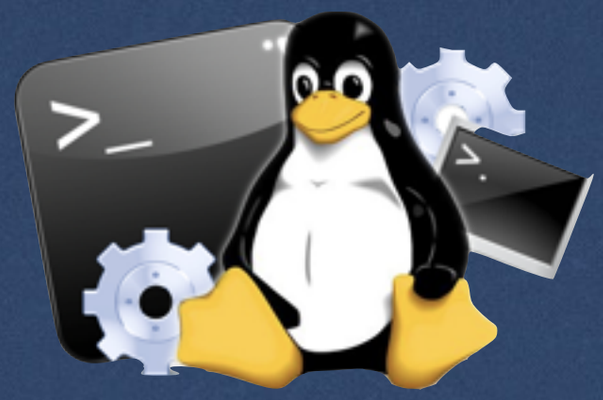

Linux Shell

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Shell

- *A command line, or terminal, is a text based interface to the system. You are able to enter commands by typing them on the keyboard and feedback will be given to you similarly as text.*

- *Within a terminal you have what is known as a **shell**. This is a part of the operating system that defines how the terminal will behave and looks after running (or executing) commands for you. There are various shells available but the most common one is called **bash** which stands for **B**ourne **a**gain **sh**ell.*

- *This course will assume you are using bash as your shell.*

Shell

- *If you would like to know which shell you are using you may use a command called **echo** to display a **system variable** stating your current shell.*
- *echo is a command which is used to display messages.*

Terminal

```
1.  user@roberto: echo $SHELL
2.  /bin/bash
3.  user@roberto: echo ciao
4.  ciao
5.  user@roberto:
```

- *syntax: **echo** <message to display> or $<system variable name>*

System variable

- *An environment variable is a named object that contains data used by one or more applications.*
- *In simple terms, it is a variable with a **name** and a **value**. The value of an environmental variable can for example be the location of all executable files in the file system, the default editor that should be used, or the system local settings.*
- *Users new to Linux may often find this way of managing settings a bit unmanageable. However, environment variables provide a **simple way to share configuration settings** between multiple applications and processes in Linux.*

System variable

- *The coreutils package contains the programs printenv and env.*
  To list the current environmental variables with values:

mac — bash — 132×36

```
MacBook-Air-di-mac:~ mac$ printenv
TERM_PROGRAM=Apple_Terminal
PIG_HOME=/Users/mac/Documents/pig-0.14.0
SHELL=/bin/bash
TERM=xterm-256color
HADOOP_HOME=/Users/mac/Documents/hadoop-1.2.1
TMPDIR=/var/folders/7x/0vs6d57s41ldplvz609s46fw0000gn/T/
Apple_PubSub_Socket_Render=/tmp/launch-nMOwSW/Render
TERM_PROGRAM_VERSION=326
MONGODB_HOME=/Users/mac/Documents/mongodb-osx-x86_64-2.6.1
TERM_SESSION_ID=B784E82F-C268-4FD0-A238-1ABE027B54F6
USER=mac
HBASE_HOME=/Users/mac/Documents/hbase-0.94.19
SSH_AUTH_SOCK=/tmp/launch-Oh4a0t/Listeners
__CF_USER_TEXT_ENCODING=0x1F5:0:4
backup=/nas10/mysql
PATH=/opt/local/bin:/opt/local/sbin:/Library/Frameworks/Python.framework/Versions/3.4/bin:/Users/mac/Documents/hbase-0.94.19/bin:/Us
ers/mac/Documents/mongodb-osx-x86_64-2.6.1/bin:/Users/mac/Documents/hadoop-1.2.1/bin:/Users/mac/Documents/pig-0.14.0/bin:/usr/bin:/b
in:/usr/sbin:/sbin:/usr/local/bin:/opt/X11/bin:/usr/texbin
__CHECKFIX1436934=1
PWD=/Users/mac
JAVA_HOME=/Library/Java/JavaVirtualMachines/jdk1.8.0_05.jdk/Contents/Home
PIG_CLASSPATH=/Users/mac/Documents/hadoop-1.2.1/etc/hadoop
LANG=it_IT.UTF-8
SHLVL=1
HOME=/Users/mac
LOGNAME=mac
DISPLAY=/tmp/launch-BjFB5l/org.macosforge.xquartz:0
_=/usr/bin/printenv
MacBook-Air-di-mac:~ mac$
```

