

uniq: Removes Duplicate Lines from a File

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- The uniq (unique) utility displays a file, skipping adjacent duplicate lines, but does not change the original file.

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diff: Compares Two Files

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- The diff (difference) utility compares two files and displays a list of the differences between them.
- The diff -u command breaks long, multiline text into hunks.
- The two files being compared are differentiated by a **plus and minus sign**.

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```
$ diff -u colors.1 colors.2
--- colors.1    2009-07-29 16:41:11.000000000 -0700
+++ colors.2    2009-07-29 16:41:17.000000000 -0700
@@ -1,6 +1,5 @@
red
+blue
green
yellow
-pink
-purple
orange
```

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• Creating directories

- There's not much to creating a new directory

in Linux, just use the **mkdir** command:

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• The basic command for removing a directory
is **rmdir**:

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ORANE LABS**ORANE LABS****ORANE LABS**• By default, the **rmdir** command only works for

• rmdir: dir1: Directory not empty

• rmdir: dir1: Directory not empty

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Who will then come to rescue ORANE LABS ORANE LABS ORANE LABS

- Our friend the rm command can also help us out some when handling directories.

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- The ultimate solution removing an entire directory, contents and all, is the rm command with both the -r and -f parameters:

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– \$ rm -rf dir2

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Viewing file statistics ORANE LABS ORANE LABS ORANE LABS

- The stat command provides a complete rundown of the status of a file on the file system:

SIIC II \$ stat test10 File: "test10"

Size: 6 Blocks: 8 Regular File com

Device: 306h/774d Inode: 1954891 Links: 2

Access: (0644/-rw-r--r--)Uid: (501/ rich) Gid: (501/ rich)

Access: Sat Sep 1 12:10:25 2007

Modify: Sat Sep 1 12:11:17 2007

Change: Sat Sep 1 12:16:42 2007

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Viewing the file type

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- The file command is a handy little utility to have around. It has the ability to peek inside of a file and determine just what kind of file it is:

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– \$ file test1

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– test1: ASCII text

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Viewing the whole file

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- The cat command is a handy tool for displaying all of the data inside a text file:

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\$ cat test1

SIIC hello

www. This is a test file.

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That we'll use to test the cat command.

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The -n parameter numbers all of the lines for us

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Viewing parts of a file

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- **The tail command**

- The tail command displays the last group of lines in a file. By default, it'll show the last 10 lines in the file.

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- **The head command**

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- While not as exotic as the tail command, the head command does what you'd expect, it displays the first group of lines at the start of a file.

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Introduction to grep

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- The name "grep" stands for "**global regular expression print**".

- This means that grep can be used to see if the input it receives matches a specified pattern.

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Basic Usage

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- Let's try an example. We will use grep to search for every line that contains the word "GNU" in the GNU General Public License version 3

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– cd /lib/firmware
– grep "GNU" GPL-3

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grep: Searches for a String

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- The grep utility searches through one or more files to see whether any contain a specified string of characters. This utility does not change the file it searches but simply displays each line that contains the string.

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\$ cat memo

Helen:

In our meeting on June 6 we discussed the issue of credit. Have you had any further thoughts about it?

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Max

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\$ grep 'credit' memo

discussed the issue of credit.

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Using Regular Expressions with grep

- *The main function for grep* is to look for strings matching a regular expression and print only the lines found.

– For example, here's how to list the lines in the file ch04 that contain either run-time or run time

```
$ grep "run[- ]time" ch04
This procedure avoids run-time errors for not-assigned
and a run-time error message is produced.
run-time error message is produced.
program aborts and a run-time error message is produced. UR
DIMENSION statement in BASIC is executable at run time.
This means that arrays can be redimensioned at run time. :om
accessible or not open, the program aborts and a run-time
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```

Anchor Matches

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- Anchors are special characters that specify where in the line a match must occur to be valid.

• To look for a string at the beginning of a line we use the `^` anchor.

- This string example will only match "GNU" if it occurs at the very beginning of a line.

– grep "`^GNU`" GPL-3

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• Similarly, the "\$" anchor can be used after a string to indicate that the match will only be valid if it occurs at the very end of a line.

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— grep "and\$" GPL-3

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Matching Any Character

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• The period character (.) is used in regular expressions to mean that any single character can exist at the specified location.

— For example:

— grep ".cept" GPL-3

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- By placing a group of characters within brackets ("[" and "]"), we can specify that the character at that position can be any one character found within the bracket group.

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- if we want to find every line that begins with a capital letter, we can use the following pattern:
 - grep "^[A-Z]" GPL-3

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Repeat Pattern Zero or More Times

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- Finally, one of the most commonly used meta-characters is the "*", which means "repeat the previous character or expression zero or more times".

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Example
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- If we wanted to find each line that contained an opening and closing parenthesis, with only letters and single spaces in between, we could use the following expression:

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Escaping Meta-Characters

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- Sometimes, it becomes necessary to match meta characters in your string.

In that case we need to escape the meta characters using a back slash (\).

