Virtualinux

Multi Tier

Installation Guide

Version 0.1

DOCUMENTATION LICENSE

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paternes@di.unipi.it

andrea.paternesi@gmail.com

patton73@users.sourceforge.net

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1. Introduction

VirtuaLinux is a Linux meta-distribution that allows the creation, deployment and administration of both physical and virtualized clusters with no single point of failure.

They are avoided by means of a combination of architectural, software and hardware strategies, including the transparent support for disk-less and master-less cluster configuration.

VirtuaLinux supports the creation and management of virtual clusters in seamless way. The Virtual Cluster Manager enables the system administrator to create, save, restore Xen-based virtual clusters, and to map and dynamically re-map them onto the nodes of the physical cluster.

Master-less, disk-less and virtual clustering relies on the novel VirtuaLinux disk abstraction layer, which enables the fast (almost constant time), space-efficient, dynamic creation of virtual clusters composed of fully independent complete virtual machines.

VirtuaLinux has been jointly designed and developed by the Computer Science Deparment. (HPC lab.) of the University of Pisa and Eurotech HPC lab., a division of Eurotech S.p.A.

VirtuaLinux is a open source software licensed under GPL.

Available at http://virtualinux.sourceforge.net/

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2. Pre Requisites

Virtualinux is a software designed to run on 64bit based computer diskless clusters.

In this guide i will explain how to to install Virtualinux on a 64bit based Personal Computer using Vmware Server to simulate the availability of many nodes.

An **Intel Core 2 Duo** or an **AMD Athlon 64bit** with at least **1GB** of RAM and at least 20GB of free space on Disk **are required** to run Virtualinux using a VMWare Server.

Pay attention and check if the **VT emulation** is enabled from the mother board's Bios of the personal computer because it is needed by the VmWare server to run Virtual machines.So if it is not, then enalbe the VT emulation.

The host's main Operating System is **Debian Etch 64bit** updated to the latest version **r2.**

The software that must be downloaded and installed on the host machine is:

1. latest version of the VMWare Server (latest should be version 1.04) that can be found here http://www.vmware.com
2. latest version of IscsiTarget (latest should be version 0.4.15) that can be found here http://iscsitarget.....

The packages needed and that must be installed from the Debian Repositories are:

1. The Linux Kernel Headers.
2. The CheckInstall package.
3. The Gcc compiler and all common developing libraries.

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3. Setting Up The iSCSI Server

The basic idea is to simulate the presence of a remote scsi storage area that can be accessed by the virtual cluster's nodes while in the startup phase.

The compilation of the iscsitarget will install a kernel module, that allows the host's kernel to cope with Internet over SCSI protocol, and an Iscsi daemon that allows the host to handle the iscsi communications.

You need to untar the file iscsitarget-0.4.15.tar.gz, then enter the directory iscsitarget-0.4.15. The package does not compile against the lastest kernels, so if you encounter a compilation error you should look for the file **kernel/event.c** and change the line

```
nl = netlink_kernel_create(NETLINK_IET, 1, event_recv, THIS_MODULE);
```

with the following one

```
nl = netlink_kernel_create(NETLINK_IET, 1, event_recv, THIS_MODULE,NULL);
```

After that just type the "**make**" command and wait the compilation to finish. To install the compiled stuff you would use the checkinstall utility that can create a debian package of the iscsitarget so that you can in future unistall the stuff without problems.

So with root privileges execute the "**checkinstall**" command. You will be asked if you want to create package docs. Docs are not mandatory. After that you will be asked to prompt in the package name and you should insert "**iscsitarget**"and press **Crtl-D** to go on. A summay with the package information will be displayed. Just press **Return** to finish the package generation.

