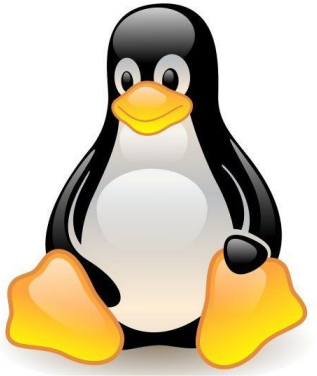


Using Directories Listing Files

Linux Essentials
Session-4

CLARUSWAY
WAY TO REINVENT YOURSELF

1

Files and Directories

Files and Directories

The file system hierarchy standard (FHS) defines the structure of the file systems on Linux.

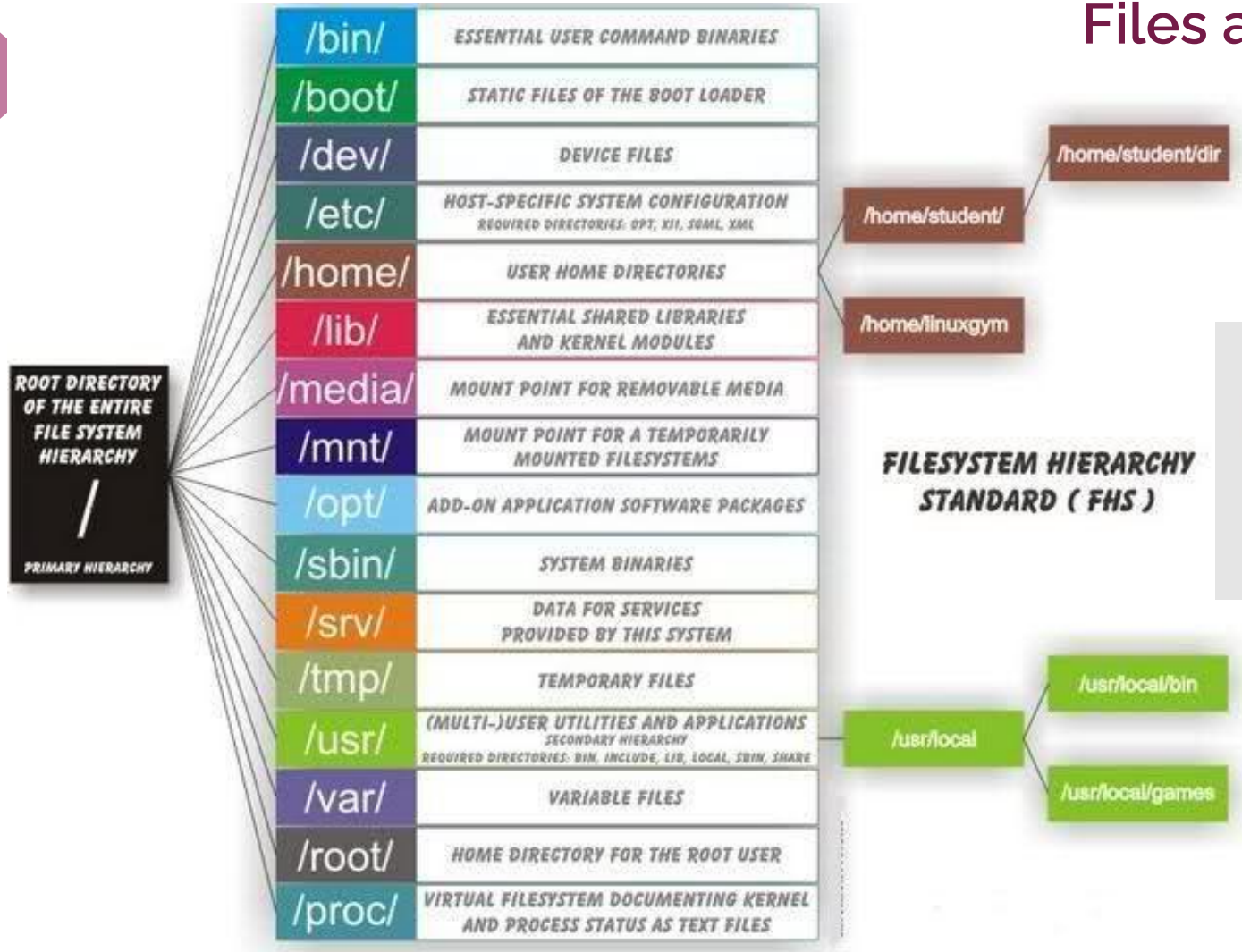
In the FHS, all files and directories appear under the root directory /, even if they are stored on different physical or virtual devices.

Most of these directories exist in all UNIX, however, they are not considered authoritative for platforms other than Linux.

