



Image Management Guide BETA PREVIEW

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Image Management Overview

Welcome to the Eucalyptus Image Management Guide. This guide contains conceptual overviews about what images are, as well as best practices and common tasks for using images in your cloud.



Note: This guide assumes a moderately high level of expertise with the Linux command line.



Note: Because of the wide variety of Linux distributions (and other operating systems) that may be running on an instance, specific examples may vary.

Image Overview

An image defines what will run on a guest instance with your Eucalyptus cloud. Typically, an image contains one of the Linux distributions like CentOS, Fedora, Ubuntu, Debian or others. It could also contain one of the supported Windows server versions. The format for these is identical.

Normally when we use the term "image" we mean the root file system. Once bundled, uploaded, and registered with Eucalyptus, such an image is known as a Eucalyptus machine image (EMI).

There are, however, other types of images that support the EMI. They are the kernel (EKI) and ramdisk (ERI). They contain kernel modules necessary for proper functioning of the image. Often, one set of these ERIs and EKIs are used by multiple EMIs. Once loaded into the Eucalyptus cloud, the EKI and ERI are referred to by the image and you don't have much interaction with them directly.

To help get you started, Eucalyptus provides pre-packaged virtual machines that are ready to run in your cloud. You can get them at the [Eucalyptus Machine Images](#) page. Each Eucalyptus image from this site comes bundled with a corresponding EKI and ERI. You can manually download these images from the web page, or you can use the Eucalyptus Image Store commands to list and describe these images, as well as to install an image in your cloud. For more information, see [Browse and Install Images from EuStore](#).

If you find that the pre-packaged images don't meet your needs, you can migrate an image from another cloud system (such as vSphere or Amazon Web Services) or create your own image. See the rest of this guide for more information.

Once you've created or downloaded the image(s) you plan to use, you can bundle, upload and register the images with your Eucalyptus cloud.



Tip: For a list of supported guest operating systems, go to [Eucalyptus Cloud Compatibility Matrix](#).

Image Tasks

An image is the basis for instances that you spin up for your computing needs. This section explains how to create or acquire an image and then add it to your Eucalyptus cloud.

There are a few ways you can create or acquire an image for use in a Eucalyptus cloud:

- Add an image based on an existing image. Eucalyptus has stock images available to help you get started right away. You can find links to these images in the Eucalyptus Administrator Console's start page, or you can use the EuStore command line tools. For more information, see [Browse and Install Images from EuStore](#).
- Add an image that you create. For more information, see the [Create a New Image](#) section.
- Migrate an image from another cloud, such as Amazon Web Services (AWS). For more information, see the [Migrate an Image](#) section.

Browse and Install Images from EuStore

Eucalyptus provides a resource, called EuStore. EuStore contains images that you can download and install. This task explains how to browse and install images from EuStore.

To browse and install an image from EuStore:

1. Find an image on EuStore:

```
eustore-describe-images
```

This command returns a list of images available from the EuStore. For example:

```
0400376721 fedora      x86_64  starter      kvm          Fedora 16
x86_64 - SELinux / iptables disabled. Root disk of 4.5G. Root user enabled.
2425352071 fedora      x86_64  starter      kvm          Fedora 17
x86_64 - SELinux / iptables disabled. Root disk of 4.5G. Root user enabled.
1107385945 centos       x86_64  starter      xen, kvm, vmware CentOS 5 1.3GB
root, Hypervisor-Specific Kernels
3868652036 centos       x86_64  starter      kvm          CentOS 6.3
x86_64 - SELinux / iptables disabled. Root disk of 4.5G. Root user enabled.
1347115203 opensuse     x86_64  starter      kvm          OpenSUSE 12.2
x86_64 - KVM image. SUSE Firewall off. Root disk of 2.5G. Root user enabled.
Working with kexec kernel and ramdisk. OpenSUSE minimal base package set..
.
.
.
```

For additional information regarding the images on eustore (for example, who is the maintainer of the image), use the -v option, which returns the email address of the maintainer of the image in the last column. For example:

```
# eustore-describe-images -v
0400376721 fedora      x86_64  starter      kvm          Fedora 16
x86_64 - SELinux / iptables disabled. Root disk of 4.5G. Root user enabled.
20121107181713      d13e-1e35  fedora-based
olivier.renault@eucalyptus.com
2425352071 fedora      x86_64  starter      kvm          Fedora 17
x86_64 - SELinux / iptables disabled. Root disk of 4.5G. Root user enabled.
20121107181713      6369-6e28  fedora-based
olivier.renault@eucalyptus.com
1107385945 centos       x86_64  starter      xen, kvm, vmware CentOS 5 1.3GB
root, Hypervisor-Specific Kernels
20120517102326      84ae-59db  centos-based
```

```

images@lists.eucalyptus.com
3868652036 centos      x86_64  starter      kvm          CentOS 6.3
x86_64 - SELinux / iptables disabled. Root disk of 4.5G. Root user enabled.
20121107181713      48df-52d4  centos-based
olivier.renault@eucalyptus.com
1347115203 opensuse   x86_64  starter      kvm          OpenSUSE 12.2
x86_64 - KVM image. SUSE Firewall off. Root disk of 2.5G. Root user enabled.
Working with kexec kernel and ramdisk. OpenSUSE minimal base package set..
20121120130646      a981-db13  opensuse-based
lester.wade@eucalyptus.com

```

- Pick an available image from the returned list and note the image ID. For this example, we will choose:

```

3868652036 centos      x86_64  starter      kvm          CentOS 6.3
x86_64 - SELinux / iptables disabled. Root disk of 4.5G. Root user enabled.

```

- Install the image from EuStore using the `eustore-install-image` command. For this example, we only need to specify the image ID and the name of a bucket (the bucket will be created if it doesn't already exist):



Note: Some images may require additional parameters (for example, that you specify a kernel type with the `-k` option). Please see the `eustore-install-image` topic in the Eucalyptus Command Line Reference for more information.

```

eustore-install-image -b centos-testbucket -i 3868652036 --hypervisor kvm

```

This command performs a number of tasks for you, including downloading the image from the central Eucalyptus image store and installing the image on your own Eucalyptus private cloud. The output from this command will look similar to the following example:

```

Downloading Image :  CentOS 6.3 x86_64 - SELinux / iptables disabled. Root
disk of 4.5G. Root user enabled.
0-----1-----2-----3-----4-----5-----6-----7-----8-----9-----10
#####

Checking image bundle
Unbundling image
going to look for kernel dir : kvm-kernel
Bundling/uploading ramdisk
Checking image
Compressing image
Encrypting image
Splitting image...
Part: initrd-2.6.32-279.14.1.el6.x86_64.img.part.00
Generating manifest
/tmp/olEuG_/initrd-2.6.32-279.14.1.el6.x86_64.img.manifest.xml
Checking bucket: centos-testbucket
Creating bucket: centos-testbucket
Uploading manifest file
Uploading part: initrd-2.6.32-279.14.1.el6.x86_64.img.part.00
Uploaded image as
centos-testbucket/initrd-2.6.32-279.14.1.el6.x86_64.img.manifest.xml
centos-testbucket/initrd-2.6.32-279.14.1.el6.x86_64.img.manifest.xml
eri-064B387A
Bundling/uploading kernel
Checking image
Compressing image
Encrypting image

```

```

Splitting image...
Part: vmlinuz-2.6.32-279.14.1.el6.x86_64.part.00
Generating manifest /tmp/olEuG_/vmlinuz-2.6.32-279.14.1.el6.x86_64.manifest.xml
Checking bucket: centos-testbucket
Uploading manifest file
Uploading part: vmlinuz-2.6.32-279.14.1.el6.x86_64.part.00
Uploaded image as
centos-testbucket/vmlinuz-2.6.32-279.14.1.el6.x86_64.manifest.xml
centos-testbucket/vmlinuz-2.6.32-279.14.1.el6.x86_64.manifest.xml
eki-A4D6398A
Bundling/uploading image
Checking image
Compressing image
Encrypting image
Splitting image...
Part: centos-6.3-x86_64.part.00
Part: centos-6.3-x86_64.part.01
Part: centos-6.3-x86_64.part.02
Part: centos-6.3-x86_64.part.03
[...example truncated...]
Part: centos-6.3-x86_64.part.19
Generating manifest /tmp/olEuG_/centos-6.3-x86_64.manifest.xml
Checking bucket: centos-testbucket
Uploading manifest file
Uploading part: centos-6.3-x86_64.part.00
Uploading part: centos-6.3-x86_64.part.01
Uploading part: centos-6.3-x86_64.part.02
Uploading part: centos-6.3-x86_64.part.03
[...example truncated...]
Uploading part: centos-6.3-x86_64.part.19
Uploaded image as centos-testbucket/centos-6.3-x86_64.manifest.xml
centos-testbucket/centos-6.3-x86_64.manifest.xml
Installed image: emi-233637E1

```

Note the last line in the output, which provides the image ID for the image you just installed from the euca store. In this example, the image ID is emi-233637E1.

