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CSE 366

Fog Server and Image Implementation

Project Description: For this project, my goal is to create a functioning FOG server for the purpose of creating and implementing images in a virtual environment using VirtualBox, kubuntu, and Windows 7.

An image is essentially an exact copy of a machine on a storage device. This includes the operating system, personal files, settings, and users.

A FOG server works by taking an image of a machine, and storing it on the FOG server for later use. Seeing that I am using a virtual environment for this, the imaged machine will be a simple Windows 7 computer created in VirtualBox. Once this image is created, it will then be used to create a new machine in VirtualBox, using the server, that is an exact copy of the original.

This is useful for a systems administrator, and in systems networking in general, for many reasons. The most prominent reason, however, is to save time. Seeing how a FOG server can image multiple machines at one time, it allows the system admin to prepare workstations at a significantly faster rate, than if they need to set up each machine one at a time.

For instance, the system admin will only need to create one machine, and download all of the necessary software and files needed for all of the workstations being made. Then the admin can create this image and distribute it to many machines in one sitting. The alternative being creating each Windows machine, then downloading all of the software and files one by one.

Project Preparation: Before beginning work on the project only a few steps are necessary.

1. Download VirtualBox on the computer you are using
2. Download an ISO for a Linux of your choice. For this lab, I am using Kubuntu.
3. Download an ISO for Windows 7, or any OS you wish to image.
4. Decide on a version of FOG to use, I used 0.32 for this lab.
5. Begin creating the necessary virtual machines

Project Step 1: Creating the Server

The first step is to create the virtual machine that the FOG server will be running on.

Follow these steps to properly setup the virtual machine, if you are using a different type of Linux, your setup may be different.

1. Click on Create New Machine in the VirtualBox window. I named mine “Kubuntu FOG Server” for I will be using kubuntu
2. You will want to make the virtual disk size fairly large as this is where our images will be stored. I made mine 100 GB
3. Make sure to set the network card to NAT in order to receive internet access in the machine
4. Set the disk to be read from the ISO you downloaded. Mine is a kubuntu ISO
5. Start the machine.

Once the machine starts it will begin the installation process for kubuntu. This is a fairly simple process. Make sure you select the proper time zone, and be certain that you possess an internet connection.

After a few minutes the install will be completed, and you can create your user account and password. Login to finish the initial setup.

Now that the machine is made, we will want to begin setting up the server.

We will first want to issue a few commands to download any and all packages we might need. Open a terminal and type in:

sudo apt-get update

Then type in:

sudo apt-get upgrade

These two commands will simply add and update the operating system and many packages on the operating system. It may take some time to finish, so once it is done restart the machine.

Once the reboot has finished we want to issue one last command:

sudo apt-get install build-essential
This finishes upgrading, updating, and installing any important software on the system that we may need for the server.

At this time, we will want to download the FOG software for the server.

Open a web browser in the machine, and type in “FOG imaging download”
I downloaded mine from sourceforge.net

Look for the available fog_0.32.tar.gz file, and download it.

We now want to open a terminal, and go to the location where it was downloaded. We will now need to enter the following commands to install:

1. sudo gunzip fog_0.32.tar.gz
2. sudo tar -xvf fog_0.32.tar

These commands unzip and compress the file, turning it into a directory.

Next want to give our machine a static IP address. For this we want to right click the connection settings in the bottom right, and select Network Management Settings. Move to the wired tab, and select edit.

Turn the method from Automatic to Manual.

Next open up the terminal and type in the commands:

ifconfig
route -n

These two commands will provide the information we need to enter.
Go back to network settings and add your information. For me, I entered:
IP Address: 10.0.2.15
Subnet Mask: 255.255.255.0
Gateway: 10.0.2.2
DNS: 8.8.8.8
Next, go to the terminal and type:
sudo service networking restart

This updates the server with this new information. The static IP has been set.

