

Introduction to the Unix language and to Supercomputers

Rémi Marchal

Inorganic Theoretical Chemistry group, ISCR, Rennes

remi.marchal@univ-rennes1.fr

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Introduction to the Unix language

Outline

1. Genesis

2. Why Unix ?

3. Some basic commands

- 3.1 First commands
- 3.2 List the content of a directory
- 3.3 The file tree
- 3.4 Copy/Paste
- 3.5 Cut/Paste
- 3.6 Remove files or directories
- 3.7 Some other useful commands

Introduction to the Unix language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

Outline

Introduction to the Unix
language

1. Genesis

2. Why Unix ?

3. Some basic commands

- 3.1 First commands
- 3.2 List the content of a directory
- 3.3 The file tree
- 3.4 Copy/Paste
- 3.5 Cut/Paste
- 3.6 Remove files or directories
- 3.7 Some other useful commands

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

A bit of history

1969 : Ken Thompson creates the first version of a mono-user Operating System (OS) in assembly language which will be later named Unix.



1971 : Ken Thompson decides to rewrite Unix using an other computer language. However, none of the existing languages were adapted and he finally choose to rewrite it using the C language with the help of Dennis Ritchie who just created this language.



1973 : Ken Thompson and Dennis Ritchie present Unix for the first time in its 4th version.

1975 : Ken Thompson develops the 5th Unix version, with the help of Jeff Schriebman and Bob Kridle. This version is the first one which was transmitted out of the Bell company.

Introduction to the Unix language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

Operating Systems written in Unix

Introduction to the Unix language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

Linux

Debian



Ubuntu



Mint



RedHat



Fedora



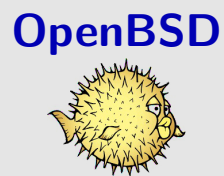
Arch



Operating Systems written in Unix

Introduction to the Unix language

Les BSDs



macOS



Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

Outline

1. Genesis

2. Why Unix ?

3. Some basic commands

- 3.1 First commands
- 3.2 List the content of a directory
- 3.3 The file tree
- 3.4 Copy/Paste
- 3.5 Cut/Paste
- 3.6 Remove files or directories
- 3.7 Some other useful commands

Introduction to the Unix
language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

Why to teach you Unix?

Introduction to the Unix language

Genesis

Why Unix?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

Reason :

- ▶ **All** the scientific supercomputers are using Unix

Advantages of Unix on supercomputers ?

Introduction to the Unix
language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

Advantages of Unix on supercomputers ?

For servers administrators

- ▶ **Security** : Connection through login/pwd
↳ No « Unknown » user can access the servers
- ▶ **Flexibility** : Installation of a minimal OS and then you can choose which packages you want to install.

Introduction to the Unix language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

Advantages of Unix on supercomputers ?

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- ▶ **Security** : Connection through login/pwd
↳ No « Unknown » user can access the servers
- ▶ **Flexibility** : Installation of a minimal OS and then you can choose which packages you want to install.

For users

- ▶ You will find almost the same environment on every server (easier to switch from a server to another)
- ▶ **Confidentiality of data** : No other users can access your data except if you allow it.

Introduction to the Unix language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

Outline

1. Genesis

2. Why Unix ?

3. Some basic commands

- 3.1 First commands
- 3.2 List the content of a directory
- 3.3 The file tree
- 3.4 Copy/Paste
- 3.5 Cut/Paste
- 3.6 Remove files or directories
- 3.7 Some other useful commands

Introduction to the Unix language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

Outline

1. Genesis

2. Why Unix ?

3. Some basic commands

3.1 First commands

3.2 List the content of a directory

3.3 The file tree

3.4 Copy/Paste

3.5 Cut/Paste

3.6 Remove files or directories

3.7 Some other useful commands

Introduction to the Unix language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

The shell

What appears at connection time

When you are accessing a Unix based computer through the terminal, you will see this

Introduction to the Unix language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

The shell

What appears at connection time

When you are accessing a Unix based computer through the terminal, you will see this

```
remarcha @ sr019099 :~ $
```

Introduction to the Unix language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

The shell

Introduction to the Unix language

What appears at connection time

When you are accessing a Unix based computer through the terminal, you will see this

```
remarcha @ sr019099 :~ $
```

Login

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

The shell

Introduction to the Unix language

What appears at connection time

When you are accessing a Unix based computer through the terminal, you will see this

```
remarcha @ sr019099 :~ $
```

Login

Machine

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

The shell

Introduction to the Unix language

What appears at connection time

When you are accessing a Unix based computer through the terminal, you will see this

```
remarcha @ sr019099 :~ $
```

Login

Machine

The shell : What's this ?