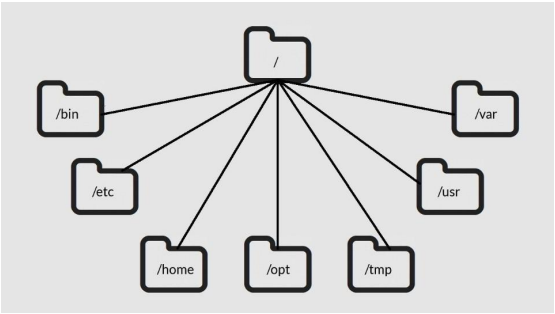
Files and Directories

/root	Home directory of the root user
/bin	Essential command binaries
/boot	Boot loader files
/dev	Essential device files
/etc	Host-specific configuration files
/home	Users' home directories
/lib	Libraries essential for the binaries
/mnt	Temporarily mounted filesystems.
/opt	Optional application packages
/proc	Contains information about system
/sbin	Essential system binaries
/tmp	Temporary files
/var	Variable data files

Files and Directories



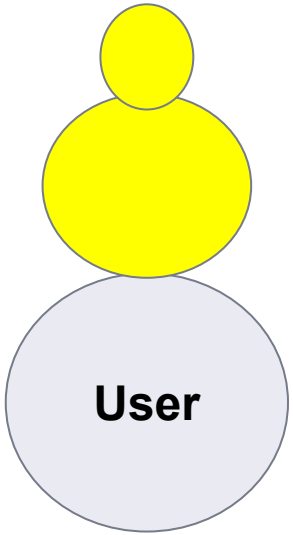
FILESYSTEM HIERARCHY STANDARD (FHS)

