

Lab - Working with Systemd & Dnf Package Management in Linux

Overview:

In this lab, the student will work with the most commonly used Linux command concepts. Starting with Fedora 15, Fedora introduced a piece of core software called systemd. systemd is a collection of tools for a range of different tasks. Its primary purpose is initializing, managing and tracking system services and daemons in Fedora, both during startup and while the system is running. In previous versions of Fedora, these jobs were handled by SysVinit (System V init, or just init).

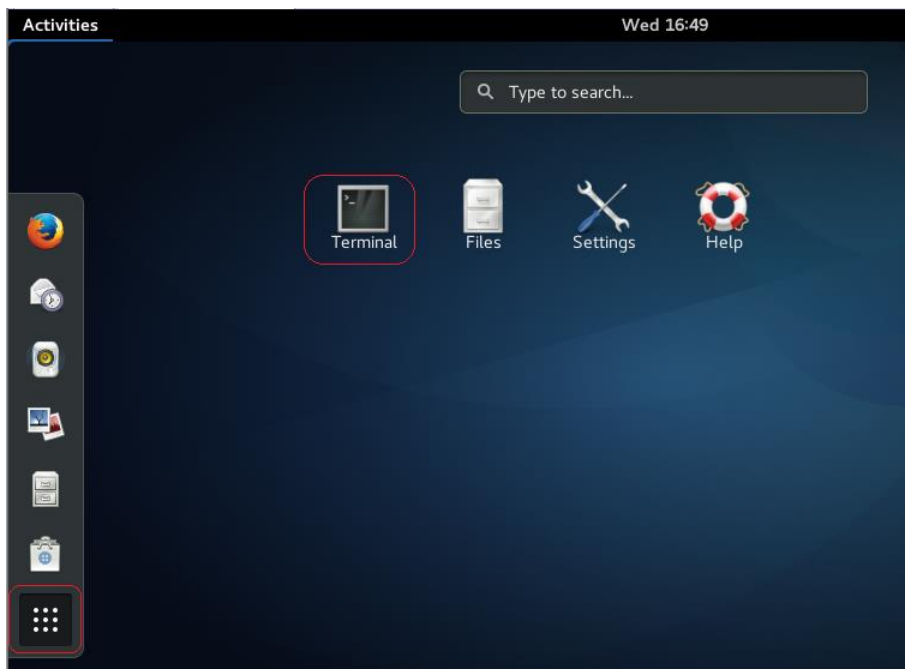
Lab Procedure

Determining How to Install Linux Packages

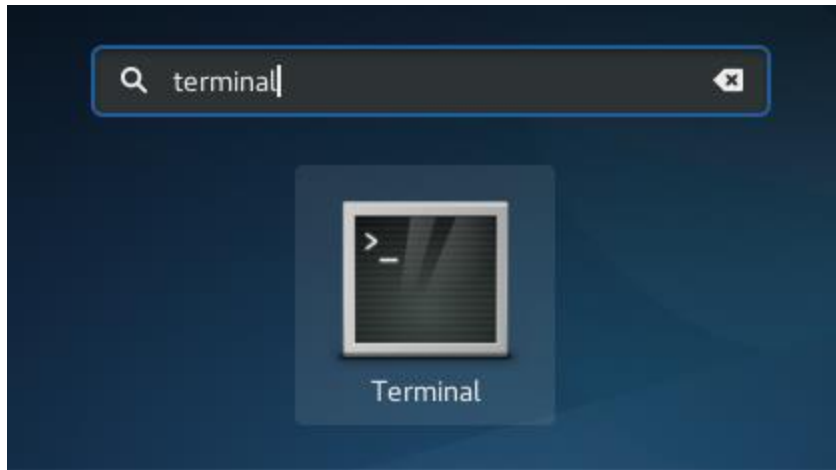
1. Logon to your virtual install of Linux server.
2. Login as superuser (su)
3. Open a terminal shell:

On Server1, click on **Activities > Utilities > Terminal**.

Click on the Show Applications icon.



You can also type **terminal** in the search window and click on the terminal icon.