It's a program which decode your command and send them to the OS.

It allows you to launch some tasks and also to define some environment variables.

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

The « man » command.

Introduction to the Unix
language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

The « man » command.

What's this ?

This command give access to the manual of a given Unix command.

This is highly useful for knowing all the possible options of a given command.

Introduction to the Unix language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

The « man » command.

What's this ?

This command give access to the manual of a given Unix command.

This is highly useful for knowing all the possible options of a given command.

An example

Lets display the manual of the « man » command by running the « man man » command in the shell

```
remarcha@sr017099 :~ $ man man
```

Introduction to the Unix language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

The « man » command.

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This command give access to the manual of a given Unix command.

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An example

Lets display the manual of the « man » command by running the « man man » command in the shell

```
remarcha@sr017099 :~ $ man man
MAN(1) Utilitaires de l'afficheur des pages de manuel MAN(1)
NOM
man - Interface de consultation des manuels de référence en ligne
SYNOPSIS
man [-C fichier] [-d] [-D] [-warnings[=avertissements]] [-R encodage] [-L locale] [-m
système[,...]] [-M chemin] [-S liste] [-e extension]
```

Introduction to the Unix
language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

Outline

1. Genesis

2. Why Unix ?

3. Some basic commands

- 3.1 First commands
- 3.2 List the content of a directory
- 3.3 The file tree
- 3.4 Copy/Paste
- 3.5 Cut/Paste
- 3.6 Remove files or directories
- 3.7 Some other useful commands

Introduction to the Unix language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

List the content of a directory

Introduction to the Unix
language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

List the content of a directory

How to do it ?

You can do it using the « *ls* » Unix command.
This command displays the content in alphabetic ordering.

Introduction to the Unix
language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

List the content of a directory

How to do it ?

You can do it using the « *ls* » Unix command.
This command displays the content in alphabetic ordering.

Some interesting options.

To display the contents in a chronological way, use the « *ls* » command with its « *-lrt* » option.

Introduction to the Unix
language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

List the content of a directory

How to do it ?

You can do it using the « *ls* » Unix command. This command displays the content in alphabetic ordering.

Some interesting options.

To display the contents in a chronological way, use the « *ls* » command with its « *-lrt* » option.

An example

```
remarcha@sr017099 :~ $ ls
run.sh run.sh.slurm test
remarcha@sr017099 :~ $ ls -lrt
-rw-r--r-- 1 remarcha remarcha 15 oct. 12 08 :10 test
-rw-r--r-- 1 remarcha remarcha 15 oct. 16 10 :44 run.sh.slurm
-rwxr--r-- 1 remarcha remarcha 15 oct. 16 10 :44 run.sh
```

Introduction to the Unix
language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

Outline

1. Genesis

2. Why Unix ?

3. Some basic commands

- 3.1 First commands
- 3.2 List the content of a directory
- 3.3 The file tree
- 3.4 Copy/Paste
- 3.5 Cut/Paste
- 3.6 Remove files or directories
- 3.7 Some other useful commands

Introduction to the Unix language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

The file tree

Introduction to the Unix
language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

The file tree

What's this?

In Unix, the file tree is the location of a file or a directory in the file system.

Introduction to the Unix language

[Genesis](#)

[Why Unix?](#)

[Basic commands](#)

[First commands](#)

[List the content of a directory](#)

[The file tree](#)

[Copy/Paste](#)

[Cut/Paste](#)

[Remove](#)

[Others](#)

The file tree

What's this ?

In Unix, the file tree is the location of a file or a directory in the file system.

Where am I in the file tree ?

The « *pwd* » command display your actual location in the file tree.

Introduction to the Unix language

[Genesis](#)

[Why Unix ?](#)

[Basic commands](#)

[First commands](#)

[List the content of a directory](#)

[The file tree](#)

[Copy/Paste](#)

[Cut/Paste](#)

[Remove](#)

[Others](#)

The file tree

What's this ?