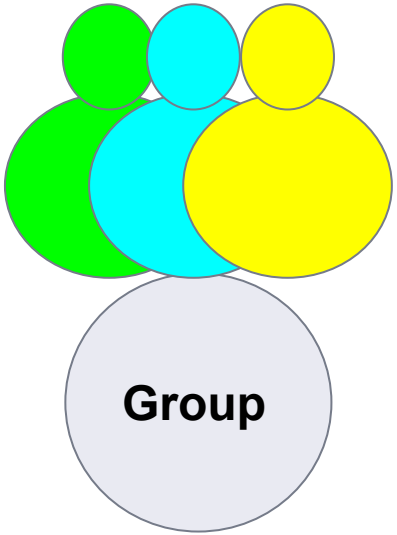


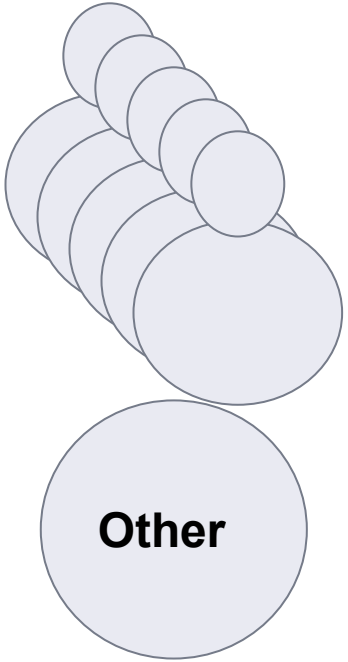
2 File Permission

File Permission

Ownership

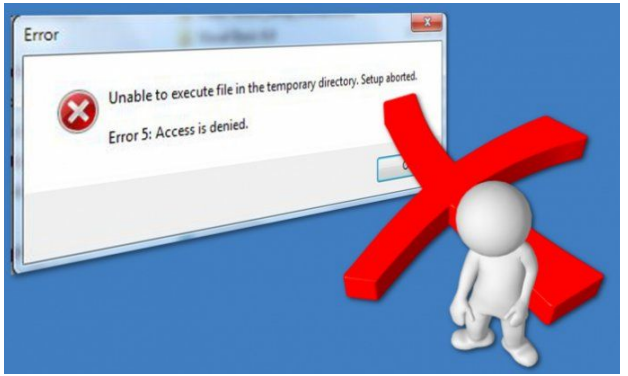






File Permission

Permissions



Read

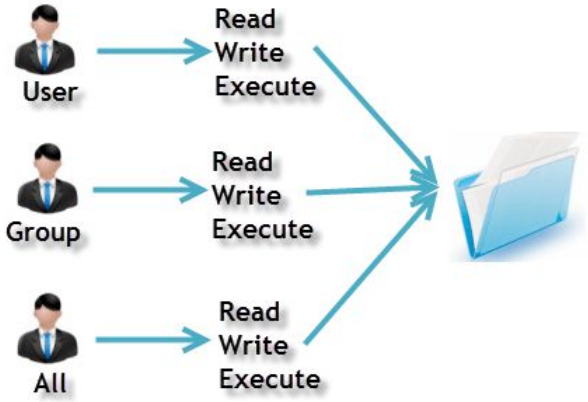
Write

Execute

File Permission

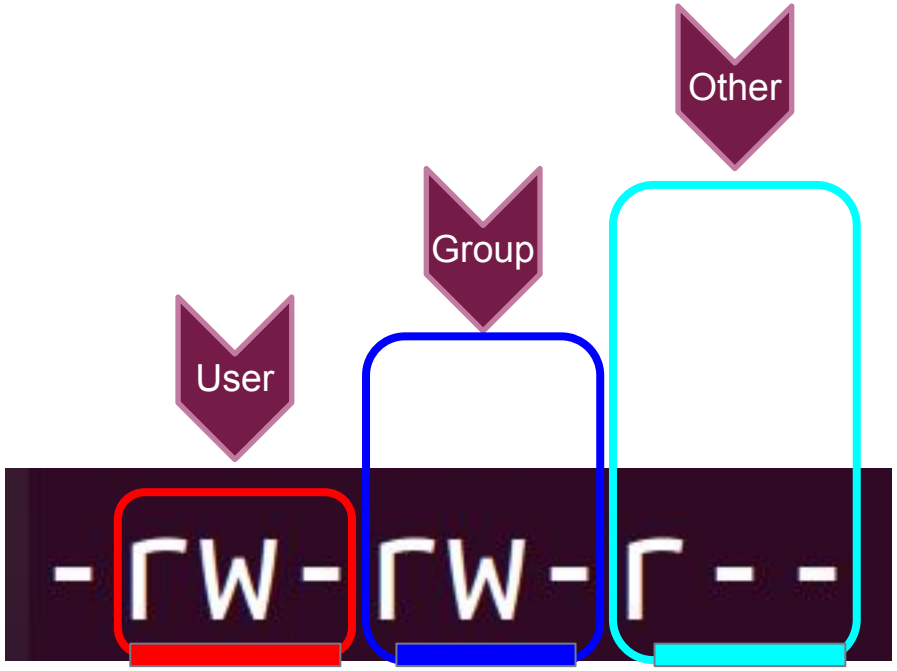
Ownership	
User	• A user is the owner of the file.
Group	• A user- group can contain multiple users.
Other	• Any other user who has access to a file.

Permission	
Read	• This permission give you the authority to open and read a file.
Write	• The write permission gives you the authority to modify the contents of a file.
Execute	• you cannot run a program unless the execute permission is set.



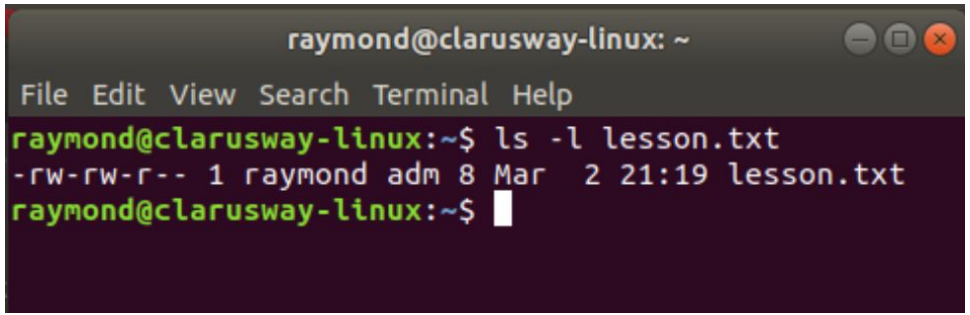
File Permission

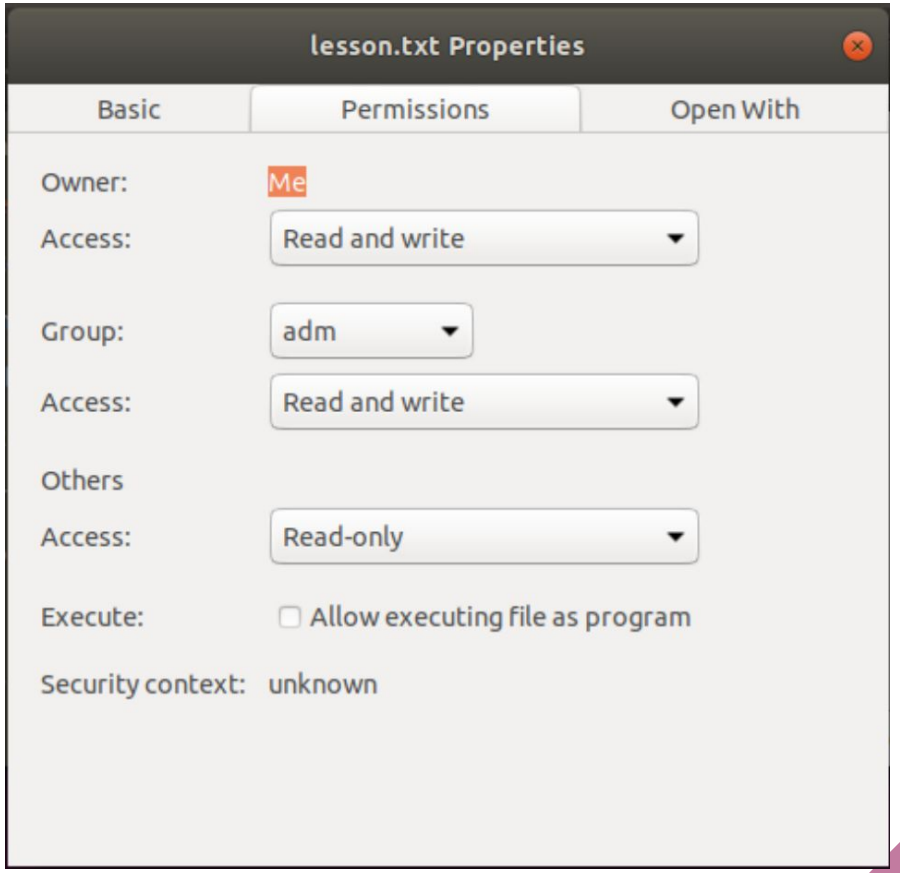
Ownership




```
-rw-rw-r-- 1 zk zk 0 Dec  7 15:39 html.txt
```

