

TEXT EDITORS

```
[~]$ cat Asia/India/Mumbai/City.txt  
Mumbai
```

```
[~]$
```

```
[~]$ cat >  
Africa/Egypt/Cairo/City.txt Cairo
```

```
ctrl d
```

VI EDITOR

VI EDITOR

```
[~]$ vi/home/michael/sample.txt
```

COMMAND MODE

INSERT MODE

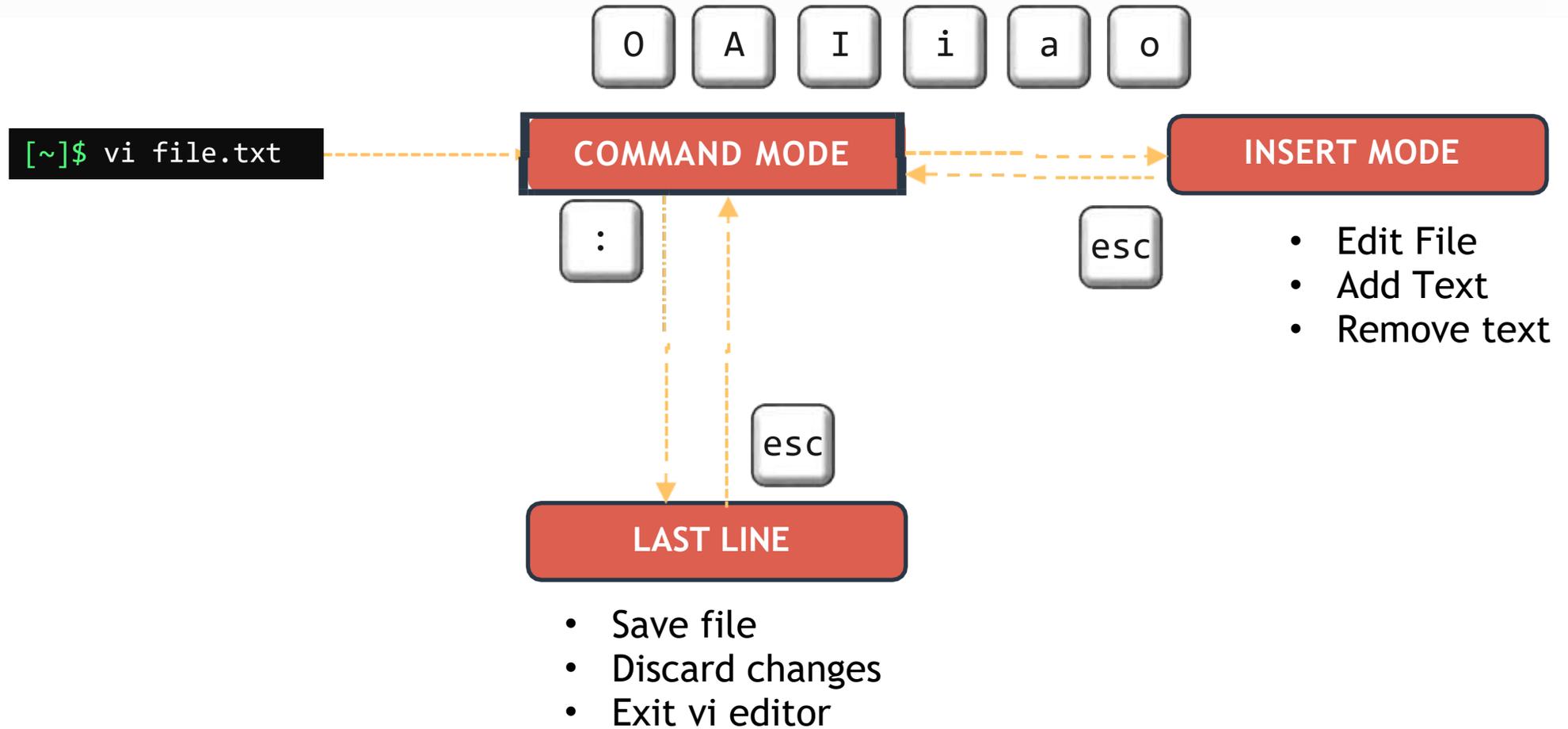
LAST LINE

```
This is the first line. Followed by the second line.  
Third line is very long compared to the previous two  
lines. Hello there! hello there! ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~  
~ ~ ~ ~ ~ ~ ~ "sample.txt" 5L, 139C
```

1,1

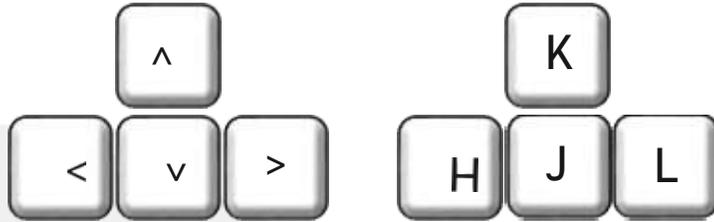
All

VI EDITOR MODES



COMMAND MODE

Move Around



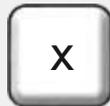
Copy a Line



Paste



Delete a letter



```
This is the first line.  
Followed by the second line. Third line is very long compared  
to the previous two lines. Hello there! hello there! ~ ~ ~ ~  
~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ "sample.txt" 5L, 139C
```