Now we want to change directory into the fog_0.32 we created.
We want to type the following commands:

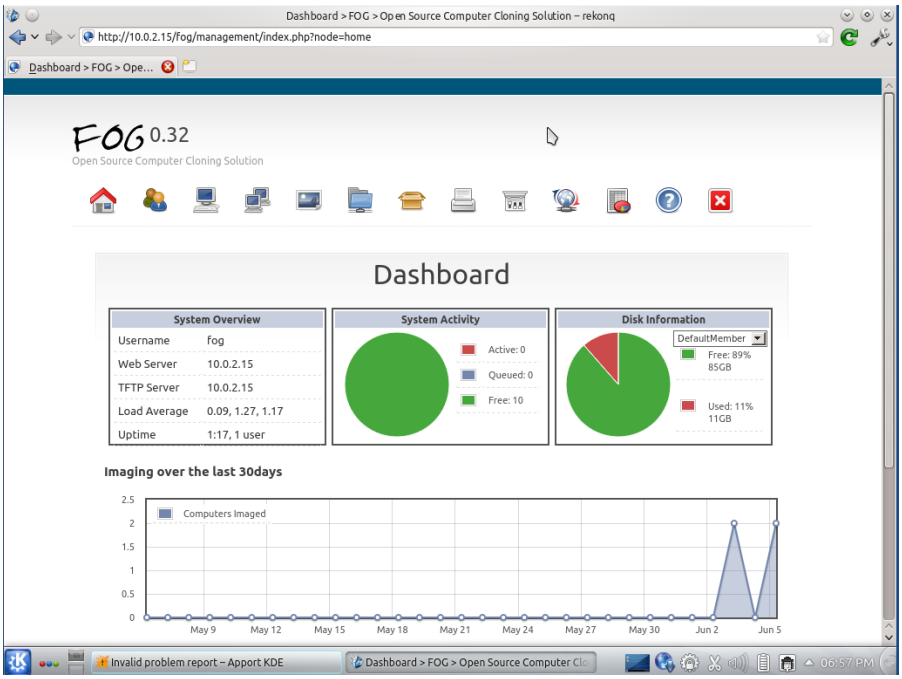
1. cd for_0.32/
2. cd bin/
3. sudo ./installfog.sh

This will begin the FOG installation process. Follow the simple on screen commands and make certain the IP information it asks for is correct with what we entered earlier.

This will take some time for the FOG server to install, so wait patiently.

When the install is finished, it will display a link similar to:

http://10.0.2.15/fog/management



This will take you to your server GUI, where we will be creating and managing our images. Simply login with your username and password. The default will be:

Username: fog
Password: password
You can easily make a new user with password once you are logged in.
The first thing we want to do is select “Other Information” then select “FOG Settings” from the side.

Scroll down to FOG_QUCIKREG_IMG_ID and FOG_QUICKREG_OS_ID and change them both from -1 to 1. This enables us to easily register what we need. Select Save Changes

The last thing we want to do is to change our VirtualBox network card from NAT to Internal Network. You can change this from your machine settings in VirtualBox. This will lose our internet access, but allows us to easily to connect our other machines to our server.

This completes the initial creation of our FOG server.

Project Step 2: Create the Machine to Image

In this step, we will want to setup the machine we want to make a copy, or image, from.

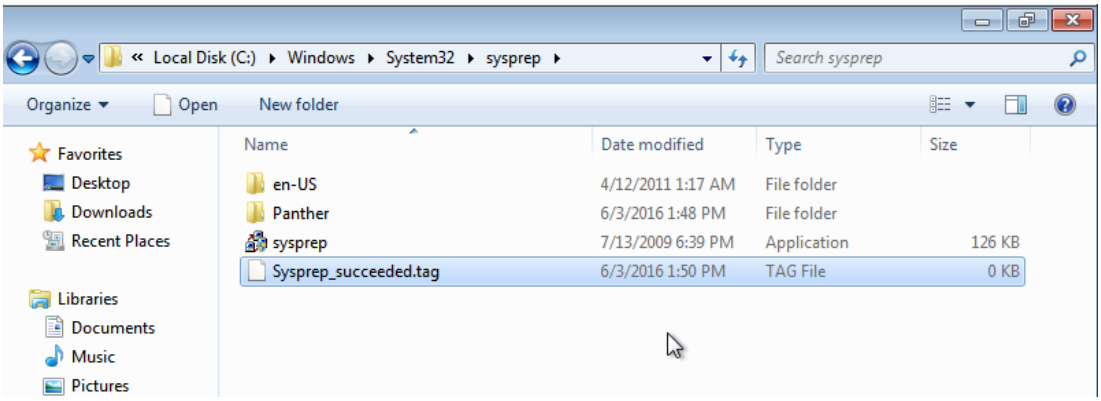
This is a short step that will mostly be Windows installation.