4. Verify the image was installed on your Eucalyptus cloud. To do this, use the `euca-describe-images` command, which returns a list of the available images on your Eucalyptus cloud:

```
euca-describe-images | grep centos-testbucket
```

This command will return output similar to the following example:

```

IMAGE     eki-A4D6398A
centos-testbucket/vmlinuz-2.6.32-279.14.1.el6.x86_64.manifest.xml
345590850920    available    public      x86_64    kernel
instance-store
IMAGE     eri-064B387A
centos-testbucket/initrd-2.6.32-279.14.1.el6.x86_64.img.manifest.xml
345590850920    available    public      x86_64    ramdisk
instance-store
IMAGE     emi-233637E1    centos-testbucket/centos-6.3-x86_64.manifest.xml
345590850920    available    public      x86_64    machine eki-A4D6398A
eri-064B387A    instance-store

```

The first three characters of the ID returned in the second column indicate what the object is - `eki` indicates a Eucalyptus kernel image, `eri` is a Eucalyptus ramdisk image, and `emi` indicates a Eucalyptus machine image.

Note the ID of the last image in the output -

```
emi-233637E1
```

- matches that of the image we installed from EuStore.

The image has been successfully downloaded from EuStore and installed on your Eucalyptus cloud.

You can now run an instance from this image and connect to it using SSH.



Tip: If you use a Debian image from Eustore, add `nozeroconf=yes` in the `/etc/sysconfig/network` file on the node controller to make sure that the image boots and runs properly.

Create a New Image

This section covers how to create or acquire a new image for use in your Eucalyptus cloud..

Create a New Image from an Existing EBS-Backed Image

A common way to create a new image is to customize an existing image.

This example shows how to create a new EBS-backed Eucalyptus image based on an existing EBS-backed Eucalyptus instance.

1. Log on to an existing Eucalyptus EBS-backed instance and customize the instance.
2. Prepare the image. See [Prepare a Linux Image for Eucalyptus](#) for instructions.
3. Create a new image based on the image you just modified by using the `eucalyptus-create-image` command, specifying a name, a description, and the instance ID of the Eucalyptus instance you customized in the previous step. For example:

```
euca-create-image -name "mynewimage" -d "This is my new custom recycled image"
-i i-1ABCDEFF
```

This command will show the ID of the new machine image and exit immediately. In the background, Eucalyptus will begin the process of creating a new image based on the instance you supplied.

You can monitor the status of the image using the `euca-describe-images` command, supplying the ID of the image returned from the `euca-create-image` command. For example:

```
euca-describe-images i-e12398ab
```

Create a New Image from an Existing Instance-Store Image

A common way to create a new image is to customize an existing image.

This example shows how to create a new instance store Eucalyptus image based on an existing instance store Eucalyptus instance.

1. Log on to an existing Eucalyptus instance-store instance and customize the instance. See [Prepare a Linux Image for Eucalyptus](#) for instructions.
2. Create a new image based on the image you just modified by using the `euca-bundle-instance` command, specifying a name (for Windows instances, prefix the name with 'windows'), a description, and the instance ID of the Eucalyptus instance you customized in the previous step. For example:

```
euca-bundle-instance -b mybundle -p mycentos6 -o $EC2_ACCESS_KEY -w
$EC2_SECRET_KEY i-96154365
BUNDLE      bun-96154365      i-96154365      mybundle      mycentos
62013-11-05T21:37:23.469Z 2013-11-05T21:37:23.469Z      pending      0
```


This command will the bundle task ID and exit immediately. In the background, Eucalyptus will begin the bundling process. Depending on the size of the instance, it can take several minutes for the bundling task to complete.

You can monitor the status of the bundle task using the `euca-describe-bundle-tasks` command, supplying the ID of the image returned from the `eucalyptus-bundle-instance` command. For example:

```
euca-describe-bundle-tasks
BUNDLE      bun-96154365      i-96154365      mybundle      mycentos6
2013-11-05T21:37:23.469Z 2013-11-05T21:37:58.446Z      storing      0
```

- Once the bundle task is complete, you can register the bundle as an instance-store image using the `euca-register` command, specifying the path to the bundle manifest in the format `[bucket]/[prefix].manifest.xml`. For example:

```
euca-register mybundle/mycentos6.manifest.xml.
```

Your new image is now ready for use in your Eucalyptus cloud.

Create an EBS-Backed Image

An EBS-backed image (sometimes referred to as a "bfEBS" image) is an image with a root device that is an EBS volume created from an EBS snapshot. An EBS-backed image has a number of advantages, including:

- Faster boot time
- Larger volume size limits
- Changes to the data on the image persist after instance termination

Create an Image File

You can create an EBS-backed EMI from an existing `.img` file or create your own `.img` file. One way to create your own `.img` file is to use `virt-install` as described below.



Note: If you already have `.img` file, skip to the [Register an EBS-Backed EMI](#) section.



Note: Use `virt-install` on a system with the same operating system version and hypervisor as your Node Controller. If you use an image created by `virt-install` under a different distribution or hypervisor combination, it is likely that it will not install the correct drivers into the ramdisk and the image will not boot on your Node Controller.

To create an EBS-backed image file:

- On the designated host, use the QEMU disk utility to create a disk image. For example:

```
qemu-img create -f raw bfefs.img 2G
```

- Use `parted` to set the disk label:

```
parted bfefs.img mklabel msdos
```

- Use `virt-install` to start a new virtual machine installation using the disk image you just created:

```
virt-install --name rhel6 --ram 1024 --os-type linux --os-variant rhel6 \
-c /tmp/media.iso --disk \
path=/tmp/bfefs.img,device=disk,bus=virtio --vnc
```

- Once you have completed the installation, start the virtual machine using `virt-manager` or other libvirt tool of your choice.
- Configure the virtual machine by connecting to it and making the following changes:

- a) Comment out the HWADDR entry from the `/etc/sysconfig/network-scripts/ifcfg-eth0` file. For example:

```
DEVICE="eth0"
BOOTPROTO="dhcp"
#HWADDR="B8:AC:6F:83:1C:45"
IPV6INIT="yes"
MTU="1500"
NM_CONTROLLED="yes"
ONBOOT="yes"
TYPE="Ethernet"
UUID="499c07cc-4a53-408c-87d2-ce0db991648e"
PERSISTENT_DHCLIENT=1
```

- b) Add the following option to the end of `/boot/grub/menu.lst` to get a serial console:
- ```
console=ttyS0
```
- c) Remove the `quiet` option from the kernel parameters and grub menu splash image in the `/boot/grub/menu.lst` file.
- d) Add the following line to the `/etc/sysconfig/network` file to disable the zeroconf route, which can interfere with access to the metadata service:
- ```
NOZEROCONF=yes
```
- e) Edit `/etc/udev/rules.d/70-persistent-net.rules` and remove the entry for the existing NIC.
- f) Copy the Eucalyptus `rc.local` file from <https://github.com/eucalyptus/Eucalyptus-Scripts/blob/master/rc.local>.