System variable

- ***DE*** *indicates the Desktop Environment being used. Recognised values of DE variable are: gnome, kde, xfce, lxde and mate.*

- ***PATH*** *contains a colon-separated list of directories in which your system looks for executable files. When a regular command (e.g., ls, rc-update or ic|emerge) is interpreted by the shell (e.g., bash or zsh), the shell looks for an executable file with the same name as your command in the listed directories, and executes it. To run executables that are not listed in PATH, the absolute path to the executable must be given: /bin/ls.*

- ***HOME*** *contains the path to the home directory of the current user. This variable can be used by applications to associate configuration files and such like with the user running it.*

- ***PWD*** *contains the path to your working directory.*

Set System variable

- ***Globally:*** *The following files should be used for defining global environment variables on your system:* ***/etc/profile****,* ***/etc/bash.bashrc*** *and* ***/etc/environment****. Each of these files has different limitations, so you should carefully select the appropriate one for your purposes.*
  - */etc/profile initializes variables for login shells only. It does, however, run scripts and can be used by all Bourne shell compatible shells.*
  - */etc/bash.bashrc initializes variables for interactive shells only. It also runs scripts but (as its name implies) is Bash specific.*
  - */etc/environment is used by the PAM-env module and is agnostic to login/non-login, interactive/non-interactive and also Bash/non-Bash, so scripting or glob expansion cannot be used. The file only accepts variable=value pairs.*

Set System variable

- ***Per User:*** *You do not always want to define an environment variable globally. You have to use* ***export*** *command.*

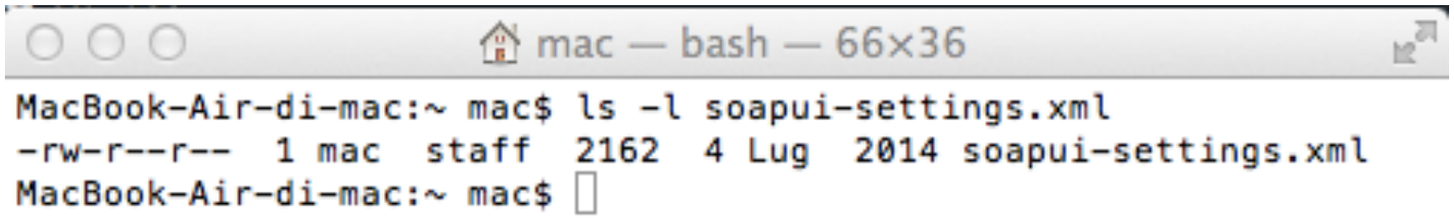
```
MacBook-Air-di-mac:~ mac$ echo $PWD
/Users/mac
MacBook-Air-di-mac:~ mac$ echo $PATH
/opt/local/bin:/opt/local/sbin:/Library/Frameworks/Python.framework/Versions/3.4/bin:/Users/mac/Documents/hbase-0.94.19/bin:/Users/m
ac/Documents/mongodb-osx-x86_64-2.6.1/bin:/Users/mac/Documents/hadoop-1.2.1/bin:/Users/mac/Documents/pig-0.14.0/bin:/usr/bin:/bin:/u
sr/sbin:/sbin:/usr/local/bin:/opt/X11/bin:/usr/texbin
MacBook-Air-di-mac:~ mac$ echo $HOME
/Users/mac
MacBook-Air-di-mac:~ mac$ export myvar="/Users/mac"
MacBook-Air-di-mac:~ mac$ echo $myvar
/Users/mac
MacBook-Air-di-mac:~ mac$ ecport myvar="$myvar:/Desktop"
-bash: ecport: command not found
MacBook-Air-di-mac:~ mac$ export myvar="$myvar:/Desktop"
MacBook-Air-di-mac:~ mac$ echo $myvar
/Users/mac:/Desktop
MacBook-Air-di-mac:~ mac$
```

