



Lab Title: User, Group and Permission

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Course Name: Linux System Administrative Adventure

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Executive Summary

This lab exercise provides hands-on experience in **Linux system administration**, focusing on managing users, groups, file permissions, and software packages.

It simulates real-world administrative tasks in a company environment (TechVille Inc.), where system administrators are responsible for onboarding employees, controlling access to project files, and maintaining essential developer tools.

Throughout the lab, I perform key administrative functions such as creating and modifying user accounts, assigning group memberships, setting and verifying file permissions, and managing software packages using the apt package manager.

These operations strengthen my understanding of Linux command-line tools, security practices, and system maintenance.

By completing this lab, I demonstrate proficiency in executing administrative commands safely and efficiently

Lab Objective

1. User Management

- Create, modify, lock/unlock, and delete user accounts.
- Assign and update user IDs (UID), group IDs (GID), usernames, and personal details.
- Test and verify user access and account functionality.

2. Group Management

- Create, rename, and delete groups representing organizational departments.
- Add or remove users from groups.
- Verify user group memberships and system group listings.

3. File Permissions

- Create and inspect file permissions.
- Modify permissions and ownership.
- Test permission restrictions.
- Accessing a restricted directory

4. Package Management

- Install, remove, update, and upgrade software packages using the apt tool.
- Search repositories for specific packages such as wget and curl.

Maintain system software integrity and currency

Tools and Resources Used

- ❖ **Kali Linux:** Primary environment for performing user, group, file, and package management tasks.
- ❖ **Bash Shell:** Command-line interface used to execute all administrative commands.
- ❖ **Operating System:** Kali Linux
- ❖ **Terminal Commands:** sudo, adduser, usermod, chmod, chown, apt, etc.
- ❖ **Package Manager:** apt
- ❖ **User Accounts:** root and standard users
- ❖ Documentation and online Linux resources

Methodology

User creation and verification

- I created interactive and non-interactive accounts to observe differences in workflow:
 - i. sudo adduser alice - followed the prompts to set password and full name.
 - ii. sudo useradd bob - created a non-interactive account and checked /etc/passwd to confirm the entry.
- To verify results I used getent passwd and id alice, confirming UID, GID and initial group membership

Modifying credentials and access

- When Bob resigned I removed his account and rechecked the user list:
 - i. `sudo deluser bob && getent passwd`
 - ii. Observed that Bob's entry was removed from `/etc/passwd`.
- I tested password and login workflows:
 - i. `sudo passwd alice` - set a stronger password interactively.
 - ii. `su alice` - switched to the account to validate login and shell environment.

Modifying account

- HR requested changes which I applied and verified:
 - i. Change UID: `sudo usermod -u 1501 alice` then `id alice` to confirm the new UID.
 - ii. Lock/unlock account during leave: `sudo usermod -L alice` and `sudo usermod -U alice`.
 - iii. Rename user: `sudo usermod -l Alicia alice` followed by `getent passwd`
 - iv. Update comment full name: `sudo usermod -c "Alicia Johnson" Alicia`.
 - v. After each modification I used `id`, `getent passwd`, and checks of the home directory to ensure consistency

Group Management

- I created and managed departmental groups:
 - i. `sudo groupadd developers`
 - ii. `sudo groupadd -g 5050 admins` then realized the admins group was unnecessary and removed it with `sudo groupdel admins`.
- I added and removed users from groups:
 - i. `sudo usermod -aG developers alicia` to add.
 - ii. `sudo gpasswd -d alicia developers` to remove.
 - iii. Verification used `getent group` and `id alicia`.

File Permission and ownership

- I created a file and examined default permissions:
 - i. `touch project.txt; ls -l project.txt`
- I changed file modes and ownership stepwise and checked after each change:
 - i. `chmod 755 project.txt` - owner full, group and others read+execute.
 - ii. `chmod u+x project.txt` - ensured owner execute bit was set symbolically.

- iii. `sudo chgrp developers project.txt` and `sudo chown alicia:developers project.txt` - verified with `ls -l project.txt`.
- I performed an access test as a regular user:
 - i. `cd /root` - recorded "Permission denied" (expected) to demonstrate restricted access.