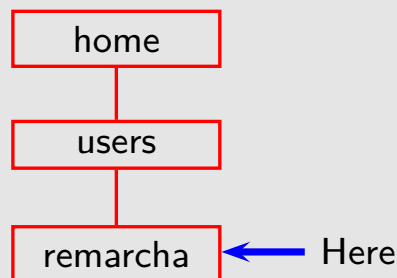
In Unix, the file tree is the location of a file or a directory in the file system.

Where am I in the file tree ?

The « *pwd* » command display your actual location in the file tree.

An example

```
remarcha@sr017099 :~ $ pwd  
/home/users/remarcha/
```



Introduction to the Unix language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

The file tree

What's this?

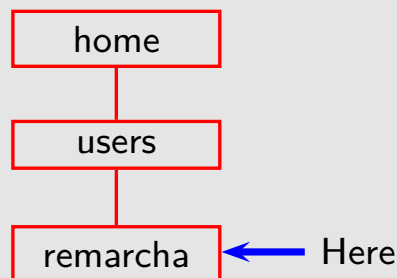
In Unix, the file tree is the location of a file or a directory in the file system.

Where am I in the file tree?

The « *pwd* » command display your actual location in the file tree.

An example

```
remarcha@sr017099 :~ $ pwd  
/home/users/remarcha/
```



When you log on a Unix based machine, your starting directory is named the HOME

Genesis

Why Unix?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

Create a directory

Introduction to the Unix
language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

Create a directory

How to do it ?

Using the « *mkdir* » Unix command

Introduction to the Unix
language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

Create a directory

Introduction to the Unix language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

How to do it ?

Using the « *mkdir* » Unix command

An example

```
remarcha@sr017099 :~ $ ls
run.sh run.sh.slum test
remarcha@sr017099 :~ $ mkdir direc
remarcha@sr017099 :~ $ ls
direc run.sh run.sh.slum test
```

Navigate in the file tree

Introduction to the Unix
language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

Navigate in the file tree

How to access a directory ?

Through the « *cd* » command.

Introduction to the Unix
language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

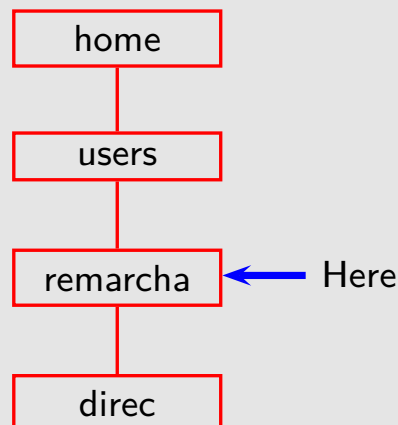
Navigate in the file tree

How to access a directory ?

Through the « *cd* » command.

An exemple

```
remarcha@sr017099 :~ $ ls  
direc run.sh run.sh.slum test  
remarcha@sr017099 :~ $ pwd  
/home/users/remarcha
```



Introduction to the Unix language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

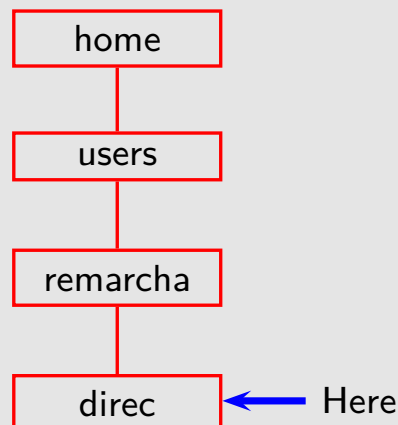
Navigate in the file tree

How to access a directory ?

Through the « *cd* » command.

An exemple

```
remarcha@sr017099 :~ $ ls
direc run.sh slum test
remarcha@sr017099 :~ $ pwd
/home/users/remarcha
remarcha@sr017099 :~ $ cd direc
remarcha@sr017099 :direc$ pwd
/home/users/remarcha/direc
```



Introduction to the Unix language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

Navigate in the file tree

Introduction to the Unix
language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

Navigate in the file tree

How to access a directory higher in the file tree ?