First, create a new virtual machine and name it “Windows 7”.
Set the network card to Internal Network, just like the FOG server.
Lastly, download an ISO of Windows 7 and prep it to the virtual disk for the VM.

Perform the initial Windows 7 setup, just as you would on any other computer. Create your username and password, then login.

Now that we have our Windows machine setup , we now need to “sysprep” it.

In Windows, go to C:/Windows/System32/sysprep



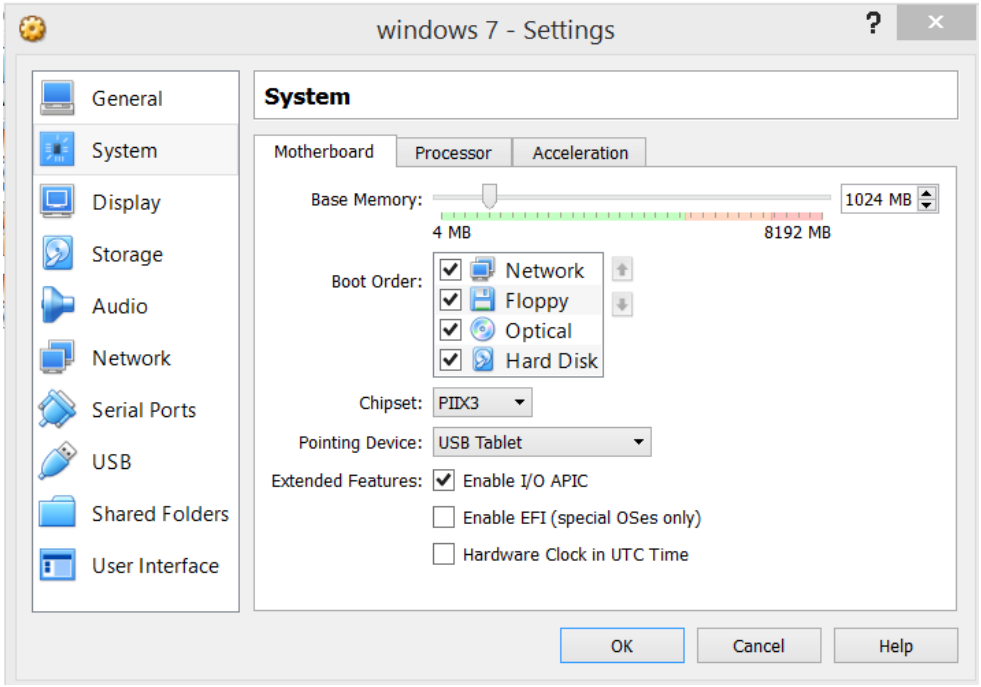
In the sysprep folder, there will be a sysprep utility. Double click it, then press OK.

Sysprep allows the image made from this machine to be uploaded onto computers that may have different hardware on it.
At this point, the Windows machine itself is ready to be imaged. If you like you can customize this Windows machine in any way you like. Including changing the wallpaper, or downloading any software needed. This will carry over in the image.

Once the customizations are finished, you can shutdown the machine and go back to VirtualBox.