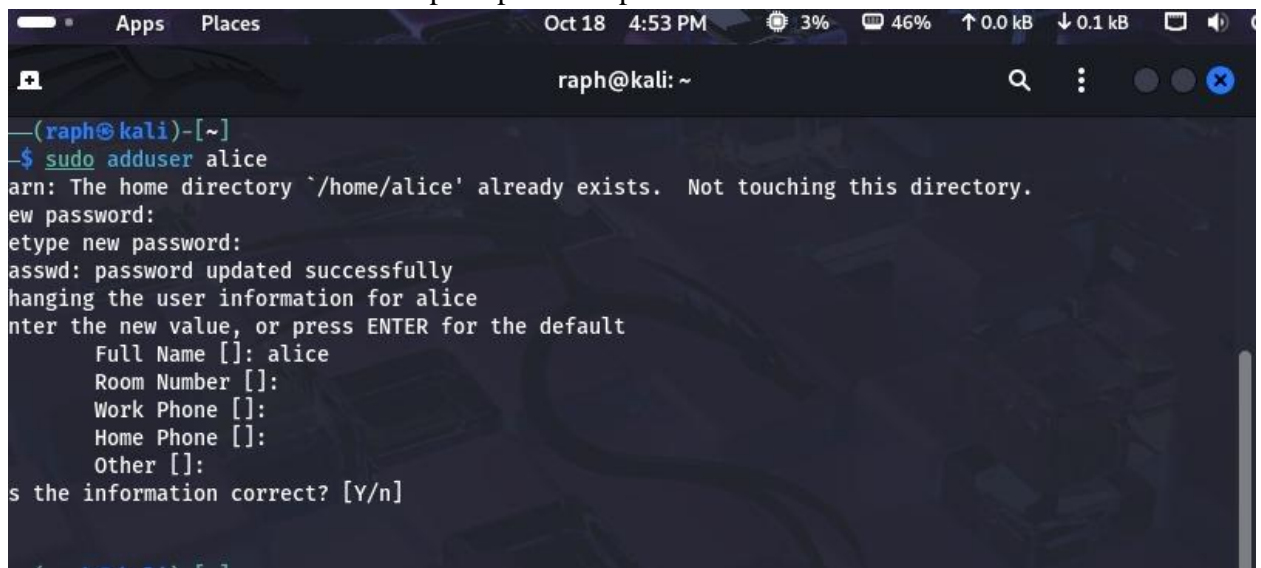
Package management

- I installed and removed packages and kept the system current:
 - i. `sudo apt install wget -y` and later `sudo apt remove wget -y`.
 - ii. `sudo apt update` then `sudo apt upgrade -y` to refresh and upgrade packages.
 - iii. Searched for packages with `apt search curl`.
- After installations I confirmed package presence via `dpkg -l | grep wget`.

