CNS - CS 431 Computer Networks and Security

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Assignment 1 Access Control Policies

Given the assignment parameters, we have to setup an access control list for given conditions in the problem statement.

The first step is creating the directory using the **mkdir** commands as follows:

assignments/
       handouts/
       submissions/
              st1/
              st2/
       gradereports/
              st1/
              st2/

Afterwards, creating users and groups with their designated uids and gids is done through **useradd** and **groupadd** commands

using **gpasswd** for adding multiple users to their required groups simultanenously. Afterthat, changing the ownership of the files and directories created from the user on computer to the specified user required. In this case, the owner of the directory tree is **alice**, and the group is **instructors**. This is done by the chown and chgrp commands.

From then on, the permissions as required are changed using the **setfacl** and **getfacl** commands which allow for ACL management.

Afterwards, the directory is zipped using the **sudo tar -cfp --acls ACL** command to preserve the permission information.

I have used groups for permissions for all cases except where a single user, i.e., the students require access to a specific folder and nothing else, to allow users to be added and removed as needed, without the need to configure all folder everytime

References: man pages of the commands I had used.
https://www.redhat.com/sysadmin/linux-groups
https://askubuntu.com/questions/421465/how-to-give-different-groups-different-permissions-on-a-specific-folder

The output of the **sudo getfacl -Rn assignments** command:

```
# file: assignments
# owner: 10001
# group: 20001
user::rwx
user:1000:rwx
group::r-x
mask::rwx
other::r-x

# file: assignments/submissions
# owner: 10001
# group: 20001
user::r-x
group::r-x
group:20001:r-x
group:21001:r-x
group:22001:r-x
mask::r-x
other::r-x

# file: assignments/submissions/st2
# owner: 10001
# group: 20001
user::r-x
user:12002:rwx
group::r-x
group:20001:r-x
group:21001:r-x
group:22001:--x
mask::rwx
other::---

# file: assignments/submissions/st1
# owner: 10001
# group: 20001
user::r-x
user:12001:rwx
group::r-x
group:20001:r-x
group:21001:r-x
group:22001:--x
mask::rwx
other::---

# file: assignments/gradereports
# owner: 10001
# group: 20001
user::rwx
group::r-x
group:20001:rwx
group:21001:r-x
group:22001:r-x
mask::rwx
other::r-x

# file: assignments/gradereports/st2
# owner: 10001
# group: 20001
```

```
user::rwx
user:12002:r-x
group::r-x
group:20001:rwx
group:21001:r-x
group:22001:--x
mask::rwx
other::r-x

# file: assignments/gradereports/st1
# owner: 10001
# group: 20001
user::rwx
user:12001:r-x
group::r-x
group:20001:rwx
group:21001:r-x
group:22001:--x
mask::rwx
other::r-x

# file: assignments/handouts
# owner: 10001
# group: 20001
user::rwx
group::r-x
group:20001:rwx
group:21001:rwx
group:22001:r-x
mask::rwx
other::r-x
```