There is 2 methods

Introduction to the Unix
language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

Navigate in the file tree

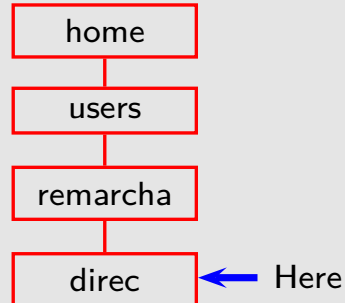
Introduction to the Unix language

How to access a directory higher in the file tree ?

There is 2 methods

1st method : The absolute path method

```
remarcha@sr017099 :direc$ pwd  
/home/users/remarcha/direc
```



Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

Navigate in the file tree

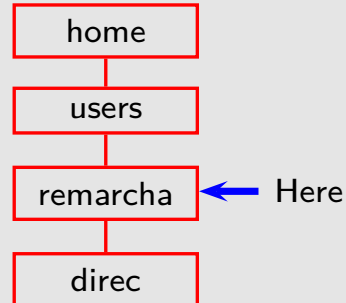
Introduction to the Unix language

How to access a directory higher in the file tree ?

There is 2 methods

1st method : The absolute path method

```
remarcha@sr017099 :direc$ pwd
/home/users/remarcha/direc
remarcha@sr017099 :direc$ cd /home/users/remarcha/
remarcha@sr017099 :~ $ pwd
/home/users/remarcha
```



Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

Navigate in the file tree

How to access a directory higher in the file tree ?

There is 2 methods

2nd method : the « cd .. » method

Here, .. means the directory directly higher in the file tree

Introduction to the Unix language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

Navigate in the file tree

How to access a directory higher in the file tree ?

There is 2 methods

2nd method : the « cd .. » method

Here, .. means the directory directly higher in the file tree

Introduction to the Unix language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

Navigate in the file tree

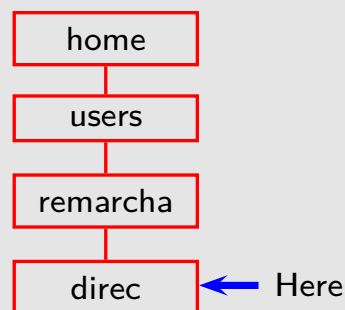
How to access a directory higher in the file tree ?

There is 2 methods

2nd method : the « cd .. » method

Here, .. means the directory directly higher in the file tree

```
remarcha@sr017099 :direc$ pwd  
/home/users/remarcha/direc
```



Introduction to the Unix language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

Navigate in the file tree

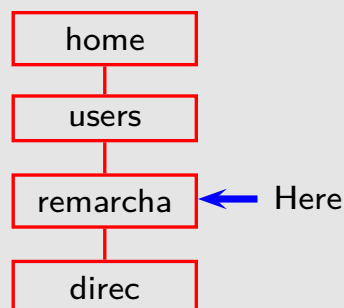
How to access a directory higher in the file tree ?

There is 2 methods

2nd method : the « cd .. » method

Here, .. means the directory directly higher in the file tree

```
remarcha@sr017099 :direc$ pwd
/home/users/remarcha/direc
remarcha@sr017099 :direc$ cd ..
remarcha@sr017099 :~ $ pwd
/home/users/remarcha
```



Introduction to the Unix language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

Outline

1. Genesis

2. Why Unix ?

3. Some basic commands

- 3.1 First commands
- 3.2 List the content of a directory
- 3.3 The file tree
- 3.4 Copy/Paste
- 3.5 Cut/Paste
- 3.6 Remove files or directories
- 3.7 Some other useful commands

Introduction to the Unix language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

The « *cp* » command

Introduction to the Unix
language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

The « cp » command

Aim

This command allows to copy a file or a directory and paste it in another directory.

Introduction to the Unix language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

The « *cp* » command

Introduction to the Unix
language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

Aim

This command allows to copy a file or a directory and paste it in another directory.

Syntax

The syntax is the following :
cp source target where the source is the file or directory you want to copy and target is the new file (or directory) that will be created.

