03: Managing Permissions and Ownership

Modifying File and Directory Permissions

Scenario

> You're concerned about how to protect files and directories on a Linux server. You will interpret the existing permissions of a few files, and then configure permissions for the file owner, the group, and all others for files and directories.

- Objectives
    - Completing this activity will help you to use content examples from the following syllabus objectives:
        - 3.1 Given a scenario, apply or acquire the appropriate user and/or group permissions and ownership

1. Configuring permissions
    - Log in as `student01` with `Pa22w0rd` as the password.
    - Enter `ls -l` to see the permissions string for files and directories in the student01 home directory.
    - Review the permissions assigned, identifying which bits are configured for the owner, the group, and all others.
    - Enter `ls -l /etc/ssh/sshd_config` to view the permissions for this configuration file.
    - Write down the permissions for the owner, group, and others.
    - Owner:
    - Group:
    - Other:
    - Enter `ls -l /var/log/cron` to view the permissions for this log file.
    - Write down the permissions for the owner, group, and others.
    - Owner:
    - Group:
    - Other:

2. Create a test directory and file you can configure the permissions for
    - Enter `mkdir permissions-demo` to create a directory in the student01 home directory.
    - Enter `cd permissions-demo` to change to that directory.
    - Enter `mkdir DirA` to create a permissions demonstration directory named DirA.
    - Enter `touch file1` to create a permissions demonstration file named file1.
    - Enter `ls -l` to display the current permissions on both objects.

3. Configure permissions for the test directory and file using absolute mode.
    - Enter `chmod 755 DirA` to set permissions on DirA.
    - Enter `ls -l` to see how the permissions have changed on the directory.
    - Enter `chmod 660 file1` to set permissions on file1.

- Enter `ls -l` to see how the permissions have changed on file1.
- Enter `chmod 750 DirA` to set different permissions on DirA.
- Enter `ls -l` to see how the permissions have changed on DirA.
- Enter `chmod 744 file1` to configure permissions on file1.
- Enter `ls -l` and note the permissions changes.

4. Configure permissions for the test directory and file using symbolic mode.

- Enter `chmod o+r DirA` to set permissions on DirA.
- Enter `ls -l` to see how the permissions have changed on DirA.
- Enter `chmod go+rw file1` to set different permissions on file1.
- Enter `ls -l` to see how the permissions have changed on file1.
- Enter `chmod go-rwx DirA` to set permissions on DirA.
- Enter `ls -l` and note the permissions changes on DirA.
- Enter `chmod go-w file1` to set permissions on file1.
- Enter `ls -l` and note the permissions changes on file1.
- The final permissions state of the directory should be: `drwx------`
- The final permissions state of the file should be: `-rwxr--r--`

Modifying Default Permissions

Scenario

> One of the Develetech employees, Chris Mason, wants to create files and directories with nondefault permissions so he can share them more easily with a co-worker. Since the requested change does not violate the Develetech security policy, it has been approved. You will implement the change for Chris.

Objectives

- Completing this activity will help you to use content examples from the following syllabus objectives:
  - 3.1 Given a scenario, apply or acquire the appropriate user and/or group permissions and ownership

1. Display the current default permissions settings for users that create new files and directories.

- Enter umask to display the default umask value that defines default permissions for newly-created files and directories.
- Verify that the default mask is `0002`
- For standard users, no advanced permissions are set by default (the first 0), owner and group permissions aren't masked, and other user permissions are masked by 2

2. Configure `Chris Mason's .bashrc` file with a non-standard umask value.

- Enter `sudo vim /home/cmason/.bashrc` to open the file in a text editor.
- Press `Page Down` to move the cursor to the bottom of the file.
- Press `i` to enter Insert mode.
- Add the following text on a new line:
- `umask 022`
- Press `Esc` to exit Insert mode.
- Enter `:wq` to save and close the file.

3. Test the new default permissions.

    - Enter `su - cmason` to switch credentials.
    - Enter `Pa22w0rd` when prompted.
    - Enter `umask` to view the current permissions default.
    - You should see the `0022` value that was configured in the steps above.
    - Enter `touch test-file` to create a new file named `test-file`.
    - Enter `ls -l` and verify that the permissions for test-file match the newly configured umask value.
    - The permissions should be: `-rw-r--r--`
    - Enter `exit` to return to your student account.

Modifying File and Directory Ownership

Scenario

> You will create a Graphics department directory where department members can store content. You will investigate default ownership and group associations, and then create the /Graphics directory. You will configure ownership and group associations of the directory and files.

Objectives

- Completing this activity will help you to use content examples from the following syllabus objectives:
    - 3.1 Given a scenario, apply or acquire the appropriate user and/or group permissions and ownership

1. Display the current ownership and group associations for files and directories

    - Enter `ls -l /var/log/cron` to view ownership and group details about the cron log file.
    - The root user is the owner, and the root group is the group.
    - Enter `ls -l /etc/ssh/sshd_config` to view ownership and group details about th sshd configuration file.
    - The root user is the owner, and the root group is the group.
    - Enter `sudo ls -l /home/cmason` to view ownership and group details about the contents of cmason's home directory.
    - The `cmason` user is the owner, and the `cmason` group is the group.

2. Create a directory and populate the directory with files, then manage the ownership values.

    - Enter `sudo mkdir /Graphics` to create a directory named Graphics at the root of the file system.
    - Enter `sudo touch /Graphics/file1` to create a file named file1 in the Graphics directory.
    - Repeat this command with file2 and file3 to create two additional empty files inside the directory.
    - Enter `ls -l /Graphics` to display the ownership information.
    - The owner is the creator; in this case that is the root account, due to the use of the `sudo` command.
    - Enter `sudo chmod -R 774 /Graphics` to set permissions on the `/Graphics` directory and its contents.
    - Enter `sudo ls -l /Graphics` to view the new permissions.
    -  Permissions

3. Change the owner and group values of the /Graphics directory and its contents

    - Enter `sudo chown -R :GraphicsDept /Graphics` to set the group association as the GraphicsDept group.
    - Enter `sudo ls -ld /Graphics` to display the changes.
    - Enter `sudo chown rstanley /Graphics/file2` to change the ownership of `file2` to Rose Stanley.
    - Enter `sudo ls -l /Graphics` to confirm rstanley is now the owner of `file2`.

Configuring SGID Permissions and Sticky Bits

Scenario

> Some users have noted that the group associations for /Graphics are not applied to files created in the directory. One user also complained that another user accidentally deleted one of her files. You are asked to correct these concerns.

