

Dernière mise-à-jour : 2020/01/30 03:28

# Command Line Interface

## The Shell

A shell is a **Command Line Interpreter** (C.L.I). It is used to give instructions or **commands** to the operating system (OS).

The word shell is generic. There are many shells under Unix and Linux such as:

Shell	Name	Release Date	Inventer	Command	Comments
tsh	Thompson Shell	1971	Ken Thompson	sh	The first shell
sh	Bourne Shell	1977	Stephen Bourne	sh	The shell common to all Unix and Linux OSs: /bin/sh
csh	C-Shell	1978	Bill Joy	csh	The BSD shell: /bin/csh
tcsh	Tenex C-Shell	1979	Ken Greer	tcsh	A fork of the csh shell: /bin/tcsh
ksh	Korn Shell	1980	David Korn	ksh	Open Source since 2005: /bin/ksh
bash	Bourne Again Shell	1987	Brian Fox	bash	The default shell for Linux, MacOS X, Solaris 11: /bin/bash
zsh	Z Shell	1990	Paul Falstad	zsh	Zsh is an extended Bourne shell with a large number of improvements, including some features of bash, ksh, and tcsh: /usr/bin/zsh

When using Debian 8 **/bin/sh** is a soft link to **/bin/dash** :

```
trainee@debian8:~$ ls -l /bin/sh
lrwxrwxrwx 1 root root 4 Nov  8 2014 /bin/sh -> dash
```

When using Ubuntu 16.04 **/bin/sh** is a soft link to **/bin/dash** :

```
trainee@ubuntu1604:~$ ls -l /bin/sh
lrwxrwxrwx 1 root root 4 mai   3 2016 /bin/sh -> dash
```

When using RHEL/CentOS 7 **/bin/sh** is a soft link to **/bin/bash** :

```
[trainee@centos7 ~]$ ls -l /bin/sh
lrwxrwxrwx. 1 root root 4 30 sept. 06:01 /bin/sh -> bash
```

When using SLES 12 **/bin/sh** is a soft link to **/bin/bash** :

```
trainee@SLES12SP1:~> ls -l /bin/sh
lrwxrwxrwx 1 root root 4 1 mai 2016 /bin/sh -> bash
```

## **/bin/bash**

This unit covers the `/bin/bash` shell. The **/bin/bash** shell allows you to:

- Recall previously typed commands
- Auto-generate the end of a file name
- Use Aliases
- Use tables
- Use C language numerical and math variables
- Manage strings
- Use Functions

A command always starts with a keyword. This keyword is interpreted by the shell, in the order shown, as one of the following:

- An Alias,
- A Function,
- A Built-in Command,
- An External Command.

## **Internal And External Commands**

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The `/bin/bash` shell comes with a set of built-in or *internal* commands. External commands are executable binaries or scripts generally found in one of the following directories:

- `/bin`,
- `/sbin`,
- `/usr/bin`,
- `/usr/sbin`.

To check if a command is internal to the shell or external, use the **type** command:

```
trainee@debian8:~$ type cd
cd is a shell builtin
```

```
trainee@ubuntu1604:~$ type cd
cd is a shell builtin
```

```
[trainee@centos7 ~]$ type cd
cd is a shell builtin
```

```
trainee@SLES12SP1:~> type cd
cd is a shell builtin
```

External commands are either binaries or scripts that can be found in `/bin`, `/sbin`, `/usr/bin` or `/usr/sbin` :

```
trainee@debian8:~$ type passwd
passwd is /usr/bin/passwd
```

```
trainee@ubuntu1604:~$ type passwd
passwd is /usr/bin/passwd
```

```
[trainee@centos7 ~]$ type passwd
passwd is /usr/bin/passwd
```

```
trainee@SLES12SP1:~> type passwd
```

```
passwd is /usr/bin/passwd
```

## Aliases

Aliases are strings that are aliased to a command, a command and some options or even several commands. Aliases are specific to the shell in which they are created and unless specified in one of the start-up files, they disappear when the shell is closed:

```
trainee@debian8:~$ type ls
ls is aliased to `ls --color=auto`
```

```
trainee@ubuntu1604:~$ type ls
ls is aliased to `ls --color=auto`
```

```
[trainee@centos7 ~]$ type ls
ls is aliased to `ls --color=auto`
```

```
trainee@SLES12SP1:~> type ls
ls is aliased to `_ls`
```



**Important:** Note that the **ls** alias is an alias to the **ls** command itself.

An alias is defined using the **alias** command:

```
trainee@debian8:~$ alias dir='ls -l'
trainee@debian8:~$ dir
total 36
-rw-r--r-- 1 trainee trainee  0 Aug 19 17:08 aac
-rw-r--r-- 1 trainee trainee  0 Aug 19 17:08 abc
-rw-r--r-- 1 trainee trainee  0 Aug 19 17:08 bca
drwxr-xr-x 2 trainee trainee 4096 May  1 2016 Desktop
```

```
drwxr-xr-x 2 trainee trainee 4096 May 1 2016 Documents
drwxr-xr-x 2 trainee trainee 4096 May 1 2016 Downloads
drwxr-xr-x 2 trainee trainee 4096 May 1 2016 Music
drwxr-xr-x 2 trainee trainee 4096 May 1 2016 Pictures
drwxr-xr-x 2 trainee trainee 4096 May 1 2016 Public
drwxr-xr-x 2 trainee trainee 4096 May 1 2016 Templates
drwxr-xr-x 2 trainee trainee 4096 May 1 2016 Videos
-rw-r--r-- 1 trainee trainee 391 Aug 18 23:34 vitext
-rw-r--r-- 1 trainee trainee 0 Aug 19 17:08 xyz
```

```
trainee@ubuntu1604:~$ alias dir='ls -l'
```

```
trainee@ubuntu1604:~$ dir
```

```
total 48
```

```
-rw-rw-r-- 1 trainee trainee 0 oct. 4 14:24 aac
-rw-rw-r-- 1 trainee trainee 0 oct. 4 14:24 abc
-rw-rw-r-- 1 trainee trainee 0 oct. 4 14:24 bca
drwxr-xr-x 2 trainee trainee 4096 mai 3 2016 Desktop
drwxr-xr-x 2 trainee trainee 4096 mai 3 2016 Documents
drwxr-xr-x 2 trainee trainee 4096 mai 3 2016 Downloads
-rw-r--r-- 1 trainee trainee 8980 mai 3 2016 examples.desktop
drwxr-xr-x 2 trainee trainee 4096 mai 3 2016 Music
drwxr-xr-x 2 trainee trainee 4096 mai 3 2016 Pictures
drwxr-xr-x 2 trainee trainee 4096 mai 3 2016 Public
drwxr-xr-x 2 trainee trainee 4096 mai 3 2016 Templates
drwxr-xr-x 2 trainee trainee 4096 mai 3 2016 Videos
-rw-rw-r-- 1 trainee trainee 442 sept. 30 11:35 vitext
-rw-rw-r-- 1 trainee trainee 0 oct. 4 14:24 xyz
```

```
[trainee@centos7 ~]$ alias dir='ls -l'
```

```
[trainee@centos7 ~]$ dir
```

```
total 4
```

```
-rw-rw-r-- 1 trainee trainee 0 29 sept. 18:20 aac
-rw-rw-r-- 1 trainee trainee 0 29 sept. 18:20 abc
-rw-rw-r-- 1 trainee trainee 0 29 sept. 18:20 bca
```

```
drwxr-xr-x. 2 trainee trainee 6 30 avril 11:54 Desktop
drwxr-xr-x. 2 trainee trainee 6 30 avril 11:54 Documents
drwxr-xr-x. 2 trainee trainee 6 30 avril 11:54 Downloads
drwxr-xr-x. 2 trainee trainee 6 30 avril 11:54 Music
drwxr-xr-x. 2 trainee trainee 6 30 avril 11:54 Pictures
drwxr-xr-x. 2 trainee trainee 6 30 avril 11:54 Public
drwxr-xr-x. 2 trainee trainee 6 30 avril 11:54 Templates
drwxr-xr-x. 2 trainee trainee 6 30 avril 11:54 Videos
-rw-rw-r--. 1 trainee trainee 442 29 sept. 00:53 vitext
-rw-rw-r--. 1 trainee trainee 0 29 sept. 18:20 xyz
```

```
trainee@SLES12SP1:~> alias dir='ls -l'
trainee@SLES12SP1:~> dir
total 4
-rw-r--r-- 1 trainee users 0 1 oct. 06:55 aac
-rw-r--r-- 1 trainee users 0 1 oct. 06:55 abc
-rw-r--r-- 1 trainee users 0 1 oct. 06:55 bca
drwxr-xr-x 1 trainee users 0 1 mai 2016 bin
drwxr-xr-x 1 trainee users 0 2 mai 2016 Desktop
drwxr-xr-x 1 trainee users 0 2 mai 2016 Documents
drwxr-xr-x 1 trainee users 0 2 mai 2016 Downloads
drwxr-xr-x 1 trainee users 0 2 mai 2016 Music
drwxr-xr-x 1 trainee users 0 2 mai 2016 Pictures
drwxr-xr-x 1 trainee users 0 2 mai 2016 Public
drwxr-xr-x 1 trainee users 20 1 mai 2016 public_html
drwxr-xr-x 1 trainee users 0 2 mai 2016 Templates
drwxr-xr-x 1 trainee users 0 2 mai 2016 Videos
-rw-r--r-- 1 trainee users 391 30 sept. 10:27 vitext
-rw-r--r-- 1 trainee users 0 1 oct. 06:55 xyz
```



**Important:** Note that **dir** exists as a command. By creating an alias of the same name, the alias will be executed in place of the command.