Below there is the output of the checkinstall package generation routine run on my laptop.

```
patton@ThinkPat:~/Desktop/VirtuaLinux/iscsitarget-0.4.15$ checkinstall

checkinstall 1.6.1, Copyright 2002 Felipe Eduardo Sanchez Diaz Duran
           This software is released under the GNU GPL.

The package documentation directory ./doc-pak does not exist.
Should I create a default set of package docs?  [y]: y

Please write a description for the package.
End your description with an empty line or EOF.
>> iscsitarget
>>
```

```
****************************************
**** Debian package creation selected ***
****************************************

This package will be built according to these values:

0 -  Maintainer: [ patton@ThinkPat ]
1 -  Summary: [ iscsitarget ]
2 -  Name:    [ iscsitarget ]
3 -  Version: [ 0.4.15 ]
4 -  Release: [ 1 ]
5 -  License: [ GPL ]
6 -  Group:   [ checkinstall ]
7 -  Architecture: [ i386 ]
8 -  Source location: [ iscsitarget-0.4.15 ]
9 -  Alternate source location: [  ]
10 - Requires: [  ]

Enter a number to change any of them or press ENTER to continue:
Installing with make install...

======================== Installation results ==========================
`kernel/iscsi_trgt.ko' -> `/lib/modules/2.6.23.12/kernel/iscsi/iscsi_trgt.ko'
depmod -aq
`usr/ietd' -> `/usr/sbin/ietd'
`usr/ietadm' -> `/usr/sbin/ietadm'
`etc/initd/initd.debian' -> `/etc/init.d/iscsi-target'
`doc/manpages/ietadm.8' -> `/usr/share/man/man8/ietadm.8'
`doc/manpages/ietd.8' -> `/usr/share/man/man8/ietd.8'
`doc/manpages/ietd.conf.5' -> `/usr/share/man/man5/ietd.conf.5'
`ChangeLog' -> `/usr/share/doc/iscsitarget/ChangeLog'
`COPYING' -> `/usr/share/doc/iscsitarget/COPYING'
`README' -> `/usr/share/doc/iscsitarget/README'
`README.vmware' -> `/usr/share/doc/iscsitarget/README.vmware'

======================== Installation successful ========================

Copying documentation directory...
./
./doc/
```


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```
./doc/manpages/
./doc/manpages/ietd.conf.5
./doc/manpages/ietd.8
./doc/manpages/ietadm.8
./README
./README.vmware
./ChangeLog
./COPYING

Copying files to the temporary directory...OK
Stripping ELF binaries and libraries...OK
Compressing man pages...OK
Building file list...OK

Kernel modules found. Calling depmod in the postinstall script

Building Debian package...OK
Installing Debian package...OK
Erasing temporary files...OK
Writing backup package...OK
Deleting temp dir...OK

*****************************************************************

 Done. The new package has been installed and saved to

 /home/patton/Desktop/VirtuaLinux/iscsitarget-0.4.15/iscsitarget_0.4.15-1_i386.deb

 You can remove it from your system anytime using:

      dpkg -r iscsitarget

*****************************************************************
```

Now with root privileges just install the created package for iscsitarget.

```
patton@ThinkPat:~$dpkg -i iscsitarget_0.4.15-1_i386.deb
```

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After installation we need to configure the iscsi daemon to use one of the host partition as device for the internet scsi disk. If you do not have any good free partition to choose then create a new one. To be sure that the system will not give errors related to the disk space create a new 20GB partition and set the type to “Linux” without make any filesystem over it.

After that just copy the configuration file below into **/etc/ietd.conf**.

Pay attention that you must change the device from “/dev/sda8” to your newly created device.

```
IncomingUser
OutgoingUser
     Target iqn.2006-10.org.lapd:MyiSCSIDisk_01
            IncomingUser
            OutgoingUser
            Lun 0 Path=/dev/sda8,Type=blockio
            Alias Test
            HeaderDigest None
            DataDigest None
            MaxConnections 1
            InitialR2T No
            ImmediateData Yes
            MaxRecvDataSegmentLength 262144
            MaxXmitDataSegmentLength 8192
            MaxBurstLength 262144
            FirstBurstLength 65536
            DefaultTime2Wait 2
            DefaultTime2Retain 20
            MaxOutstandingR2T 1
            DataPDUInOrder Yes
            DataSequenceInOrder Yes
            ErrorRecoveryLevel 0
            Wthreads 8
            QueuedCommands 32
```

Now start the iscsi service executing the runlevel script /etc/init.d/iscsi-target this way

```
patton@ThinkPat:~$/etc/init.d/iscsi-target start
```


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If you succeeded to run the server without problems then you can go on with the installation of the VMWare server system covered in the next session.

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4. Setting up the VMware Server

In order to install the VMware server just download the latest version from the Vmware's site and untar the package. After that with root privileges run the installation script as describet below. The script will install the complete package asking the user to prompt in some informations as the various installation directories and so on. After the installation it will call itsself the execution of the configuration script.

```
ThinkPat:/home/patton/vmware-server-distrib# ./vmware-install.pl
...
...
...
The installation of VMware Server 1.0.4 build-56528 for Linux completed
successfully. You can decide to remove this software from your system at any
time by invoking the following command: "/usr/bin/vmware-uninstall.pl".