Register an EBS-Backed EMI

Creating an EBS-backed EMI will require initial assistance from a helper instance. The helper instance can be either an instance store or EBS-backed instance and can be deleted when finished. It only exists to help create the initial volume that will be the source of the snapshot behind the EBS-backed EMI.

1. Create and launch a help instance.
2. Create a volume big enough to hold the bootable .img file.


```
euca-create-volume -z <cluster_name> -s <size_in_GB>
```
3. Attach the volume to the helper instance.


```
euca-attach-volume <volume-id> -i <instance-id> -d <device>
```
4. Log in to the instance and copy the bootable image to the attached volume by performing one of the following steps:
 - If the bootable image is saved in an http or ftp repository, use `curl` or `wget` to download the .img file to the attached volume. For example:


```
curl <path_to_bootable_image> > <device>
```
 - If the bootable image is from a source other than an http or FTP repository, copy the bootable image from its source to the helper instance, and then copy it to the attached volume using the `dd` command. For example:


```
dd if=<path_to_bootable_image> of=<device> bs=1M
```
5. Detach the volume from the instance:


```
euca-detach-volume <volume-id>
```
6. Create a snapshot of the volume:


```
euca-create-snapshot <volume-id>
```
7. Register the snapshot:


```
euca-register --name <image-name> --snapshot <snapshot-id> --root-device-name <device>
```

You've now created a EBS-backed image. To maintain data persistence, be sure to use `euca-stop-instances` and `euca-start-instances` to stop and start your EBS-backed instance.

Install a Linux Distribution ISO to an Image

This topic shows how to install a Linux distribution ISO and prepare an image for registration with Eucalyptus.

1. Use the QEMU disk utility to create a disk image. In the following example, we create a 5GB disk image:

```
qemu-img create -f raw centos6.img 5G
```

2. Use the parted utility to set the disk label.

```
parted centos6.img mklabel msdos
```

3. Use `virt-install` to start a new virtual machine installation, as in the following example (note the example has been broken into multiple lines for formatting purposes):

```
virt-install --name centos6 --ram 1024 --os-type linux --os-variant rhel6
-c /tmp/CentOS-6.3-x86_64-bin-DVD1.iso --disk
path=/tmp/centos6.img,device=disk,bus=virtio
--graphics vnc,listen=0.0.0.0 --force
```

4. Use the VNC client of your choice to connect to the new virtual machine and complete the installation.

5. Modify the following `libvirt.xml` template to create the VM and run `virsh create <libvirt.xml>`.

```
<domain type='kvm'>
  <name>eucalyptus-centos</name>
  <os>
    <type>hvm</type>
  </os>
  <features>
    <acpi/>
  </features>
  <memory>1073741</memory>
  <vcpu>1</vcpu>
  <devices>
    <!--<emulator>/usr/bin/kvm</emulator>-->
    <disk type='file'>
      <source file='/tmp/centos6.img'>
      <target dev='hda'>
    </disk>
    <interface type='bridge'>
      <source bridge='br0'>
      <model type='virtio'>
    </interface>
    <graphics type='vnc' port='-1' autoport='yes' listen='0.0.0.0'>
  </devices>
</domain>
```

6. Connect to the virtual machine using your VNC client of choice and make the following configuration changes:

- a) Modify the `/etc/sysconfig/network-scripts/ifcfg-eth0` file and set the `ONBOOT` option to "yes". For example:

```
DEVICE="eth0"
BOOTPROTO="dhcp"
HWADDR="B8:AC:6F:83:1C:45"
IPV6INIT="yes"
MTU="1500"
NM_CONTROLLED="yes"
ONBOOT="yes"
TYPE="Ethernet"
```

```
UUID="499c07cc-4a53-408c-87d2-ce0db991648e"
PERSISTENT_DHCLIENT=1
```

- b) Enable a serial console on the virtual machine by adding the following option to the end of the `/boot/grub/menu.lst`:
`console=ttyS0`
- c) Remove the `quiet` option from the kernel parameters and the grub menu splash image in the `/boot/grub/menu.lst` file. For example:

```
# grub.conf generated by anaconda
#
# Note that you do not have to rerun grub after making changes to this file
# NOTICE:  You have a /boot partition.  This means that
#           all kernel and initrd paths are relative to /boot/, eg.
#           root (hd0,0)
#           kernel /vmlinuz-version ro root=/dev/sda2
#           initrd /initrd-[generic-]version.img
#boot=/dev/sda
default=0
timeout=5
#splashimage=(hd0,0)/grub/splash.xpm.gz
hiddenmenu
title Eucalyptus (2.6.32-358.18.1.el6.x86_64)
    root (hd0,0)
    kernel /vmlinuz-2.6.32-358.18.1.el6.x86_64 ro
root=UUID=062b9c31-95f3-424f-8b47-35107cfdcf08 rd_NO_LUKS rd_NO_LVM
LANG=en_US.UTF-8 rd_NO_MD SYSFONT=latarcyrheb-sun16 crashkernel=auto
KEYBOARDTYPE=pc KEYTABLE=us rd_NO_DM rhgb
    initrd /initramfs-2.6.32-358.18.1.el6.x86_64.img
```

- d) Add the following line to the `/etc/sysconfig/network` file to disable the zeroconf route, which can interfere with access to the metadata service:
`NOZEROCONF=yes`
 - e) Edit the `/etc/udev/rules.d/70-persistent-net.rules` file and remove all entries for the existing network interface. Make sure that you delete all entries before terminating the virtual machine and registering it with Eucalyptus.
7. Eucalyptus instances use cloud-init to specify actions to run on your instance at boot time, which can be passed using the `userdata` parameter. To install and configure cloud-init on your instance:

- a) Install cloud-init:

```
# rpm -Uvh
http://download.fedoraproject.org/pub/epel/6/x86_64/epel-release-6-8.noarch.rpm
# yum install cloud-init
```

- b) By default, cloud-init uses `ec2-user` as the log-in user. Add `ec2-user` to your instance and give it appropriate sudo permissions:

```
# adduser ec2-user
# passwd ec2-user
```

- c) Run `visudo` and add the following entries at the bottom of the `sudoers` file:

```
## Allow root to run any commands anywhere
root    ALL=(ALL)        ALL
ec2-user    ALL=(ALL)        NOPASSWD: ALL
```

- d) You can optionally copy Eucalyptus `rc.local` file (available at <https://github.com/eucalyptus/Eucalyptus-Scripts/blob/master/rc.local>) to the `/etc` directory on your virtual machine and modify it as needed.

You've now installed a distribution from an ISO and created a Eucalyptus-ready image that can be registered with Eucalyptus.

Create a Windows Image (KVM)

This section details the tasks necessary to create a Windows image.

We recommend that you perform this task on a node controller (NC), or a host running the same Linux distributions and hypervisors as your NCs. If you are creating the Windows image on a machine currently running as a NC, terminate all running instances and stop the NC. To stop the NC, enter:

```
service eucalyptus-nc stop
```

A template file that closely matches those that Eucalyptus generates at VM instantiation time is located at `/usr/share/eucalyptus/doc/libvirt-kvm-windows-example.xml`. We recommend that you review the file to acquaint yourself with its contents, noting required files, bridges, and resources. For more information about configuring the libvirt.xml file, go to the [Domain XML format](#) page in the libvirt documentation.

To create an image from a Windows OS in VMware you will need one network interface and one disk.



Note: If you are using VMware, make sure that the Windows VM uses the LSI Logic Parallel driver as the SCSI controller. For some Windows versions, this is not the default SCSI controller in the VM setting.

Install Base Windows OS

The first task for creating a Windows image is installing a base Windows operating system (OS). To install a base Windows OS using KVM:

1. Log in to the stopped NC server or a host that runs the same hypervisor as the NCs.
2. Create a blank disk file. Specify your Windows VM image name using the parameter `of`.

```
dd if=/dev/zero of=windows.<image_name>.img bs=1M count=1 seek=16999
```



Important: Your image name must start with the word, windows (all lower-case).