The list of currently defined aliases is obtained by using the **alias** command with no options:

```
trainee@debian8:~$ alias
alias dir='ls -l'
alias ls='ls --color=auto'
```

```
trainee@ubuntu1604:~$ alias
alias alert='notify-send --urgency=low -i "${([ $? = 0 ]) && echo terminal || echo error}" "$(history|tail -n1|sed -e '\''s/^\s*[0-9]\+\s*//;s/[\&|]\s*alert$//'\''")"'
alias dir='ls -l'
alias egrep='egrep --color=auto'
alias fgrep='fgrep --color=auto'
alias grep='grep --color=auto'
alias l='ls -CF'
alias la='ls -A'
alias ll='ls -alF'
alias ls='ls --color=auto'
```

```
[trainee@centos7 ~]$ alias
alias dir='ls -l'
alias egrep='egrep --color=auto'
alias fgrep='fgrep --color=auto'
alias grep='grep --color=auto'
alias l.='ls -d .* --color=auto'
alias ll='ls -l --color=auto'
alias ls='ls --color=auto'
alias vi='vim'
alias which='alias | /usr/bin/which --tty-only --read-alias --show-dot --show-tilde'
```

```
trainee@SLES12SP1:~> alias
alias +=='pushd .'
alias -=='popd'
alias ..='cd ..'
alias ...='cd ../..'
```

```
alias aumix='padsp aumix'
alias beep='echo -en "\007"'
alias cd.='cd ..'
alias dir='ls -l'
alias egrep='egrep --color=auto'
alias fgrep='fgrep --color=auto'
alias grep='grep --color=auto'
alias l='ls -aF'
alias la='ls -la'
alias ll='ls -l'
alias ls='_ls'
alias ls-l='ls -l'
alias md='mkdir -p'
alias o='less'
alias rd='rmdir'
alias rehash='hash -r'
alias sox='padsp sox'
alias timidity='timidity -Oe'
alias umount='echo "Error: Try the command: umount" 1>&2; false'
alias you='if test "$EUID" = 0 ; then /sbin/yast2 online_update ; else su - -c "/sbin/yast2 online_update" ; fi'
```



**Important:** In the above list you can see, without distinction, the system wide aliases created by system start up scripts and the user created alias **dir**. The latter is only available for trainee and will disappear when the current session is terminated.

To force the shell to use the command and not the alias, you can precede the command with the `\` character:

```
trainee@debian8:~$ \dir
aac  bca      Documents Music      Public    Videos  xyz
abc  Desktop  Downloads Pictures  Templates vitext
```

```
trainee@ubuntu1604:~$ \dir
```

```
aac bca Documents examples.desktop Pictures Templates vitext
abc Desktop Downloads Music Public Videos xyz
```

```
[trainee@centos7 ~]$ \dir
aac bca Documents Music Public Videos xyz
abc Desktop Downloads Pictures Templates vitext
```

```
trainee@SLES12SP1:~> \dir
aac bca Desktop Downloads Pictures public_html Videos xyz
abc bin Documents Music Public Templates vitext
```

To delete an alias, simply use the **unalias** command:

```
trainee@debian8:~$ unalias dir
trainee@debian8:~$ dir
aac bca Documents Music Public Videos xyz
abc Desktop Downloads Pictures Templates vitext
```

```
trainee@ubuntu1604:~$ unalias dir
trainee@ubuntu1604:~$ dir
aac bca Documents examples.desktop Pictures Templates vitext
abc Desktop Downloads Music Public Videos xyz
```

```
[trainee@centos7 ~]$ unalias dir
[trainee@centos7 ~]$ dir
aac bca Documents Music Public Videos xyz
abc Desktop Downloads Pictures Templates vitext
```

```
trainee@SLES12SP1:~> unalias dir
trainee@SLES12SP1:~> dir
aac bca Desktop Downloads Pictures public_html Videos xyz
abc bin Documents Music Public Templates vitext
```