Screenshot and Evidence

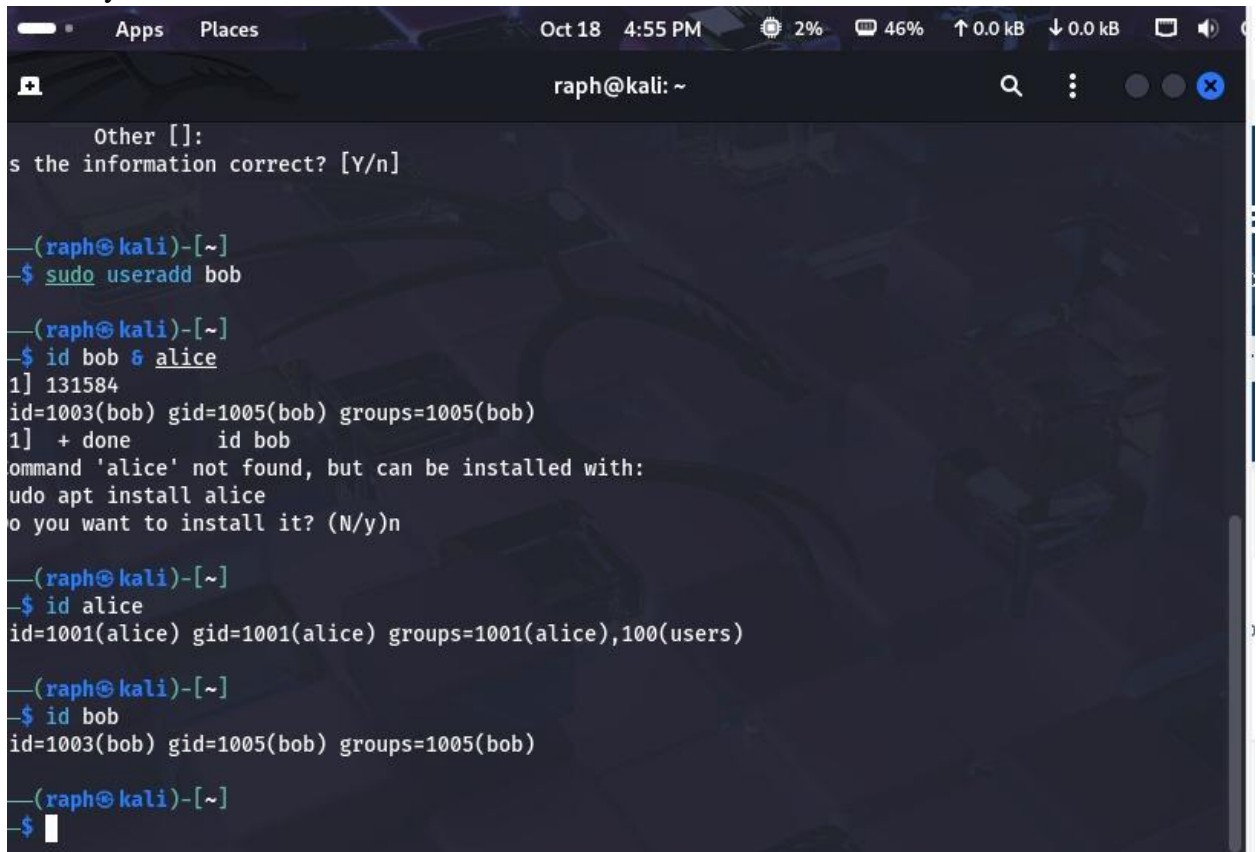
User management

- i. `sudo adduser` alice: followed the prompts to set password and full name.



```
Oct 18 4:53 PM 3% 46% ↑ 0.0 kB ↓ 0.1 kB
raph@kali: ~
(raph@kali)~$ sudo adduser alice
warn: The home directory `/home/alice' already exists. Not touching this directory.
new password:
retype new password:
passwd: password updated successfully
Changing the user information for alice
Enter the new value, or press ENTER for the default
  Full Name []: alice
  Room Number []:
  Work Phone []:
  Home Phone []:
  Other []:
Is the information correct? [Y/n]
```

- ii. `sudo useradd bob: create` a non-interactive account and checked `/etc/passwd` to confirm the entry.

A terminal window on a Kali Linux system. The window title is 'raph@kali: ~'. The terminal shows the following sequence of commands and outputs:
- Prompt: 'Other []:'
- Prompt: 's the information correct? [Y/n]'
- Command: `—(raph@kali)-[~]`
- Command: `$ sudo useradd bob`
- Command: `—(raph@kali)-[~]`
- Command: `$ id bob & alice`
- Output: `1] 131584`
- Output: `id=1003(bob) gid=1005(bob) groups=1005(bob)`
- Command: `1] + done id bob`
- Output: `ommand 'alice' not found, but can be installed with:`
- Output: `udo apt install alice`
- Output: `o you want to install it? (N/y)n`
- Command: `—(raph@kali)-[~]`
- Command: `$ id alice`
- Output: `id=1001(alice) gid=1001(alice) groups=1001(alice),100(users)`
- Command: `—(raph@kali)-[~]`
- Command: `$ id bob`
- Output: `id=1003(bob) gid=1005(bob) groups=1005(bob)`
- Command: `—(raph@kali)-[~]`
- Command: `$` (with a cursor)