Type the following in the terminal to see where systemd is installed:

whereis systemd

```
root@localhost:~  
File Edit View Search Terminal Help  
[root@localhost ~]# whereis systemd  
systemd: /usr/lib/systemd /etc/systemd /usr/share/systemd /usr/share/man/man1/sy  
stemd.1.gz  
[root@localhost ~]#
```

Type the following in the terminal to see if systemd is running:

ps -ef | grep systemd

```
root@localhost:~  
File Edit View Search Terminal Help  
[root@localhost ~]# ps -ef | grep systemd  
root      1      0  0 16:47 ?        00:00:02 /usr/lib/systemd/systemd --swi  
tched-root --system --deserialize 23  
root      562    1  0 16:47 ?        00:00:00 /usr/lib/systemd/systemd-journ  
ald  
root      595    1  0 16:47 ?        00:00:00 /usr/lib/systemd/systemd-udev  
dbus      738    1  0 16:47 ?        00:00:00 /usr/bin/dbus-daemon --system  
--address=systemd: --nofork --nopidfile --systemd-activation --syslog-only  
root      755    1  0 16:47 ?        00:00:00 /usr/lib/systemd/systemd-logi  
n  
gdm       945    1  0 16:48 ?        00:00:00 /usr/lib/systemd/systemd --use  
r  
gdm       987    945  0 16:48 ?        00:00:00 /usr/bin/dbus-daemon --session  
--address=systemd: --nofork --nopidfile --systemd-activation --syslog-only  
root     1361    1  0 16:48 ?        00:00:00 /usr/lib/systemd/systemd --use  
r  
root     1381   1361  0 16:48 ?        00:00:00 /usr/bin/dbus-daemon --session  
--address=systemd: --nofork --nopidfile --systemd-activation --syslog-only  
root     2319   2173  0 17:00 pts/0    00:00:00 grep --color=auto systemd  
[root@localhost ~]#
```

Type the following to view the system bootup process:

systemd-analyze

```
root@localhost:~  
File Edit View Search Terminal Help  
[root@localhost ~]# systemd-analyze  
Startup finished in 1.464s (kernel) + 2.656s (initrd) + 32.967s (userspace) = 37  
.087s  
[root@localhost ~]#
```

Type the following to view the time each process took during bootup:

systemd-analyze blame

```
root@localhost:~  
File Edit View Search Terminal Help  
[root@localhost ~]# systemd-analyze blame  
33.072s dnf-makecache.service  
14.413s plymouth-quit-wait.service  
10.104s firewalld.service  
6.894s NetworkManager-wait-online.service  
3.733s systemd-udev-settle.service  
3.275s lvm2-monitor.service  
3.181s dev-mapper-fedora\x2droot.device  
3.089s fwupd.service  
2.347s libvirtd.service  
2.255s accounts-daemon.service  
1.870s abrt.service  
1.596s lvm2-pvscan@8:2.service  
1.463s avahi-daemon.service  
1.446s ModemManager.service  
1.429s polkit.service  
1.301s chronyd.service  
1.262s systemd-journal-flush.service  
929ms systemd-udevd.service  
745ms systemd-logind.service  
688ms NetworkManager.service  
635ms gssproxy.service  
589ms abrt-ccpp.service  
551ms packagekit.service
```

Type **Ctrl^C** to exit display.

Type the following to see if a service is running: **systemctl status httpd** (look under Active)

```
root@localhost:~  
File Edit View Search Terminal Help  
[root@localhost ~]# systemctl status httpd  
● httpd.service - The Apache HTTP Server  
   Loaded: loaded (/usr/lib/systemd/system/httpd.service; disabled; vendor prese  
   Active: inactive (dead)  
lines 1-3/3 (END)
```

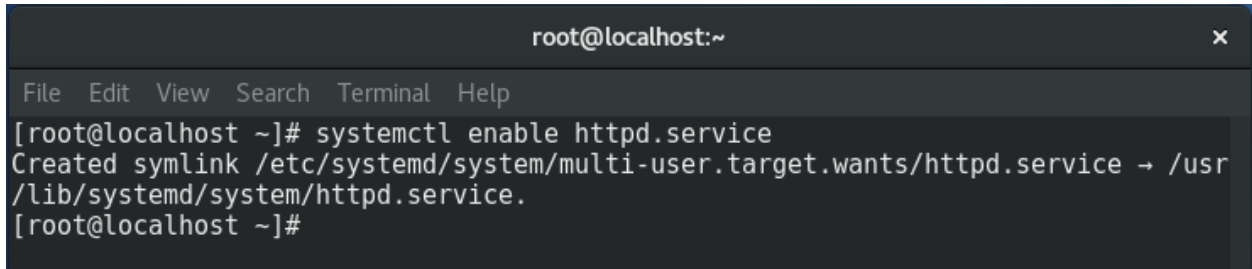
Type the following to see if a service is enabled to start automatically when the OS starts:

systemctl is-enabled httpd.service

```
root@localhost:~  
File Edit View Search Terminal Help  
[root@localhost ~]# systemctl is-enabled httpd.service  
disabled  
[root@localhost ~]#
```