Linux Permissions

- *Linux permissions dictate 3 things you may do with a file, **read**, **write** and **execute**. They are referred to in Linux by a single letter each.*
  - ***r** read - you may view the contents of the file.*
  - ***w** write - you may change the contents of the file.*
  - ***x** execute - you may execute or run the file if it is a program or script.*
- *For every file we define 3 sets of people for whom we may specify permissions.*
  - ***owner** - a single person who owns the file. (typically the person who created the file but ownership may be granted to some one else by certain users)*
  - ***group** - every file belongs to a single group.*
  - ***others** - everyone else who is not in the group or the owner.*
- *Three permissions and three groups of people. That's about all there is to permissions really. Now let's see how we can view and change them.*

View Linux Permissions

- *To view Linux Permissions, digit **ls -l [file]***

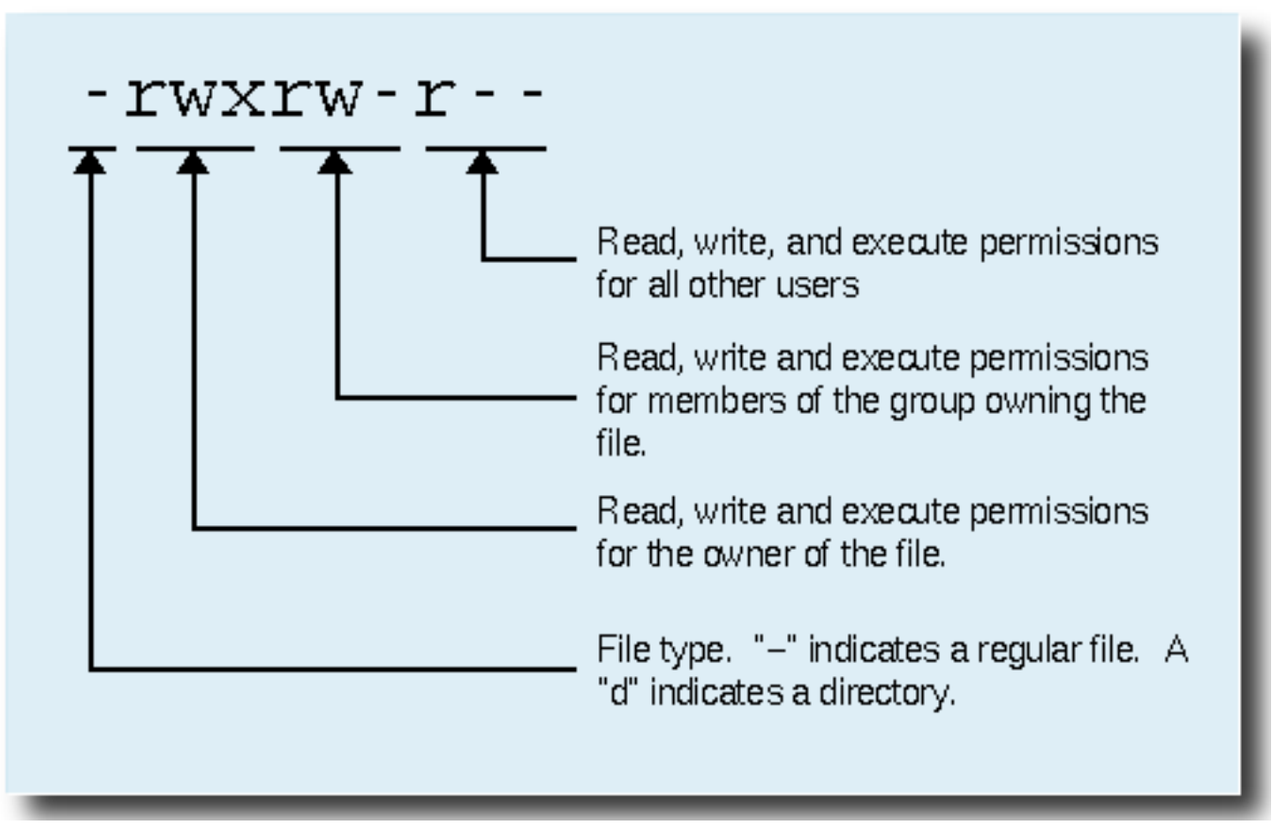


- *In the above example the first **10 characters** of the output are what we look at to identify permissions.*
  - *The first character identifies the **file type**. If it is a dash **(-)** then it is a normal file. If it is a **d** then it is a directory.*
  - *The following 3 characters represent the permissions for the **owner**. A letter represents the presence of a permission and a dash (-) represents the absence of a permission. In this example the owner has permissions to read and to write but no to execute.*
  - *The following 3 characters represent the permissions for the **group**. In this example the group has the ability to read but not write or execute. Note that the order of permissions is always read, then write then execute.*
  - *Finally the last 3 characters represent the permissions for others (or everyone else). In this example they have the read permission and nothing else.*

View Linux Permissions

- *To view Linux Permissions, digit* ***ls -l [file]***

```
mac — bash — 66×36
MacBook-Air-di-mac:~ mac$ ls -l soapui-settings.xml
-rw-r--r--  1 mac  staff  2162  4 Lug  2014 soapui-settings.xml
MacBook-Air-di-mac:~ mac$
```



Change Linux Permissions

- *To change Linux Permissions, digit* ***chmod [permissions] [path]***
- *Grant the execute permission to the group. Then remove the write permission for the owner.*

Terminal

```
1.  user@bash: ls -l frog.png
2.  -rwxr----x 1 harry users 2.7K Jan 4 07:32 frog.png
3.  user@bash:
4.  user@bash: chmod g+x frog.png