We now need to change this machine to boot first from the network card. This is so when we start the machine, it will alway first look for the FOG server for instructions, instead of just booting into Windows 7. In order to do this, do the following:

1. Open VirtualBox
2. Click on the Windows 7 machine and select Settings
3. In the Settings window, select the System tab
4. There will be a “Boot Order” box. Check the option that says Network, and carry it into the top position.



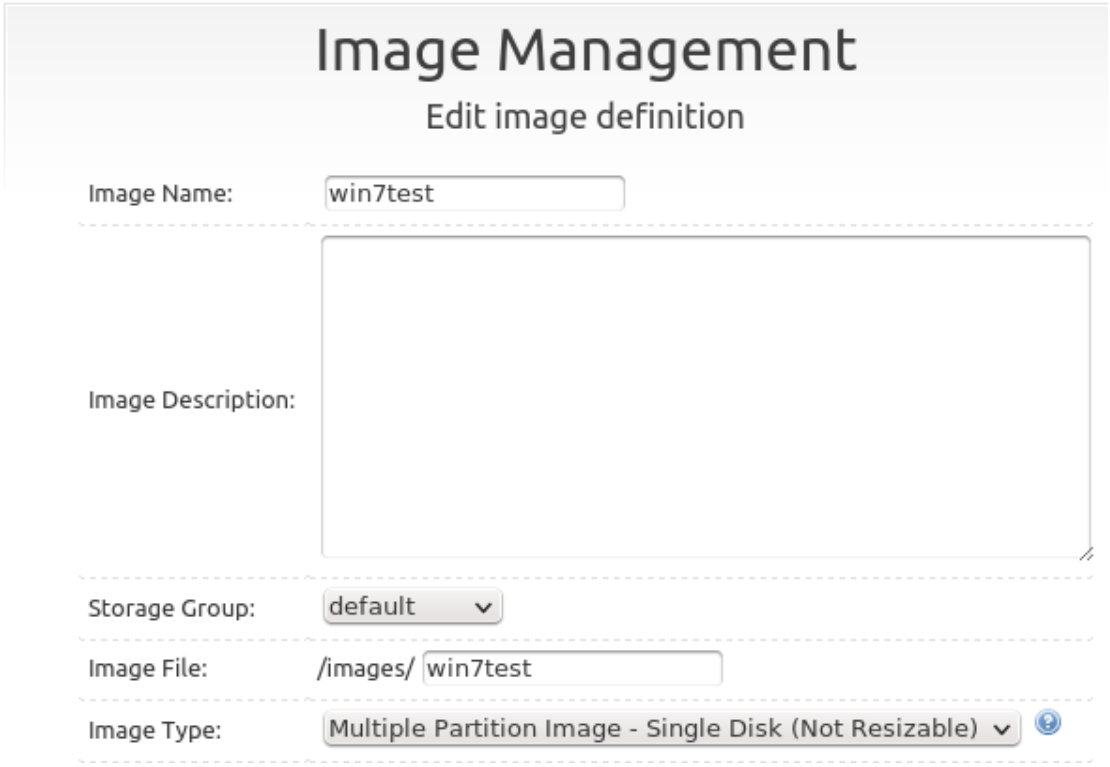
The Windows machine is now fully prepped for Imaging.

Project Step 3: Creating a New Image and Registering Machines

Now that the necessary machines are created and ready to go, we can now begin using the FOG server.
First, open up the FOG server machine and go to the GUI.

We need to create an image file, where we can put the image we are about to create:

1. Select Image Management from the top of the page.
2. On the left side, select “New Image”
3. Name the image after what it will, I named mine “win7test”
4. Select the storage group as default
5. For the image type, select Multiple Partition Image - Single Disk (Not Resizable)