If a service is not enabled, type the following to enable it at bootup:

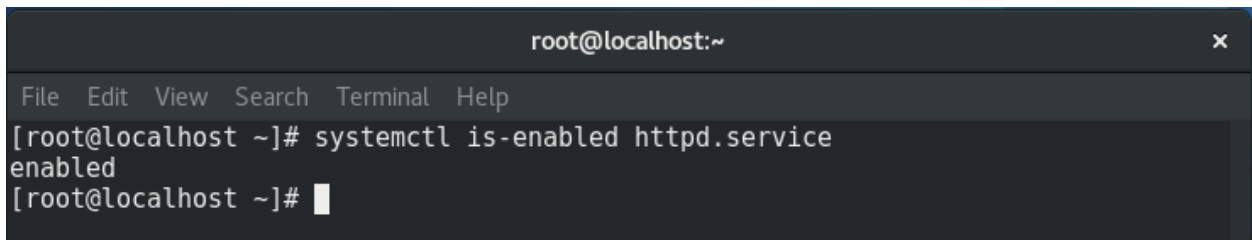
systemctl enable httpd.service

A terminal window titled 'root@localhost:~' with a menu bar (File, Edit, View, Search, Terminal, Help). The command '[root@localhost ~]# systemctl enable httpd.service' has been entered. The output shows 'Created symlink /etc/systemd/system/multi-user.target.wants/httpd.service -> /usr/lib/systemd/system/httpd.service.' followed by a new prompt '[root@localhost ~]#'.

```
root@localhost:~
File Edit View Search Terminal Help
[root@localhost ~]# systemctl enable httpd.service
Created symlink /etc/systemd/system/multi-user.target.wants/httpd.service -> /usr
/lib/systemd/system/httpd.service.
[root@localhost ~]#
```

Type the following to see if a service is enabled to start automatically when the OS starts:

systemctl is-enabled httpd.service

A terminal window titled 'root@localhost:~' with a menu bar (File, Edit, View, Search, Terminal, Help). The command '[root@localhost ~]# systemctl is-enabled httpd.service' has been entered. The output is 'enabled', followed by a new prompt '[root@localhost ~]#'.

```
root@localhost:~
File Edit View Search Terminal Help
[root@localhost ~]# systemctl is-enabled httpd.service
enabled
[root@localhost ~]#
```

Reboot after enabling the httpd.service.

Type the following to see if a service is running: **systemctl status httpd**
(look under Active)

```
root@localhost:~
File Edit View Search Terminal Help
[root@localhost ~]# systemctl status httpd
● httpd.service - The Apache HTTP Server
   Loaded: loaded (/usr/lib/systemd/system/httpd.service; enabled; vendor preset
   Active: active (running) since Wed 2017-06-14 17:14:01 +08; 48s ago
 Main PID: 850 (httpd)
   Status: "Total requests: 0; Idle/Busy workers 100/0;Requests/sec: 0; Bytes se
   Tasks: 32 (limit: 19660)
   CGroup: /system.slice/httpd.service
           └─850 /usr/sbin/httpd -DFOREGROUND
             └─896 /usr/sbin/httpd -DFOREGROUND
               └─897 /usr/sbin/httpd -DFOREGROUND
                 └─898 /usr/sbin/httpd -DFOREGROUND
                   └─899 /usr/sbin/httpd -DFOREGROUND
                     └─902 /usr/sbin/httpd -DFOREGROUND

Jun 14 17:13:59 localhost.localdomain systemd[1]: Starting The Apache HTTP Serve
Jun 14 17:14:01 localhost.localdomain httpd[850]: AH00558: httpd: Could not reli
Jun 14 17:14:01 localhost.localdomain systemd[1]: Started The Apache HTTP Server
lines 1-17/17 (END)
```

DNF or Dandified Yum

DNF or Dandified yum is the next generation version of yum. DNF is a software package manager that installs, updates, and removes packages on RPM-based Linux distributions. It automatically computes dependencies and determines the actions required to install packages. DNF also makes it easier to maintain groups of machines, eliminating the need to manually update each one using rpm. Introduced in Fedora 18, it has been the default package manager since Fedora 22.