1,1

All

COMMAND MODE

Delete a line



Delete 3 lines



Undo



Redo



```
This is the first line.  
Followed by the second line. Third line is very long compared  
to the previous two lines. Hello there! hello there! ~ ~ ~ ~  
~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ "sample.txt" 5L, 139C
```

1,1

All

VIM

VIM =VI IMPROVED

- | | |
|-------------|------------------|
| COMPLETION | PLUGINS |
| SPELL CHECK | SYNTAX |
| COMPARISON | HIGHLIGHTING |
| MERGING GUI | ...and many more |

```
[~]$ which vi
/usr/bin/vi
[~]$ ls -ltr /usr/bin/vi
lrwxrwxrwx 1 root root 20 Apr 10 08:31 /usr/bin/vi -> /etc/alternatives/vi
[~]$ ls -ltr /etc/alternatives/vi
lrwxrwxrwx 1 root root 18 Apr 24 02:06 /etc/alternatives/vi -> /usr/bin/vim.basic
```

```
Differences between Vim and Vi                                vi-differences

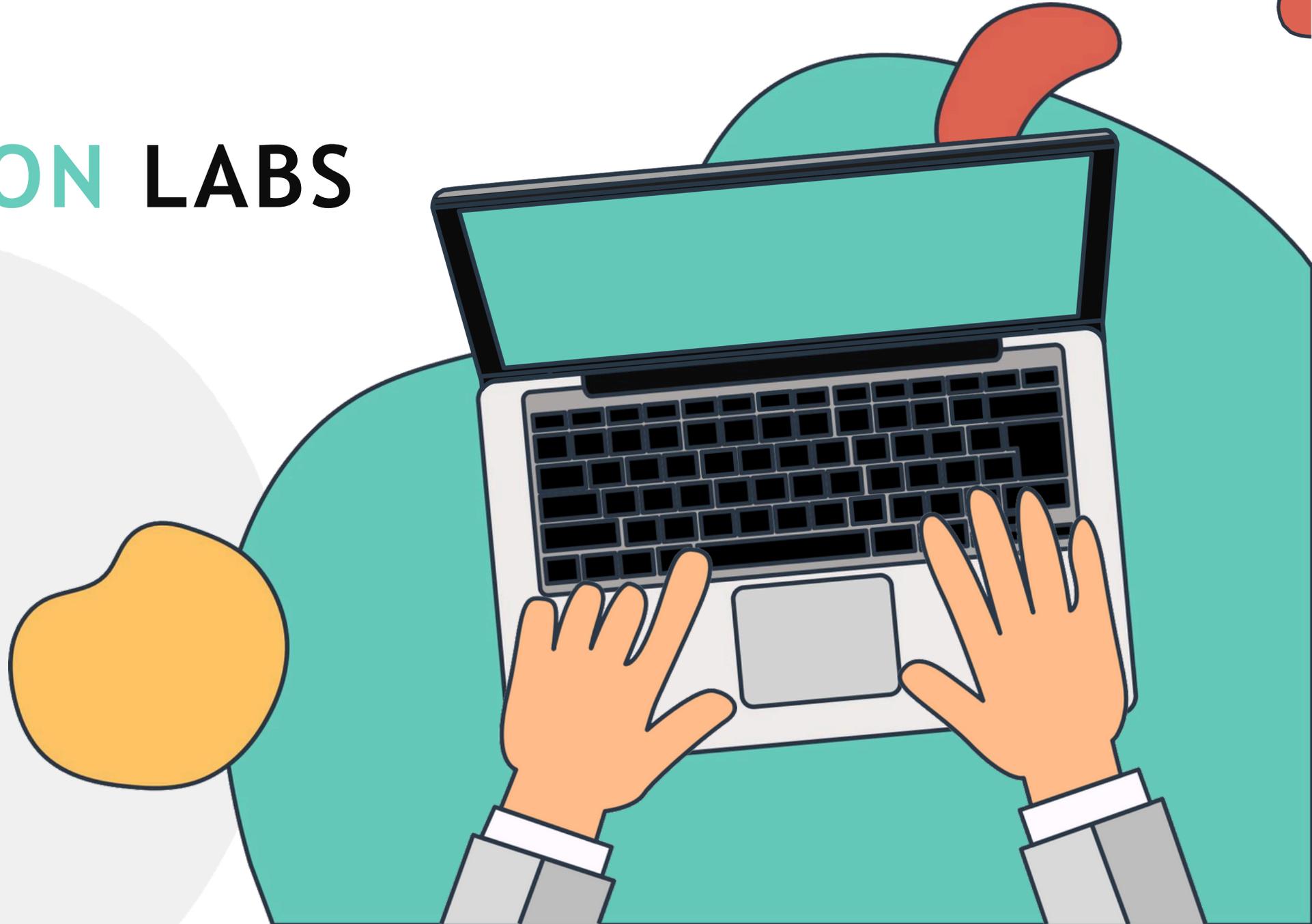
1. Simulated command                                         simulated-command
2. Missing options                                           missing-options
3. Limits                                                     limits
4. The most interesting additions                             vim-additions
5. Other vim features                                         other-features
6. Supported Vi features                                     vi-features
7. Command-line arguments                                   cmdline-arguments
8. POSIX compliance                                          posix-compliance

=====
1. Simulated command                                         simulated-command
vi_diff.txt [Help][RO]
7,35-57          0%
This is the first line.
sample.txt
Top
"vi_diff.txt" [readonly] 1370L, 57621C

1,1
```