3. Create a floppy and secondary blank disk to be attached to the image later, in order to test paravirtualization drivers

```
dd if=/dev/zero of=floppy.img \
bs=1k count=1474
dd if=/dev/zero of=secondary.img \
bs=1M count=1 seek=1000
```

4. Copy all of the `.img` and `.iso` files to the `/var/lib/libvirt/images/` directory.
5. Copy the `libvirt-kvm-windows-example.xml` file to your working directory and rename it to `libvirt-kvm-windows.xml`.

```
cp /usr/share/eucalyptus/doc/libvirt-kvm-windows-example.xml
/var/lib/libvirt/images/libvirt-kvm-windows.xml
```

or

```
cp /usr/share/eucalyptus/doc/libvirt-xen-windows-example.xml
/var/lib/libvirt/images/libvirt-xen-windows.xml
```

- Open the new `libvirt-kvm-windows.xml` file and provide fully qualified paths to the VM image file and iso. Make sure that the name of the bridge is the same as the one used by the hypervisor on which you are creating the Windows image.

Your file should look similar to the following example:

```
<domain type='kvm'>
  <name>your-domain-name-here</name>
  <os>
    <type>hvm</type>
    <boot dev='cdrom' />
  </os>
  <features>
    <acpi />
  </features>
  <memory>524288</memory>
  <vcpu>1</vcpu>
  <devices>
    <emulator>/usr/libexec/qemu-kvm</emulator>
    <disk type='file'>
      <source file='/var/lib/libvirt/images/windows_2003.img' />
      <target dev='hda' />
    </disk>
    <!-- <disk type='file' device='disk'>
      <source file='fully_qualified_path_to_secondary_disk' />
      <target dev='vda' bus='virtio' />
    </disk>
    <disk type='file' device='floppy'>
      <source file='fully_qualified_path_to_floppy_disk' />
      <target dev='fda' />
    </disk> -->
    <disk type='file' device='cdrom'>
      <source
file='/var/lib/libvirt/images/en_win_srv_2003_r2_enterprise_with_sp2_cd1_x13-05460.iso' />
      <target dev='hdc' />
      <readonly />
    </disk>
    <interface type='bridge'>
      <source bridge='br0' />
      <model type='rtl8139' />
    </interface>
    <!--<interface type='bridge'>
      <source bridge='br0' />
      <model type='virtio' />
    </interface> -->
    <graphics type='vnc' port='-1' autoport='yes' listen='0.0.0.0' />
  </devices>
</domain>
```

- Start the VM.

```
cd /var/lib/libvirt/images
virsh create libvirt-kvm-windows.xml
```

- Connect to the virtual console using the VNC client of your choice. On the NC, check the display number that has been allocated by looking at the process table (`ps axw | grep vnc`). For example, if the display number is 0, then connect to the NC using the VNC client:

```
vinagre <machine-hosting-vm>:0
```

- Follow the standard Windows installation procedure until the VM has completed installing Windows.



Tip: On some hosts, the VNC's display number will change when an image restarts. Use `ps` to find the current number.

- Run `virsh list` to display the domain name.


- Shut down the Windows VM you have just created. The easiest way to shutdown your VM is to use the `virsh destroy` command, as shown:

```
virsh destroy <domain_name>
```

To install the base Windows operating system using VMware, create a new VM using the VMware vSphere Client. Install Windows on the VM following standard VMware procedures, and install VMware Tools.

Install Eucalyptus Windows Integration

To install the Eucalyptus Windows Integration Service:

-  **Note:** The following step assumes you're running a recent version of Windows. If you're running Windows Server 2003, you'll need to download the legacy version of the Windows prep tool from: <http://downloads.eucalyptus.com/software/tools/windows-prep/>

If you're running a version of Windows more recent than Windows Server 2003, download the most recent version of the Windows Image Preparation Tool from <http://downloads.eucalyptus.com/software/tools/windows-prep/> to `/var/lib/libvirt/images` on your NC or on the host running the vSphere client.

- Open the `libvirt-kvm-windows-example.xml` file you used in the previous section and make the following edits:
 - Comment out the lines of XML code directing the hypervisor to boot the Windows image from the CDROM.
 - Change the text so that `windows-prep-tools-latest.iso` replaces the Windows .iso image and is mounted as `cdrom`.
 - Enter the path to the secondary disk file you created in the previous task.
 - Uncomment the lines that direct attachment of a floppy disk, secondary disk, and secondary network interface.



Tip: If you plan on using virtio networking for instances (via `USE_VIRTIO_NET` option on node controllers), uncommenting the virtio interface in the xml is mandatory

Your finished file should look similar to the following example:

```
<domain type="kvm">
  <name>eucalyptus-windows</name>
  <os>
    <type>hvm</type>
    <!-- <boot dev='cdrom' /> -->
  </os>
  <features>
    <acpi/>
  </features>
  <memory>524288</memory>
  <vcpu>1</vcpu>
  <devices>
    <emulator>/usr/libexec/qemu-kvm</emulator>
    <disk type='file'>
      <source file='/var/lib/libvirt/images/windows_2003.img' />
      <target dev='hda' />
    </disk>
    <disk type='file' device='disk'>
      <source file='/var/lib/libvirt/images/secondary.img' />
      <target dev='vda' bus='virtio' />
    </disk>
```

```

<disk type='file' device='floppy'>
  <source file='/var/lib/libvirt/images/floppy.img' />
  <target dev='fda' />
</disk>
<disk type='file' device='cdrom'>
  <source
file='/var/lib/libvirt/images/windows-preps-tools-latest.iso' />
  <target dev='hdc' />
  <readonly />
</disk>
<interface type='bridge'>
  <source bridge='br0' />
  <model type='rtl8139' />
</interface>
<interface type='bridge'>
  <source bridge='br0' />
  <model type='virtio' />
</interface>
<graphics type='vnc' port='-1' autoport='yes' listen='0.0.0.0' />
</devices>
</domain>

```

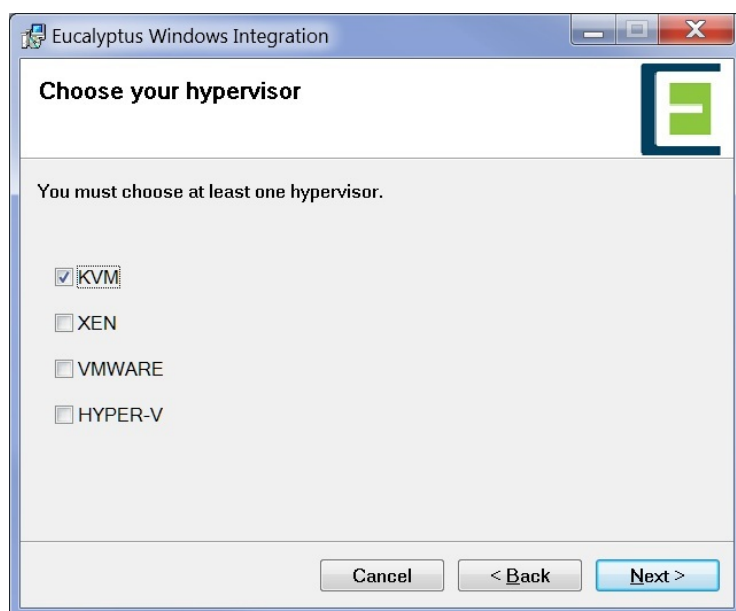
3. Start the VM.

```

cd /var/lib/libvirt/images/
virsh create libvirt-kvm-windows-example.xml

```

4. For VMware, use the VMware vSphere client to upload the ISO file to the VSphere datastore. Attach the `windows-prep-tools-latest.iso` to the Windows VM.
5. Log in to Windows and find the Eucalyptus installation files in the CDROM drive.
 - For Windows Server 2003 R2, run `setup.exe`. This automatically installs the .NET framework 2.0, which is not bundled in Server 2003 R2.
 - For all other versions, run `EucalyptusWindowsIntegration.msi`. (`setup.exe` will automatically install .NET framework 2.0, which is not bundled in Server 2003 R2).
6. In the **Choose your hypervisor** step, select **KVM** and then click **Next**.