Before running VMware Server for the first time, you need to configure it by
invoking the following command: "/usr/bin/vmware-config.pl". Do you want this
program to invoke the command for you now? [yes]
...
...
...
```

As before the configuration script will ask the user to prompt in some required informations and it will compile some modules for the specific host's kernel. So be warned that it will ask for the kernel headers' location in order to compile those modules.

```
None of the pre-built vmmon modules for VMware Server is suitable for your
running kernel. Do you want this program to try to build the vmmon module for
your system (you need to have a C compiler installed on your system)? [yes]

Using compiler "/usr/bin/gcc". Use environment variable CC to override.

What is the location of the directory of C header files that match your running
kernel? [/lib/modules/2.6.23.14/build/include]

Extracting the sources of the vmmon module.
```


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```
Building the vmmon module.
```

After the compilation of the kernel modules the installation script will ask the user to configure the network for the virtual machines run by the server. This is a very important part of the configuratio so you should pay the right attention to it. In order to run the Virtualinux environment we need to configure the net carefully because the virtual machines (each machine will be a cluster's node as said before) need to access the net to find the iSCSI Target remote partitions. So a way to setup the networking is to configure a **natted network** for the virtual machines. In my case i had 2 ethernet network interfaces configured on two different private subnets : 192.168.1.1(eth1) and 10.0.0.1(eth0). So i configured a Bridged network **vmnet0** on the second device **eth1** and a **natted** network **vmnet2** on private subnet 192.168.2.0.

That did the job to have a working configuration for the virtual machines network. It is very important to have a NAT vmnet2 network although either the network and Virtualinux won't run.

```
Would you prefer to modify your existing networking configuration using the
wizard or the editor? (wizard/editor/help) [editor] editor

The following virtual networks have been defined:

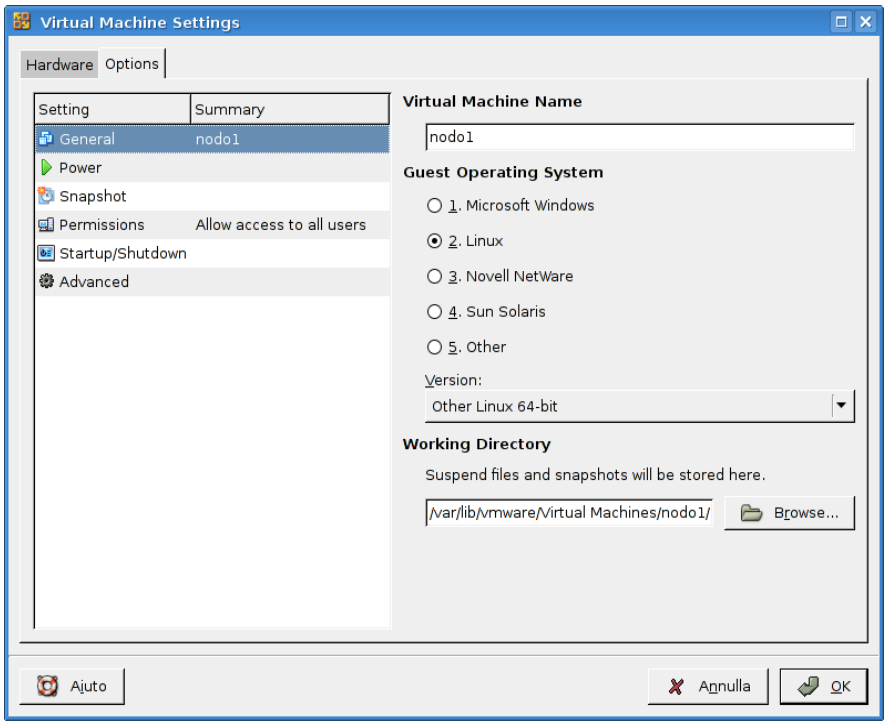
. vmnet0 is bridged to eth1
. vmnet2 is a NAT network on private subnet 192.168.2.0.

Do you wish to make any changes to the current virtual networks settings?
(yes/no) [no]
```

After the network configuration, the script will ask some other questions about the general vmware configuration, will install a startup script for the Vmware server and then will terminate “hopefully” sucessfully.

If you find problems in configuring properly the Vmware server please refer to the Vmware documentation where you can find many answered FAQ and trouble shooting questions.

After Vmware server installation start the vmware server console and create two virtual machines. The machines must host a Ubuntu/Debian 64bit linux operating system so pay attention to choose the right options while creating the machines.



More we need diskless machines because we will relay on the iScsi remote partitions so remove any disk devices from the virtual machines. Then configure the Etherneth device so that it will be linked to **/dev/vmnet2**.