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HANDS-ON LABS



Security and File Permissions

—

The Linux Basics Course

Security and File Permissions

Basic Security and Identifying File Types

Creating Users and Groups

Labs: Users and Groups

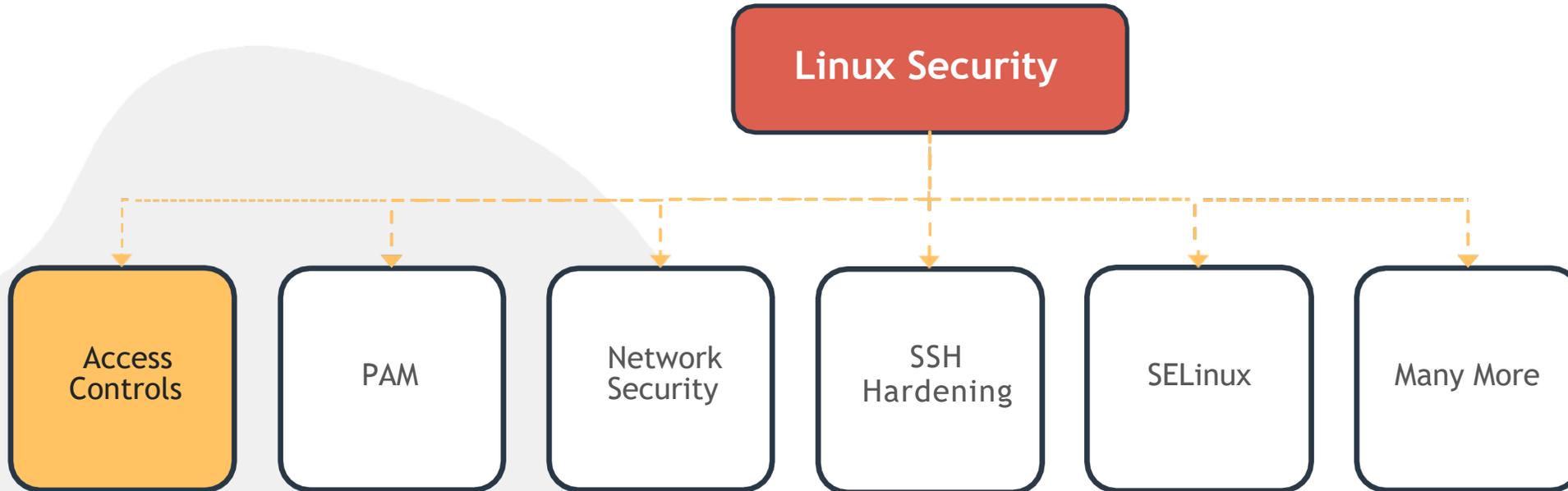
Managing file permission and ownership

Labs: File Permissions

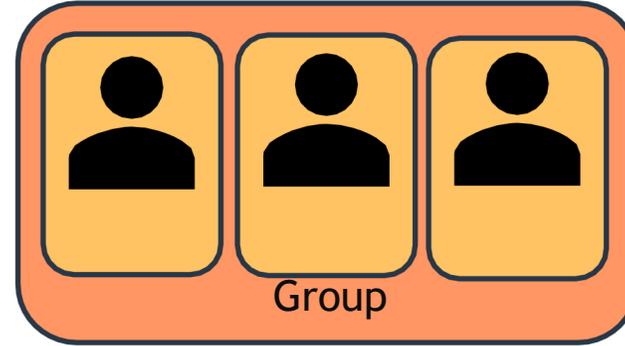
Special Directories and Files

Labs: Special Directories and Files

Linux Accounts



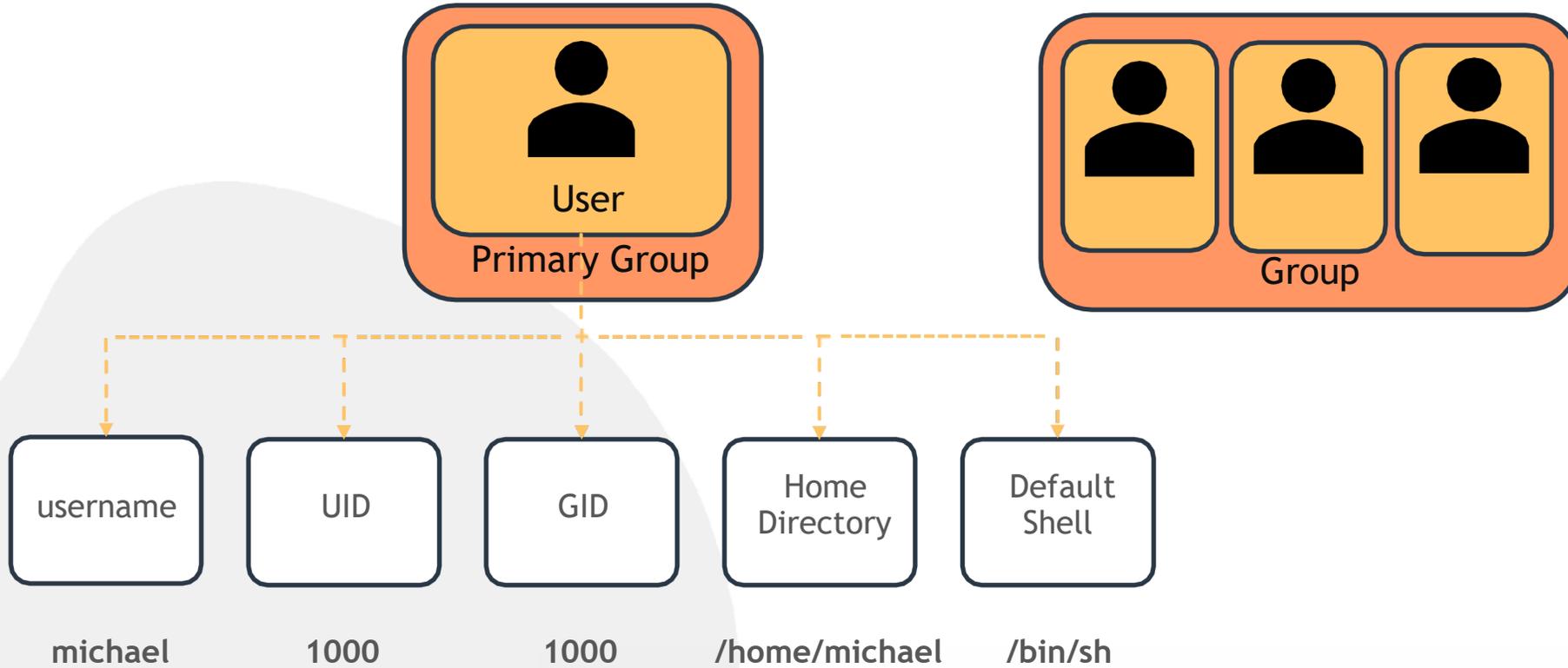
Linux Accounts



```
[~]$ cat /etc/passwd root:x:0:0:root:/root:/bin/bash
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
uucp:x:10:10:uucp:/var/spool/uucp:/usr/sbin/nologin
www-data:x:33:33:www-
data:/var/www:/usr/sbin/nologin
bob:1000:1000:Bob Kingsley,,,:/home/bob:/bin/bash
```

```
[~]$ cat /etc/group
ssh:x:118:
lpadmin:x:119:
scanner:x:120:saned
avahi:x:121:
saned:x:122:
colord:x:123:
geoclue:x:124:
pulse:x:125:
pulse-access:x:126:
gdm:x:127:
systemd-coredump:x:999:
bob:x:1000:
developers:x:1003:bob,michael
```

Linux Accounts



```
[~]$ id michael
uid=1001(michael) gid=1001(michael)groups=1001(michael),1003(developers)
```

```
[~]$ grep -i michael /etc/passwd
michael:x:1001:1001:~/home/michael:/bin/s
h
```

Account Types

- Bob
- michael
- dave

01
UserAccount

02
Superuser Account
UID = 0

- root

- ssh
- mail

03
System Accounts
UID < 100 OR between 500 - 1000