Each user's shell is defined by root in the **/etc/passwd** file:

```
trainee@debian8:~$ cat /etc/passwd
root:x:0:0:root:/root:/bin/bash
daemon:x:1:1:daemon:/usr/sbin:/usr/sbin/nologin
bin:x:2:2:bin:/bin:/usr/sbin/nologin
sys:x:3:3:sys:/dev:/usr/sbin/nologin
sync:x:4:65534:sync:/bin:/bin/sync
games:x:5:60:games:/usr/games:/usr/sbin/nologin
man:x:6:12:man:/var/cache/man:/usr/sbin/nologin
lp:x:7:7:lp:/var/spool/lpd:/usr/sbin/nologin
mail:x:8:8:mail:/var/mail:/usr/sbin/nologin
news:x:9:9:news:/var/spool/news:/usr/sbin/nologin
uucp:x:10:10:uucp:/var/spool/uucp:/usr/sbin/nologin
proxy:x:13:13:proxy:/bin:/usr/sbin/nologin
www-data:x:33:33:www-data:/var/www:/usr/sbin/nologin
backup:x:34:34:backup:/var/backups:/usr/sbin/nologin
list:x:38:38:Mailing List Manager:/var/list:/usr/sbin/nologin
irc:x:39:39:ircd:/var/run/ircd:/usr/sbin/nologin
gnats:x:41:41:Gnats Bug-Reporting System (admin):/var/lib/gnats:/usr/sbin/nologin
nobody:x:65534:65534:nobody:/nonexistent:/usr/sbin/nologin
systemd-timesync:x:100:103:systemd Time Synchronization,,,:/run/systemd:/bin/false
systemd-network:x:101:104:systemd Network Management,,,:/run/systemd/netif:/bin/false
systemd-resolve:x:102:105:systemd Resolver,,,:/run/systemd/resolve:/bin/false
systemd-bus-proxy:x:103:106:systemd Bus Proxy,,,:/run/systemd:/bin/false
trainee:x:1000:1000:trainee,,,:/home/trainee:/bin/bash
sshd:x:104:65534::/var/run/sshd:/usr/sbin/nologin
Debian-exim:x:105:110::/var/spool/exim4:/bin/false
messagebus:x:106:111::/var/run/dbus:/bin/false
statd:x:107:65534::/var/lib/nfs:/bin/false
avahi-autoipd:x:108:113:Avahi autoip daemon,,,:/var/lib/avahi-autoipd:/bin/false
avahi:x:109:115:Avahi mDNS daemon,,,:/var/run/avahi-daemon:/bin/false
colord:x:110:117:colord colour management daemon,,,:/var/lib/colord:/bin/false
dnsmasq:x:111:65534:dnsmasq,,,:/var/lib/misc:/bin/false
```

```
speech-dispatcher:x:112:29:Speech Dispatcher,,,:/var/run/speech-dispatcher:/bin/sh
pulse:x:113:119:PulseAudio daemon,,,:/var/run/pulse:/bin/false
rtkit:x:114:121:RealtimeKit,,,:/proc:/bin/false
saned:x:115:122::/var/lib/saned:/bin/false
usbmux:x:116:46:usbmux daemon,,,:/var/lib/usbmux:/bin/false
lightdm:x:117:124:Light Display Manager:/var/lib/lightdm:/bin/false
```

```
trainee@ubuntu1604:~$ cat /etc/passwd
root:x:0:0:root:/root:/bin/bash
daemon:x:1:1:daemon:/usr/sbin:/usr/sbin/nologin
bin:x:2:2:bin:/bin:/usr/sbin/nologin
sys:x:3:3:sys:/dev:/usr/sbin/nologin
sync:x:4:65534:sync:/bin:/bin/sync
games:x:5:60:games:/usr/games:/usr/sbin/nologin
man:x:6:12:man:/var/cache/man:/usr/sbin/nologin
lp:x:7:7:lp:/var/spool/lpd:/usr/sbin/nologin
mail:x:8:8:mail:/var/mail:/usr/sbin/nologin
news:x:9:9:news:/var/spool/news:/usr/sbin/nologin
uucp:x:10:10:uucp:/var/spool/uucp:/usr/sbin/nologin
proxy:x:13:13:proxy:/bin:/usr/sbin/nologin
www-data:x:33:33:www-data:/var/www:/usr/sbin/nologin
backup:x:34:34:backup:/var/backups:/usr/sbin/nologin
list:x:38:38:Mailing List Manager:/var/list:/usr/sbin/nologin
irc:x:39:39:ircd:/var/run/ircd:/usr/sbin/nologin
gnats:x:41:41:Gnats Bug-Reporting System (admin):/var/lib/gnats:/usr/sbin/nologin
nobody:x:65534:65534:nobody:/nonexistent:/usr/sbin/nologin
systemd-timesync:x:100:102:systemd Time Synchronization,,,:/run/systemd:/bin/false
systemd-network:x:101:103:systemd Network Management,,,:/run/systemd/netif:/bin/false
systemd-resolve:x:102:104:systemd Resolver,,,:/run/systemd/resolve:/bin/false
systemd-bus-proxy:x:103:105:systemd Bus Proxy,,,:/run/systemd:/bin/false
syslog:x:104:108::/home/syslog:/bin/false
_apt:x:105:65534::/nonexistent:/bin/false
messagebus:x:106:110::/var/run/dbus:/bin/false
uidd:x:107:111::/run/uidd:/bin/false
```

```
lightdm:x:108:114:Light Display Manager:/var/lib/lightdm:/bin/false
whoopsie:x:109:116::/nonexistent:/bin/false
avahi-autoipd:x:110:119:Avahi autoip daemon,,,:/var/lib/avahi-autoipd:/bin/false
avahi:x:111:120:Avahi mDNS daemon,,,:/var/run/avahi-daemon:/bin/false
dnsmasq:x:112:65534:dnsmasq,,,:/var/lib/misc:/bin/false
colord:x:113:123:colord colour management daemon,,,:/var/lib/colord:/bin/false
speech-dispatcher:x:114:29:Speech Dispatcher,,,:/var/run/speech-dispatcher:/bin/false
hplip:x:115:7:HPLIP system user,,,:/var/run/hplip:/bin/false
kernoops:x:116:65534:Kernel Oops Tracking Daemon,,,:/bin/false
pulse:x:117:124:PulseAudio daemon,,,:/var/run/pulse:/bin/false
rtkit:x:118:126:RealtimeKit,,,:/proc:/bin/false
saned:x:119:127::/var/lib/saned:/bin/false
usbmux:x:120:46:usbmux daemon,,,:/var/lib/usbmux:/bin/false
trainee:x:1000:1000:trainee,,,:/home/trainee:/bin/bash
sshd:x:121:65534::/var/run/sshd:/usr/sbin/nologin
```

```
[trainee@centos7 ~]$ cat /etc/passwd
root:x:0:0:root:/root:/bin/bash
bin:x:1:1:bin:/bin:/sbin/nologin
daemon:x:2:2:daemon:/sbin:/sbin/nologin
adm:x:3:4:adm:/var/adm:/sbin/nologin
lp:x:4:7:lp:/var/spool/lpd:/sbin/nologin
sync:x:5:0:sync:/sbin:/bin/sync
shutdown:x:6:0:shutdown:/sbin:/sbin/shutdown
halt:x:7:0:halt:/sbin:/sbin/halt
mail:x:8:12:mail:/var/spool/mail:/sbin/nologin
operator:x:11:0:operator:/root:/sbin/nologin
games:x:12:100:games:/usr/games:/sbin/nologin
ftp:x:14:50:FTP User:/var/ftp:/sbin/nologin
nobody:x:99:99:Nobody:/:/sbin/nologin
avahi-autoipd:x:170:170:Avahi IPv4LL Stack:/var/lib/avahi-autoipd:/sbin/nologin
systemd-bus-proxy:x:999:997:systemd Bus Proxy:/:/sbin/nologin
systemd-network:x:998:996:systemd Network Management:/:/sbin/nologin
dbus:x:81:81:System message bus:/:/sbin/nologin
```

```
polkitd:x:997:995:User for polkitd:/:/sbin/nologin
abrt:x:173:173::/etc/abrt:/sbin/nologin
usbmuxd:x:113:113:usbmuxd user:/:/sbin/nologin
colord:x:996:993:User for colord:/var/lib/colord:/sbin/nologin
libstoragemgmt:x:995:992:daemon account for libstoragemgmt:/var/run/lsm:/sbin/nologin
setroubleshoot:x:994:991::/var/lib/setroubleshoot:/sbin/nologin
rpc:x:32:32:Rpcbind Daemon:/var/lib/rpcbind:/sbin/nologin
rtkit:x:172:172:RealtimeKit:/proc:/sbin/nologin
chrony:x:993:990::/var/lib/chrony:/sbin/nologin
unbound:x:992:989:Unbound DNS resolver:/etc/unbound:/sbin/nologin
tss:x:59:59:Account used by the trousers package to sandbox the tcsd daemon:/dev/null:/sbin/nologin
geoclue:x:991:988:User for geoclue:/var/lib/geoclue:/sbin/nologin
ntp:x:38:38::/etc/ntp:/sbin/nologin
sssd:x:990:987:User for sssd:/:/sbin/nologin
rpcuser:x:29:29:RPC Service User:/var/lib/nfs:/sbin/nologin
nfsnobody:x:65534:65534:Anonymous NFS User:/var/lib/nfs:/sbin/nologin
pulse:x:171:171:PulseAudio System Daemon:/var/run/pulse:/sbin/nologin
gdm:x:42:42::/var/lib/gdm:/sbin/nologin
gnome-initial-setup:x:989:984::/run/gnome-initial-setup:/sbin/nologin
avahi:x:70:70:Avahi mDNS/DNS-SD Stack:/var/run/avahi-daemon:/sbin/nologin
postfix:x:89:89::/var/spool/postfix:/sbin/nologin
sshd:x:74:74:Privilege-separated SSH:/var/empty/ssh:/sbin/nologin
tcpdump:x:72:72::/sbin/nologin
trainee:x:1000:1000:trainee:/home/trainee:/bin/bash
vboxadd:x:988:1::/var/run/vboxadd:/bin/false
named:x:25:25:Named:/var/named:/sbin/nologin
```

```
trainee@SLES12SP1:~> cat /etc/passwd
at:x:25:25:Batch jobs daemon:/var/spool/atjobs:/bin/bash
bin:x:1:1:bin:/bin:/bin/bash
daemon:x:2:2:Daemon:/sbin:/bin/bash
ftp:x:40:49:FTP account:/srv/ftp:/bin/bash
ftpsecure:x:488:65534:Secure FTP User:/var/lib/empty:/bin/false
games:x:12:100:Games account:/var/games:/bin/bash
```

```
gdm:x:486:485:Gnome Display Manager daemon:/var/lib/gdm:/bin/false
lp:x:4:7:Printing daemon:/var/spool/lpd:/bin/bash
mail:x:8:12:Mailer daemon:/var/spool/clientmqueue:/bin/false
man:x:13:62:Manual pages viewer:/var/cache/man:/bin/bash
messagebus:x:499:499:User for D-Bus:/var/run/dbus:/bin/false
news:x:9:13:News system:/etc/news:/bin/bash
nobody:x:65534:65533:nobody:/var/lib/nobody:/bin/bash
nscd:x:496:495:User for nscd:/run/nscd:/sbin/nologin
ntp:x:74:492:NTP daemon:/var/lib/ntp:/bin/false
openslp:x:494:2:openslp daemon:/var/lib/empty:/sbin/nologin
polkitd:x:497:496:User for polkitd:/var/lib/polkit:/sbin/nologin
postfix:x:51:51:Postfix Daemon:/var/spool/postfix:/bin/false
pulse:x:490:489:PulseAudio daemon:/var/lib/pulseaudio:/sbin/nologin
root:x:0:0:root:/root:/bin/bash
rpc:x:495:65534:user for rpcbind:/var/lib/empty:/sbin/nologin
rtkit:x:491:490:RealtimeKit:/proc:/bin/false
scard:x:487:487:Smart Card Reader:/var/run/pcscd:/usr/sbin/nologin
sshd:x:498:498:SSH daemon:/var/lib/ssh:/bin/false
statd:x:489:65534:NFS statd daemon:/var/lib/nfs:/sbin/nologin
usbmux:x:493:65534:usbmuxd daemon:/var/lib/usbmuxd:/sbin/nologin
uucp:x:10:14:Unix-to-Unix CoPy system:/etc/uucp:/bin/bash
vnc:x:492:491:user for VNC:/var/lib/empty:/sbin/nologin
wwwrun:x:30:8:WWW daemon apache:/var/lib/wwwrun:/bin/false
trainee:x:1000:100:trainee:/home/trainee:/bin/bas
```