- iii. `sudo deluser bob && getent passwd`. Observed that Bob's entry was removed from `getent passwd`

```
raph@kali: ~  
(raph@kali)-[~]  
$ sudo deluser bob && getent passwd  
[sudo] password for raph:  
Sorry, try again.  
[sudo] password for raph:  
root:x:0:0:root:/root:/usr/bin/zsh  
daemon:x:1:1:daemon:/usr/sbin:/usr/sbin/nologin  
bin:x:2:2:bin:/bin:/usr/sbin/nologin  
sys:x:3:3:sys:/dev:/usr/sbin/nologin  
sync:x:4:65534:sync:/bin:/bin/sync  
games:x:5:60:games:/usr/games:/usr/sbin/nologin  
man:x:6:12:man:/var/cache/man:/usr/sbin/nologin  
lp:x:7:7:lp:/var/spool/lpd:/usr/sbin/nologin  
mail:x:8:8:mail:/var/mail:/usr/sbin/nologin  
news:x:9:9:news:/var/spool/news:/usr/sbin/nologin  
uucp:x:10:10:uucp:/var/spool/uucp:/usr/sbin/nologin  
proxy:x:13:13:proxy:/bin:/usr/sbin/nologin  
www-data:x:33:33:www-data:/var/www:/usr/sbin/nologin  
backup:x:34:34:backup:/var/backups:/usr/sbin/nologin  
list:x:38:38:Mailing List Manager:/var/list:/usr/sbin/nologin  
irc:x:39:39:ircd:/run/ircd:/usr/sbin/nologin  
_apt:x:42:65534::/nonexistent:/usr/sbin/nologin  
nobody:x:65534:65534:nobody:/nonexistent:/usr/sbin/nologin  
systemd-network:x:998:998:systemd Network Management:/:/usr/sbin/nologin  
dhcpcd:x:100:65534:DHCP Client Daemon:/usr/lib/dhcpcd:/bin/false  
mysql:x:101:102:MariaDB Server:/nonexistent:/bin/false  
tss:x:102:104:TPM software stack:/var/lib/tpm:/bin/false  
systemd-coredump:x:991:991:systemd Core Dumper:/:/usr/sbin/nologin  
strongswan:x:103:65534::/var/lib/strongswan:/usr/sbin/nologin  
systemd-timesync:x:990:990:systemd Time Synchronization:/:/usr/sbin/nologin  
systemd-oom:x:989:989:systemd Userspace OOM Killer:/:/usr/sbin/nologin  
_gophish:x:104:106::/var/lib/gophish:/usr/sbin/nologin  
iodine:x:105:65534::/run/iodine:/usr/sbin/nologin  
messagebus:x:988:988:System Message Bus:/nonexistent:/usr/sbin/nologin  
tcpdump:x:106:107::/nonexistent:/usr/sbin/nologin  
miredo:x:107:65534::/var/run/miredo:/usr/sbin/nologin  
_rpc:x:108:65534::/run/rpcbind:/usr/sbin/nologin  
redis:x:109:110::/var/lib/redis:/usr/sbin/nologin
```

- iv. `sudo passwd alice`: to set a stronger password interactively.

```
(raph@kali)-[~]  
$ sudo passwd alice  
[sudo] password for raph:  
New password:  
Retype new password:  
passwd: password updated successfully
```

- v. `su alice`: switched to the account to validate login and shell environment.

```
(raph@kali)-[~]  
$ su alice  
Password:  
(alice@kali)-[/home/raph]  
$
```


- vi. Change UID: `sudo usermod -u 1501 alice` then `id alice` to confirm the new UID.

```
(raph@kali)-[~]
└─$ id alice
uid=1001(alice) gid=1001(alice) groups=1001(alice),100(users)

(raph@kali)-[~]
└─$ sudo usermod -u 1501 alice
[sudo] password for raph:

(raph@kali)-[~]
└─$ id alice
uid=1501(alice) gid=1001(alice) groups=1001(alice),100(users)

(raph@kali)-[~]
└─$
```

