

Filesystems

File Permissions

Every file (in Unix) has a collection of permission bits

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- for the owner

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- for the group

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- for the owner
- for the group
- for everybody else not included in the above

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And for each of

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Every file (in Unix) has a collection of permission bits

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And for each of

- read access

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Every file (in Unix) has a collection of permission bits

- for the owner
- for the group
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And for each of

- read access
- write access

Filesystems

File Permissions

Every file (in Unix) has a collection of permission bits

- for the owner
- for the group
- for everybody else not included in the above

And for each of

- read access
- write access
- execute access

Filesystems

File Permissions

Every file (in Unix) has a collection of permission bits

- for the owner
- for the group
- for everybody else not included in the above

And for each of

- read access
- write access
- execute access

And a couple of others

Filesystems

File Permissions

```
-rw-r--r-- 1 rjb comp 12 2008-02-01 14:39 hi
```

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```
-rw-r--r--  1  rjb  comp  12 2008-02-01 14:39  hi
```

permissions links user group size modify date filename

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```
-rw-r--r-- 1 rjb comp 12 2008-02-01 14:39 hi
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Three groups of three flags, with one extra at the start

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If the userid of the process matches the userid of the file, use the first set

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-rw-r--r-- 1 rjb comp 12 2008-02-01 14:39 hi
```

Three groups of three flags, with one extra at the start

If the userid of the process matches the userid of the file, use the first set

Else if the groupid of the process matches the groupid of the file, use the second set

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```
-rw-r--r-- 1 rjb comp 12 2008-02-01 14:39 hi
```

Three groups of three flags, with one extra at the start

If the userid of the process matches the userid of the file, use the first set

Else if the groupid of the process matches the groupid of the file, use the second set

Else use the third set

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File Permissions

```
-rw-r--r-- 1 rjb comp 12 2008-02-01 14:39 hi
```

- The `r` flag indicates permission to read
- The `w` flag indicates permission to write
- The `x` flag indicates permission to execute

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```
-rw-r--r-- 1 rjb comp 12 2008-02-01 14:39 hi
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- The `r` flag indicates permission to read
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A process running as user `rjb` can read and write this file

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-rw-r--r-- 1 rjb comp 12 2008-02-01 14:39 hi
```

- The `r` flag indicates permission to read
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- The `x` flag indicates permission to execute

A process running as user `rjb` can read and write this file

A process running as group `comp` can only read this file

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File Permissions

```
-rw-r--r-- 1 rjb comp 12 2008-02-01 14:39 hi
```

- The `r` flag indicates permission to read
- The `w` flag indicates permission to write
- The `x` flag indicates permission to execute

A process running as user `rjb` can read and write this file

A process running as group `comp` can only read this file

Other processes can only read this file

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```
-rwxr-x--- 1 rjb comp 24 2008-02-01 15:11 prog
```

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File Permissions

```
-rwxr-x--- 1 rjb comp 24 2008-02-01 15:11 prog
```

- User `rjb` can read, write and execute this

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```
-rwxr-x--- 1 rjb comp 24 2008-02-01 15:11 prog
```

- User `rjb` can read, write and execute this
- Users in the group `comp` can read and execute, but not write

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File Permissions

```
-rwxr-x--- 1 rjb comp 24 2008-02-01 15:11 prog
```

- User `rjb` can read, write and execute this
- Users in the group `comp` can read and execute, but not write
- Others can do nothing at all

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For a directory

```
drwxr-xr-x 2 rjb comp 4096 2008-02-01 15:11 .
```


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drwxr-xr-x 2 rjb comp 4096 2008-02-01 15:11 .
```

The first flag is set if this is a directory

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For a directory

```
drwxr-xr-x 2 rjb comp 4096 2008-02-01 15:11 .
```

The first flag is set if this is a directory

- `r` read: you can list the contents of this directory

Filesystems

File Permissions

For a directory

```
drwxr-xr-x 2 rjb comp 4096 2008-02-01 15:11 .
```

The first flag is set if this is a directory

- **r** read: you can list the contents of this directory
- **w** write: you can create, delete and rename files in this directory

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File Permissions

For a directory

```
drwxr-xr-x 2 rjb comp 4096 2008-02-01 15:11 .
```

The first flag is set if this is a directory

- **r** read: you can list the contents of this directory
- **w** write: you can create, delete and rename files in this directory
- **x**: you can search this directory; also can set as cwd

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File Permissions

For a directory

```
drwxr-xr-x 2 rjb comp 4096 2008-02-01 15:11 .
```

The first flag is set if this is a directory

- **r** read: you can list the contents of this directory
- **w** write: you can create, delete and rename files in this directory
- **x**: you can search this directory; also can set as `cwd`

Note that if the directory permission is `w` you can delete a file even if you cannot read it; even if you don't own it

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Permissions are set by the Unix `chmod` command

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Other flags include

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Other flags include

- `t` sticky, “restricted deletion flag”: when set on a directory only the owner of a file may delete it

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Permissions are set by the Unix `chmod` command

Other flags include

- `t` sticky, “restricted deletion flag”: when set on a directory only the owner of a file may delete it
- `s` `setuid` on a program: execute this program with the `userid` of the *file* not the user

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Other OSs have less support for access permissions



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Other OSs have less support for access permissions

- DOS and Windows pre-XP just have a “read-only” permission which can be set and cleared by any user



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- DOS and Windows pre-XP don't really have users



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File Permissions

Other OSs have less support for access permissions

- DOS and Windows pre-XP just have a “read-only” permission which can be set and cleared by any user
- DOS and Windows pre-XP don't really have users
- MacOS pre-X are similar