Type the following command to check to see if there are any updates

dnf check-update

```
root@localhost:~
File Edit View Search Terminal Help
[root@localhost ~]# dnf check-update
Last metadata expiration check: 0:18:26 ago on Wed Jun 14 16:58:54 2017.

libsndfile.x86_64                               1.0.28-2.fc25                               updates
[root@localhost ~]#
```

Type the following to update your system with the latest updates:

dnf -y update or **dnf -y upgrade**

(If you leave the `-y` out, you must indicate yes to the question after issuing the command)

```
root@localhost:~  
File Edit View Search Terminal Help  
[root@localhost ~]# dnf -y update  
Last metadata expiration check: 0:20:13 ago on Wed Jun 14 16:58:54 2017.  
Dependencies resolved.  
=====
```

Package	Arch	Version	Repository	Size
Upgrading:				
libsndfile	x86_64	1.0.28-2.fc25	updates	185 k

```
Transaction Summary  
=====
```

Type the following to see a listing of all packages:

dnf list or **dnf list all**

You can parse through the result by using a pipe (`|`) and the more command.

dnf list all | more

```
root@localhost:~  
File Edit View Search Terminal Help  
[root@localhost ~]# dnf list all | more  
Last metadata expiration check: 0:22:52 ago on Wed Jun 14 16:58:54 2017.  
Installed Packages  
GConf2.x86_64 3.2.6-16.fc24 @anaconda  
GeoIP.x86_64 1.6.11-1.fc25 @updates  
GeoIP-GeoLite-data.noarch 2017.04-1.fc25 @updates  
LibRaw.x86_64 0.17.2-1.fc25 @anaconda  
ModemManager.x86_64 1.6.4-1.fc25 @updates  
ModemManager-glib.x86_64 1.6.4-1.fc25 @updates  
NetworkManager.x86_64 1:1.4.4-5.fc25 @updates  
NetworkManager-ads1.x86_64 1:1.4.4-5.fc25 @updates  
NetworkManager-bluetooth.x86_64 1:1.4.4-5.fc25 @updates  
NetworkManager-config-connectivity-fedora.x86_64
```

Type the following to see packages installed one page at a time:

dnf list installed | more

```
root@localhost:~  
File Edit View Search Terminal Help  
[root@localhost ~]# dnf list installed | more  
Last metadata expiration check: 0:27:39 ago on Wed Jun 14 16:58:54 2017.  
Installed Packages  
GConf2.x86_64 3.2.6-16.fc24 @anaconda  
GeoIP.x86_64 1.6.11-1.fc25 @updates  
GeoIP-GeoLite-data.noarch 2017.04-1.fc25 @updates  
LibRaw.x86_64 0.17.2-1.fc25 @anaconda  
ModemManager.x86_64 1.6.4-1.fc25 @updates  
ModemManager-glib.x86_64 1.6.4-1.fc25 @updates  
NetworkManager.x86_64 1:1.4.4-5.fc25 @updates  
NetworkManager-ads1.x86_64 1:1.4.4-5.fc25 @updates  
NetworkManager-bluetooth.x86_64 1:1.4.4-5.fc25 @updates  
NetworkManager-config-connectivity-fedora.x86_64
```

Type the following to see groups of packages:

```
dnf group list | more
```

```
root@localhost:~  
File Edit View Search Terminal Help  
[root@localhost ~]# dnf group list | more  
Last metadata expiration check: 0:30:45 ago on Wed Jun 14 16:58:54 2017.  
Available environment groups:  
Fedora Custom Operating System  
Minimal Install  
Fedora Server Edition  
Fedora Workstation  
Fedora Cloud Server  
KDE Plasma Workspaces  
Xfce Desktop  
LXDE Desktop  
Hawaii Desktop  
LXQt Desktop  
Cinnamon Desktop  
MATE Desktop
```

