Linux part1 challenges with answers

Introduction to Linux

- Define Linux
- Describe the main features and components of the Linux operating system
- What is the purpose of the user's home directory?
- Use the built in Linux documentation
- List different Linux distributions Linux Command Line
- Describe the login workflow
- Explain the Linux command syntax
- Perform basic operations at the command line
- Explain standard input, standard output, and standard error

Linux Users and Groups

• Manage user accounts

• Elevate permissions by using the su and sudo commands

• Describe AWS Identity and Access Management (IAM), the authentication service that Amazon Web Services (AWS) uses

For questions that require a screenshot from the command line of your EC2: • you will use the sandbox environment or your own AWS account

• be sure to use Amazon Linux 2 (not Amazon 2023)

• choose a free-tier eligible instance category like t2.micro

• Make sure inbound traffic to port 22 (SSH) and port 80 (HTTP) are allowed • After everything is set up correctly, gain remote access to your EC2 via ssh.

1. Who created Linux and when? **1991 by Linux Torvalds**

2. What is the relationship between hardware, software and the operating system? Hardware is the physical components (CPU, memory, storage drives, etc.). Software is the collection of applications and programs that are installed on the computer. One key type of software that computers require is an operating system. The operating system Interface between user and hardware.

3. Name 2 other popular operating systems besides Linux?

Unix, Microsoft Windows ((proprietary), MACos (proprietary)

4. What makes Linux different than an OS like Windows?

Linux is open source, can be expanded, and modified by users to create distributions.

5. What are Linux distros?

Linux distros are packaged versions that can be distributed and tailored for a given purpose. It includes the core operating system functionality (kernel) and additional complementary tools and software applications.

6. Name 2 distros that stem from Fedora and 2 that stem from Debian?

- Fedora : Amazon Linux2 , Cent OS, Redhat
- Debian : Ubuntu, Q4OS, Linux Mint

7. What are the major components of Linux?

- Kernel - manages the running of multiple applications and the sharing of resources with different users. Ex. (I/O) devices
- Applications - are software that provide set of functions that helps user to perform a type of task or activity - Ex : Web browser, Word Processor
- Shell - a command line interpreter where it interfaces with users to execute commands. Ex: Bash shell
- Daemons -na computer program that runs in the background and is not under the control of an interactive user. It typically provides a service to other running programs - Ex : sshd, syslogd
- Data File - A file contains information, or data, that the user has created or captured. Files can be of different types depending on the type of data that they contain. Ex. music, text, or image files (/pictures/dog.gif)
- Configuration files - are a special type of file that contains initial settings or stores values for a system program. Ex. /etc/group file

8. What is the difference between the CLI and the GUI?

CLI(Command Line Interface) consumes fewer hardware resources, it can automate with scripts, and provides more options.

GUI (Graphical User Interface) is visual and intuitive to navigate. This is similar in Linux, Windows and MacOS.

9. Why is the shell needed?

The Shell provides the command prompt. It defines the list of commands and functions that you

can run. A shell interprets the command that you type and invokes the appropriate kernel component that runs the command

10. Use the built-in documentation in Linux to find information on the command that will list files in a directory in a long format. Provide a screenshot of the documentation for that command in your linux system.
man (documentation) ls (listing) -l (long listing)

11. When logging in, if a user is in the system, the username is checked against which file?
`/etc/.passwd`

12. The password is checked against which file?
`/etc/shadow (sudo)`

13. What is the purpose of the user's home directory?
The Linux home directory is a directory for a particular user of the system and consists of individual files. It is also referred to as the login directory. This is the first place that occurs after logging into a Linux system. It is automatically created as "/home" for each user in the directory'.

14. Name 2 ways in which you can tell if a user is logged in as a standard user or as root?

- The root user command prompt ends with #
- The standard user command prompt ends with $
- The username will say root

15. What is special about the root user? They have all privileges and no restrictions.

16. What is a group and why would we want to use them in the Linux system?

- Groups are a convenient way to associate user accounts with similar security needs
- it is easier to grant permissions to a group of four users than to grant permissions individually to each of four users individually
- Controls user access to increase security - access management

17. What is the relationship between a command, option, and an argument?
It describes Syntax.

- Command: What you want Linux to do.
- Option: Modifies the command.
- Argument: What the command acts on.