5.  user@bash: ls -l frog.png
6.  -rwxr-x--x 1 harry users 2.7K Jan 4 07:32 frog.png
7.  user@bash:
8.  user@bash: chmod u-w frog.png
9.  user@bash: ls -l frog.png
10. -r-xr-x--x 1 harry users 2.7K Jan 4 07:32 frog.png
11. user@bash:
```

Change Linux Permissions

- *To change Linux Permissions, digit* ***chmod [permissions] [path]***
- *Don't want to assign permissions individually? We can assign multiple permissions at once.*

```
                                                    Terminal
1.  user@bash: ls -l frog.png
2.  -rwxr----x 1 harry users 2.7K Jan 4 07:32 frog.png
3.  user@bash:
4.  user@bash: chmod g+wx frog.png
5.  user@bash: ls -l frog.png
6.  -rwxrwx--x 1 harry users 2.7K Jan 4 07:32 frog.png
7.  user@bash:
8.  user@bash: chmod go-x frog.png
9.  user@bash: ls -l frog.png
10. -rwxrw---- 1 harry users 2.7K Jan 4 07:32 frog.png
11. user@bash:
```

Change Linux Permissions

- *The method outlined above is not too hard for setting permissions but it can be a little tedious if we have a specific set of permissions we should like to apply regularly to certain files. Luckily, there is a shorthand way to specify permissions that makes this easy.*

Octal	Binary
0	000
1	001
2	010
3	011
4	100
5	101
6	110
7	111

Change Linux Permissions

- *The method outlined above is not too hard for setting permissions but it can be a little tedious if we have a specific set of permissions we should like to apply regularly to certain files. Luckily, there is a shorthand way to specify permissions that makes this easy.*

Octal	Binary
0	000
1	001
2	010
3	011
4	100
5	101
6	110
7	111

Terminal

```
1.  user@bash: ls -l frog.png
2.  -rw-r----x 1 harry users 2.7K Jan 4 07:32 frog.png
3.  user@bash:
4.  user@bash: chmod 751 frog.png
5.  user@bash: ls -l frog.png
6.  -rwxr-x--x 1 harry users 2.7K Jan 4 07:32 frog.png
7.  user@bash:
8.  user@bash: chmod 240 frog.png
9.  user@bash: ls -l frog.png
10. --w-r----- 1 harry users 2.7K Jan 4 07:32 frog.png
11. user@bash:
```

Becoming Superuser

- *The **root user** is a superuser who is allowed to do anything and everything on the system. Typically the administrators of a system would be the only ones who have access to the root account and would use it to maintain the system.*
- *Typically **normal users** would mostly only have access to files and directories in their home directory and maybe a few others for the purposes of sharing and collaborating on work and this helps to maintain the security and stability of the system.*

