1 LFCS

Generated on: 2026-01-13 15:04:47 **Version:** 1.0

1.1 Table of Contents

1.2 Overview

The **Linux Foundation Certified SysAdmin (LFCS)** exam demonstrates a candidate's proficiency in Linux system administration.

1.3 Exam Overview

Detail	Information
Exam Format	Performance-based (hands-on)
Duration	2 hours
Passing Score	66%
Certification Validity	3 years
Cost	$395 USD
Retake Policy	1 free retake
Distribution	Ubuntu 22.04 or AlmaLinux 9

1.4 Exam Domains & Weights

Domain	Weight
Essential Commands	25%
Operation of Running Systems	20%
User and Group Management	10%
Networking	12%
Service Configuration	20%
Storage Management	13%

1.5 Prerequisites

- Basic understanding of Linux command line
- Familiarity with text editors (vim, nano)
- Understanding of file systems and permissions
- Basic networking knowledge

1.6 Study Resources

1.6.1 Official Resources

- LFCS Exam Curriculum
- Linux Documentation
- Ubuntu Documentation

1.6.2 Recommended Courses

- Linux System Administration Essentials (LFS207)
- Essentials of Linux System Administration (LFS201)

1.6.3 Practice Resources

- Linux Journey
- OverTheWire Bandit

1.7 Exam Tips

1. **Practice on Ubuntu/AlmaLinux**: Use the same distribution as the exam
2. **Master vim/nano**: You'll need to edit files quickly
3. **Know systemd**: Service management is crucial
4. **Understand permissions**: File and directory permissions
5. **Practice networking**: IP configuration, firewall rules
6. **Learn LVM**: Logical Volume Management is important

1.8 Key Topics to Master

1.8.1 Essential Commands

- File manipulation (cp, mv, rm, find, grep)
- Text processing (sed, awk, cut, sort)
- Archive and compression (tar, gzip, bzip2)
- File permissions and ownership

1.8.2 System Operations

- Boot process and systemd
- Process management
- System logging
- Scheduling tasks (cron, at)

1.8.3 Networking

- Network configuration
- Firewall management (firewalld, iptables)
- SSH configuration
- DNS and hostname resolution

1.8.4 Storage

- Partition management
- LVM operations
- File system creation and mounting
- RAID configuration

1.9 Navigation

- Next: Essential Commands →

1.10 Essential Commands

1.11 File and Directory Operations

1.11.1 Basic Commands

```
# List files
ls -la                    # Long listing with hidden files
ls -lh                    # Human-readable sizes
ls -ltr                   # Sort by time, reverse

# Change directory
cd /path/to/dir
cd ~                      # Home directory
cd -                      # Previous directory

# Create directories
mkdir mydir
mkdir -p parent/child/grandchild

# Copy files
cp file1 file2
cp -r dir1 dir2           # Recursive copy
cp -p file1 file2         # Preserve attributes

# Move/rename
mv oldname newname
mv file /path/to/dest/

# Remove
rm file
rm -r directory           # Recursive
rm -rf directory          # Force recursive
```

1.11.2 File Content Commands

```
# View files
cat file
less file
head -n 20 file
tail -n 20 file
tail -f /var/log/syslog   # Follow log
```

```
# Word/line count
wc -l file                # Line count
wc -w file                # Word count
wc -c file                # Byte count
```

1.12 Finding Files

1.12.1 find Command

```
# Find by name
find /path -name "*.txt"
find /home -name "file.txt"

# Find by type
find /var -type f         # Files only
find /var -type d         # Directories only
find /var -type l         # Symbolic links

# Find by size
find /var -size +100M     # Larger than 100MB
find /var -size -1k       # Smaller than 1KB

# Find by time
find /var -mtime -7       # Modified in last 7 days
find /var -atime +30      # Accessed more than 30 days ago

# Find and execute
find /tmp -name "*.tmp" -exec rm {} \;
find /var/log -name "*.log" -exec gzip {} \;

# Find by permissions
find /home -perm 777
find /home -perm /u+x     # User executable
```

