	Carátula para entrega de prácticas
Facultad de Ingeniería	Laboratorio de docencia

Laboratorios de computación salas A y B

Profesor: **César Fabián Domínguez Velasco**

Asignatura: **Fundamentos de Programación**

No. de práctica(s): **02**

Integrante(s): **12_Garcia_Sanchez_Alejandro**
17_Lopez_Castro_Anastacia
32_Ramirez_Rivas_Gael
37_Ruiz_Hernandez_Ruben_Antonio

No. de lista o brigada: **1ª**

Semestre: **2024-2**

Fecha de entrega: **21 de Febrero del 2024**

Observaciones:

CALIFICACIÓN: _____

PRÁCTICA 02: GNU/Linux

1) Objetivo:

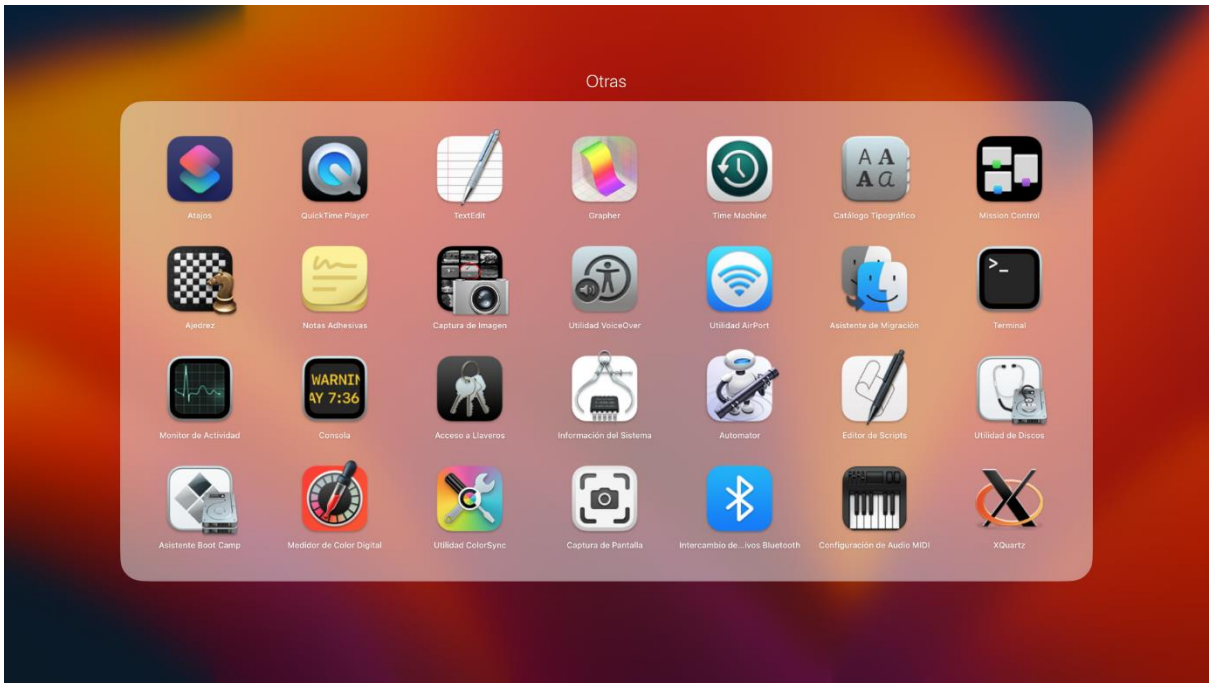
El alumno identificará al sistema operativo como una parte esencial de un sistema de cómputo. Explorará un sistema operativo GNU/Linux con el fin de conocer y utilizar sus comandos básicos.

2) Introducción:

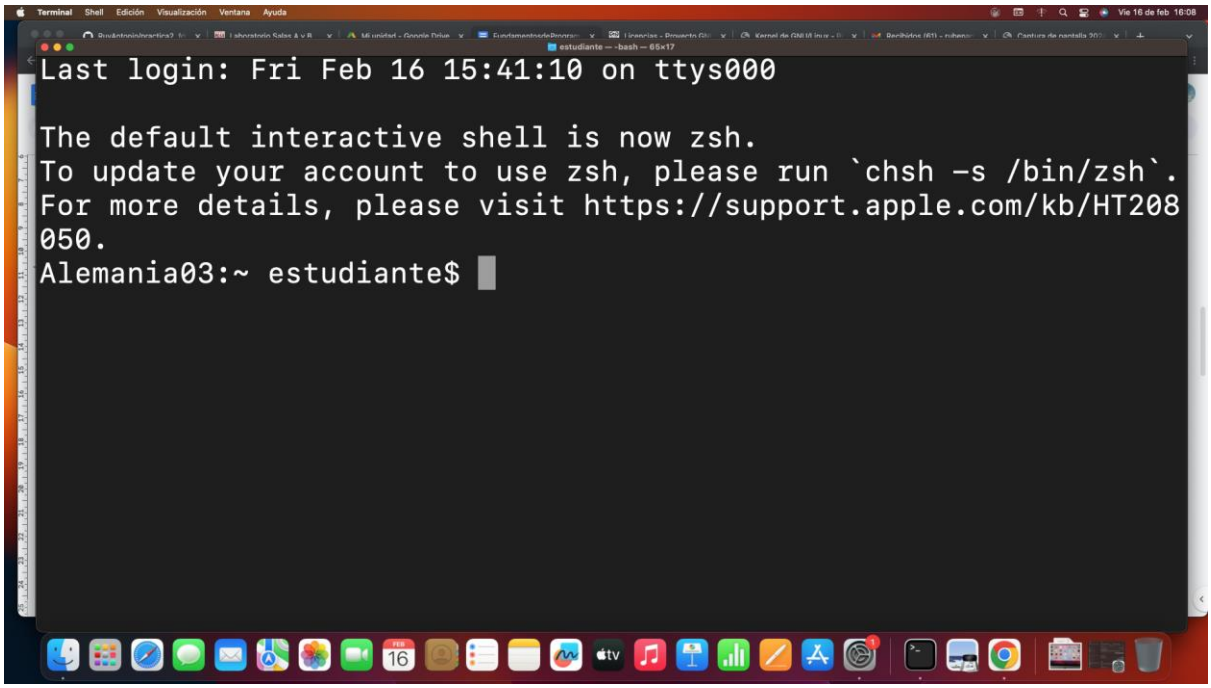
En la actualidad existen diversos sistemas operativos; por ejemplo, para equipos de cómputo están Windows, Linux, Mac OS entre otros, sin embargo para el caso de dispositivos móviles se encuentran Android, IOS, Windows Phone, etc, puesto que cada uno de ellos tiene diferentes versiones y distribuciones que se ajustan a los diversos equipos de cómputo y comunicación en los que trabajan, de igual manera, los futuros ingenieros aprenderemos diversos comando del sistema operativo (Linux) mediante el uso de la terminal de una computadora Mac.

3) Desarrollo (Capturas de pantalla de los comandos de Linux):

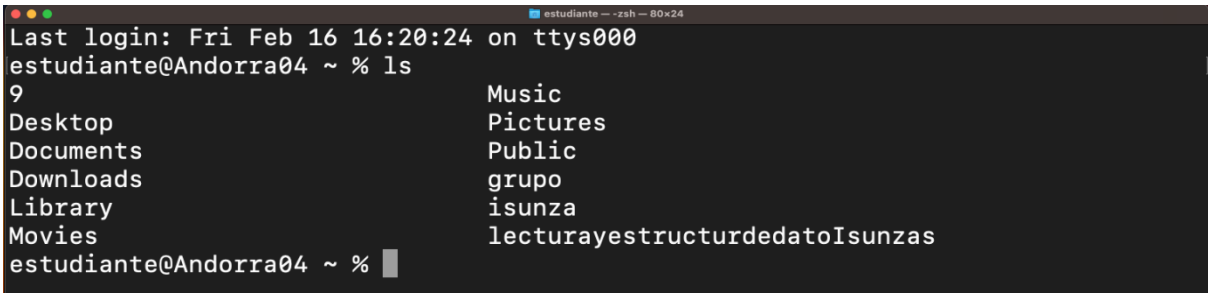
a) Figura 1: Utilidades de entorno gráfico en una computadora Mac.



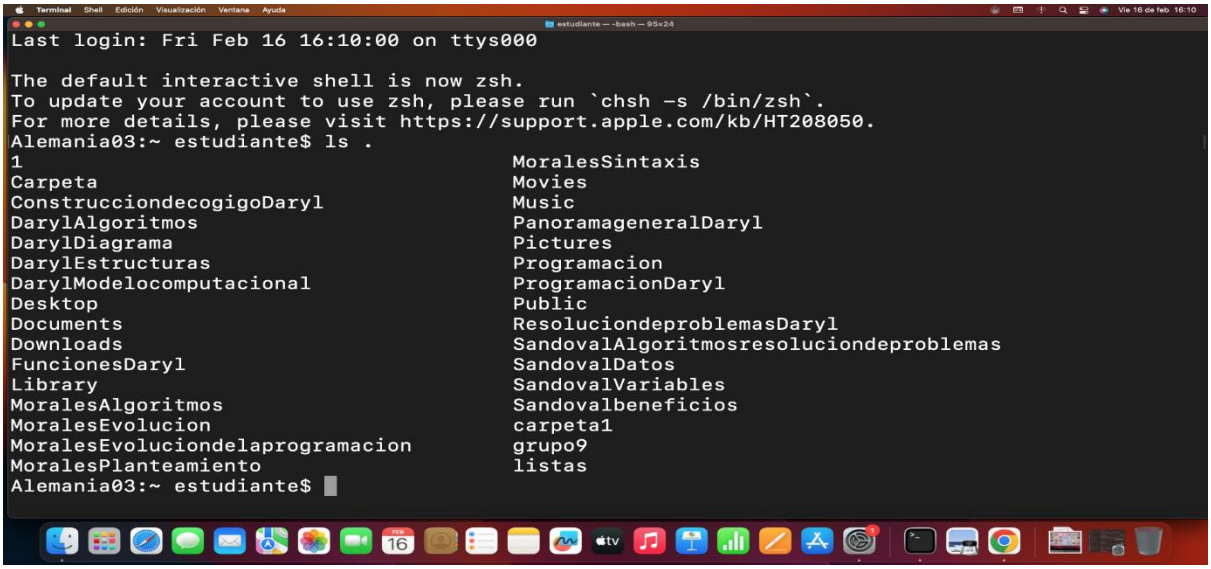
b) **Figura 2: Terminal del sistema operativo Linux.**