Objectives

- Completing this activity will help you to use content examples from the following syllabus objectives:
    - 3.1 Given a scenario, apply or acquire the appropriate user and/or group permissions and ownership

1. Use SGID to automatically set group associations for newly created files in the /Graphics directory

    - Enter `ls -ld /Graphics` to see the default permissions on the `/Graphics` directory.
    - Enter `sudo chmod g+s /Graphics` to set the SGID on `/Graphics` so that newly created files will get the group association.
    - Enter `ls -ld /Graphics` to display the new permissions.
    - Enter `su - rstanley` and enter `Pa22w0rd` to switch to Rose Stanley's credentials.
    - Enter `cd /Graphics` and then `touch file4` to create a file named `file4`.
    - Enter `ls -l` and confirm `rstanley` is the owner and the group is `GraphicsDept` for `file4`.
    - Enter `exit` to return to the `student01` login.

2. Use the sticky bit to better protect files from deletion by anyone but their owner

    - Enter `sudo chmod +t /Graphics` to configure the sticky bit on the `/Graphics` directory.
    - Enter `su - jrobinson` and enter `Pa22w0rd` to switch to Jerry Robinson's credentials.
    - Enter `cd /Graphics` to move to the `/Graphics` directory.
    - Enter `rm file4` to attempt to delete file4, which is owned by `rstanley`.

```
Note that you receive an "__Operation not permitted__" response. If
this were a permissions issue, you would receive an "__access denied__"
response instead. Even though `jrobinson` is a member of the
`GraphicsDept group`, and that group has the permissions to delete a
file in this directory, the sticky bit is preventing file deletion from
a non-owner.
```

- Enter `exit` to return to the `student01` login.

Setting the Immutable Flag on a File

Scenario

> You have written a README text file to be stored in the /Graphics directory to help guide users on the proper use of the content. You want to ensure that no one, not even the root user, can accidentally delete the file. You will use the immutable attribute to accomplish this task.

Objectives

- Completing this activity will help you to use content examples from the following syllabus objectives:
  - 3.1 Given a scenario, apply or acquire the appropriate user and/or group permissions and ownership

1. Configure the immutable flag

   - Enter `sudo touch /Graphics/README` to create a document in the `/Graphics` directory.
   - Enter `sudo ls -l /Graphics` to view the current permissions settings for the `README` file.

2. Verify the `README` file is owned by root, and that the owner would normally be able to delete the file

   - Enter `sudo chattr +i /Graphics/README` to set the immutable attribute on the `README` file.
   - Enter `sudo ls -l /Graphics` to view the current permissions and verify that they have not changed.
   - Enter `sudo lsattr /Graphics/README` to confirm the immutable attribute is set.

3. Verify that the flag works by attempting to delete the file.

   - Enter `sudo rm /Graphics/README` to attempt to delete the README file from the `/Graphics` directory.
   - Verify that this fails.
   - This is due to the immutable attribute. Note the "Operation not permitted" response rather than the "access denied" response that indicates a permissions issue.

Configuring ACLs

Scenario

> The Graphics department has requested that the Marketing department be given read-only access to the /Graphics directory. With standard permissions, only one group association can exist. You will use access control lists (ACLs) to ensure that both the Graphics and Marketing departments have access.

Objectives

- Completing this activity will help you to use content examples from the following syllabus objectives:
  - 3.1 Given a scenario, apply or acquire the appropriate user and/or group permissions and ownership

1. Set an ACL for the Marketing department.
    - Enter `sudo getfacl /Graphics` to view the current ACL on the Graphics directory.
    - Enter `sudo setfacl -R -m g:MarketingDept:r /Graphics` to grant read-only permissions to the MarketingDept to the /Graphics directory and its contents.
        - You can ignore the "Operation not permitted" warning about the README file; the ACL settings will still apply to all other objects.
    - Enter sudo getfacl /Graphics to view the new level of access for the MarketingDept.
    -  Access Level