An example for a file

Introduction to the Unix
language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

An example for a file

Introduction to the Unix
language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

Copy a file in the same directory

```
remarcha@sr017099 :~ $ ls
direc run.sh run.sh.slum test
remarcha@sr017099 :~ $ cp run.sh run2.sh
remarcha@sr017099 :~ $ ls
direc run.sh run2.sh run.sh.slum test
```

An example for a file

Copy a file in another directory

keeping the name.

```
remarcha@sr017099 :~ $ ls
direc run.sh
remarcha@sr017099 :~ $ cp run.sh direc/
remarcha@sr017099 :~ $ ls direc/
run.sh
```

changing the name.

```
remarcha@sr017099 :~ $ ls
direc run.sh
remarcha@sr017099 :~ $ cp run.sh
direc/run2.sh
remarcha@sr017099 :~ $ ls direc/
run.sh run2.sh
```

Introduction to the Unix
language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

An example for a file

Introduction to the Unix language

Copy a file in another directory

keeping the name.

```
remarcha@sr017099 :~ $ ls
direc run.sh run.sh.slum test
remarcha@sr017099 :~ $ cp run.sh direc/
remarcha@sr017099 :~ $ ls direc/
run.sh
```

changing the name.

```
remarcha@sr017099 :~ $ ls
direc run.sh run.sh.slum test
remarcha@sr017099 :~ $ cp run.sh
direc/run2.sh
remarcha@sr017099 :~ $ ls direc/
run.sh run2.sh
```

Copy a file from another directory to your actual directory.

keeping the name.

```
remarcha@sr017099 :~ $ ls
direc run.sh run.sh.slum test
remarcha@sr017099 :~ $ ls direc/
run2.sh
remarcha@sr017099 :~ $ cp direc/run2.sh
.
remarcha@sr017099 :~ $ ls
direc run.sh run2.sh run.sh.slum test
```

changing the name.

```
remarcha@sr017099 :~ $ ls
direc run.sh run.sh.slum test
remarcha@sr017099 :~ $ ls direc/
run2.sh
remarcha@sr017099 :~ $ cp direc/run2.sh
./run3.sh
remarcha@sr017099 :~ $ ls direc/
direc run.sh run3.sh run.sh.slum test
```

The « . » means *here* (your actual location in the file tree.)

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

An example of a directory copy

Introduction to the Unix
language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

An example of a directory copy

Lets try as for a file

```
remarcha@sr017099 :~ $ ls
direc run.sh
remarcha@sr017099 :~ $ cp direc direc2
cp : direc is a directory (not copied).
```

← Error message

```
remarcha@sr017099 :~ $ ls
direc run.sh
```

It doesn't work.

Introduction to the Unix language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

An example of a directory copy

Introduction to the Unix language

Lets try as for a file

```
remarcha@sr017099 :~ $ ls
direc run.sh run.sh.slum test
remarcha@sr017099 :~ $ cp direc direc2
cp : direc is a directory (not copied). ← Error message
```

```
remarcha@sr017099 :~ $ ls
direc run.sh run.sh.slum test
```

It doesn't work.

So how to do it ?

```
remarcha@sr017099 :~ $ ls
direc run.sh run.sh.slum test
remarcha@sr017099 :~ $ cp -r direc direc2
remarcha@sr017099 :~ $ ls
direc direc2 run.sh run.sh.slum test
```

You should use the « -r » option.

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

An example of a directory copy

Introduction to the Unix language

Lets try as for a file

```
remarcha@sr017099 :~ $ ls
direc run.sh run.sh.slum test
remarcha@sr017099 :~ $ cp direc direc2
cp : direc is a directory (not copied). ← Error message
```

```
remarcha@sr017099 :~ $ ls
direc run.sh run.sh.slum test
```

It doesn't work.

So how to do it ?

```
remarcha@sr017099 :~ $ ls
direc run.sh run.sh.slum test
remarcha@sr017099 :~ $ cp -r direc direc2
remarcha@sr017099 :~ $ ls
direc direc2 run.sh run.sh.slum test
```

You should use the « -r » option.

Thus, the syntax is the same as for a file

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

Outline

1. Genesis

2. Why Unix ?

3. Some basic commands

- 3.1 First commands
- 3.2 List the content of a directory
- 3.3 The file tree
- 3.4 Copy/Paste
- 3.5 Cut/Paste**
- 3.6 Remove files or directories
- 3.7 Some other useful commands

Introduction to the Unix language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

The « mv » command

Introduction to the Unix
language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

The « mv » command

Aim

Move a file or a directory in another location in the file tree.

Introduction to the Unix language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

The « mv » command

Aim

Move a file or a directory in another location in the file tree.

Syntax

The syntax of this command is similar to the « cp » one :

`mv source target` where the source is the file or directory you want to copy and target is the new file (or directory) that will be created.