c) **Figura 3: Comando (ls)**



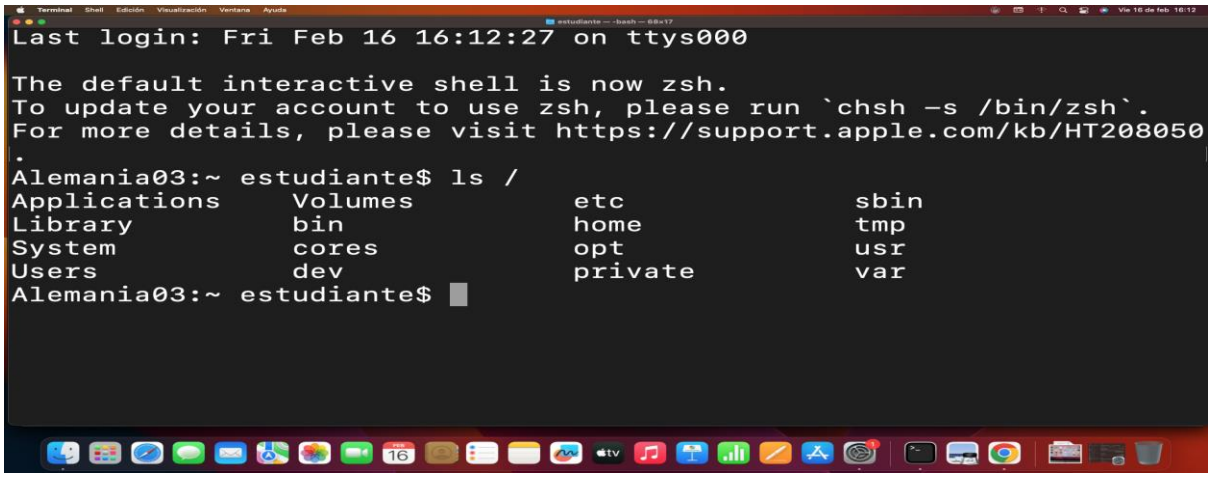
d) **Figura 4: Comando (ls .)**



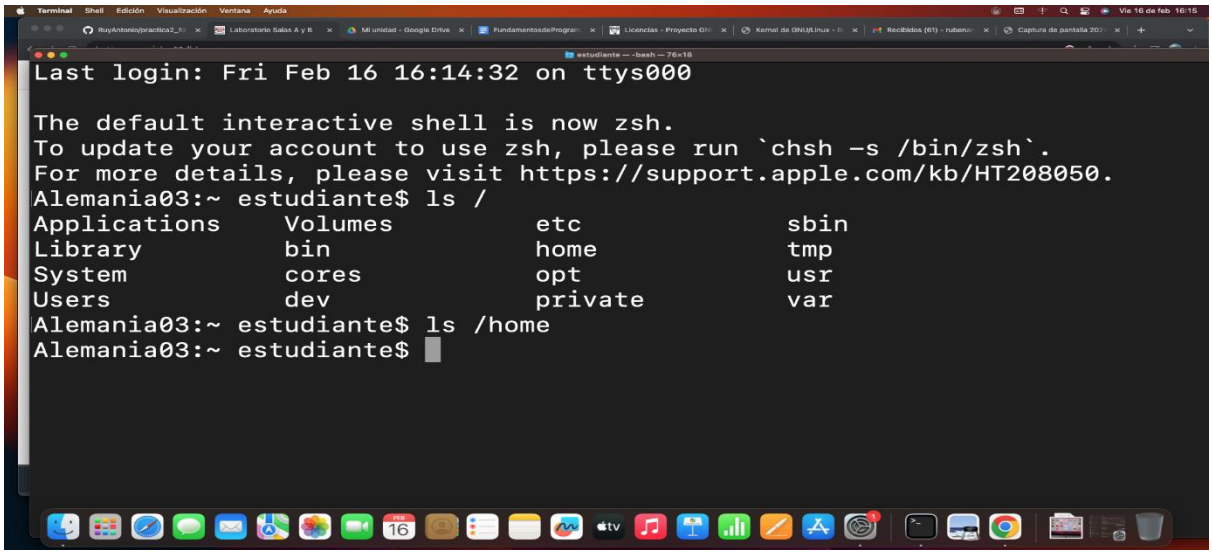
e) **Figura 5: Comando (ls -l)**

```
Last login: Fri Feb 16 16:27:48 on ttys000
estudiante@Andorra04 ~ % ls -l
total 0
drwxr-xr-x   2 estudiante  staff    64 Feb 16 11:35 9
drwx------+ 16 estudiante  staff   512 Feb 16 16:25 Desktop
drwx------+  3 estudiante  staff    96 Feb 16 09:02 Documents
drwx------+  4 estudiante  staff   128 Feb 16 11:08 Downloads
drwx------@ 76 estudiante  staff  2432 Feb 16 12:05 Library
drwx------   3 estudiante  staff    96 Feb 16 09:02 Movies
drwx------+  3 estudiante  staff    96 Feb 16 09:02 Music
drwx------+  4 estudiante  staff   128 Feb 16 12:04 Pictures
drwxr-xr-x+  4 estudiante  staff   128 Feb 16 09:02 Public
drwxr-xr-x   4 estudiante  staff   128 Feb 16 11:38 grupo
drwxr-xr-x   3 estudiante  staff    96 Feb 16 12:13 isunza
drwxr-xr-x   2 estudiante  staff    64 Feb 16 11:57 lecturayestructurdedatoIsunz
as
estudiante@Andorra04 ~ %
```