04
Service Accounts

- nginx
- mercury

COMMAND

```
[~]$ id
```

```
uid=1000(michael) gid=1000(michael)  
groups=1000(michael)
```

```
[~]$ who
```

```
bob          pts/2          Apr 28 06:48 (172.16.238.187)
```

```
[~]$ last
```

```
michael    :1      :1      Tue May 12 20:00  still loggedin  
sarah      :1      :1      Tue May 12 12:00  still running  
reboot     system boot 5.3.0-758-gen  Mon May 11 13:00  -19:00 (06:00)
```

Switching Users

```
[~]$ su -  
Password:  
root ~#
```

```
[michael@ubuntu-server ~]$ su -c "whoami"  
Password:  
root
```

```
[michael@ubuntu-server ~]$ sudo apt-get install  
nginx [sudo] password for michael:
```

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visudo

/etc/sudoers

```
[~]$ grep -i ^root /etc/passwd  
/root:x:0:0:root:/root:/usr/sbin/nologin
```

SUDO

```
[michael@ubuntu-server ~]$ sudo apt-get install  
nginx [sudo] password for michael:
```

```
[~]$ cat /etc/sudoers  
User privilege specification  
root    ALL=(ALL:ALL) ALL  
# Members of the admin group may gain root privileges  
%admin  ALL=(ALL) ALL  
# Allow members of group sudo to execute any command  
%sudo   ALL=(ALL:ALL) ALL  
# Allow Bob to run any command bob ALL=  
(ALL:ALL) ALL # Allow Sarah to reboot the  
system sarah localhost=/usr/bin/shutdown -  
r now # See sudoers(5) for more  
information on "#include" directives:  
#includedir /etc/sudoers.d
```

