

# Linux and Unix In command

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## About In

In creates links between files.

## Description

In creates a [link](#) to file *TARGET* with the name *LINKNAME*. If *LINKNAME* is omitted, a link to *TARGET* is created in the current [directory](#), using the name of *TARGET* as the *LINKNAME*.

In creates [hard links](#) by default, or [symbolic links](#) if the **-s** (**--symbolic**) option is specified. When creating hard links, each *TARGET* must exist.

## What Is A Link?

Before we discuss the In command, let's first discuss the [link](#) command, as well as what a link is and how it relates to files as we know them.

A *link* is an entry in your [file system](#) which connects a filename to the actual [bytes](#) of [data](#) on the [disk](#). More than one filename can "link" to the same data. Here's an example. Let's create a file named **file1.txt**:

```
echo "This is a file." >
file1.txt
```

This command [echoes](#) the [string](#) "This is a file". Normally this would simply echo to our terminal, but the > operator [redirects](#) the string's text to a file, in this case **file1.txt**. We can check that it worked by using [cat](#) to display the contents of the file:

```
cat          This is a
file1.txt    file.
```

When this file was created, the operating system wrote the bytes to a location on the disk and also *linked* that data to a filename, **file1.txt** so that we can refer to the file in commands and [arguments](#). If you rename the file, the contents of the file are not altered; only the information that *points* to it. *The filename and the file's data are two separate entities.*

Here's an illustration of the filename and the data to help you visualize it:

## Using The link Command

What the **link** command does is allow us to manually create a link to file data that already exists. So, let's use **link** to create our own link to the file data we just created. In essence, we'll create another file name for the data that already exists.

Let's call our new link **file2.txt**. How do we create it?

The general form of the **link** command is: "**link filename linkname**". Our first argument is the name of the file whose data we're linking to; the second argument is the name of the new link we're creating.

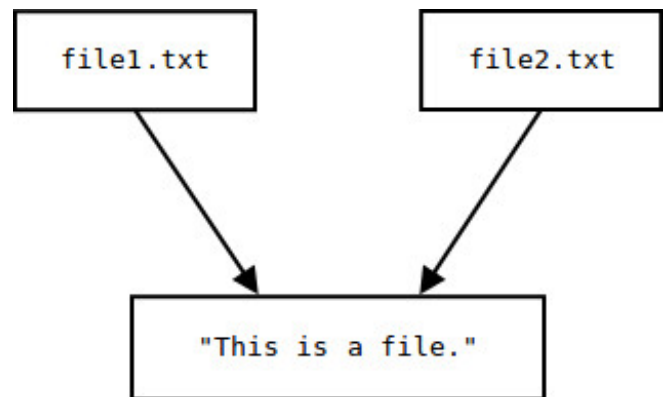
```
link file1.txt file2.txt
```

Now both **file1.txt** and **file2.txt** point to the same data on the disk:

```
cat          This is a      cat          This is a
file1.txt    file.          file2.txt    file.
```

The important thing to realize is that we did *not make a copy* of this data. Both filenames point to the same bytes of data on the disk. Here's an illustration to help you visualize it:

If we change the contents of the data pointed to by either one of these files, the other file's contents are changed as well. Let's append a line to one of them using the **>>** operator:



```
echo "It points to data on the disk." >>
file1.txt
```

Now let's look at the contents of **file1.txt**:

```
cat          This is a file.
file1.txt    It points to data on the
              disk.
```

... and now let's look at the second file, the one we created with the **link** command:

```
cat file1.txt    This is a file.
cat file2.txt    It points to data on the
                 disk.
```

Both files show the change because they share the same data on the disk. Changes to the data of either one of these files will change the contents of the other.

But what if we delete one of the files? Will both files be deleted?

No. If we delete one of the files, we're simply deleting one of the links to the data. Because we created another link manually, we still have a pointer to that data; we still have a way, at the user-level, to access the data we put in there. So if we use the **rm** command to remove our first file:

```
rm file1.txt
```

...it no longer exists as a file with that name:

```
cat file1.txt    cat: file1.txt: No such file or
                 directory
```

...but the link to the data we manually created still exists, and still points to the data:

```
cat file2.txt    This is a file.
cat file2.txt    It points to data on the
                 disk.
```

As you can see, the data stays on the disk even after the "file" (which is actually just a link to the data) is removed. We can still access that data as long as there is a link to it. This is important to know when you're removing files — "removing" a file just makes the data inaccessible by **unlink**-ing it. The data still exists on the storage media, somewhere, inaccessible to the system, and that space on disk is marked as being available for future use.