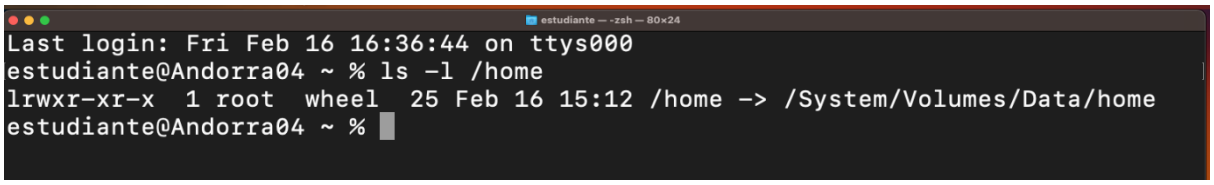
f) **Figura 6: Comando (ls /)**



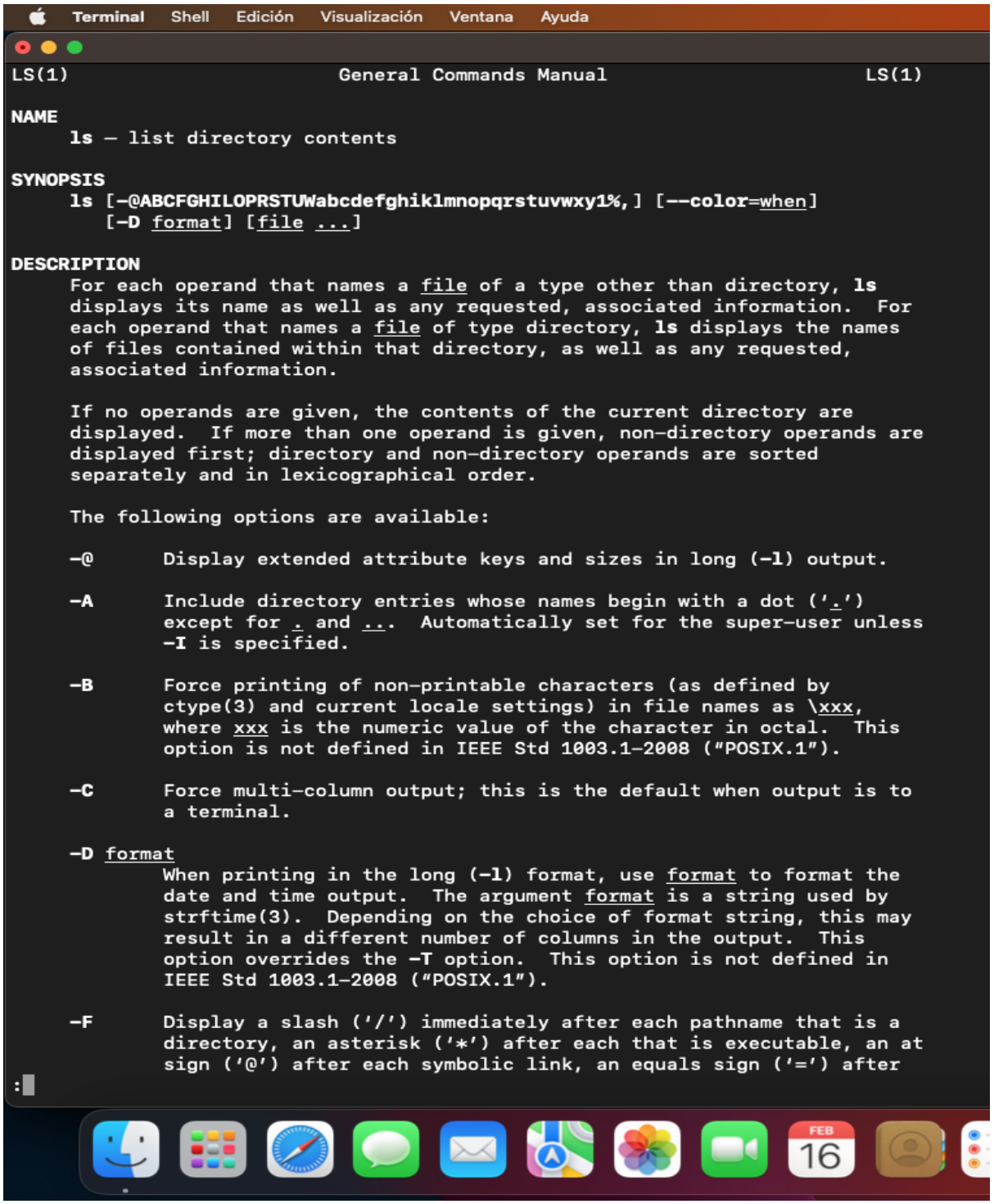
g) **Figura 7: Comando (ls /home)**

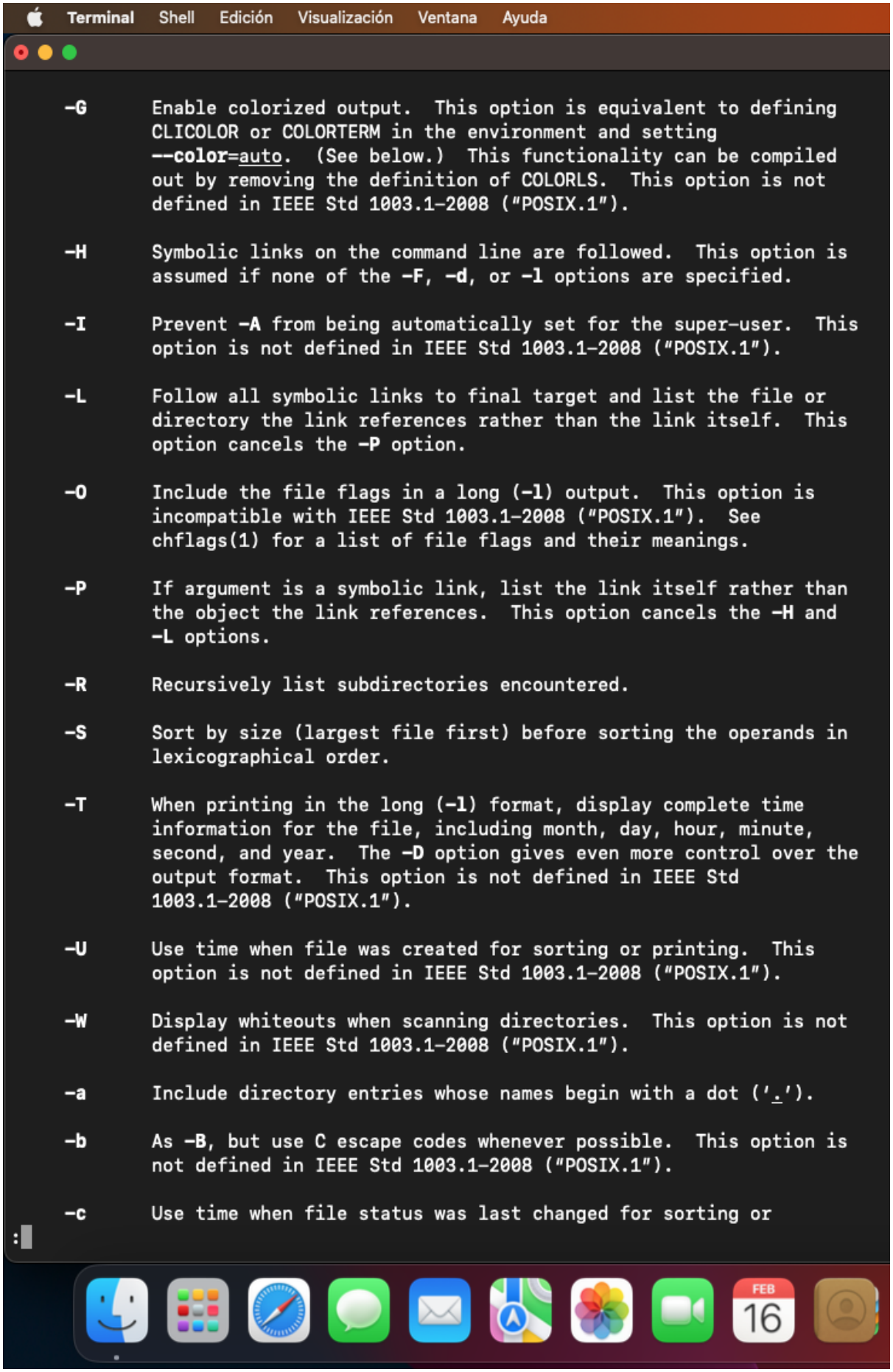


h) **Figura 8: Comando (ls -l /home)**



i) **Figura 9: Comando (man ls)**




Terminal Shell Edición Visualización Ventana Ayuda
-G Enable colorized output. This option is equivalent to defining CLICOLOR or COLORTERM in the environment and setting --color=auto. (See below.) This functionality can be compiled out by removing the definition of COLORLS. This option is not defined in IEEE Std 1003.1-2008 ("POSIX.1").
-H Symbolic links on the command line are followed. This option is assumed if none of the -F, -d, or -l options are specified.
-I Prevent -A from being automatically set for the super-user. This option is not defined in IEEE Std 1003.1-2008 ("POSIX.1").
-L Follow all symbolic links to final target and list the file or directory the link references rather than the link itself. This option cancels the -P option.
-O Include the file flags in a long (-l) output. This option is incompatible with IEEE Std 1003.1-2008 ("POSIX.1"). See chflags(1) for a list of file flags and their meanings.
-P If argument is a symbolic link, list the link itself rather than the object the link references. This option cancels the -H and -L options.
-R Recursively list subdirectories encountered.
-S Sort by size (largest file first) before sorting the operands in lexicographical order.
-T When printing in the long (-l) format, display complete time information for the file, including month, day, hour, minute, second, and year. The -D option gives even more control over the output format. This option is not defined in IEEE Std 1003.1-2008 ("POSIX.1").
-U Use time when file was created for sorting or printing. This option is not defined in IEEE Std 1003.1-2008 ("POSIX.1").
-W Display whiteouts when scanning directories. This option is not defined in IEEE Std 1003.1-2008 ("POSIX.1").
-a Include directory entries whose names begin with a dot ('.').
-b As -B, but use C escape codes whenever possible. This option is not defined in IEEE Std 1003.1-2008 ("POSIX.1").
-c Use time when file status was last changed for sorting or
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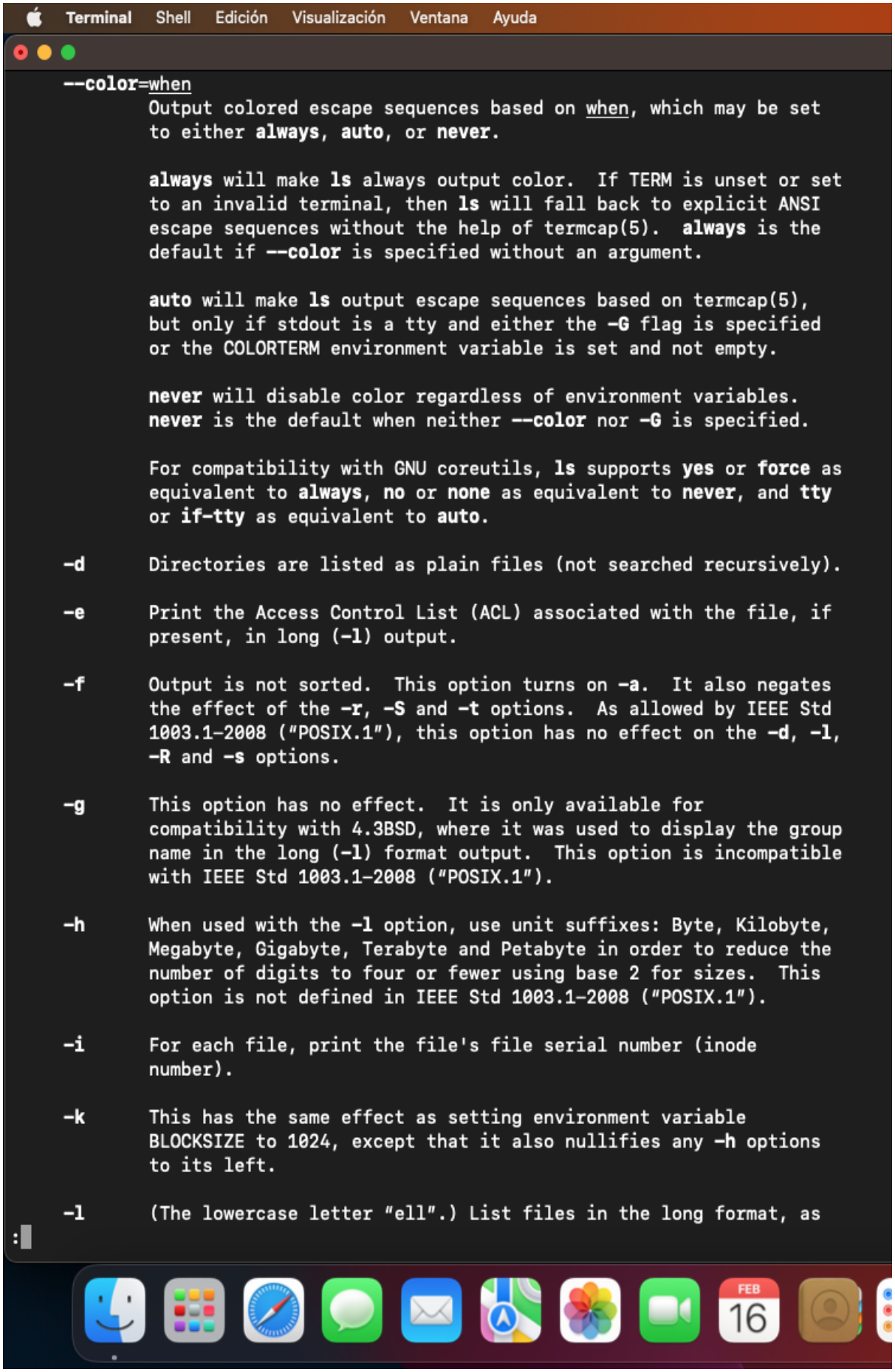
Terminal Shell Edición Visualización Ventana Ayuda
--color=when
Output colored escape sequences based on when, which may be set to either always, auto, or never.
always will make ls always output color. If TERM is unset or set to an invalid terminal, then ls will fall back to explicit ANSI escape sequences without the help of termcap(5). always is the default if --color is specified without an argument.
auto will make ls output escape sequences based on termcap(5), but only if stdout is a tty and either the -G flag is specified or the COLORTERM environment variable is set and not empty.
never will disable color regardless of environment variables. never is the default when neither --color nor -G is specified.
For compatibility with GNU coreutils, ls supports yes or force as equivalent to always, no or none as equivalent to never, and tty or if-tty as equivalent to auto.
-d Directories are listed as plain files (not searched recursively).
-e Print the Access Control List (ACL) associated with the file, if present, in long (-l) output.
-f Output is not sorted. This option turns on -a. It also negates the effect of the -r, -S and -t options. As allowed by IEEE Std 1003.1-2008 ("POSIX.1"), this option has no effect on the -d, -l, -R and -s options.
-g This option has no effect. It is only available for compatibility with 4.3BSD, where it was used to display the group name in the long (-l) format output. This option is incompatible with IEEE Std 1003.1-2008 ("POSIX.1").
-h When used with the -l option, use unit suffixes: Byte, Kilobyte, Megabyte, Gigabyte, Terabyte and Petabyte in order to reduce the number of digits to four or fewer using base 2 for sizes. This option is not defined in IEEE Std 1003.1-2008 ("POSIX.1").
-i For each file, print the file's file serial number (inode number).
-k This has the same effect as setting environment variable BLOCKSIZE to 1024, except that it also nullifies any -h options to its left.
-l (The lowercase letter "ell".) List files in the long format, as