18. What is standard input? Provide a screenshot using standard input.

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19. What would be a use case for using standard output? Provide a screenshot of using standard output.

20. Where can you send errors that you do not want to see or discard them?

21. Why is Bash tab completion helpful?

helps users type their commands faster and easier.

22. Execute the following objectives using commands and provide screenshots verifying that you have completed the task:

First login to your ec2

```
sreedevi@Sreedevis-iMac Downloads % chmod 400 mylinuxkeypair.pem
sreedevi@Sreedevis-iMac Downloads % ssh -i "mylinuxkeypair.pem" ec2-user@ec2-34-
219-110-160.us-west-2.compute.amazonaws.com

       __|  __|_  )
       _|  (     /   Amazon Linux 2 AMI
      ___|\___|___|

https://aws.amazon.com/amazon-linux-2/
[ec2-user@ip-172-31-23-231 ~]$
```

a) Create an empty file in the system called system-users.

touch system-users

ls

```
https://aws.amazon.com/amazon-linux-2/
[ec2-user@ip-172-31-23-231 ~]$ touch system-users
[ec2-user@ip-172-31-23-231 ~]$ ls
system-users
[ec2-user@ip-172-31-23-231 ~]$
```

b) What is the date on your system?

$ date

c) Show me the first few lines of /etc/yum.repos.d file

/etc/yum.repos.d is not a file so I created sample.txt file

Touch sample.txt

Cat > sample.txt to write content in that text file.

Press **Contrl+D** to save the content .

To get first 3 lines **head -3 sample.txt**

```
[ec2-user@ip-172-31-23-231 ~]$ ls
system-users
[ec2-user@ip-172-31-23-231 ~]$ date
Tue Jun 20 20:57:58 UTC 2023
[ec2-user@ip-172-31-23-231 ~]$ cat system-users
[ec2-user@ip-172-31-23-231 ~]$ touch sample.txt
[ec2-user@ip-172-31-23-231 ~]$ ls
sample.txt  system-users
[ec2-user@ip-172-31-23-231 ~]$ cat >sample.txt
Hi
This my sample text file
you can see the contect of this file
you can edit too
[ec2-user@ip-172-31-23-231 ~]$ cat sample.txt
Hi
This my sample text file
you can see the contect of this file
you can edit too
[ec2-user@ip-172-31-23-231 ~]$
```

```
[ec2-user@ip-172-31-23-231 ~]$ head -5 sample.txt
Hi
This my sample text file
you can see the contect of this file
you can edit too
[ec2-user@ip-172-31-23-231 ~]$ head -3 sample.txt
Hi
This my sample text file
you can see the contect of this file
[ec2-user@ip-172-31-23-231 ~]$
```

d) Change from your present working directory to the directory /tmp

cd /tmp

e) Show the history of commands you have executed on the system.

History

```
[ec2-user@ip-172-31-23-231 ~]$ cd /tmp
[ec2-user@ip-172-31-23-231 tmp]$ history
    1  touch system-users
    2  ls
    3  clear
    4  ls
    5  date
    6  cat system-users
    7  touch sample.txt
    8  ls
    9  cat >sample.txt
   10  cat sample.txt
   11  head -5 sample.txt
   12  head -3 sample.txt
   13  cd /tmp
   14  history
[ec2-user@ip-172-31-23-231 tmp]$
```

f) Create a user named night-shift

Sudo useradd night-shift

```
[ec2-user@ip-172-31-23-231 tmp]$ sudo useradd night-shift
[ec2-user@ip-172-31-23-231 tmp]$ id night-shift
uid=1001(night-shift) gid=1001(night-shift) groups=1001(night-shift)
[ec2-user@ip-172-31-23-231 tmp]$
```

g) Create 5 more users.

