

Lab 1

1. Install CentOS /RHEL

```
[amr@localhost ~]$ cat /etc/redhat-release
CentOS Stream release 8
[amr@localhost ~]$
```

2. What is the difference between cat and more command?

cat: command will display the entire content of the file on the terminal , also it can be used to concatenate multiple files into a single file.

```
[amr@localhost sprints]$ 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:65534:65534:Kernel Overflow User:/sbin/nologin
dbus:x:81:81:System message bus:/sbin/nologin
systemd-coredump:x:999:997:systemd Core Dumper:/sbin/nologin
systemd-resolve:x:193:193:systemd Resolver:/sbin/nologin
tss:x:59:59:Account used for TPM access:/dev/null:/sbin/nologin
polkitd:x:998:996:User for polkitd:/sbin/nologin
geoclue:x:997:995:User for geoclue:/var/lib/geoclue:/sbin/nologin
unbound:x:996:992:Unbound DNS resolver:/etc/unbound:/sbin/nologin
rtkit:x:172:172:RealtimeKit:/proc:/sbin/nologin
pipewire:x:995:991:PipeWire System Daemon:/var/run/pipewire:/sbin/nologin
pulse:x:171:171:PulseAudio System Daemon:/var/run/pulse:/sbin/nologin
qemu:x:107:107:qemu user:/sbin/nologin
usbmuxd:x:113:113:usbmuxd user:/sbin/nologin
gluster:x:994:988:GlusterFS daemons:/run/gluster:/sbin/nologin
rpc:x:32:32:Rpcbind Daemon:/var/lib/rpcbind:/sbin/nologin
avahi:x:70:70:Avahi mDNS/DNS-SD Stack:/var/run/avahi-daemon:/sbin/nologin
chrony:x:993:987::/var/lib/chrony:/sbin/nologin
saslauthd:x:992:76:Saslauthd user:/run/saslauthd:/sbin/nologin
libstoragemgmt:x:991:985:daemon account for libstoragemgmt:/var/run/lsm:/sbin/nologin
dnsmasq:x:984:984:Dnsmasq DHCP and DNS server:/var/lib/dnsmasq:/sbin/nologin
sssd:x:983:983:User for sssd:/sbin/nologin
cockpit-ws:x:982:982:User for cockpit web service:/nonexisting:/sbin/nologin
cockpit-ws instance:x:981:981:User for cockpit-ws instances:/nonexisting:/sbin/nologin
colord:x:980:980:User for colord:/var/lib/colord:/sbin/nologin
setroubleshoot:x:979:979::/var/lib/setroubleshoot:/sbin/nologin
```

more: command will display content that would fit your screen and you can press enter to see rest of the content line by line and space key can be used to scroll another page.

```
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:65534:65534:Kernel Overflow User:/sbin/nologin
dbus:x:81:81:System message bus:/sbin/nologin
systemd-coredump:x:999:997:systemd Core Dumper:/sbin/nologin
systemd-resolve:x:193:193:systemd Resolver:/sbin/nologin
tss:x:59:59:Account used for TPM access:/dev/null:/sbin/nologin
polkitd:x:998:996:User for polkitd:/sbin/nologin
geoclue:x:997:995:User for geoclue:/var/lib/geoclue:/sbin/nologin
unbound:x:996:992:Unbound DNS resolver:/etc/unbound:/sbin/nologin
rtkit:x:172:172:RealtimeKit:/proc:/sbin/nologin
pipewire:x:995:991:PipeWire System Daemon:/var/run/pipewire:/sbin/nologin
pulse:x:171:171:PulseAudio System Daemon:/var/run/pulse:/sbin/nologin
qemu:x:107:107:qemu user:/sbin/nologin
usbmuxd:x:113:113:usbmuxd user:/sbin/nologin
gluster:x:994:988:GlusterFS daemons:/run/gluster:/sbin/nologin
rpc:x:32:32:Rpcbind Daemon:/var/lib/rpcbind:/sbin/nologin
avahi:x:70:70:Avahi mDNS/DNS-SD Stack:/var/run/avahi-daemon:/sbin/nologin
chrony:x:993:987::/var/lib/chrony:/sbin/nologin
saslauthd:x:992:76:Saslauthd user:/run/saslauthd:/sbin/nologin
libstoragemgmt:x:991:985:daemon account for libstoragemgmt:/var/run/lsm:/sbin/nologin
dnsmasq:x:984:984:Dnsmasq DHCP and DNS server:/var/lib/dnsmasq:/sbin/nologin
sssd:x:983:983:User for sssd:/sbin/nologin
cockpit-ws:x:982:982:User for cockpit web service:/nonexisting:/sbin/nologin
cockpit-ws instance:x:981:981:User for cockpit-ws instances:/nonexisting:/sbin/nologin
colord:x:980:980:User for colord:/var/lib/colord:/sbin/nologin
setroubleshoot:x:979:979::/var/lib/setroubleshoot:/sbin/nologin
--More-- (81%)
```