The type of link we've been working with here is sometimes called a "hard" link. A hard link and the data it links to must always exist on the same filesystem; you can't, for instance, create a hard link on one **partition** to file data stored on another partition. You also can't create a hard link to a directory. Only symbolic links may link to a directory; we'll get to that in a moment.

## The Difference Between In And link

So what about **ln**? That's why we're here, right?

**ln**, by default, creates a hard link just like **link** does. So this **ln** command:

```
ln file1.txt file2.txt
```

...is the same as the following **link** command:

```
link file1.txt file2.txt
```

...because both commands create a hard link named **file2.txt** which links to the data of **file1.txt**.

However, we can also use **ln** to create *symbolic links* with the **-s** option. So the command:

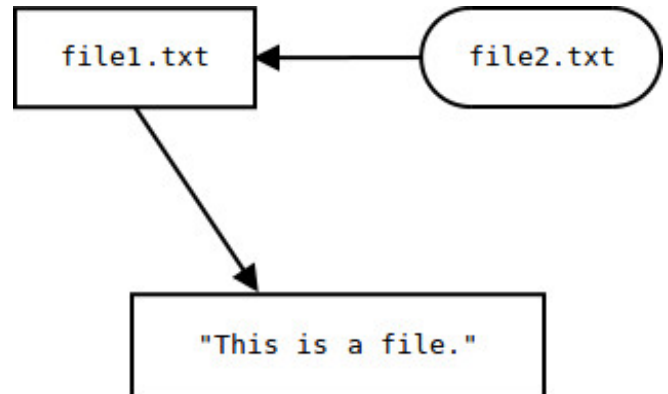
```
ln -s file1.txt  
file2.txt
```

Will create a symbolic link to **file1.txt** named **file2.txt**. In contrast to our hard link example, here's an illustration to help you visualize our symbolic link:

## About Symbolic Links

Symbolic links, sometimes called "soft" links, are different than "hard" links. Instead of linking to the data of a file, they *link to another link*. So in the example above, **file2.txt** points to the link **file1.txt**, which in turn points to the data of the file.

This has several potential benefits. For one thing, symbolic links (also called "symlinks" for short) can link to directories. Also, symbolic links can cross file system boundaries, so a symbolic link to data on one drive or partition can exist on another drive or partition.



You should also be aware that, unlike hard links, removing the file (or directory) that a symlink points to will break the link. So if we create **file1.txt**:

```
echo "This is a file." >  
file1.txt
```

...and create a symbolic link to it:

```
ln -s file1.txt  
file2.txt
```

...we can **cat** either one of these to see the contents:

```
cat          This is a      cat          This is a  
file1.txt    file.          file2.txt    file.
```

...but if we remove **file1.txt**:

```
rm file1.txt
```

...we can no longer access the data it contained with our symlink:

```
cat file2.txt cat: file2.txt: No such file or directory
```

This error message might be confusing at first, because **file2.txt** still exists in your directory. It's a broken symlink, however — a symbolic link which points to something that no longer exists. The operating system tries to follow the symlink to the file that's supposed to be there (**file1.txt**), but finds nothing, and so it returns the error message.

While hard links are an essential component of how the operating system works, symbolic links are generally more of a convenience. You can use them to refer, in any way you'd like, to information already on the disk somewhere else.

## Creating Symlinks To Directories

To create a symbolic link to a directory, simply specify the directory name as the target. For instance, let's say we have a directory named **documents**, which contains one file, named **file.txt**.

Let's create a symbolic link to **documents** named **dox**. This command will do the trick:

```
ln -s documents/ dox
```

We now have a symlink named **dox** which we can refer to *as if it is the directory **documents***. For instance, if we use **ls** to list the contents of the directory, and then to list the contents of the symlinked directory, they will both show the same file:

```
ls
ls documents file.txt dox file.txt
```

When we work in the directory **dox** now, we will actually be working in **documents**, but we will see the word **dox** instead of **documents** in all pathnames.