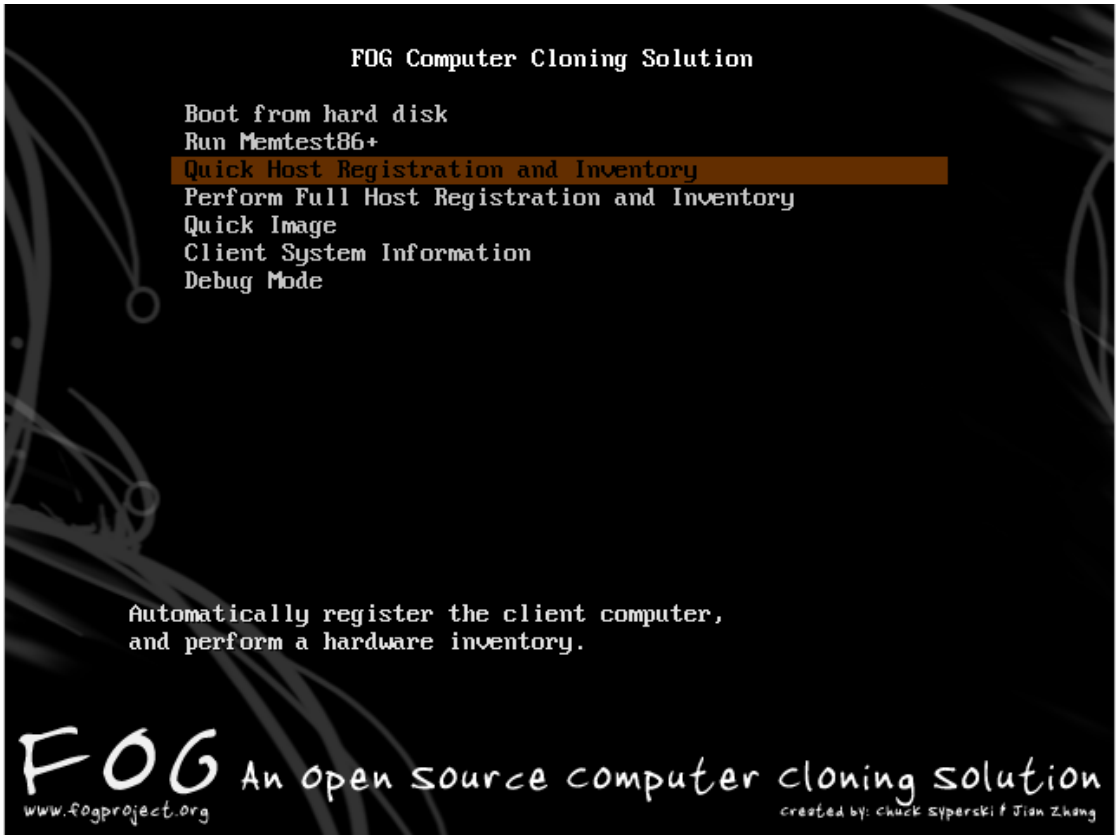


This is where our image will be saved.

By selecting List All Images, our new image file will now be there.

Our next goal is to add our new Windows 7 machine as a host, and register it on the FOG Server.

Make sure the FOG Server is running, then boot the Windows 7 machine. This time, because it is set to boot from the network, it will load into the FOG Computer Cloning Solution. From this screen we want to select “Quick Host Registration and Inventory” and press enter.



This will add this computer into the FOG database, making Imaging it very simple.

Upon completion, it will say, Attempting to send to inventory……..Done
Once finished, head back to the FOG server and refresh the Host Management page. The computer we just added will appear titled after its MAC address.

To finish this Host, do the following:

1. Select Edit on the right side of the host you wish to edit
2. Rename the host name to the name of the machine, Windows 7
3. Make sure the MAC address is correct
4. Under host Image, select the image file we created, win7test
5. Under host os, select Windows 7
6. Select update the finish

This host is now ready to be used

Project Step 4: Upload the Image

We are now ready to start the image process.