- vii. Lock/unlock account during leave: `sudo usermod -L alice` and `sudo usermod -U alice`.

```
(raph@kali)-[~]
└─$ sudo usermod -L alice

(raph@kali)-[~]
└─$ su alice
Password:
su: Authentication failure

(raph@kali)-[~]
└─$ sudo usermod -U alice

(raph@kali)-[~]
└─$ sudo usermod -l Alicia alice

(raph@kali)-[~]
└─$ id alice
id: 'alice': no such user

(raph@kali)-[~]
└─$ id Alicia
uid=1501(Alicia) gid=1001(alice) groups=1001(alice),100(users)

(raph@kali)-[~]
└─$
```

- viii. Rename user: `sudo usermod -l alicia alice` followed by `getent passwd | grep alicia`. Update alice id: `sudo groupmod -g 1601 alice`. Update comment/full name: `sudo usermod -c "Alicia Johnson" alicia`.

```
(raph@kali)-[~]  
$ sudo groupmod -g 1601 alice  
  
(raph@kali)-[~]  
$ id alice  
id: 'alice': no such user  
  
(raph@kali)-[~]  
$ id Alicia  
uid=1501(Alicia) gid=1601(alice) groups=1601(alice),100(users)  
  
(raph@kali)-[~]  
$ sudo usermod -c "Alicia Johnson" alicia  
usermod: user 'alicia' does not exist  
  
(raph@kali)-[~]  
$ sudo usermod -c "Alicia Johnson" Alicia  
  
(raph@kali)-[~]  
$ sudo passwd Alicia  
New password:  
Retype new password:  
passwd: password updated successfully
```

Group management

- ix. `sudo groupadd developers`.

```
(raph@kali)-[~]
$ sudo groupadd developers

(raph@kali)-[~]
$ id developers
id: 'developers': no such user

(raph@kali)-[~]
$ getent group
root:x:0:
daemon:x:1:
bin:x:2:
sys:x:3:
adm:x:4:raph
tty:x:5:
disk:x:6:
lp:x:7:
mail:x:8:
news:x:9:
uucp:x:10:
man:x:12:
proxy:x:13:
kmem:x:15:
```

- x. `sudo groupadd -g 5050 admins` then realized the admins group was unnecessary and removed it with `sudo groupdel admins`.

```
(raph@kali)-[~]
$ sudo groupadd -g 5050 admin

(raph@kali)-[~]
$ sudo groupdel admin

(raph@kali)-[~]
$ getent group
root:x:0:
daemon:x:1:
bin:x:2:
sys:x:3:
adm:x:4:raph
tty:x:5:
disk:x:6:
```

- xi. `sudo usermod -aG developers Alice`: to add Alicia in developers group. `sudo gpasswd -d alicia developers`: to remove Alicia from developers group.

```
(raph@kali)-[~]
└─$ sudo usermod -aG developers Alicia
[sudo] password for raph:

(raph@kali)-[~]
└─$ sudo gpasswd -d Alicia developers
Removing user Alicia from group developers

(raph@kali)-[~]
└─$ id Alicia
uid=1501(Alicia) gid=1601(alice) groups=1601(alice),100(users)

(raph@kali)-[~]
└─$
```

- xii. `touch project.txt`; `ls -l project.txt`. `chmod 755 project.txt` - owner full, group and others read+execute.

```
(raph@kali)-[~]
└─$ touch project.txt; ls -l project.txt
-rw-rw-r-- 1 raph raph 0 Oct 19 12:11 project.txt

(raph@kali)-[~]
└─$ chmod 755 project.txt

(raph@kali)-[~]
└─$ ls -l
total 36
----- 1 raph raph 0 Oct 15 10:32 aisha
drwxrwxr-x 5 raph raph 4096 Oct 10 22:58 cyber_project
drwxr-xr-x 2 raph raph 4096 Oct 15 10:37 Desktop
drwxr-xr-x 4 raph raph 4096 Oct 15 10:56 Documents
drwxr-xr-x 2 raph raph 4096 Oct 6 16:45 Downloads
-rw-rw-r-- 1 raph raph 0 Oct 15 10:38 maryam
drwxr-xr-x 3 raph raph 4096 Oct 15 11:02 Music
drwxr-xr-x 4 raph raph 4096 Oct 18 17:08 Pictures
-rwxr-xr-x 1 raph raph 0 Oct 19 12:11 project.txt
drwxr-xr-x 2 raph raph 4096 Oct 6 16:45 Public
drwxr-xr-x 2 raph raph 4096 Oct 6 16:45 Templates
drwxr-xr-x 2 raph raph 4096 Oct 6 16:45 Videos
```