Type the following to view enabled repositories:

```
dnf repolist
```



```
root@localhost:~
File Edit View Search Terminal Help
[root@localhost ~]# dnf repolist
Last metadata expiration check: 0:32:04 ago on Wed Jun 14 16:58:54 2017.
repo id      repo name      status
*fedora      Fedora 25 - x86_64  51,669
*updates     Fedora 25 - x86_64 - Updates 19,965
[root@localhost ~]#
```

Type the following in the terminal:

dnf repository-packages fedora list installed

```
root@localhost:~
File Edit View Search Terminal Help
[root@localhost ~]# dnf repository-packages fedora list installed
Last metadata expiration check: 0:33:02 ago on Wed Jun 14 16:58:54 2017.
Installed Packages
xmlsec1-openssl.x86_64      1.2.23-1.fc25      @fedora
[root@localhost ~]#
```

Type the following in the terminal to install a package: **dnf install** {package name}

Example: **dnf install nano**

```
root@localhost:~
File Edit View Search Terminal Help
[root@localhost ~]# dnf install nano
Last metadata expiration check: 0:35:40 ago on Wed Jun 14 16:58:54 2017.
Dependencies resolved.
=====
Package      Arch      Version      Repository      Size
=====
Installing:
nano         x86_64    2.6.1-1.fc25  fedora          555 k
Transaction Summary
=====
```

Type the following to remove a package: **dnf remove** {package name}

Example: **dnf remove nano**

```
root@localhost:~  
File Edit View Search Terminal Help  
[root@localhost ~]# dnf remove nano  
Dependencies resolved.  
=====
```

Package	Arch	Version	Repository	Size
Removing: nano	x86_64	2.6.1-1.fc25	@fedora	2.0 M

```
=====
```

Transaction Summary

Type the following to clean up and remove cached packages:

dnf clean all

```
root@localhost:~  
File Edit View Search Terminal Help  
[root@localhost ~]# dnf clean all  
23 files removed  
[root@localhost ~]#
```

Type the following for help with dnf: or **man dnf**

```
root@localhost:~  
File Edit View Search Terminal Help  
[root@localhost ~]# dnf help  
usage: dnf [options] COMMAND  
  
List of Main Commands  
  
autoremove          remove all unneeded packages that were originally installed as dependencies  
check-update         check for available package upgrades  
clean                remove cached data  
distro-sync          synchronize installed packages to the latest available versions
```

Type the following to view the history of dnf usage:

dnf history

```
root@localhost:~  
File Edit View Search Terminal Help  
[root@localhost ~]# dnf history  
ID | Command line | Date and time | Action(s) | Altered  
-----  
7 | remove nano | 2017-06-14 17:36 | Erase | 1  
6 | install nano | 2017-06-14 17:34 | Install | 1  
5 | -y update | 2017-06-14 17:19 | Update | 1  
4 | install kernel-devel ker | 2017-06-12 19:22 | Install | 1  
3 | install nautilus-open-te | 2017-06-12 18:18 | Install | 1  
2 | update | 2017-06-12 17:28 | I, O, U | 729 EE  
1 | | 2016-11-16 05:27 | Install | 1485 EE  
[root@localhost ~]#
```

Type the following to sync the distros repos to a stable release:

dnf distro-sync

(reboot maybe required for this command to run. Command must me run as root (su))

```
root@localhost:~  
File Edit View Search Terminal Help  
[root@localhost ~]# dnf distro-sync  
Fedora 25 - x86_64 3.0 MB/s | 50 MB 00:16  
Fedora 25 - x86_64 - Updates 3.4 MB/s | 23 MB 00:06  
Last metadata expiration check: 0:00:09 ago on Wed Jun 14 17:42:05 2017.  
Dependencies resolved.  
Nothing to do.  
Complete!  
[root@localhost ~]#
```

Type the following to view information about a specific package:

dnf info {Package Name}

```
root@localhost:~  
File Edit View Search Terminal Help  
[root@localhost ~]# dnf info nano  
Last metadata expiration check: 0:01:23 ago on Wed Jun 14 17:42:05 2017.  
Available Packages  
Name      : nano  
Arch      : x86_64  
Epoch    : 0  
Version   : 2.6.1  
Release   : 1.fc25  
Size      : 555 k  
Repo      : fedora  
Summary   : A small text editor  
URL       : http://www.nano-editor.org  
License   : GPLv3+  
Description : GNU nano is a small and friendly text editor.  
[root@localhost ~]#
```

End of Lab!