However, each user can change his shell using the **chsh** command. The shells available to users are listed in the **/etc/shells** file:

```
trainee@debian8:~$ cat /etc/shells
# /etc/shells: valid login shells
/bin/sh
/bin/dash
/bin/bash
/bin/rbash
```

```
/usr/bin/screen
```

```
trainee@ubuntu1604:~$ cat /etc/shells
# /etc/shells: valid login shells
/bin/sh
/bin/dash
/bin/bash
/bin/rbash
/usr/bin/screen
```

```
[trainee@centos7 ~]$ cat /etc/shells
/bin/sh
/bin/bash
/sbin/nologin
/usr/bin/sh
/usr/bin/bash
/usr/sbin/nologin
/bin/tcsh
/bin/csh
```

```
trainee@SLES12SP1:~> cat /etc/shells
/bin/ash
/bin/bash
/bin/csh
/bin/dash
/bin/false
/bin/ksh
/bin/ksh93
/bin/mksh
/bin/pdksh
/bin/sh
/bin/tcsh
/bin/true
/bin/zsh
```

```
/usr/bin/csh
/usr/bin/dash
/usr/bin/ksh
/usr/bin/ksh93
/usr/bin/mksh
/usr/bin/passwd
/usr/bin/pdksh
/usr/bin/bash
/usr/bin/tcsh
/usr/bin/zsh
```

Now use the **echo** command to view the contents of the system variable SHELL for your current session:

```
trainee@debian8:~$ echo $SHELL
/bin/bash
```

```
trainee@ubuntu1604:~$ echo $SHELL
/bin/bash
```

```
[trainee@centos7 ~]$ echo $SHELL
/bin/bash
```

```
trainee@SLES12SP1:~> echo $SHELL
/bin/bash
```



**Important** : Note that when using RHEL/CentOS 7 the output shows that trainee's shell is **/bin/bash** and not **/usr/bin/bash**. This is because `/bin` is a soft link to `/usr/bin`.

Now change your shell to **/bin/sh** using the **chsh** command:

```
trainee@debian8:~$ chsh
```

```
Password: trainee
Changing the login shell for trainee
Enter the new value, or press ENTER for the default
  Login Shell [/bin/bash]: /bin/sh
```

```
trainee@ubuntu1604:~$ chsh
Password: trainee
Changing the login shell for trainee
Enter the new value, or press ENTER for the default
  Login Shell [/bin/bash]: /bin/sh
```

```
[trainee@centos7 ~]$ chsh
Changing shell for trainee.
New shell [/bin/bash]: /bin/sh
Password: trainee
Shell changed.
```

```
trainee@SLES12SP1:~> chsh
Password: trainee
Changing the login shell for trainee
Enter the new value, or press ENTER for the default
  Login Shell [/bin/bash]: /bin/sh
```



**Important:** Note that the password will not be printed to standard output.

Now check your current shell:

```
trainee@debian8:~$ echo $SHELL
/bin/bash
```

```
trainee@ubuntu1604:~$ echo $SHELL
```

```
/bin/bash
```

```
[trainee@centos7 ~]$ echo $SHELL  
/bin/bash
```

```
trainee@SLES12SP1:~> echo $SHELL  
/bin/bash
```

At first glance nothing has happened. However if you view your entry in the **/etc/passwd** file you will notice that your login shell has changed:

```
trainee@debian8:~$ cat /etc/passwd | grep trainee  
trainee:x:1000:1000:trainee,,,:/home/trainee:/bin/sh
```

```
trainee@ubuntu1604:~$ cat /etc/passwd | grep trainee  
trainee:x:1000:1000:trainee,,,:/home/trainee:/bin/sh
```

```
[trainee@centos7 ~]$ cat /etc/passwd | grep trainee  
trainee:x:1000:1000:trainee:/home/trainee:/bin/sh
```

```
trainee@SLES12SP1:~> cat /etc/passwd | grep trainee  
trainee:x:1000:100:trainee:/home/trainee:/bin/sh
```



**Important** : The **/bin/sh** shell will be your active shell the next time you login.

Now change your shell back to **/bin/bash** using the **chsh** command:

```
trainee@debian8:~$ chsh  
Password: trainee  
Changing the login shell for trainee  
Enter the new value, or press ENTER for the default
```

```
Login Shell [/bin/sh]: /bin/bash
```

```
trainee@ubuntu1604:~$ chsh
Password: trainee
Changing the login shell for trainee
Enter the new value, or press ENTER for the default
  Login Shell [/bin/sh]: /bin/bash
```

```
[trainee@centos7 ~]$ chsh
Changing shell for trainee.
New shell [/bin/sh]: /bin/bash
Password: trainee
Shell changed.
```

```
trainee@SLES12SP1:~> chsh
Password: trainee
Changing the login shell for trainee
Enter the new value, or press ENTER for the default
  Login Shell [/bin/sh]: /bin/bash
```



**Important:** Note that the password will not be printed to standard output.

## The Prompt

As you have already noticed, the **prompt** under Linux is different for a normal user and root:

- **\$** for a user when using RHEL/CentOS, Debian and Ubuntu,
- **>** for a user when using SLES,
- **#** for root.

## The history Command

**/bin/bash** keeps track of commands that have been previously executed. To access the *command history*, use the following command:

```
trainee@debian8:~$ history | more
```

```
 1 su -
 2 su -
 3 exit
 4 su -
 5 exit
 6 ls -l /var
 7 su -
 8 su -
 9 vi vitext
10 view vitext
11 clear
12 stty -a
13 date
14 who
15 df
16 df -h
17 free
18 free -h
19 whoami
20 su -
21 clear
22 su -
23 exit
```

```
--More--
```

```
trainee@ubuntu1604:~$ history | more
```

```
 1 sudo su -
 2 vi vitext
```

```
3 view vitext
4 vi vitext
5 vi .exerc
6 vi vitext
7 clear
8 stty -a
9 date
10 locale
11 LANG=en_GB.UTF-8
12 export LANG
13 locale
14 date
15 LC_ALL=en_GB.UTF-8
16 export LC_ALL
17 locale
18 date
19 who
20 df
21 df -h
22 free
23 free -h
--More--
```

```
[trainee@centos7 ~]$ history | more
```

```
1 su -
2 df -h
3 su -
4 exit
5 su -
6 su -
7 vi vitext
8 view vitext
9 vi vitext
10 locale
```

```
11 LANG=en_GB.UTF-8
12 export LANG
13 locale
14 vi vitext
15 vi .exrc
16 vi vitext
17 clear
18 stty -a
19 date
20 locale
21 who
22 df
23 df -h
--More--
```

```
trainee@SLES12SP1:~> history | more
```

```
1 su -
2 su -
3 clear
4 cd /
5 ls -l
6 ls -l /var/run
7 cd /mnt
8 ls
9 cd
10 mount
11 mount --help
12 cat /etc/fstab
13 umount --help
14 dumpe2fs /dev/sda1 | grep -i superbloc
15 ls -ld /dev/console /dev/initctl /dev/loop0 /etc /etc/passwd
16 ls -ld /dev/console /dev/initctl /etc /etc/passwd
17 ls -ldi /dev/console /dev/initctl /etc /etc/passwd
18 cd /tmp; mkdir inode; cd inode; touch fichier1; ls -ali
```

```
19 ln fichier1 fichier2
20 ls -ali
21 ln -s fichier1 fichier3
22 ls -ali
23 su -
--More--
```



**Important:** The history is specific to each user.

The history command uses **emacs** style control characters. As a result you can navigate through the list as follows:

Control Character	Action
[CTRL]-[P] (= Up Arrow)	Navigates backwards through the list
[CTRL]-[N] (= Down Arrow)	Navigates forwards through the list

To move around in the history:

Control Character	Action
[CTRL]-[A]	Move to the beginning of the line
[CTRL]-[E]	Move to the end of the line
[CTRL]-[B]	Move one character to the left
[CTRL]-[F]	Move one character to the right
[CTRL]-[D]	Delete the character under the cursor

Pour rechercher dans l'historique il convient d'utiliser les touches :