Becoming Superuser

- *However a normal user can become a superuser or acquire superuser privileges.*
- *The command **su** is used to become another user, inheriting identifier, group identifier, privileges, execute permissions and navigation and in some cases, environment variables, aliases, path defaults and so on - in a shell or a virtual terminal.*

***su** <parameters> username*

- *In this way you can became root by composing "**su root**" or simply "**su**".*
- *Then you can go back to the normal user session by using the command "**exit**"*

Becoming Superuser

- *However a normal user can become a superuser or acquire superuser privileges.*
- *The command **sudo** is used to acquire privileges of another user (no to become another user).*

***sudo** <parameters> command*

- *In this way you can execute the same processes as you were root.*

Comandi di uso frequente

- ***find percorso -name nome_file [INVIO]***: *visualizza tutti i file che si trovano sotto "percorso" aventi "nome_file".*
- ***find /tmp -size +10000k [INVIO]***: *visualizza i file memorizzati sotto /tmp aventi dimensione maggiore di 10000k*
- ***find /home -user topolino [INVIO]***: *visualizza i file memorizzati sotto /home di proprietà di topolino.*
- ***which programma [INVIO]***: *visualizza il percorso completo di dove si trova il comando*
- ***grep nome [INVIO]***: *filtra le righe che contengono la parola "nome"*
- ***more programma [INVIO]***: *interrompe la visualizzazione quando si riempie lo schermo ed attende la pressione di un tasto per proseguire*
- ***clear [INVIO]***: *ripulisce il terminale*

Comandi di uso frequente

- ***cat filename***: *visualizza il contenuto del file di nome "filename".*
- ***cat filename1 filename2 filename3 [INVIO]***: *visualizza la concatenazione dei tre file con nomi "filename1", "filename2", "filename3"*
- ***cat filename > newfile [INVIO]***: *copia il contenuto del file con nome "filename" nel file con nome "newfile" (sovrascrivendolo).*
- ***cat filename >> newfile [INVIO]***: *"appende" il contenuto del file con nome "filename" alla fine del file con nome "newfile"*
- ***cat - > newfile [INVIO]***: *tutto quello che viene digitato con la tastiera viene memorizzato nel file con nome "newfile"*
- ***cat -n filename [INVIO]***: *nello stampare il contenuto di "filename" enumera le righe*
- ***clear [INVIO]***: *ripulisce il terminale*

Comandi di uso frequente

- ***head***: *prints the first so many lines of it's input. By default it will print the first 10 lines but we may modify this with a command line argument.*
- ***tail***: *prints the last so many lines of it's input. By default it will print the last 10 lines but we may modify this with a command line argument*
- ***sort***: *will sort it's input, nice and simple.*
- ***nl***: *stands for number lines and it does just that*
- ***nl -s '. ' -w 10 sample.txt***: *The first one -s specifies what should be printed after the number while the second one -w specifies how much padding to put before the numbers*
- ***wc***: *stands for word count and it does just that (as well as characters and lines. By default it will give a count of all 3 but using command line options we may limit it to just what we are after*
- ***cut***: *is a nice little program to use if your content is separated into fields (columns) and you only want certain fields*

Comandi di uso frequente

- ***uniq***: *stands for unique and it's job is to remove duplicate lines from the data.*
- ***tac***: *Linux guys are known for having a funny sense of humor. The program tac is actually cat in reverse*
- ***less***: *s a program similar to more, but which allows backward movement in the file as well as forward movement*

Piping

- *We'll take a look at a mechanism for sending data from one program to another. It's called **piping** and the operator we use is **(|)**.*
- *What this operator does is feed the output from the program on the left as input to the program on the right. In the example below we will list only the first 3 files in the directory*

Terminal

```
1.  user@bash: ls
2.  barry.txt bob example.png firstfile foo1 myoutput video.mpeg
3.  user@bash: ls | head -3
4.  barry.txt
5.  bob
6.  example.png
7.  user@bash:
```

Piping

- *We may pipe as many programs together as we like. In the below example we have then piped the output to tail so as to get only the third file.*

```
                                                    Terminal
1.  user@bash: ls | head -3 | tail -1
2.  example.png
3.  user@bash:
```