3. What is the difference between rm and rmdir using man?

rm: Can remove both files and non-empty directories and we can use “-r” to delete the directory and its content.

```
RM(1) User Commands RM(1)
NAME
  rm - remove files or directories
SYNOPSIS
  rm [OPTION]... [FILE]...
DESCRIPTION
  This manual page documents the GNU version of rm.  rm removes each specified file.  By default, it does not remove directories.

  If the -I or --interactive=once option is given, and there are more than three files or the -r, -R, or --recursive are given, then rm prompts the user for whether to proceed with the entire operation.  If the response is not affirmative, the entire command is aborted.

  Otherwise, if a file is unwritable, standard input is a terminal, and the -f or --force option is not given, or the -i or --interactive=always option is given, rm prompts the user for whether to remove the file.  If the response is not affirmative, the file is skipped.
OPTIONS
  Remove (unlink) the FILE(s).

  -f, --force
        ignore nonexistent files and arguments, never prompt

  -i
        prompt before every removal

  -I
        prompt once before removing more than three files, or when removing recursively; less intrusive than -i, while still giving protection against most mistakes

  --interactive[=WHEN]
        prompt according to WHEN: never, once (-I), or always (-i); without WHEN, prompt always

  --one-file-system
        when removing a hierarchy recursively, skip any directory that is on a file system different from that of the corresponding command line argument
Manual page rm(1) line 1 (press h for help or q to quit)
```

rmdir: Can only be used to remove an empty directory and it won't work for non-empty directories.

```
RMDIR(1) User Commands RMDIR(1)
NAME
  rmdir - remove empty directories
SYNOPSIS
  rmdir [OPTION]... DIRECTORY...
DESCRIPTION
  Remove the DIRECTORY(ies), if they are empty.

  --ignore-fail-on-non-empty
        ignore each failure that is solely because a directory is non-empty

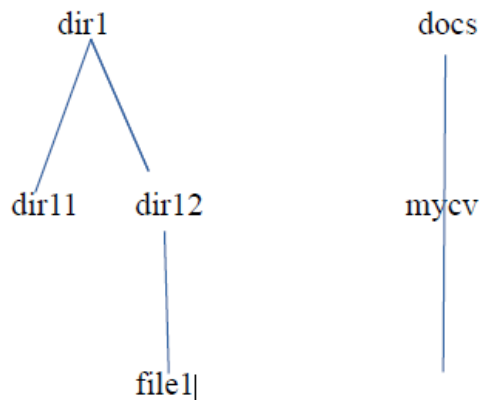
  -p, --parents
        remove DIRECTORY and its ancestors; e.g., 'rmdir -p a/b/c' is similar to 'rmdir a/b/c a/b a'

  -v, --verbose
        output a diagnostic for every directory processed

  --help display this help and exit

  --version
        output version information and exit
AUTHOR
  Written by David MacKenzie.
REPORTING BUGS
  GNU coreutils online help: <https://www.gnu.org/software/coreutils/>
  Report rmdir translation bugs to <https://translationproject.org/team/>
COPYRIGHT
  Copyright © 2018 Free Software Foundation, Inc. License GPLv3+: GNU GPL version 3 or later
Manual page rmdir(1) line 1 (press h for help or q to quit)
```

4. Create the following hierarchy under your home directory



```
[amr@localhost ~]$ mkdir dir1 docs
[amr@localhost ~]$ cd dir1
[amr@localhost dir1]$ mkdir dir11 dir12
[amr@localhost dir1]$ cd dir12/
[amr@localhost dir12]$ touch file1
[amr@localhost dir12]$ cd ..
[amr@localhost dir1]$ cd ..
[amr@localhost ~]$ cd docs/
[amr@localhost docs]$ touch mycv
[amr@localhost docs]$ ls
mycv

[amr@localhost ~]$ ls dir1/
dir11  dir12
[amr@localhost ~]$ ls dir1/dir12
file1
[amr@localhost ~]$
```

a. Remove dir11 in one-step. What did you notice? And how did you overcome that?

```
[amr@localhost ~]$ rmdir dir1/dir11
[amr@localhost ~]$ ls dir1
dir12
[amr@localhost ~]$
```

We can delete it easily as it's an empty directory.

