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The ls -l command output format

Output format example	-rw-r--r--@	1	jdoe	staff	␣	5111	9 Jun 14:30	readme.rst.txt		
Fields	-	rw-	r--	r--	@	1	jdoe	staff	5111	9 Jun 14:30	readme.rst.txt
	Device Type:	*Owner*	*Group*	*Word*	*Optional Extra field*		*ownership*				

Description

Note: use the **`info ls`** command to see more information related to your system.

See Also: **ls @ wikipedia** with all the identified external links.

- **-** Regular file.
- **b** Block special file.
- **c** Character special file.
- **C** High performance (*contiguous data*) file.
- **d** Directory.
- **D** Door (Solaris).
- **l** (letter `l`) Symbolic link.
- **M** Off-line (migrated) file (Cray DMF).
- **n** Network special file (HP-UX).
- **p** FIFO (named pipe).
- **P** Port (Solaris).
- **s** Socket.
- **?** Some other file type.

Discretionary Access Control (DAC)

Permissions:
- **r**ead,
- **w**rite,
- other:
  - **`s`** : If the set-user-ID or set-group-ID and corresponding executable bit are both set.
  - **`S`** : If the set-user-ID or set-group-ID is set but the corresponding executable bit is not set.
  - **`t`** : If the restricted deletion flag or sticky bit, and the other-executable bit, are both set. The restricted deletion flag is another name of the sticky bit.
  - **`T`** : If the restricted deletion flag or sticky bit is set but the other-executable bit is not set.
  - **`x`** : If the executable bit is set and none of the above apply.
  - **`-`** : otherwise.

macOS only:
- @ has **extended attributes**.
- % dataless file or directory.

Linux only:
- . Flag that file has **SELinux security context**

  The SELinux context is shown with ls **-Z** option.

Number of links or directories

User *ownership:* user that owns the file or directory

Group ownership

Size in bytes.

With **`ls -lh`**, size format is human readable with units:
- **k** : kilo
- **M** : mega
- **G** : giga

Date of last modification.

Date format might be affected by the LANG environment variable.

On Linux, you can change the date format with the **`--time-style`** option.

For example:
`ls -l --time-style="long-iso"`

Name of the file.

Extra Notes:
- **POSIX File System Permissions**
  - **s**
  - **S**

  The **s** and **S** bits identify whether the set user ID or set group ID permissions are active.
  These are special permissions bits that allow a program, when run by any user, to be run with the effective UID of the owner (identified by the ownership fields).
  - For example, if the user ownership is root and the s bit is set, another user will be able to run the program as if it was root.

  This permission is therefore a security risk and should be restricted to the programs that absolutely require this (as sudo does for example).

SELinux: With **-Z** option:

SELinux security context
- Shown with the -Z option between ownership & size for the **ls -l** output: in place of ␣ above.
- **?** The **?** is displayed when the file has no associated **SELinux security context**.

SELinux contexts follow the SELinux **user:role:type:level** syntax with the following fields (as described in the SELinux RedHat web page):

user (…_**u**)	The **SELinux user** identity. This can be associated to one or more roles that the SELinux user is allowed to use.
role (…_**r**)	The **SELinux role**. This can be associated to one or more types the SELinux user is allowed to access.
type (…_**t**)	The **SELinux type** of the file (the **SELinux object**). It defines what access permissions the SELinux user has to that object.
level	**SELinux security level** field (or range). It is only present if the policy supports MCS or MLS. The entry can consist of: • A single security level that contains a **sensitivity** level and zero or more **categories** (e.g. s0, s1:c0, s7:c10.c15). • A range that consists of two security levels (a low and high) separated by a hyphen (e.g. s0 - s15:c0.c1023).

References:
- **SELinux Notebook**
  - Table of Contents
- **Red Hat SELinux**
- **SELinux @ Gentoo wiki**
- **SELinux @ ArchLinux wiki**
- **Rocky Linux 8 @ server-world**
- **Alma Linux 9 @ server-world**

☝ *On SELinux:* The **-Z** switch is available on several utilities to show or manage SELinux security contexts information. For example:
ls -lZ **ps axZ** **id -Z**