Sudo useradd userA

Sudo useradd userB

Sudo useradd userC

Sudo useradd userD

Sudo useradd userE

Cat /etc/passwd - will show the users

```
ec2-user:x:1000:1000:EC2 Default User:/home/ec2-user:/bin/bash
apache:x:48:48:Apache:/usr/share/httpd:/sbin/nologin
night-shift:x:1001:1001::/home/night-shift:/bin/bash
userA:x:1002:1002::/home/userA:/bin/bash
userB:x:1003:1003::/home/userB:/bin/bash
userC:x:1004:1004::/home/userC:/bin/bash
userD:x:1005:1005::/home/userD:/bin/bash
userE:x:1006:1006::/home/userE:/bin/bash
[ec2-user@ip-172-31-23-231 tmp]$
```

h) Your boss tells you the last user was created by mistake, and you need to delete the user from your system. Provide a screenshot.

Sudo userdel -r userA

```
[[ec2-user@ip-172-31-23-231 tmp]$ sudo userdel -r userA
[[ec2-user@ip-172-31-23-231 tmp]$ id userA
id: userA: no such user
[ec2-user@ip-172-31-23-231 tmp]$
```

i) Show me the last 5 lines of the /etc/passwd file.

Tail -5 /etc/passwd

j) Copy the passwd file to the empty file you created at step

Cp /etc/passwd system-users

k) Show the contents of /etc/resolv.conf
Cat /etc/resol.conf

```
[ec2-user@ip-172-31-23-231 tmp]$ cat /etc/resolv.conf
; generated by /usr/sbin/dhclient-script
search us-west-2.compute.internal
options timeout:2 attempts:5
nameserver 172.31.0.2
[ec2-user@ip-172-31-23-231 tmp]$
```

l) You need to add the user you deleted in step (h) back to the system because the user is indeed a new hire.

Sudo useradd userA

```
[ec2-user@ip-172-31-23-231 tmp]$ sudo useradd userA
[ec2-user@ip-172-31-23-231 tmp]$ cat /etc/passwd
root:x:0:0:root:/root:/bin/bash
bin:x:1:1:bin:/bin:/sbin/nologin
daemon:x:2:2:daemon:/sbin:/sbin/nologin
adm:x:3:4:adm:/var/adm:/sbin/nologin
lp:x:4:7:lp:/var/spool/lpd:/sbin/nologin
sync:x:5:0:sync:/sbin:/bin/sync
shutdown:x:6:0:shutdown:/sbin:/sbin/shutdown
halt:x:7:0:halt:/sbin:/sbin/halt
mail:x:8:12:mail:/var/spool/mail:/sbin/nologin
operator:x:11:0:operator:/root:/sbin/nologin
games:x:12:100:games:/usr/games:/sbin/nologin
ftp:x:14:50:FTP User:/var/ftp:/sbin/nologin
nobody:x:99:99:Nobody:/:/sbin/nologin
systemd-network:x:192:192:systemd Network Management:/:/sbin/nologin
dbus:x:81:81:System message bus:/:/sbin/nologin
rpc:x:32:32:Rpcbind Daemon:/var/lib/rpcbind:/sbin/nologin
libstoragemgmt:x:999:997:daemon account for libstoragemgmt:/var/run/lsm:/sbin/nologin
sshd:x:74:74:Privilege-separated SSH:/var/empty/sshd:/sbin/nologin
rpcuser:x:29:29:RPC Service User:/var/lib/nfs:/sbin/nologin
nfsnobody:x:65534:65534:Anonymous NFS User:/var/lib/nfs:/sbin/nologin
rngd:x:998:996:Random Number Generator Daemon:/var/lib/rngd:/sbin/nologin
chrony:x:997:995::/var/lib/chrony:/sbin/nologin
ec2-instance-connect:x:996:994::/home/ec2-instance-connect:/sbin/nologin
postfix:x:89:89::/var/spool/postfix:/sbin/nologin
tcpdump:x:72:72::/:/sbin/nologin
ec2-user:x:1000:1000:EC2 Default User:/home/ec2-user:/bin/bash
apache:x:48:48:Apache:/usr/share/httpd:/sbin/nologin
night-shift:x:1001:1001::/home/night-shift:/bin/bash
userB:x:1003:1003::/home/userB:/bin/bash
userC:x:1004:1004::/home/userC:/bin/bash
userD:x:1005:1005::/home/userD:/bin/bash
userE:x:1006:1006::/home/userE:/bin/bash
userA:x:1007:1007::/home/userA:/bin/bash
[ec2-user@ip-172-31-23-231 tmp]$
```

m) Show me via screenshots, a user that has a password on the system and a user that does not.