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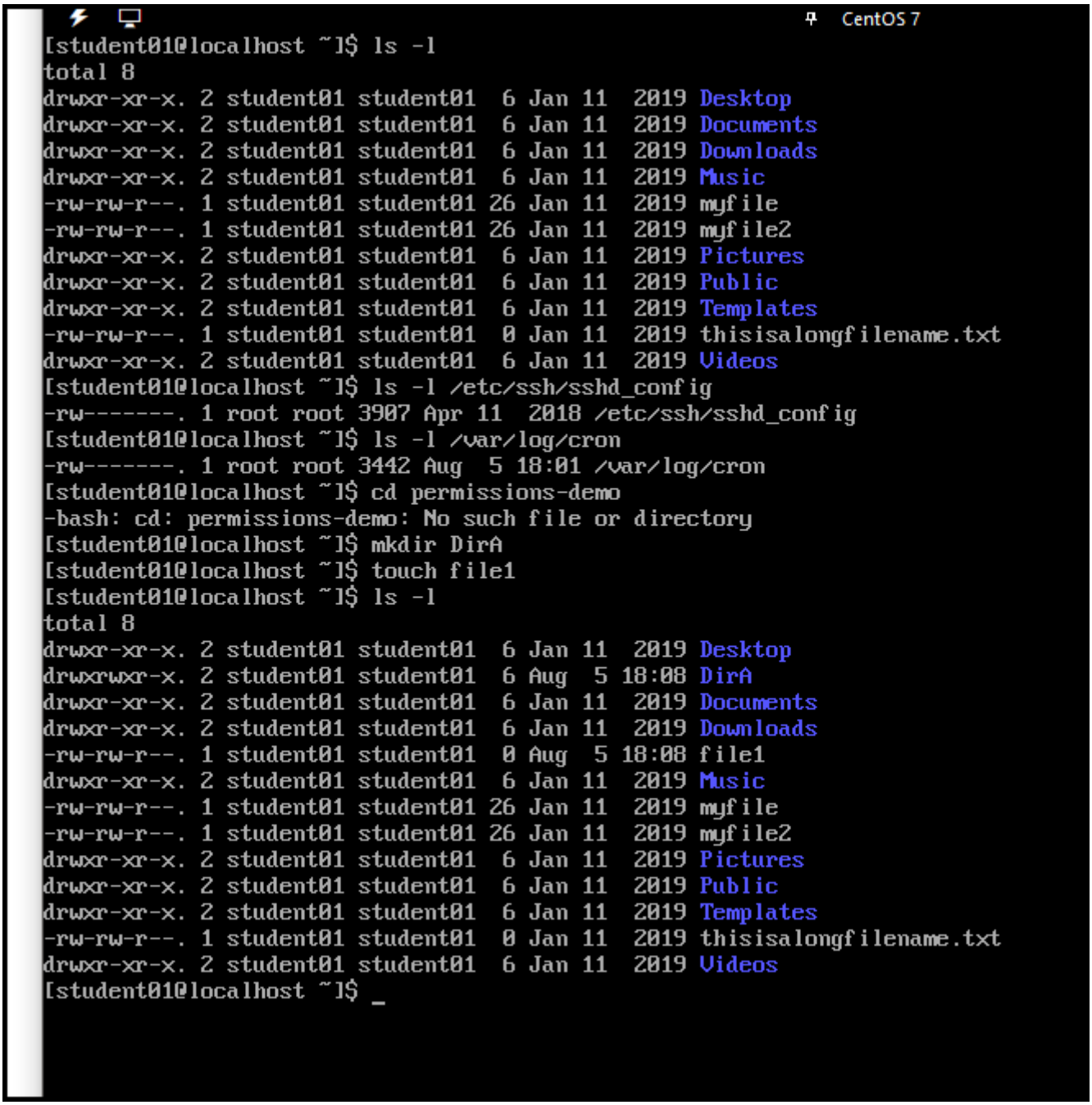
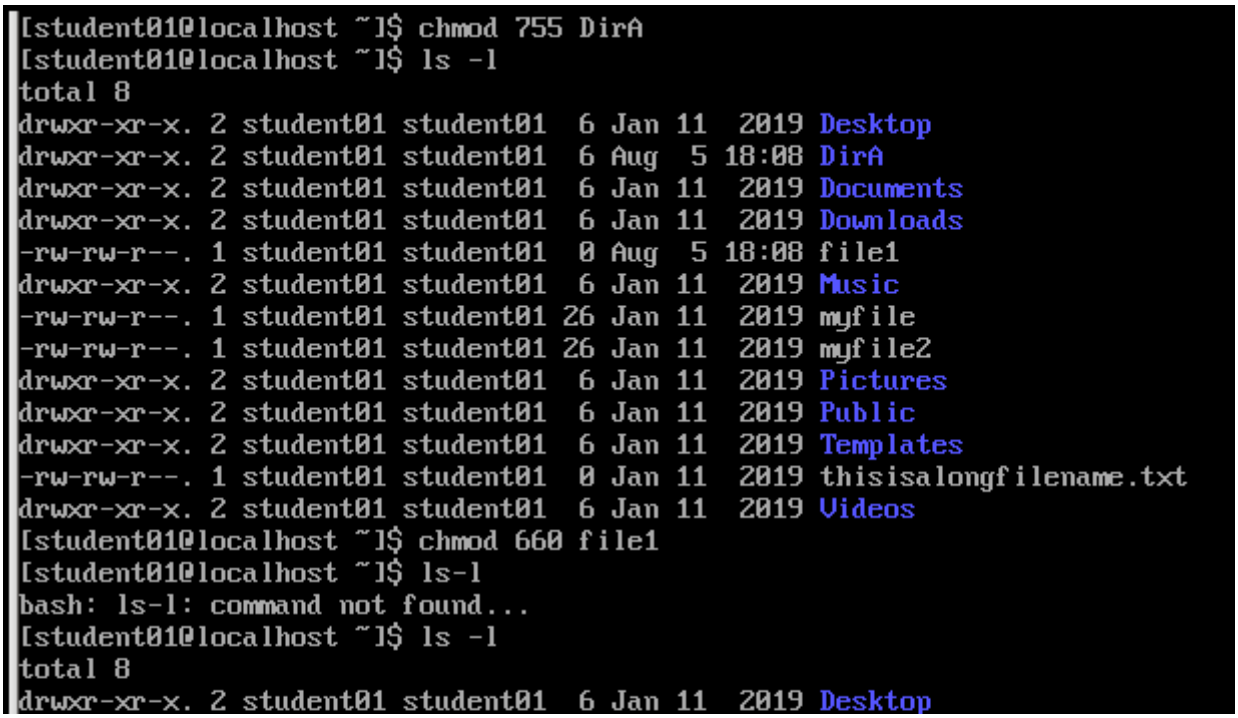

CentOS 7
[student01@localhost ~]$ ls -l
total 8
drwxr-xr-x. 2 student01 student01 6 Jan 11 2019 Desktop
drwxr-xr-x. 2 student01 student01 6 Jan 11 2019 Documents
drwxr-xr-x. 2 student01 student01 6 Jan 11 2019 Downloads
drwxr-xr-x. 2 student01 student01 6 Jan 11 2019 Music
-rw-rw-r--. 1 student01 student01 26 Jan 11 2019 myfile
-rw-rw-r--. 1 student01 student01 26 Jan 11 2019 myfile2
drwxr-xr-x. 2 student01 student01 6 Jan 11 2019 Pictures
drwxr-xr-x. 2 student01 student01 6 Jan 11 2019 Public
drwxr-xr-x. 2 student01 student01 6 Jan 11 2019 Templates
-rw-rw-r--. 1 student01 student01 0 Jan 11 2019 thisisalongfilename.txt
drwxr-xr-x. 2 student01 student01 6 Jan 11 2019 Videos
[student01@localhost ~]$ ls -l /etc/ssh/sshd_config
-rw-------. 1 root root 3907 Apr 11 2018 /etc/ssh/sshd_config
[student01@localhost ~]$ ls -l /var/log/cron
-rw-------. 1 root root 3442 Aug 5 18:01 /var/log/cron
[student01@localhost ~]$ cd permissions-demo
-bash: cd: permissions-demo: No such file or directory
[student01@localhost ~]$ mkdir DirA
[student01@localhost ~]$ touch file1
[student01@localhost ~]$ ls -l
total 8
drwxr-xr-x. 2 student01 student01 6 Jan 11 2019 Desktop
drwxrwxr-x. 2 student01 student01 6 Aug 5 18:08 DirA
drwxr-xr-x. 2 student01 student01 6 Jan 11 2019 Documents
drwxr-xr-x. 2 student01 student01 6 Jan 11 2019 Downloads
-rw-rw-r--. 1 student01 student01 0 Aug 5 18:08 file1
drwxr-xr-x. 2 student01 student01 6 Jan 11 2019 Music
-rw-rw-r--. 1 student01 student01 26 Jan 11 2019 myfile
-rw-rw-r--. 1 student01 student01 26 Jan 11 2019 myfile2
drwxr-xr-x. 2 student01 student01 6 Jan 11 2019 Pictures
drwxr-xr-x. 2 student01 student01 6 Jan 11 2019 Public
drwxr-xr-x. 2 student01 student01 6 Jan 11 2019 Templates
-rw-rw-r--. 1 student01 student01 0 Jan 11 2019 thisisalongfilename.txt
drwxr-xr-x. 2 student01 student01 6 Jan 11 2019 Videos
[student01@localhost ~]$


