# Appendix A
# Build a Xen Server

In this appendix, we describe how to set up Xen (Dom0) and how to configure the virtual machines (DomUs) that we use in this book.

## A.1 Install Xen

Download and install packages:

```
$ sudo apt-get install
xen-linux-system-2.6.18-4-xen-686 \
> libc6-xen
```

Download bridge utilities package:

```
$ sudo apt-get install bridge-utils
```

Reboot:

```
$ sudo reboot
```

```
$ uname -a
Linux xen 2.6.18-4-xen-686 #1 SMP Thu May 10 03:24:35
UTC 2007 i686 GNU/Linux
```

In */etc/xen/xend-config.sxp*, uncomment the line:

```
(network-script network-bridge)
```

Install xen-tools:

```
$ sudo apt-get install xen-tools
```

In the file */etc/xen-tools/xen-tools.conf*, change the *kernel* and *initrd* parameters to reflect the system:

```
kernel = /boot/vmlinuz-2.6.18-4-xen-686
initrd = /boot/initrd.img-2.6.18-4-xen-686
```

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Also, adjust the settings below:

```
dir = /home/xen
debootstrap = 1
size = 4Gb # Disk image size.
memory = 128Mb
swap = 128Mb
fs = ext3 # use the EXT3 filesystem
dist = etch # Default distribution
image = sparse # Sparse vs. full disk images.
```

Create a directory for xen guests:

```
$ sudo mkdir /home/xen/{,domains}
```

Here, we describe how to configure Xen to support multiple network (Ethernet) interfaces. Add a logical bridge:

```
$ sudo brctl addbr xenbr1
```

Turn off spanning tree:

```
$ sudo brctl stp xenbr1 off
```

Set the learning state time to zero:

```
$ sudo brctl setfd xenbr1 0
```

Activate the bridge:

```
$ sudo ip link set xenbr1 up
```

Check the bridge interfaces:

```
$ /usr/sbin/brctl show
bridge name bridge id         STP enabled interfaces
xenbr0      8000.feffffffffff no          vif0.0
                                          peth0
                                          vif26.0
                                          vif26.1
xenbr1      8000.000000000000 no
```

Add eth1 to xenbr1:

```
$ sudo brctl addif xenbr1 eth1
```

Configure */etc/xen/ipp-radius.cfg*:

```
vif  = [ 'bridge=xenbr0', 'bridge=xenbr1' ]
```

Create the script file */etc/xen/scripts/int2-script*:

```
#!/bin/bash

dir=${dirname "$0")
```

```
$dir/network-bridge" start vifnum=0 \
                     netdev=eth0 bridge=xenbr0
$dir/network-bridge" start vifnum=1 \
                     netdev=eth1 bridge=xenbr1
```

In the file */etc/xen/xend-config.sxp*, enter the line:

```
(network-script int2-script)
```

## A.2 DomU Configuration

In this section, we provide details of the configuration of the DomU virtual machines used in this book.

### *A.2.1 RADIUS Server*

*/etc/fstab*:

```
/dev/hda1 /     ext3 errors=remount-ro      0 1
/dev/hda2 none  swap sw                     0 0
proc      /proc proc rw,nodev,nosuid,noexec 0 0
```

*/etc/hostname*:

```
radius
```

*/etc/hosts*:

```
172.16.20.70    radius
172.16.20.79    mysql
172.16.20.80    server
172.16.20.81    client sta

# The following lines are desirable for IPv6 capable
hosts
::1     ip6-localhost ip6-loopback
fe00::0 ip6-localnet
ff00::0 ip6-mcastprefix
ff02::1 ip6-allnodes
ff02::2 ip6-allrouters
ff02::3 ip6-allhosts
```

*/etc/network/interfaces*:

```
iface lo inet loopback

# The primary network interface
auto eth0
iface eth0 inet static
  address 172.16.20.70
  network 172.16.20.0
  gateway 172.16.20.1
  netmask 255.255.255.0
  dns-nameservers 192.168.1.201 192.168.1.203
```