The zshell history for achieving the output:

```
: 1705473587:0;setfacl
: 1705473592:0;man setfacl
: 1705473687:0;ls -l
: 1705473692:0;pwd
: 1705473693:0;ls -l
: 1705473698:0;ls -R
: 1705473700:0;cd assignments
: 1705473771:0;getfacl gradereports
: 1705473897:0;cd ..
: 1705473903:0;ls ACP
: 1705473907:0;cd ACP/ACL
: 1705473907:0;ls
: 1705473912:0;ls -l
: 1705473941:0;setfact -m u:dashlander:rwx assignments
: 1705473946:0;setfacl -m u:dashlander:rwx assignments
: 1705473953:0;sudo setfacl -m u:dashlander:rwx assignments
: 1705473964:0;getfacl assignments
: 1705473983:0;cd assignments
: 1705474065:0;sudo groupadd -g 20001 instructors
: 1705474074:0;sudo groupadd -g 21001 tas
: 1705474082:0;sudo groupadd -g 22001 students
: 1705474094:0;id bob
: 1705474136:0;sudo gpasswd -M alice instructors
: 1705474152:0;sudo gpasswd -M bob,charlie tas
: 1705474168:0;sudo gpasswd -M st1,st2 students
: 1705474263:0;sudo setfacl -m g:instructors:rwx,g:tas:rwx handouts
: 1705474275:0;getfacl handouts
: 1705474298:0;sudo setfacl -m g:students:rx handouts
: 1705474300:0;getfacl handouts
: 1705474385:0;sudo setfacl -m g:instructors:rx,g:tas:rx,g:students:rx submissions
: 1705474409:0;sudo setfact -m u:st1:rwx submissions/st1
: 1705474419:0;sudo setfacl -m u:st1:rwx submissions/st1
: 1705474425:0;sudo setfacl -m u:st2:rwx submissions/st2
: 1705474433:0;cd submissions
: 1705474437:0;ls -l
: 1705474442:0;getfact st1
: 1705474451:0;getfacl st1
: 1705474463:0;cd ..
: 1705474487:0;sudo setfacl -m u:st1: submissions/st2
: 1705474575:0;cd submissions
: 1705474577:0;ls -l
: 1705474626:0;sudo chown -R st1 st1
: 1705474631:0;sudo chown -R st2 st2
: 1705474638:0;getfacl st1
: 1705474675:0;sudo chgrp -R student st1
: 1705474678:0;sudo chgrp -R students st1
```

```
: 1705474681:0;sudo chgrp -R students st2
: 1705474683:0;ls -l
: 1705474688:0;getfacl st1
: 1705474724:0;sudo chmod -R 700 st1
: 1705474729:0;getfacl
: 1705474733:0;getfacl st1
: 1705474747:0;ls -l
: 1705474762:0;sudo chmod -R 700 st2
: 1705474768:0;ls -l
: 1705474773:0;cd
: 1705474778:0;cd -
: 1705474782:0;cd st1
: 1705474789:0;cd ..
: 1705474790:0;ls
: 1705480362:0;ls -l
: 1705480368:0;getfacl handouts
: 1705480399:0;getfacl submissions/st1
: 1705480435:0;sudo setfacl -m u:st1:x submissions/st2
: 1705480476:0;sudo setfacl -m g:students:x submissions
: 1705480481:0;getfacl submissions/st1
: 1705480497:0;man setfacl
: 1705480510:0;sudo setfacl -Rm g:students:x submissions
: 1705480513:0;getfacl submissions/st1
: 1705480536:0;getfacl submissions/st2
: 1705480555:0;man setfacl
: 1705480649:0;sudo setfacl -x u:st1 submissions/st2
: 1705480651:0;getfacl submissions/st2
: 1705480715:0;sudo setfacl -Rm g:instructors:rx,g:tas:rx submissions
: 1705480801:0;sudo setfacl -Rm g:instructors:rwx,g:tas:rx gradereports
: 1705480817:0;sudo setfacl -Rm g:students:x gradereports
: 1705480863:0;sudo setfacl -Rm u:st1:rx gradereports/st1
: 1705480868:0;sudo setfacl -Rm u:st2:rx gradereports/st2
: 1705480872:0;ls -l
: 1705480883:0;getfact gradereports
: 1705480887:0;getfacl gradereports
: 1705480920:0;sudo setfacl -m g:students:rx gradereports
: 1705480921:0;getfacl gradereports
: 1705480927:0;getfacl gradereports/st1
: 1705480951:0;cd ..
: 1705480958:0;ls -R
: 1705481219:0;ls
: 1705481409:0;man getfacl
: 1705481469:0;sudo getfacl -Rn ACP
: 1705481558:0;sudo setfacl -m g:students:rx ACP/ACL/assignments/submissions
: 1705481560:0;sudo getfacl -Rn ACP
: 1705481602:0;cd ACP/ACL/
```

```
: 1705481609:0;cd assignments
: 1705481618:0;cd ..
: 1705481623:0;sudo getfacl -Rn assignments
: 1705481711:0;sudo chgrp instructors assignments/handouts
: 1705481746:0;sudo chown alice assignments/handouts
: 1705481785:0;sudo chgrp -R instructors assignments/submissions
: 1705481797:0;sudo chown -R alice assignments/submissions
: 1705481801:0;sudo getfacl -Rn assignments
: 1705481832:0;sudo chgrp -R instructors assignments/gradereports
: 1705481844:0;sudo chown -R alice assignments/gradereports
: 1705481846:0;sudo getfacl -Rn assignments
: 1705481977:0;sudo chmod u+rx assignments/submissions
: 1705481985:0;sudo chmod u-w assignments/submissions
: 1705481992:0;sudo chmod g-w assignments/submissions
: 1705482000:0;sudo chmod g+rx assignments/submissions
: 1705482003:0;sudo getfacl -Rn assignments
: 1705482048:0;sudo chmod -R g-w assignments/submissions
: 1705482081:0;sudo chmod -R u+rx assignments/submissions
: 1705482090:0;sudo chmod -R g+rx assignments/submissions
: 1705482100:0;sudo chmod -R u-w assignments/submissions
: 1705482103:0;sudo getfacl -Rn assignments
: 1705482193:0;sudo setfacl -m g:students:rx assignments/submissions
: 1705482224:0;sudo getfacl -Rn assignments/submissions
: 1705482260:0;sudo setfacl -Rm u:st1:rwx assignments/submissions/st1
: 1705482265:0;sudo setfacl -Rm u:st2:rwx assignments/submissions/st2
: 1705482267:0;sudo getfacl -Rn assignments/submissions
: 1705482293:0;sudo getfacl -Rn assignments
: 1705482332:0;sudo chgrp instructors assignments
: 1705482335:0;sudo getfacl -Rn assignments
: 1705482347:0;cd ..
: 1705482358:0;cd ACP
: 1705482359:0;ls
: 1705482902:0;tar --help
: 1705483118:0;tar -c -p --acls ACL
: 1705483128:0;tar -cf -p --acls ACL
: 1705483147:0;tar -cfp --acls ACL arhive
: 1705483172:0;sudo tar -cfp --acls ACL
: 1705483211:0;sudo tar -cfp --acls ACL/assignments
: 1705483281:0;sudo chown alice ACL/assignments
: 1705483300:0;sudo getfacl -Rn ACL
: 1705483315:0;cd ACL
: 1705483316:0;ls
: 1705483321:0;sudo getfacl -Rn assignments
: 1705483533:0;sudo tar -cfp --acls ACL
: 1705483651:0;sudo getfacl -Rn assignments
```