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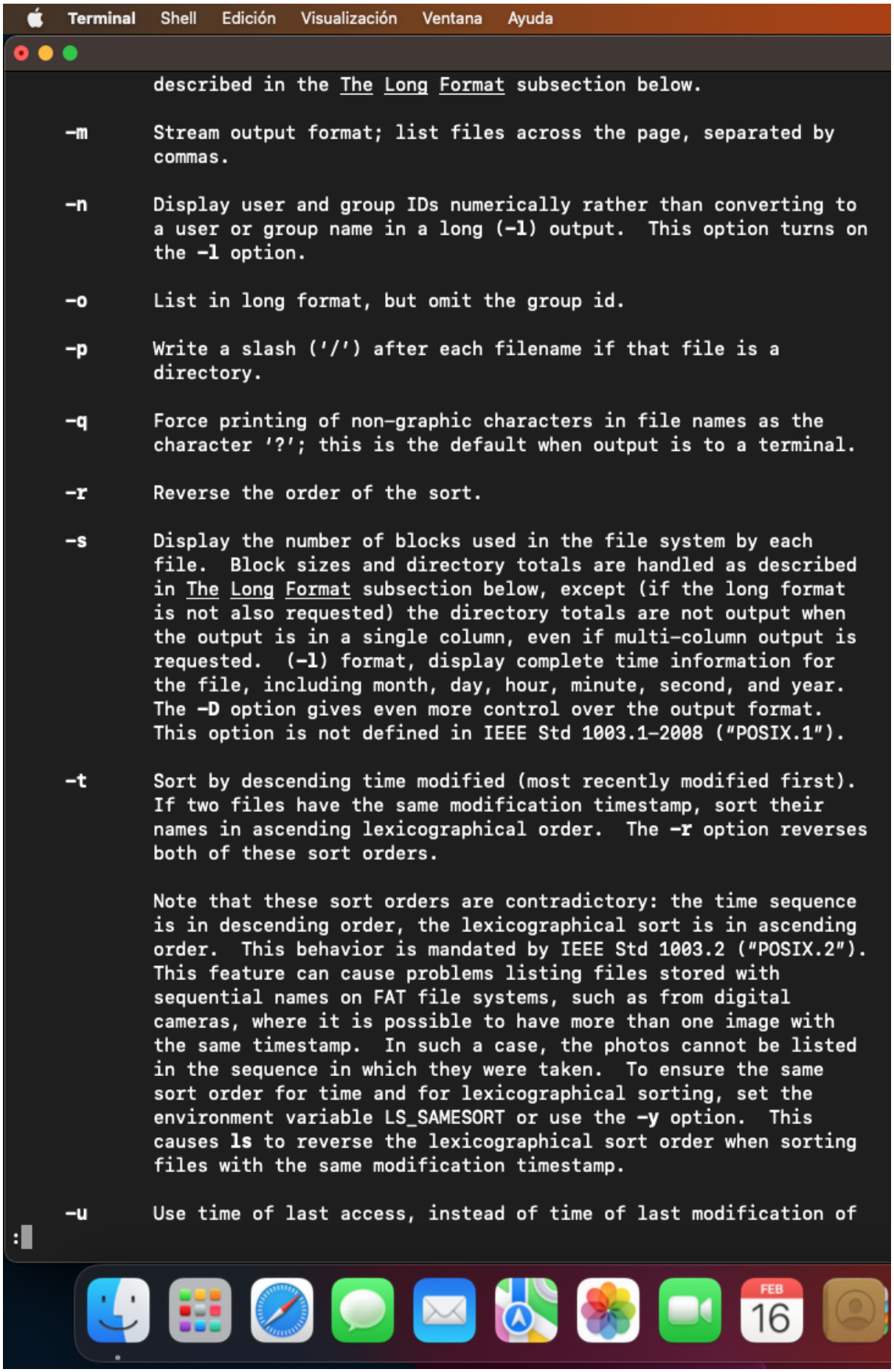
Terminal Shell Edición Visualización Ventana Ayuda
described in the The Long Format subsection below.
-m Stream output format; list files across the page, separated by commas.
-n Display user and group IDs numerically rather than converting to a user or group name in a long (-l) output. This option turns on the -l option.
-o List in long format, but omit the group id.
-p Write a slash ('/') after each filename if that file is a directory.
-q Force printing of non-graphic characters in file names as the character '?'; this is the default when output is to a terminal.
-r Reverse the order of the sort.
-s Display the number of blocks used in the file system by each file. Block sizes and directory totals are handled as described in The Long Format subsection below, except (if the long format is not also requested) the directory totals are not output when the output is in a single column, even if multi-column output is requested. (-l) format, display complete time information for the file, including month, day, hour, minute, second, and year. The -D option gives even more control over the output format. This option is not defined in IEEE Std 1003.1-2008 ("POSIX.1").
-t Sort by descending time modified (most recently modified first). If two files have the same modification timestamp, sort their names in ascending lexicographical order. The -r option reverses both of these sort orders.
Note that these sort orders are contradictory: the time sequence is in descending order, the lexicographical sort is in ascending order. This behavior is mandated by IEEE Std 1003.2 ("POSIX.2"). This feature can cause problems listing files stored with sequential names on FAT file systems, such as from digital cameras, where it is possible to have more than one image with the same timestamp. In such a case, the photos cannot be listed in the sequence in which they were taken. To ensure the same sort order for time and for lexicographical sorting, set the environment variable LS_SAMESORT or use the -y option. This causes ls to reverse the lexicographical sort order when sorting files with the same modification timestamp.
-u Use time of last access, instead of time of last modification of
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FEB
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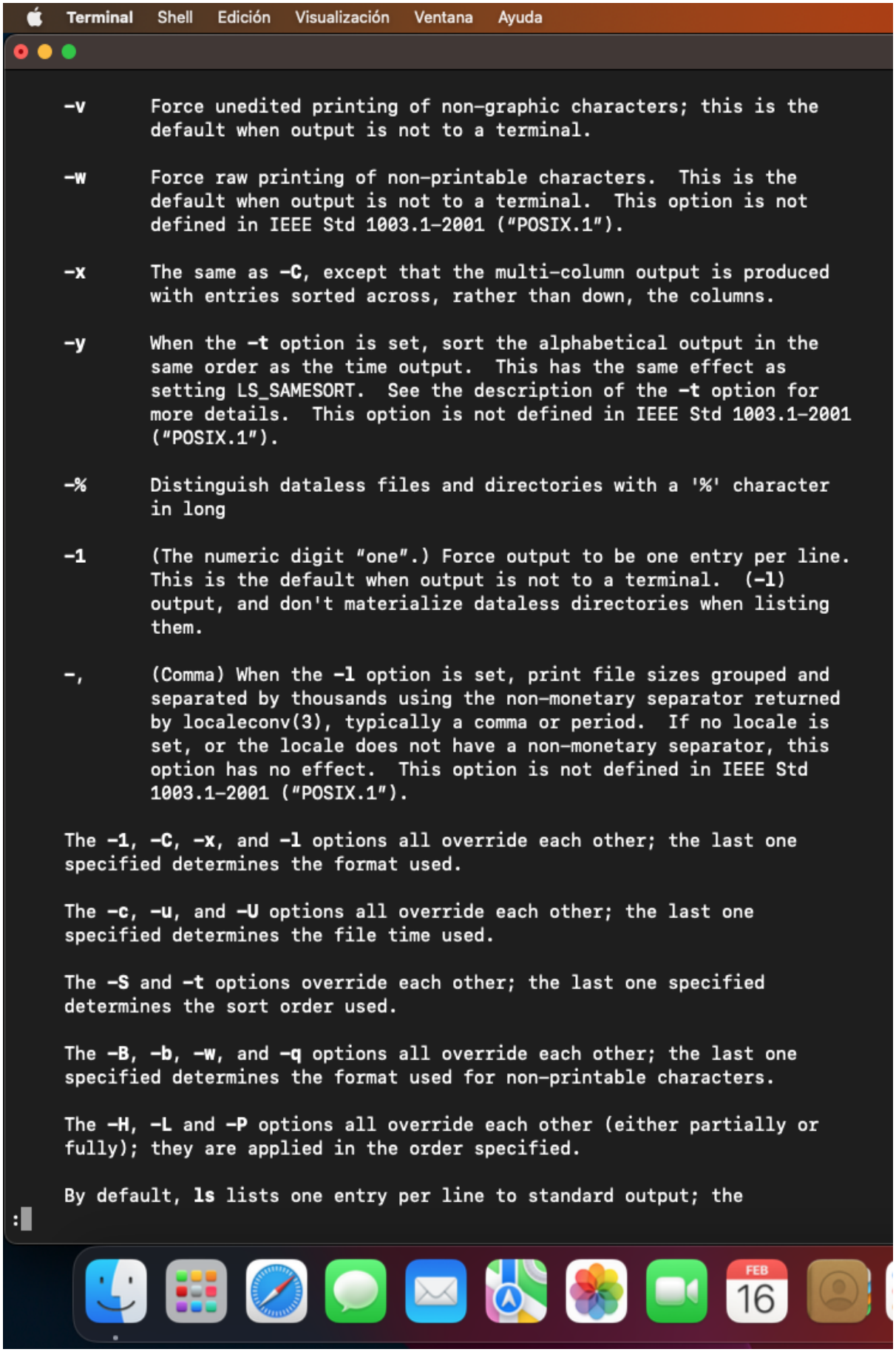
Terminal Shell Edición Visualización Ventana Ayuda
-v Force unedited printing of non-graphic characters; this is the default when output is not to a terminal.
-w Force raw printing of non-printable characters. This is the default when output is not to a terminal. This option is not defined in IEEE Std 1003.1-2001 ("POSIX.1").
-x The same as -C, except that the multi-column output is produced with entries sorted across, rather than down, the columns.
-y When the -t option is set, sort the alphabetical output in the same order as the time output. This has the same effect as setting LS_SAMESORT. See the description of the -t option for more details. This option is not defined in IEEE Std 1003.1-2001 ("POSIX.1").
-% Distinguish dataless files and directories with a '%' character in long
-1 (The numeric digit "one".) Force output to be one entry per line. This is the default when output is not to a terminal. (-l) output, and don't materialize dataless directories when listing them.
-, (Comma) When the -l option is set, print file sizes grouped and separated by thousands using the non-monetary separator returned by localeconv(3), typically a comma or period. If no locale is set, or the locale does not have a non-monetary separator, this option has no effect. This option is not defined in IEEE Std 1003.1-2001 ("POSIX.1").
The -1, -C, -x, and -l options all override each other; the last one specified determines the format used.
The -c, -u, and -U options all override each other; the last one specified determines the file time used.
The -S and -t options override each other; the last one specified determines the sort order used.
The -B, -b, -w, and -q options all override each other; the last one specified determines the format used for non-printable characters.
The -H, -L and -P options all override each other (either partially or fully); they are applied in the order specified.