1.12.2 locate Command

```
# Update database
sudo updatedb

# Search
locate filename
locate -i filename        # Case insensitive
```

1.13 Text Processing

1.13.1 grep

```
# Basic search
grep "pattern" file
grep -i "pattern" file    # Case insensitive
grep -r "pattern" /dir    # Recursive
grep -v "pattern" file    # Invert match
grep -n "pattern" file    # Show line numbers
grep -c "pattern" file    # Count matches
grep -l "pattern" *.txt   # List files with matches

# Extended regex
grep -E "pattern1|pattern2" file
egrep "pattern1|pattern2" file
```

1.13.2 sed

```
# Substitute
sed 's/old/new/' file           # First occurrence
sed 's/old/new/g' file          # All occurrences
sed -i 's/old/new/g' file       # In-place edit

# Delete lines
sed '/pattern/d' file           # Delete matching lines
sed '5d' file                   # Delete line 5
sed '1,5d' file                 # Delete lines 1-5

# Print specific lines
sed -n '5p' file                # Print line 5
sed -n '1,10p' file             # Print lines 1-10
```

1.13.3 awk

```
# Print columns
awk '{print $1}' file           # First column
awk '{print $1, $3}' file       # First and third columns
awk -F: '{print $1}' /etc/passwd # Custom delimiter

# Conditions
awk '$3 > 100 {print $1}' file
awk '/pattern/ {print $0}' file

# Built-in variables
awk '{print NR, $0}' file       # Line numbers
awk 'END {print NR}' file       # Total lines
```

1.13.4 Other Text Tools

```
# Sort
sort file
sort -n file              # Numeric sort
sort -r file              # Reverse
sort -k2 file             # Sort by column 2
sort -u file              # Unique

# Unique
uniq file                 # Remove adjacent duplicates
uniq -c file              # Count occurrences
sort file | uniq          # Remove all duplicates

# Cut
cut -d: -f1 /etc/passwd   # First field, colon delimiter
cut -c1-10 file           # Characters 1-10

# tr (translate)
tr 'a-z' 'A-Z' < file     # Lowercase to uppercase
tr -d '\n' < file         # Delete newlines
```

1.14 Archive and Compression

1.14.1 tar

```
# Create archive
tar -cvf archive.tar files/
tar -czvf archive.tar.gz files/   # With gzip
tar -cjvf archive.tar.bz2 files/  # With bzip2

# Extract
tar -xvf archive.tar
tar -xzvf archive.tar.gz
tar -xjvf archive.tar.bz2
tar -xvf archive.tar -C /dest/    # Extract to directory

# List contents
tar -tvf archive.tar
```

1.14.2 Compression Tools

```
# gzip
gzip file                 # Compress (replaces original)
gunzip file.gz            # Decompress
gzip -k file              # Keep original

# bzip2
bzip2 file
bunzip2 file.bz2
```

```
# xz
xz file
unxz file.xz

# zip
zip archive.zip file1 file2
zip -r archive.zip directory/
unzip archive.zip
```

1.15 File Permissions

1.15.1 Understanding Permissions

```
-rwxr-xr-x  1 user group  size date filename
|└┘└┘└┘
| |  |  └── Others: r-x (read, execute)
| |  └───── Group: r-x (read, execute)
| └──────── User: rwx (read, write, execute)
└─────────── File type: - (regular file)
```

1.15.2 chmod

```
# Symbolic mode
chmod u+x file            # Add execute for user
chmod g-w file            # Remove write for group
chmod o=r file            # Set others to read only
chmod a+x file            # Add execute for all

# Numeric mode
chmod 755 file            # rwxr-xr-x
chmod 644 file            # rw-r--r--
chmod 700 file            # rwx------

# Recursive
chmod -R 755 directory/
```

1.15.3 chown and chgrp

```
# Change owner
chown user file
chown user:group file
chown -R user:group directory/

# Change group
chgrp group file
chgrp -R group directory/
```