- xiii. `chmod u+x project.txt` - ensured owner execute bit was set symbolically. `sudo chgrp developers project.txt` and `sudo chown alicia:developers project.txt` - verified with `ls -l project.txt`.

```

(raph@kali)-[~]
$ chmod u+x project.txt

(raph@kali)-[~]
$ ls -l
total 36
----- 1 raph raph    0 Oct 15 10:32 aisha
drwxrwxr-x 5 raph raph 4096 Oct 10 22:58 cyber_project
drwxr-xr-x 2 raph raph 4096 Oct 15 10:37 Desktop
drwxr-xr-x 4 raph raph 4096 Oct 15 10:56 Documents
drwxr-xr-x 2 raph raph 4096 Oct  6 16:45 Downloads
-rw-rw-r-- 1 raph raph    0 Oct 15 10:38 maryam
drwxr-xr-x 3 raph raph 4096 Oct 15 11:02 Music
drwxr-xr-x 4 raph raph 4096 Oct 18 17:08 Pictures
-rwxr-xr-x 1 raph raph    0 Oct 19 12:11 project.txt
drwxr-xr-x 2 raph raph 4096 Oct  6 16:45 Public
drwxr-xr-x 2 raph raph 4096 Oct  6 16:45 Templates
drwxr-xr-x 2 raph raph 4096 Oct  6 16:45 Videos

(raph@kali)-[~]
$ sudo chgrp developers project.txt

(raph@kali)-[~]
$ sudo chown Alicia:developers project.txt

```

- xiv. When I tried to access the `/root` directory using the command `cd /root`, the system displayed a “Permission denied” message. This happened because `/root` is the home directory of the root user and is restricted to administrative access only.

```

(raph@kali)-[~]
$ ls -l project.txt
-rwxr-xr-x 1 Alicia developers 0 Oct 19 12:11 project.txt

(raph@kali)-[~]
$ cd/root
zsh: no such file or directory: cd/root

(raph@kali)-[~]
$ cd /root
cd: permission denied: /root

(raph@kali)-[~]
$

```

Package management

- i. `sudo apt install wget -y` and later `sudo apt remove wget -y`

```
(raph@kali)-[~]
└─$ sudo apt install wget -y
wget is already the newest version (1.25.0-2).
Summary:
  Upgrading: 0, Installing: 0, Removing: 0, Not Upgrading: 838

(raph@kali)-[~]
└─$ sudo apt remove wget -y
The following packages were automatically installed and are no longer required:
  binutils-mingw-w64-i686      mingw-w64-i686-dev
  binutils-mingw-w64-x86-64   mingw-w64-x86-64-dev
  dnsmap                      oracle-instantclient-basic
  dsniiff                    python3-git
  ettercap-common             python3-gitdb
  ettercap-graphical          python3-pefile
  figlet                      python3-pyexploitdb
  finger                     python3-pyfiglet
  gcc-mingw-w64-base          python3-pyshodan
  gcc-mingw-w64-i686-win32    python3-qasync
  gcc-mingw-w64-i686-win32-runtime python3-qrcode
  gcc-mingw-w64-x86-64-win32  python3-serial-asyncio
  gcc-mingw-w64-x86-64-win32-runtime python3-smmmap
  imagemagick                 python3-tld
  imagemagick-7.q16           python3-yaswfp
  libaio1t64                  rsh-redone-client
```