*/etc/xen/raduis.cfg*:

```
kernel = '/boot/vmlinuz-2.6.18-4-xen-686'
ramdisk = '/boot/initrd.img-2.6.18-4-xen-686'

memory = '128'
root    = '/dev/hda1 ro'

disk
   = ['file:/home/xen/domains/radius/disk.img,hda1,w',\
      'file:/home/xen/domains/radius/swap.img,hda2,w']

name = 'radius'

vif = [ 'bridge=xenbr0' ]

on_poweroff = 'destroy'
on_reboot   = 'restart'
on_crash    = 'restart'
```

### *A.2.2 MySQL Server*

The files, */etc/hosts* and */etc/fstab* are the same as for the RADIUS server, described in Sect. A.2.1 above.
*/etc/hostname*:

```
mysql
```

*/etc/network/interfaces*:

```
iface lo inet loopback

# The primary network interface
auto eth0
iface eth0 inet static
```

```
  address 172.16.20.79
  network 172.16.20.0
  gateway 172.16.20.1
  netmask 255.255.255.0
```

*/etc/xen/mysql.cfg*:

```
kernel = '/boot/vmlinuz-2.6.18-4-xen-686'
ramdisk = '/boot/initrd.img-2.6.18-4-xen-686'

memory = '128'
root    = '/dev/hda1 ro'

disk
   = ['file:/home/xen/domains/mysql/disk.img,hda1,w',\
      'file:/home/xen/domains/mysql/swap.img,hda2,w']

name = 'mysql'

vif = [ 'bridge=xenbr0' ]

on_poweroff = 'destroy'
on_reboot   = 'restart'
on_crash    = 'restart'
```

### *A.2.3 DHCP Server*

The files, */etc/hosts* and */etc/fstab* are the same as for the RADIUS server described in Sect. A.2.1 above.
*/etc/hostname*:

```
dhcp
```

*/etc/network/interfaces*:

```
iface lo inet loopback

# The primary network interface
auto eth0
iface eth0 inet static
  address 172.16.20.57
  network 172.16.20.0
  gateway 172.16.20.1
  netmask 255.255.255.0
```

*/etc/xen/dhcp.cfg*:

```
kernel = '/boot/vmlinuz-2.6.18-4-xen-686'
ramdisk = '/boot/initrd.img-2.6.18-4-xen-686'

memory = '128'
root    = '/dev/hda1 ro'

disk = ['file:/home/xen/domains/dhcp/disk.img,hda1,w',\
        'file:/home/xen/domains/dhcp/swap.img,hda2,w']

name = 'dhcp'

vif = [ 'bridge=xenbr0' ]

on_poweroff = 'destroy'
on_reboot   = 'restart'
on_crash    = 'restart'
```

### *A.2.4 Test Client*

The files, */etc/hosts* and */etc/fstab* are the same as for the RADIUS server described in Sect. A.2.1 above.
*/etc/hostname*:

```
client
```

*/etc/network/interfaces*:

```
iface lo inet loopback

# The primary network interface
auto eth0
iface eth0 inet static
  address 172.16.20.81
  network 172.16.20.0
  gateway 172.16.20.1
  netmask 255.255.255.0
```

*/etc/xen/client.cfg*:

```
kernel = '/boot/vmlinuz-2.6.18-4-xen-686'
ramdisk = '/boot/initrd.img-2.6.18-4-xen-686'
```

```
memory = '128'
root    = '/dev/hda1 ro'

disk
   = ['file:/home/xen/domains/client/disk.img,hda1,w',\
      'file:/home/xen/domains/client/swap.img,hda2,w']

name = 'client'

vif = [ 'bridge=xenbr0' ]

on_poweroff = 'destroy'
on_reboot   = 'restart'
on_crash    = 'restart'
```

# Appendix B
# Initial Configuration of Access-Point Controllers

The Alcalel-Lucent Omniaccess and Meru Network's wireless range is controller based. In this appendix, we show the initial configuration of the respective controllers.

## B.1 Alcalel-Lucent Omniaccess Controller

Connect to the controller's console port with a terminal emulator application using the settings: 9600 baud, 8 bits, no parity, 1 stop bit and no flow control.