b. Then remove dir12 using `rmdir -p` command. State what happened to the hierarchy (Note: you are in your home directory).

```
[amr@localhost ~]$ rmdir -p dir1/dir12/  
rmdir: failed to remove 'dir1/dir12/': Directory not empty  
[amr@localhost ~]$
```

We can't delete the directory as it's not empty.

```
[amr@localhost ~]$ rm -r dir1/dir12/  
[amr@localhost ~]$ ls dir1/  
[amr@localhost ~]$
```

But if we used "`rm -r`" we can delete it easily.

c. The output of the command `pwd` was `/home/user`. Write the absolute and relative path for the file `mycv`

The absolute path is exactly where to locate the file: `/home/amr/docs/mycv`

```
[amr@localhost ~]$ realpath docs  
/home/amr/docs  
[amr@localhost ~]$
```

The relative path is the location of the file relative to my current location : `/docs/mycv`

```
[amr@localhost ~]$ ls docs/  
mycv
```

5. Copy the `/etc/passwd` file to your home directory making its name is `mypasswd`.

```
[amr@localhost ~]$ cp /etc/passwd mypasswd  
[amr@localhost ~]$
```

6. Rename this new file to be `oldpasswd`.

```
[amr@localhost ~]$ mv mypasswd oldpasswd  
[amr@localhost ~]$ ls  
Desktop dir1 docs Documents Downloads Music oldpasswd Pictures Public sprints Templates Videos  
[amr@localhost ~]$
```

7. You are in /usr/bin, list four ways to go to your home directory

- cd
- cd ~
- cd \$HOME
- cd /home/amr

```
[amr@localhost ~]$ cd /usr/bin
[amr@localhost bin]$ cd
[amr@localhost ~]$ cd /usr/bin
[amr@localhost bin]$ cd ~
[amr@localhost ~]$ cd /usr/bin
[amr@localhost bin]$ cd $HOME
[amr@localhost ~]$ cd /usr/bin
[amr@localhost bin]$ cd /home/amr/
[amr@localhost ~]$ cd /usr/bin
[amr@localhost bin]$ cd ../.. /home/amr/
[amr@localhost ~]$
```

8. List Linux commands in /usr/bin that start with letter w

```
[amr@localhost bin]$ ls w*
w      wall  watchgnupg  wc      wget  whereis  whiptail  whoami  word-list-compress  wvgain  wvunpack
wait  watch  wavpack    wdctl  whatis  which    who       wnck-urgency-monitor  write  wvtag
[amr@localhost bin]$
```

9. Display the first 4 lines of /etc/passwd

```
[amr@localhost bin]$ head -n 4 /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
```

10. Display the last 7 lines of /etc/passwd

```
[amr@localhost bin]$ tail -n 7 /etc/passwd
rpcuser:x:29:29:RPC Service User:/var/lib/nfs:/sbin/nologin
clevis:x:977:977:Clevis Decryption Framework unprivileged user:/var/cache/clevis:/sbin/nologin
gdm:x:42:42::/var/lib/gdm:/sbin/nologin
gnome-initial-setup:x:976:975::/run/gnome-initial-setup:/sbin/nologin
sshd:x:74:74:Privilege-separated SSH:/var/empty/sshd:/sbin/nologin
tcpdump:x:72:72:::/sbin/nologin
amr:x:1000:1000:amr:/home/amr:/bin/bash
```

