

## Task1: (In lab Task)

- As a Root use Ubuntu OS terminal to do the following:
  1. Create all the given users and add them to their groups.

```
root@ekor-VirtualBox: ~  
root@ekor-VirtualBox:~# for group in designer developer programmer; do groupadd $group; done  
root@ekor-VirtualBox:~# for group in Junior Senior TeamLeader; do groupadd $group; done  
root@ekor-VirtualBox:~# tail -n 6 /etc/group  
designer:x:1025:  
developer:x:1026:  
programmer:x:1027:  
Junior:x:1028:  
Senior:x:1029:  
TeamLeader:x:1030:  
root@ekor-VirtualBox:~# useradd -c "Ahmed" -G Junior,designer ahmed  
root@ekor-VirtualBox:~# useradd -c "Mohamed" -G Senior,designer mohamed  
root@ekor-VirtualBox:~# useradd -c "Nada" -G TeamLeader,designer nada  
root@ekor-VirtualBox:~# useradd -c "Mona" -G Junior,developer mona  
root@ekor-VirtualBox:~# useradd -c "Hassan" -G Senior,developer hassan  
root@ekor-VirtualBox:~# useradd -c "Karin" -G TeamLeader,developer karim  
root@ekor-VirtualBox:~# useradd -c "Ayman" -G Junior,programmer ayman  
root@ekor-VirtualBox:~# useradd -c "Omnia" -G Senior,programmer omnia  
root@ekor-VirtualBox:~# useradd -c "Adam" -G TeamLeader,programmer adam  
root@ekor-VirtualBox:~#
```

2. Use both head and tail Commands to show only one user information in your system.

```
root@ekor-VirtualBox: ~  
root@ekor-VirtualBox:~# head -n 1 /etc/passwd  
root:x:0:0:root:/root:/bin/bash  
root@ekor-VirtualBox:~# tail -n 1 /etc/passwd  
adam:x:1031:1042:Adam:/home/adam:/bin/sh  
root@ekor-VirtualBox:~#
```

### 3. Apply all users' access permissions on the file ICTcompany.txt.

```
root@ekor-VirtualBox: /tmp# getfacl ICTcompany.txt
# file: ICTcompany.txt
# owner: root
# group: root
user::rw-
group::r--
other::r--

root@ekor-VirtualBox: /tmp# setfacl -m g:Junior:r ICTcompany.txt
root@ekor-VirtualBox: /tmp# setfacl -m g:Senior:rx ICTcompany.txt
root@ekor-VirtualBox: /tmp# setfacl -m g:TeamLeader:rwX ICTcompany.txt
root@ekor-VirtualBox: /tmp# getfacl ICTcompany.txt
# file: ICTcompany.txt
# owner: root
# group: root
user::rw-
group::r--
group:Junior:r--
group:Senior:r-x
group:TeamLeader:rwX
mask::rwX
other::r--
```

### 4. Change Nada login name to be Salma with the same Salary.

```
root@ekor-VirtualBox: ~# tail -n 7 /etc/passwd
mona:x:1026:1037:Mona:/home/mona:/bin/sh
hassan:x:1027:1038:Hassan:/home/hassan:/bin/sh
karim:x:1028:1039:Karim:/home/karim:/bin/sh
ayman:x:1029:1040:Ayman:/home/ayman:/bin/sh
omnia:x:1030:1041:Omnia:/home/omnia:/bin/sh
adam:x:1031:1042:Adam:/home/adam:/bin/sh
nada:x:1025:1036:Nada:/home/nada:/bin/sh
root@ekor-VirtualBox: ~#
root@ekor-VirtualBox: ~#
root@ekor-VirtualBox: ~# usermod -l salma nada
root@ekor-VirtualBox: ~#
root@ekor-VirtualBox: ~# tail -n 7 /etc/passwd
mona:x:1026:1037:Mona:/home/mona:/bin/sh
hassan:x:1027:1038:Hassan:/home/hassan:/bin/sh
karim:x:1028:1039:Karim:/home/karim:/bin/sh
ayman:x:1029:1040:Ayman:/home/ayman:/bin/sh
omnia:x:1030:1041:Omnia:/home/omnia:/bin/sh
adam:x:1031:1042:Adam:/home/adam:/bin/sh
salma:x:1025:1036:Nada:/home/nada:/bin/sh
root@ekor-VirtualBox: ~#
```

