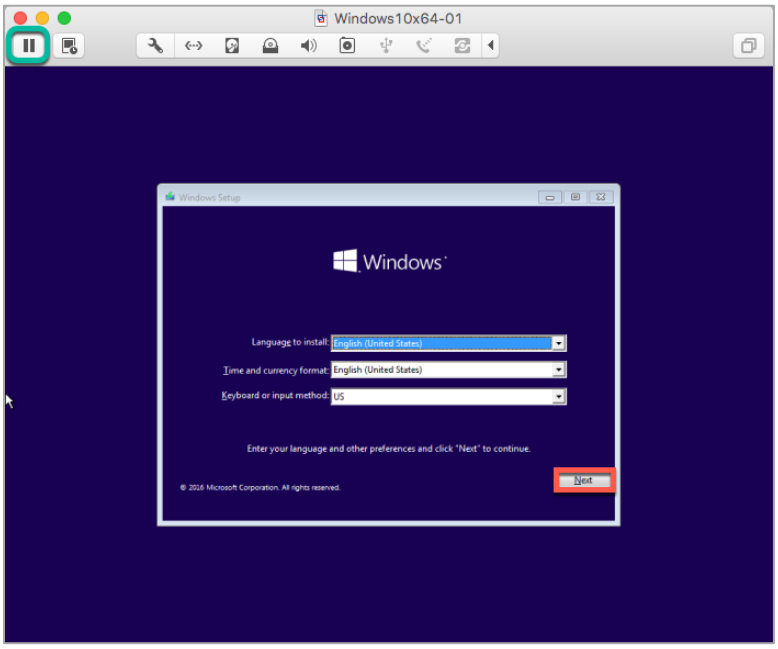
For directions of how to install Windows, see section Install Windows Inside the VM.

3.4 Install Windows Inside the VM

The VM starts from the ISO boot file.

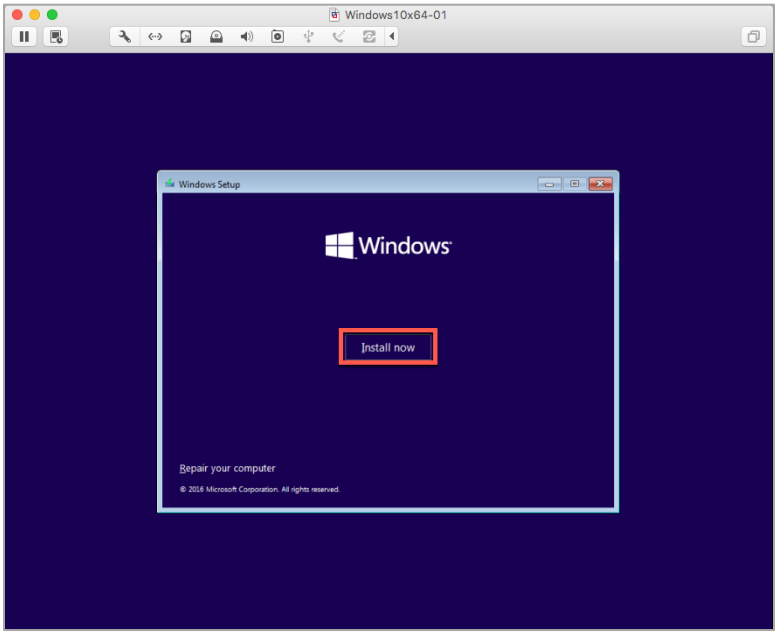
1. On the Windows dialog, click **Next**.

Figure 43 – Windows Install dialog



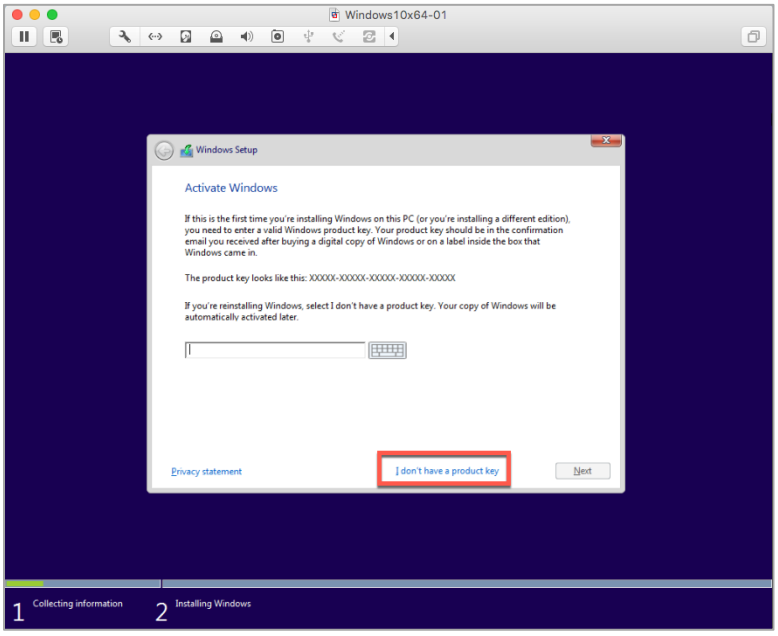
2. Click **Install Now**.

Figure 44 – Windows Install dialog



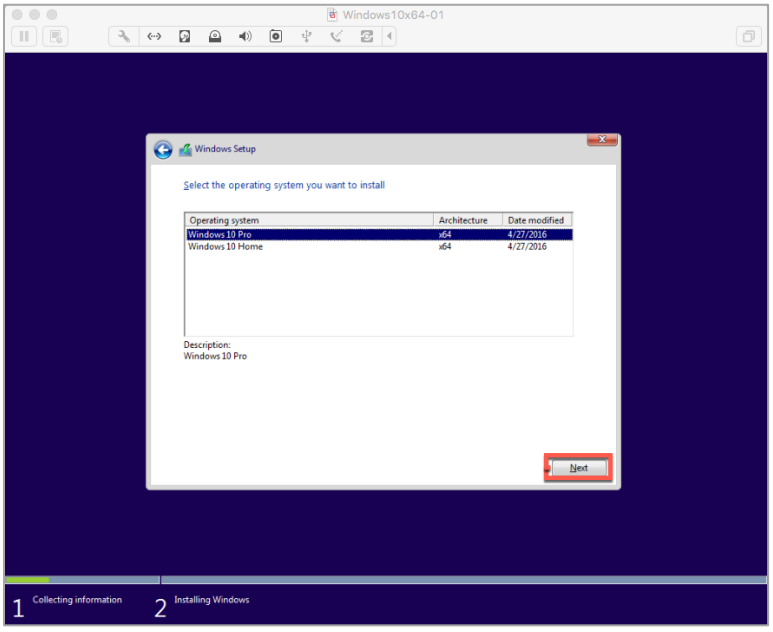
3. On the Activate Windows dialog, click **I don't have a product key**:

Figure 45 – Activate Windows dialog



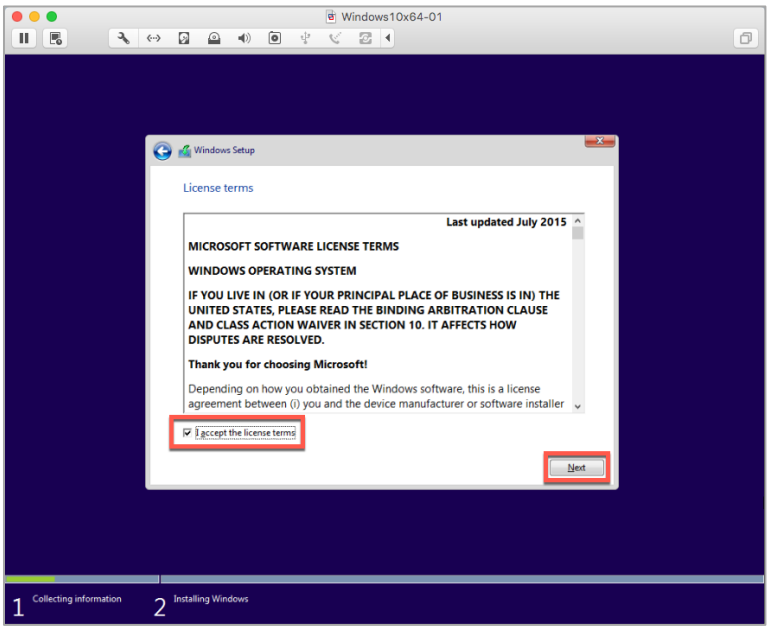
4. On the Select the OS dialog, click **Next**.

Figure 46 – Select OS dialog



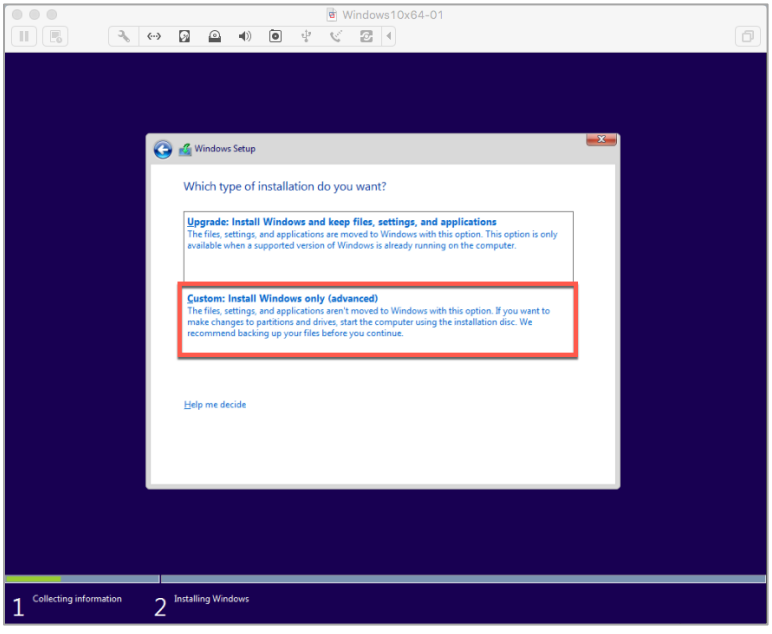
5. On License Terms dialog, click **Next**.

Figure 47 – License Terms dialog



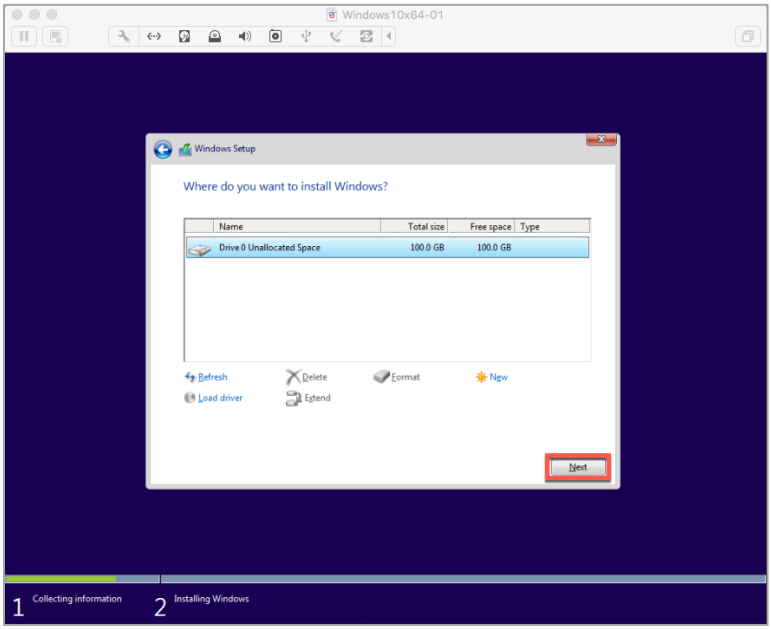
6. On Type of Installation dialog, select **Custom Install Windows Only (Advanced)**.