Introduction to the Unix language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

An example with a file

Introduction to the Unix
language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

An example with a file

Move a file to another location

keeping the name.

```
remarcha@sr017099 :~ $ ls
direc run.sh
remarcha@sr017099 :~ $ mv run.sh direc/
remarcha@sr017099 :~ $ ls
direc run.sh
remarcha@sr017099 :~ $ ls direc/
run.sh
```

changing the name.

```
remarcha@sr017099 :~ $ ls
direc run.sh
remarcha@sr017099 :~ $ mv run.sh
direc/run2.sh
remarcha@sr017099 :~ $ ls
direc run.sh
remarcha@sr017099 :~ $ ls direc/
run2.sh
```

Introduction to the Unix language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

An example with a file

Introduction to the Unix language

Move a file to another location

keeping the name.

```
remarcha@sr017099 :~ $ ls
direc run.sh run.sh.slum test
remarcha@sr017099 :~ $ mv run.sh direc/
remarcha@sr017099 :~ $ ls
direc run.sh.slum test
remarcha@sr017099 :~ $ ls direc/
run.sh
```

changing the name.

```
remarcha@sr017099 :~ $ ls
direc run.sh run.sh.slum test
remarcha@sr017099 :~ $ mv run.sh
direc/run2.sh
remarcha@sr017099 :~ $ ls
direc run.sh.slum test
remarcha@sr017099 :~ $ ls direc/
run2.sh
```

Move a file from another directory to the actual location.

keeping the name.

```
remarcha@sr017099 :~ $ ls
direc run.sh.slum test
remarcha@sr017099 :~ $ ls direc/
run.sh
remarcha@sr017099 :~ $ mv direc/run.sh
./
remarcha@sr017099 :~ $ ls
direc run.sh run.sh.slum test
```

changing the name.

```
remarcha@sr017099 :~ $ ls
direc run.sh.slum test
remarcha@sr017099 :~ $ ls direc/
run.sh
remarcha@sr017099 :~ $ mv direc/run.sh
./run2.sh
remarcha@sr017099 :~ $ ls
direc run2.sh run.sh.slum test
```

The « . » means *the actual location*

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

An example with a file

Move a file without changing its location.

```
remarcha@sr017099 :~ $ ls
direc run.sh run.sh.slum test
remarcha@sr017099 :~ $ mv run.sh run2.sh
remarcha@sr017099 :~ $ ls
direc run2.sh run.sh.slum test
```

It's just a way to rename a file

Introduction to the Unix
language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

An example with a directory

Introduction to the Unix
language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

An example with a directory

Lets try the same command as for a file

```
remarcha@sr017099 :~ $ ls
direc run.sh.slum test
remarcha@sr017099 :~ $ mv direc direc2
remarcha@sr017099 :~ $ ls
direc2 run.sh.slum test
```

It works.

Contrary to the « cp » command, you don't have to use the -r option.

Introduction to the Unix
language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

Outline

1. Genesis

2. Why Unix ?

3. Some basic commands

- 3.1 First commands
- 3.2 List the content of a directory
- 3.3 The file tree
- 3.4 Copy/Paste
- 3.5 Cut/Paste
- 3.6 Remove files or directories
- 3.7 Some other useful commands

Introduction to the Unix language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

The « rm » command

Introduction to the Unix
language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

The « rm » command

Aim

Remove files and directories

Introduction to the Unix
language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

The « rm » command

Aim

Remove files and directories

Attention

Contrary to Windows, no trash is available. This means that if you remove a file, there is no way to restore it.

Introduction to the Unix
language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

The « rm » command

Aim

Remove files and directories

Attention

Contrary to Windows, no trash is available. This means that if you remove a file, there is no way to restore it.