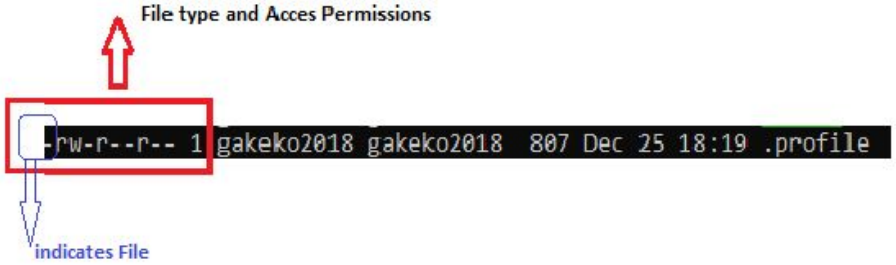
File Permission

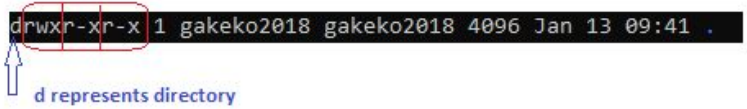


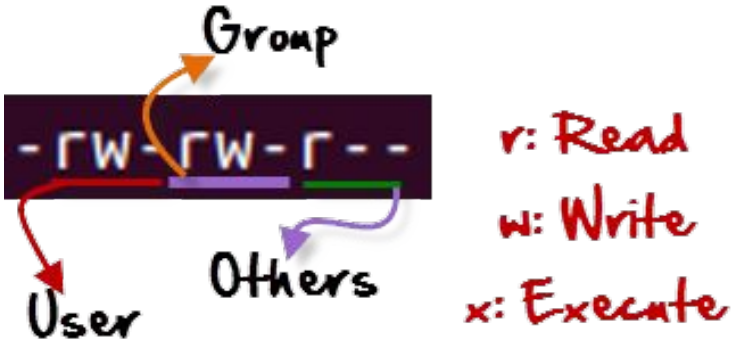


File Permission

```
gakeko2018@DESKTOP-JAO7K2U:~$ ls
cert.pem
gakeko2018@DESKTOP-JAO7K2U:~$ ls -a
.  ..  .bash_history  .bash_logout  .bashrc  .local  .profile  .ssh  cert.pem
gakeko2018@DESKTOP-JAO7K2U:~$ ls -al
total 12
drwxr-xr-x 1 gakeko2018 gakeko2018 4096 Jan 13 09:41 .
drwxr-xr-x 1 root       root       4096 Dec 25 18:19 ..
-rw------- 1 gakeko2018 gakeko2018  236 Jan 14 12:21 .bash_history
-rw-r--r-- 1 gakeko2018 gakeko2018  220 Dec 25 18:19 .bash_logout
-rw-r--r-- 1 gakeko2018 gakeko2018 3771 Dec 25 18:19 .bashrc
drwxrwxrwx 1 gakeko2018 gakeko2018 4096 Jan 13 09:38 .local
-rw-r--r-- 1 gakeko2018 gakeko2018  807 Dec 25 18:19 .profile
drwx------ 1 gakeko2018 gakeko2018 4096 Jan 13 09:41 .ssh
-r-------- 1 gakeko2018 gakeko2018 1675 Jan 13 09:38 cert.pem
```







r: Read

w: Write

x: Execute

r = read permission
w = write permission
x = execute permission
- = no permission

File Permission

Changing Permission with chmod Command

We can use the chmod command which stands for **change mode**.
we can set permissions (read, write, execute) on a file/directory for the owner, group and the world.

chmod permissions filename

```
chmod u=rwx,g=rx,o=r myfile
```

Symbol	Permission Type
---	No Permission
--x	Execute
-w-	Write
-wx	Execute+Write
r--	Read
r-x	Read+Execute
rw-	Read+Write
rwx	Read+Write+Execute

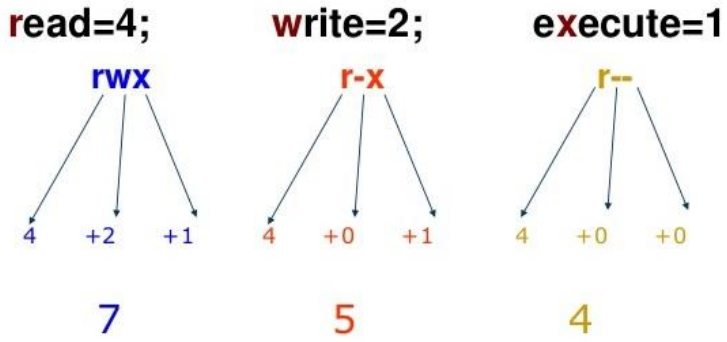
File Permission

```
root@DESKTOP-4QQ1S5L:~# ls -l
total 0
-rw-rw-rw- 1 root root 0 Dec 29 17:53 file1
-r--r--rwx 1 root root 0 Dec 29 17:53 file2
root@DESKTOP-4QQ1S5L:~# chmod 754 file2
root@DESKTOP-4QQ1S5L:~# ls -l file2
-rwxr-xr-- 1 root root 0 Dec 29 17:53 file2
root@DESKTOP-4QQ1S5L:~#
```