Control Character	Action
[CTRL]-[R] <i>string</i>	Search backwards for <i>string</i> in the history. Using [CTRL]-[R] again will search for the previous occurrence of <i>string</i>
[CTRL]-[S] <i>string</i>	Search forwards for <i>string</i> in the history. Using [CTRL]-[S] again will search for the next occurrence of <i>string</i>
[CTRL]-[G]	Quit the search mode

It is also possible to recall the last command executed by using the !! characters:

```
trainee@debian8:~$ ls
aac bca Documents Music Public Videos xyz
abc Desktop Downloads Pictures Templates vitext
trainee@debian8:~$ !!
ls
aac bca Documents Music Public Videos xyz
abc Desktop Downloads Pictures Templates vitext
```

```
trainee@ubuntu1604:~$ ls
aac bca Documents examples.desktop Pictures Templates vitext
abc Desktop Downloads Music Public Videos xyz
trainee@ubuntu1604:~$ !!
ls
aac bca Documents examples.desktop Pictures Templates vitext
abc Desktop Downloads Music Public Videos xyz
```

```
[trainee@centos7 ~]$ ls
aac bca Documents Music Public Videos xyz
abc Desktop Downloads Pictures Templates vitext
[trainee@centos7 ~]$ !!
ls
aac bca Documents Music Public Videos xyz
abc Desktop Downloads Pictures Templates vitext
```

```
trainee@SLES12SP1:~> ls
aac bca Desktop Downloads Pictures public_html Videos xyz
abc bin Documents Music Public Templates vitext
trainee@SLES12SP1:~> !!
ls
aac bca Desktop Downloads Pictures public_html Videos xyz
abc bin Documents Music Public Templates vitext
```

Alternatively, to execute a command in the list, you can use the list number preceded by the ! character:

```
trainee@debian8:~$ !52
ls
aac bca Documents Music Public Videos xyz
abc Desktop Downloads Pictures Templates vitext
```

```
trainee@ubuntu1604:~$ !107
ls
aac bca Documents examples.desktop Pictures Templates vitext
abc Desktop Downloads Music Public Videos xyz
```

```
[trainee@centos7 ~]$ !123
ls
aac bca Documents Music Public Videos xyz
abc Desktop Downloads Pictures Templates vitext
```

```
trainee@SLES12SP1:~> !131
ls
aac bca Desktop Downloads Pictures public_html Videos xyz
abc bin Documents Music Public Templates vitext
```

The environmental variables associated with the history are set system-wide in the **/etc/profile** file. When using Debian or Ubuntu however, the values are set in the **~/.bashrc** file where **~/** indicates the home directory of the user concerned:

```
trainee@debian8:~$ cat .bashrc | grep HISTSIZE
# for setting history length see HISTSIZE and HISTFILESIZE in bash(1)
HISTSIZE=1000
```

```
trainee@ubuntu1604:~$ cat .bashrc | grep HISTSIZE
# for setting history length see HISTSIZE and HISTFILESIZE in bash(1)
HISTSIZE=1000
```

```
[trainee@centos7 ~]$ cat /etc/profile | grep HISTSIZE
HISTSIZE=1000
export PATH USER LOGNAME MAIL HOSTNAME HISTSIZE HISTCONTROL
```

```
trainee@SLES12SP1:~> cat /etc/profile | grep HISTSIZE
HISTSIZE=1000
export HISTSIZE
```

As you can see, in the previous case the **HISTSIZE** value is set to **1000**. This means that the last 1,000 commands are held in the history.

The history command stores data in the `~/.bash_history` file for each user. The commands for the current bash session are stored in the file when the session is closed:

```
trainee@debian8:~$ nl .bash_history | more
 1 su -
 2 su -
 3 exit
 4 su -
 5 exit
 6 ls -l /var
 7 su -
 8 su -
 9 vi vitext
10 view vitext
11 clear
12 stty -a
13 date
14 who
15 df
16 df -h
17 free
18 free -h
19 whoami
20 su -
```

```
21 clear
22 su -
23 exit
--More--
```

```
trainee@ubuntu1604:~$ nl .bash_history | more
```

```
1 sudo su -
2 vi vitext
3 view vitext
4 vi vitext
5 vi .exerc
6 vi vitext
7 clear
8 stty -a
9 date
10 locale
11 LANG=en_GB.UTF-8
12 export LANG
13 locale
14 date
15 LC_ALL=en_GB.UTF-8
16 export LC_ALL
17 locale
18 date
19 who
20 df
21 df -h
22 free
23 free -h
--More--
```

```
[trainee@centos7 ~]$ nl .bash_history | more
```

```
1 su -
2 df -h
```

```
3 su -
4 exit
5 su -
6 su -
7 vi vitext
8 view vitext
9 vi vitext
10 locale
11 LANG=en_GB.UTF-8
12 export LANG
13 locale
14 vi vitext
15 vi .exrc
16 vi vitext
17 clear
18 stty -a
19 date
20 locale
21 who
22 df
23 df -h
--More--
```

```
trainee@SLES12SP1:~> nl .bash_history | more
```

```
1 su -
2 su -
3 clear
4 cd /
5 ls -l
6 ls -l /var/run
7 cd /mnt
8 ls
9 cd -
10 mount
```

```
11 mount --help
12 cat /etc/fstab
13 umount --help
14 dumpe2fs /dev/sda1 | grep -i superbloc
15 ls -ld /dev/console /dev/initctl /dev/loop0 /etc /etc/passwd
16 ls -ld /dev/console /dev/initctl /etc /etc/passwd
17 ls -ldi /dev/console /dev/initctl /etc /etc/passwd
18 cd /tmp; mkdir inode; cd inode; touch fichier1; ls -ali
19 ln fichier1 fichier2
20 ls -ali
21 ln -s fichier1 fichier3
22 ls -ali
23 su -
--More--
```



**Important** : Note the use of the **nl** command to number the lines in the output of the contents of **.bash\_history** file.

## The TAB key

**/bin/bash** can auto-generate the end of a file name. Consider the following example:

```
$ ls .b [Tab][Tab][Tab]
```

By hitting the Tab key three times, the system shows you the files that match:

```
trainee@debian8:~$ ls .bash
.bash_history  .bash_logout  .bashrc
```

```
trainee@ubuntu1604:~$ ls .bash
```

```
.bash_history .bash_logout .bashrc
```

```
[trainee@centos7 ~]$ ls .bash
.bash_history .bash_logout .bash_profile .bashrc
```

```
trainee@SLES12SP1:~> ls .bash
.bash_history .bashrc
```



**Important** : Note that when using Debian or Ubuntu, the **.bash\_profile** file does not exist. In the case of both of these distributions, the file is replaced by the **.profile** file.

This same technique can also be used to auto-generate command names. Consider the following example:

```
$ mo [Tab][Tab]
```

By hitting the `[Tab]` twice the system lists all known commands available to the user and starting with **mo**:

```
trainee@debian8:~$ mo
moc          moggsplit   more        mount        mountpoint  mousepad
```

```
trainee@ubuntu1604:~$ mo
moc          mogrify-im6      mount          mount.ntfs
modinfo      montage          mountall       mount.ntfs-3g
modprobe     montage-im6      mount.fuse     mountpoint
mogrify      more            mount.lowntfs-3g  mousetweaks
```

```
[trainee@centos7 ~]$ mo
mobj_dump    modutil          mount.cifs     mount.nfs4    mousetweaks
modifyrepo   mokutil          mount.fuse     mountpoint
modinfo      more            mount.glusterfs  mountstats
```

```
modprobe          mount          mount.nfs        mount.vboxsf
```

```
trainee@SLES12SP1:~> mo
modeprint        modsign-verify  mount           mouse-test
modetest         more           mountpoint
```

## Metacharacters

It is often necessary and desirable to be able to work with several files at one time as opposed to repeating the operation on each file individually. For this reason, bash accepts the use of Metacharacters:

Metacharacter	Description
*	Matches one or more characters
?	Matches a single character
[abc]	Matches any one of the characters between square brackets
[!abc]	Matches any character except those between square brackets
[m-t]	Matches any character from m through to t
[!m-t]	Matches any character other than m through to t
?(expression1 expression2  ...)	Matches 0 or 1 occurrence of expression1 OR 0 or 1 occurrence of expression2 OR ...
* (expression1 expression2  ...)	Matches 0 to x occurrences of expression1 OR 0 to x occurrences of expression2 OR ...
+ (expression1 expression2  ...)	Matches 1 to x occurrences of expression1 OR 1 to x occurrences of expression2 OR ...
@(expression1 expression2  ...)	Matches 1 occurrence of expression1 OR 1 occurrence of expression2 OR ...
!(expression1 expression2  ...)	Matches 0 occurrences of expression1 OR 0 occurrences of expression2 OR ...