[student01@localhost ~]$ chmod 755 DirA
[student01@localhost ~]$ ls -l
total 8
drwxr-xr-x. 2 student01 student01 6 Jan 11 2019 Desktop
drwxr-xr-x. 2 student01 student01 6 Aug 5 18:08 DirA
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drwxr-xr-x. 2 student01 student01 6 Jan 11 2019 Templates
-rw-rw-r--. 1 student01 student01 0 Jan 11 2019 thisisalongfilename.txt
drwxr-xr-x. 2 student01 student01 6 Jan 11 2019 Videos
[student01@localhost ~]$ chmod 660 file1
[student01@localhost ~]$ ls-l
bash: ls-l: command not found...
[student01@localhost ~]$ ls -l
total 8
drwxr-xr-x. 2 student01 student01 6 Jan 11 2019 Desktop

```
drwxr-xr-x. 2 student01 student01  6 Aug  5 18:08 DirA
drwxr-xr-x. 2 student01 student01  6 Jan 11  2019 Documents
drwxr-xr-x. 2 student01 student01  6 Jan 11  2019 Downloads
-rw-rw----. 1 student01 student01  0 Aug  5 18:08 file1
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-rw-rw-r--. 1 student01 student01 26 Jan 11  2019 myfile
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[student01@localhost ~]$ _
```

CentOS 7

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drwxr-xr-x. 2 student01 student01  6 Jan 11  2019 Pictures
drwxr-xr-x. 2 student01 student01  6 Jan 11  2019 Public
drwxr-xr-x. 2 student01 student01  6 Jan 11  2019 Templates
-rw-rw-r--. 1 student01 student01  0 Jan 11  2019 thisisalongfilename.txt
drwxr-xr-x. 2 student01 student01  6 Jan 11  2019 Videos
[student01@localhost ~]$ chmod 750 DirA
[student01@localhost ~]$ ls -l
total 8
drwxr-xr-x. 2 student01 student01  6 Jan 11  2019 Desktop
drwxr-x---. 2 student01 student01  6 Aug  5 18:08 DirA
drwxr-xr-x. 2 student01 student01  6 Jan 11  2019 Documents
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-rw-rw-r--. 1 student01 student01  0 Jan 11  2019 thisisalongfilename.txt
drwxr-xr-x. 2 student01 student01  6 Jan 11  2019 Videos
[student01@localhost ~]$ chmod 744 file1
[student01@localhost ~]$ ls -l
total 8
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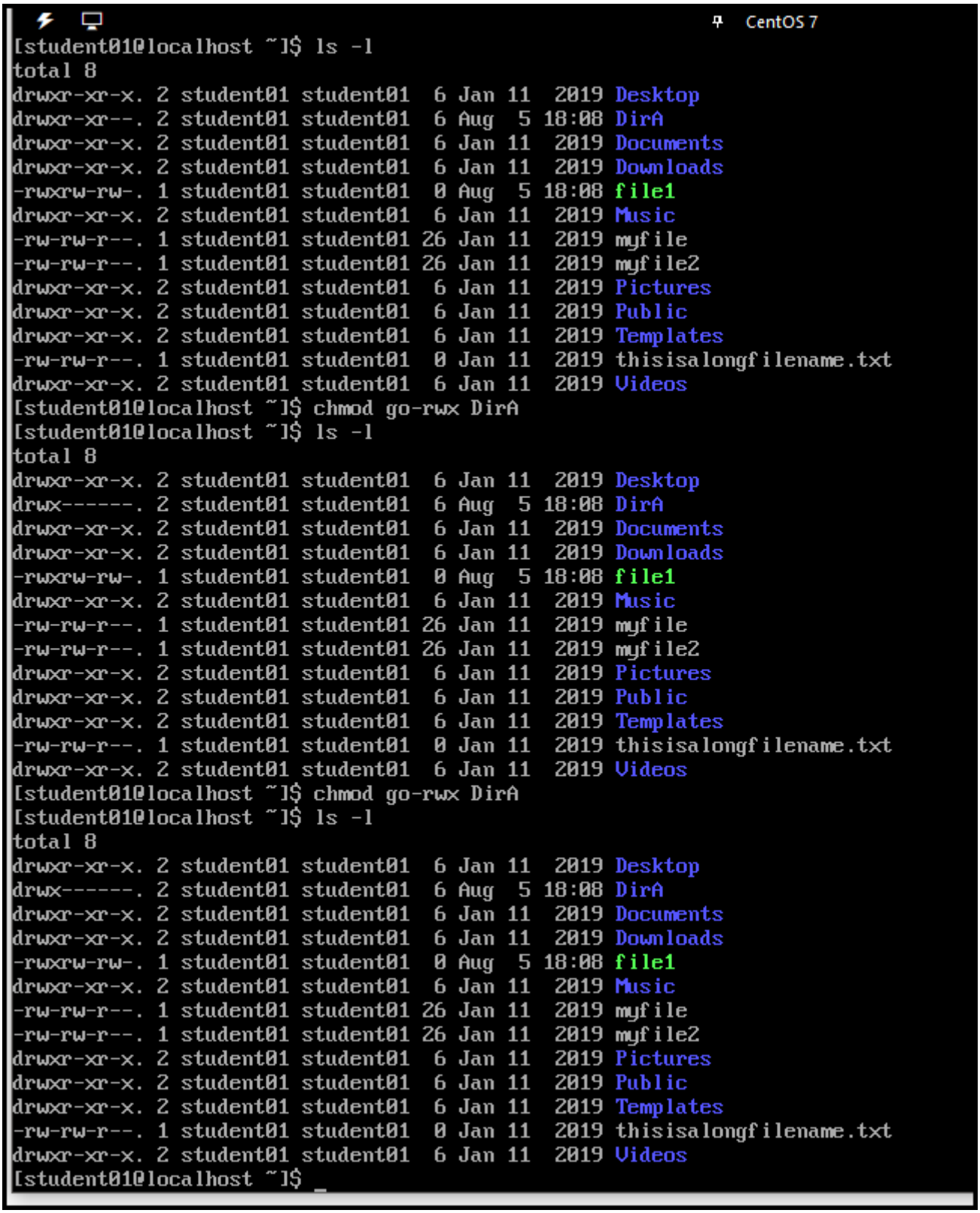
drwxr-xr-x. 2 student01 student01  6 Jan 11  2019 Videos
[student01@localhost ~]$ _
```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-rw-rw-r--. 1 student01 student01 0 Jan 11 2019 thisisalongfilename.txt
drwxr-xr-x. 2 student01 student01 6 Jan 11 2019 Videos
[student01@localhost ~]$ chmod go-rwx DirA
[student01@localhost ~]$ ls -l
total 8
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drwx------. 2 student01 student01 6 Aug 5 18:08 DirA
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-rw-rw-r--. 1 student01 student01 0 Jan 11 2019 thisisalongfilename.txt
drwxr-xr-x. 2 student01 student01 6 Jan 11 2019 Videos
[student01@localhost ~]$ chmod go-rwx DirA
[student01@localhost ~]$ ls -l
total 8
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drwxr-xr-x. 2 student01 student01 6 Jan 11 2019 Music
-rw-rw-r--. 1 student01 student01 26 Jan 11 2019 myfile
-rw-rw-r--. 1 student01 student01 26 Jan 11 2019 myfile2
drwxr-xr-x. 2 student01 student01 6 Jan 11 2019 Pictures
drwxr-xr-x. 2 student01 student01 6 Jan 11 2019 Public
drwxr-xr-x. 2 student01 student01 6 Jan 11 2019 Templates
-rw-rw-r--. 1 student01 student01 0 Jan 11 2019 thisisalongfilename.txt
drwxr-xr-x. 2 student01 student01 6 Jan 11 2019 Videos
[student01@localhost ~]$ _

