Training resources for LFCS certification (Linux Foundation

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LFCS Training Resources

Training resources for LFCS certification (Linux Foundation Certified System Administrator)

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Software management

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Resources

Certification Preparation Guide

Free Training Resources

- Linux System Administration (by Paul Cobbaut)

Paid Training Resources

- Linux Foundation LFS220 course (Course Outline)
- Linux Foundation LFS230 course (Course Outline)

Command-line

https://www.youtube.com/watch?v=1NImWlosIyg

https://www.youtube.com/watch?v=_SrVSUH8dtc

https://www.youtube.com/watch?v=2hOQgU-T-kU

Editing text files on the command line

Most popular text editors: **Vi** and **Nano**

Vi

The default editor that comes with the UNIX operating system is called *vi*.

Two modes:

- Command mode
- Insert mode

In the **command mode**, every character typed is a command that does something to the text file being edited.

In the **insert mode**, every character typed is added to the text in the file. Pressing `&lt;Esc&gt;` turns off the insert mode.

Start Vi

Edit file *readme.txt*:

```
$ vi readme.txt
```

Recover file *readme.txt* (that was being edited when system crashed):

```
$ vi -r readme.txt
```

Exit from Vi

There are several ways to quit *vi*:

```
:x  quit vi, writing out modified file to file named in original invocation
:wq  -> quit vi, writing out modified file to file named in original invocation
:q  -> quit (or exit) vi
:q!  -> quit vi even though latest changes have not been saved for this vi call
```

Commands

- Inserting text: **i**
- Inserting text (beginning current line): **I**
- Inserting text (ending current line): **A**
- Deleting single character: **x**
- Deleting entire current line: **dd**
- Searching *string* in text: **/string**
- Saving file: **:w**

More: http://www.cs.colostate.edu/helpdocs/vi.html

Nano

Start Nano

Edit file *readme.txt*:

```
nano readme.txt
```

Manipulating text files from the command line

redirection

```
$ command > file.txt
$ command >> file.txt (adding)
```

pipe

```
$ command | command
```

Different commands:

```
* ls
* cat
* sed
* du
* sort
* head *
* tail *
* uniq *
* grep
* cut
```

example I (cat and sed)

'cat' command will show the content of the file gu.txt.

```
$ cat gu.txt
My name is Antton and my friend is Xabi.
I have a green tree.
You and I, we are friends.
```

We would manipulate 'gu.txt' with 'sed' and redirect the output into a new file 'gu2.txt', after that, check manipulated new file again with 'cat'.

```
$ sed ‘s/y/Y/g’ gu.txt > gu2.txt
$ cat gu2.txt
MY name is Antton and mY friend is Xabi.
I have a green tree.
You and I, we are friends.
```

We would manipulate the previous created 'gu2.txt' file and change some text with characters. We would use the character (^) with 'sed' to represent the beginning of a line. (check the changes with 'cat')

```
$ sed 's/and/\&/g;s/^I/You/g' gu2.txt
$ cat gu2.txt
MY name is Antton & mY friend is Xabi.
You have a green tree.
You & I, we are friends.
```

Example II (du and sort)

```
$ du -sch /var/* | sort
0    /var/lock
0    /var/run
123M    /var/opt
138M    /var/lib
15M    /var/log
326M    total
4,0K    /var/backups
4,0K    /var/local
4,0K    /var/mail
4,0K    /var/tmp
51M    /var/cache
60K    /var/chef
888K    /var/spool
```

lets add the -h into the sort command.

```
$ du -sch /var/* | sort -h
0    /var/lock
0    /var/run
4,0K    /var/backups
4,0K    /var/local
4,0K    /var/mail
4,0K    /var/tmp
60K    /var/chef
888K    /var/spool
15M    /var/log
51M    /var/cache
123M    /var/opt
138M    /var/lib
326M    total
```

Example III (grep)

```
$ grep -rni backup /etc/passwd
14:backup:x:34:34:backup:/var/backups:/bin/sh
```

```
$ ls -l /etc | grep rc[0-9]
drwxr-xr-x 2 root root    4096 ene 19 14:12 rc0.d
drwxr-xr-x 2 root root    4096 ene 19 14:12 rc1.d
drwxr-xr-x 2 root root    4096 ene 19 14:12 rc2.d
drwxr-xr-x 2 root root    4096 ene 19 14:12 rc3.d
drwxr-xr-x 2 root root    4096 ene 19 14:12 rc4.d
drwxr-xr-x 2 root root    4096 ene 19 14:12 rc5.d
drwxr-xr-x 2 root root    4096 ene 19 14:12 rc6.d
```

Example IV (cat and cut)

