Linux Best Practices

Introduction and/or Background

Starting out most people consider the Linux software installation process confusing. There is some truth to that, mostly because there maybe more than one solution available. But the process if one breaks it down follow this:

1. Ascertain the program, the dependencies and any support tools required.
2. Perform installation from repositories.
3. Validate the program status and port availability.
4. Make necessary configuration changes as required.
5. Validate the program status and port availability (again).
6. Start service if it did not autostart on installation.
7. Test access.

Objectives

In this project/lab the student will:

- Gain familiarity with Linux Best Practices
- Installation of an additional Debian VM.

Equipment/Supplies Needed

- As specified in Lab 0.0.1.

This is a reading assignment in Lab Format. The student must understand both the PROCESS and REASON for each step.

Procedure

Follow the steps in this lab in the order they are presented to you. Answer all questions and record the requested information. Use the Linux Virtual Machine to perform lab activities as directed. Unless otherwise stated, all tasks done as a non-root user. If root access is needed use the sudo command.

Step 1: *Ascertain the program*

Linux programs are of two types, client programs and server programs also called daemons. Client programs are just listed by name. Daemon programs terminate with a 'd' at the end of the name. For example, the client program for FTP isftp while the daemon FTP is vsftpd.

1. Try it yourself. Open a terminal and:

   `aptitude search [program name]`

   or,

   `apt search [program name]`

2. In most cases the service you are looking for has a program of a similar name. But not always. Try:

   `aptitude search dns`

3. You will see a full screen of dns referenced tools and helper apps but not the core server. The DNS server is provided by a program called `Bind9`. When in doubt, do a Google search for the service desired. Something like 'Linux service'. Where service is the name of the program you are looking for.

Review dependencies

1. The majority of the time the install process will resolve this issue. However it is worth the effort to know the dependencies that are needed. The needs for a program can be evaluated by:

   `apt-cache depends [program name]`

   Doing so lists the supporting libraries. Provides information on what programs it will conflict with. Finally the programs it replaces. Bottom line - if you have an existing program installed and were to install vsftpd the existing program will not run.

Assemble support tools

Typically you will have them already!

- Your favorite text editor

- Nmap
- The services or systemd commands

Some daemon programs may have ancillary tools as well. Best means of discovery is to find the webpage for that service and look at the README file.

Step 2: *Install*

1. Open a terminal session. Promote to root user with either su - or sudo -i.

   Perform either -
   `apt-get install [program name]`
   or
   `aptitude install [program name]`

   Pssst- omit the [ ] for the install.

   Watch for error or warning messages. Warning messages generally will not stop a daemon from working but there might be tweaks that need to be executed. Error messages on the other hand are a show stopper. 80% of the time it's either a dependency or permissions issue involved.

   DO NOT PROCEED ANY FURTHER TILL ALL ERROR MESSAGES ARE CLEARED.

Step 3: *Program Status*

1. At this juncture you want to know "is the program running?" Not all daemons perform an autostart. There are two ways to determine the status of a program. As root user perform:

   `cd /etc/init.d`
   `service [program] status`
   or
   `systemctl status [program]`

2. If the daemon is not running then either:

   `cd /etc/init.d`
   `service [program] start`
   or
   `systemctl start [program]`

   Be sure to watch for errors. If there are none, your daemon is running.

Ports Open
It is good practice to check that the required port is open. Even if the daemon is running does not mean that the port is open. It should be, but it is possible that a firewall rule might be overriding access.

1. An easy way to check via the terminal is:

   `nmap [ip address]` where ip address is your machine ip address.

   The report that comes back should have on the list the port open for the daemon you installed. For example if I installed vsftpd then I would receive a line item stating 'ftp' and '20' which is the standard port for an ftp service.

Step 4: *Configuration*

Except for the simplest of daemons, every service implemented will have its own configuration requirements. Vsftpd will have a different configuration than say Samba. But there are some generalities that can help:

- Configuration files end in .conf.
- Configuration files are in /etc or a subdirectory of /etc.
- You need to be in the root user mode via either su or sudo -i.

1. Want to know where to look? Execute the whereis command:

   `whereis [program]`

A listing will be generated and where the .conf file for vsftpd exists is listed.

Make a backup copy of the current configuration before you edit the configuration file!

Beyond this you will need to learn what are the essential configurations for each daemon service you intend to use.

Step 5: *Revalidate status and ports*

1. Essentially repeat step 3 above.

2. Your configuration change might cause an error that will need correction. By the way configuration changes in Linux do not take effect automatically. You the operator need to restart the service. That causes the daemon to reread the

configuration file.

You made a backup copy of the working configuration right??

3. If you have completed the previous step, then skip this step. There are minor cases where a daemon that should autostart does not because some other service failed or a driver for a piece of hardware did not load before the daemon started. Some administrators also have programs that they prefer to not have running except for certain conditions where manual start is appropriate.

Step 6: *Start your service.*

1. If that is the case this is the step where you start the program.

   Two choices:

   Use the services command.

   ```
   services [program name] start
   ```

   Use systemctl command.

   ```
   systemctl start [program name]
   ```

Step 7: *Your service is running*,

the ports are open and the configuration has been completed. It is now time to test the system.

50% of the time that means you have to have a client program to test against the computer providing the service. For example if you have `vsftpd` running on VMSVR1 then you need the mating client program `ftp` on your PC. Fortunately for Linux users a command line program ftp client is available for installation. Here are the general steps to accomplish the task:

- Check connectivity. Use the ping command to confirm that the PC can access the server via TCP. If there is a failure then the connectivity issue must be resolved first.
- Install the client program if it is not already loaded on the PC.
- Launch the program with the appropriate command line options to make the connection. At a minimum the ip address to the server is needed.

- Did you get a response or an error? Check your inputs via the client program.

Installing Linux daemon services follow these 7 steps. It's repeatable and there is no guesswork.

Assignment

Install ftp client program:

1. Open a terminal session.
2. Execute apt-get install ftp. Wait for install to complete.
3. Test the client program.

    Execute ftp

4. You should see a ftp> prompt.
5. Type bye.
6. Submit screen shot.

Further Action Required

1. The student will be required to create another instance of Debian for use as VMSVR1 for server functions. That can be accomplished by either:
    - Creating a fresh install of a Debian instance. Or,
    - Cloning the current instance of Debian using the appropriate VMWare tools.
2. If the student opts to clone they need to be mindful to change:
    - Hostname
    - IP address
    - MAC address

Reflection

1. If during the installation process you receive errors what should you do?

Rubric

Checklist/Single Point Mastery

Concerns Working Towards Proficiency	Criteria Standards for This Competency	Accomplished Evidence of Mastering Competency
	Criteria #1:Recorded output (50 points)	
	Criteria #2: Reflection question (50 Points)	