Installation of Ubuntu on Mac Mini

Contents

1 Overview

These notes describe the installation of Ubuntu 12.04.3 on a Mac Mini. This is the most powerful server we have found for its size, especially considering that the PSU is internal.

1.1 Mac Mini versions

The recommended configuration of a workshop server is:

- Quad-core i7 ("server" version)
- 16GB RAM
- Two 250GB SSDs (e.g. OCZ Vertex 4)

These instructions have been tested on the following models:

- Mid 2011 (Macmini5,3)
- Mid 2013 (Macmini6,2)

When you have Linux running, you can determine your model using

```
sudo dmidecode -s system-product-name
```

For more information on the different models of Mac Mini see:

- https://support.apple.com/kb/HT3476
- https://en.wikipedia.org/wiki/Mac_Mini

1.2 Items required

For installation only, you will need:

- A mini-displayport to VGA adapter, or a mini-displayport to DVI adapter and a DVI-to-DVI or DVI-to-HDMI cable
- A monitor
- A USB keyboard
- A 1GB+ USB flash drive or a USB CD-R drive

We also recommend an Apple USB to Ethernet adapter for the external Internet connection. This leaves the internal gigabit Ethernet port available for the lab internal network and avoids having to trunk VLANs; it also helps if you have a newer Mac Mini where the internal ethernet adapter is not supported in the default kernel.

2 Preparing the install image

First you need to choose which ISO image to use and download it. Start with the standard 64-bit server edition (ubuntu-12.04.3-server-amd64.iso) which should work fine with recent Mac Minis.

If you have problems booting, then try one of the amd64+mac[1] variants from the alternative downloads page:

- ubuntu-12.04.3-alternate-amd64+mac.iso
- ubuntu-12.04.3-desktop-amd64+mac.iso

However you would then end up installing a desktop version.

You may burn the image onto a CD-R if you have a USB CD-ROM drive to boot from, such as the Apple Superdrive.

Otherwise, to write the image to a USB stick you need use a Mac which is running OSX and follow these instructions

```
hdiutil convert -format UDRW -o ubuntu-12.04.3-server-amd64.img ubuntu-12.04.3-server-amd64.
# Note: the output filename may be .img.dmg
diskutil list   # note the devices seen
# insert flash drive
diskutil list   # note the new device seen, e.g. /dev/disk2
diskutil unmountDisk /dev/diskN
sudo dd if=ubuntu-12.04.3-server-amd64.img.dmg of=/dev/rdiskN bs=1m
diskutil eject /dev/diskN
# remove flash drive
```

3 Installation

Insert the CD-ROM or flash disk into the Mac Mini, and connect the keyboard and screen. Connect ethernet uplink - using the USB-to-ethernet adapter if you have one.

Power on and hold the alt/option key while it is starting. You may get a choice of boot icons - the USB key will be “EFI boot”.

After this you should get a menu of Ubuntu options:

```
Install Ubuntu Server
Install in expert mode
Multiple server install with MAAS
```

[1] See http://askubuntu.com/questions/37999/what-is-different-about-the-mac-iso-image

```
Check disc for defects
Rescue a broken system
```

Select "Install Ubuntu Server" and proceed as normal, choosing country, language and keyboard layout.

If you are using the USB-to-ethernet adapter for your external Internet connection, then you will be prompted for the primary network interface:

```
eth0: Broadcom Corporation NetXtreme BCM57765 Gigabit Ethernet PCIe
eth1: Ethernet
```

Choose the one which is your ethernet uplink (i.e. eth1)

- When you see "Configuring network with DHCP" press ENTER to cancel. Do this quickly!
- Press "Continue" on the Network autoconfiguration failed screen.
- Select "Do not configure the network at this time"
- Hostname: s1
- Full name for the new user: NSRC instructor
- Username: nsrc
- (Use a suitable instructor password)
- Encrypt your home directory? No
- Select timezone. If you are going to be travelling around the world you should not accept the local timezone, and instead scroll down to "UTC" at the very end of the worldwide list.
- Partitioning:
  - Guided - use entire disk
  - "Select disk to partition" SCSI1 (0,0,0) sda
  - "Write changes to disk" Yes.
- Use HTTP proxy? leave blank
- No automatic updates (you don't want changes in the middle of a workshop)
- Software to install: select only "OpenSSH server"
- Installation is complete: hit Enter, then unplug CD-ROM or USB stick.

4 Login after reboot

Your Mac should be up and running - login as user `nsrc`.

Use `ifconfig -a` to find its external IP address, and you should be able to ssh into it from outside. Then you no longer need the keyboard and monitor.

Hint: also take a note of the MAC address of the USB-ethernet adapter, and label it. It helps when locating the machine without a monitor.

4.1 Format the second hard drive

The secondary hard drive needs to be partitioned and formatted so it can be used for storing half of the VM disk images.

```
sudo su - (type the nsrc account password)
parted -s -a optimal /dev/sdb mklabel gpt -- mkpart primary ext4 1 -1
mkfs.ext4 /dev/sdb1
mkdir /data
edit /etc/fstab
    /dev/sdb1   /data   ext4    defaults    0   2
mount /data
```

Now let's see that we actually have the second disk available to us under the /data partition:

```
df -h
```

You should see something like:

```
Filesystem      Size  Used Avail Use% Mounted on
/dev/sda2       215G  1.5G  202G   1% /
udev            7.8G  4.0K  7.8G   1% /dev
tmpfs           3.2G  376K  3.2G   1% /run
none            5.0M     0  5.0M   0% /run/lock
none            7.8G     0  7.8G   0% /run/shm
/dev/sda1        93M  2.1M   91M   3% /boot/efi
/dev/sdb1       230G   60M  219G   1% /data
```