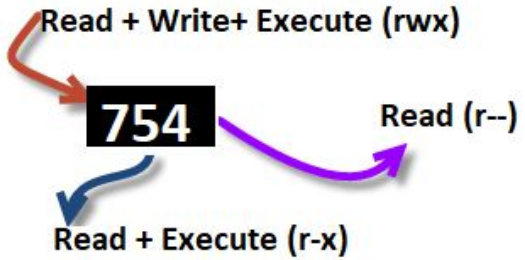
754 code says;

- Owner can read, write and execute
- User's group can read and execute
- Other can only read

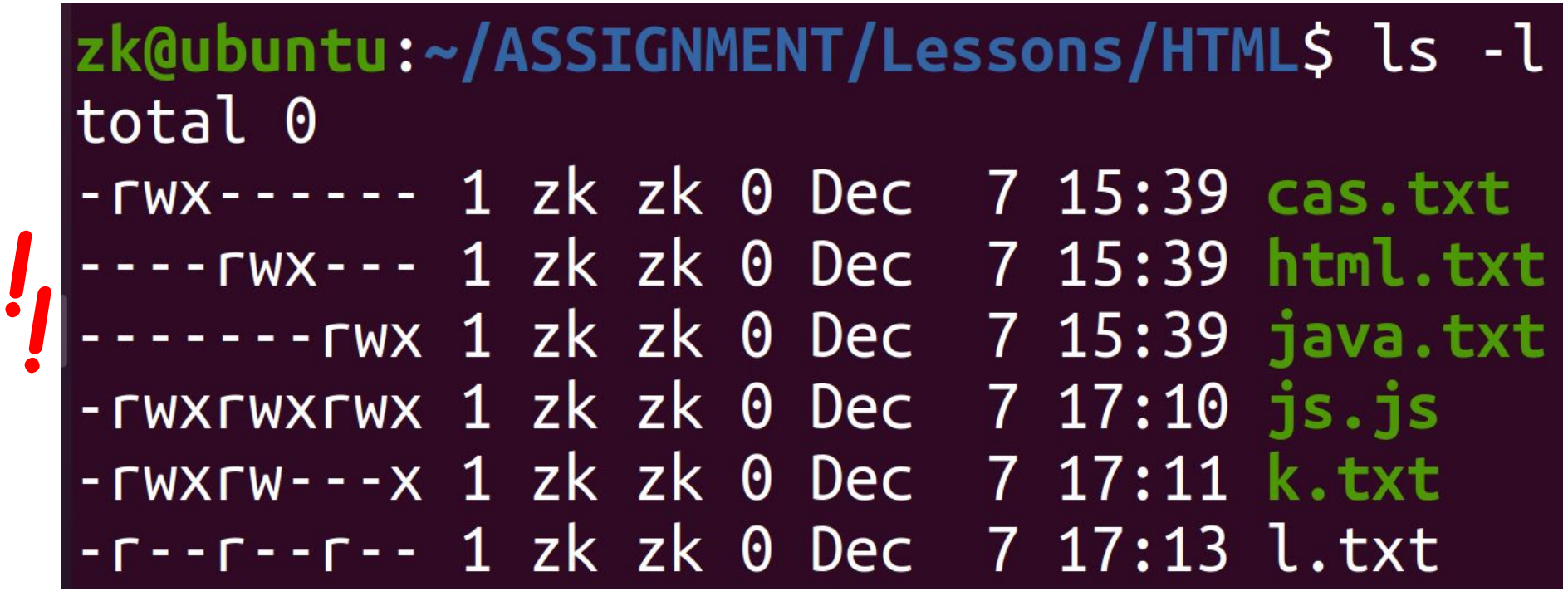
Permissions



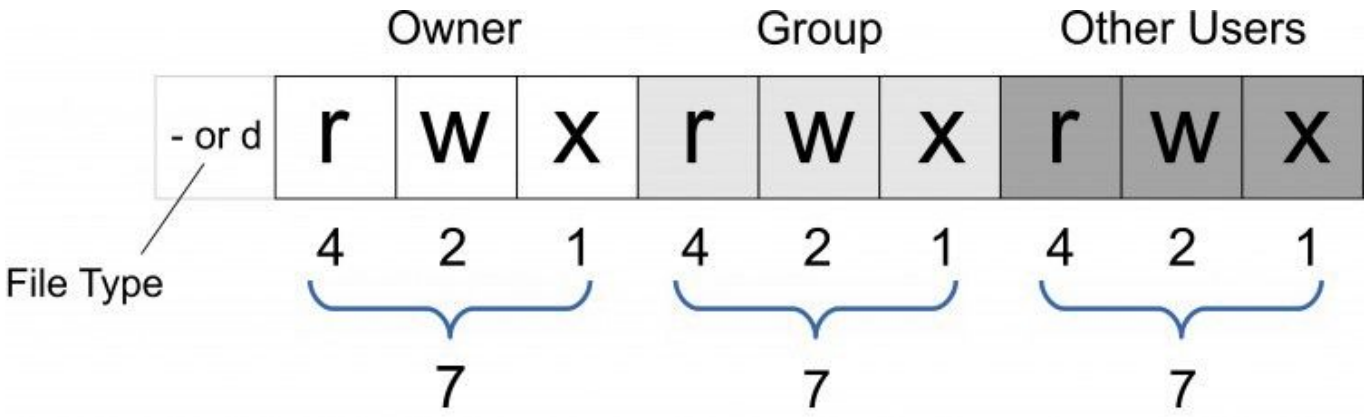

```
chmod u=rwx,g=rx,o=r myfile
chmod 754 myfile
```