## 5. Remove Omnia from programmer group.

```
root@ekor-VirtualBox: ~  
root@ekor-VirtualBox:~# cat /etc/group | grep -i "programmer"  
programmer:x:1027:ayman,adam,omnia  
root@ekor-VirtualBox:~# deluser omnia programmer  
Removing user `omnia' from group `programmer' ...  
Done.  
root@ekor-VirtualBox:~# cat /etc/group | grep -i "programmer"  
programmer:x:1027:ayman,adam  
root@ekor-VirtualBox:~#
```

## 6. Add Sarah to programmer group as a Senior with Salary 7000.

```
root@ekor-VirtualBox: /tmp  
root@ekor-VirtualBox:~# useradd -c "Sarah" -G programmer,Senior sarah  
root@ekor-VirtualBox:~# cat /etc/group | grep -i "sarah"  
programmer:x:1027:ayman,adam,sarah  
Senior:x:1029:mohamed,hassan,omnia,sarah  
sarah:x:1044:  
root@ekor-VirtualBox:~# cd /tmp  
root@ekor-VirtualBox:/tmp# cat >> ICTcompany.txt  
- Sarah Senior programmer 7000  
root@ekor-VirtualBox:/tmp# cat ICTcompany.txt  
- User type group Salary  
- Ahmed Joiner designer 30000  
- Mohamed Senior designer 35000  
- Nada TeamLeader designer 60000  
- Mona Joiner developer 10000  
- Hassan Senior developer 40000  
- Karim TeamLeader developer 70000  
- Ayman Joiner programmer 4000  
- Omnia Senior programmer 5000  
- Adam TeamLeader programmer 9000  
- Sarah Senior programmer 7000  
root@ekor-VirtualBox:/tmp#
```

**7. Change Ayman access permissions on the file ICTcompany.txt to be like TeamLeader access permissions and login with Ayman to change the Adam Salary to be 5000 is that works and why? (Analyze the reasons based on access permissions and file ownership).**

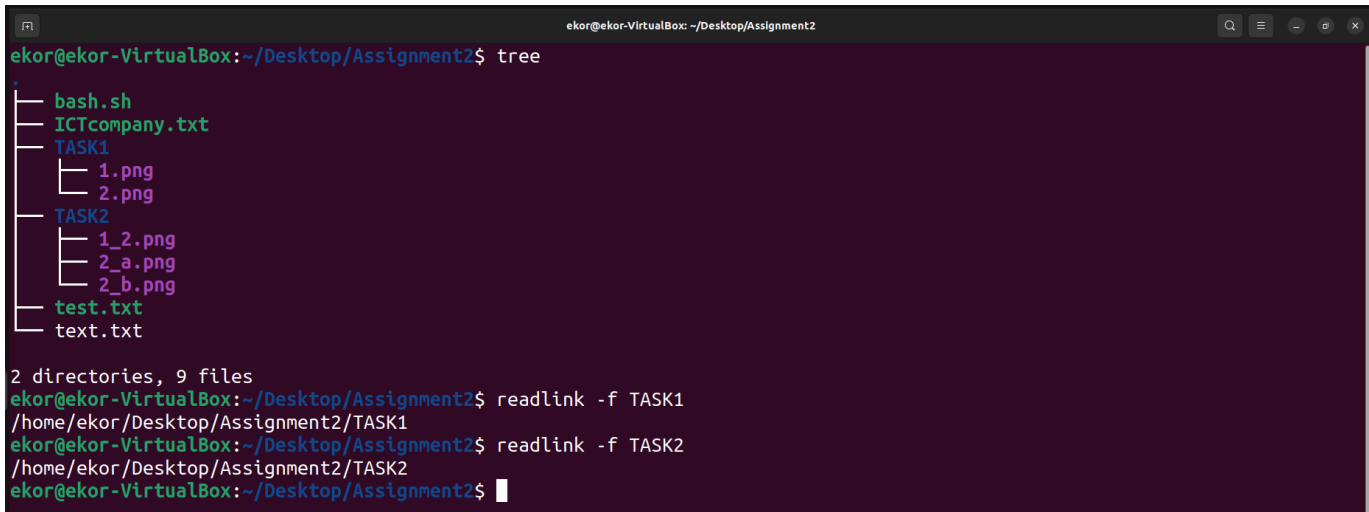
```
root@ekor-VirtualBox: /tmp
root@ekor-VirtualBox: /tmp# setfacl -m u:ayman:rwX ICTcompany.txt
root@ekor-VirtualBox: /tmp# getfacl ICTcompany.txt | grep "ayman"
user:ayman:rwX
root@ekor-VirtualBox: /tmp# su ayman
$ nano ICTcompany.txt
- User type group Salary
- Ahmed Joiner designer 30000
- Mohamed Senior designer 35000
- Nada TeamLeader designer 60000
- Mona Joiner developer 10000
- Hassan Senior developer 40000
- Karim TeamLeader developer 70000
- Ayman Joiner programmer 4000
- Omnia Senior programmer 5000
- Adam TeamLeader programmer 5000
- Sarah Senior programmer 7000
```

