

# Installing Fedora for Ethos Development

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# Chapter 1

## Installing Fedora

### 1.1 Introduction

This chapter describes how to install Fedora with Xen and a Dom0 Linux kernel which may be used for Ethos development<sup>1</sup>. In particular, this document describes how to set up two types of configurations:

1. VMware-hosted Xen, Fedora & Ethos
2. Xen, Fedora & Ethos on bare metal

### 1.2 Obtain Fedora Installation Media

The Fedora network install image, `Fedora-16-ARCH-netinst.iso`, may be found at

<http://download.fedora.redhat.com/pub/fedora/linux/releases/16/Fedora/ARCH/iso/>,  
where *ARCH* is `i386` or `x86_64`. Download the image and transfer it to a writable CD.

### 1.3 *Cheating* with Kickstart

**Warning: the kickstart process will overwrite *all* data on your disk (or virtual machine's disk) with the Fedora install.** If you simply want to get a Dom0 Fedora installation running quickly and are not interested in the details of the process, then you can use a Kickstart script. We have written a Kickstart script that automates the steps enumerated in this document. This script is available at

<http://www.ethos-os.org/ethosInstall/Fedora-16/Fedora-16-ARCH-ethos.ks>

where *ARCH* is `i386` or `x86_64`. To use it, boot the Fedora installation media. When prompted by the initial boot menu, press `Tab` to edit the installation boot parameters. Add:

ks=[http://www.ethos-os.org/ethosInstall/Fedora-16/Fedora-16-x86\\_64-ethos.ks](http://www.ethos-os.org/ethosInstall/Fedora-16/Fedora-16-x86_64-ethos.ks)  
or

ks=<http://www.ethos-os.org/ethosInstall/Fedora-16/Fedora-16-i386-ethos.ks>

to the list of kernel arguments, depending on which architecture you wish to install.

## 1.4 Installing Using a Manual Process

### 1.4.1 Dom0 Fedora Installation

#### 1. Install Fedora using the network install CD-ROM

Boot from the Fedora installation media. During the installation process, you may choose the minimal install option if you wish to avoid installing the X Window System. Follow the onscreen instructions in order to install Fedora. Reboot the newly installed system.

#### 2. Install additional Fedora packages

As root and while connected to the Internet, execute

```
yum install bison ed gcc git glibc-static make ntp xen xen-devel
```

If you are using an x86\_64 system and wish to build the 32-bit version of Ethos, then you must also install two 32-bit libraries; `yum install glibc.i686 glibc-devel.i686 glibc-static.i686 libgcc.i686`. Likewise, you may use yum to install additional packages.

#### 3. Install the Ethos kernel and related software from binary packages

Review <http://www.ethos-os.org/ethosInstall/Fedora-16/> and find the following packages:

- nacl
- ethosFoundation
- ethosTypes
- ethosFrame
- ethosKernel
- go
- ethosUserspace
- goTools

Note the full filename of each package and, again as root, execute

```
rpm -Uvh  
http://www.ethos-os.org/ethosInstall/Fedora-16/PACKAGE-FILENAME
```

for each of the packages found. At the preset, the 32-bit versions of `nacl`, `ethosFoundation`, `ethosTypes`, `ethosFrame`, `ethosKernel`, `ethosUserspace`, and `goTools` must be installed; the 64-bit version of Ethos is not yet fully functional.

4. **Enable the developer's user account to use sudo**
5. **Ensure the networking and time services are running**

```
chkconfig network on
service network start
chkconfig ntpd on
service ntpd start
```

6. **Additional steps to complete installation within VMware environment**

- (a) Install VMware tools. This will allow you to mount files from the host operating system. VMware tools will warn you that Xen is untested, but it seems to work just fine. You may copy the tar file from another virtual machine.
- (b) Configure clock synchronization. Edit the `*.vmx` and ensure the following lines exist:

```
tools.syncTime = "TRUE"
tools.syncTime.period = 60
```

Note, the first line should already exist.

7. **Reboot**

Choose the Xen Dom0 kernel when presented with the GRUB menu.

## Dom0 Network Configuration

1. **Configure Xen**

Xen must be configured to use routing-based virtual networking in order to support Ethos. This is because Ethos relies on Dom0's proxy ARP features. Download the configuration file from <http://www.ethos-os.org/ethosInstall/Fedora-16/xend-config.sxp> and install it at `/etc/xen/`. Next, download the three startup scripts from <http://www.ethos-os.org/ethosInstall/Fedora-16/xen-hotplug-common.sh>, `/network-ethos` and `/vif-ethos` and install them at `/etc/xen/scripts/`. In order to ensure that the Dom0 guest's firewall allows communication with Ethos instances, install the file at <http://www.ethos-os.org/ethosInstall/Fedora-16/00-vif-local.hook> at `/etc/xen/scripts/`. Finally, restart xend with `service xend restart`.

2. **Configure the associated physical device**

For Ethos to run, your primary network device, `eth0`, must have a network configuration.

**DHCP** To configure your system to assign `eth0`'s network parameters using DHCP, write the following to `/etc/sysconfig/network-scripts/ifcfg-eth0`:

```
DEVICE=eth0
HWADDR=XX:XX:XX:XX:XX:XX
TYPE=Ethernet
ONBOOT=yes
USERCTL=no
BOOTPROTO=dhcp
NM_CONTROLLED=no
```

The value of `HWADDR` may be found in the output of the `ifconfig` command.

**Non-DHCP Static IP** If you would like to assign a static IP address without using DHCP, then write a configuration such as the following to the file noted above:

```
DEVICE=eth0
HWADDR=XX:XX:XX:XX:XX:XX
TYPE=Ethernet
ONBOOT=yes
USERCTL=no
BOOTPROTO=none
IPADDR=192.168.0.100
NETMASK=255.255.255.0
GATEWAY=192.168.0.1
DNS1=192.168.0.2
DNS2=192.168.0.3
NM_CONTROLLED=no
```

3. Initialize `eth0` using:

```
ifup eth0
```

## 1.5 Frequently Asked Questions

**Why can't Xen find my Ethos kernel, even though I confirmed its path?**

SELinux is probably enforcing its policy with regard to Xen kernels. Either turn SELinux off, properly label your Ethos kernel, or install the kernel at

```
/var/lib/xen/images/.
```

The latter option will ensure the system properly labels your Ethos kernel; this is the default install location used by the Ethos Makefile.

### **Why are my Ethos programs unable to connect to a remote host?**

There are many things on Dom0 that affect Ethos networking.

- Dom0 firewall, `00-vif-local.hook` manipulates the firewall so that packets may be forwarded on behalf of Ethos guests.
- Dom0 routes, `vif-route` manipulates the routing table so that Dom0 knows which port each Ethos guest is present on.
- Dom0 proxy ARP, `network-route` turns on proxy ARP; for more on this idiosyncratic subject, please refer to *Networking Scenarios*.
- Dom0 IP forwarding, `network-route` turns on IP forwarding when `xend` starts at boot time.

### **Why is Dom0 periodically unresponsive when running Ethos in DomU?**

You may be encountering a guest scheduling anomaly. Confirm that `dom0_max_vcpus=1` is listed in Xen's boot options, as defined in `/etc/grub.conf`. You may also want to read <http://wiki.xensource.com/xenwiki/XenBestPractices>.

## **Notes**

<sup>1</sup> Both 32-bit PAE and x86\_64 Fedora may serve as a Dom0 guest, resulting in a Xen environment capable of running 32-bit PAE Ethos.