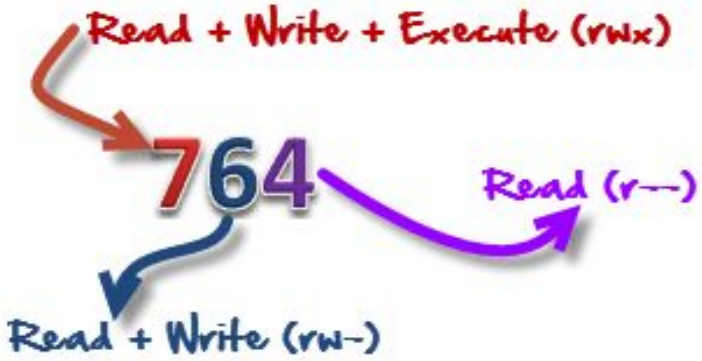


File Permission



File Permission

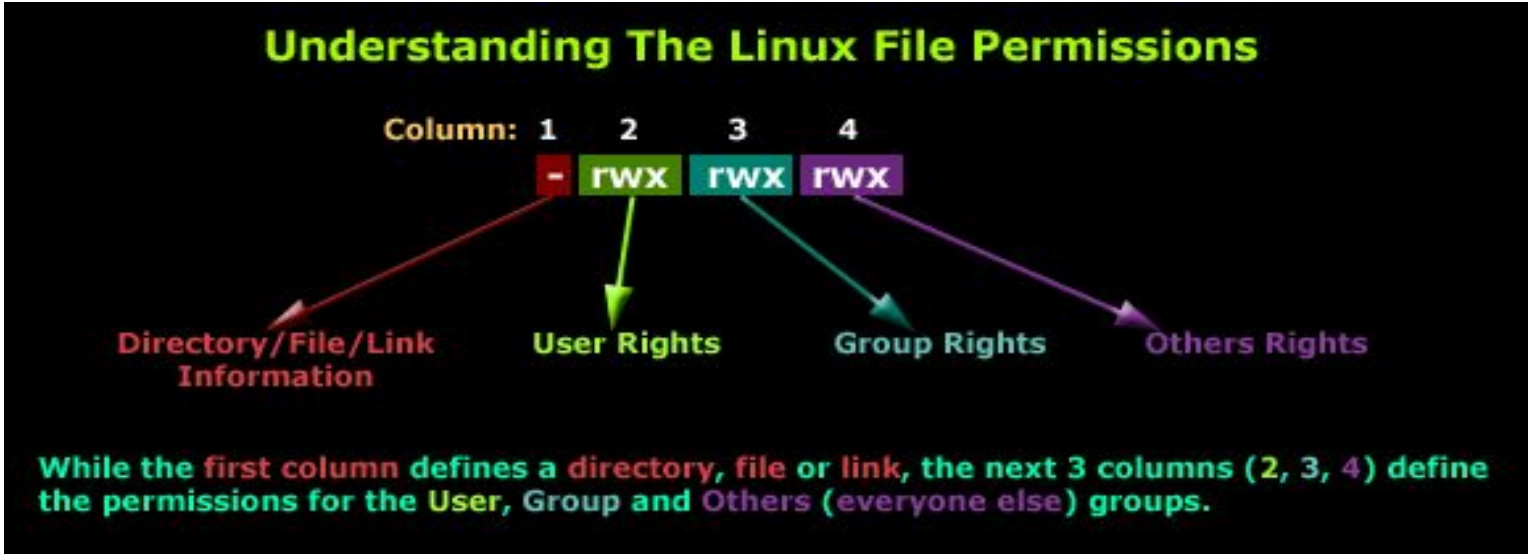


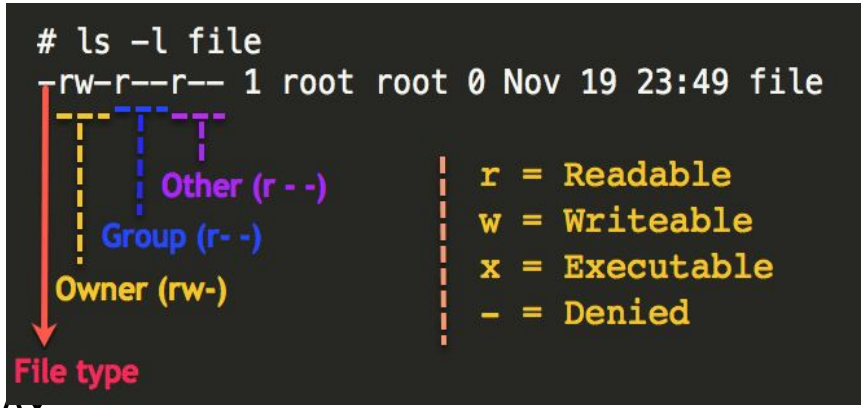


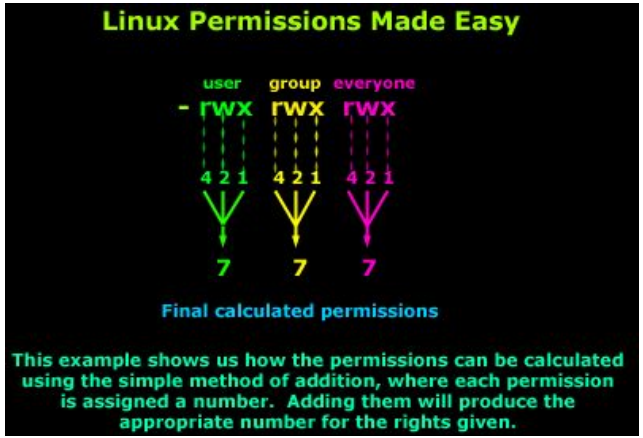
d	r read	w write	x exec	r read	- write	x exec	r read	- write	- exec
File type	Owner permissions			Group permissions			User permissions		
(directory)	4	2	1	4	2	1	4	2	1
	7			5			4		

Set permissions of myfile.txt to;

owner : full access
group : read and execute
others : no access


Understanding The Linux File Permissions
Column: 1 2 3 4
- rwx rwx rwx
Directory/File/Link Information
User Rights
Group Rights
Others Rights
While the first column defines a directory, file or link, the next 3 columns (2, 3, 4) define the permissions for the User, Group and Others (everyone else) groups.


ls -l file
-rw-r--r-- 1 root root 0 Nov 19 23:49 file
Other (r - -)
Group (r- -)
Owner (rw-)
File type
r = Readable
w = Writeable
x = Executable
- = Denied


Linux Permissions Made Easy
user group everyone
- rwx rwx rwx
4 2 1 4 2 1 4 2 1
7 7 7
Final calculated permissions
This example shows us how the permissions can be calculated using the simple method of addition, where each permission is assigned a number. Adding them will produce the appropriate number for the rights given.


3
Ping & SSH Command

Ping Command

Ping or Packet Internet Groper is a network administration utility used to check the connectivity status between a source and a destination device.

ping host-name/IP

```
ping 54.93.34.220
```

```
gakeko2018@DESKTOP-JAO7K2U:~$ ping 54.93.34.220
PING 54.93.34.220 (54.93.34.220) 56(84) bytes of data.
64 bytes from 54.93.34.220: icmp_seq=1 ttl=243 time=62.6 ms
64 bytes from 54.93.34.220: icmp_seq=2 ttl=243 time=93.5 ms
64 bytes from 54.93.34.220: icmp_seq=3 ttl=243 time=66.8 ms
64 bytes from 54.93.34.220: icmp_seq=4 ttl=243 time=67.6 ms
64 bytes from 54.93.34.220: icmp_seq=5 ttl=243 time=62.7 ms