1.15.4 Special Permissions

```
# SUID (4)
chmod u+s file
chmod 4755 file

# SGID (2)
chmod g+s directory
chmod 2755 directory

# Sticky bit (1)
chmod +t directory
chmod 1755 directory
```

1.16 Links

```
# Hard link
ln file hardlink

# Symbolic link
ln -s /path/to/file symlink
ln -s /path/to/dir symlink

# View link target
readlink symlink
readlink -f symlink       # Full path
```

1.17 Input/Output Redirection

```
# Output redirection
command > file            # Overwrite
command >> file           # Append

# Error redirection
command 2> error.log
command 2>&1              # Stderr to stdout

# Combined
command > output.log 2>&1
command &> output.log     # Both stdout and stderr

# Input redirection
command < file

# Here document
cat << EOF > file
line 1
line 2
EOF
```

```
# Pipes
command1 | command2
ls -l | grep "pattern" | wc -l
```

1.18 Practice Questions

1. Find all files larger than 100MB in /var
2. Replace all occurrences of “old” with “new” in a file
3. Create a compressed tar archive of /etc
4. Set permissions to rwxr-x— on a directory recursively
5. Find all files modified in the last 24 hours

1.19 Navigation

- ← Back to Overview
- Next: Operation of Running Systems →

1.20 Sample Practice Questions

1.21 Practice Resources

- Linux Journey
- OverTheWire Bandit
- killer.sh LFCS Simulator

1.22 Section 1: Essential Commands (25%)

1.22.1 Question 1.1

Find all files in /var larger than 50MB and list them with their sizes.

Show Solution

```
find /var -type f -size +50M -exec ls -lh {} \;
# Or
find /var -type f -size +50M -ls
```

1.22.2 Question 1.2

Replace all occurrences of “error” with “warning” in /var/log/app.log without creating a backup.

Show Solution

```
sed -i 's/error/warning/g' /var/log/app.log
```

1.22.3 Question 1.3

Create a compressed tar archive of /etc named etc-backup.tar.gz.

Show Solution

```
tar -czvf etc-backup.tar.gz /etc
```

1.22.4 Question 1.4

Set permissions on /data directory so owner has full access, group has read/execute, others have no access. Apply recursively.

Show Solution

```
chmod -R 750 /data
```

1.23 Section 2: Operation of Running Systems (20%)

1.23.1 Question 2.1

List all running services and their status.

Show Solution

```
systemctl list-units --type=service --state=running
```

1.23.2 Question 2.2

Configure the nginx service to start automatically at boot.

Show Solution

```
systemctl enable nginx
```

1.23.3 Question 2.3

Find the process using the most CPU and kill it.

Show Solution

```
# Find top CPU process
ps aux --sort=-%cpu | head -2

# Or use top/htop to identify PID, then:
kill -9 <PID>
```

1.23.4 Question 2.4

Schedule a script /opt/backup.sh to run every day at 2:30 AM.

Show Solution

```
crontab -e
# Add line:
30 2 * * * /opt/backup.sh
```

1.24 Section 3: User and Group Management (10%)

1.24.1 Question 3.1

Create a user “developer” with home directory /home/developer and shell /bin/bash.

Show Solution

```
useradd -m -d /home/developer -s /bin/bash developer
```

1.24.2 Question 3.2

Add user “developer” to the “docker” group as a secondary group.

Show Solution

```
usermod -aG docker developer
```

1.24.3 Question 3.3

Set password expiry for user “developer” to 90 days.

Show Solution

```
chage -M 90 developer
```

1.25 Section 4: Networking (12%)

1.25.1 Question 4.1

Display all network interfaces and their IP addresses.

Show Solution

```
ip addr show
# Or
ip a
```

1.25.2 Question 4.2

Add a static route to network 10.0.0.0/24 via gateway 192.168.1.1.

Show Solution

```
ip route add 10.0.0.0/24 via 192.168.1.1
```

1.25.3 Question 4.3

Open port 8080/tcp in the firewall permanently.

