

Freenet Testbed Setup

University of Hawaii at Manoa

Project Members

Dr. Yingyei Dong

Todd Baumeister

Dwayne Yuen

Author

Todd Baumeister

Date

5/4/2011

1. Purpose

The purpose of this document is to describe the processes of setting up a Freenet testbed, and the most common issues that arise. The steps necessary for creating a testbed will be enumerated through. This will include setting up a VMWare server, creating VMWare machine images to host the Freenet nodes, and general maintenance of the VMWare images once they are up and running. This document is describing the implementation of the Freenet testbed that was proposed in *Freenet Testbed Design* document.

2. VMWare Server

This testbed was designed to use virtual machine (VM) to emulate physical machines. This allows us to create many more Freenet nodes with far fewer physical machines. However, since we are using VMs that means that we must still have some physical machines to host them. In our testbed, we are running VMWare ESX server on our physical machines to host the VMs. VMWare ESX was used because it is designed to run and manage multiple VMs running on a single physical machine.

Installing ESX server on a machine is relatively straight forward. The installer will guide users through the install process. The only issue with using ESX server is that it only supports a limited set of hardware. The installer will check before starting if the machine meets those requirements, but if you are purchasing new hardware check if you meet the requirements.

After ESX server is installed there are several methods for managing the server. You can use the console window on the ESX server, or you can use a GUI based tool. We choose to use the GUI based tool because it not only allowed us to manage the ESX server, but it can also manage the VMWare images that are running on the ESX server. The management tool can be obtained from this URL: <http://vsphereclient.vmware.com/vsphereclient/2/5/8/9/0/2/VMware-viclient-all-4.1.0-258902.exe>. The only issue with this tool is that it will only run on a Microsoft Windows OS. There is also a web interface for managing ESX server that can be turned on, but we ran into several issue with getting the interface to work properly. The steps for enabling the web interface can be found in the ESX manual.

Now that the server is installed, you need to create a datastore for storing your VM images. A datastore is just a chunk of the underlying OS file system that has been set aside for the ESX server. This is where ESX will physically store the files that are associated with a VM. The specifics on setting up a datastore can be found in the manual.

3. Freenet Node Images

You are now ready to create you first VM image. Using the GUI management tool you can select create new VM from the menu. This will start a wizard that will help you configure you

VM. We choose to have 512Mb of RAM and a 8 Gb Hard drive for our configuration. You will need to experiment with these settings to find what works for you. After you have completed this wizard you will have the setting for a bare VM that does not have an OS installed yet.

Now you can boot up the VM that you just created. The VM can be launched from the GUI management tool. When it boots up you will get the machines BIOS screen since no OS has been installed yet. If you have an OS installer on a CD then you will need to make sure that you added a virtual CD drive to you VM image so that it will be able to boot the VM image from it. If your OS installer in an ISO file, then ESX server also has a mechanism for mounting that file as a drive. Further detailed information on these steps can be found in the ESX manual.

Once you get the VM image to boot from you OS install disk, complete the installation like you would on a physical machine. You should install all of the software and updates that you are going to need on all of your Freenet nodes. Do this because after you are done setting up this first VM image, we are going to copy this image and use it as a template for creating all of the other VM images needed.

You will now be cloning the first VM image you created to create other other VM images that you need to run the different Freenet nodes. A small customizable script was created to help in this process. The script can be found in our project at <https://github.com/tbaumeist/FreeNet-Analysis>. It is located at <https://github.com/tbaumeist/FreeNet-Analysis/blob/master/Scripts/server/CloneVMs.sh>. This script will need to be customized before it is run. Place the script directly in the datastore folder when executing it. The script will copy a target VM image and rename it to make it unique. The target VM image is hard coded into the script and will need to be customized to your setup. The script also takes care of registering the new VM image with the ESX sever.

After running the script you will have several VM images that can now be booted up through the VMWare GUI management tool. At this point you will need to boot each of the new VMs and change individual settings such as machine name and IP (assuming its statically assigned).

4. Image Maintenance

There are several scripts available for managing the Freenet nodes on the VMs. These scripts can be found in the folder and sub-folders of <https://github.com/tbaumeist/FreeNet-Analysis/tree/master/Scripts>. At the moment the scripts available are still a work in progress so they will not be described in detail, as those details will most likely change. The general purpose of the different scripts will be covered though. The basic scripts are update, clean, and run remote.

The update script will update the Freenet folder on all of the Freenet nodes. The location of the Freenet nodes can be found in the configuration file <https://github.com/tbaumeist/FreeNet->

[Analysis/blob/master/Scripts/config/remoteMachines.dat](#). All of the scripts are written such that when the files from the repository are cloned to a local machine they will be able to find other files relative to their own folder structure. So basically the update script looks for the file /config/remoteMachines.dat when it is run. The update script will copy all of the files from a master folder, typically ../NodeImages/General, to all of the Freenet node VMs. The location of a Freenet nodes master folder is specified in the configuration file also. The update script will also run the clean script.

The clean script will clean all of the extra files off of a Freenet node VM. This will leave the node in a state like it has just been installed, and it has not been run yet. This script can be used at the end of an experiment to reset the nodes back to a starting point. This script is run by default when update script is run.

The run remote script is used to start up and shut down Freenet on all of the VMs. This script will also start a log collector script when it is set to start up Freenet of the VMs.

5. Setup Issues

Most of the setup issues with getting Freenet up and running revolve around the configuration of the Freenet software. There are more details on these setup issues in the document *Freenet: Setup Experiments on the Testbed*. The biggest issue with setting up the framework for the Freenet testbed is creating a complete VM template to copy for the VMs. The problem is knowing all of the software and settings that you will need for your experiments. The alternative to not including something in the template is manually installing it on each individual VM.

- VMWare ESX server has limited hardware support. Verify hardware requirements before purchasing new equipment.
- Creating a complete Freenet node VM template.
- Identifying the correct configuration settings for running a Freenet seed node.
- Disabling security features so configuration files can be manually manipulated. Most configuration files are hashed, and checked by Freenet when loaded.

6. References

Freenet Testbed Design - <https://github.com/tbaumeist/FreeNet-Analysis/blob/master/Documents/FreeNetTestBedDesign.pdf>

Freenet: Setup Experiments on the Testbed - <https://github.com/tbaumeist/FreeNet-Analysis/blob/master/Documents/FreenetSetupExperimentsontheTestbed.pdf>