```
[student01@localhost ~]$ chmod go-rwx DirA
[student01@localhost ~]$ ls -l
total 8
drwxr-xr-x. 2 student01 student01  6 Jan 11  2019 Desktop
drwx------. 2 student01 student01  6 Aug  5 18:08 DirA
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drwxr-xr-x. 2 student01 student01  6 Jan 11  2019 Downloads
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drwxr-xr-x. 2 student01 student01  6 Jan 11  2019 Pictures
drwxr-xr-x. 2 student01 student01  6 Jan 11  2019 Public
drwxr-xr-x. 2 student01 student01  6 Jan 11  2019 Templates
-rw-rw-r--. 1 student01 student01  0 Jan 11  2019 thisisalongfilename.txt
drwxr-xr-x. 2 student01 student01  6 Jan 11  2019 Videos
[student01@localhost ~]$ chmod go-w file1
[student01@localhost ~]$ ls -l
total 8
drwxr-xr-x. 2 student01 student01  6 Jan 11  2019 Desktop
drwx------. 2 student01 student01  6 Aug  5 18:08 DirA
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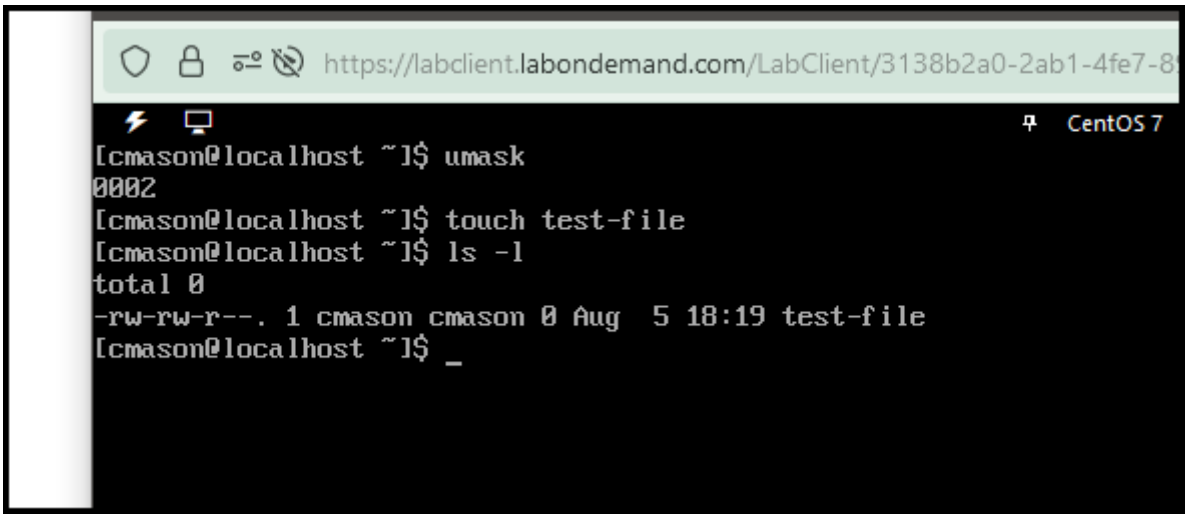
drwxr-xr-x. 2 student01 student01  6 Jan 11  2019 Public
drwxr-xr-x. 2 student01 student01  6 Jan 11  2019 Templates
-rw-rw-r--. 1 student01 student01  0 Jan 11  2019 thisisalongfilename.txt
drwxr-xr-x. 2 student01 student01  6 Jan 11  2019 Videos
[student01@localhost ~]$ _
```

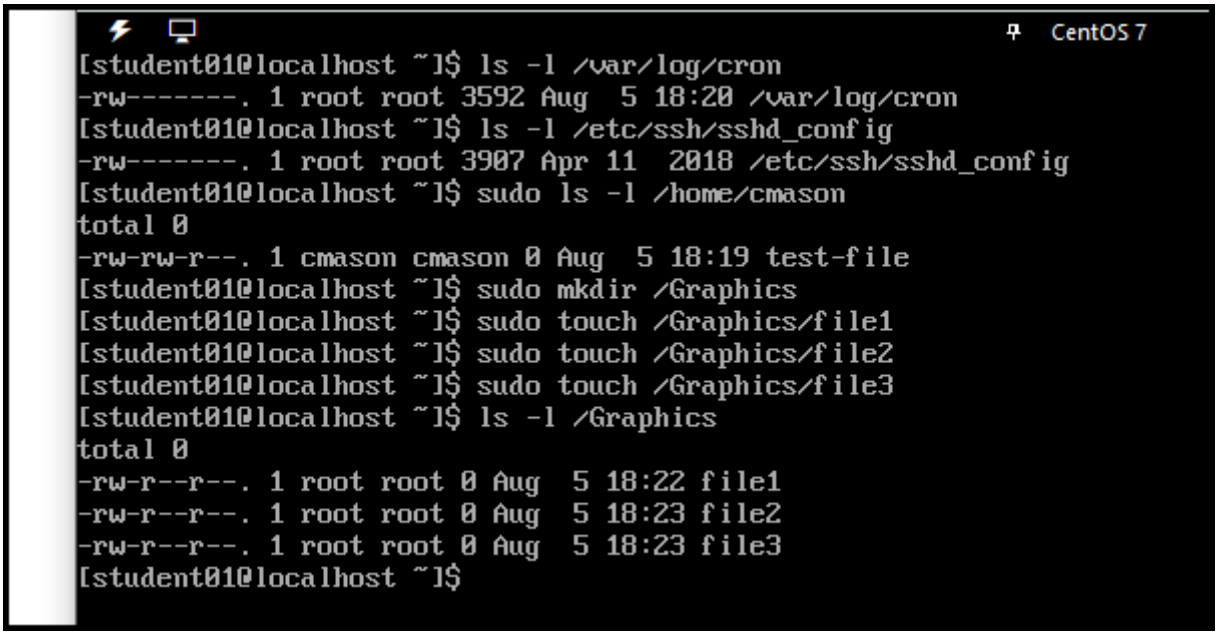
```
[student01@localhost ~]$ umask
0002
[student01@localhost ~]$ _
```

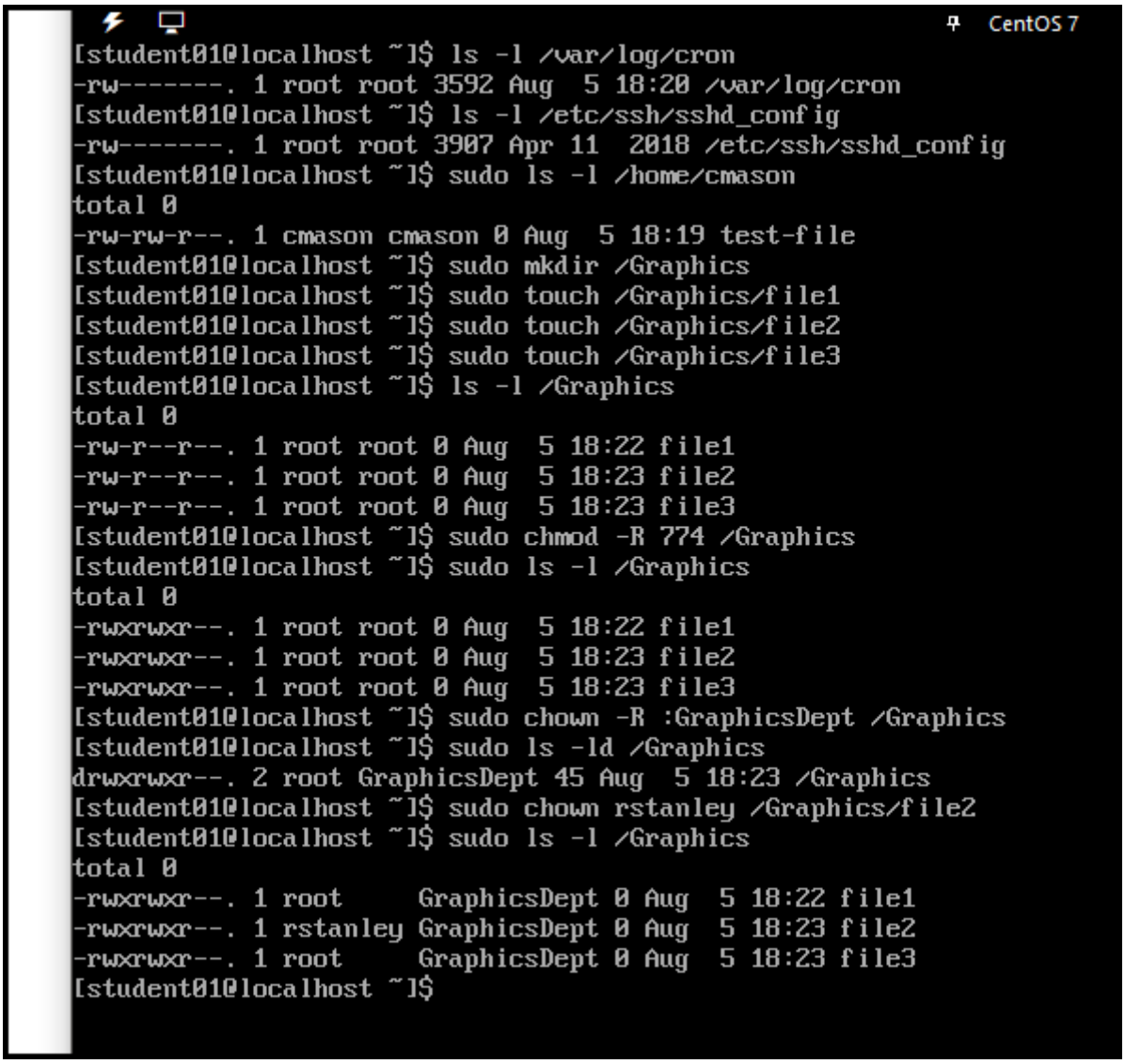
```
~
~
~
~
~
:wq
```

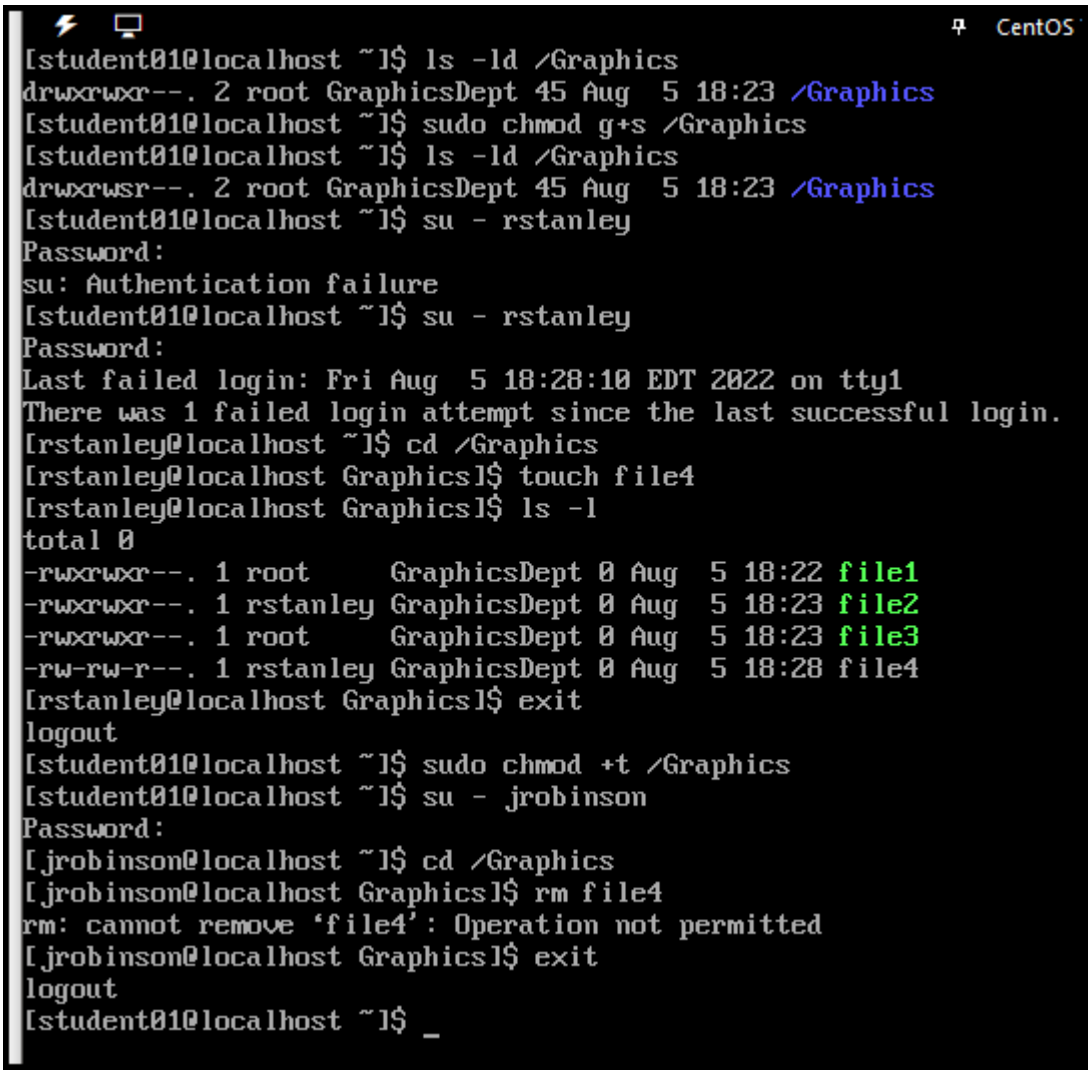
https://labclient.labondemand.com/LabClient/3138b

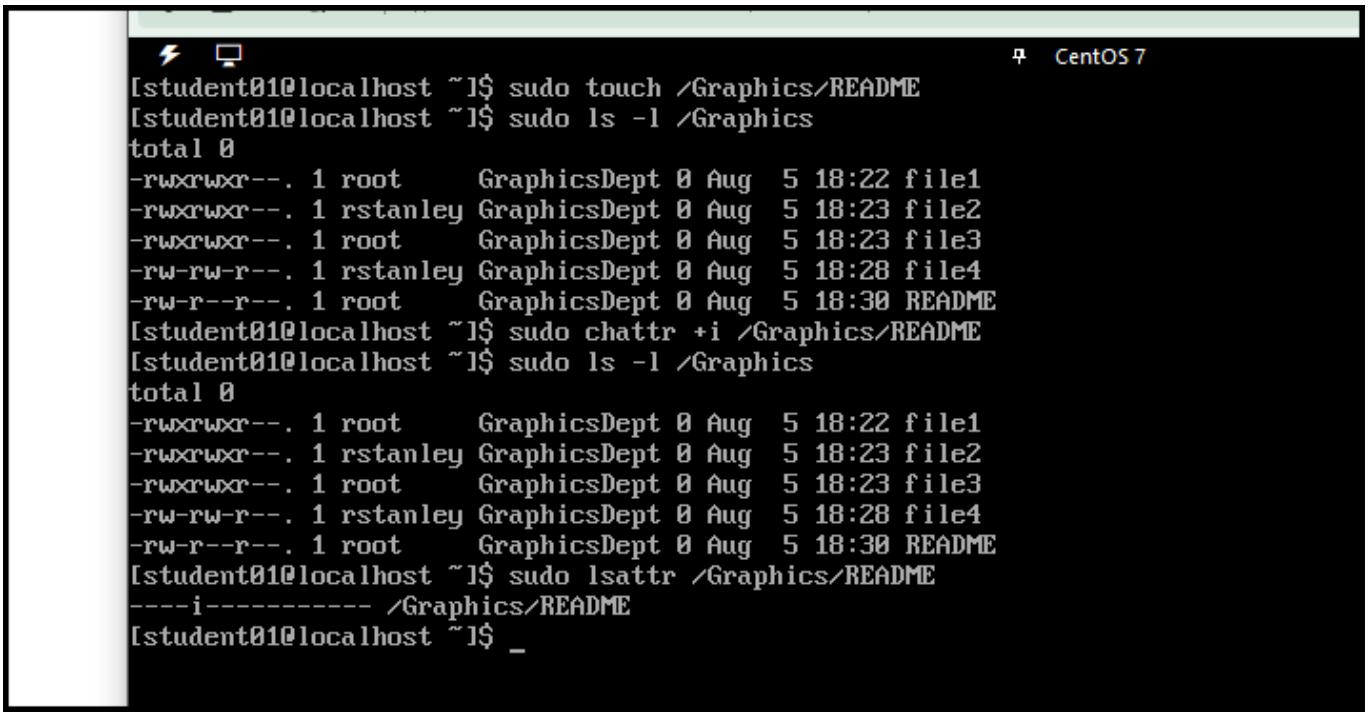
```
umask022# User specific aliases and functions
~
~
~
~
~
~
~
~
~
~
```


https://labclient.labondemand.com/LabClient/3138b2a0-2ab1-4fe7-8
CentOS 7
[cmason@localhost ~]$ umask
0002
[cmason@localhost ~]$ touch test-file
[cmason@localhost ~]$ ls -l