Show Solution

```
# firewalld
firewall-cmd --permanent --add-port=8080/tcp
firewall-cmd --reload

# Or iptables
iptables -A INPUT -p tcp --dport 8080 -j ACCEPT
```

1.25.4 Question 4.4

Configure the system to use DNS server 8.8.8.8.

Show Solution

```
# Edit /etc/resolv.conf
echo "nameserver 8.8.8.8" >> /etc/resolv.conf

# Or for permanent (systemd-resolved)
# Edit /etc/systemd/resolved.conf and add:
# DNS=8.8.8.8
```

1.26 Section 5: Service Configuration (20%)

1.26.1 Question 5.1

Configure SSH to disable root login.

Show Solution

```
# Edit /etc/ssh/sshd_config
# Set: PermitRootLogin no

sed -i 's/^#*PermitRootLogin.*/PermitRootLogin no/' /etc/ssh/
        sshd_config
systemctl restart sshd
```

1.26.2 Question 5.2

Configure NTP to sync time with pool.ntp.org.

Show Solution

```
# For systemd-timesyncd
# Edit /etc/systemd/timesyncd.conf
# NTP=pool.ntp.org

# Or for chrony
# Edit /etc/chrony/chrony.conf
# server pool.ntp.org iburst

systemctl restart systemd-timesyncd
# Or
systemctl restart chronyd
```

1.26.3 Question 5.3

Set up a basic Apache virtual host for domain example.com serving content from /var/www/example.

Show Solution

```
# Create /etc/apache2/sites-available/example.com.conf (Ubuntu)
# Or /etc/httpd/conf.d/example.com.conf (RHEL)

cat << EOF > /etc/apache2/sites-available/example.com.conf
<VirtualHost *:80>
    ServerName example.com
    DocumentRoot /var/www/example
    <Directory /var/www/example>
        AllowOverride All
        Require all granted
    </Directory>
</VirtualHost>
EOF

a2ensite example.com.conf
systemctl reload apache2
```

1.27 Section 6: Storage Management (13%)

1.27.1 Question 6.1

Create a new partition on /dev/sdb using all available space.

Show Solution

```
fdisk /dev/sdb
# n (new partition)
# p (primary)
# 1 (partition number)
# Enter (default first sector)
# Enter (default last sector)
# w (write)

# Or with parted
parted /dev/sdb mklabel gpt
parted /dev/sdb mkpart primary 0% 100%
```

1.27.2 Question 6.2

Create an ext4 filesystem on /dev/sdb1 and mount it at /data.

Show Solution

```
mkfs.ext4 /dev/sdb1
mkdir -p /data
mount /dev/sdb1 /data

# For persistent mount, add to /etc/fstab:
echo "/dev/sdb1 /data ext4 defaults 0 2" >> /etc/fstab
```

1.27.3 Question 6.3

Create an LVM logical volume named “data” of 10GB from volume group “vg01”.

Show Solution

```
lvcreate -L 10G -n data vg01
```

1.27.4 Question 6.4

Extend logical volume /dev/vg01/data by 5GB and resize the filesystem.

Show Solution

```
lvextend -L +5G /dev/vg01/data
resize2fs /dev/vg01/data    # For ext4
# Or
xfs_growfs /dev/vg01/data   # For XFS
```

1.28 Quick Reference Commands

```
# System info
uname -a
hostnamectl
```

```
cat /etc/os-release

# Disk usage
df -h
du -sh /path

# Memory
free -h

# Processes
ps aux
top
htop

# Services
systemctl status service
systemctl start/stop/restart service
systemctl enable/disable service

# Logs
journalctl -u service
tail -f /var/log/syslog

# Network
ip addr
ip route
ss -tulpn
netstat -tulpn
```

1.29 Exam Tips

1. **Know your editor**: vim or nano - be fast
2. **Use tab completion**: Save time and avoid typos
3. **Check man pages**: `man command` is your friend
4. **Verify your work**: Always check if changes took effect
5. **Time management**: Don't spend too long on one question
6. **Read carefully**: Understand what's being asked

← Back to LFCS Overview