Figure 48 – Tpe of Installation dialog



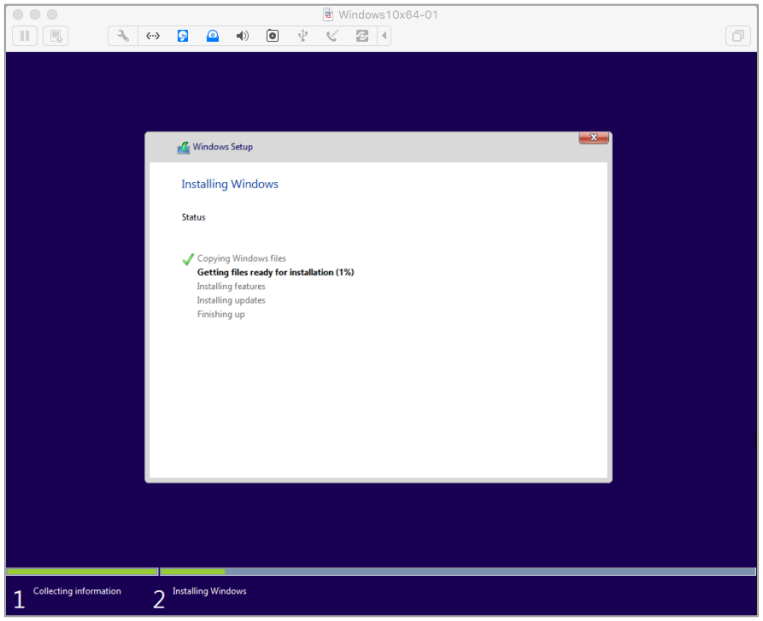
7. On Where do you want to install dialog, click **Next**.

Figure 49 – Where to Install dialog



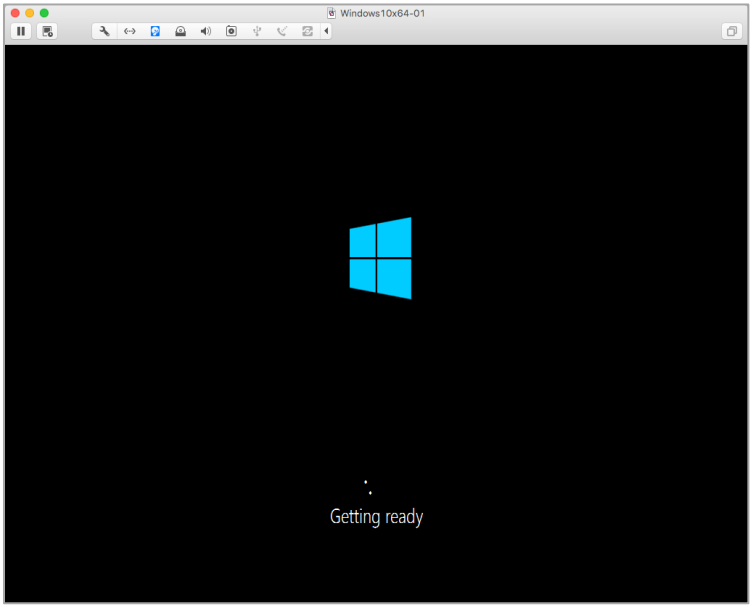
8. On the Installing Windows dialog, monitor the install process.

Figure 50 – Installing Windows dialog



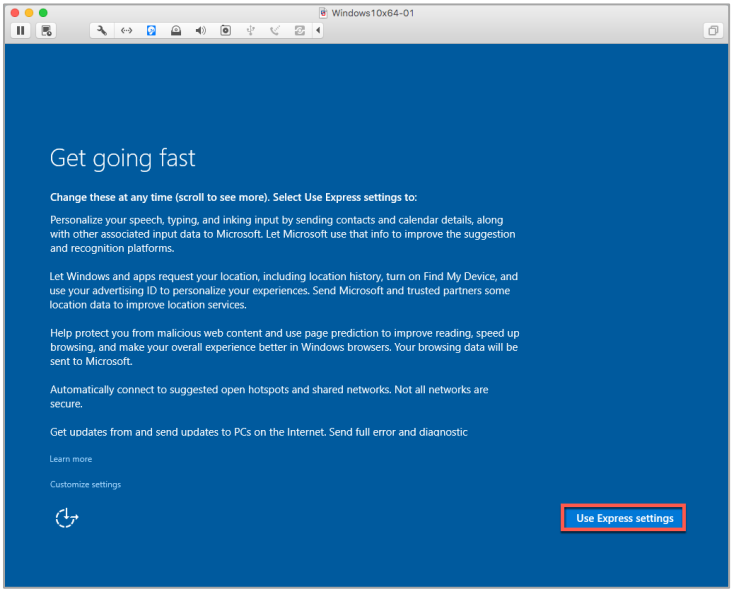
9. When done, the Getting Ready dialog displays.

Figure 51 – Getting Ready dialog



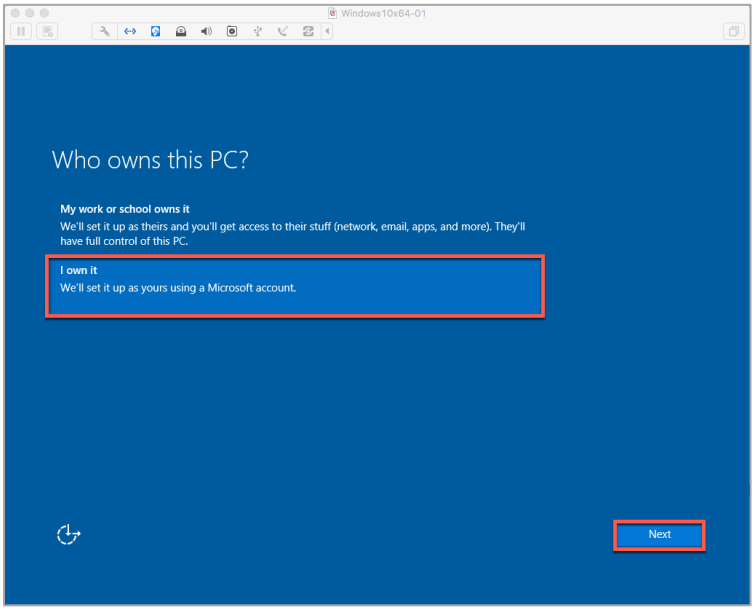
10. On the Get going fast dialog, click **Use Express Settings**.

Figure 52 – Get going fast dialog



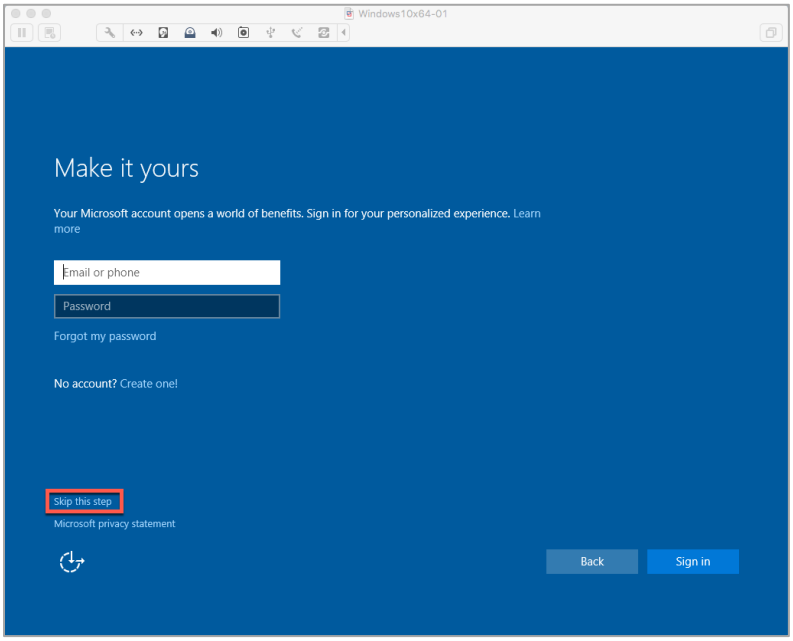
11. On Who owns this PC dialog, select **I own it** and click **Next**.

Figure 53 – Who owns this PC dialog



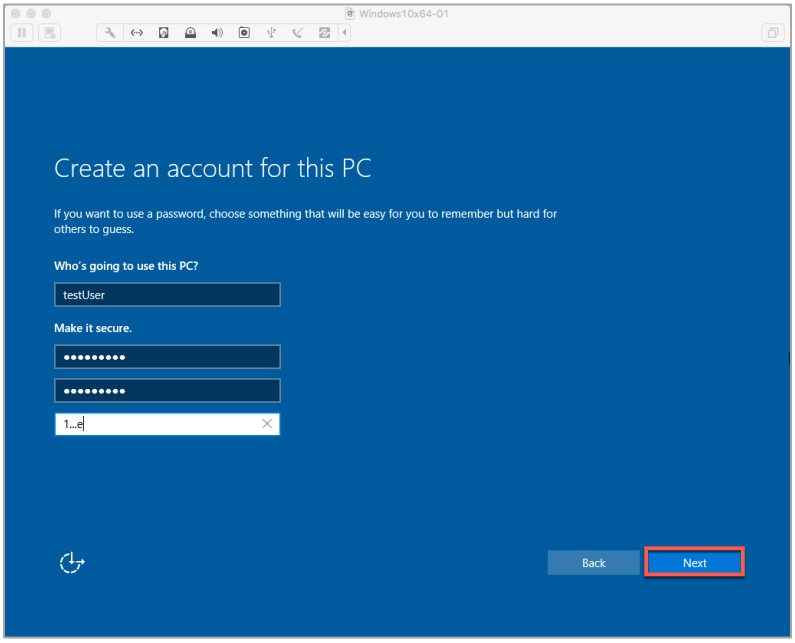
12. On Make it yours dialog, click **Skip this step**.

Figure 54 – Make it y ours dialog



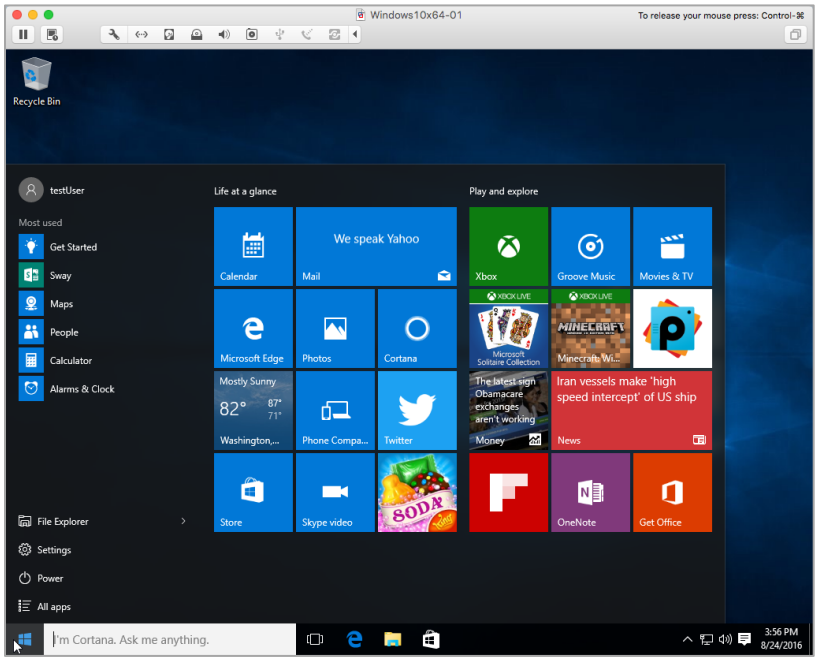
13. On Create an account dialog, enter user account details, and click **Next**.