### **It works**

- **Ownership:** Every file and directory belongs to a specific user and group, determining who has default access rights.
  - Owner: The user who created the file or directory.
  - Group: A set of users with shared access rights.
- **Permissions:** Define what actions can be performed on a file or directory by different users.
  - Read (r): Allow viewing contents of a file or listing contents of a directory.
  - Write (w): Allow modifying contents of a file or adding/removing files within a directory.
  - Execute (x): Allow running a file as a program or entering a directory.

## Task1: (In lab Task)

1. From your exploration of the directory tree in your Linux operating Systems. Sketch the directory tree and mention the direct path of each directory. Then, give the function of at least three system directories.



```
ekor@ekor-VirtualBox: ~/Desktop/Assignment2$ tree
.
├── bash.sh
├── ICTcompany.txt
├── TASK1
│   ├── 1.png
│   └── 2.png
├── TASK2
│   ├── 1_2.png
│   ├── 2_a.png
│   └── 2_b.png
├── test.txt
└── text.txt

2 directories, 9 files
ekor@ekor-VirtualBox:~/Desktop/Assignment2$ readlink -f TASK1
/home/ekor/Desktop/Assignment2/TASK1
ekor@ekor-VirtualBox:~/Desktop/Assignment2$ readlink -f TASK2
/home/ekor/Desktop/Assignment2/TASK2
ekor@ekor-VirtualBox:~/Desktop/Assignment2$
```

### **/bin:**

- Binary or executable programs.
- Booting the system.
- Running core commands in the root filesystem.

### **/etc:**

- System configuration file.
- Serves as the central repository for system-wide configuration files.
- These files define settings and options that control the behavior of various programs and services, shaping the system's overall functionality.

### **/boot:**

- It contains all the boot-related information files and folders such as conf, grub, etc.
- Houses essential files required for the system to boot successfully.
- It's like a launchpad that provides the bootloader with the necessary tools to initiate the startup process.

## 2. Based on the given scenario, Use ICTcompany.txt do the following:

a. Use AWK Command with different options and arguments to print the output of some organized data in three different examples.

```
ekor@ekor-VirtualBox: ~/Desktop/Assignment2
ekor@ekor-VirtualBox: ~/Desktop/Assignment2$ #Display all lines
ekor@ekor-VirtualBox: ~/Desktop/Assignment2$ awk '{print}' ICTcompany.txt
Amed Joiner designer 30000
Mohamed Senior designer 35000
Nada TeamLeader designer 60000
Mona Joiner developer 10000
Hassan Senior developer 40000
Karim TeamLeader developer 70000
Aman Joiner programmer 4000
Onnia Senior programmer 5000
Adam TeamLeader programmer 9000
ekor@ekor-VirtualBox: ~/Desktop/Assignment2$ #Display people names who work in programin
ekor@ekor-VirtualBox: ~/Desktop/Assignment2$ awk '/programmer/ {print $1}' ICTcompany.txt
Aman
Onnia
Adam
ekor@ekor-VirtualBox: ~/Desktop/Assignment2$ #Display names and salaries
ekor@ekor-VirtualBox: ~/Desktop/Assignment2$ awk '{print $1, $4}' ICTcompany.txt
Amed 30000
Mohamed 35000
Nada 60000
Mona 10000
Hassan 40000
Karim 70000
Aman 4000
Onnia 5000
Adam 9000
ekor@ekor-VirtualBox: ~/Desktop/Assignment2$
```