By default, ls lists one entry per line to standard output; the
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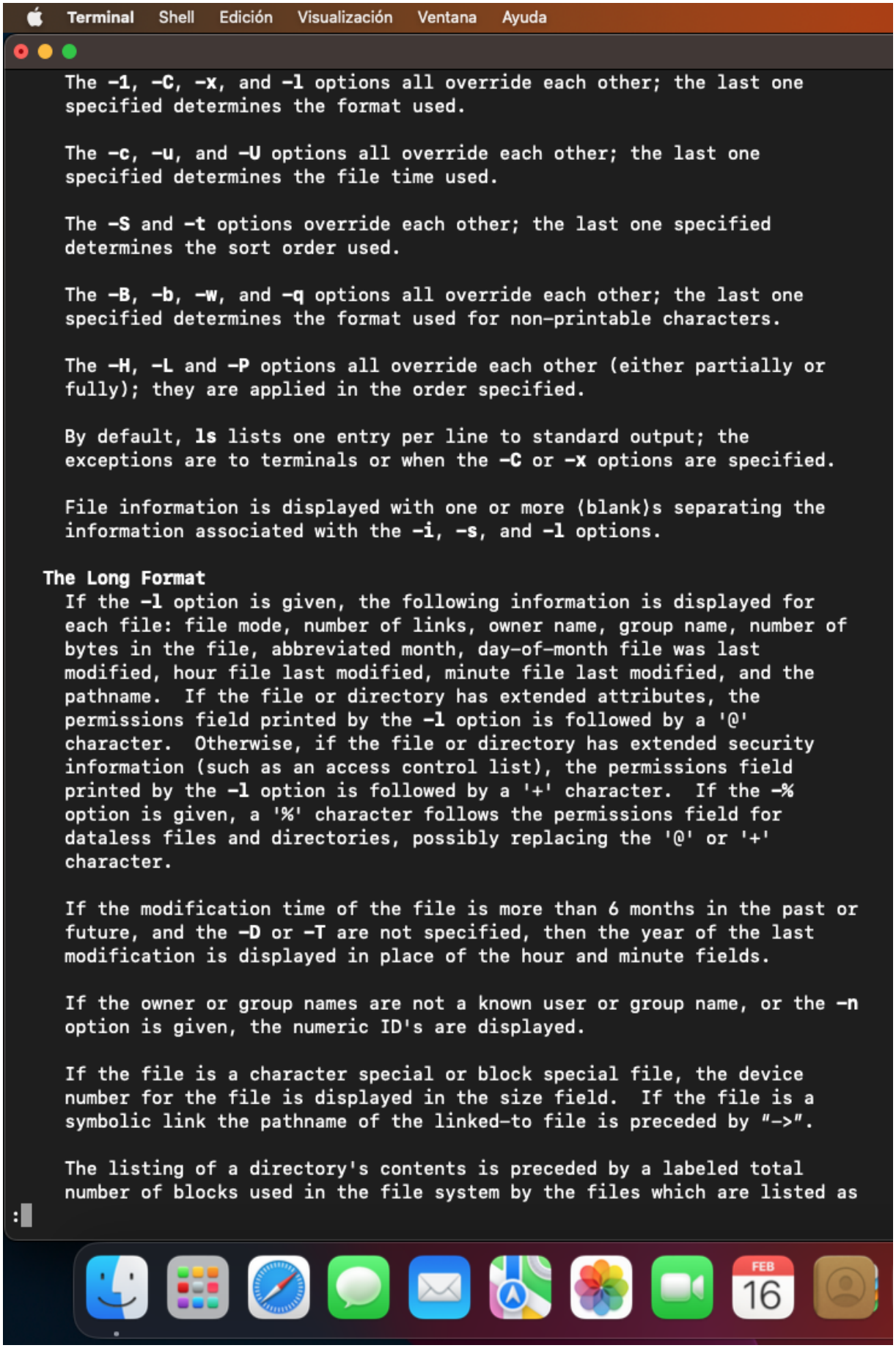
Terminal Shell Edición Visualización Ventana Ayuda
The -1, -C, -x, and -l options all override each other; the last one specified determines the format used.
The -c, -u, and -U options all override each other; the last one specified determines the file time used.
The -S and -t options override each other; the last one specified determines the sort order used.
The -B, -b, -w, and -q options all override each other; the last one specified determines the format used for non-printable characters.
The -H, -L and -P options all override each other (either partially or fully); they are applied in the order specified.
By default, ls lists one entry per line to standard output; the exceptions are to terminals or when the -C or -x options are specified.
File information is displayed with one or more (blank)s separating the information associated with the -i, -s, and -l options.
The Long Format
If the -l option is given, the following information is displayed for each file: file mode, number of links, owner name, group name, number of bytes in the file, abbreviated month, day-of-month file was last modified, hour file last modified, minute file last modified, and the pathname. If the file or directory has extended attributes, the permissions field printed by the -l option is followed by a '@' character. Otherwise, if the file or directory has extended security information (such as an access control list), the permissions field printed by the -l option is followed by a '+' character. If the -% option is given, a '%' character follows the permissions field for dataless files and directories, possibly replacing the '@' or '+' character.
If the modification time of the file is more than 6 months in the past or future, and the -D or -T are not specified, then the year of the last modification is displayed in place of the hour and minute fields.
If the owner or group names are not a known user or group name, or the -n option is given, the numeric ID's are displayed.
If the file is a character special or block special file, the device number for the file is displayed in the size field. If the file is a symbolic link the pathname of the linked-to file is preceded by "->".
The listing of a directory's contents is preceded by a labeled total number of blocks used in the file system by the files which are listed as
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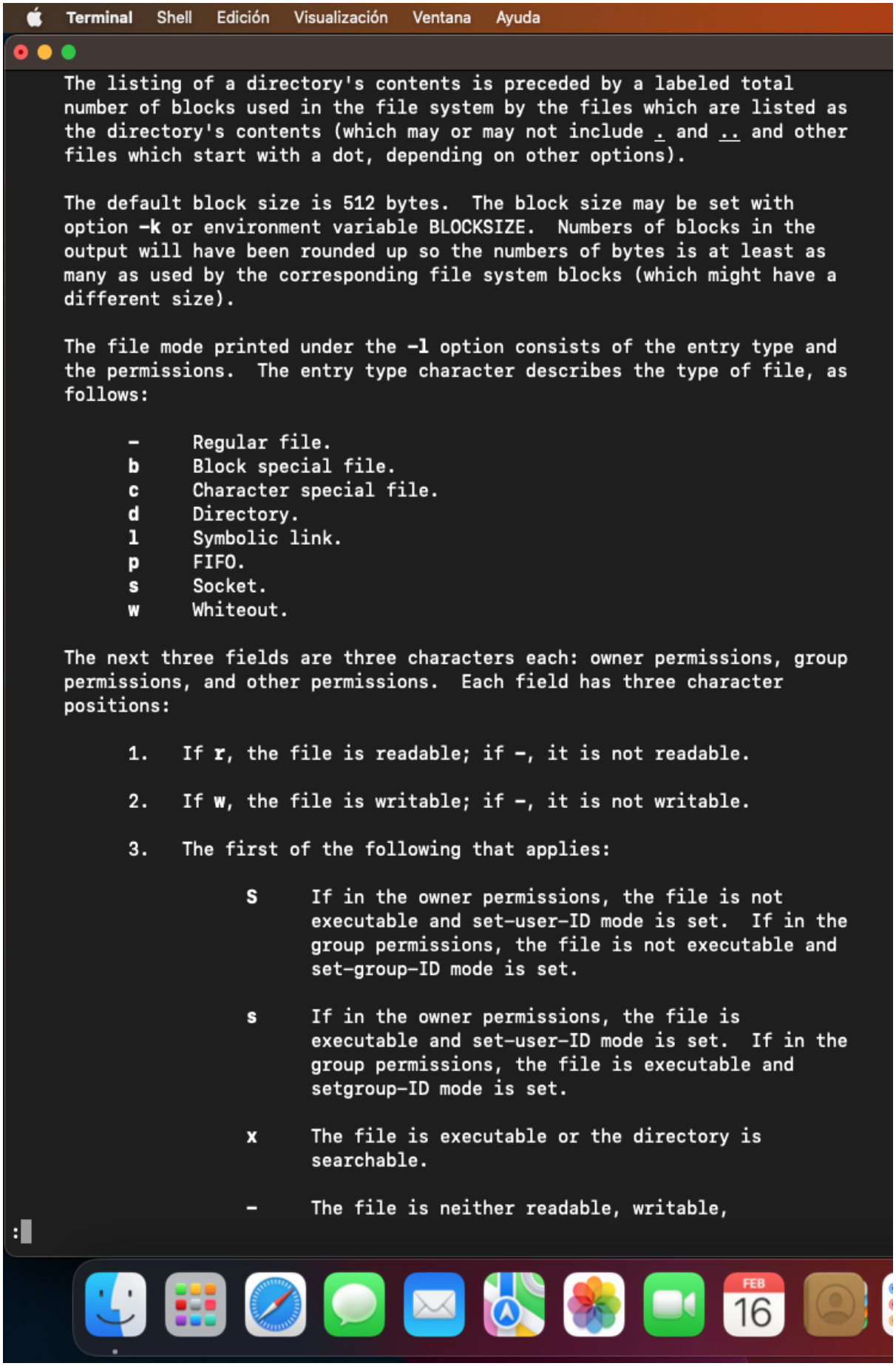
Terminal Shell Edición Visualización Ventana Ayuda
The listing of a directory's contents is preceded by a labeled total number of blocks used in the file system by the files which are listed as the directory's contents (which may or may not include . and .. and other files which start with a dot, depending on other options).
The default block size is 512 bytes. The block size may be set with option -k or environment variable BLOCKSIZE. Numbers of blocks in the output will have been rounded up so the numbers of bytes is at least as many as used by the corresponding file system blocks (which might have a different size).
The file mode printed under the -l option consists of the entry type and the permissions. The entry type character describes the type of file, as follows:
- Regular file.
b Block special file.
c Character special file.
d Directory.
l Symbolic link.
p FIFO.
s Socket.
w Whiteout.
The next three fields are three characters each: owner permissions, group permissions, and other permissions. Each field has three character positions:
1. If r, the file is readable; if -, it is not readable.
2. If w, the file is writable; if -, it is not writable.
3. The first of the following that applies:
S If in the owner permissions, the file is not executable and set-user-ID mode is set. If in the group permissions, the file is not executable and set-group-ID mode is set.
s If in the owner permissions, the file is executable and set-user-ID mode is set. If in the group permissions, the file is executable and setgroup-ID mode is set.
x The file is executable or the directory is searchable.
- The file is neither readable, writable,
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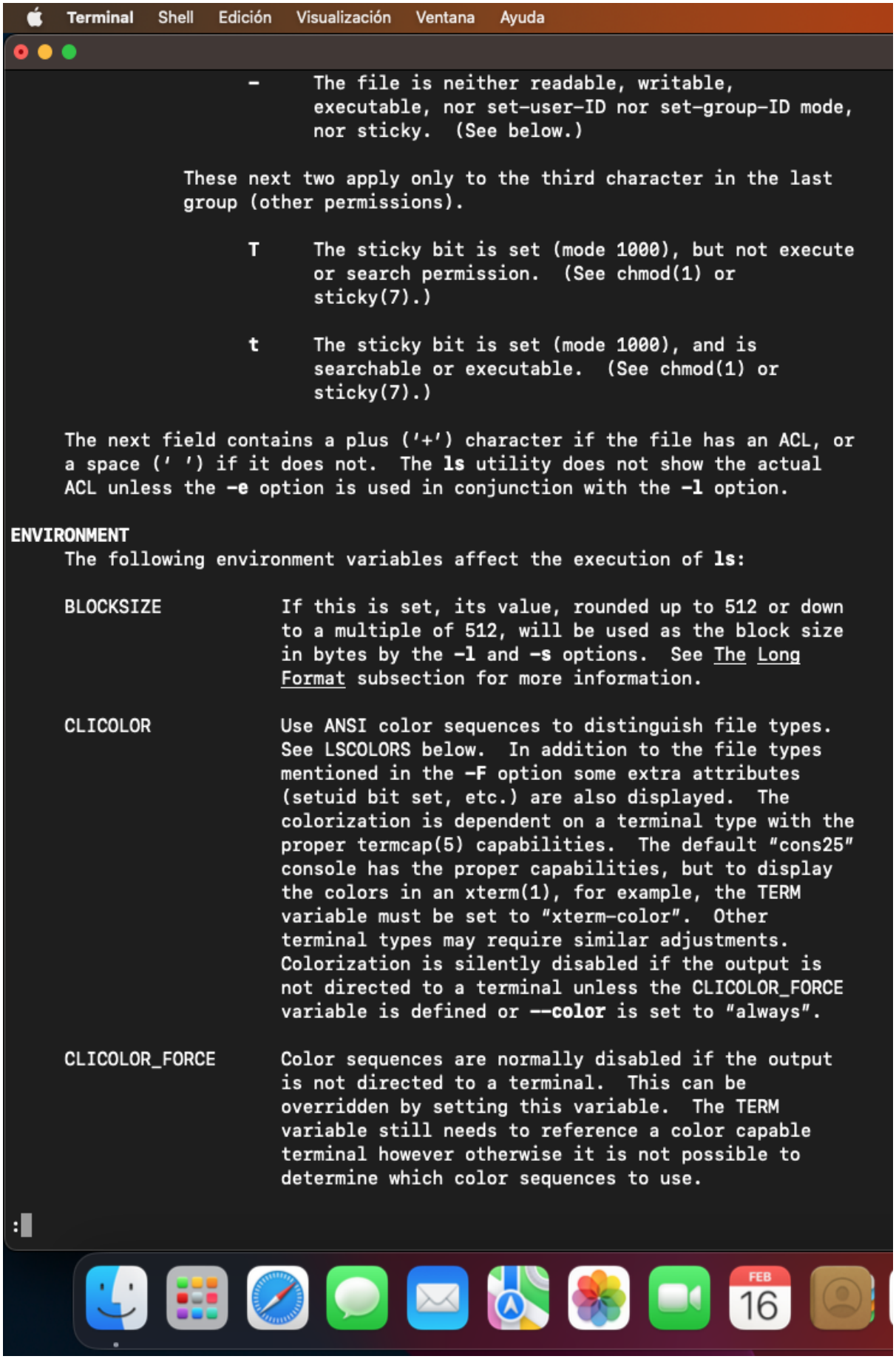
Terminal Shell Edición Visualización Ventana Ayuda