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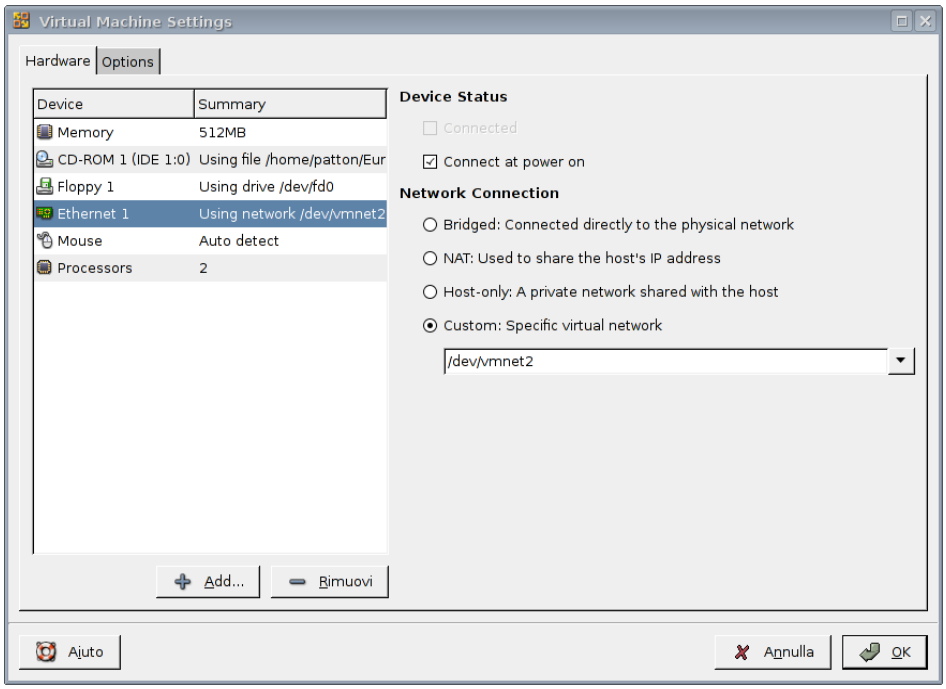
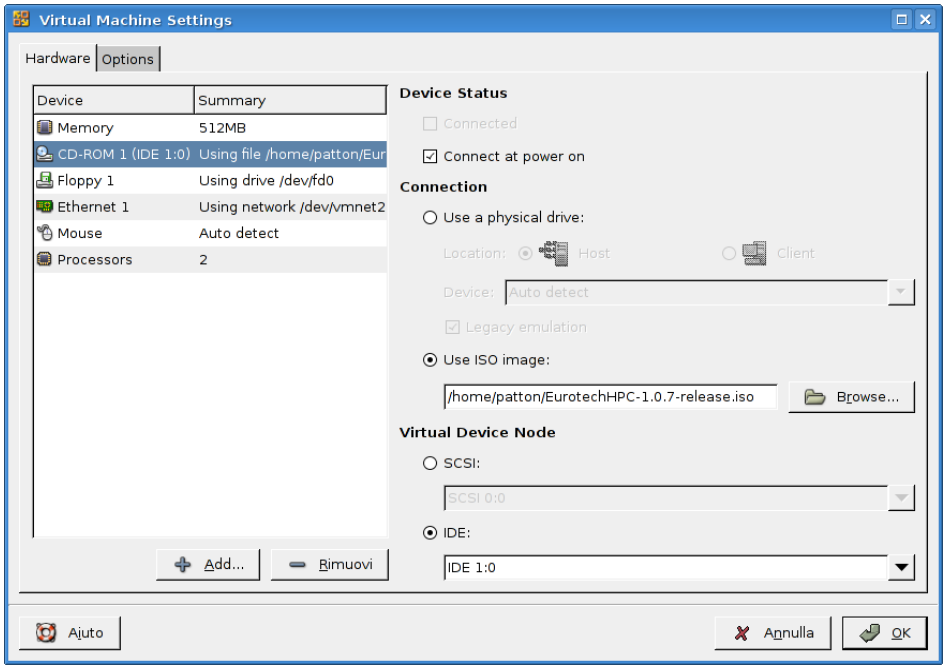
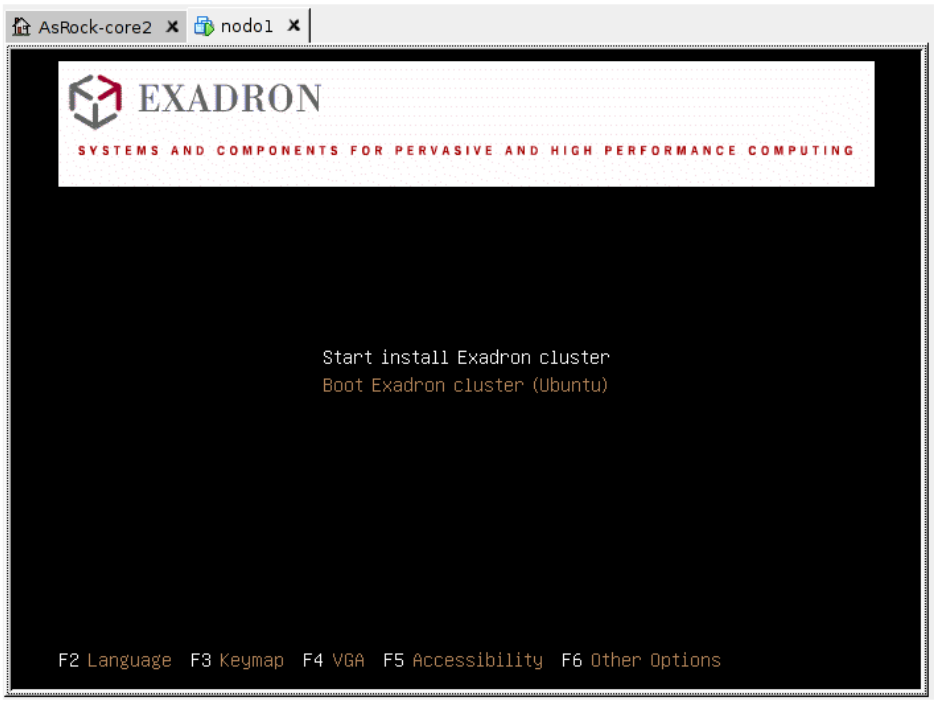