SUDO

```
[~]$ cat /etc/sudoers
User privilege specification
root    ALL=(ALL:ALL) ALL
# Members of the admin group may gain
root privileges
%admin  ALL=(ALL) ALL
# Allow members of group sudo to execute
any command
%sudo   ALL=(ALL:ALL) ALL
# Allow Bob to run any command
bob     ALL=(ALL:ALL) ALL
# Allow Sarah to reboot the system
sarah   localhost=/usr/bin/shutdown -r now
# See sudoers(5) for more information on
"#include" directives:
#includedir /etc/sudoers.d
```

Field	Description	Example
1	User or Group	bob, %sudo (group)
2	Hosts	localhost, ALL(default)
3	User	ALL(default)
4	Command	/bin/ls, ALL(unrestricted)

Access Control Files

/ etc/ passwd

```
[~]$ grep -i ^bob /etc/passwd  
/bob:x:1001:1001::/home/bob:/bin/bash
```

/ etc/ shadow

```
[~]$ grep -i ^bob /etc/shadow  
/bob:$6$h0ut0t0$5JcuRxR7y72LLQk4Kdog7u09LsNFS0yZPkIC8pV9tgD0wXCHut  
YcWF/7.eJ3TfGfG0lj4JF63PyuPwKC18tJS.:18188:0:99999:7:::
```

/ etc/ g roup

```
[~]$ grep -i ^bob /etc/group  
developer:x:1001:bob,michael
```

Access Control Files

/ etc/ passwd

```
[~]$ grep -i ^bob /etc/passwd
```

```
bob:x:1001:1001:./home/bob:/bin/bash
```

```
USERNAME:PASSWORD:UID:GID:GECOS:HOMEDIR:SHELL
```

Access Control Files

/ etc/ shadow

```
[~]$ grep -i ^bob /etc/shadow
```

```
bob:$6$0h0ut0t0$5JcuRxR7y72LLQk4Kdog7u09LsNFS0yZPkIC8pV9tgD0wXCHutY  
cWF/7.eJ3TfGfG0lj4JF63PyuPwKC18tJS.:18188:0:99999:7:::
```

```
USERNAME:PASSWORD:LASTCHANGE:MINAGE:MAXAGE:WARN:INACTIVE:EXPDATE
```

Access Control Files

/ etc/ group

```
[~]$ grep -i ^bob /etc/group  
developer:x:1001:bob,sara
```

```
NAME:PASSWORD:GID:MEMBERS
```

Managing Users

```
[~]$ useradd bob
```

```
[~]$ grep -i bob /etc/passwd  
bob:x:1002:1002::/home/bob:/bin/sh
```

```
[~]$ grep -i bob /etc/shadow  
bob:!:18341:0:99999:7:::
```

```
[~]$ passwd bob  
Changing password for user bob.  
New UNIX password:  
Retype new UNIX password:  
passwd: all authentication tokens updated  
successfully.
```

```
[~]$ whoami
```

```
bob
```

```
[~]$ passwd  
Changing password for bob.  
(current) UNIX password:  
Enter new UNIX password:  
Retype new UNIX password:  
passwd: password updated successfully
```

Managing Users

```
[~]$ useradd -u 1009 -g 1009 -d /home/robert -s /bin/bash -c "Mercury Project member" bob
```

```
[~]$ id bob
uid=1009(bob) gid=1009(avenger) groups=1009(avenger)
```

```
[~]$ grep -i bob /etc/passwd
bob:x:1009:1009:Robert Downey Jr,Avenger:/home/bob:/bin/bash
```