- The file is neither readable, writable, executable, nor set-user-ID nor set-group-ID mode, nor sticky. (See below.)
These next two apply only to the third character in the last group (other permissions).
T The sticky bit is set (mode 1000), but not execute or search permission. (See chmod(1) or sticky(7).)
t The sticky bit is set (mode 1000), and is searchable or executable. (See chmod(1) or sticky(7).)
The next field contains a plus ('+') character if the file has an ACL, or a space (' ') if it does not. The ls utility does not show the actual ACL unless the -e option is used in conjunction with the -l option.
ENVIRONMENT
The following environment variables affect the execution of ls:
BLOCKSIZE If this is set, its value, rounded up to 512 or down to a multiple of 512, will be used as the block size in bytes by the -l and -s options. See The Long Format subsection for more information.
CLICOLOR Use ANSI color sequences to distinguish file types. See LSCOLORS below. In addition to the file types mentioned in the -F option some extra attributes (setuid bit set, etc.) are also displayed. The colorization is dependent on a terminal type with the proper termcap(5) capabilities. The default "cons25" console has the proper capabilities, but to display the colors in an xterm(1), for example, the TERM variable must be set to "xterm-color". Other terminal types may require similar adjustments. Colorization is silently disabled if the output is not directed to a terminal unless the CLICOLOR_FORCE variable is defined or --color is set to "always".
CLICOLOR_FORCE Color sequences are normally disabled if the output is not directed to a terminal. This can be overridden by setting this variable. The TERM variable still needs to reference a color capable terminal however otherwise it is not possible to determine which color sequences to use.
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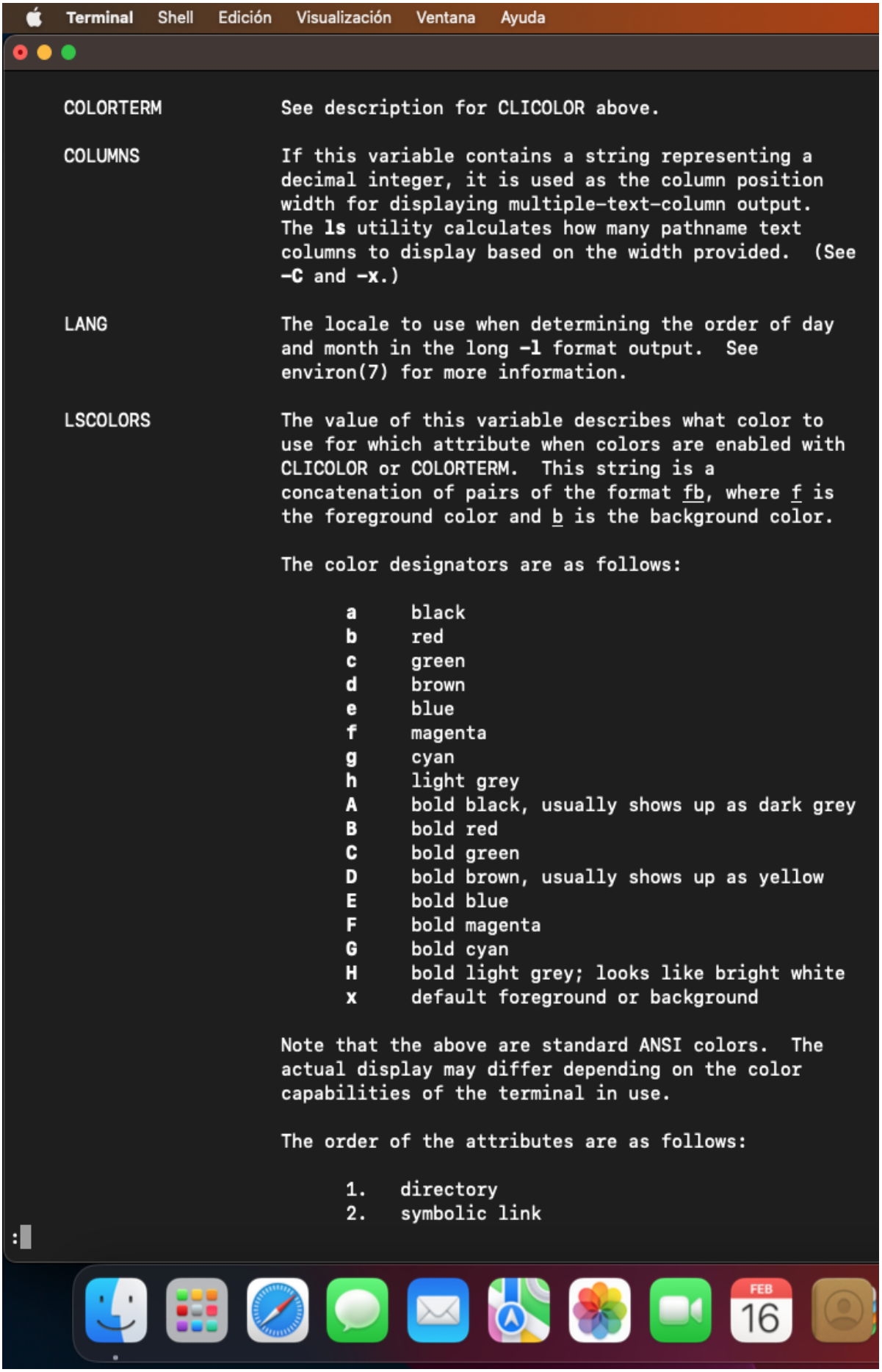
Terminal Shell Edición Visualización Ventana Ayuda
COLORTERM See description for CLICOLOR above.
COLUMNS If this variable contains a string representing a decimal integer, it is used as the column position width for displaying multiple-text-column output. The ls utility calculates how many pathname text columns to display based on the width provided. (See -C and -x.)
LANG The locale to use when determining the order of day and month in the long -l format output. See environ(7) for more information.
LSCOLORS The value of this variable describes what color to use for which attribute when colors are enabled with CLICOLOR or COLORTERM. This string is a concatenation of pairs of the format fb, where f is the foreground color and b is the background color.
The color designators are as follows:
a black
b red
c green
d brown
e blue
f magenta
g cyan
h light grey
A bold black, usually shows up as dark grey
B bold red
C bold green
D bold brown, usually shows up as yellow
E bold blue
F bold magenta
G bold cyan
H bold light grey; looks like bright white
x default foreground or background
Note that the above are standard ANSI colors. The actual display may differ depending on the color capabilities of the terminal in use.
The order of the attributes are as follows:
1. directory
2. symbolic link
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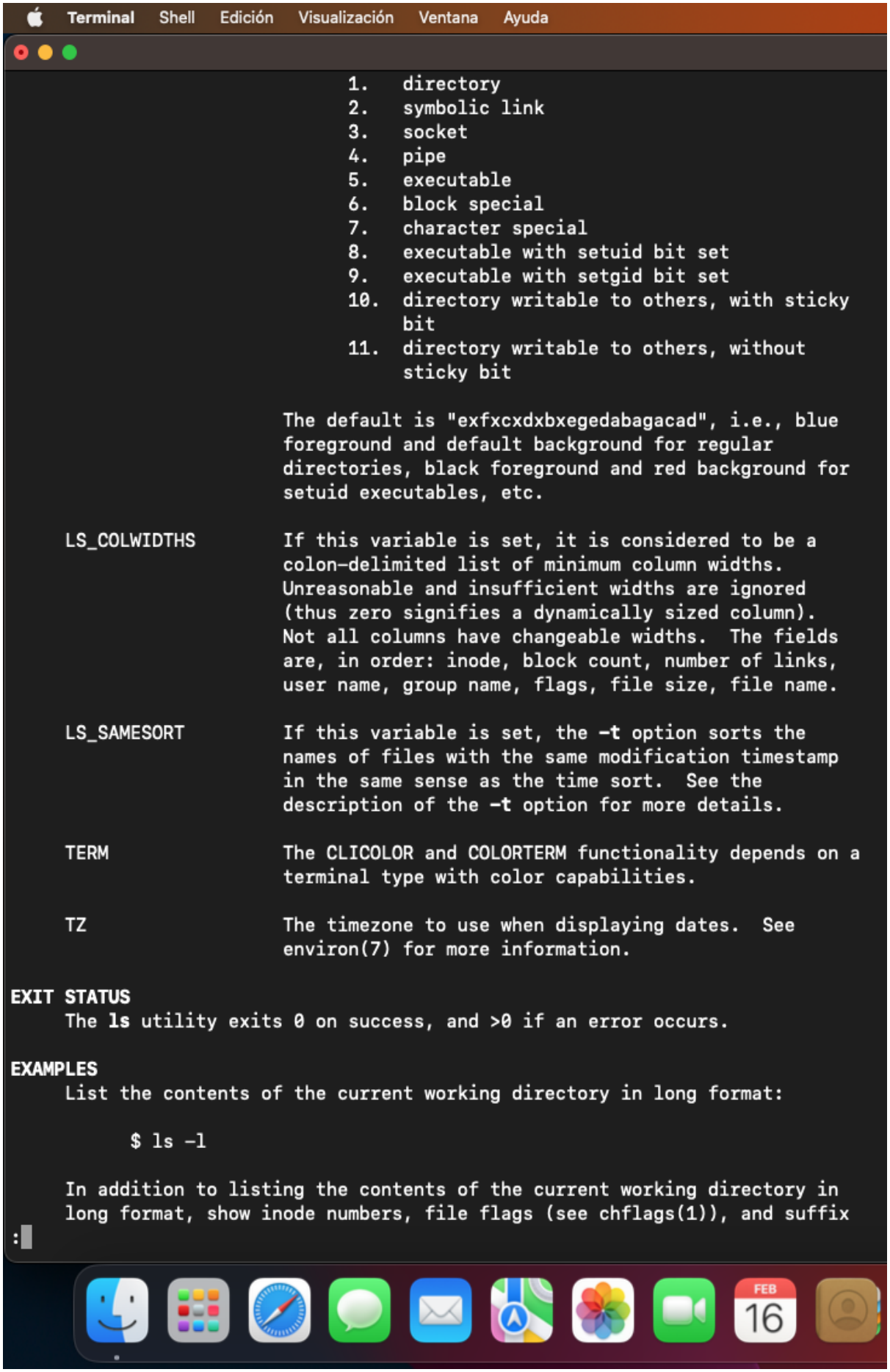
Terminal Shell Edición Visualización Ventana Ayuda
1. directory
2. symbolic link
3. socket
4. pipe
5. executable
6. block special
7. character special
8. executable with setuid bit set
9. executable with setgid bit set
10. directory writable to others, with sticky bit
11. directory writable to others, without sticky bit
The default is "exfxcxdxbxegedabagacad", i.e., blue foreground and default background for regular directories, black foreground and red background for setuid executables, etc.
LS_COLWIDTHS
If this variable is set, it is considered to be a colon-delimited list of minimum column widths. Unreasonable and insufficient widths are ignored (thus zero signifies a dynamically sized column). Not all columns have changeable widths. The fields are, in order: inode, block count, number of links, user name, group name, flags, file size, file name.
LS_SAMESORT
If this variable is set, the -t option sorts the names of files with the same modification timestamp in the same sense as the time sort. See the description of the -t option for more details.