- For instance:

– grep "^[A-Z].*\\$\." GPL-3

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Extended Regular Expressions

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- grep can be used with an even more extensive regular expression language by using the "-E" flag or by calling the "egrep" command instead of grep.

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- grep -E "(grouping)" file.txt

- egrep "(grouping)" file.txt

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- To indicate alternation, we use the pipe

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- The following will find either "GPL" or

"General Public License" in the text:

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- grep -E "(GPL|General Public License)" GPL-3

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**Grouping
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**Alternation
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- Another use might be to look for a specific HTML tag in a file. The following command will list top-level (<H1> or <h1>) and second-level (<H2> or <h2>) headings that have the starting tag at the beginning (^) of the line.

```
$ grep "^[Hh][12]>" ch0[12].html
ch01.html:<h1>Introduction</h1>
ch01.html:<h1>Windows, Screens, and Images</h1>
ch01.html:<h2>The Standard Screen-stdscr</h2>
ch01.html:<h2>Adding Characters</h2>
ch02.html:<H1>Introduction</H1>
ch02.html:<H1>What Is Terminal Independence?</H1>
ch02.html:<H2>Termcap</H2>
ch02.html:<H2>Terminfo</H2>
```

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```
$ grep "^[Hh][12]>" ch0[12].html
ch01.html:<h1>Introduction</h1>
ch01.html:<h1>Windows, Screens, and Images</h1>
ch01.html:<h2>The Standard Screen-stdscr</h2>
ch01.html:<h2>Adding Characters</h2>
ch02.html:<H1>Introduction</H1>
ch02.html:<H1>What Is Terminal Independence?</H1>
ch02.html:<H2>Termcap</H2>
ch02.html:<H2>Terminfo</H2>
```

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- If you want to reverse the search (output lines that don't match the pattern) use the **-v** parameter:

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```
— $ grep -v t file1
```

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```
— one
```

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```
— four
```

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```
— five
```

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```
— $
```

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- If you need to find the line numbers where the matching patterns are found, use the **-n** parameter:

- \$ grep -n t file1
 - 2:two
 - 3:three

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- If you just need to see a count of how many lines contain the matching pattern, use the **-c** parameter:

- \$ grep -c t file1
 - 2
 - \$

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Specifying other match parameters

- If you need to specify more than one matching pattern, use the -e parameter to specify each individual pattern:

- \$ grep -e t -e f file1
 - two
 - three

- four
 - five
 - \$

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Search for the given string in a single file

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• Syntax:

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— grep "literal_string" filename

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• Example

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— grep "this" demo

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Checking for the given string in multiple files.

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— grep "string" FILE_PATTERN

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SIIC \$ grep "this" demo_*

demo_file:this line is the 1st lower case line in this file.

WW demo_file:Two lines above this line is empty.

demo_file:And this is the last line.

demo_file1:this line is the 1st lower case line in this file.

OI demo_file1:Two lines above this line is empty.

demo_file1:And this is the last line.

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Checking for full words, not for sub-

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\$ grep -iw "is" demo_file

SIIC THIS LINE IS THE 1ST UPPER CASE LINE IN THIS FILE. PUR

this line is the 1st lower case line in this file.

WW Two lines above this line is empty.

And this is the last line.

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locate: Searches for a file

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/usr/share/app-install/icons/xmotd.xpm

/usr/share/app-install/desktop/motd-editor.desktop

/usr/share/app-install/desktop/xmotd.desktop

/usr/share/base-files/motd.md5sums

/usr/share/base-files/motd

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Searching for files with find

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Finding by Name

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- To find files by name, you can use the **-name** and **-iname** options.

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SIIC I # **find /etc -name passwd**
/etc/pam.d/passwd
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Finding files by size

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- The **-size** option enables you to search for files that are exactly, smaller than, or larger than a selected size.

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www.oranelabs.com \$ **find /usr/share/ -size +10M**
\$ **find /mostlybig -size -1M**

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Finding files by user

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- You can search for a particular owner (-user) or group (-group) when you try to find files.