-c Custom Comments

-d custom home directory

-e Expiry date

-g specific GID

-G create user with multiple secondary groups

-s specify login shells

-u specific UID

Managing Users

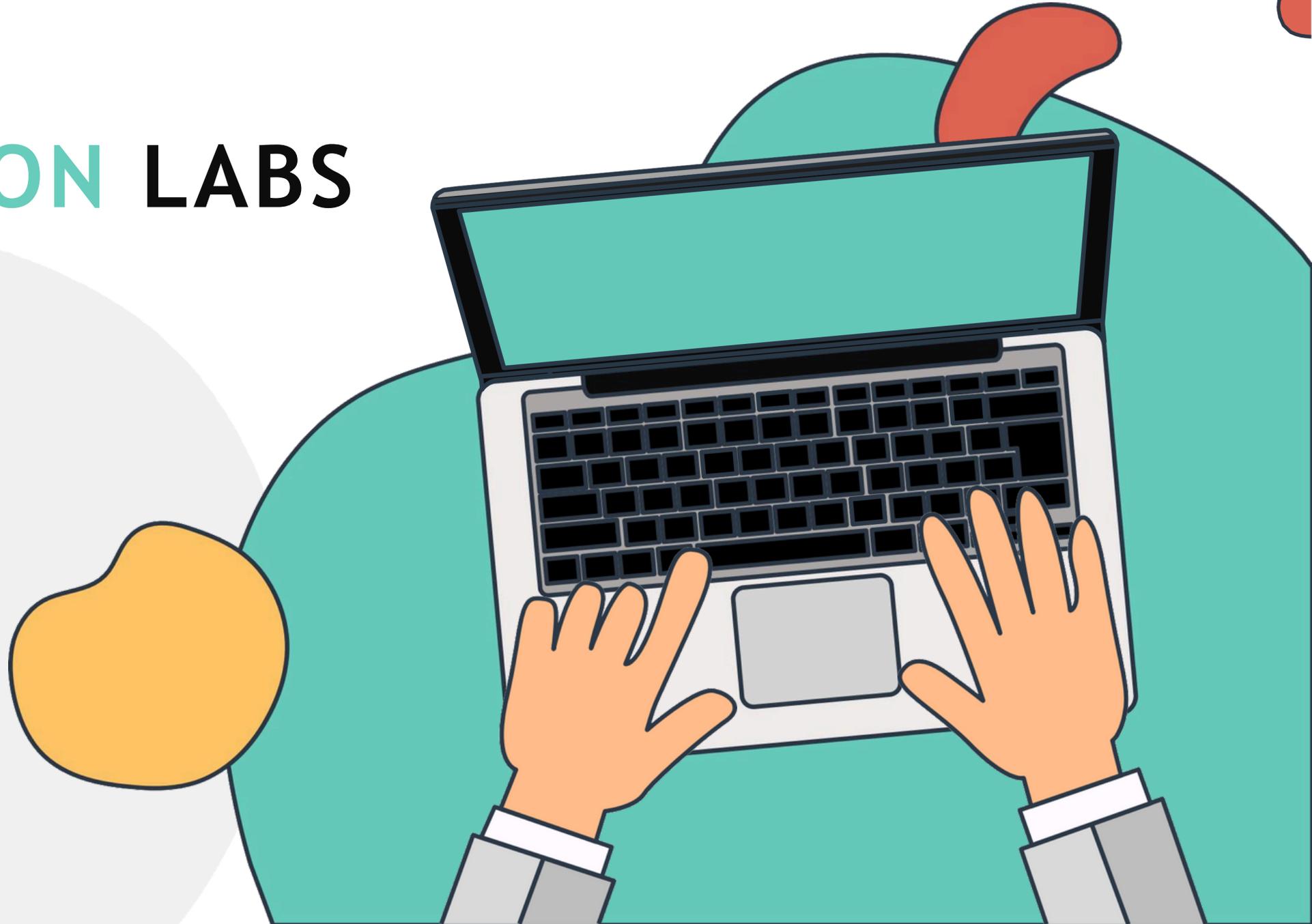
```
[~]$ userdel bob
```

```
[~]$ groupadd -g 1011 developer
```

```
[~]$ groupdel developer
```

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HANDS-ON LABS



Linux File Permissions

```
[~]$ ls -l bash-script.sh  
-rwxrwxr-x 1 bob bob 89 Mar 17 01:35 bash-script.sh
```

File Type	Identifier
DIRECTORY	d
REGULAR FILE	-
CHARACTER DEVICE	c
LINK	l
SOCKET FILE	s
PIPE	p
BLOCK DEVICE	b

Linux File Permissions

- rwxrwxr-x



Bit	Purpose	Octal Value
r	Read	4
w	Write	2
x	Execute	1

Directory Permissions

Bit	Purpose	Octal Value
r	Read	4
w	Write	2
x	Execute	1
-	No permission	0

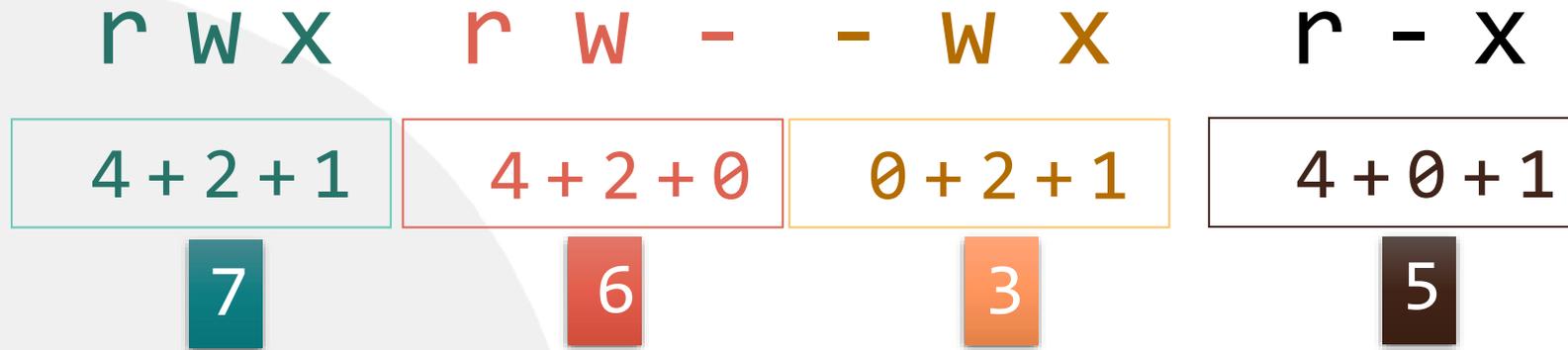
```
[~]$ ls -ld /home/bob/random_dir  
d--xrw-rwx 1 bob bob 89 Mar 17 01:35 .
```

```
[~]$ whoami  
bob
```

```
[~]$ ls /home/bob/random_dir  
ls: cannot open directory 'random_dir/': Permission denied
```

```
[~]$ cd /home/bob/random_dir  
[bob@ubuntu-server random_dir]$
```