After a number of boot statements, the configuration sequence starts. Enter the name of the controller and IP address details. The switch-role needs to be set to "master":

```
Enter System name [OAW-4302]: controller1
Enter VLAN 1 interface IP address [172.16.0.254]:
172.16.50.101
Enter VLAN 1 interface subnet mask [255.255.255.0]:
255.255.255.0
Enter IP Default gateway [none]: 172.16.50.254
Enter Switch Role, (master|local) [master]: master
```

Select the appropriate country code. Do not select this option arbitrarily, as it configures the wireless channels pursuant to that country's regulations. Furthermore, if you select the country code "US", it cannot be changed[1] For the purpose of this example, we select "GB":

```
Enter Country code (ISO-3166), <ctrl-I> for supported
list: GB
```

Confirm your selection:

[1] This is a peculiarity of the Omniaccess controller.

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```
You have chosen Country code GB for United Kingdom
(yes|no)?: yes
```

Configure the time and data and set the passwords:

```
Enter Time Zone [PST-8:0]:
Enter Time in GMT [10:05:01]: 10:13:00
Enter Date (MM/DD/YYYY) [3/12/2009]: 03//12/2009
Enter Password for admin login (up to 32 chars): admin
Re-type Password for admin login: admin
Enter Password for enable mode (up to 15 chars): admin
Re-type Password for enable mode: admin
Do you wish to shutdown all the ports (yes|no)? [no]:
yes
```

Note, the passwords are not echoed to the screen. The controller prompts you to confirm the configuration details:

```
Current choices are:

System name: controller1
VLAN 1 interface IP address: 172.16.50.101
VLAN 1 interface subnet mask: 255.255.255.0
IP Default gateway: 172.16.50.254
Switch Role: master
Country code: GB
Time Zone: PST-8:0
Ports shutdown: yes

If you accept the changes the switch will restart!
Type <ctrl-P> to go back and change answer for any
question
Do you wish to accept the changes (yes|no)
```

Answer "yes" if the details are correct. The controller will then reboot:

```
Creating configuration... Done.

System will now restart!
  :
  :
```

## B.2 Meru Controller

The serial console settings for the Meru controller are 115200 baud, 8 bits, no parity, 1 stop bit and no flow control. When the controller starts up, displays the following output:

Controller startup:

```
CPU: Intel(R) Pentium(R) 4 CPU 2.00GHz stepping 09
PCI: Device 00:1f.1 not available because of resource
collisions
PCI_IDE: (ide_setup_pci_device:) Could not enable
device.
hda: 512MB CompactFlash Card,

 hda1 hda2 hda3
ICMP, UDP, TCP, IGMP
<6>EXT3-fs: INFO: recovery required on readonly
filesystem.
EXT3-fs: write access will be enabled during recovery.
kjournald starting.  Commit interval 5 seconds
EXT3-fs: recovery complete.
EXT3-fs: mounted filesystem with ordered data mode.
Your system appears to have shut down uncleanly
Checking root filesystem
[/sbin/fsck.ext2 (1) -- /] fsck.ext2 -a /dev/hda2
/: clean, 5032/228928 files, 277150/457728 blocks
EXT3 FS 2.4-0.9.17, 10 Jan 2002 on ide0(3,2), internal
journal
Mounting local filesystems ...

Accepting reset requests...

Intel(R) PRO/1000 Network Driver - version 6.1.16
Copyright (c) 1999-2005 Intel Corporation.
e1000: 01:0d.0: e1000_validate_option: Flow Control
Disabled
e1000: 01:0d.0: e1000_check_options: Interrupt
Throttling Rate (ints/sec) set te
e1000: eth0: e1000_probe: Intel(R) PRO/1000 Network
Connection
e1000: 01:0e.0: e1000_validate_option: Flow Control
Disabled
e1000: 01:0e.0: e1000_check_options: Interrupt
Throttling Rate (ints/sec) set te
e1000: eth1: e1000_probe: Intel(R) PRO/1000 Network
Connection
Using /lib/modules/2.4.18-3-meruenabled/kernel/drivers/
net/e1000_6_1_6/e1000.o
Setting hostname: default

...no longer accepting reset requests.
```

```
Starting Meru 3.4.2-135 wireless LAN services ...

ERROR : Cannot determine wireless subnet address.
System not fully operational.
Login as admin and use the "setup" command to correct
configuration errors.


default login:
```

Login as "admin" with password "admin" (the password is not echoed to the screen):

```
default login: admin
Password:
The system is not fully operational
```

Run the controller setup function:

```
default# setup

Begin system configuration ...
```

Set the region:

```
Set country code:


Country code configuration for this machine.