Figure 55 – Create an account dialog



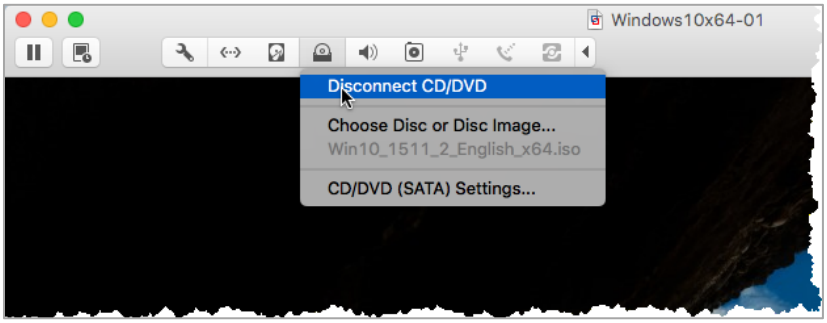
After the initial configuration, the new clean VM is ready to use.

Figure 56 – Active VM



14. Disable the mounted ISO file and disable the associated virtual CD/DVD drive.

Figure 57 – Disconnect drop-down



Important: It is advisable to change the computers hostname. For more information see Assign hostname to Windows 10-based VM.

3.5 OS Virtualization Extensions (Guest Tools Set)

For best user experience, install VMware Tools on the VM.

The following are some features available when VMware Tools is installed:

- Faster graphics performance and Windows Aero on operating systems (that support Aero)
- The Unity feature to enable a VM application appear on the host desktop like any other application window
- Shared folders between host and guest file systems
- Copy and paste text, graphics, and files between the VM and the host or client desktop
- Improved mouse performance
- Clock synchronization in the VM with the clock on the host or client desktop
- Scripting to help automate guest operating system operations

For more information about VMware tools usage and configuration see:

https://www.vmware.com/pdf/vmware-tools-installation-configuration.pdf

(See Additional Installation Steps in a Windows VM.)

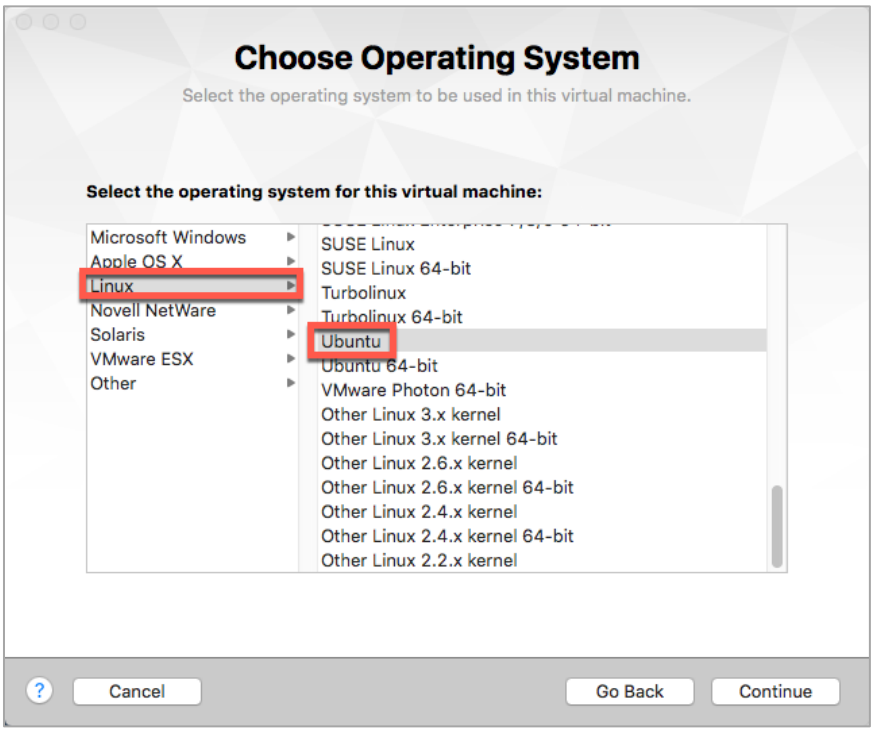
Congratulation!!! The VM is ready to install needed applications.

3.6 Create Ubuntu (Linux) Guest VM

Create a Ubuntu (Linux) guest VM is conceptually the same as the Windows VM, except for the following differences:

1. When asked to choose Operating System, select **Linux** and **Ubuntu**.

Figure 58 – Choose Operating System dialog



2. Keep the following VMware Ubuntu defaults:
   - 20GB Desk Drive
   - 1GB Memory (RAM)

3. For everything else, accept the recommended defaults.

3.6.1 Ubuntu (Linux) 16.04.1-based Guest Environments

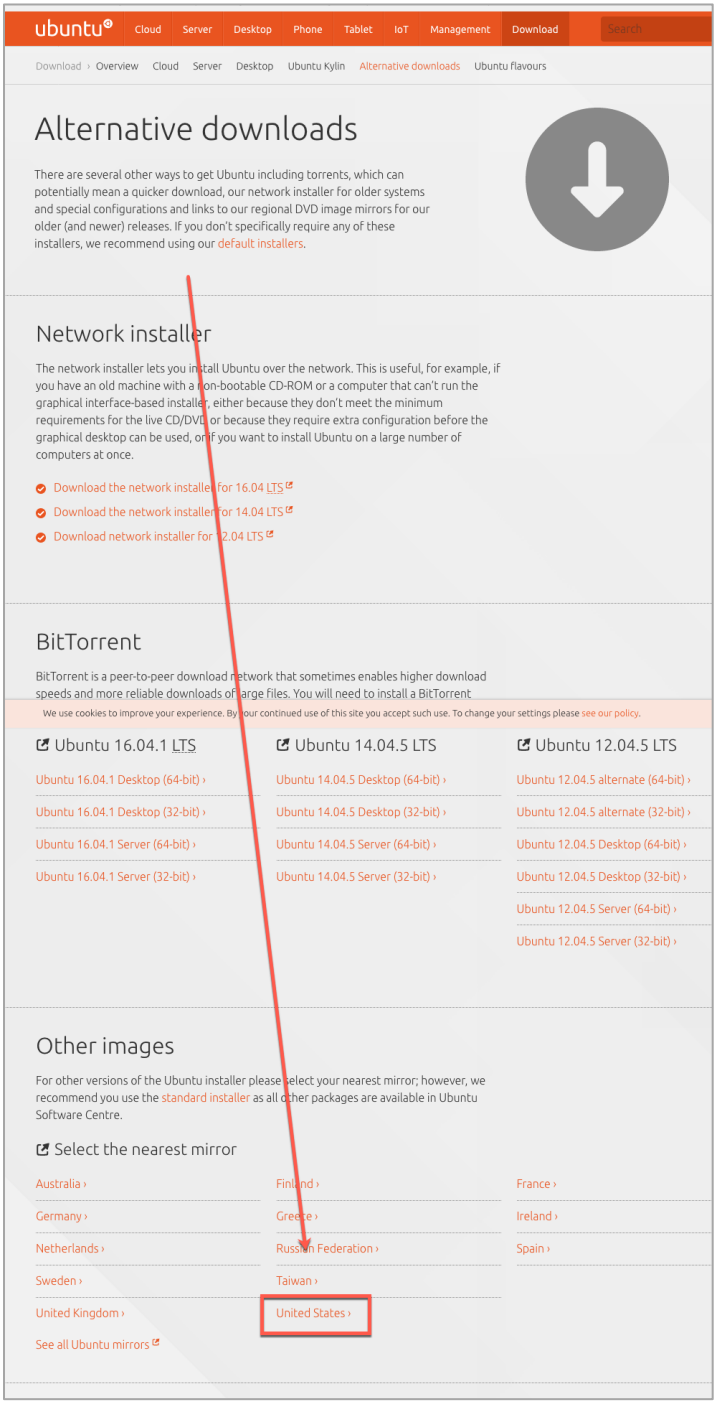
Ayla has tested Ubuntu 16.04.1 0x86 (Linux), for the virtual Development Guest OS, which can be downloaded from the following location in a ISO format.

1. In the selected Ubuntu OS page, click **Alternative Downloads** link.

Figure 59 – Get Ubuntu page

2. In Mirror Locations section, click the country.

Figure 60 – Alternataive Downloads page

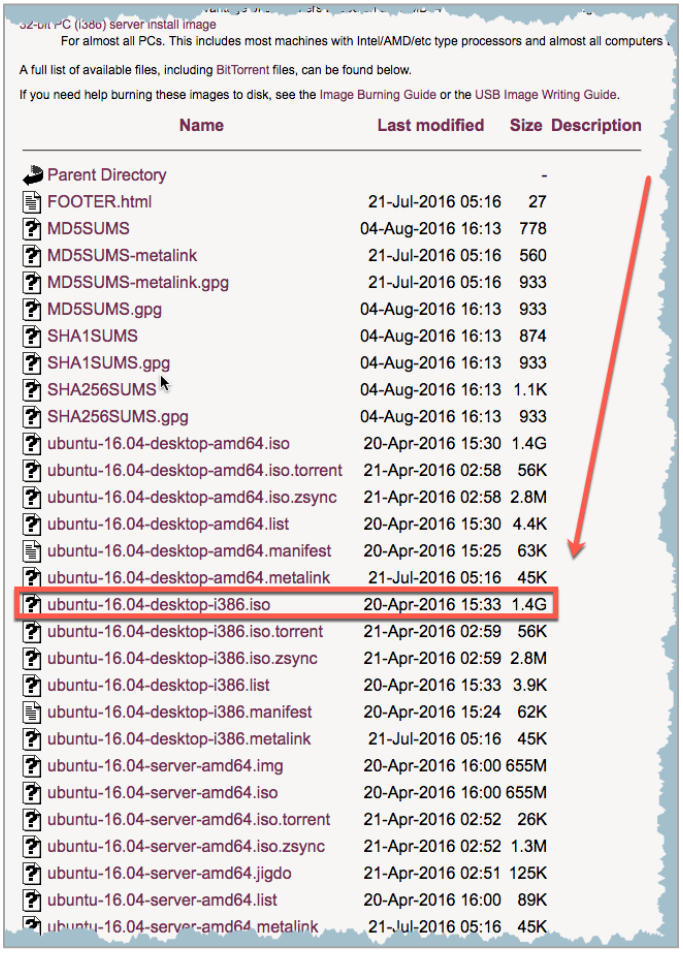


3. On Ubuntu Releases page, click the folder link for the appropriate release.

Figure 61 – Ubuntu Releases page

4. On the release listing, select the ISO image.

Figure 62 – Ubuntu Releases page



NOTE If the guest OS is configured with less than the recommended storage capacity, that can be exhausted when required apps are installed.