Passwd userA

Sudo cat /etc/shadow - to see the passwords

```
[ec2-user@ip-172-31-23-231 tmp]$ passwd userA
passwd: Only root can specify a user name.
[ec2-user@ip-172-31-23-231 tmp]$ sudo passwd userA
Changing password for user userA.
New password:
BAD PASSWORD: The password is shorter than 8 characters
Retype new password:
Sorry, passwords do not match.
New password:
BAD PASSWORD: The password contains the user name in some form
Retype new password:
passwd: all authentication tokens updated successfully.
```

```
[ec2-user@ip-172-31-23-231 tmp]$ sudo cat /etc/shadow
root:*LOCK*:14600::::::
bin:*:18313:0:99999:7:::
daemon:*:18313:0:99999:7:::
adm:*:18313:0:99999:7:::
lp:*:18313:0:99999:7:::
sync:*:18313:0:99999:7:::
shutdown:*:18313:0:99999:7:::
halt:*:18313:0:99999:7:::
mail:*:18313:0:99999:7:::
operator:*:18313:0:99999:7:::
games:*:18313:0:99999:7:::
ftp:*:18313:0:99999:7:::
nobody:*:18313:0:99999:7:::
systemd-network:!!:19521::::::
dbus:!!:19521::::::
rpc:!!:19521:0:99999:7:::
libstoragemgmt:!!:19521::::::
sshd:!!:19521::::::
rpcuser:!!:19521::::::
nfsnobody:!!:19521::::::
rngd:!!:19521::::::
chrony:!!:19521::::::
ec2-instance-connect:!!:19521::::::
postfix:!!:19521::::::
tcpdump:!!:19521::::::
ec2-user:!!:19528:0:99999:7:::
apache:!!:19528::::::
night-shift:!!:19528:0:99999:7:::
userB:!!:19528:0:99999:7:::
userC:!!:19528:0:99999:7:::
userD:!!:19528:0:99999:7:::
userE:!!:19528:0:99999:7:::
userA:$6$FUSVeVuZ$S7vFEiEk956d8y7/yvGON4NOwnyMQxkndZzhKwYvUtyc8fY36W.BlGhO0CrZ1XkIblGZk3mxcwakeQuUJz.ok1:19528:0:99999:7:::
[ec2-user@ip-172-31-23-231 tmp]$
```

n) At this point you should have created 6 users in the system. Add 2 to a group called HR; 2 to a group called Finance; and 2 to a group called Sales.