Note that /data is mounted on /dev/sdb1, or the second hard drive in your MacMini

4.2 Configure the internal network interface

We purposely did not configure our network interfaces during installation so that the installation would go faster and we could configure out interfaces as we want now. You can see that neither eth0 or eth1 are configured by doing:

```
ifconfig
```

To fix this, as root, at the command line prompt type:

```
edit /etc/network/interfaces
```

Make sure the file looks like this:

```
# This file describes the network interfaces available on your system
# and how to activate them. For more information, see interfaces(5).

# The loopback network interface
auto lo
iface lo inet loopback

auto eth0
# eth0 internal network interface
iface eth0 inet static
        address 10.10.0.241
        netmask 255.255.255.0

auto eth1
# eth1 external, public network interface
iface eth1 inet dhcp
```

Now to bring up both interfaces with their new configurations do:

```
ifup eth0
ifup eth1
```

Wait a few seconds for the script to complete then type:

```
ifconfig
```

to see that your network is now configured. Trying pinging some external sites to verify that your network is working.

4.3 Update all packages

Now that our base operating system is installed we need to pull down a list of current versions of available packages and then download and install the packages.

Let's first see what version of the Linux kernel we are running:

```
uname -a
```

Remember this and see if you have a newer kernel version once we are finished with this exercise. To update apt and then packages that need updating do:

```
sudo apt-get update
sudo apt-get dist-upgrade
```

Say "Yes" to downloading and installing the new packages.

This could take some time as a considerable amount of information is going to be downloaded. While this is happening we will go on to the next set of configuration items for your workshop kit which includes configuring your switch and access point.

When your machine finishes with the apt-get update and the apt-get dist-upgrade processes you will likely have a new kernel image. This is one of the few times you need to reboot Linux to see change. To do this do:

```
sudo shutdown -r now
```

Wait for the MacMini to restart and log back in as the user nsrc, then type:

```
uname -a
```

To see the version of the Linux kernel that you are running. Is it different from what you had before running "apt-get update" and "apt-get dist-upgrade"?

At this point your MacMini is ready and in its initial state. We'll be updating your MacMini environment using a tool called Ansible a bit later.

Assuming your network interfaces are properly configured you can now remove the monitor and keyboard attached to your MacMini and connect to it using ssh instead.

5 Troubleshooting post installation problems

5.1 Your Mac does not boot

If this is the first time you are installing Linux on your MacMini it's possible that the Linux installer will not set the boot order correctly. Your Mac may be set to boot Mac OS X, but this is no longer available. To correct this you need to do:

- Connect a current Ubuntu version installation media, such as an Ubuntu 12.0.4.3 LTS USB disk.
- Start your MacMini and hold down the option key until you see an option to boot as "EFI Boot"
- Select "EFI Boot" and when presented with the Ubuntu Install screen select "Rescue a broken system"
- You are now asked to run through the initial stages of the Ubuntu installation.
- Select keyboard, country, set hostname and time zone. Note that you can just use all defaults as none of these items will be saved.
- When you see the screen for "Device to use as root file system:" select /dev/sda2
- Select "Execute a shell in /dev/sda2" and select "Continue"

At the bottom of your screen you will see the "#" command prompt. You are now in a rescue Linux shell where we can set some hardware options. You can type:

```
efibootmgr
```

You'll probably see MacOS X listed as the BootCurrent item (0080). We want the Ubuntu entry to become the BootCurrent item. To do this type:

```
efibootmgr -o 00
```

And, that's it.

- Type "exit" to leave the rescue shell
- Select "Reboot the system" and remove the USB key.

Your MacMini should now boot. It may pause for a moment with the white screen, but give it a few seconds to complete booting.

5.2 Problems with video

If the attached monitor displays the grub prompt but then goes blank after booting, your monitor may not support the default resolution. If this happens, try booting with parameter "nomodeset".

- Hit any key at the grub menu to stop booting
- Hit 'e' to edit
- Go to the end of the "linux ..." line, and add `nomodeset` to the end
- Ctrl-X or F10 to continue booting

Then to make this change permanent:

```
# vi /etc/default/grub
GRUB_CMDLINE_LINUX_DEFAULT="nomodeset"

# update-grub
```

6 Installing on older MacMinis

The following instructions were from previous tests with a Macmini4,1 and are kept in case they help debugging problems on older machines.

6.1 Boot using Mac OS X install CD

6.2 Wipe out all partitions

It's probably safer to wipe out the existing Mac OS X and Linux partitions, which should also get rid of rEFIt. That way we make sure that rEFIt is not changing how Linux views the system.

- Use Disk Utility to remove all partitions on both drives

6.3 Get the right Ubuntu install CD

The image used successfully was the alternate-amd64+mac.iso image

The problem is that this installs all the desktop GUI crap, which must be removed after installation.

6.4 Install Ubuntu

- Boot from CD
- Press F6 and select:
  - acpi=off
  - nomodeset
- Continue as above, including same partitioning scheme
- Reboot

6.5 Edit grub defaults

```
# vi /etc/default/grub

GRUB_CMDLINE_LINUX_DEFAULT="quiet"
GRUB_CMDLINE_LINUX="noacpi nomodeset reboot=acpi"
```

Disable lightdm (replacement for gdm):

```
echo 'manual' | sudo tee /etc/init/lightdm.override
```

Then:

```
# update-grub
```

6.6 Convert into server

Remove all the desktop-related packages:

```
# apt-get --purge remove 'gnome-*' xerver-xorg
```

And install the right kernel:

```
# apt-get install linux-headers-server linux-image-server linux-server
```

All set.

Aside: there may be another way to do this using tasksel