- *You may combine pipes and redirection too.*

```
                                                    Terminal
1.  user@bash: ls | head -3 | tail -1 > myoutput
2.  user@bash: cat myoutput
3.  example.png
4.  user@bash:
```

Piping: more examples

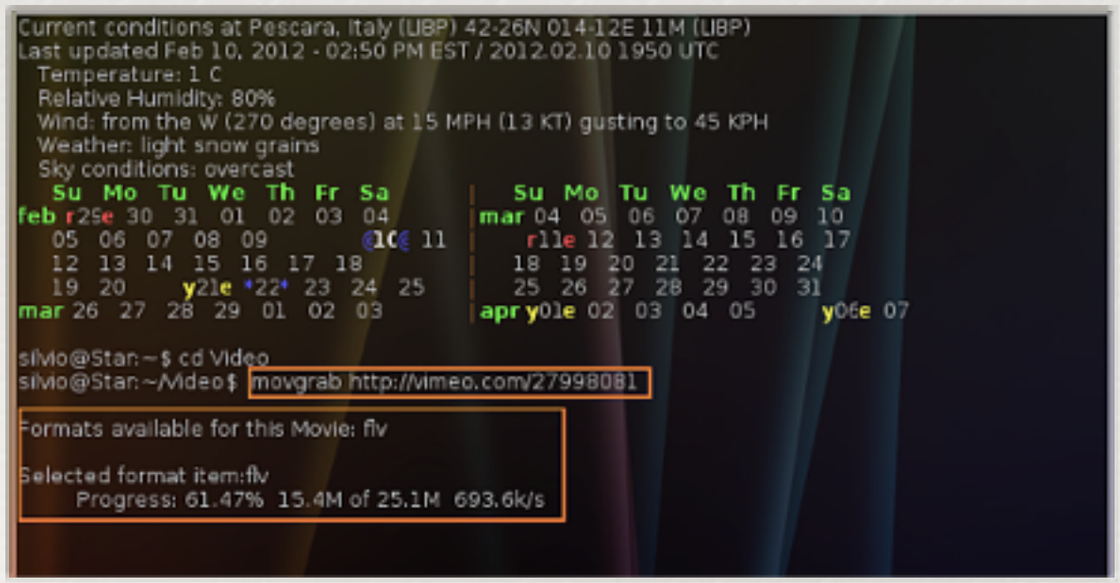
- *In this example we are sorting the listing of a directory so that all the directories are listed first.*

Terminal

```
1.  user@bash: ls -l /etc | tail -n +2 | sort
2.  drwxrwxr-x 3 nagios nagcmd 4096 Mar 29 08:52 nagios
3.  drwxr-x--- 2 news news 4096 Jan 27 02:22 news
4.  drwxr-x--- 2 root mysql 4096 Mar 6 22:39 mysql
5.  ...
6.  user@bash:
```


Lesson
Learned!


LINUX
Professional Operating System
THANK YOU


Current conditions at Pescara, Italy (UBP) 42-26N 014-12E 11M (UBP)
Last updated Feb 10, 2012 - 02:50 PM EST / 2012.02.10 1950 UTC
Temperature: 1 C
Relative Humidity: 80%
Wind: from the W (270 degrees) at 15 MPH (13 KT) gusting to 45 KPH
Weather: light snow grains
Sky conditions: overcast
Su Mo Tu We Th Fr Sa
feb 26 27 28 29 01 02 03
05 06 07 08 09 10 11
12 13 14 15 16 17 18
19 20 21 22 23 24 25
mar 26 27 28 29 01 02 03
Su Mo Tu We Th Fr Sa
mar 04 05 06 07 08 09 10
11 12 13 14 15 16 17
18 19 20 21 22 23 24
25 26 27 28 29 30 31
apr 01 02 03 04 05 06 07
silvio@Star:~$ cd Video
silvio@Star:~/Video$ movgrab http://vimeo.com/27998081
Formats available for this Movie: flv
Selected format item:flv
Progress: 61.47% 15.4M of 25.1M 693.6k/s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