11. Display the man pages of passwd the command and the file sequentially in one command.

```
[amr@localhost ~]$ man passwd && man 5 passwd
```

```
PASSWD(1) User utilities PASSWD(1)
NAME
passwd - update user's authentication tokens

SYNOPSIS
passwd [-k] [-l] [-u [-f]] [-d] [-e] [-n mindays] [-x maxdays] [-w warndays] [-i inactivedays] [-S] [--stdin] [-?] [--usage]
[username]

DESCRIPTION
The passwd utility is used to update user's authentication token(s).

This task is achieved through calls to the Linux-PAM and Libuser API. Essentially, it initializes itself as a "passwd" service with Linux-PAM and utilizes configured password modules to authenticate and then update a user's password.

A simple entry in the global Linux-PAM configuration file for this service would be:

#
# passwd service entry that does strength checking of
# a proposed password before updating it.
#
passwd password requisite pam_cracklib.so retry=3
passwd password required pam_unix.so use_authtok
#

Note, other module types are not required for this application to function correctly.

OPTIONS
-k, --keep-tokens
    The option -k is used to indicate that the update should only be for expired authentication tokens (passwords); the user wishes to keep their non-expired tokens as before.

-l, --lock
    This option is used to lock the password of specified account and it is available to root only. The locking is performed by rendering the encrypted password into an invalid string (by prefixing the encrypted string with an !). Note that the account is not fully locked - the user can still log in by other means of authentication such as the ssh public key authentication. Use chage -E 0 user command instead for full account locking.

Manual page passwd(1) line 1 (press h for help or q to quit)

PASSWD(5) Linux Programmer's Manual PASSWD(5)
NAME
passwd - password file

DESCRIPTION
The /etc/passwd file is a text file that describes user login accounts for the system. It should have read permission allowed for all users (many utilities, like ls(1) use it to map user IDs to usernames), but write access only for the superuser.

In the good old days there was no great problem with this general read permission. Everybody could read the encrypted passwords, but the hardware was too slow to crack a well-chosen password, and moreover the basic assumption used to be that of a friendly user-community. These days many people run some version of the shadow password suite, where /etc/passwd has an 'x' character in the password field, and the encrypted passwords are in /etc/shadow, which is readable by the superuser only.

If the encrypted password, whether in /etc/passwd or in /etc/shadow, is an empty string, login is allowed without even asking for a password. Note that this functionality may be intentionally disabled in applications, or configurable (for example using the "nullok" or "nonull" arguments to pam_unix.so).

If the encrypted password in /etc/passwd is "*NP*" (without the quotes), the shadow record should be obtained from an NIS+ server.

Regardless of whether shadow passwords are used, many system administrators use an asterisk (*) in the encrypted password field to make sure that this user can not authenticate him- or herself using a password. (But see NOTES below.)

If you create a new login, first put an asterisk (*) in the password field, then use passwd(1) to set it.

Each line of the file describes a single user, and contains seven colon-separated fields:

    name:password:UID:GID:GECOS:directory:shell

The field are as follows:

name      This is the user's login name. It should not contain capital letters.

password  This is either the encrypted user password, an asterisk (*), or the letter 'x'. (See pwconv(8) for an explanation of 'x'.)

Manual page passwd(5) line 1 (press h for help or q to quit)
```

12. Display the man page of the passwd file.

```
[amr@localhost ~]$ man passwd
```

```
PASSWD(1) User utilities PASSWD(1)

NAME
    passwd - update user's authentication tokens

SYNOPSIS
    passwd [-k] [-l] [-u [-f]] [-d] [-e] [-n mindays] [-x maxdays] [-w warndays] [-i inactivedays] [-S] [--stdin] [-?] [--usage]
    [username]

DESCRIPTION
    The passwd utility is used to update user's authentication token(s).

    This task is achieved through calls to the Linux-PAM and Libuser API. Essentially, it initializes itself as a "passwd" service with Linux-PAM and utilizes configured password modules to authenticate and then update a user's password.

    A simple entry in the global Linux-PAM configuration file for this service would be:

    #
    # passwd service entry that does strength checking of
    # a proposed password before updating it.
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    passwd password requisite pam_cracklib.so retry=3
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    #

    Note, other module types are not required for this application to function correctly.

OPTIONS
    -k, --keep-tokens
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    -l, --lock
        This option is used to lock the password of specified account and it is available to root only. The locking is performed by rendering the encrypted password into an invalid string (by prefixing the encrypted string with an !). Note that the account is not fully locked - the user can still log in by other means of authentication such as the ssh public key authentication. Use chage -E 0 user command instead for full account locking.

Manual page passwd(1) line 1 (press h for help or q to quit)
```

13. Display a list of all the commands that contain the keyword passwd in their man page.

```
[amr@localhost ~]$ man -k passwd
```

```
chgpaswd (8) - update group passwords in batch mode
chpasswd (8) - update passwords in batch mode
fgetpwent_r (3) - get passwd file entry reentrantly
getpwent_r (3) - get passwd file entry reentrantly
gpaswd (1) - administer /etc/group and /etc/gshadow
grub2-mkpasswd-pbkdf2 (1) - Generate a PBKDF2 password hash.
lpaswd (1) - Change group or user password
openssl-paswd (1ssl) - compute password hashes
pam_localuser (8) - require users to be listed in /etc/passwd
passwd (1) - update user's authentication tokens
passwd (5) - password file
passwd2des (3) - RFS password encryption
pwhistory_helper (8) - Helper binary that transfers password hashes from passwd or shadow to opaswd
saslpaswd2 (8) - set a user's sasl password
smbpaswd (5) - The Samba encrypted password file
sslpaswd (1ssl) - compute password hashes
vncpaswd (1) - change the VNC password
[amr@localhost ~]$
```