The country code is currently set to:   US
```

The default country code is "US", at this point we elect to change it:

```
Would you like to change it [yes/no/quit]?: y

The supported countries are:
    :
    :
GB (United Kingdom)
    :
    :
** WARNING:  Once set to anything other than US, you
will not be able to change*
```

In this example, we select "GB":

```
Please enter a valid country code, or q to quit: GB
```

```
The system is configured for the following ISO country
code:   GB
Host Name configuration for this machine
```

We give the controller the hostname "controller":

```
Set host name:


Please enter host name, or q to quit: controller
Is controller correct [yes/no/quit]?: y
```

We keep the default password, but we strongly advise changing it:

```
Passwords (keep defaults):


Currently default password is used for admin
Would you like to change the password [yes/no/quit]?:
no

Currently default password is used for guest
Would you like to change the password [yes/no/quit]?:
no
```

Configure networking:

```
Networking:


IP configuration for this machine.

Would you like to configure networking [yes/no/quit]?:
yes

Would you like to use Dynamic IP configuration (DHCP)
[yes/no/quit]?: no

Please enter the IP configuration for this machine.
Each item should be entered as an IP version 4 style
address in dotted-decimal
notation (for example, 10.20.30.40)

Enter IP address, or q to quit: 172.16.11.50
Is 172.16.11.50 correct [yes/no/quit]?: yes
```

```
Enter netmask, or q to quit: 255.255.255.0
Is 255.255.255.0 correct [yes/no/quit]?: yes

Enter default gateway (IP), or q to quit: 172.16.11.1
Is 172.16.11.1 correct [yes/no/quit]?: yes


Would you like to configure a Domain Name Server
[yes/no/quit]?: no
```

Set the time:

```
Time:


The time is now Tue Aug 12 22:05:18 UTC 2008
Would you like to change the time zone for this machine
[yes/no/quit]?: yes
Please identify a location so that time zone rules can
be set correctly.
Please select a continent or ocean.
 1) Africa
 2) Americas
 3) Antarctica
 4) Arctic Ocean
 5) Asia
 6) Atlantic Ocean
 7) Australia
 8) Europe
 9) Indian Ocean
10) Pacific Ocean
11) none—I want to specify the time zone using the
Posix TZ format.
#? 8
Please select a country.
 1) Aaland Islands          25) Latvia
 2) Albania                 26) Liechtenstein
 3) Andorra                 27) Lithuania
 4) Austria                 28) Luxembourg
 5) Belarus                 29) Macedonia
 6) Belgium                 30) Malta
 7) Bosnia & Herzegovina    31) Moldova
 8) Britain (UK)            32) Monaco
 9) Bulgaria                33) Netherlands
10) Croatia                 34) Norway
11) Czech Republic          35) Poland
```

```
12) Denmark                 36) Portugal
13) Estonia                 37) Romania
14) Finland                 38) Russia
15) France                  39) San Marino
16) Germany                 40) Serbia and Montenegro
17) Gibraltar               41) Slovakia
18) Greece                  42) Slovenia
19) Guernsey                43) Spain
20) Hungary                 44) Sweden
21) Ireland                 45) Switzerland
22) Isle of Man             46) Turkey
23) Italy                   47) Ukraine
24) Jersey                  48) Vatican City
#? 8

The following information has been given:

        Britain (UK)

The name of the time zone is 'Europe/London'.
Is the above information OK?
#? 1

The following command is the alternative way of
selecting the same time zone

        timezone set Europe/London


Set system time for this machine.

Synchronize time with a Network Time Protocol (NTP)
server [yes/no/quit]?: yes

Please enter the name or IP address of an NTP server,
or q to quit: 130.88.203.2
Is 130.88.203.12 correct [yes/no/quit]?: yes
```

Upon completion, the controller reboots:

```
System configuration completed.
Do you want to commit your changes and reboot
[yes/no/quit]?: yes

Broadcast message from root (ttyS0) (Tue Aug 12
23:10:36 2008):
```

```
Now rebooting system...
The system is going down for reboot NOW!
flushing ide devices: hda
Restarting system.
```

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