Finally take the first machine and set to boot from iso cd image and link the Virtualinux iso image to it. When you start the virtual machine the iso image wil be booted and therefore the Virtualinux installation will start.



Switch on the virtual machine and after a quick boot choose to Start the installation of the Cluster. This is needed because you are going to install the iSCSI remote partition with Virtualinux software.



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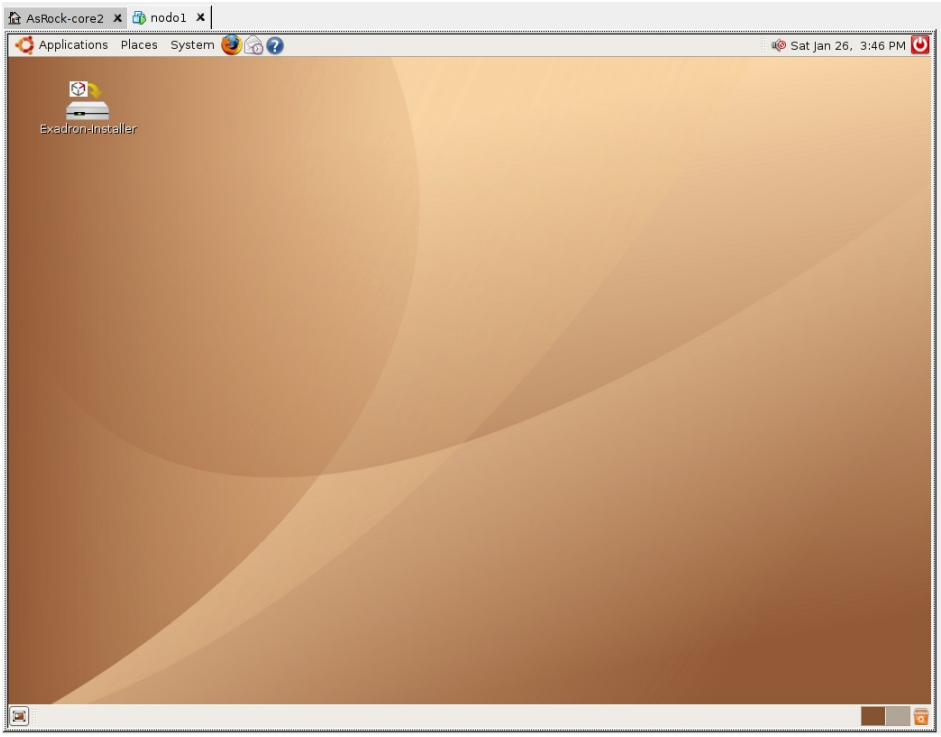
5. References

References.



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```

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