64 bytes from 54.93.34.220: icmp_seq=7 ttl=243 time=84.6 ms
64 bytes from 54.93.34.220: icmp_seq=8 ttl=243 time=64.6 ms
64 bytes from 54.93.34.220: icmp_seq=9 ttl=243 time=72.0 ms
```

Ping Command

The `ping` command is one of the most used utilities for troubleshooting, testing, and diagnosing network connectivity issues.

Ping works by sending one or more ICMP (Internet Control Message Protocol) Echo Request packages to a specified destination IP on the network and waits for a reply. When the destination receives the package, it will respond back with an ICMP echo reply.

With the `ping` command, you can determine whether a remote destination IP is active or inactive. You can also find the round-trip delay in communicating with the destination and check whether there is a packet loss.

The `ping` utility is a part of the `iputils` (or `iputils-ping`) package, which is pre-installed on nearly all Linux distributions. `ping` is also available on Windows, macOS, and FreeBSD.

Ping Command

The `ping` command resolves the domain name into an IP address and starts sending ICMP packages to the destination IP. If the destination IP is reachable it will respond back and the ping command prints a line that includes the following fields:

- The number of data bytes. The default is 56, which translates into 64 ICMP data bytes - `64 bytes`
- The IP address of the destination - `from ….`
- The ICMP sequence number for each packet. `icmp_seq=1`
- The Time to Live. - `ttl=53`
- The ping time, measured in milliseconds which is the round trip time for the packet to reach the host, and for the response to return to the sender. - `time=41.4 ms`

By default, the interval between sending a new packet is one second.

The `ping` command will continue to send ICMP packages to the Destination IP address until it receives an interrupt. To stop the command, just hit the `Ctrl+C` key combination.