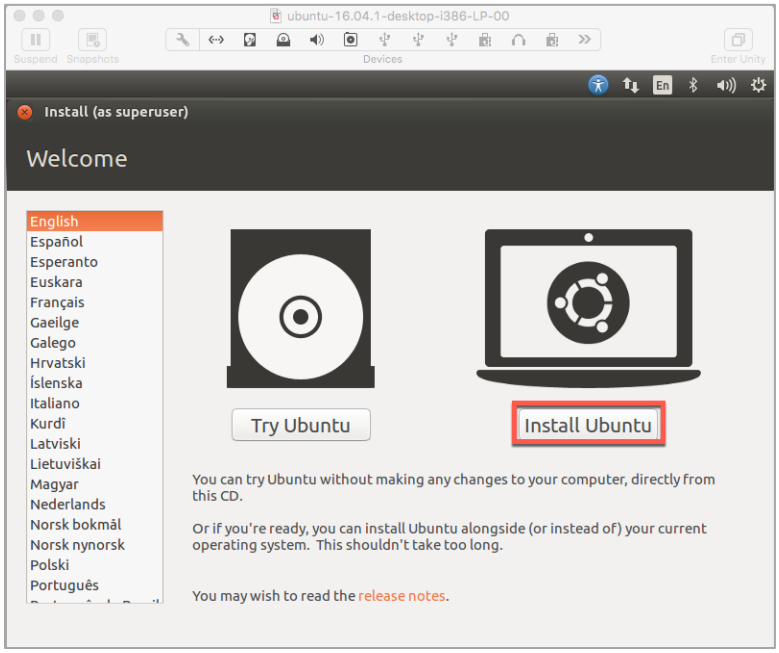
For directions of how to install Ubuntu see section Install Linux Ubuntu Inside the VM.

3.6.2 Install Linux Ubuntu Inside the VM

1. Attach the Ubuntu ISO and confirm it is Connected. The ensures the VM boots from the ISO image.
2. Start the ISO image.

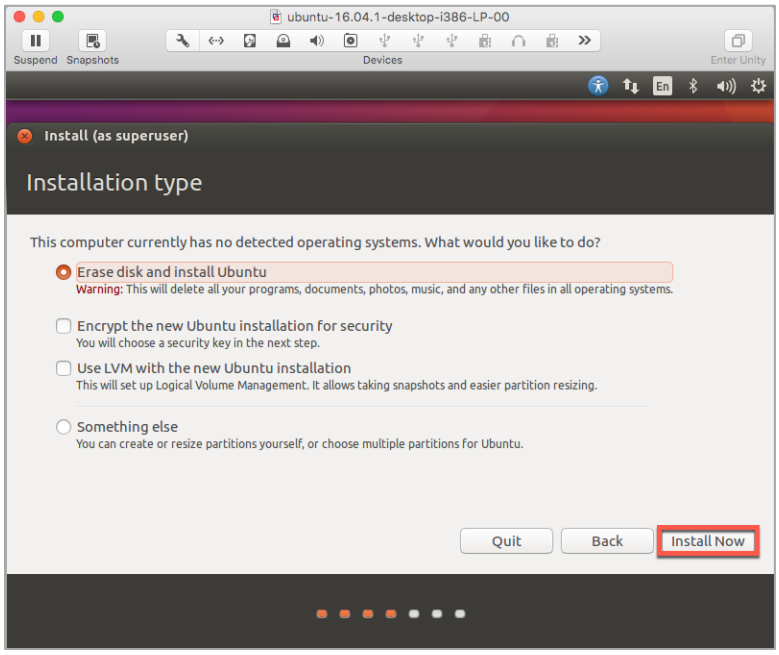
3. On the Welcome page, click **Install Ubuntu**.

Figure 63 – Welcome page



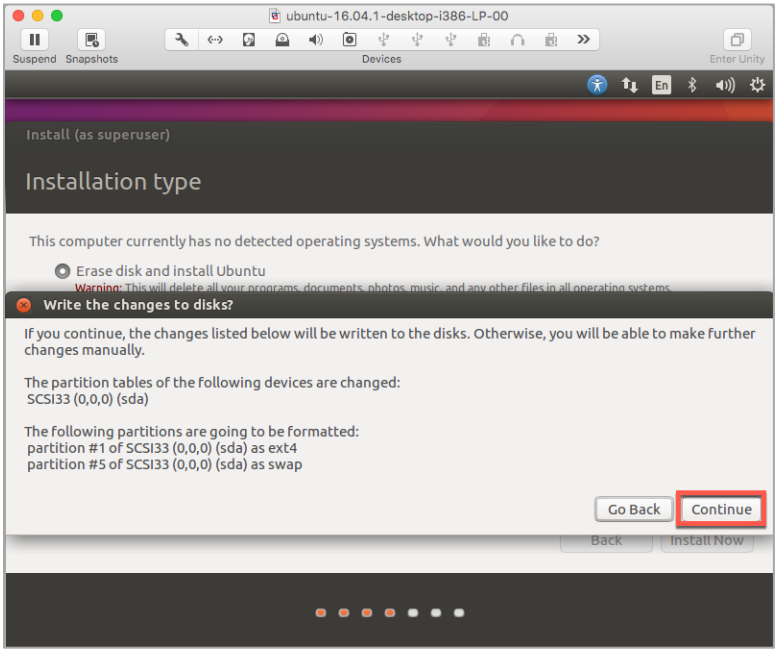
4. On Installation type page, accept defaults and click **Install Now**.

Figure 64 – Installation Type



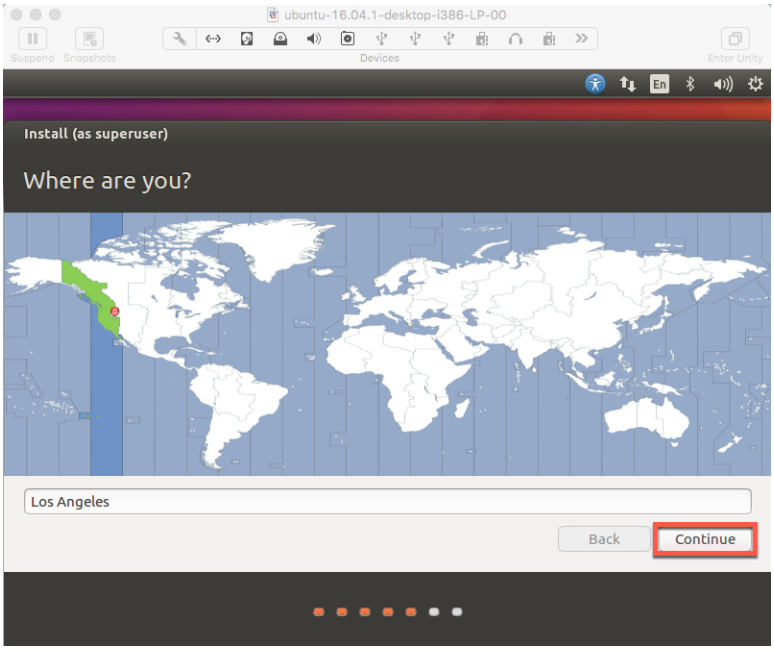
5. Accept the defaults and click **Continue**.

Figure 65 – Write the changes to disks dialog



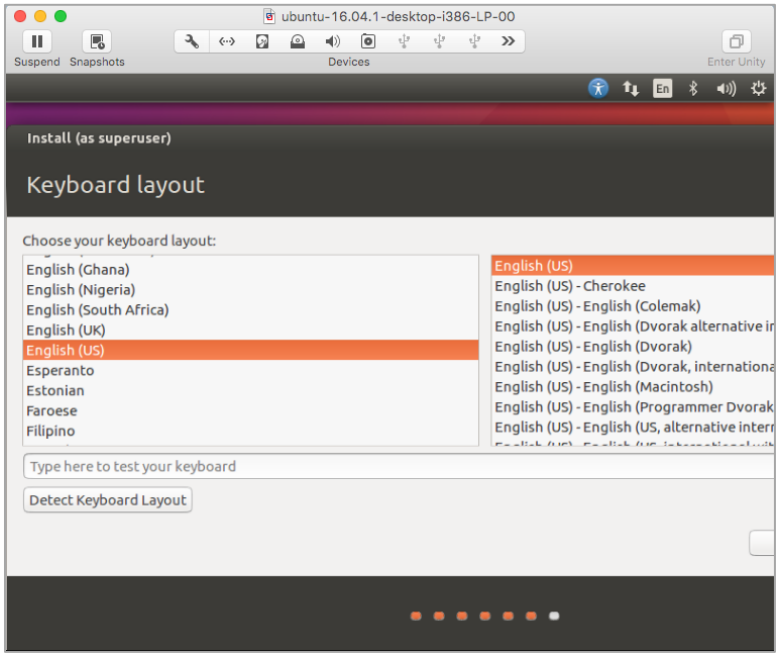
6. On the Where are you map page, select the region and click **Continue.**

Figure 66 Where are you page



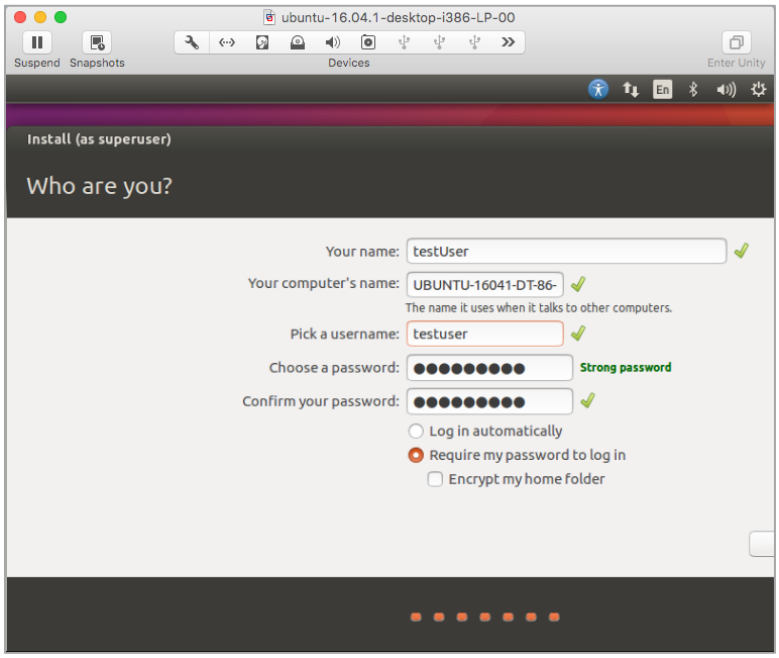
7. On the Keyboard layout page, select the preferred keyboard and click **Continue.**

Figure 67 – Keyboard Layout page



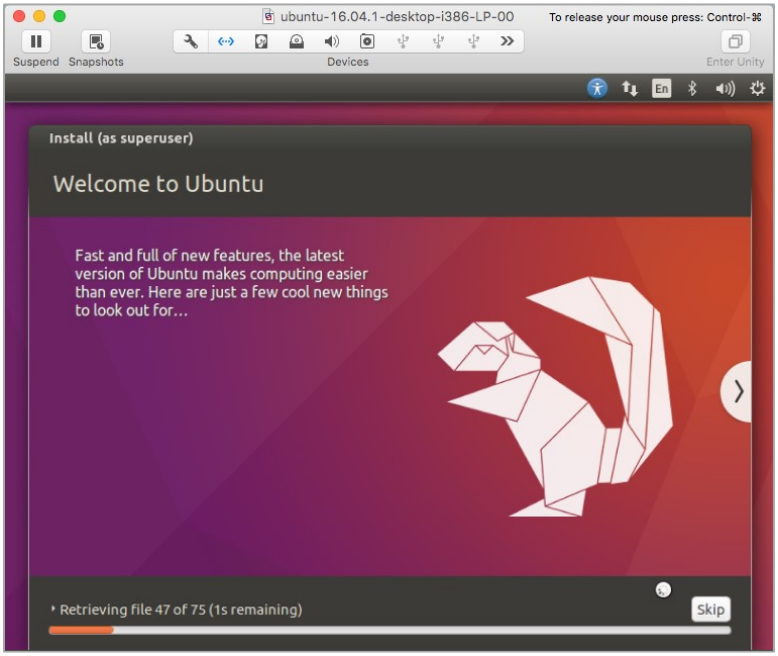
8. On the Who are you page, enter details and click **Continue.**

Figure 68 – Who are you page



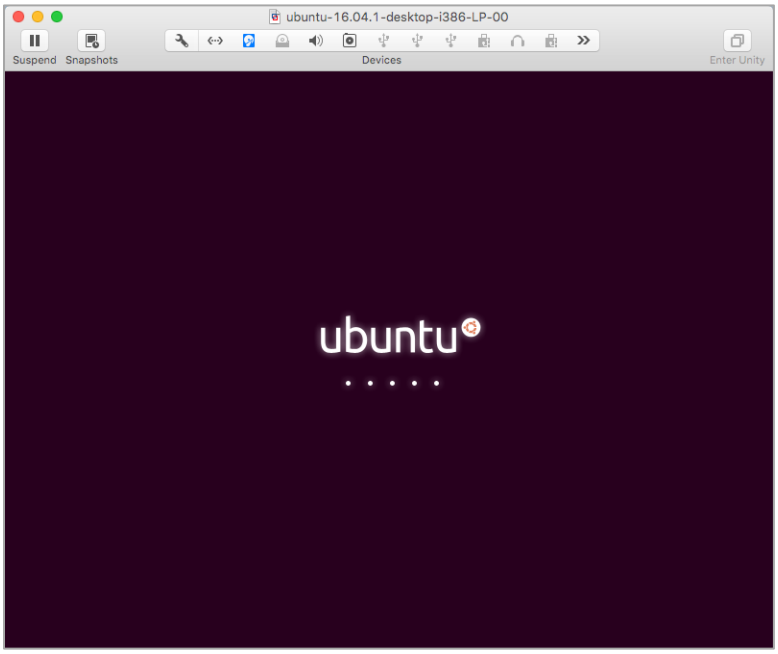
9. The progress bar shows the installation process.