TERM
The CLICOLOR and COLORTERM functionality depends on a terminal type with color capabilities.
TZ
The timezone to use when displaying dates. See environ(7) for more information.
EXIT STATUS
The ls utility exits 0 on success, and >0 if an error occurs.
EXAMPLES
List the contents of the current working directory in long format:
$ ls -l
In addition to listing the contents of the current working directory in long format, show inode numbers, file flags (see chflags(1)), and suffix
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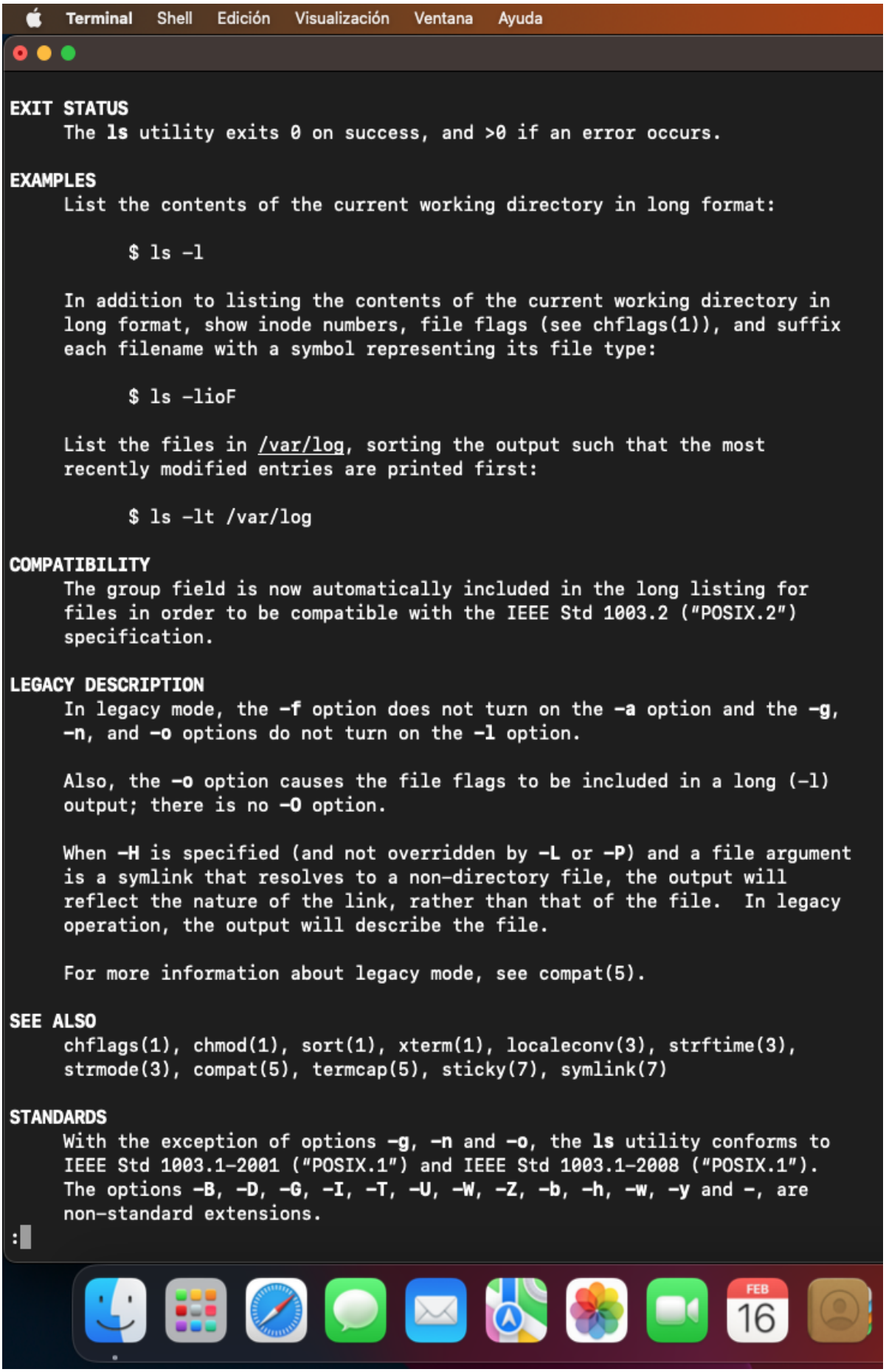
Terminal Shell Edición Visualización Ventana Ayuda
EXIT STATUS
The ls utility exits 0 on success, and >0 if an error occurs.
EXAMPLES
List the contents of the current working directory in long format:
$ ls -l
In addition to listing the contents of the current working directory in long format, show inode numbers, file flags (see chflags(1)), and suffix each filename with a symbol representing its file type:
$ ls -lioF
List the files in /var/log, sorting the output such that the most recently modified entries are printed first:
$ ls -lt /var/log
COMPATIBILITY
The group field is now automatically included in the long listing for files in order to be compatible with the IEEE Std 1003.2 ("POSIX.2") specification.
LEGACY DESCRIPTION
In legacy mode, the -f option does not turn on the -a option and the -g, -n, and -o options do not turn on the -l option.
Also, the -o option causes the file flags to be included in a long (-l) output; there is no -O option.
When -H is specified (and not overridden by -L or -P) and a file argument is a symlink that resolves to a non-directory file, the output will reflect the nature of the link, rather than that of the file. In legacy operation, the output will describe the file.
For more information about legacy mode, see compat(5).
SEE ALSO
chflags(1), chmod(1), sort(1), xterm(1), localeconv(3), strftime(3), strmode(3), compat(5), termcap(5), sticky(7), symlink(7)
STANDARDS
With the exception of options -g, -n and -o, the ls utility conforms to IEEE Std 1003.1-2001 ("POSIX.1") and IEEE Std 1003.1-2008 ("POSIX.1"). The options -B, -D, -G, -I, -T, -U, -W, -Z, -b, -h, -w, -y and -, are non-standard extensions.
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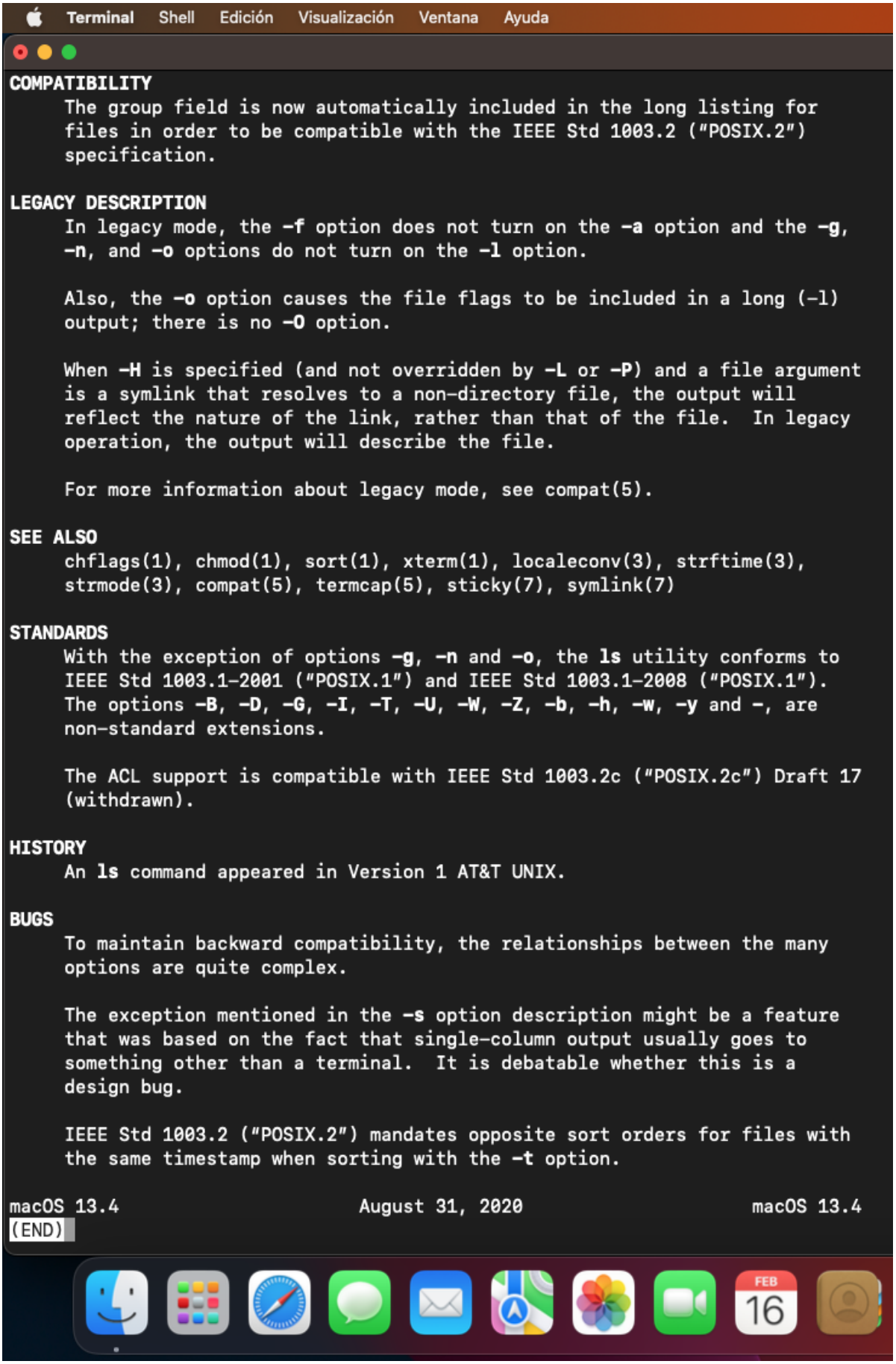
Terminal Shell Edición Visualización Ventana Ayuda
COMPATIBILITY
The group field is now automatically included in the long listing for files in order to be compatible with the IEEE Std 1003.2 ("POSIX.2") specification.
LEGACY DESCRIPTION
In legacy mode, the -f option does not turn on the -a option and the -g, -n, and -o options do not turn on the -l option.
Also, the -o option causes the file flags to be included in a long (-l) output; there is no -O option.
When -H is specified (and not overridden by -L or -P) and a file argument is a symlink that resolves to a non-directory file, the output will reflect the nature of the link, rather than that of the file. In legacy operation, the output will describe the file.
For more information about legacy mode, see compat(5).
SEE ALSO
chflags(1), chmod(1), sort(1), xterm(1), localeconv(3), strftime(3), strmode(3), compat(5), termcap(5), sticky(7), symlink(7)
STANDARDS
With the exception of options -g, -n and -o, the ls utility conforms to IEEE Std 1003.1-2001 ("POSIX.1") and IEEE Std 1003.1-2008 ("POSIX.1"). The options -B, -D, -G, -I, -T, -U, -W, -Z, -b, -h, -w, -y and -, are non-standard extensions.
The ACL support is compatible with IEEE Std 1003.2c ("POSIX.2c") Draft 17 (withdrawn).
HISTORY
An ls command appeared in Version 1 AT&T UNIX.
BUGS
To maintain backward compatibility, the relationships between the many options are quite complex.
The exception mentioned in the -s option description might be a feature that was based on the fact that single-column output usually goes to something other than a terminal. It is debatable whether this is a design bug.
IEEE Std 1003.2 ("POSIX.2") mandates opposite sort orders for files with the same timestamp when sorting with the -t option.
macOS 13.4 August 31, 2020 macOS 13.4
(END)
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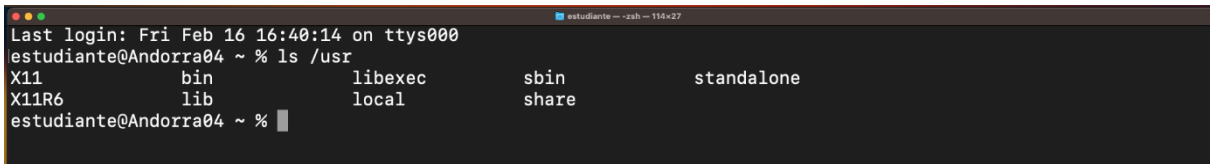
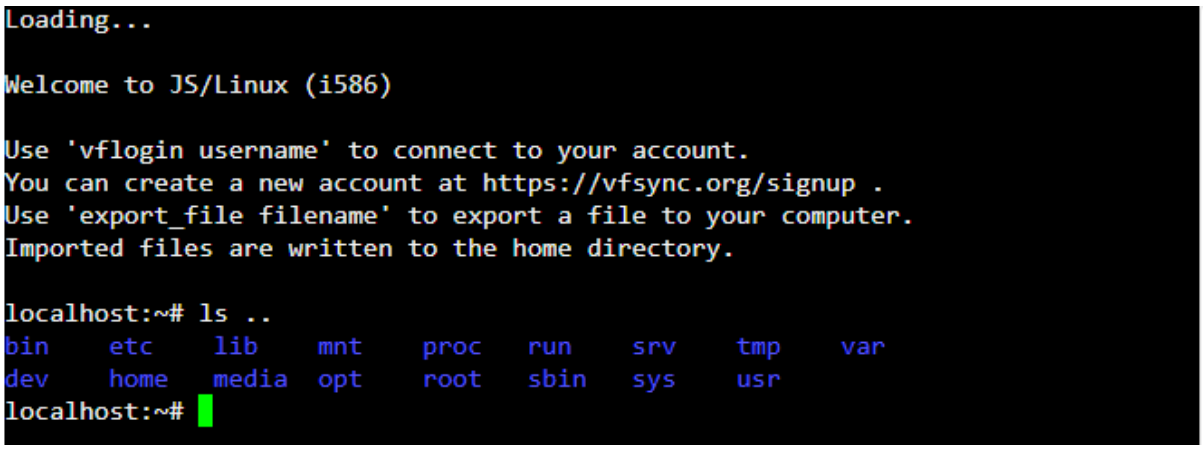
16