Click **Next** and continue until the end of installation.

7. Reboot the Windows VM
8. Open the Windows device manager and check that the following drivers are found for each device.

- Floppy disk drive
- Disk drivers: Red Hat VirtIO SCSI Disk Device
- SCSI and RAID controllers: Red Hat VirtIO SCSI controller
- Network adapters: Red Hat VirtIO Ethernet Adapter

If the correct drivers are not found, question marks display on the devices. To install the devices, do the following:

- Right-click on the devices in question and select **Update Drivers** to open the New Hardware Wizard.
- When the new hardware wizard asks if Windows update is to be connected, click **No, not this time**.
- Choose **Install software automatically (recommended)**.
- If a confirmation popup message displays, click **Continue**.

Configure Active Directory

The Eucalyptus Integration service lets an enterprise with existing Active Directory domains attach Windows instances to the domains and control access to these instances using the existing AD user database. Users can log into the instance either using their domain credentials or the Administrator's password generated with the `euca-get-password` command.

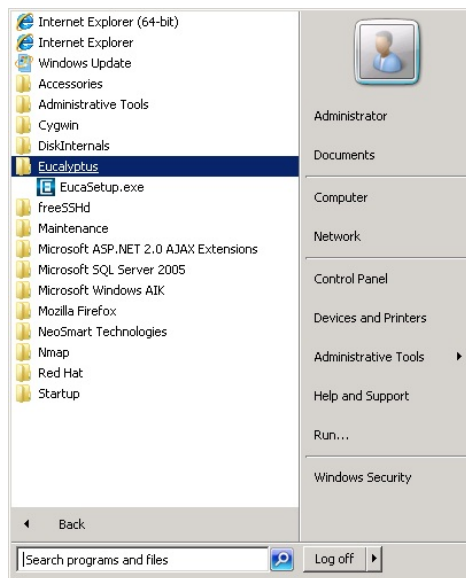
Because AD technology is tightly integrated with domain name service (DNS), the default name server contacted by the instance must be able to resolve the AD address as a proper domain controller. You can do this for all networking modes except System, by configuring the following line the CC's `eucalyptus.conf` file:

```
VNET_DNS=<domain_controller_IP_address>
```

If there is no such pre-existing DNS set-up or your networking mode is System, you might need to change the VM's network interface so that the preferred DNS server points to the domain controller.

To set up Active Directory:

1. Click **Windows Programs > Eucalyptus > Eucalyptus Setup**.



The **Eucalyptus Windows Integration** popup displays.

2. Click the **Active Directory** tab in the Eucalyptus Windows Integration window and enter the following information:

The screenshot shows the 'Eucalyptus Windows Integration' dialog box with the 'ActiveDirectory' tab selected. The fields are filled with the following values:

- AD Address:** dc.eucalyptus.com
- Admin Username:** Eucalyptus
- Admin Password:** ***** (masked)
- Confirm:** ***** (masked)
- Organizational Unit (optional):** OU=Eucalyptus,DC=eucalyptus,DC=com
- Status:** not a member of a domain

At the bottom, there are three buttons: 'Apply', 'Close', and 'Clear'.

- Enter the domain name of the existing Active Directory domain controller in the **AD Address** field.
- Enter the administrator username in the **Admin Username** field. We recommend using a generic user account that has permission to join a computer to a domain or a specific organizational unit.
- Enter and confirm the password in the **Admin Password** field. Note that the Admin username and password are required to join an instance to an Active Directory. When launched in Eucalyptus, these properties will be deleted as soon as the instance joins (or fails to join) the domain.
- Optionally, enter an organizational unit in the **Organizational Unit** field. This specifies a container that the instances launched from this image will be attach to.



Tip: If the values entered in this section are incorrect, the launched instances will fail to join the domain. We recommend that you verify the information by manually joining a computer to a domain using the same information that you entered in this step. You may first log in the launched instance using the administrator password (`euca-get-passsword`) and manually join the domain for verification.

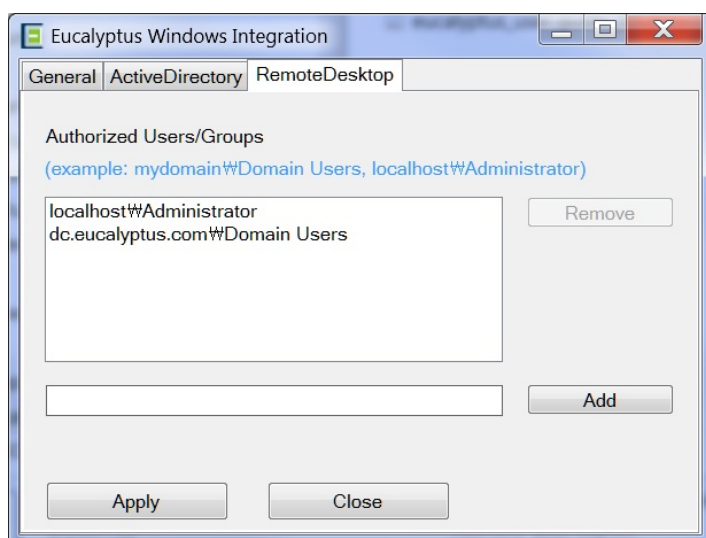
3. Click **Apply**.

Configure Remote Desktop

Domain users or groups require remote desktop permission to log into an instance. By default, only the local administrator has the remote desktop permission. The Eucalyptus Integration Service provides a way to grant remote desktop permission to additional domain users or groups.

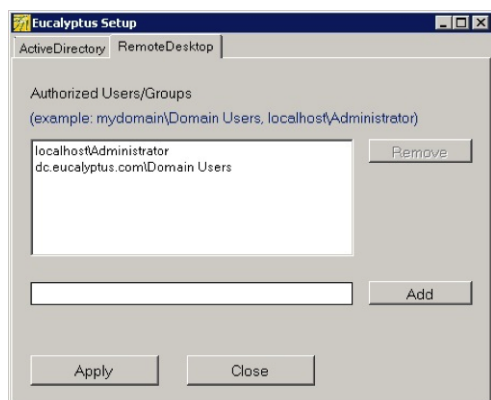
To configure remote desktop permission:

1. Open the **Eucalyptus Windows Integration** popup (**Windows Programs > Eucalyptus > Eucalyptus Setup**).
2. Click the **RemoteDesktop** tab



The names of authorized domain users and groups display in the **Authorized User/Groups** field. By default, only the local administrator is listed as authorized.

3. In the text field below the list, enter a user and group account name in the format [DOMAIN]\[USER or GROUP]. If you add a new local user or local group, prepend the account name localhost\ instead of the domain name.



4. Click **Add**.
5. Repeat for all user/groups that you want to add.
6. Click **Apply**.

When the instance launches, the members of the groups you added can log in to the instance through remote desktop.

Run Sysprep

Sysprep is a Microsoft tool for deploying multiple Windows operating systems in an enterprise. Running Sysprep removes system-specific information such as security ID (SID) from the Windows OS before you clone an image. Sysprep then re-initializes the OS after the image is cloned and started on multiple computers. Use Sysprep to prepare images when you use Microsoft Key Management Service to activate license keys. Also, use Sysprep when your Windows systems are attached to Active Directory.