- ii. `sudo apt update` then `sudo apt upgrade -y` to refresh and upgrade packages.

```
Processing triggers for kali-menu (2025.3.2) ...

(raph@kali)-[~]
└─$ sudo apt update
Get:1 http://kali.download/kali kali-rolling InRelease [34.0 kB]
Get:2 http://kali.download/kali kali-rolling/main amd64 Packages [20.9 MB]
Get:3 http://kali.download/kali kali-rolling/main amd64 Contents (deb) [51.8 MB]
78% [3 Contents-amd64 34.7 MB/51.8 MB 67%] 152 kB/s 2min 1s
78% [3 Contents-amd64 34.8 MB/51.8 MB 67%] 170 kB/s 1min 48s
80% [3 Contents-amd64 36.7 MB/51.8 MB 71%] 167 kB/s 1min 38s
Get:4 http://kali.download/kali kali-rolling/contrib amd64 Packages [115 kB]
Get:5 http://kali.download/kali kali-rolling/contrib amd64 Contents (deb) [258 kB]
Get:6 http://kali.download/kali kali-rolling/non-free amd64 Packages [187 kB]
Get:7 http://kali.download/kali kali-rolling/non-free amd64 Contents (deb) [891 kB]
Fetched 74.2 MB in 3min 48s (325 kB/s)
996 packages can be upgraded. Run 'apt list --upgradable' to see them.

(raph@kali)-[~]
└─$ sudo apt upgrade -y
The following packages were automatically installed and are no longer required:
  amass-common      libudfread0
  binutils-mingw-w64-i686  libx264-164
```

- iii. Searched for packages with `apt search curl`.

```
(raph@kali)-[~]
$ apt search curl
ario/kali-rolling 1.6-1.5 amd64
  GTK+ client for the Music Player Daemon (MPD)

ario-common/kali-rolling 1.6-1.5 all
  GTK+ client for the Music Player Daemon (MPD) (Common files)

cht.sh/kali-rolling 0.0-git20220418.571377f-2 all
  Cht is the only cheat sheet you need

cl-curry-compose-reader-macros/kali-rolling 20171227-1.1 all
  Reader macros for function partial application and composition.

collectd-core/kali-rolling 5.12.0-27 amd64
  statistics collection and monitoring daemon (core system)

curl/kali-rolling,now 8.15.0-1 amd64 [installed]
  command line tool for transferring data with URL syntax

curlftpfs/kali-rolling,now 0.9.2-10 amd64 [installed]
  filesystem to access FTP hosts based on FUSE and cURL

debian-goodies/kali-rolling 0.88.2 all
  Small toolbox-style utilities for Debian systems

dehydrated/kali-rolling 0.7.2-2 all
  ACME client implemented in Bash
```

Analysis and findings

- ✚ The analysis reveals the process of creating users, assigning user IDs (UIDs), group IDs (GIDs), usernames, and personal details, as well as modifying user accounts when necessary.
- ✚ The group management section shows how groups were created and modified - including renaming, deleting, and managing membership by adding, removing, and verifying users within groups.
- ✚ The file management part of the lab demonstrates how I created a file, inspected its permissions using the `ls -l` command, and modified both permissions and ownership using commands such as `chmod`, `chown` and `chgrp`.

Challenges and solutions

- ✚ During the lab, the `sudo` command initially failed to assign the UID 1501 to the user `alice` due to restricted access from the current login user. This issue was resolved by switching to the `/root` user for administrative privileges.
- ✚ However, when retrying the command as `/root`, the system reported that `alice` was currently in use by process **27599**, preventing the UID change. The issue was resolved by terminating the process using `sudo kill -9 27599`, after which the modification completed successfully.

Conclusion

From this lab, I learned how important the /root user is when managing and assigning permissions to other users. It also showed me why it's necessary to think carefully before giving permissions to anyone who might not be trusted. I discovered that even the sudo command can sometimes be limited, depending on who is logged in. Overall, this lab helped me understand more about system security, user privacy, and how Linux keeps control over who can access what.

Recommendation

To protect user privacy and system integrity, every user in an organization should have their own unique login credentials. It's also important to regularly update user accounts, review access permissions, and ensure that only authorized individuals can access sensitive data. Consistent monitoring and security updates help maintain a safer and more organized system environment.

Reference

- ✚ Kali Linux Documentation. (2025). Official Kali Linux User Documentation. Retrieved from <https://www.kali.org/docs/>
- ✚ International Cybersecurity and Digital Forensics Academy.
- ✚ YouTube video. Networkchuks. Retrieved from <https://youtu.be/jwnvKOjmtEA?si=bKgt7kH1MtKJ2ZzL>