First, shut down the Windows 7 machine if it is still open.
Next, in the FOG GUI, go to the Task Management page at the top

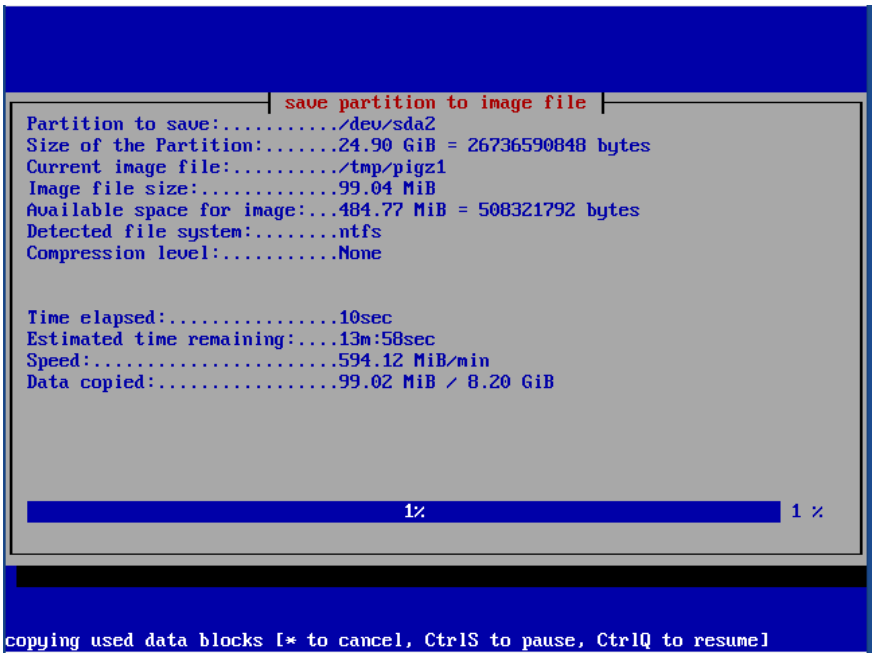
This is the page that allows us to Upload and Deploy our images

From the side, select List All Hosts
You should now see this:

This the host that we want to make an image of. Simply select the Upload button.
From the following page, select Upload Image

This begins the task of uploading the image. Once when we start up the Windows 7 machine, the image will automatically begin the upload.

Go back to VirtualBox, and start the Windows 7 machine.
After the FOG project loads up, you should see this pop up:



This means that the image is now being Uploaded to the FOG server
Clearly, my Windows machine consists of 8.20 GB, so this may take several minutes.

Upon finishing the upload, the Windows 7 machine will boot back into the FOG Computer Cloning Solution. You can then choose to close the machine or boot it up.

This means that our win7test image file has now been loaded with the image from this machine.

Project Step 5: Deploy the Image

The final step in this project is to deploy the image we just created to a new machine.

We do this by first creating a new virtual machine in VirtualBox.

Open VirtualBox, and select New

We can name this new machine windows 7 clone, and leave the rest of these settings as the default.

The first change we need to make is set this machine to boot from the Network card just like we did with the other machine.

After this, we need to change the Network adapter to our Internal Network, so it can boot to our FOG server.

Similarly to before, we need to add this clone machine into the FOG database. We can do this by powering on the machine, and selecting Quick Host Registration and Inventory, just as we did before.

Once this finishes, power down the machine and open the FOG server again.

Go to Host Management, and edit the new host just like we did the last time. Name it windows7clone, give it the win7test image, and set the OS to Windows 7.

Now this machine is ready to be imaged. Head to Task Management at the top, and this time hit Deploy under windows7clone, instead of upload:

Host Name	MAC	Deploy	Upload	Advanced
windows 7	08:00:27:1e:ff:6d			
windows7clone	08:00:27:01:02:73			

This will now queue this clone machine to be imaged. Simply start up the machine, and the image will begin.

Similarly to last time, the loading screen will come up to deploy the 8 GB image to the new, blank hard disk.

Once when this is finished, the cloned machine will be ready to use as an exact replica of the other machine.

At this point, the imaging process is complete.

Final Thoughts

This was a very fun, and informative project to complete. It offered a lot of detail covering images, creating servers, virtualization, and networking. All of which are significantly important to a system admin.

All of the information I gathered from this lab are necessary skills that I can continue to develop throughout my studies.