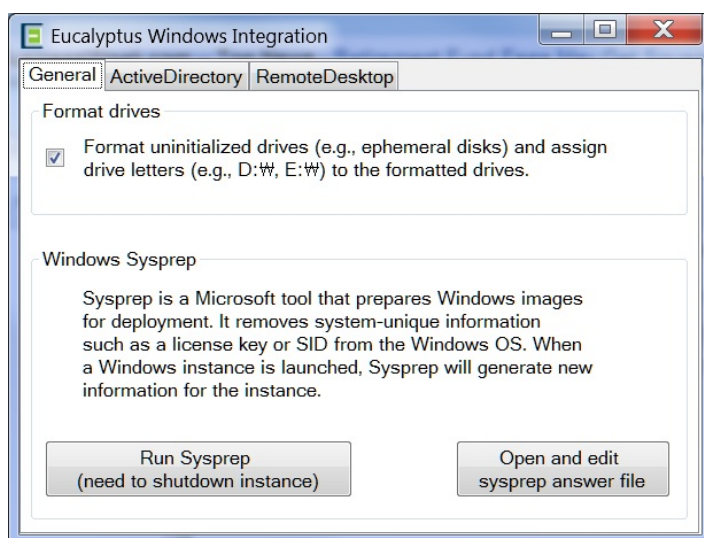
In Eucalyptus, you can run Sysprep before you bundle images with the `euca-bundle-image` or `euca-bundle-instance` commands.



Note: The Eucalyptus Integration Service supports Sysprep for Windows Server 2008, Windows Server 2008 R2, and Windows 7.

To configure and run Sysprep:

1. Open the **Eucalyptus Windows Integration** popup (**Windows Programs > Eucalyptus > Eucalyptus Setup**).



2. Click the **General** tab.
3. Ensure that **Format uninitialized drives** is checked
4. If you want to edit the Sysprep answer file, click the **Open and change** button in the General tab. Otherwise skip this step.
5. Click the **Run Sysprep** button.
Sysprep starts.
6. After Sysprep is complete, close the application and shutdown the Windows VM using the Windows Programs menu.

Convert the VMDK to an Image

After your Windows VM image is ready on ESX/ESX-i/vCenter, use the `euca_imager` command to download the image and convert it to the format Eucalyptus uses. The `euca_imager` command converts a remote VMDK located on a datastore into a disk image on the local disk on the CC/VMware Broker machine.

1. Log into the CC/VMware Broker machine, set the required environment variables, and source your `euca.rc` file.

```
export VDDK_HOME=/opt/packages/vddk/
export EUCALYPTUS=/
export LD_LIBRARY_PATH=/opt/packages/vddk/lib/vmware-vix-disklib/lib64/
source ~/.euca/euarc
```

2. Enter the `euca_imager` command with appropriate parameters to extract and convert the VMDK to a raw disk image. Parameters are described in the following table:

Parameter	Description
<code>debug</code>	Enables <code>euca_imager</code> debugging output
<code>in</code>	https URL for the vCenter Server or ESX/ESXi machine
<code>out</code>	User-defined name of disk
<code>login</code>	Name used to access the VMware machine
<code>password</code>	Password used to access the VMware machine
<code>vsphere-vmdk</code>	Go to vSphere client, find the virtual machine that you have installed (make sure it is in powered off state), and select the Hard disk 1 resource. There will be a Disk File field for the VMDK, and a similar field on the Option tab for the VMX file.

Parameter	Description
<code>vsphere-vmx</code>	Same description as <code>vsphere-vmdk</code> parameter. This is optional if you're contacting an ESX node directly, but may be required when contacting vCenter.
<code>vsphere-datacenter</code>	Specified name of the datacenter. This is optional if you're contacting an ESX node directly, but may be required when contacting vCenter.

The following example shows `euca_imager` with the appropriate parameters as described above converting a VMDK to a raw disk image. Note that the prefix of the `out` parameter must begin with the word `windows`.

```
/usr/lib/eucalyptus/euca_imager debug=yes convert in=
https://192.168.7.198 out=windows.disk login=Administrator
password=password
vsphere-vmdk="[datastore1]WindowsVM/WindowsVM.vmdk"
vsphere-datacenter=DataCenter1
vsphere-vmx="[datastore1]WindowsVM/WindowsVM.vmx"
```

Add Image to Eucalyptus

To enable an image as an executable entity, you must bundle and upload the Windows disk image to Walrus, and then register the uploaded image with Eucalyptus.

Run the following command to bundle, upload, and register your Windows disk image:

```
euca-bundle-image -i <vm_image_file>
euca-upload-bundle -b <image_bucket> -m /tmp/<vm_image_file>.manifest.xml
euca-register --name windows-image-name
<image_bucket>/<vm_image_file>.manifest.xml
```

Your Windows image is now ready to run as an instance.

After you register the image, Walrus decrypts the image bundle. This process might take a few minutes for a large Windows image to be decrypted. For example, a 10G image requires that you wait about 10 minutes before you launch the instance. You can use the [euca-describe-bundle-tasks](#) command line utility to check the status of active bundle tasks.

Migrate an Image

This section covers migrating images to and from your Eucalyptus cloud.

Prepare a Linux Image for Eucalyptus

This section explains how to prepare an image before importing it for use in Eucalyptus.

1. Install cloud software and drivers:

- Make sure Virtio drivers are installed if the image is going to be run in a KVM cluster which has virtio enabled, and verify use if possible (ie. set disks and network interface in hypervisor, try hot plug in for disks, etc). For most recent Linux distributions nothing is needed to be done.
- Make sure VMware tools are installed if the image is going to be run in a vmware cluster. There are several options for Linux-based images, including RPM, yum installations, or through VMware if the guest is running in VMware.

- c) Make sure appropriate init scripts are in place; for example: cloud-init packages (if appropriate), and rc.local or similar scripts to prepare new instances at boot time utilizing user/meta-data.
- d) Install cloud-init:



Note: For more information on cloud-init, go to <https://help.ubuntu.com/community/CloudInit>

For Ubuntu images:

```
sudo apt-get install cloud-init
```

For Red Hat, Fedora, and CentOS EL5:

```
rpm -Uvh
http://download.fedoraproject.org/pub/epel/5/i386/epel-release-5-4.noarch.rpm
```

For Red Hat, Fedora, and CentOS EL6:

```
rpm -Uvh
http://download.fedoraproject.org/pub/epel/6/i386/epel-release-6-8.noarch.rpm
yum install cloud-init
```

- e) Install and configure ssh:

For Ubuntu:

```
sudo apt-get install openssh-server
```

For Red Hat, Fedora, and CentOS:

```
yum install openssh-server
chkconfig sshd on
```

- f) Install Euca2ools:

For Ubuntu:

```
sudo apt-get install euca2ools
```

For Red Hat, Fedora, and CentOS:

```
yum install euca2ools
```

- g) Optionally, update existing packages.

For Ubuntu:

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

For Red Hat, Fedora, and CentOS:

```
yum update
```

2. Prepare the network:

- a) Disable the firewall. It is recommended that the firewall is disabled and network rules are instead enforced in the security-group the instances run in. If the guest's firewall is not disabled, review the existing rules and make sure they are appropriate for the guest's future use within a cloud environment.
- b) Clear or disable iptable rules:

Save the rules in case you want to restore them later:

```
sudo iptables-save > /root/firewall.rules
```

Clear the rules:

```
iptables -F
iptables -X
iptables -t nat -F
iptables -t nat -X
iptables -t mangle -F
iptables -t mangle -X
iptables -P INPUT ACCEPT
iptables -P OUTPUT ACCEPT
iptables -P FORWARD ACCEPT
```

For Red Hat, Fedora, and CentOS, you can disable iptables via service scripts. For example:

```
/etc/init.d/iptables stop
(or...)
service iptables stop
(then use...)
chkconfig iptables off (to disable at boot time as well)
```

- c) Disable selinux.

In some distributions, the selinux configuration file can be found in the following locations:

```
/etc/sysconfig/selinux
/etc/selinux/config
```

The following is an example selinux config file:

```
# This file controls the state of SELinux on the system.
# SELINUX= can take one of these three values:
#     enforcing - SELinux security policy is enforced.
#     permissive - SELinux prints warnings instead of enforcing.
#     disabled - SELinux is fully disabled.
SELINUX=disabled
# SELINUXTYPE= type of policy in use. Possible values are:
#     targeted - Only targeted network daemons are protected.
#     strict - Full SELinux protection.
SELINUXTYPE=targeted
```



Note: Some distributions may not have the selinux config and may need a flag set in the booter. For example /boot/grub/grub.conf may need 'enforcing=0' added to the 'kernel' configuration line.