Figure 69 – Installation Progress Bar



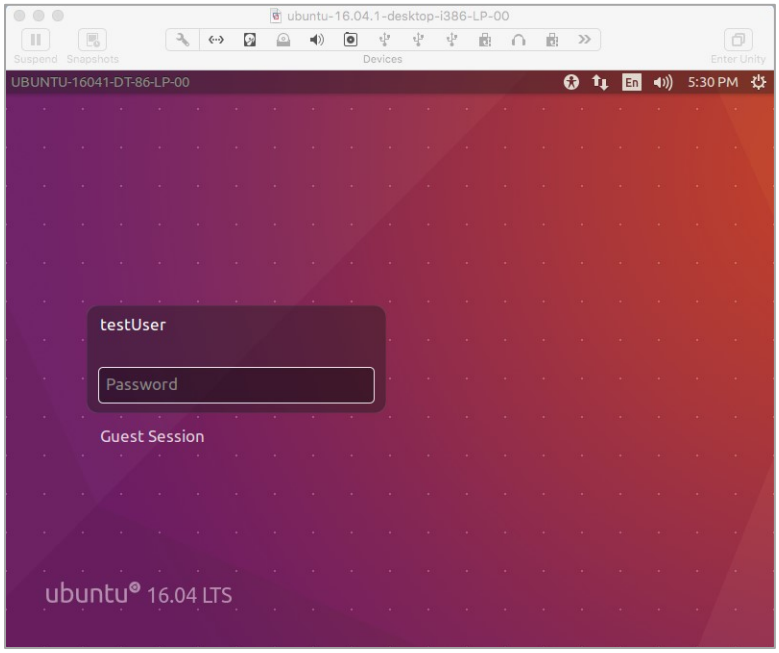
10. The Ubuntu start-up window displays.

Figure 70 – Start-up OS



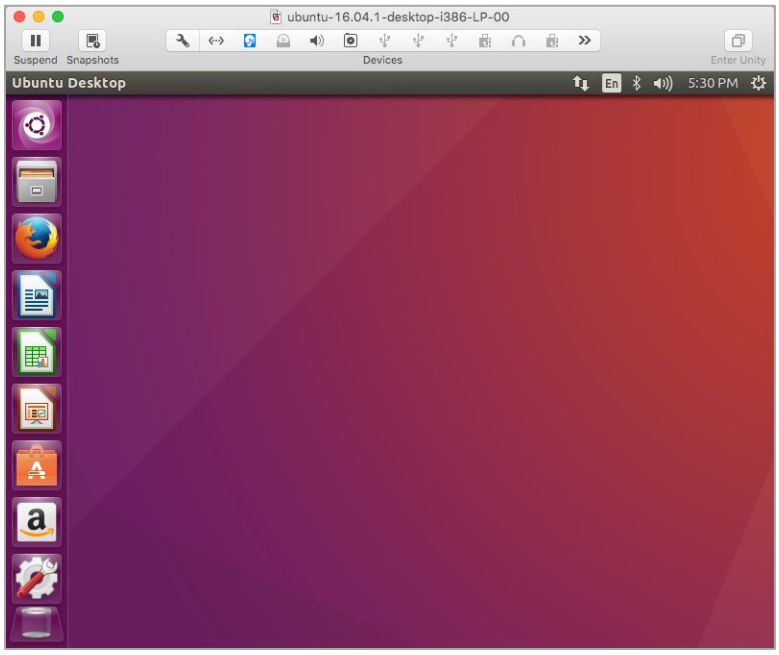
11. On the login dialog, enter the user login credentials.

Figure 71 - Login



12. On successful login, the Ubuntu desktop displays.

Figure 72 – Ubuntu Desktop



Congratulation!!! The VM is ready to install needed applications.

3.7 Additional Installation Steps

1. Hostname Management

   Important: It is advisable to create a user-friendly computer hostname. For more information see Assign hostname to Ubuntu 16.04.1-based VM.

2. Scripting Interpreter Runtime

   The Perl scripting interpreter runtime should be installed on the Ubuntu VM use for Ayla development. This makes the installation of the VMware Tools application easier. See Install Perl on your Linux Ubuntu VM.

3. OS Virtualization Extensions (Guest Tools Set)

   Important: For best user experience, install the VMware Tools in the guest OS.

   The following features are just some of the features that are available only if VMware Tools is installed:

   - Faster graphics performance and Windows Aero on operating systems (that support Aero)
   - The Unity feature to enable a VM application appear on the host desktop like any other application window
   - Shared folders between host and guest file systems
   - Copy and paste text, graphics, and files between the VM and the host or client desktop
   - Improved mouse performance
   - Clock synchronization in the VM with the clock on the host or client desktop
   - Scripting to help automate guest operating system operations

   For more information about VMware Tools usage and configuration, see:

   Install VMware tools on Linux Ubuntu VM.

   For more information about VMware Tools usage and configuration, see:

   https://www.vmware.com/pdf/vmware-tools-installation-configuration.pdf

(See Additional Installation Steps in a Windows VM)

4. OS Updates

CAUTION

Keep the kernel version unchanged to avoid compatible problems.

Ensure the Ubuntu OS is up to date. For more information about updating Ubuntu, see Update Ubuntu with Online Updates.

4 Install Perl on Linux Ubuntu VM

To install Perl on your newly created Ubuntu VM log into the machine and open a terminal window by either:

1. Click the Ubuntu icon (upper-left) and type `terminal`.

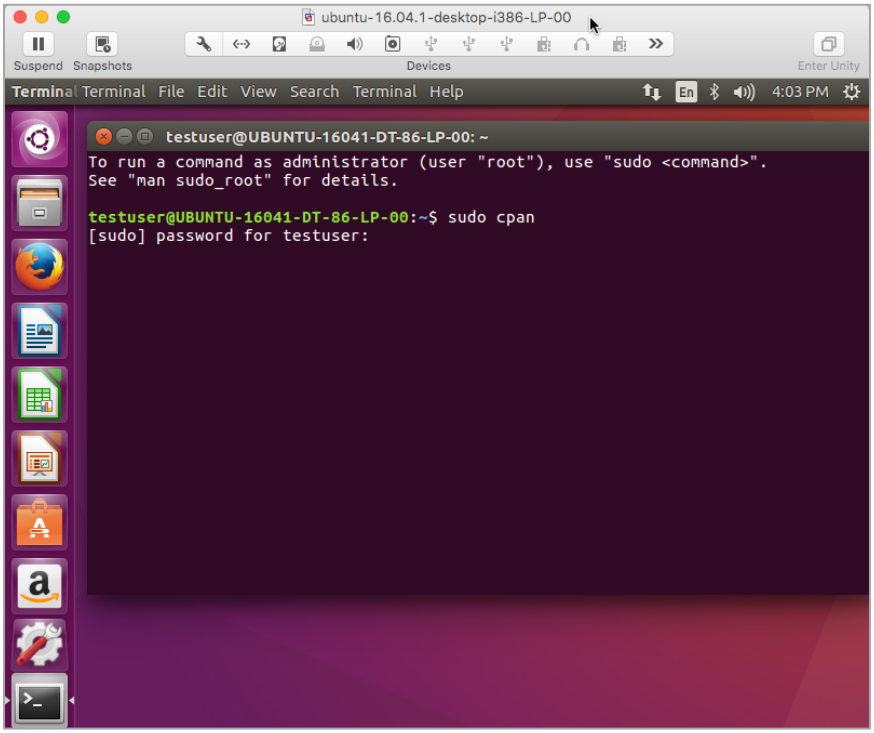
   On the results, select the Terminal application.

2. Press keyboard shortcut **Ctrl - Alt + T**
3. In the terminal window, type the following command to install Perl:

   ```
   $ sudo cpan
   ```

4. When prompted, type password for testuser.

Figure 73 – Terminal window login



5. Accept each default.
6. When done, type:

   ```
   exit
   ```

   This exits the Perl prompt and closes the terminal window.

4.1 Update Perl

To update the Perl runtime:

1. Open a Terminal session window.
2. Type:

   ```
   $ sudo cpan
   cpan[1]> upgrade
   ```

   The update script starts.
3. When done, type:

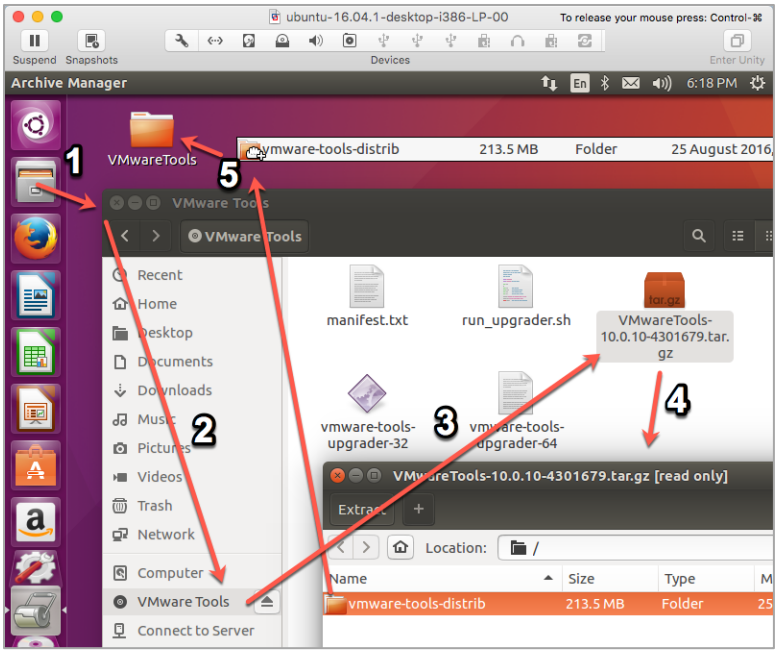
   ```
   exit
   ```

5 Install VMware tools on Linux Ubuntu VM

Follow this procedure to install VMware tools on your newly created Ubuntu VM.