To illustrate the use of Metacharacters, you need to create a directory in your home directory and then create some files within it:

```
trainee@debian8:~$ mkdir training
trainee@debian8:~$ cd training
trainee@debian8:~/training$ touch f1 f2 f3 f4 f5
```

```
trainee@ubuntu1604:~$ mkdir training
```

```
trainee@ubuntu1604:~$ cd training
trainee@ubuntu1604:~/training$ touch f1 f2 f3 f4 f5
```

```
[trainee@centos7 ~]$ mkdir training
[trainee@centos7 ~]$ cd training
[trainee@centos7 training]$ touch f1 f2 f3 f4 f5
```

```
trainee@SLES12SP1:~> mkdir training
trainee@SLES12SP1:~> cd training
trainee@SLES12SP1:~/training> touch f1 f2 f3 f4 f5
```

## The \* Metacharacter

Now use the Metacharacter \*:

```
trainee@debian8:~/training$ echo f*
f1 f2 f3 f4 f5
```

```
trainee@ubuntu1604:~/training$ echo f*
f1 f2 f3 f4 f5
```

```
[trainee@centos7 training]$ echo f*
f1 f2 f3 f4 f5
```

```
trainee@SLES12SP1:~/training> echo f*
f1 f2 f3 f4 f5
```



**Important:** Note that the \* is used as a wild card which replaces 0 or more characters.

## The ? Metacharacter

Create two more files:

```
trainee@debian8:~/training$ touch f52 f62
```

```
trainee@ubuntu1604:~/training$ touch f52 f62
```

```
[trainee@centos7 training]$ touch f52 f62
```

```
trainee@SLES12SP1:~/training> touch f52 f62
```

Now use the Metacharacter ?:

```
trainee@debian8:~/training$ echo f?2  
f52 f62
```

```
trainee@ubuntu1604:~/training$ echo f?2  
f52 f62
```

```
[trainee@centos7 training]$ echo f?2  
f52 f62
```

```
trainee@SLES12SP1:~/training> echo f?2  
f52 f62
```



**Important:** Note that the **?** is used as a wild card which replaces a single character.

## The [] Metacharacter

The [] Metacharacter can take several forms:

Metacharacter	Description
[xyz]	Represents either x or y or z
[m-t]	
[!xyz]	Represents any character other than x or y or z
[!m-t]	Represents any character outside of the range m to t

To demonstrate the use of the metacharacter [], create a file called **a100**:

```
trainee@debian8:~/training$ touch a100
```

```
trainee@ubuntu1604:~/training$ touch a100
```

```
[trainee@centos7 training]$ touch a100
```

```
trainee@SLES12SP1:~/training> touch a100
```

The use of this Metacharacter can be demonstrated with the following examples:

```
trainee@debian8:~/training$ echo [a-f]*  
a100 f1 f2 f3 f4 f5 f52 f62  
trainee@debian8:~/training$ echo [af]*  
a100 f1 f2 f3 f4 f5 f52 f62
```

```
trainee@ubuntu1604:~/training$ echo [a-f]*  
a100 f1 f2 f3 f4 f5 f52 f62  
trainee@ubuntu1604:~/training$ echo [af]*  
a100 f1 f2 f3 f4 f5 f52 f62
```

```
[trainee@centos7 training]$ echo [a-f]*
```

```
a100 f1 f2 f3 f4 f5 f52 f62
[trainee@centos7 training]$ echo [af]*
a100 f1 f2 f3 f4 f5 f52 f62
```

```
trainee@SLES12SP1:~/training> echo [a-f]*
a100 f1 f2 f3 f4 f5 f52 f62
trainee@SLES12SP1:~/training> echo [af]*
a100 f1 f2 f3 f4 f5 f52 f62
```



**Important:** Note that all the files starting with either **a**, **b**, **c**, **d**, **e** or **f** are displayed.

```
trainee@debian8:~/training$ echo [!a]*
f1 f2 f3 f4 f5 f52 f62
```

```
trainee@ubuntu1604:~/training$ echo [!a]*
f1 f2 f3 f4 f5 f52 f62
```

```
[trainee@centos7 training]$ echo [!a]*
f1 f2 f3 f4 f5 f52 f62
```

```
trainee@SLES12SP1:~/training> echo [!a]*
f1 f2 f3 f4 f5 f52 f62
```



**Important:** Note that all the files in the directory are displayed except the file starting with **a** .

```
trainee@debian8:~/training$ echo [a-b]*
a100
```

```
trainee@ubuntu1604:~/training$ echo [a-b]*  
a100
```

```
[trainee@centos7 training]$ echo [a-b]*  
a100
```

```
trainee@SLES12SP1:~/training> echo [a-b]*  
a100
```



**Important:** Note that only the file starting with **a** is displayed since no file starting with **b** is present.

```
trainee@debian8:~/training$ echo [a-f]  
[a-f]
```

```
trainee@ubuntu1604:~/training$ echo [a-f]  
[a-f]
```

```
[trainee@centos7 training]$ echo [a-f]  
[a-f]
```

```
trainee@SLES12SP1:~/training> echo [a-f]  
[a-f]
```



**Important:** Note that in the above example, since no file called **a**, **b**, **c**, **d**, **e** or **f** exists in the directory, the **echo** command simply returns the filter used.

## The extglob Option

In order to use **?(expression)**, **\*(expression)**, **+(expression)**, **@(expression)** and **!(expression)**, you need to activate the **extglob** option:

```
trainee@debian8:~/training$ shopt -s extglob
```

```
trainee@ubuntu1604:~/training$ shopt -s extglob
```

```
[trainee@centos7 training]$ shopt -s extglob
```

```
trainee@SLES12SP1:~/training> shopt -s extglob
```

The **shopt** command is used to activate and deactivate the shopt option of the shell.

The list of all the options can be displayed by simply using the **shopt** command:

```
trainee@debian8:~/training$ shopt
autocd          off
cdable_vars     off
cdspell         off
checkhash       off
checkjobs       off
checkwinsize    on
cmdhist         on
compat31        off
compat32        off
compat40        off
compat41        off
compat42        off
complete_fullquote on
direxand        off
dirspell        off
dotglob         off
```

```
execfail      off
expand_aliases on
extdebug      off
extglob       on
extquote      on
failglob      off
force_ignores on
globstar      off
globasciiranges off
gnu_errfmt    off
histappend    on
histredit     off
histverify    off
hostcomplete  off
huponexit     off
interactive_comments on
lastpipe      off
lithist       off
login_shell   on
mailwarn      off
no_empty_cmd_completion off
nocaseglob    off
nocasematch   off
nullglob      off
progcomp      on
promptvars    on
restricted_shell off
shift_verbose off
sourcepath    on
xpg_echo      off
```

```
trainee@ubuntu1604:~/training$ shopt
```

```
autocd        off
cdable_vars   off
```

```
cdspell      off
checkhash    off
checkjobs    off
checkwinsize on
cmdhist      on
compat31     off
compat32     off
compat40     off
compat41     off
compat42     off
complete_fullquote on
direxand     off
dirspell     off
dotglob      off
execfail     off
expand_aliases on
extdebug     off
extglob      on
extquote     on
failglob     off
force_ignore on
globstar     off
globasciiranges off
gnu_errfmt   off
histappend   on
histreedit   off
histverify   off
hostcomplete off
huponexit    off
interactive_comments on
lastpipe     off
lithist      off
login_shell  on
mailwarn     off
```

```
no_empty_cmd_completion off
nocaseglob      off
nocasematch     off
nullglob       off
progcomp       on
promptvars     on
restricted_shell off
shift_verbose   off
sourcepath     on
xpg_echo       off
```

```
[trainee@centos7 training]$ shopt
```

```
autocd         off
cdable_vars    off
cdspell        off
checkhash      off
checkjobs      off
checkwinsize   on
cmdhist        on
compat31       off
compat32       off
compat40       off
compat41       off
direxpend      off
dirspell       off
dotglob        off
execfail       off
expand_aliases on
extdebug       off
extglob        on
extquote       on
failglob       off
force_ignores  on
globstar       off
```

```
gnu_errfmt      off
histappend     on
histreedit     off
histverify     off
hostcomplete   off
huponexit      off
interactive_comments  on
lastpipe       off
lithist        off
login_shell    on
mailwarn       off
no_empty_cmd_completion off
nocaseglob     off
nocasematch    off
nullglob       off
progcomp       on
promptvars     on
restricted_shell off
shift_verbose  off
sourcepath     on
xpg_echo       of
```

```
trainee@SLES12SP1:~/training> shopt
```

```
autocd         off
cdable_vars    off
cdspell        off
checkhash      off
checkjobs      off
checkwinsize   on
cmdhist        on
compat31       off
compat32       off
compat40       off
compat41       off
```

```
direxand      off
dirspell      off
dotglob       off
execfail      off
expand_aliases on
extdebug      off
extglob       on
extquote      on
failglob      off
force_ignores on
globstar      off
gnu_errfmt    off
histappend    on
histreedit    off
histverify    off
hostcomplete  off
huponexit     off
interactive_comments on
lastpipe      off
lithist       off
login_shell   on
mailwarn      off
no_empty_cmd_completion off
nocaseglob    off
nocasematch   off
nullglob      off
progcomp      on
promptvars    on
restricted_shell off
shift_verbose off
sourcepath    on
xpg_echo      off
```