- d) Make sure there is only a single primary network interface.

Check the configuration for:

- Enabled on boot (ONBOOT="yes")
- IP provisioning is done via DHCP (BOOTPROTO="dhcp")
- MAC address is commented out (for example:#HWADDR="AA:BB:CC:DD:EE:FF").



Note: If the system is rebooted after you've commented out the MAC address, the MAC address may be restored and will need to be commented out again.

For Red Hat, Fedora, and CentOS images, the configuration for the default network interface can usually be found in the following file:

```
/etc/sysconfig/network-scripts/ifcfg-eth0
```

The following is an example of an `ifcfg-eth0` configuration file:

```
DEVICE=eth0
ONBOOT=yes
#THE HWADDR LINE MUST BE COMMENTED OUT OR REMOVED
#HWADDR=AA:BB:CC:DD:EE:FF
TYPE=Ethernet
BOOTPROTO=dhcp
PERSISTENT_DHCLIENT=yes
```

- e) Remove persistent udev rules:

```
echo "" > /etc/udev/rules.d/70-persistent-net.rules
echo "" > /lib/udev/rules.d/75-persistent-net-generator.rules
```

- f) On CentOS and Red Hat, disable zeroconf by adding an entry to the `/etc/sysconfig/network` file:

```
NETWORKING=yes
NOZEROCONF=yes
```

3. Clean the image:

- We recommend that you remove all non-root, non-administrator users before bundling the image.
- Remove root/Administrator password. We recommend that you remove root's password for Linux systems (for windows, use sysprep (see Administrators guide for Windows Integration tool)).



Note: Once these passwords are removed, access to this system will be limited or blocked until this image is recreated as a cloud instance. SSH host and authorization keys for Linux (or dynamically created passwords for Windows sysprep) will be used going forward.

- For larger Windows images, we recommend that you use the tool of your choice to zero out unused disk space.
- Remove any unwanted programs.

4. Configure a serial port by adding an option to the end of the `/boot/grub/menu.lst` file:

```
console=ttyS0
```

You've now prepared your instance for image creation. ** add 'continue to...' link to image creation topic here **

Migrate a Linux Image from AWS to Eucalyptus

You can migrate an S3-backed image from AWS to Eucalyptus.



Note: This topic assumes you are migrating an S3-backed Amazon Machine Image (AMI) that you own. For instructions on creating an S3-backed AMI from an existing AMI, see [Creating an Instance Store-Backed AMI From an Existing AMI](#).



Note: Specific examples may vary depending on the distro running on the image that you want to migrate.

- Set up your Euca2ools configuration to work with both Eucalyptus and Amazon Web Services. For more information, see .

2. Check ownership of the AMI that you want to migrate to Eucalyptus by using the `euca-describe-images` command. For example:

```
euca-describe-images --region us-east-1 --owner 999999999999
IMAGE ami-elale888 999999999999/precise-test 999999999999 available private
x86_64 machine aki-88aa75e1 instance-store paravirtual xen
BLOCKDEVICEMAPPING EPHEMERAL sda2 ephemeral0
```

3. Run the AWS instance.

```
euca-run-instance ami-elale888 --region us-east-1
```

4. Install Euca2ools on the instance. For instructions, see the Euca2ools Guide.
5. Make sure that you have enough space on a volume to hold the bundle that we will create.
6. Bundle the running AWS instance. For example:

```
sudo -s
ec2-bundle-vol -b testbucket -d /mnt -u 4299-4227-3585 -k my-aws.pem -c
my-aws-cert.pem -r x86_64 -s 2048
Copying / into the image file /mnt/image...
Excluding:
  /dev/pts
  /
  /sys
  /proc
  /proc/sys/fs/binfmt_misc
  /dev
  /media
  /mnt
  /proc
  /sys
  /mnt/image
  /mnt/img-mnt
1+0 records in
1+0 records out
1048576 bytes (1.0 MB) copied, 0.00209056 s, 502 MB/s
mke2fs 1.42.3 (14-May-2012)
Bundling image file...
Splitting /mnt/image.tar.gz.enc...
Created image.part.00
Created image.part.01
[example truncated]
Created image.part.30
Generating digests for each part...
Digests generated.
Unable to read instance meta-data for ancestor-ami-ids
Unable to read instance meta-data for ramdisk-id
Unable to read instance meta-data for product-codes
Creating bundle manifest...
ec2-bundle-vol complete.
```

7. Switch the Euca2ools configuration file to use Eucalyptus. You can do this by specifying the Eucalyptus region as defined in your Euca2ools configuration file by specifying the `--region` parameter on the command line, or by changing the `default-region` option in the Euca2ools configuration file:

```
default-region = euca-release
```

8. Download the bundle from the AWS S3 bucket:

```
euca-download-bundle --bucket testbucket --directory /tmp/aws-image/ --region
us-east-1
```

9. Unbundle the AWS instance bundle:

```
euca-unbundle --manifest /tmp/aws-image/image.manifest.xml --source
/tmp/aws-image/ --destination /tmp/aws-image/ --region us-east-1
```

10. Run some checks to make sure that the image can be used with Eucalyptus:

a) Mount the image via loopback:

```
# sudo mkdir /mnt/aws-image
# sudo mount -o loop /tmp/aws-image/image /mnt/aws-image
# df -ah
.....
/tmp/aws-image/image          9.9G  1.1G  8.3G  12% /mnt/aws-image
```

b) Make sure that the distro repositories in the image do not point to EC2-specific repositories.

c) Install a non-Xen kernel into the image from distro and make sure VirtIO modules are added.

d) Extract the ramdisk and kernel to be bundled, uploaded and registered as ERI and EKI files. In this example, initrd.img-3.2.0-53-virtual and vmlinuz-3.2.0-53-virtual will be copied from /mnt/aws-image/boot to the /tmp/aws-image directory:

```
# sudo cp /mnt/aws-image/boot/initrd.img-3.2.0-53-virtual /tmp/aws-image/.
# sudo cp /mnt/aws-image/boot/vmlinuz-3.2.0-53-virtual /tmp/aws-image/.
```

e) Make sure that the file system of the image is either ext2, ext3, or ext4 by using the file command. For example:

```
# file /tmp/aws-image/image
/tmp/aws-image/image: Linux rev 1.0 ext4 filesystem data (extents) (large
files) (huge files)
```

11. Bundle the image using euca-bundle-image:

```
euca-bundle-image -i /tmp/aws-image/image
```

12. Upload the AWS bundled instance to Eucalyptus.

```
euca-upload-bundle -b hybrid-guide-sample-bucket -m
/tmp/aws-image/image.manifest.xml --access-key myaccesskey --secret-key
mysecretkey
```

13. Test the new uploaded image.

```
euca-run-instance emi-a6e15bcf
```

Migrate a Linux Image from Eucalyptus to AWS

To migrate an image from Eucalyptus to AWS, perform the following steps.



Note: These are high-level guidelines for moving an instance from Eucalyptus to AWS. Specific examples will vary depending on the distro running on the image.

1. Run an instance from the image you chose.

```
euca-run-instance emi-1A6338AE
```

2. SSH into the instance and verify that the instance is valid for use with AWS:
 - a) Download the latest ec2-modules from <http://s3.amazonaws.com/ec2-downloads> and put them into the `/lib/modules` directory on the instance.
 - b) Copy the AWS EC2 certificate and private key from the AWS instance to your local workstation.
 - c) Shut down unneeded services on the AWS instance (for example, Apache and MySQL).
 - d) Clear out log files and bash history files.
 - e) Remove your ssh keys from the instance.
 - f) Reset passwords for the instance, and for any services that maintain their own password database.
 - g) Clear out any temporary directories.
3. Install Euca2ools on the instance.