total 0
-rw-rw-r--. 1 cmason cmason 0 Aug 5 18:19 test-file
[cmason@localhost ~]$ _


CentOS 7
[student01@localhost ~]$ ls -l /var/log/cron
-rw-------. 1 root root 3592 Aug 5 18:20 /var/log/cron
[student01@localhost ~]$ ls -l /etc/ssh/sshd_config
-rw-------. 1 root root 3907 Apr 11 2018 /etc/ssh/sshd_config
[student01@localhost ~]$ sudo ls -l /home/cmason
total 0
-rw-rw-r--. 1 cmason cmason 0 Aug 5 18:19 test-file
[student01@localhost ~]$ sudo mkdir /Graphics
[student01@localhost ~]$ sudo touch /Graphics/file1
[student01@localhost ~]$ sudo touch /Graphics/file2
[student01@localhost ~]$ sudo touch /Graphics/file3
[student01@localhost ~]$ ls -l /Graphics
total 0
-rw-r--r--. 1 root root 0 Aug 5 18:22 file1
-rw-r--r--. 1 root root 0 Aug 5 18:23 file2
-rw-r--r--. 1 root root 0 Aug 5 18:23 file3
[student01@localhost ~]$


CentOS 7
[student01@localhost ~]$ ls -l /var/log/cron
-rw-------. 1 root root 3592 Aug 5 18:20 /var/log/cron
[student01@localhost ~]$ ls -l /etc/ssh/sshd_config
-rw-------. 1 root root 3907 Apr 11 2018 /etc/ssh/sshd_config
[student01@localhost ~]$ sudo ls -l /home/cmason
total 0
-rw-rw-r--. 1 cmason cmason 0 Aug 5 18:19 test-file
[student01@localhost ~]$ sudo mkdir /Graphics
[student01@localhost ~]$ sudo touch /Graphics/file1
[student01@localhost ~]$ sudo touch /Graphics/file2
[student01@localhost ~]$ sudo touch /Graphics/file3
[student01@localhost ~]$ ls -l /Graphics
total 0
-rw-r--r--. 1 root root 0 Aug 5 18:22 file1
-rw-r--r--. 1 root root 0 Aug 5 18:23 file2
-rw-r--r--. 1 root root 0 Aug 5 18:23 file3
[student01@localhost ~]$ sudo chmod -R 774 /Graphics
[student01@localhost ~]$ sudo ls -l /Graphics
total 0
-rwxrwxr--. 1 root root 0 Aug 5 18:22 file1
-rwxrwxr--. 1 root root 0 Aug 5 18:23 file2
-rwxrwxr--. 1 root root 0 Aug 5 18:23 file3