**?(expression)**

Create the following files:

```
trainee@debian8:~/training$ touch f f.txt f123.txt f123123.txt f123123123.txt
```

```
trainee@ubuntu1604:~/training$ touch f f.txt f123.txt f123123.txt f123123123.txt
```

```
[trainee@centos7 training]$ touch f f.txt f123.txt f123123.txt f123123123.txt
```

```
trainee@SLES12SP1:~/training> touch f f.txt f123.txt f123123.txt f123123123.txt
```

Execute the following command:

```
trainee@debian8:~/training$ ls f?(123).txt  
f123.txt  f.txt
```

```
trainee@ubuntu1604:~/training$ ls f?(123).txt  
f123.txt  f.txt
```

```
[trainee@centos7 training]$ ls f?(123).txt  
f123.txt  f.txt
```

```
trainee@SLES12SP1:~/training> ls f?(123).txt  
f123.txt  f.txt
```



**Important:** Note that the command displays file names that match 0 or 1 occurrences of the string **123**.

**\*(expression)**

Execute the following command:

```
trainee@debian8:~/training$ ls f*(123).txt
f123123123.txt  f123123.txt  f123.txt  f.txt
```

```
trainee@ubuntu1604:~/training$ ls f*(123).txt
f123123123.txt  f123123.txt  f123.txt  f.txt
```

```
[trainee@centos7 training]$ ls f*(123).txt
f123123123.txt  f123123.txt  f123.txt  f.txt
```

```
trainee@SLES12SP1:~/training> ls f*(123).txt
f123123123.txt  f123123.txt  f123.txt  f.txt
```



**Important:** Note that the command displays file names that match 0 to x occurrences of the string **123**.

**+(expression)**

Execute the following command:

```
trainee@debian8:~/training$ ls f+(123).txt
f123123123.txt  f123123.txt  f123.txt
```

```
trainee@ubuntu1604:~/training$ ls f+(123).txt
f123123123.txt  f123123.txt  f123.txt
```

```
[trainee@centos7 training]$ ls f+(123).txt
```

```
f123123123.txt f123123.txt f123.txt
```

```
trainee@SLES12SP1:~/training> ls f+(123).txt  
f123123123.txt f123123.txt f123.txt
```



**Important:** Note that the command displays file names that match 1 to x occurrences of the string **123..**

### @(expression)

Execute the following command:

```
trainee@debian8:~/training$ ls f@(123).txt  
f123.txt
```

```
trainee@ubuntu1604:~/training$ ls f@(123).txt  
f123.txt
```

```
[trainee@centos7 training]$ ls f@(123).txt  
f123.txt
```

```
trainee@SLES12SP1:~/training> ls f@(123).txt  
f123.txt
```



**Important:** Note that the command displays file names that match 1 occurrence of the string **123.**

## !(expression)

Execute the following command:

```
trainee@debian8:~/training$ ls f!(123).txt
f123123123.txt  f123123.txt  f.txt
```

```
trainee@ubuntu1604:~/training$ ls f!(123).txt
f123123123.txt  f123123.txt  f.txt
```

```
[trainee@centos7 training]$ ls f!(123).txt
f123123123.txt  f123123.txt  f.txt
```

```
trainee@SLES12SP1:~/training> ls f!(123).txt
f123123123.txt  f123123.txt  f.txt
```



**Important:** Note that the command displays file names that match 0 or x occurrences of the string **123**, where  $x > 1$ .

## Protecting Metacharacters

To cancel the wild card effect of a special character, the character needs to be escaped or “protected”:

Character	Description
\	Escapes the character which immediately follows
' '	Protects any character between the two ' '
" "	Protects any character between the two " " except the following: \$, \ and ' '

For example:

```
trainee@debian8:~/training$ echo * est un caractère spécial
a100 f f1 f123123123.txt f123123.txt f123.txt f2 f3 f4 f5 f52 f62 f.txt est un caractère spécial
```

```
trainee@debian8:~/training$ echo \* est un caractère spécial
* est un caractère spécial
```

```
trainee@debian8:~/training$ echo "*" est un caractère spécial"
* est un caractère spécial
```

```
trainee@debian8:~/training$ echo '* est un caractère spécial'
* est un caractère spécial
```

```
trainee@ubuntu1604:~/training$ echo * est un caractère spécial
a100 f f1 f123123123.txt f123123.txt f123.txt f2 f3 f4 f5 f52 f62 f.txt est un caractère spécial
```

```
trainee@ubuntu1604:~/training$ echo \* est un caractère spécial
* est un caractère spécial
```

```
trainee@ubuntu1604:~/training$ echo "*" est un caractère spécial"
* est un caractère spécial
```

```
trainee@ubuntu1604:~/training$ echo '* est un caractère spécial'
* est un caractère spécial
```

```
[trainee@centos7 training]$ echo * est un caractère spécial
a100 f f1 f123123123.txt f123123.txt f123.txt f2 f3 f4 f5 f52 f62 f.txt est un caractère spécial
```

```
[trainee@centos7 training]$ echo \* est un caractère spécial
* est un caractère spécial
```

```
[trainee@centos7 training]$ echo "*" est un caractère spécial"
* est un caractère spécial
```

```
[trainee@centos7 training]$ echo '* est un caractère spécial'
```

```
* est un caractère spécial
```

```
trainee@SLES12SP1:~/training> echo * est un caractère spécial  
a100 f f1 f123123123.txt f123123.txt f123.txt f2 f3 f4 f5 f52 f62 f.txt est un caractère spécial
```

```
trainee@SLES12SP1:~/training> echo \* est un caractère spécial  
* est un caractère spécial
```

```
trainee@SLES12SP1:~/training> echo "* est un caractère spécial"  
* est un caractère spécial
```

```
trainee@SLES12SP1:~/training> echo '* est un caractère spécial'  
* est un caractère spécial
```

## Exit Status

Each command returns an **exit status** when it is executed. This exit status is stored in a special variable: **\$?**.

For example:

```
trainee@debian8:~/training$ cd ..  
trainee@debian8:~$ mkdir codes  
trainee@debian8:~$ echo $?  
0  
trainee@debian8:~$ touch codes/exit.txt  
trainee@debian8:~$ rmdir codes  
rmdir: failed to remove 'codes': Directory not empty  
trainee@debian8:~$ echo $?  
1
```

```
trainee@ubuntu1604:~/training$ cd ..  
trainee@ubuntu1604:~$ mkdir codes  
trainee@ubuntu1604:~$ echo $?
```

```
0
trainee@ubuntu1604:~$ touch codes/exit.txt
trainee@ubuntu1604:~$ rmdir codes
rmdir: failed to remove 'codes': Directory not empty
trainee@ubuntu1604:~$ echo $?
1
```

```
[trainee@centos7 training]$ cd ..
[trainee@centos7 ~]$ mkdir codes
[trainee@centos7 ~]$ echo $?
0
[trainee@centos7 ~]$ touch codes/exit.txt
[trainee@centos7 ~]$ rmdir codes
rmdir: failed to remove 'codes': Directory not empty
[trainee@centos7 ~]$ echo $?
1
```

```
trainee@SLES12SP1:~/training> cd ..
trainee@SLES12SP1:~> mkdir codes
trainee@SLES12SP1:~> echo $?
0
trainee@SLES12SP1:~> touch codes/exit.txt
trainee@SLES12SP1:~> rmdir codes
rmdir: failed to remove 'codes': Directory not empty
trainee@SLES12SP1:~> echo $?
1
```

As you can see when the exit status is 0, the command executes correctly. If the exit status is anything else, the command executes with errors.

## Redirections

Your dialogue with the system uses three **file descriptors**:

---

- Standard Input - the keyboard,
- Standard output - the screen,
- Standard error - contains any eventual errors.