Sudo groupadd HR

Sudo groupadd Finance

Sudo groupadd Sales

Cat /etc/group - to see the groups

To add users to the group

Sudo usermod -aG HR night-shift

Sudo usermod -aG HR userA

Sudo usermod -aG Finance userB
Sudo usermod -aG Finance userC
Sudo usermod -aG Sales userD
Sudo usermod -aG Sales userE

```
[ec2-user@ip-172-31-23-231 tmp]$ sudo groupadd Finance
[ec2-user@ip-172-31-23-231 tmp]$ sudo groupadd Sales
[ec2-user@ip-172-31-23-231 tmp]$ cat /etc/group
root:x:0:
bin:x:1:
daemon:x:2:
sys:x:3:
adm:x:4:ec2-user
tty:x:5:
disk:x:6:
lp:x:7:
mem:x:8:
kmem:x:9:
wheel:x:10:ec2-user
cdrom:x:11:
mail:x:12:postfix
man:x:15:
dialout:x:18:
floppy:x:19:
games:x:20:
tape:x:33:
video:x:39:
ftp:x:50:
lock:x:54:
audio:x:63:
nobody:x:99:
users:x:100:
utmp:x:22:
utempter:x:35:
input:x:999:
systemd-journal:x:190:ec2-user
systemd-network:x:192:
dbus:x:81:
ssh_keys:x:998:
rpc:x:32:
libstoragemgmt:x:997:
sshd:x:74:
rpcuser:x:29:
nfsnobody:x:65534:
rngd:x:996:
chrony:x:995:
ec2-instance-connect:x:994:
slocate:x:21:
postdrop:x:90:
postfix:x:89:
stapusr:x:156:
stapsys:x:157:
stapdev:x:158:
screen:x:84:
tcpdump:x:72:
ec2-user:x:1000:
apache:x:48:
night-shift:x:1001:
userB:x:1003:
userC:x:1004:
userD:x:1005:
userE:x:1006:
userA:x:1007:
HR:x:1008:
Finance:x:1009:
Sales:x:1010:
[ec2-user@ip-172-31-23-231 tmp]$
```

```
[ec2-user@ip-172-31-23-231 tmp]$ sudo usermod -aG Finance userC
[ec2-user@ip-172-31-23-231 tmp]$ sudo usermod -aG Sales userD
[ec2-user@ip-172-31-23-231 tmp]$ sudo usermod -aG Sales userE
[ec2-user@ip-172-31-23-231 tmp]$ cat /etc/group
root:x:0:
bin:x:1:
daemon:x:2:
sys:x:3:
adm:x:4:ec2-user
tty:x:5:
disk:x:6:
lp:x:7:
mem:x:8:
kmem:x:9:
wheel:x:10:ec2-user
cdrom:x:11:
mail:x:12:postfix
man:x:15:
dialout:x:18:
floppy:x:19:
games:x:20:
tape:x:33:
video:x:39:
ftp:x:50:
lock:x:54:
audio:x:63:
nobody:x:99:
users:x:100:
utmp:x:22:
utempter:x:35:
input:x:999:
systemd-journal:x:190:ec2-user
systemd-network:x:192:
dbus:x:81:
ssh_keys:x:998:
rpc:x:32:
libstoragemgmt:x:997:
sshd:x:74:
rpcuser:x:29:
nfsnobody:x:65534:
rngd:x:996:
chrony:x:995:
ec2-instance-connect:x:994:
slocate:x:21:
postdrop:x:90:
postfix:x:89:
stapusr:x:156:
stapsys:x:157:
stapdev:x:158:
screen:x:84:
tcpdump:x:72:
ec2-user:x:1000:
apache:x:48:
night-shift:x:1001:
userB:x:1003:
userC:x:1004:
userD:x:1005:
userE:x:1006:
userA:x:1007:
HR:x:1008:userA,night-shift
Finance:x:1009:userB,userC
Sales:x:1010:userD,userE
[ec2-user@ip-172-31-23-231 tmp]$
```

o) Login as the user you created in step (f) while keeping your environment

. p) Exit and then login as the user you created in (f) in their environment

```
https://aws.amazon.com/amazon-linux-2/
[ec2-user@ip-172-31-23-231 ~]$ whoami
ec2-user
[ec2-user@ip-172-31-23-231 ~]$ su night-shift
Password:
[night-shift@ip-172-31-23-231 ec2-user]$ exit
exit
[ec2-user@ip-172-31-23-231 ~]$ cd /tmp
[ec2-user@ip-172-31-23-231 tmp]$ su night-shift
Password:
[night-shift@ip-172-31-23-231 tmp]$ whoami
night-shift
[night-shift@ip-172-31-23-231 tmp]$ exit
exit
[ec2-user@ip-172-31-23-231 tmp]$ whoami
ec2-user
[ec2-user@ip-172-31-23-231 tmp]$ cd /home
[ec2-user@ip-172-31-23-231 home]$ ls
ec2-user  night-shift  userA  userB  userC  userD  userE
```

```
[ec2-user@ip-172-31-23-231 tmp]$ whoami
ec2-user
[ec2-user@ip-172-31-23-231 tmp]$ cd /home
[ec2-user@ip-172-31-23-231 home]$ ls
ec2-user  night-shift  userA  userB  userC  userD  userE
[ec2-user@ip-172-31-23-231 home]$ su -









[ec2-user@ip-172-31-23-231 home]$ su - night-shift
Password:
Last login: Tue Jun 20 22:17:57 UTC 2023 on pts/0
[night-shift@ip-172-31-23-231 ~]$ whoami
night-shift
[night-shift@ip-172-31-23-231 ~]$ pwd
/home/night-shift
[night-shift@ip-172-31-23-231 ~]$
```

23. What is the difference between su and sudo?
24. What did you have to do differently in step 22 (o) vs. step 22 (p)?
25. Where can we manage users and permissions in the AWS ecosystem?

AM Identities (users, user groups, and roles) - AWS Identity and Access Management.