Linux File Permissions



Bit	Purpose	Octal Value
r	Read	4
w	Write	2
x	Execute	1
-	No permission	0

Modifying File Permissions

```
chmod <permissions> file
```

```
[~]$ chmod u+rwx test-file
```

Provide full access to Owners

```
[~]$ chmod ugo+r-x test-file
```

Provide Read access to Owners, groups and others, Remove execute access

```
[~]$ chmod o-rwx test-file
```

Remove all access for others

```
[~]$ chmod u+rwx,g+r-x,o-rwx test-file
```

Full access for Owner, add read ,remove execute for group and no access for others

Modifying File Permissions

```
chmod <permissions> file
```

```
[~]$ chmod 777 test-file
```

Provide full access to Owners, group and others

```
[~]$ chmod 555 test-file
```

Provide Read and execute access to Owners, groups and others

```
[~]$ chmod 660 test-file
```

Read and Write access for Owner and Group, No access for others

```
[~]$ chmod 750 test-file
```

Full access for Owner, read and execute for group and no access for others

Modifying File Permissions

```
chown owner:group file
```

```
[~]$ chown bob:developer test-file
```

Changes owner to bob and group to developer

```
[~]$ chown bob android.apk
```

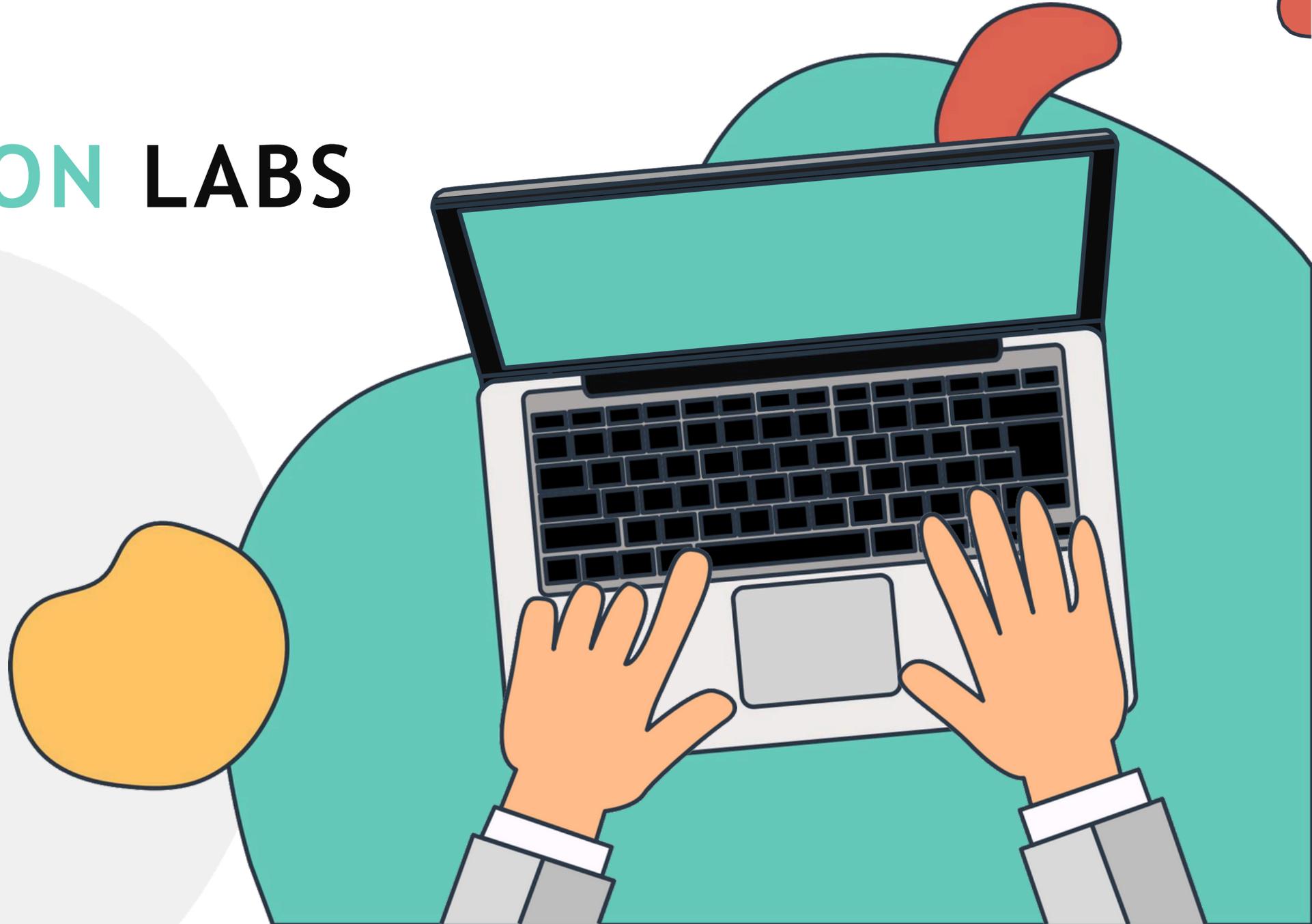
Changes just the owner of the file to bob. Group unchanged.

```
[~]$ chgrp android test-file
```

Change the group for the test-file to the group called android.