b. Use Grep command with different options and arguments to print the output of some organized data searched data in three different examples.

```
ekor@ekor-VirtualBox: ~/Desktop/Assignment2
ekor@ekor-VirtualBox: ~/Desktop/Assignment2$ #Display the teamleaders
ekor@ekor-VirtualBox: ~/Desktop/Assignment2$ grep -i "teamleader" ICTcompany.txt
Nada TeamLeader designer 60000
Karim TeamLeader developer 70000
Adam TeamLeader programmer 9000
ekor@ekor-VirtualBox: ~/Desktop/Assignment2$ #How many seniors
ekor@ekor-VirtualBox: ~/Desktop/Assignment2$ grep -i -c "senior" ICTcompany.txt
3
ekor@ekor-VirtualBox: ~/Desktop/Assignment2$ #Display people not working in Developing team
ekor@ekor-VirtualBox: ~/Desktop/Assignment2$ grep -i -v "developer" ICTcompany.txt
Amed Joiner designer 30000
Mohamed Senior designer 35000
Nada TeamLeader designer 60000
Aman Joiner programmer 4000
Onnia Senior programmer 5000
Adam TeamLeader programmer 9000
ekor@ekor-VirtualBox: ~/Desktop/Assignment2$
```

### c. Analyze how the users and groups information stored on Linux based on the given ICTcompany.txt file.

#### /etc/passwd

Users' information stored in /etc/passwd file, this file stores user essential information: username, password (encrypted), user ID, group ID, Home directly, default shell. Respectively.

```
root@ekor-VirtualBox:~# tail -n 1 /etc/passwd
eslamatia:x:1033:1045:Eslam:/home/eslamatia:/bin/sh
root@ekor-VirtualBox:~#
```

#### /etc/shadow

Passwords securely stored encrypted along with information like expiration and last date change, and account login status

```
root@ekor-VirtualBox:~# cat /etc/shadow | grep "eslamatia"
eslamatia:$y$j9T$aA4inII/a9qdAt5HrdyIt0$bWOSntQ0T1M9.C6C1AZsBRXZLmj1s5zfTbmq7ig0Fw1:19715:0:99999:7:::
root@ekor-VirtualBox:~#
```

#### /etc/group

Defines groups and their members, and some information like: Group name, Group ID, List of group members

```
root@ekor-VirtualBox:~# cat /etc/group | grep "programmer"
programmer:x:1027:ayman,adam,sarah
root@ekor-VirtualBox:~#
```



#### d. Analyze users and groups' access permissions and file ownership for the given ICTcompany.txt file.

```
root@ekor-VirtualBox: /tmp
root@ekor-VirtualBox:/tmp# getfacl ICTcompany.txt
# file: ICTcompany.txt
# owner: root
# group: root
user::rw-
user:ayman:rwx
group::r--
group:Junior:r--
group:Senior:r-x
group:TeamLeader:rwx
mask::rwx
other::r--
```

The owner of the ICTcompany.txt file is root, that's because when I created this file it was in root mode.

The Junior Group has the access to just read the file, while the Senior Group has the access to read and execute, finally the TeamLeader Group has the access to read, write and execute. Anyone else has the permission to just read the file.

Ayman has the permission to read, write and execute while he is in Junior Group; because I changed his permission in order of one of the questions.

```
root@ekor-VirtualBox: /tmp
root@ekor-VirtualBox:/tmp# head -n 2 ICTcompany.txt
- User type group Salary
- Ahmed Joiner designer 30000
root@ekor-VirtualBox:/tmp#
root@ekor-VirtualBox:/tmp#
root@ekor-VirtualBox:/tmp# sed -i "s/Ahmed Joiner designer 30000/Eslam TeamLeader Programmer 100,000/"
ICTcompany.txt
root@ekor-VirtualBox:/tmp#
root@ekor-VirtualBox:/tmp#
root@ekor-VirtualBox:/tmp# head -n 2 ICTcompany.txt
- User type group Salary
- Eslam TeamLeader Programmer 100,000
root@ekor-VirtualBox:/tmp#
```

In the previous pic, I modified in ICTcompany.txt without opening the file, using the **sed** command.