[student01@localhost ~]$ sudo chown -R :GraphicsDept /Graphics
[student01@localhost ~]$ sudo ls -ld /Graphics
drwxrwxr--. 2 root GraphicsDept 45 Aug 5 18:23 /Graphics
[student01@localhost ~]$ sudo chown rstanley /Graphics/file2
[student01@localhost ~]$ sudo ls -l /Graphics
total 0
-rwxrwxr--. 1 root   GraphicsDept 0 Aug 5 18:22 file1
-rwxrwxr--. 1 rstanley GraphicsDept 0 Aug 5 18:23 file2
-rwxrwxr--. 1 root   GraphicsDept 0 Aug 5 18:23 file3
[student01@localhost ~]$


CentOS
[student01@localhost ~]$ ls -ld /Graphics
drwxrwxr--. 2 root GraphicsDept 45 Aug 5 18:23 /Graphics
[student01@localhost ~]$ sudo chmod g+s /Graphics
[student01@localhost ~]$ ls -ld /Graphics
drwxrwsr--. 2 root GraphicsDept 45 Aug 5 18:23 /Graphics
[student01@localhost ~]$ su - rstanley
Password:
su: Authentication failure
[student01@localhost ~]$ su - rstanley
Password:
Last failed login: Fri Aug 5 18:28:10 EDT 2022 on tty1
There was 1 failed login attempt since the last successful login.
[rstanley@localhost ~]$ cd /Graphics
[rstanley@localhost Graphics]$ touch file4
[rstanley@localhost Graphics]$ ls -l
total 0
-rwxrwxr--. 1 root GraphicsDept 0 Aug 5 18:22 file1
-rwxrwxr--. 1 rstanley GraphicsDept 0 Aug 5 18:23 file2
-rwxrwxr--. 1 root GraphicsDept 0 Aug 5 18:23 file3
-rw-rw-r--. 1 rstanley GraphicsDept 0 Aug 5 18:28 file4
[rstanley@localhost Graphics]$ exit
logout
[student01@localhost ~]$ sudo chmod +t /Graphics
[student01@localhost ~]$ su - jrobinson
Password:
[jrobinson@localhost ~]$ cd /Graphics
[jrobinson@localhost Graphics]$ rm file4
rm: cannot remove ‘file4’: Operation not permitted
[jrobinson@localhost Graphics]$ exit
logout
[student01@localhost ~]$ _


CentOS 7
[student01@localhost ~]$ sudo touch /Graphics/README
[student01@localhost ~]$ sudo ls -l /Graphics
total 0
-rwxrwxr--. 1 root GraphicsDept 0 Aug 5 18:22 file1