1. Power on the VM.
2. Verify that the guest operating system is running.
3. Because the VMware Tools installer is written in Perl, verify that Perl is installed in the guest operating system.
4. Select the menu command to mount the VMware Tools virtual disc on the guest operating system:
   - Fusion: Virtual Machine > Install (or Upgrade) VMware Tools
   - Workstation: VM > Install (or Upgrade) VMware Tools
   - Player: Player > Manage > Install (or Upgrade) VMware Tools
5. In the VM, log in to the guest operating system and create a desktop folder called VMwareTools.
6. Open a File Manager window (see Step 1).
7. Select VMware Tools disk/image (see Step 2).
8. Double click **VMwareTools-x.x.x-yyyy.tar** file to open the archive manager window (see Step 3).
9. Drag the **vmware-tools-distrib** folder to the new folder on the desktop (see Step 4).

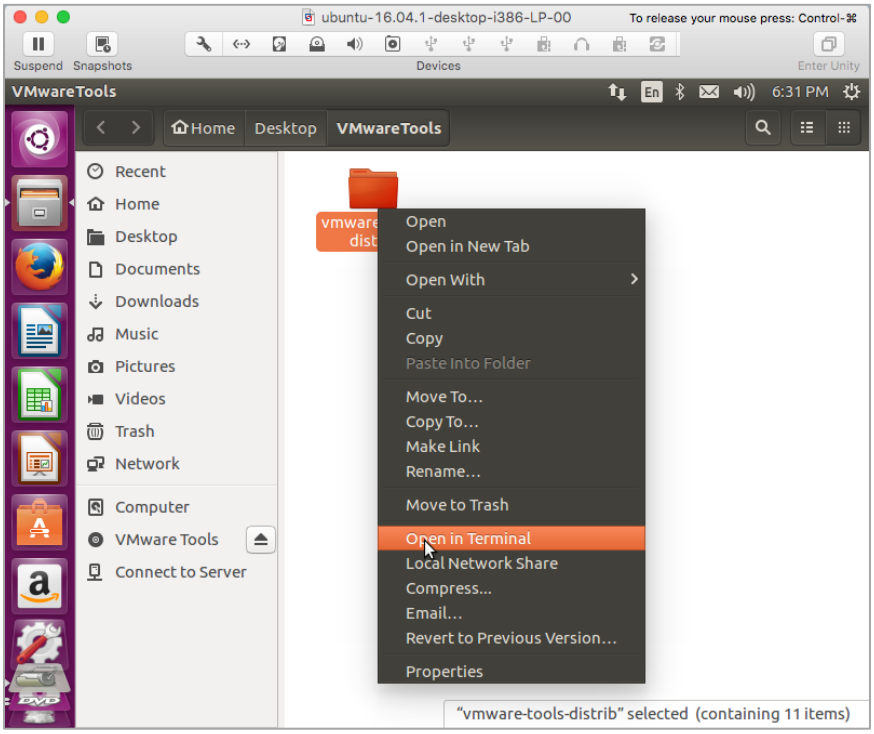
Figure 74 – Install VMware Tools



10. Open the desktop folder **VMwareTools**.

11. Right click **vmware-tools-distrib** and select **Open in Terminal**.

Figure 75 – Open dialog

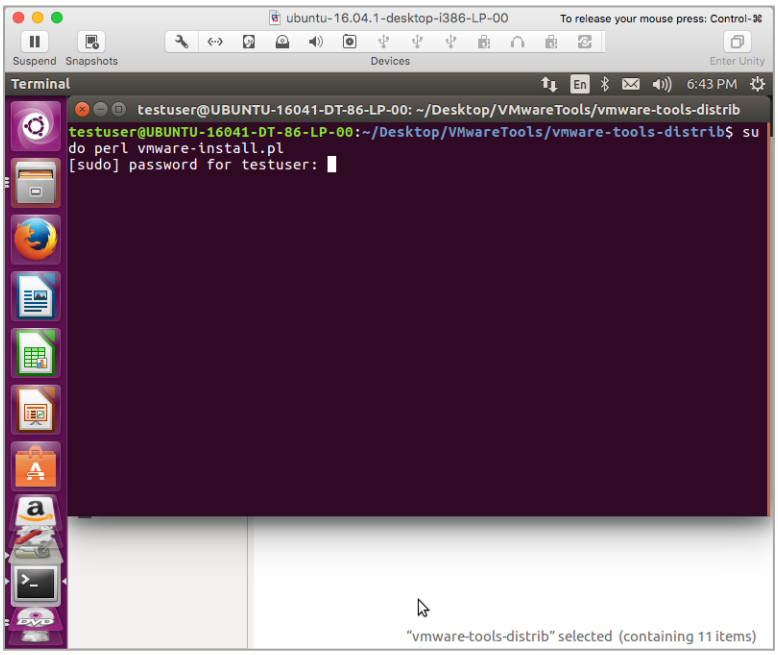


12. In terminal window, type:

```
sudo perl vmware-install.pl
```

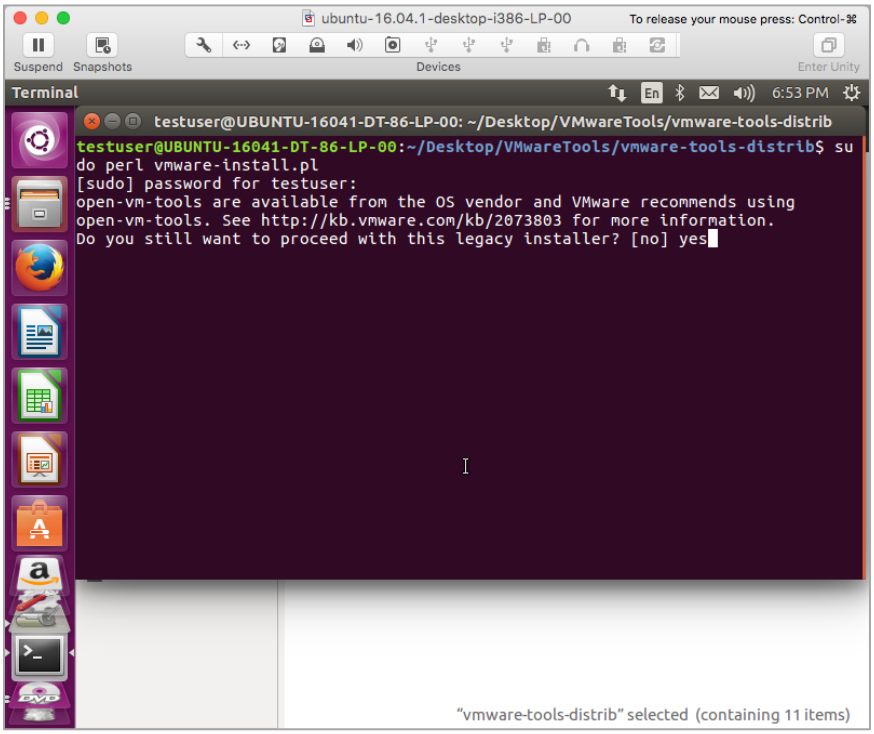
13. Type user credentials:

Figure 76 - Credentials



14. At prompt for **...proceed with this legacy installer?...**, type **yes**:

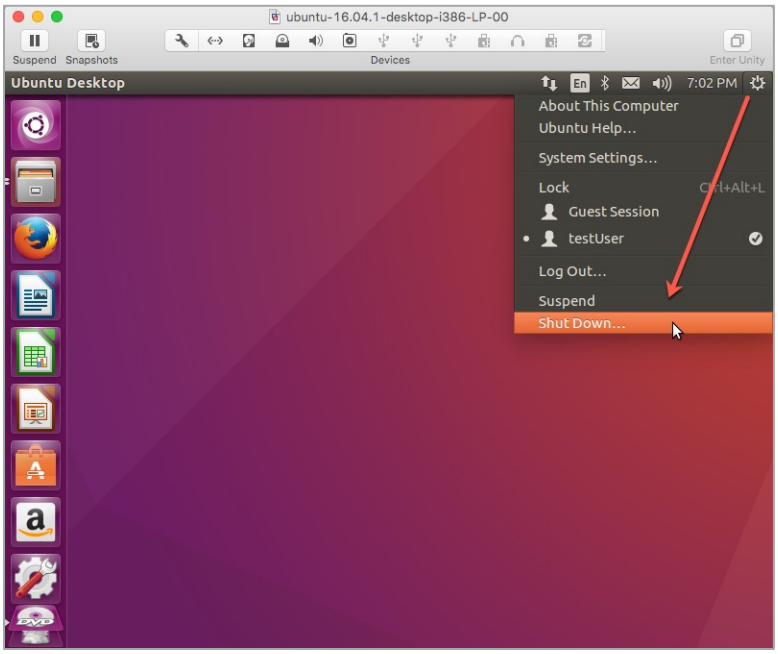
Figure 77 – Proceed dialog



15. For every installation option, accept default values.

16. When done, close all open windows.
17. Delete the VMwareTools folder on the desktop.
18. Reboot Ubuntu (from the upper right corner menu icon dropdown).

Figure 78 – Reboot Ubuntu



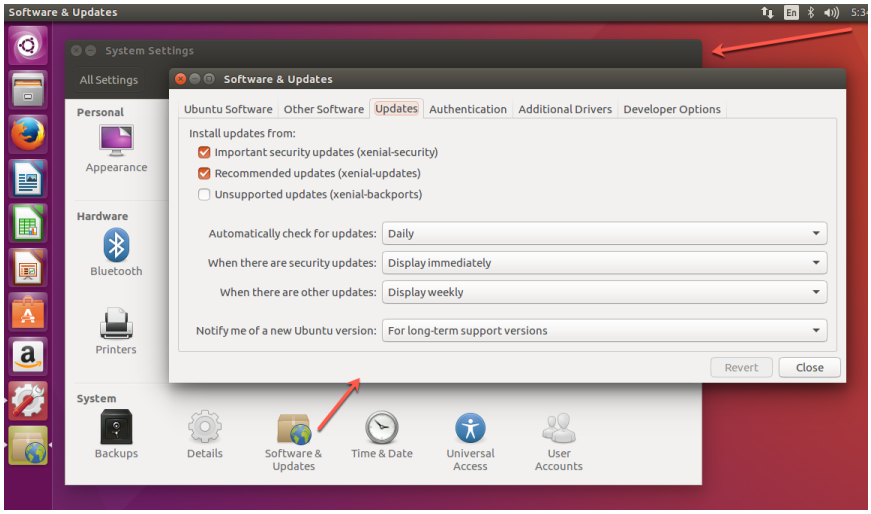
Next time the VM is started, VMware Tools should now be active.

6 Update Ubuntu with Online Updates

This section describes how to update Ubuntu with online updates.

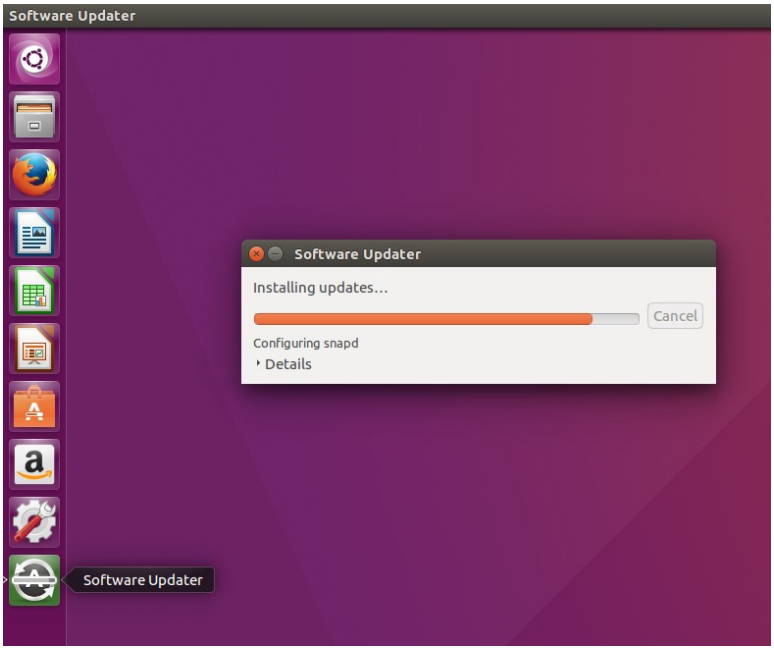
1. Configure the Ubuntu VM to send notifications when updates become available.