Ping Command

```
$ ping clarusway.com

Pinging clarusway.com [54.164.151.235] with 32 bytes of data:
Reply from 54.164.151.235: bytes=32 time=132ms TTL=237
Reply from 54.164.151.235: bytes=32 time=130ms TTL=237
Reply from 54.164.151.235: bytes=32 time=130ms TTL=237
Reply from 54.164.151.235: bytes=32 time=130ms TTL=237

Ping statistics for 54.164.151.235:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 130ms, Maximum = 132ms, Average = 130ms
```

```
$ ping www.google.com

Pinging www.google.com [172.217.169.132] with 32 bytes of data:
Reply from 172.217.169.132: bytes=32 time=19ms TTL=116
Reply from 172.217.169.132: bytes=32 time=18ms TTL=116
Reply from 172.217.169.132: bytes=32 time=18ms TTL=116
Reply from 172.217.169.132: bytes=32 time=19ms TTL=116

Ping statistics for 172.217.169.132:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 18ms, Maximum = 19ms, Average = 18ms
```

Ping Command

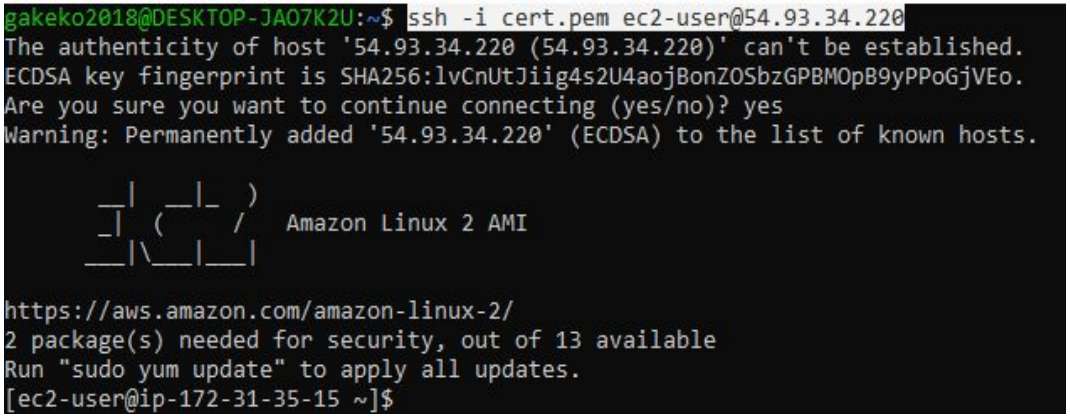
```
$ ping 54.164.151.235

Pinging 54.164.151.235 with 32 bytes of data:
Reply from 54.164.151.235: bytes=32 time=131ms TTL=237
Reply from 54.164.151.235: bytes=32 time=130ms TTL=237
Reply from 54.164.151.235: bytes=32 time=130ms TTL=237
Reply from 54.164.151.235: bytes=32 time=130ms TTL=237

Ping statistics for 54.164.151.235:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 130ms, Maximum = 131ms, Average = 130ms
```

SSH Command

* ssh stands for “Secure Shell”.
* It is a protocol used to securely connect to a remote server/system.

ssh user@host(IP/Domain_name)

```
ssh -i cert.pem ec2-user@54.93.34.220
```



Kahoot!

THANKS!

Any questions?

File Attributes	Meaning
`-rwx------`	A regular file that is readable, writable, and executable by the file's owner. No one else has any access.
`-rw-------`	A regular file that is readable and writable by the file's owner. No one else has any access.
`-rw-r--r--`	A regular file that is readable and writable by the file's owner. Members of the file's owner group may read the file. The file is world-readable.
`-rwxr-xr-x`	A regular file that is readable, writable, and executable by the file's owner. The file may be read and executed by everybody else.
`-rw-rw----`	A regular file that is readable and writable by the file's owner and members of the file's group owner only.
`lrwxrwxrwx`	A symbolic link. All symbolic links have “dummy” permissions. The real permissions are kept with the actual file pointed to by the symbolic link.
`drwxrwx---`	A directory. The owner and the members of the owner group may enter the directory and create, rename and remove files within the directory.
`drwxr-x---`	A directory. The owner may enter the directory and create, rename, and delete files within the directory. Members of the owner group may enter the directory but cannot create, delete, or rename files.

Octal	Binary	File Mode
0	000	---
1	001	--x
2	010	-w-
3	011	-wx
4	100	r--
5	101	r-x
6	110	rw-
7	111	rwx

By using three octal digits, we can set the file mode for the owner, group owner, and world.

Notation	Meaning
`u+x`	Add execute permission for the owner.
`u-x`	Remove execute permission from the owner.
`+x`	Add execute permission for the owner, group, and world. This is equivalent to `a+x`.
`o-rw`	Remove the read and write permissions from anyone besides the owner and group owner.
`go=rw`	Set the group owner and anyone besides the owner to have read and write permission. If either the group owner or the world previously had execute permission, it is removed.
`u+x,go=rx`	Add execute permission for the owner and set the permissions for the group and others to read and execute. Multiple specifications may be separated by commas.