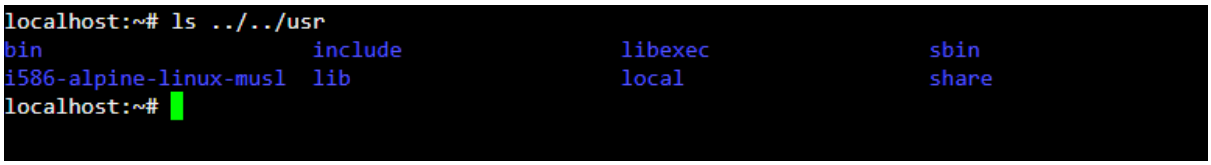
j) **Figura 9: Comando (ls /usr)**



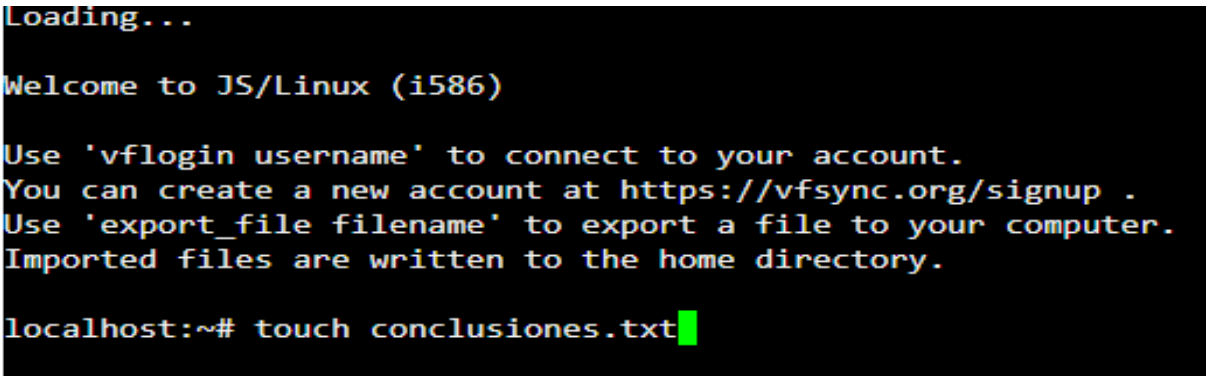
k) **Figura 10: Comando (ls ..)**

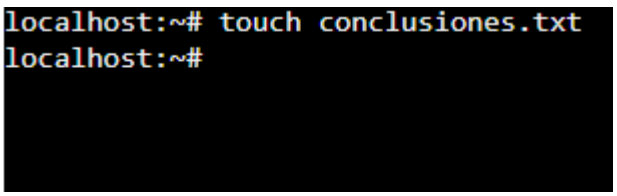


l) **Figura 11: Comando (ls ../../usr)**

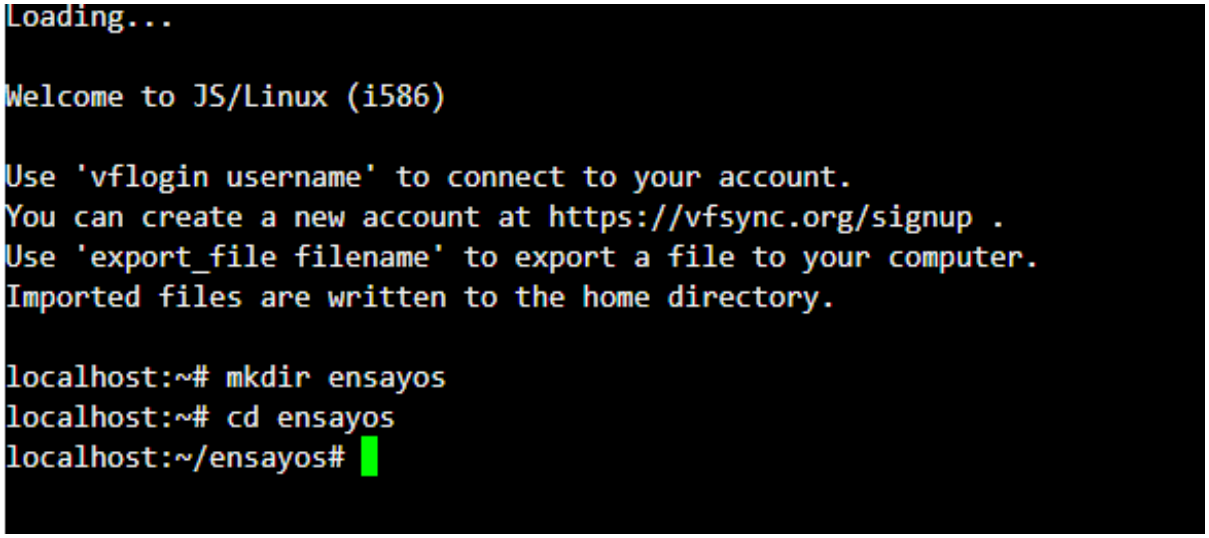


m) **Figura 12: Comando (touch)**

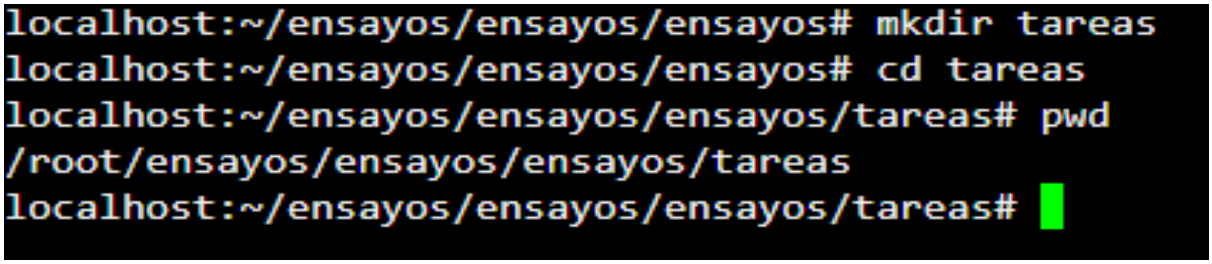




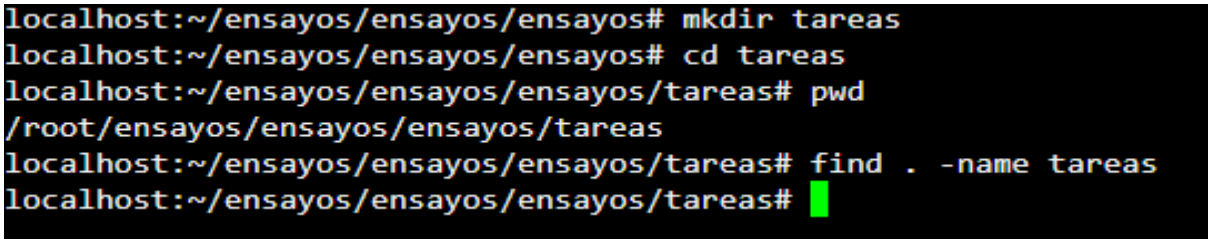
n) **Figura 13: Comando (mkdir y cd)**



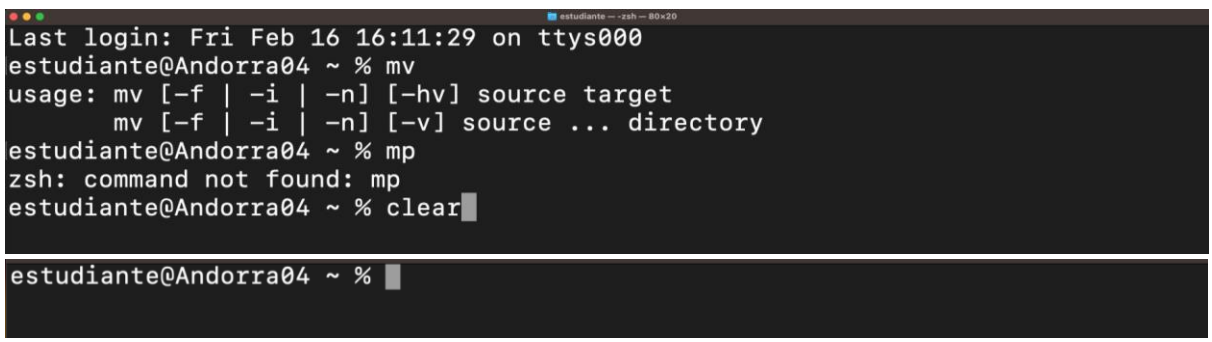
ñ) **Figura 14: Comando (pwd)**



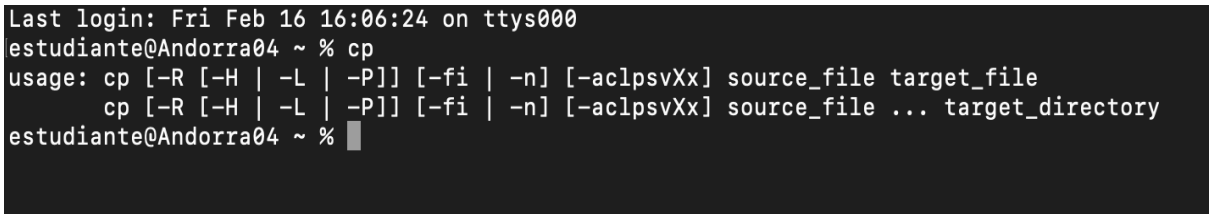
o) **Figura 15: Comando (find)**



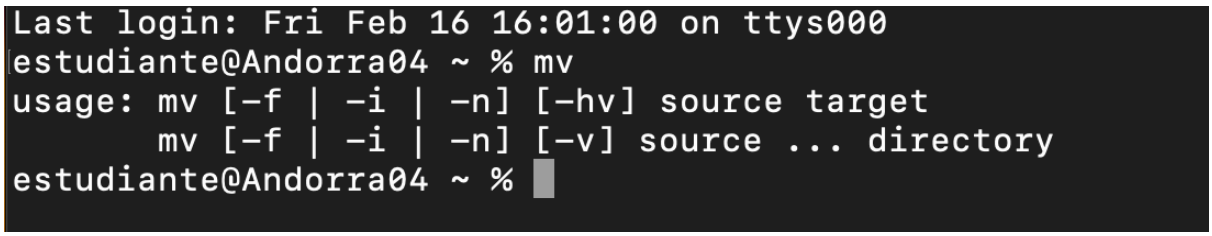
p) **Figura 16: Comando (clear)**



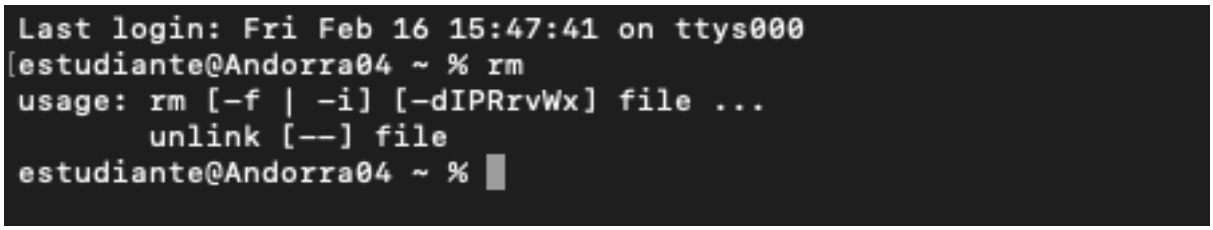
q) **Figura 17: Comando (cp)**



r) **Figura 18: Comando (mv)**



s) **Figura 19: Comando (rm)**



4) **Conclusiones (Individuales):**

- **García Sánchez Alejandro:** La realización de esta práctica brindó distintos conocimientos, desde que es una terminal, la definición del sistema operativo Linux, en qué consiste, características como que es un sistema libre, hasta el uso de distintos comandos para la realización determinada de tareas. Si bien conocemos Windows y Mac OS como sistemas operativos más comunes y a los que más recurre la gente, no está mal adentrarse y escudriñar este sistema que además está hecho para que todas las personas puedan acceder a él. El optar por otros sistemas de operación, ya sea para móvil o cómputo, nos dará nuevas experiencias y sobre todo alternativas a explorar.

- **López Castro Anastasia:** Al realizar esta práctica, pide aprender un sistema operativo diferente, el cual no había tenido la oportunidad de

utilizar. Sin embargo, puedo decir que en realidad el poco acercamiento que tuvimos con este, es bastante sencillo de manipular y de entender ya que, tanto en la práctica como el profesor, dieron una explicación bastante simple de cómo poder hacer uso de estos comandos incluyendo ejemplos en el mismo.

- **Ramírez Rivas Gael:** En esta práctica se realizaron actividades orientadas a aprender y emplear los comandos básicos para manejar y controlar archivos en el sistema operativo Linux. Con estas actividades realizamos funciones como crear carpetas y mover archivos para almacenarlos en estas. El desarrollo de las actividades presentó pequeños contratiempos sin embargo se pudieron superar cumpliendo el objetivo planteado al inicio de la práctica.

- **Ruíz Hernández Rubén Antonio:** Aprendí a emular la interfaz del sistema operativo (Linux) ocupando las herramientas básicas o comandos que solemos ocupar en una computadora o laptop de escritorio como mkdir, para crear carpetas/directorios utilizados para almacenar documentos; mv, con el que puedes renombrar archivos o moverlos de lugar siendo que en esta ocasión se utilizaron para lo moverlos; entre otros más, del mismo modo gracias a esta práctica comprendí mejor la funcionalidad de este sistema operativo en una computadora Mac como una parte esencial de un sistema de cómputo con el fin de explorar y utilizar sus comandos básicos.

5) Retroalimentación (Equipo):

Durante el desarrollo de esta práctica se emplearon computadoras Mac para el desarrollo de las actividades, las cuales consistieron en conocer y aprender algunos comandos básicos del sistema operativo Linux con el fin de manejar archivos, incluyendo funciones como copiar, pegar, crear carpetas entre otros facilitando el control de archivos siendo una herramienta útil para el máximo aprovechamiento de un dispositivo. Independientemente, se presentaron algunas dificultades especialmente en el uso y reconocimiento inicial de los

comandos, de igual manera, el manejo de la terminal empleada desde cómo subir los archivos, hasta el no saber qué tan específicos tendríamos que ser, en cambio, se pudieron superar dejándonos un aprendizaje útil y eficaz.

6) **Fuentes en APA:**

- **Laboratorio Salas A y B. (s.f.).** ***Manual de Prácticas de la Asignatura Fundamentos de Programación (Guía práctica de estudio 02: GNU/Linux, pág. 29 - 41).*** **Recuperado el 16 de Febrero del 2024, de Laboratorio de Computación Salas A y B: http://lcp02.fi-b.unam.mx/**

- **RuyAntonio. (s.f.).** ***GitHub - RuyAntonio/practica2_fdp: Práctica 02: GNU/Linux,*** **de GitHub. Recuperado el 16 de Febrero del 2024, de GitHub: https://github.com/RuyAntonio/practica2_fdp**