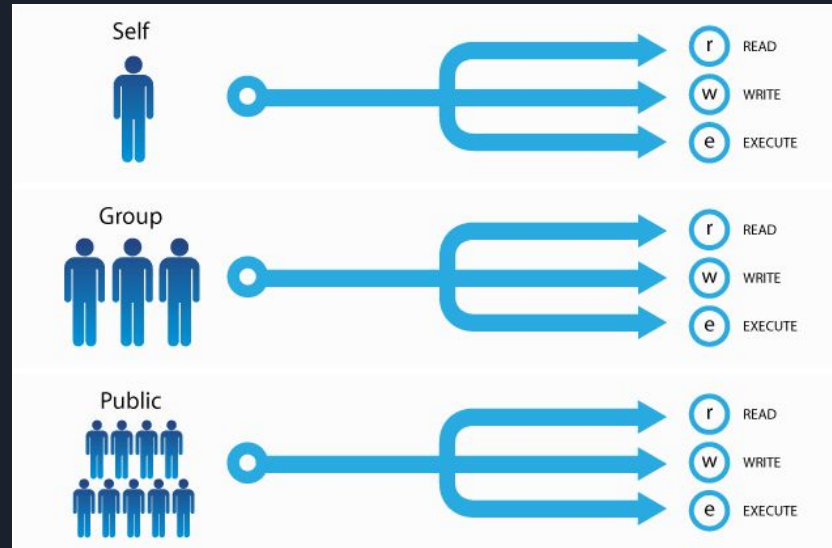
A blue parallelogram and a light green parallelogram are positioned in the upper-left corner of the slide. The background is a dark navy blue with several diagonal bands of slightly different shades of blue and grey.

File perms, ownership, attributes

I swear its importante

Why bother?

- Restrict your information
- Only correct users should be able to view certain things





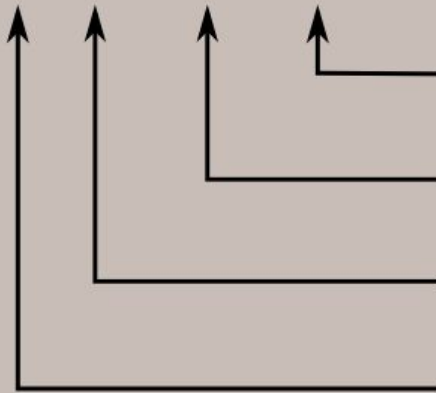
Example

```
joseph@pop-os:~/linux_examples/permissions$ ls -l
total 8
-rwxrwxrwx 1 christo christo      0 Jun 23 14:20 arch_linux
drwxr-xr-x 2 joseph  joseph    4096 Jun 23 14:21 crypto_books
drwxr-xr-x 2 christo christo    4096 Jun 23 14:21 ctf_stuffs
-rw-r--r-- 1 joseph  instructors  0 Jun 23 14:20 how_to_teach_for_dummies.pdf
joseph@pop-os:~/linux_examples/permissions$
```

What's this stuff →

```
-rwxrwxrwx 1
drwxr-xr-x 2
drwxr-xr-x 2
-rw-r--r-- 1
```

- rwx rwx rwx



Read, write, and execute permissions for all other users.

Read, write, and execute permissions for the group owner of the file.

Read, write, and execute permissions for the file owner.

File type:
- indicates regular file
d indicates directory



How is this represented?

- Ex: RWXR_XR_X
 - Let's take a look at the first trio: RWX
 - 1 is on, 0 is off
 - $RWX \rightarrow 111$
 - $111 \text{ base } 2 = 7 \text{ base } 10$
 - $R_X \rightarrow 101$
 - the write perm is not set, so it's a 0
 - $101 \text{ base } 2 = 5 \text{ base } 10$
 - put it all together
 - $RWX = 7$
 - $R_X = 5$
 - $R_X = 5$
 - $\rightarrow 755$



Practice exercise

```
-rw--wx--x 1 joseph joseph 0 Jun 23 14:33 file1
-r--r---w- 1 joseph joseph 0 Jun 23 14:33 file2
-rwxr-x-wx 1 joseph joseph 0 Jun 23 14:33 file3
----- 1 joseph joseph 0 Jun 23 14:33 file4
```

- What are the numerical values for these 4 permissions?



Chmod command

- Syntax: `chmod [permissions] [file]`
- Try:
 - Create `chmod_ex.txt`
 - Owner: can read, write, execute
 - Group: can read, execute
 - Everyone: can't do anything
- Verify with `ls -l`



Example problem

- `touch chmod_ex.txt; chmod 750 chmod_ex.txt`
- `ls -l`
- Verified result:

```
-rwxr-x--- 1 joseph joseph 0 Jun 23 14:38 chmod_ex.txt
```




Other chmod method

- u: user
- g: group
- o: other
- +: add
- -: remove
- Ex: `chmod ugo+rwx file1`
 - is the equivalent of `chmod 777`



Special permissions

- SUID, SGID, Sticky bit
 - SUID: inherit permission of the owner
 - SGID: inherit permission of the group
 - Sticky bit: only owner can delete or rename
- These are also set through the chmod command

ID	File	Directory
SUID	Run program as owner of the file	-
SGID	Assign authority to run program as owner of the file	Inherit group ownership of all of the item created beneath that directory
Sticky Bit	-	Only owner of the file can delete the file e.g. /tmp

File ownership

- Files are controlled by an owner and a group

Mode	Owner		File Size	Last Modified			Filename
		Group					
drwxrwxrwx	2	sammy	sammy	4096	Nov 10 12:15		everyone_directory
drwxrwx---	2	root	developers	4096	Nov 10 12:15		group_directory
-rw-rw----	1	sammy	sammy	15	Nov 10 17:07		group_modifiable
drwx-----	2	sammy	sammy	4096	Nov 10 12:15		private_directory
-rw-----	1	sammy	sammy	269	Nov 10 16:57		private_file
-rwxr-xr-x	1	sammy	sammy	46357	Nov 10 17:07		public_executable
-rw-rw-rw-	1	sammy	sammy	2697	Nov 10 17:06		public_file
drwxr-xr-x	2	sammy	sammy	4096	Nov 10 16:49		publicly_accessible_directory
-rw-r--r--	1	sammy	sammy	7718	Nov 10 16:58		publicly_readable_file
drwx-----	2	root	root	4096	Nov 10 17:05		root_private_directory



Chown and Chgrp

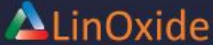

- Chown: change ownership
 - Can also be used to change the group
 - Ex: `chown root:root file`
- Chgrp: change group
 - Can only be used to change group. Cannot change the owner
 - Ex: `Chgrp root file`

Attributes

- Allows further customization of files
 - Some common ones:
 - a: append only
 - e: extent format
 - i: immutable
 - u: undeleteable

Show File Attributes in Linux

a append only	j data journaling	D synchronous directory updates
C compressed	S secure deletion	S synchronous updates
d no dump	t no tail-merging	T top of directory hierarchy
e extent format	u undeletable	
i immutable	A no atime updates	





Chattr and lsattr

- chattr: change attribute
 - ex: chattr +i file
 - + means add the attribute
 - - would remove it
- lsattr: list attribute
 - basically, ls but for attributes