Syntax

The syntax is the following :
`rm file to remove`

Introduction to the Unix
language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

Examples

Introduction to the Unix
language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

Examples

Remove a file

```
remarcha@sr017099 :~ $ ls
direc run.sh
remarcha@sr017099 :~ $ rm run.sh
remarcha@sr017099 :~ $ ls
direc
```

Introduction to the Unix language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

Examples

Remove a file

```
remarcha@sr017099 :~ $ ls
direc run.sh
remarcha@sr017099 :~ $ rm run.sh
remarcha@sr017099 :~ $ ls
direc run.sh.slum test
```

Remove several files

```
remarcha@sr017099 :~ $ ls
direc run.sh
remarcha@sr017099 :~ $ rm run.sh run.sh.slum
remarcha@sr017099 :~ $ ls
direc test
```

Introduction to the Unix language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

An example for a directory

Introduction to the Unix
language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

An example for a directory

Introduction to the Unix language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

Lets try as for a file

```
remarcha@sr017099 :~ $ ls
direc run.sh
remarcha@sr017099 :~ $ rm direc
mv : direc is a directory. ← Error message
remarcha@sr017099 :~ $ ls
direc run.sh
```

An example for a directory

Introduction to the Unix language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

Lets try as for a file

```
remarcha@sr017099 :~ $ ls
direc run.sh run.sh.slum test
remarcha@sr017099 :~ $ rm direc
mv : direc is a directory. ← Error message
remarcha@sr017099 :~ $ ls
direc run.sh run.sh.slum test
remarcha@sr017099 :~ $ rm -r direc
remarcha@sr017099 :~ $ ls
run.sh run.sh.slum test
```

You should use the « -r » option.

Outline

1. Genesis

2. Why Unix ?

3. Some basic commands

- 3.1 First commands
- 3.2 List the content of a directory
- 3.3 The file tree
- 3.4 Copy/Paste
- 3.5 Cut/Paste
- 3.6 Remove files or directories
- 3.7 Some other useful commands

Introduction to the Unix language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

The « cat » command

Introduction to the Unix
language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

The « cat » command

Aim

Display a file on the screen.

Introduction to the Unix
language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

The « cat » command

Aim

Display a file on the screen.

Why ?

It can be quite useful to make some copy/paste of some part of a file.

Introduction to the Unix language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

The « cat » command

Aim

Display a file on the screen.

Why ?

It can be quite useful to make some copy/paste of some part of a file.

Syntax

The syntax is :

`cat file`

where *file* is the file to display on the screen.

Introduction to the Unix language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

The « grep » command

Introduction to the Unix
language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

The « grep » command

Aim

This aims at looking for some *characters or characters sequence* in a file.

Introduction to the Unix language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

The « grep » command

Aim

This aims at looking for some *characters or characters sequence* in a file.

Why ?

This help in looking for some characters sequences (for example energies) in a very long file without reading the whole file.

Introduction to the Unix language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

The « grep » command

Aim

This aims at looking for some *characters or characters sequence* in a file.

Why ?

This help in looking for some characters sequences (for example energies) in a very long file without reading the whole file.

Syntax

The syntax is :

grep "sequence" file

where *sequence* is the character sequence you are looking for and *file* is the file in which you are looking for this sequence.

Introduction to the Unix language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

The « grep » command

Introduction to the Unix
language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

The « grep » command

Introduction to the Unix language

Example

I am looking for the Energy in a 87.000 line-long file and I know that the energy is printed after the sequence "SCF Done :"

```
remarcha@sr017099 :~ $ ls
direc Pd4C5P4opt.log run.sh slum test
remarcha@sr017099 :~ $ grep "SCF Done :" Pd4C5P4opt.log
SCF Done : E(RB-P86) = -1107.30781796 A.U. after 20 cycles
SCF Done : E(RB-P86) = -1107.34980955 A.U. after 18 cycles
SCF Done : E(RB-P86) = -1107.36361279 A.U. after 14 cycles
SCF Done : E(RB-P86) = -1107.36425166 A.U. after 14 cycles
SCF Done : E(RB-P86) = -1107.36539102 A.U. after 15 cycles
SCF Done : E(RB-P86) = -1107.36572245 A.U. after 14 cycles
SCF Done : E(RB-P86) = -1107.36597080 A.U. after 14 cycles
SCF Done : E(RB-P86) = -1107.36613374 A.U. after 12 cycles
SCF Done : E(RB-P86) = -1107.36623237 A.U. after 18 cycles
SCF Done : E(RB-P86) = -1107.36633147 A.U. after 18 cycles
SCF Done : E(RB-P86) = -1107.36635181 A.U. after 18 cycles
SCF Done : E(RB-P86) = -1107.36643635 A.U. after 18 cycles
SCF Done : E(RB-P86) = -1107.36641942 A.U. after 18 cycles
SCF Done : E(RB-P86) = -1107.36644143 A.U. after 12 cycles
SCF Done : E(RB-P86) = -1107.36651824 A.U. after 18 cycles
SCF Done : E(RB-P86) = -1107.36653696 A.U. after 12 cycles
...
```

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

Redirecting Unix command

Introduction to the Unix
language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

Redirecting Unix command

Aim

When you are using an Unix command, the result of it is displayed on the screen. However, in some cases, it can be useful to redirect it into a file.