4. Mount a volume that is at least 1.5 times as large as the entire instance.
5. Bundle the running instance.

```
euca-bundle-instance
```

6. Switch the Euca2ools configuration file to use Eucalyptus

```
default-region = euca-release
```

7. Upload the AWS bundled instance to Eucalyptus.

```
euca-upload-bundle -b bucket_name -m manifest_file
```

8. Test the new uploaded image.

```
euca-run-instance emi-a6e15bcf
```

Migrate an Image from vSphere to Eucalyptus

To migrate a disk in VMSDK format from vSphere to Eucalyptus, perform the following steps.

1. Download the Eucalyptus Image Tools from github:

```
yum install python-pip git
pip-python install -U psphere
git clone https://github.com/eucalyptus/eucalyptus-image-tools.git
cd eucalyptus-image-tools
```

2. Download the disk image from vSphere, supplying your vSphere IP address, login, password, and VM name. For example:

```
python tools/exporters/export_vmdk.py --ip 10.111.1.133 --user
your-vsphere-login --password your-vsphere-password\
--vmName your-vm-name --workDir /path.to/yourworkdir
Downloading 490 bytes
File saved to /path.to/yourworkdir/your-vm-name.vmdk
```

```
Downloading 5473598976 bytes
File saved to /path.to/yourworkdir/your-vm-name-flat.vmdk
```



Note: The command will fail if the VM has more than one disk or NIC.

3. Convert the VMDK into a raw disk image:

```
cd /path.to/yourworkdir
sudo qemu-img convert -O raw your-vm-name.vmdk disk.raw
```

This command will create a raw disk image which can then be bundled, uploaded, and registered with Eucalyptus.



Note: When registering the converted disk image, you must specify the `--virtualization-type=hvm` option when running the `euca-register` command line tool.)

Bundle, Upload, and Register an Image with Eucalyptus

Once you've customized or acquired an image to use with Eucalyptus, you must enable an image as an executable entity. To do that, you must do the following:

1. Bundle a root disk image and kernel/ramdisk pair
2. Upload the bundled image to Walrus bucket storage
3. Register the data with Eucalyptus



Important: Note that while all users can bundle, upload and register images, only users under the administrator account have the required permissions to upload and register kernels and ramdisks.

Once you have an image that meets your needs, perform the tasks listed in this section to add the image to your cloud.

Add a Kernel

When you add a kernel to Walrus, you bundle the kernel file, upload the file to a bucket in Walrus that you name, and then register the kernel with Eucalyptus.

To add a kernel to Walrus:

Use the following three commands:

```
euca-bundle-image -i <kernel_file> --kernel true --arch <architecture>
euca-upload-bundle -b <kernel_bucket> -m /tmp/<kernel_file>.manifest.xml
euca-register <kernel_bucket>/<kernel_file>.manifest.xml -a x86_64 -n
mynewkernel
```

For example:

```
euca-bundle-image -i
euca-fedora-10-x86_64/xen-kernel/vmlinuz-2.6.27.21-0.1-xen --kernel
true --arch x86_64
...
Generating manifest /tmp/vmlinuz-2.6.27.21-0.1-xen.manifest.xml
euca-upload-bundle -b example_kernel_bucket -m
/tmp/vmlinuz-2.6.27.21-0.1-xen.manifest.xml
...
```

```

Uploaded image as
example_kernel_bucket/vmlinuz-2.6.27.21-0.1-xen.manifest.xml

euca-register
example_kernel_bucket/vmlinuz-2.6.27.21-0.1-xen.manifest.xml -a
x86_64 -n mynewkernel
IMAGE eki-XXXXXXXX

```

Where the returned value eki-XXXXXXXX is the unique ID of the registered kernel image.

Add a Ramdisk

When you add a ramdisk to Walrus, you bundle the ramdisk file, upload the file to a bucket in Walrus that you name, and then register the ramdisk with Eucalyptus.

To add a ramdisk to Walrus:

Use the following three commands:

```

euca-bundle-image -i <ramdisk_file> --ramdisk true
euca-upload-bundle -b <ramdisk_bucket> -m /tmp/<ramdisk_file>.manifest.xml
euca-register <ramdisk_bucket>/<ramdisk_file>.manifest.xml

```

For example:

```

euca-bundle-image -i
euca-fedora-10-x86_64/xen-kernel/initrd-2.6.27.21-0.1-xen --ramdisk
true
...
Generating manifest /tmp/initrd-2.6.27.21-0.1-xen.manifest.xml

euca-upload-bundle -b example_rd_bucket -m
/tmp/initrd-2.6.27.21-0.1-xen.manifest.xml
...
Uploaded image as
example_rd_bucket/initrd-2.6.27.21-0.1-xen.manifest.xml

euca-register
example_rd_bucket/initrd-2.6.27.21-0.1-xen.manifest.xml
IMAGE eri-XXXXXXXX

```

Where the returned value eri-XXXXXXXX is the unique ID of the registered ramdisk image.

Add a Root Filesystem

When you add a root filesystem to Walrus, you bundle the root filesystem file, upload the file to a bucket in Walrus that you name, and then register the root filesystem with Eucalyptus. The bundle operation can include a registered ramdisk (ERI ID) and a registered kernel (EKI ID). The resulting image will associate the three images.

You can also bundle the root file system independently and associate the ramdisk and kernel with the resulting EMI at run time.

To add a root filesystem to Walrus:

Use the following three commands:

```
euca-bundle-image -i <root_filesystem_file> -r <architecture>
euca-upload-bundle -b <root_filesystem_file_bucket> -m
/tmp/<root_filesystem_file>.manifest.xml
euca-register <root_filesystem_file_bucket>/<root_filesystem_file>.manifest.xml
-n <rootfs_name> -a <architecture>
```

For example:

```
euca-bundle-image -i euca-fedora-10-x86_64/fedora.10.x86-64.img
--ramdisk eri-722B3CBA --kernel eki-5B3D3859 -r x86_64
...
Generating manifest /tmp/fedora.10.x86-64.img.manifest.xml

euca-upload-bundle -b example_rf_bucket -m
/tmp/fedora.10.x86-64.img.manifest.xml
...
Generating manifest /tmp/fedora.10.x86-64.img.manifest.xml

euca-register example_rf_bucket/fedora.10.x86-64.img.manifest.xml
-n example_rf -a x86_64
IMAGE emi-XXXXXXX
```

Where the returned value `emi-XXXXXXX` is the unique ID of the registered machine image.

Remove an Image

When a new image is uploaded to Eucalyptus, Eucalyptus saves the bundle and the image manifest to a bucket in Walrus. This bucket is set in the Eucalyptus property `walrus.storagedir`. The default value for this property is `/var/lib/eucalyptus/bukkits`.

When you register an image, Eucalyptus creates the actual image file. Both the image manifest and the bundle must remain intact to run as an instance.

Eucalyptus stores images in the path set

To delete an image fully, you must deregister the image and delete the bundle. To successfully remove an image and associated bundle files:

1. Find the image you want to remove.

```
euca-describe-images
IMAGE    emi-E533392E    alpha/centos.5-3.x86-64.img.manifest.xml
965590394582
available public i386 machine eki-345135C9 eri-C4F135BC
instance-store
IMAGE    emi-623C38B0    alpha/ubuntu.9-04.x86-64.img.manifest.xml 965590394582
available public i386 machine eki-E6B13926 eri-94DB3AB9
instance-store
```

2. Note the image file name (for example, `emi-623C38B0`).

3. Deregister the image.

```
euca-deregister emi-623C38B0
IMAGE    emi-623C38B0
```

4. Delete the bundle.

```
euca-delete-bundle -b alpha -p ubuntu.9-04.x86-64.img
```



Tip: If you accidentally try to delete a bundle for a second time, you might see an error message: `problem parsing: /tmp/centos.5-3.x86-64.img.manifest.xml`. This error only displays if you try to delete a bundle that no longer exists.

When you have finished these steps, display all images to confirm that the image was removed.

```
euca-describe-images
IMAGE    emi-E533392E    alpha/centos.5-3.x86-64.img.manifest.xml    965590394582
available    public    i386    machine eki-345135C9    eri-C4F135BC
instance-store
```

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