Figure 79 – Software Updaes dialog



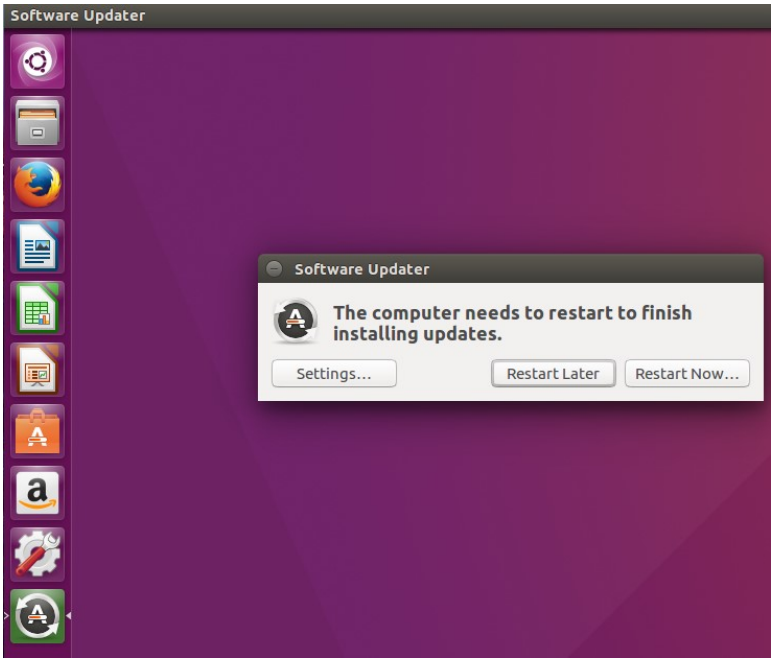
2. When updates are available an Software Updater icon is displayed in the taskbar.
3. Click the Software Installer application icon in the taskbar.
4. Accept the updates to start the update.
5. Progress bar shows the update progress.

Figure 80 – Progress bar



6. Click **Restart Now...**

Figure 81 – Restart Now



7. Login after the machine has restarted and the machine is updated and ready to use.

7 Assign a hostname to Windows 10-based VM

This section describes how to change your computer name in Windows 10.

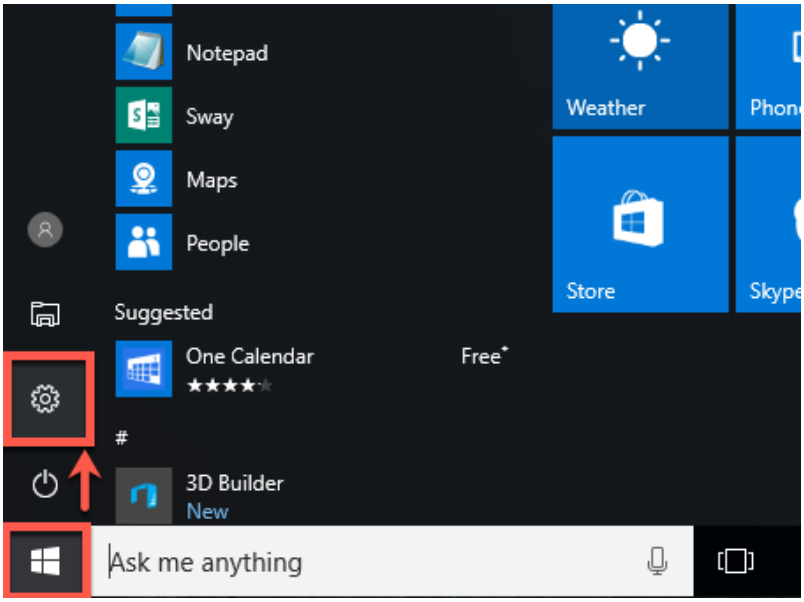
A computer should have a user-friendly hostname, not generic (i.e., windows or TUF000445811EE).

For example, if the computer is connected through a WORKGROUP, or more easily identify the computer's owner in a given network, change the computer hostname to something descriptive – i.e., **Win10P64-AB-00** (where '...AB...' is the owner initials or department or organization name).

7.1 Change Computer Name

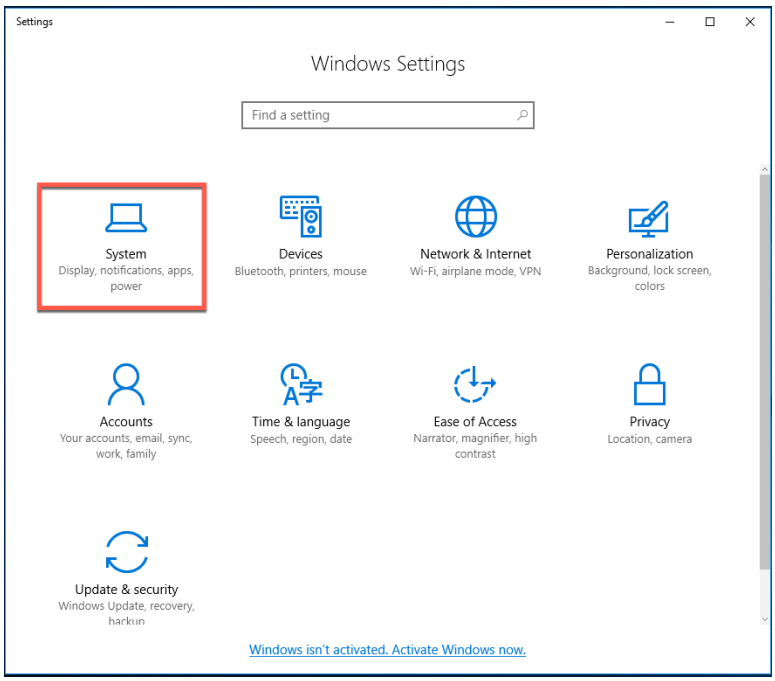
1. On Start button pop-up, click the Settings icon button.

Figure 82 – Settings icon



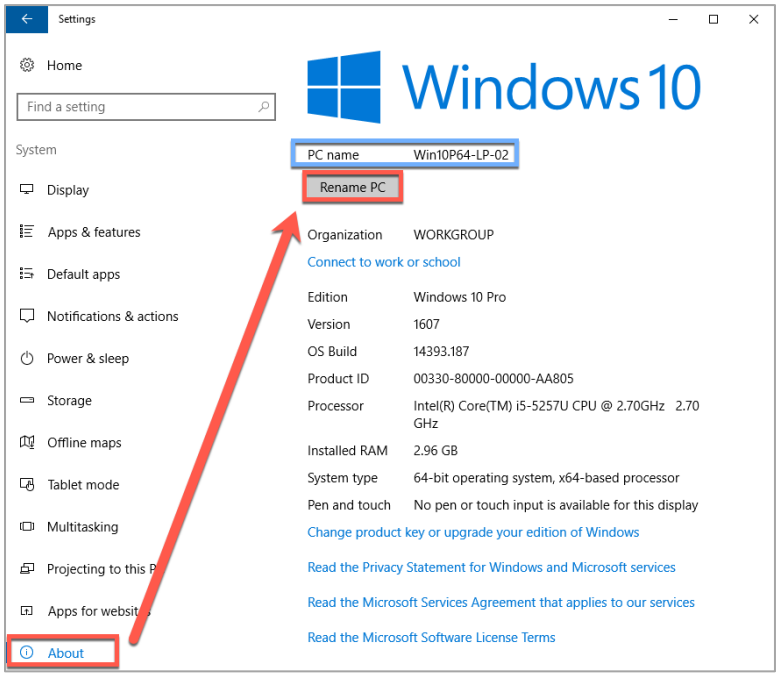
2. On the Settings dialog, click **System**.

Figure 83 – Settings window



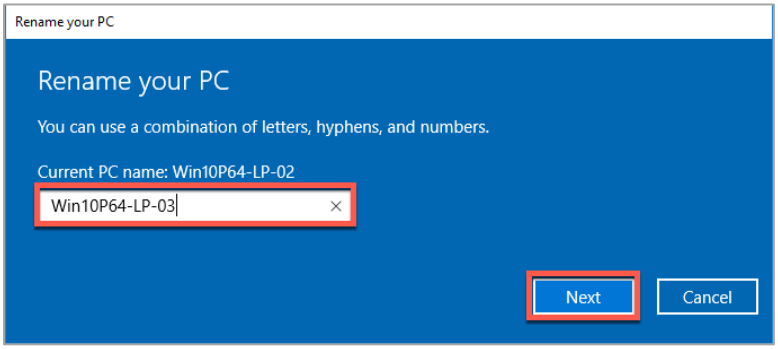
3. In the Systems dialog, left menu, click **About** . **PC name** shows the current computer name. Click **Rename PC**.

Figure 84 – PC Name



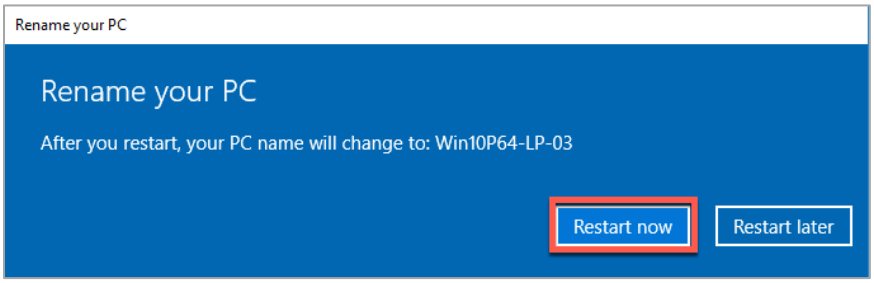
4. Enter the new host name (up to 15 letters, numbers and hyphens -- no spaces). Click **Next**.

Figure 85 – Rename PC dialog



5. On the Rename PC dialog, click **Restart Now**. (As needed, you can click **Restart later**.)

Figure 86 – Rename PC confirmation



8 Assign hostname to Ubuntu 16.04.1-based VM

This section describes how to change your computer name in Ubuntu 16.04.1.

A computer should have a user-friendly hostname (not generic names such as ubuntu or TUF000445811EE).

For example, in a given network, change the computer hostname to something more descriptive, such as **UBUNTU16041-DT-86-AB-00** (where '...AB...' is the owner initials or department or organization name).

Here are several ways to change your computer name.

- Press **Ctrl+Alt+T** to open the terminal window. When it opens, run the below command:

  ```
  hostname NEW_NAME_HERE
  ```

  This changes the hostname until next reboot. To see the change start a new terminal window.

- To change the name permanently, run command to edit the host files:

  ```
  sudo gedit /etc/hostname /etc/hosts
  ```

- For Ubuntu server without a GUI, run:

  ```
  sudo vi /etc/hostname
  ```

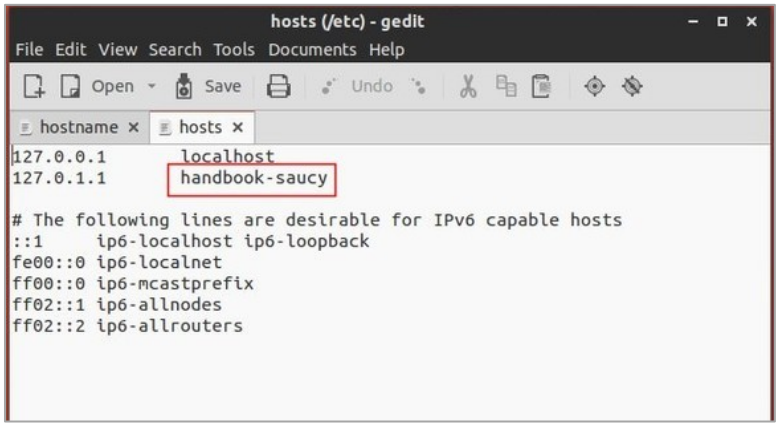
  Edit the name.

  ```
  sudo vi /etc/hosts
  ```

  Edi the name.