-rwxrwxr--. 1 rstanley GraphicsDept 0 Aug 5 18:23 file2
-rwxrwxr--. 1 root GraphicsDept 0 Aug 5 18:23 file3
-rw-rw-r--. 1 rstanley GraphicsDept 0 Aug 5 18:28 file4
-rw-r--r--. 1 root GraphicsDept 0 Aug 5 18:30 README
[student01@localhost ~]$ sudo chattr +i /Graphics/README
[student01@localhost ~]$ sudo ls -l /Graphics
total 0
-rwxrwxr--. 1 root GraphicsDept 0 Aug 5 18:22 file1
-rwxrwxr--. 1 rstanley GraphicsDept 0 Aug 5 18:23 file2
-rwxrwxr--. 1 root GraphicsDept 0 Aug 5 18:23 file3
-rw-rw-r--. 1 rstanley GraphicsDept 0 Aug 5 18:28 file4
-rw-r--r--. 1 root GraphicsDept 0 Aug 5 18:30 README
[student01@localhost ~]$ sudo lsattr /Graphics/README
----i----------- /Graphics/README
[student01@localhost ~]$ _


[student01@localhost ~]$ sudo rm /Graphics/README
rm: cannot remove ‘/Graphics/README’: Operation not permitted
[student01@localhost ~]$ _

```
[student01@localhost ~]$ sudo getfacl /Graphics
getfacl: Removing leading '/' from absolute path names
# file: Graphics
# owner: root
# group: GraphicsDept
# flags: -st
user::rwx
group::rwx
other::r--

[student01@localhost ~]$ sudo setfacl -R -m g:MarketingDept:r /Graphics_
```

```
rm: cannot remove '/Graphics/README': Operation not permitted
[student01@localhost ~]$ sudo getfacl /Graphics
getfacl: Removing leading '/' from absolute path names
# file: Graphics
# owner: root
# group: GraphicsDept
# flags: -st
user::rwx
group::rwx
other::r--

[student01@localhost ~]$ sudo setfacl -R -m g:MarketingDept:r /Graphics
setfacl: /Graphics/README: Operation not permitted
[student01@localhost ~]$ sudo getfacl /Graphics
getfacl: Removing leading '/' from absolute path names
# file: Graphics
# owner: root
# group: GraphicsDept
# flags: -st
user::rwx
group::rwx
group:MarketingDept:r--
mask::rwx
other::r--

[student01@localhost ~]$
```