If we filter the cat command output with cut we could decide to show the firs and seven columns of the file we are trying to see. (remember we could redirect into a new file as well with > newfile.txt)

```
$ cat /etc/passwd | cut -d: -f1,7
root:/bin/bash
daemon:/bin/sh
bin:/bin/sh
sys:/bin/sh
sync:/bin/sync
games:/bin/sh
man:/bin/sh
lp:/bin/sh
```

```
mail:/bin/sh
```

Filesystem & storage

Partitioning and Formatting Disks

```
Common Disk Types

Disk Geometry

Partitioning

Naming Disk Devices

Sizing up the partitions

Partition table editors
```

Linux Filesystems

```
Some Notes About Filesystems

Filesystem Types

XFS (https://www.youtube.com/watch?v=-rZn8wUIz1g )

ext4 ( https://www.youtube.com/watch?v=C725TehKBiQ )

btrfs ( https://www.youtube.com/watch?v=wso_gZwr9oQ )

Extended Attributes

How to Make a Filesystem

How to Attach a Filesystem

Getting your Quota ( https://www.youtube.com/watch?v=DqQlceYP0N8 )

Checking and Repairing Filesystems

Disk and Filesystem Usage
```

Advanced Filesystem Management

```
Software RAID

RAID Levels

RAID Configuration

Logical Volumes

Volumes and Volume Groups

Creating Logical Volumes

Resizing Logical Volumes
```

https://www.youtube.com/watch?v=InhmpDtk49c

```
LVM Snapshots
```

File attributes

- File attributes
  - chattr and lsattr
    - a,c,d,e,i,j,s...
  - Extended attributes
- Viewing permissions
  - What the columns mean
  - What the permissions mean
  - Directory
  - Files

chmod [new_mode] file/directory chown [new_mode] file/directory

https://wiki.archlinux.org/index.php/File_permissions_and_attributes

https://www.youtube.com/watch?v=kbVazfI3B_g

Archiving and compressing files and directories

tar [options] [pathname ...] tar tvf [tarball]

Grouping and compressing with gzip, bzip2 and xz

```
$ tar czf myfiles.tar.gz file[0-9]
$ tar cjf myfiles.tar.bz2 file[0-9]
$ tar cJf myfile.tar.xz file[0-9]
```

Finding files on the filesystem

find [directory_to_search] [expression]

Advanced find:

```
$ find . -maxdepth 3 -type f -size +2M
$ find /home/user -perm 777 -exec rm '{}' +
$ find /etc -iname "*.conf" -mtime -180 -print
```

Formatting filesystems

- $ fdisk /dev/sdb
- $ gdisk /dev/sdb
- $ ls /sbin/mk*
- $ mkfs -t [filesystem] -L [label] device
- $ mkfs.[filesystem] -L [label] device
- etc/fstab /dev/sdX1 swap swap sw 0 0
- $ mkswap /dev/sdX1
- $ swapon -v /dev/sdX1
- $ cat /proc/swaps
- $ swapoff /dev/sdX1 (disable swap)

Assembling partitions as RAID devices

https://www.youtube.com/watch?v=t0t0kwJu4UU

Local system administration

System Startup and Shutdown

```
Understanding the Boot Sequence

The Grand Unified Boot Loader

GRUB Configuration File

Emergency Boot Media

The init Process

SysVinit Startup

Upstart

Using systemd

Configuration Files in /etc/sysconfig

Shutting down/Rebooting the System
```

User and Group Account Management

```
User accounts

Management

Passwords

Groups

Pluggable Authentication Modules (PAM)

Authentication Process

Configuring PAM

LDAP authentication

File ownership
```

Managing user accounts

Managing file permissions

- Changing permissions using the chmod command
  - Text method (u-g-o, r-w-x...)
  - Text method shortcuts (g+w, a-w, etc)
  - Copying permissions
  - Numeric method (777)
  - Bulk chmod
- Changing ownership using the chown command

https://wiki.archlinux.org/index.php/File_permissions_and_attributes

Local security

Local System Security

```
Creating a Security Policy

Physical Security

SELinux Overview

Filesystem Security
```

Software management

Package Management Systems

```
Software Packaging Concepts

Red Hat Package Manager (RPM)

DPKG
```

Package Installers

```
YUM

Using apt-get

zypper
```

New I (Understanding Processes)

Understanding Processes

```
Process States

Execution Modes

Daemons

Creating Processes

How the Shell Creates a New Process

Monitoring Processes

Signals
```

New II (Networking)

Networking

```
Basic Network Services

IP Addresses

Configuring Network Interfaces

Routing

Name Resolution

Network Diagnostics
```

https://www.youtube.com/watch?v=4Gnb5GLVcNw

https://www.youtube.com/watch?v=lYwWK0Ct2ho

New III (Backup and Recovery Methods)

Backup and Recovery Methods

```
Why Backups?

tar

cpio

Compression: gzip, bzip2 and xz and Backups

rsync

dd

dump and restore
```

https://www.youtube.com/watch?v=R4G4DGpMT-o