Introduction to the Unix language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

Redirecting Unix command

Aim

When you are using an Unix command, the result of it is displayed on the screen. However, in some cases, it can be useful to redirect it into a file.

Syntax

You can redirect an Unix command using this syntax :

Unix command > *file*

where *file* will contain the result of the Unix command used.

Introduction to the Unix language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

Redirecting Unix command

Introduction to the Unix language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

Redirecting Unix command

Introduction to the Unix language

A redirection Example

In the previous example of the « `grep` » command, only the first lines of the result are shown. If one aim on having the results of this command in a file, for post-processing purpose, one can use this command :

```
remarcha@sr017099 :~ $ ls
direc Pd4C5P4opt.log run.sh
remarcha@sr017099 :~ $ grep "SCF DOne :" Pd4C5P4opt.log > result
remarcha@sr017099 :~ $ ls
direc Pd4C5P4opt.log result run.sh
remarcha@sr017099 :~ $ cat result
SCF Done : E(RB-P86) = -1107.30781796 A.U. after 20 cycles
SCF Done : E(RB-P86) = -1107.34980955 A.U. after 18 cycles
SCF Done : E(RB-P86) = -1107.36361279 A.U. after 14 cycles
SCF Done : E(RB-P86) = -1107.36425166 A.U. after 14 cycles
SCF Done : E(RB-P86) = -1107.36539102 A.U. after 15 cycles
SCF Done : E(RB-P86) = -1107.36572245 A.U. after 14 cycles
SCF Done : E(RB-P86) = -1107.36597080 A.U. after 14 cycles
SCF Done : E(RB-P86) = -1107.36613374 A.U. after 12 cycles
SCF Done : E(RB-P86) = -1107.36623237 A.U. after 18 cycles
SCF Done : E(RB-P86) = -1107.36633147 A.U. after 18 cycles
SCF Done : E(RB-P86) = -1107.36635181 A.U. after 18 cycles
SCF Done : E(RB-P86) = -1107.36643635 A.U. after 18 cycles
SCF Done : E(RB-P86) = -1107.36641942 A.U. after 18 cycles
SCF Done : E(RB-P86) = -1107.36644143 A.U. after 12 cycles
SCF Done : E(RB-P86) = -1107.36651824 A.U. after 18 cycles
SCF Done : E(RB-P86) = -1107.36653696 A.U. after 12 cycles
...
```

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

The « wc » command

Introduction to the Unix
language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

The « wc » command

Aim

Counting the number of lines, words or characters of a file.

Introduction to the Unix language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

The « wc » command

Introduction to the Unix
language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

Aim

Counting the number of lines, words or characters of a file.

Syntax

Below is the syntax :

For the number of lines : `wc -l file`

For the number of words : `wc -w file`

For the number of characters : `wc -m file`

where *file* is the file to be treated

the « tail » command

Introduction to the Unix
language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

the « tail » command

Aim

Display the last lines of a file.

Introduction to the Unix
language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

the « tail » command

Aim

Display the last lines of a file.

Syntax

The syntax of this command is :

tail file

By default, only the 10 last lines are displayed. To display more, one should use the *-nline* option, where *nline* is the number of lines. See below an example.

tail file for the 10 last lines of *file*

tail -20 file for the 20 last lines of *file*

Introduction to the Unix
language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

the « head » command

Introduction to the Unix
language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

the « head » command

Aim

Display the first lines of a file.

Introduction to the Unix
language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others

the « head » command

Aim

Display the first lines of a file.

Syntax

The syntax of this command is :

head file

By default, only the 10 first lines are displayed. To display more, one should use the *- nline* option, where *nline* is the number of lines. See below an example.

head file for the 10 first lines of *file*

head -20 file for the 20 first lines of *file*

Introduction to the Unix
language

Genesis

Why Unix ?

Basic commands

First commands

List the content of a directory

The file tree

Copy/Paste

Cut/Paste

Remove

Others