  In both files, change the name and save the files.

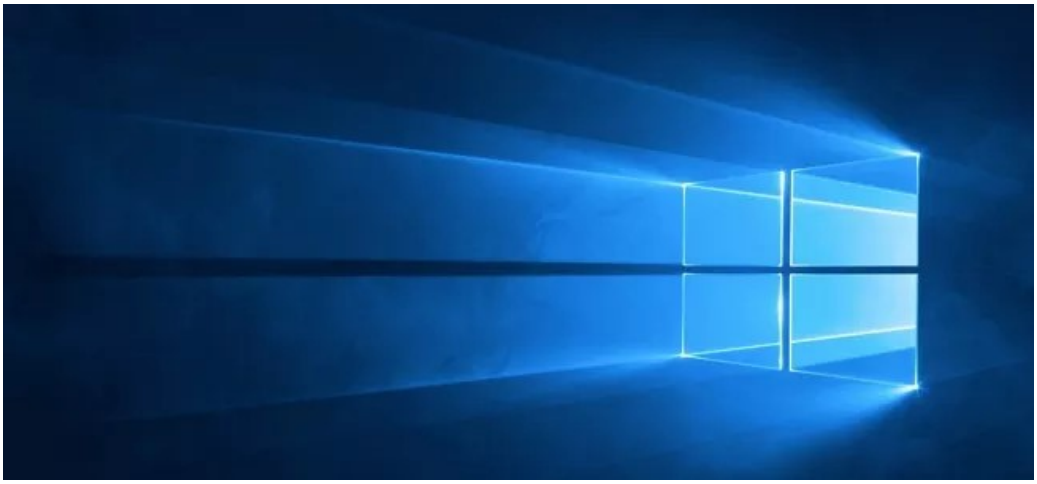
Figure 87 – Edit Name



6. Restart the computer to apply the changes.

9 Find Windows 10 Build and Version

Figure 88 Windows page

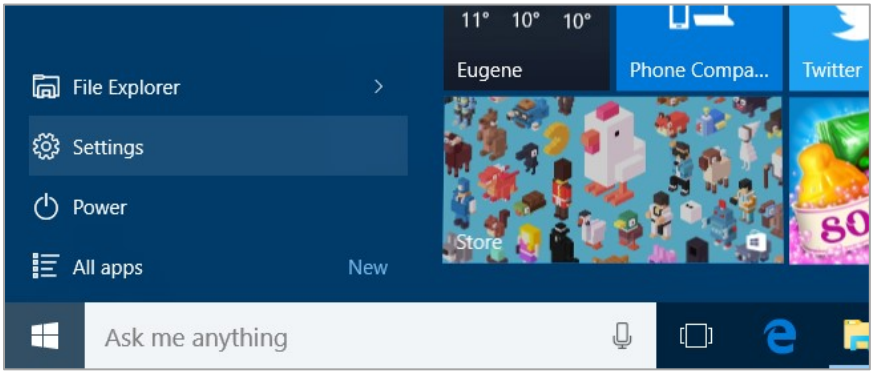


There are different editions of Windows 10 with different features and both 64-bit and 32-bit versions.

9.1 Use the Settings App

The new Settings application also offers this information in a user-friendly form. To launch it, click or tap the Start button and select Settings.

Figure 89 – Settings icon



Navigate to **System > About** and scroll down to view the Version and Build numbers.

- Edition: The Windows 10 edition, i.e., Windows 10 Home, Professional, Enterprise, or Education.

  You can upgrade to the Professional edition from within Windows 10. Switching to Windows 10 Enterprise or Education editions requires a complete reinstall and a special key that is not available to normal home Windows users.

- Build Number: Look at the Version and OS Build lines.

  If you have the original version of Windows 10, the OS Build is 10240. This was the initial release of Windows 10. The November Update version of Windows 10 (Windows 10's first big update) is Version 1511 (OS Build 10576.29).

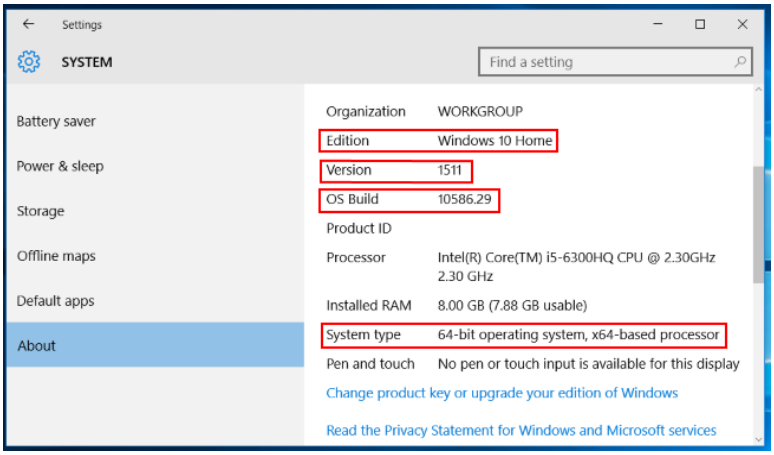
- 1511 is the key. This number identifies the build released in November (the 11th month) of 2015.

  If a build is released in April of 2016, the version number would be Version 1604.

- 64-bit or 32-bit: System type is the version (32-bit or 64-bit). It also tells whether your PC is compatible with the 64-bit version or not.

  For example,
  64-bit operating system, x64-based processor - indicates a 64-bit version of Windows 10 on a 64-bit processor
  32-bit operating system, x64-based processor - indicates a 32-bit version of Windows 10 (the 64-bit version can be installed on the hardware, if preferred)

Figure 90 – System > About dialog



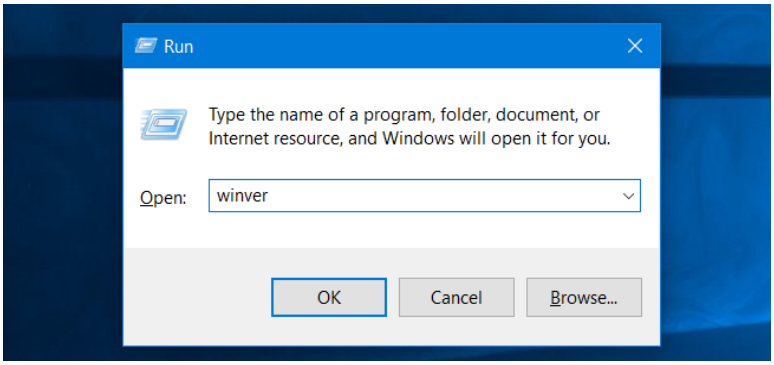
9.2 Use the winver Dialog and Control Panel

Use the winver tool to find the build number of your Windows 10 system.

1. In Start menu Search textbox, type **winver** and click **winver.exe**.

   (Alternately, press Windows Key + R, type **winver** into the Run dialog, and press **OK**.

Figure 91 – Run dialog



On the About Windows page, the second line here is Windows 10 build. Version number is in the form YYMM, where 1511 means the 11th month of 2015.

The winver dialog, also shows the Windows 10 edition.

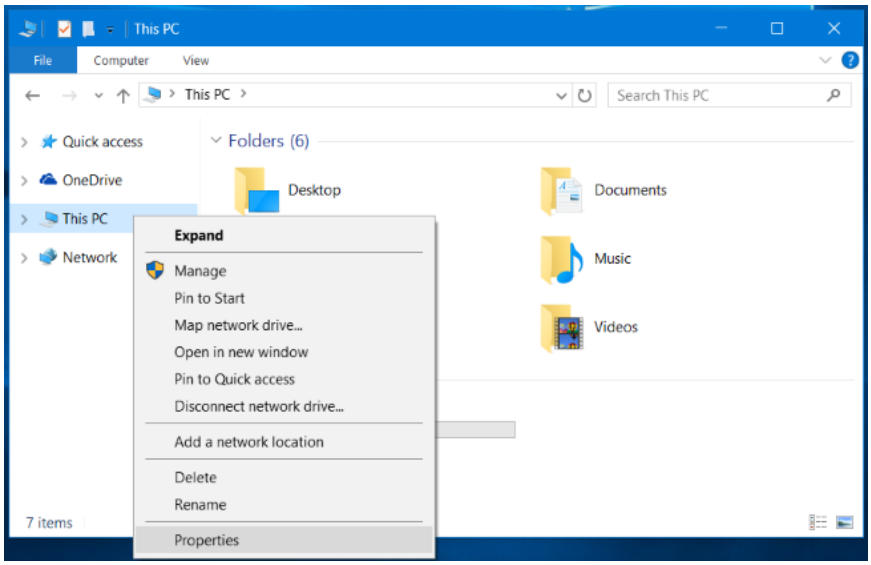
Figure 92 – Windows Version dialog

The winver dialog does not show whether the machine is a 64-bit or 32-bit version.

In a File Explorer window, right click **This PC** and select **Properties**.

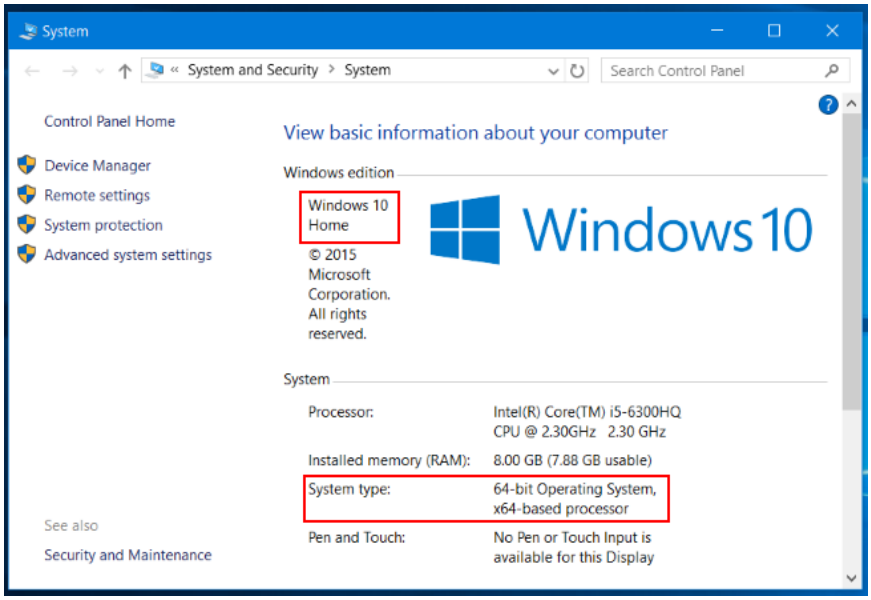
You can also go to the Control Panel > System and Security > System.

Figure 93 - Properties



The Windows edition section at the top of the window displays the edition of Windows 10. The System type displays the 64-bit or 32-bit edition of Windows 10, and whether the computer hardware is 64-bit compatible, or not.

Figure 94 – Control Panel Windows edition



This information is important if you want to know whether your Windows 10 machine has received an update yet, figure out if you have a feature available only in certain editions of Windows, or find out whether you should download the 64-bit version of a program or not.

10 Troubleshooting

For troubleshooting VMs visit:

www.vmware.com

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