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HANDS-ON LABS



SSH

```
ssh <hostname OR IP Address>
```

```
ssh <user>@<hostname OR IP Address>
```

```
ssh -l <user> <hostname OR IP Address>
```

```
[bob@caleston-lp10 ~]$ ssh devapp01  
bob@devapp01's password:  
Last login: Tue Apr 7 20:08:58 2020  
from 192.168.1.109  
[bob@devapp01 ~]$
```



Client/Laptop

SSH/port 22

Remote Server

PASSWORD-LESS SSH

Key Pair = Private Key +Public Key



PASSWORD-LESS SSH

Client

```
[bob@caleston-lp10 ~]$ ssh-keygen -t rsa
Generating public/private rsa key pair. Enter file in which to save
the key (/home/bob/.ssh/id_rsa): /home/bob/.ssh/id_rsa already exists.
Overwrite (y/n)? y Enter passphrase (empty for no passphrase): Enter
same passphrase again: Your identification has been saved in
/home/bob/.ssh/id_rsa. Your public key has been saved in
/home/bob/.ssh/id_rsa.pub. The key fingerprint is:
SHA256:PCRTdbxxzffzmi8uunjn5V/1LZCG0BvhVJYXBr9gYsE bob@caleston-lp10
The key's randomart image is:
```

```
+---[RSA 2048] +
|
| .o=o=oo+ |
| . +E=+oo + |
| o o * o=. o |
| = o *.o o. |
| S o + . + |
| . . . = |
| oo+ |
| .. oo+.. |
| ..o=.oo+o |
+----[SHA256] ---- +
```

Public Key: /home/bob/.ssh/id_rsa.pub

Private Key: /home/bob/.ssh/id_rsa

PASSWORD-LESS SSH

Client

```
[bob@caleston-lp10 ~]$ ssh-copy-id bob@devapp01
/usr/bin/ssh-copy-id: INFO: Source of key(s) to be installed: "/home/bob/.ssh/id_rsa.pub"
/usr/bin/ssh-copy-id: INFO: attempting to log in with the new key(s), to filter out any that
are already installed
/usr/bin/ssh-copy-id: INFO: 1 key(s) remain to be installed -- if you are prompted now it is
to install the new keys
bob@devapp01's password:
Number of key(s) added: 1
```

Now try logging into the machine, with:

```
"ssh 'bob@devapp01'"
```

and check to make sure that only the key(s) you wanted were added.

```
[bob@caleston-lp10 ~]$ ssh devapp01
```

```
Last login: Tue Apr 7 20:10:58 2020 from 192.168.1.109
```

```
[bob@devapp01 ~]$
```

PASSWORD-LESS SSH

Remote Server

```
[bob@caleston-lp10 ~]$ cat /home/bob/.ssh/authorized_keys ssh-rsa  
AAAAB3NzaC1yc2EAAAADAQABAAQACgVV5wgH37kNwjnEIXgeX4j6LASNckjKi4bRpjPGecyxEiEeJhIU4x3IXPEFzUFp/1xX2rj  
eiM2Ko3oPmTGCCTEQMpQogerR7NS+bA9eXs34jWIg+xoSQjeQu1+1XgrRippJn2YhWYVAY3sKWIiiklowuMXmxjmBBR48L52di1J+  
8EASwnM4ILX/YL72Czq3uFFhVW1fNUKBPUbW58h4QSA2r9abzZfrHH48ThPJW4/5i8LOHEo3W0BX13foEV0c6pk3TgxcjTuZQ0im  
d48mM2pxWJh9WxA0xcXwbD3+JrcnZeMJq4TbrKjaXQ0pBGeng1xurxnRT2og9DeTIqGN3 bob@caleston-lp10
```

SCP



```
[bob@caleston-lp10 ~]$ scp /home/bob/caleston-code.tar.gz devapp01:/home/bob
```

```
bob@devapp01's password:
```

```
caleston-code.tar.gz
```

```
100% 2498KB 51MB/s 00.00
```

```
[bob@caleston-lp10 ~]$ scp /home/bob/caleston-code.tar.gz devapp01:/root
```

```
bob@devapp01's password:
```

```
Scp /root/caleston-code.tar.gz: Permission denied
```

```
[bob@caleston-lp10 ~]$ scp -pr /home/bob/media/ devapp01:/home/bob
```

```
bob@devapp01's password:
```

```
Caleston.jpg
```

```
Random.png
```

```
100% 3124KB 51.1MB/s 00.00
```

```
100% 2122KB 29.2MB/s 00.00
```

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HANDS-ON LABS