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```
$ find /home -user chris -ls
131077 4 -rw-r--r-- 1 cnegus cnegus 379 Jun 29 2010 ./bashrc
SII # find /home -user chris -or -user joe -ls
WW 131077 4 -rw-r--r-- 1 cnegus cnegus 379 Jun 29 2010 ./bashrc
181022 4 -rw-r--r-- 1 joe joe 379 Jun 15 2010 ./bashrc
# find /etc -group ntp -ls
OR 131438 4 drwxrwsr-x 3 root ntp 4096 Mar 9 22:16 /etc/ntp
# find /var/spool -not -user root -ls
SII 262100 0 -rw-rw---- 1 rpc mail 0 Jan 27 2011 /var/spool/mail/rpc
278504 0 -rw-rw---- 1 joe mail 0 Apr 3 2011 /var/spool/mail/joe
```

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- Consider the following examples:

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SI 788884 28 -rwxr-xr-x 1 root root 28176 Mar 10 2011 /bin/echo

R

WW

m

\$ find /home/chris/ -perm -222 -type d -ls

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Changing permissions

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- The `chmod` command allows you to change the security settings for files and directories.

The format of the `chmod` command is:

- `chmod options mode file`

- The mode parameter allows you to set the security settings using either octal or symbolic mode.

`$ chmod 760 newfile`

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Linux File Permission Codes

Permissions	Binary	Octal	Description
---	000	0	No permissions
--x	001	1	Execute-only permission
-w-	010	2	Write-only permission
-wx	011	3	Write and execute permissions
r--	100	4	Read-only permission
r-x	101	5	Read and execute permissions
rw-	110	6	Read and write permissions
rwx	111	7	Read, write, and execute permissions

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- Instead of using the normal string of three sets of three characters, the chmod command takes a different approach.
- The format for specifying a permission in symbolic mode is:
 - [ugo...][[+][-][rwxXstugo...]]
- The first group of characters defines to whom the new permissions apply:
 - u for the user
 - g for the group
 - o for others (everyone else)
 - a for all of the above
- Next, a symbol is used to indicate whether you want to add the permission to the existing permissions (+), subtract the permission from the existing permission (-).

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• The additional settings are:

- u to set the permissions to the owner's permissions
- g to set the permissions to the group's permissions
- o to set the permissions to the other's permissions

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others)

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meanings when they are used with
directories.

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\$ who am i

zach pts/7 Aug 21 10:02

\$ ls -ld /home/max/info

drwx-----x 2 max pubs 512 Aug 21 09:31 /home/max/info

\$ ls -l /home/max/info

ls: /home/max/info: Permission denied

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The d at the left end of the line that ls displays indicates that
/home/max/info is a directory.

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Permission can set using the following sequence

\$ chmod o+r /home/max/info

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An Example - Fred and Joe Want to Share Files

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- There may be times that you want to copy a file from someone else's directory. How can you access that directory and copy the file?

The following scenario describes the process.

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— Suppose that user 'joe' wants to copy the file

'prog.f' from user 'fred.' At the Unix prompt, Fred

should type

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• chmod go+x ~

• cp ~fred/prog.f prog.f

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ACLs: Access Control Lists

- Access Control Lists (ACLs) provide finer-grained control over which users can access specific directories and files.
- An ACL comprises a set of rules. A rule specifies how a specific user or group can access the file that the ACL is associated with.

There are two kinds of rules:

- Access rules and
- default rules.

Working with Access Rules

- The **setfacl** utility modifies a file's ACL
- and **getfacl** displays a file's ACL.

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\$ ls -l report

SIIC -rw-r--r-- 1 max max 9537 Jan 12 23:17 report

```
www $ getfacl report
# file: report
# owner: max
# group: max
user::rw-
group::r--
other::r--
```

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\$ getfacl report

SIIC -rw-r--r-- 1 max max 9537 Jan 12 23:17 report

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\$ getfacl report

SIIC -rw-r--r-- 1 max max 9537 Jan 12 23:17 report

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- The **setfacl --modify** (or **-m**) option adds or modifies one or more rules in a file's ACL using the following format:

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- **setfacl --modify ugo:name:permissions file-list**

- where **ugo** can be either **u**, **g**, or **o** to indicate that the command sets file permissions for a user, a group, or all other users, respectively;

- **name** is the name of the user or group that permissions are being set for;
- **permissions** is the permissions in either symbolic or absolute format;
- **file-list** are file(s) whose ACL is being set.

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```
$ setfacl --modify u:sam:rw- report
```

or

```
$ setfacl --modify u:sam:6 report
$ getfacl report
# file: report
# owner: max
# group: max
user::rw-
user:sam:rw-
group::r--
mask::rw-
other::r--
```

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Removing Permissions

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- The **-x** option removes ACL rules for a user or a group.

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\$ getfacl --omit-header report
user::rw-
user:zach:rw-
group::r--
mask::rw-
other::r--

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Setting Default Rules for a Directory

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- The setfacl command uses the **-d** (default) option to add two default rules to the ACL for dir.

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```
$ ls -ld dir
drwx----- 2 max max 4096 Feb 12 23:15 dir
$ getfacl dir
# file: dir
# owner: max
# group: max
user::rwx
group::---
other::---

$ setfacl -d -m g:pubs:r-x,g:admin:rwx dir
```

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Simple Output with echo

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- The original echo command simply printed its arguments back to standard output.

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SIIC II
\$ echo Now is the time for all good men
Now is the time for all good men
\$ echo to come to the aid of their country.
to come to the aid of their country.

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Sort

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- The sort command is a powerful little utility that enables you to sort the output of a command or file in a specified order.

Option	Description	
-d	Sorts via dictionary order, ignoring non-alphanumerics or blanks.	5
-f	Ignores case when sorting.	R
-g	Sorts by numerical value.	m
-M	Sorts by month (i.e., January before December).	
-r	Provides the results in reverse order.	5
-m	Merges sorted files.	
-u	Sorts, considering unique values only.	R

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