Symbolic links are a useful way to make shortcuts to long, complicated pathnames. For instance, this command:

```
ln -s documents/work/budgets/Engineering/2014/April aprbudge
```

...will save us a lot of typing; now, instead of **changing directory** with the following command:

```
cd documents/work/budgets/Engineering/2014/April
```

...we can do this, instead:

```
cd aprbudge
```

Normally, you remove directories (once they're empty) with the **rmdir** command. But our symbolic link is not actually

a directory: it's a file that points to a directory. So to remove our symlink, we just use the **rm** command:

```
rm  
aprbudge
```

This will remove the symlink, but the original directory and all its files are not affected.

## In syntax

```
ln [OPTION]... TARGET [...] [LINKNAME  
[...]]
```

## Options

Here are the options that can be passed to the **ln** command.

<b>--backup[=CONTROL]</b>	Use this option to additionally create a backup of each existing destination file. The style of backup is optionally defined by the value of <i>CONTROL</i> . <a href="#">See below</a> for more information.
<b>-b</b>	This functions like <b>--backup</b> , but you cannot specify the <i>CONTROL</i> ; the default style ( <b>simple</b> ) is used.
<b>-d, -F, --directory</b>	This option allows the <a href="#">superuser</a> to attempt to hard link directories (although it will probably fail due to system restrictions, even for the superuser).
<b>-f, --force</b>	If the destination file or files already exist, overwrite them.
<b>-i, --interactive</b>	Prompt the user before overwriting destination files.
<b>-L, --logical</b>	Dereference <i>TARGET</i> s that are symbolic links. In other words, if you are trying to create a link (or a symlink) to a symlink, link to what it links to, not to the symlink itself..
<b>-n, --no-dereference</b>	Treat <i>LINKNAME</i> as a normal file if it is a symbolic link to a directory.
<b>-P, --physical</b>	Make hard links directly to symbolic links, rather than dereferencing them.
<b>-r, --relative</b>	Create symbolic links relative to link location.
<b>-s, --symbolic</b>	Make symbolic links instead of hard links.
<b>-S, --suffix=SUFFIX</b>	Use the file suffix <i>SUFFIX</i> rather than the default suffix "~".
<b>-t, --target-directory=DIRECTORY</b>	Specify the <i>DIRECTORY</i> in which to create the links.
<b>-T, --no-target-directory</b>	Always treat <i>LINKNAME</i> as a normal file.
<b>-v, --verbose</b>	Operate <a href="#">verbosely</a> ; print the name of each linked file.
<b>--help</b>	Display a help message, and exit.
<b>--version</b>	Display version information, and exit.

## About The --backup Option

When using the **--backup** (or **-b**) option, the default file suffix for backups is '~'. You can change this, however, using the **--suffix** option or setting the **SIMPLE\_BACKUP\_SUFFIX** [environment variable](#).

The *CONTROL* argument to the **--backup** option specifies the version control method. Alternatively, it can be specified by setting the **VERSION\_CONTROL** environment variable. Here are the values to use for either one:

<b>none, off</b>	never make backups (even if <b>--backup</b> is given)
<b>numbered, t</b>	make numbered backups.
<b>existing, nil</b>	numbered if numbered backups exist, simple otherwise.
<b>simple, never</b>	always make simple backups.

If you use **-b** instead of **--backup**, the *CONTROL* method is always *simple*.

If you specify the **-s** option (which symlinks), **ln** ignores the **-L** and **-P** options. Otherwise (if you are making hard links), the last option specified controls behavior when a *TARGET* is a symbolic link. The default is to act as if **-P** was specified.

## In examples

```
ln public_html/myfile1.txt
```

Create a hard link to the file **public\_html/myfile1.txt** in the current directory.

```
ln -s  
public_html/myfile1.txt
```

Create a symbolic link to the file **public\_html/myfile1.txt** in the current directory.

```
ln -s public_html/  
webstuff
```

Create a symbolic link to the directory **public\_html** named **webstuff**.

```
ln -s -b file1.txt  
file2.txt
```

Creates a symbolic link to the file **file1.txt** named **file2.txt**. If **file2.txt** already exists, it is renamed to **file2.txt~** before the new **file2.txt** symlink is created.