The standard output can be redirected using the > character:

```
trainee@debian8:~$ pwd
/home/trainee
trainee@debian8:~$ cd training
trainee@debian8:~/training$ free > file
trainee@debian8:~/training$ cat file
```

	total	used	free	shared	buffers	cached
Mem:	506268	429624	76644	4804	59540	130524
-/+ buffers/cache:		239560	266708			
Swap:	2046972	0	2046972			

```
trainee@ubuntu1604:~$ pwd
/home/trainee
trainee@ubuntu1604:~$ cd training
trainee@ubuntu1604:~/training$ free > file
trainee@ubuntu1604:~/training$ cat file
```

	total	used	free	shared	buff/cache	available
Mem:	500144	160208	6548	5168	333388	307548
Swap:	1997820	0	1997820			

```
[trainee@centos7 ~]$ pwd
/home/trainee
[trainee@centos7 ~]$ cd training
[trainee@centos7 training]$ free > file
[trainee@centos7 training]$ cat file
```

	total	used	free	shared	buff/cache	available
Mem:	500780	192692	38916	4824	269172	260472
Swap:	2096124	0	2096124			

```
trainee@SLES12SP1:~> pwd
/home/trainee
trainee@SLES12SP1:~> cd training
trainee@SLES12SP1:~/training> free > file
trainee@SLES12SP1:~/training> cat file
```

	total	used	free	shared	buffers	cached
Mem:	394524	386024	8500	5716	452	300420
-/+ buffers/cache:		85152	309372			
Swap:	2103292	4	2103288			



**Important:** If the file does not exist, it is automatically created.

Repeating a single redirection will replace the file:

```
trainee@debian8:~/training$ date > file
trainee@debian8:~/training$ cat file
Mon 28 Nov 14:48:03 GMT 2016
```

```
trainee@ubuntu1604:~/training$ date > file
trainee@ubuntu1604:~/training$ cat file
Mon 28 Nov 15:51:07 CET 2016
```

```
[trainee@centos7 training]$ date > file
[trainee@centos7 training]$ cat file
Mon 28 Nov 15:48:09 CET 2016
```

```
trainee@SLES12SP1:~/training> date > file
trainee@SLES12SP1:~/training> cat file
Mon 28 Nov 15:48:29 CET 2016
```

To add additional data to the file, you need to use a **double redirection**:

```
trainee@debian8:~/training$ free >> file
trainee@debian8:~/training$ cat file
Mon 28 Nov 14:48:03 GMT 2016
      total        used         free       shared    buffers     cached
Mem:    506268      431668       74600        4804       60264     130912
-/+ buffers/cache:    240492      265776
Swap:   2046972          0     2046972
```

```
trainee@ubuntu1604:~/training$ free >> file
trainee@ubuntu1604:~/training$ cat file
Mon 28 Nov 15:51:07 CET 2016
      total        used         free       shared  buff/cache   available
Mem:    500144      160208       6436        5168       333500     307548
Swap:   1997820          0     1997820
```

```
[trainee@centos7 training]$ free >> file
[trainee@centos7 training]$ cat file
Mon 28 Nov 15:48:09 CET 2016
      total        used         free       shared  buff/cache   available
Mem:    500780      192792       38516        4824       269472     260376
Swap:   2096124          0     2096124
```

```
trainee@SLES12SP1:~/training> free >> file
trainee@SLES12SP1:~/training> cat file
Mon 28 Nov 15:48:29 CET 2016
      total        used         free       shared    buffers     cached
Mem:    394524      386876       7648        5716        452     300936
-/+ buffers/cache:    85488      309036
Swap:   2103292          4     2103288
```



**Important** : Note that standard output can only be redirected to a single destination.

File descriptors are numbered for ease of use :

- 0 = Standard Input
- 1 = Standard Output
- 2 = Standard Error

For example:

```
trainee@debian8:~/training$ cd ..
trainee@debian8:~$ rmdir training/ 2>errorlog
trainee@debian8:~$ cat erreurlog
rmdir: failed to remove 'training/': Directory not empty
```

```
trainee@ubuntu1604:~/training$ cd ..
trainee@ubuntu1604:~$ rmdir training/ 2>errorlog
trainee@ubuntu1604:~$ cat erreurlog
rmdir: failed to remove 'training/': Directory not empty
```

```
[trainee@centos7 training]$ cd ..
[trainee@centos7 ~]$ rmdir training/ 2>errorlog
[trainee@centos7 ~]$ cat erreurlog
rmdir: failed to remove 'training/': Directory not empty
```

```
trainee@SLES12SP1:~/training> cd ..
trainee@SLES12SP1:~> rmdir training/ 2>errorlog
trainee@SLES12SP1:~> cat erreurlog
rmdir: failed to remove 'training/': Directory not empty
```



**Important:** As you can see the error generated is redirected to the **errorlog** file.

You can join file descriptors using the **&** character:

```
trainee@debian8:~$ free > file 2>&1
```

```
trainee@ubuntu1604:~$ free > file 2>&1
```

```
[trainee@centos7 ~]$ free > file 2>&1
```

```
trainee@SLES12SP1:~> free > file 2>&1
```

Any errors are sent to the same destination as the standard output, in the case, **file**.

It is also possible to have a reverse redirection:

```
trainee@debian8:~$ wc -w < errorlog  
8
```

```
trainee@ubuntu1604:~$ wc -w < errorlog  
8
```

```
[trainee@centos7 ~]$ wc -w < errorlog  
8
```

```
trainee@SLES12SP1:~> wc -w < errorlog  
8
```

In this case **wc -w** counts the number of words in the file.

Other redirections exist :

Redirection	Definition
&>	Join file descriptors 1 and 2.
<<	Takes the text typed on the next lines as standard input until EOF is found at the beginning of a line.
<>	Allows the use of the same file as STDIN and STDOUT.

## Pipes

A pipe is used to present the standard output on the first command to the standard input of the second command:

```
trainee@debian8:~$ ls | wc -w
17
```

```
trainee@ubuntu1604:~$ ls | wc -w
17
```

```
[trainee@centos7 ~]$ ls | wc -w
17
```

```
trainee@SLES12SP1:~> ls | wc -w
18
```



**Important** - Several pipes can be used within the same command.

Standard output can generally only be redirected to a single destination. To redirect to two destinations at once, you need to use the **tee** command:

```
trainee@debian8:~$ date | tee file1
Mon 28 Nov 15:14:18 GMT 2016
trainee@debian8:~$ cat file1
Mon 28 Nov 15:14:18 GMT 2016
```

```
trainee@ubuntu1604:~$ date | tee file1
Mon 28 Nov 16:14:22 CET 2016
trainee@ubuntu1604:~$ cat file1
Mon 28 Nov 16:14:22 CET 2016
```

```
[trainee@centos7 ~]$ date | tee file1
Mon 28 Nov 16:14:24 CET 2016
[trainee@centos7 ~]$ cat file1
Mon 28 Nov 16:14:24 CET 2016
```

```
trainee@SLES12SP1:~> date | tee file1
Mon 28 Nov 16:14:43 CET 2016
trainee@SLES12SP1:~> cat file1
Mon 28 Nov 16:14:43 CET 2016
```

Alternatively, tee can be used to redirect to two files at the same time:

```
trainee@debian8:~$ date | tee fichier1 > fichier2
trainee@debian8:~$ cat fichier1
Mon 28 Nov 15:15:52 GMT 2016
trainee@debian8:~$ cat fichier2
Mon 28 Nov 15:15:52 GMT 2016
```

```
trainee@ubuntu1604:~$ date | tee fichier1 > fichier2
trainee@ubuntu1604:~$ cat fichier1
Mon 28 Nov 16:15:56 CET 2016
trainee@ubuntu1604:~$ cat fichier2
Mon 28 Nov 16:15:56 CET 2016
```

```
[trainee@centos7 ~]$ date | tee fichier1 > fichier2
[trainee@centos7 ~]$ cat fichier1
Mon 28 Nov 16:15:57 CET 2016
[trainee@centos7 ~]$ cat fichier2
Mon 28 Nov 16:15:57 CET 2016
```

```
trainee@SLES12SP1:~> date | tee fichier1 > fichier2
trainee@SLES12SP1:~> cat fichier1
Mon 28 Nov 16:16:15 CET 2016
```

```
trainee@SLES12SP1:~> cat fichier2
Mon 28 Nov 16:16:15 CET 2016
```



**Important** : The default action of the **tee** command is to overwrite the destination file. In order to append output to the same file, you need to use the **-a** switch.

## Command Substitution

Command substitution permits in-line execution of a command:

```
trainee@debian8:~$ echo date
date
trainee@debian8:~$ echo $(date)
Mon 28 Nov 15:19:29 GMT 2016
trainee@debian8:~$ echo `date`
Mon 28 Nov 15:19:30 GMT 2016
```

```
trainee@ubuntu1604:~$ echo date
date
trainee@ubuntu1604:~$ echo $(date)
Mon 28 Nov 16:19:33 CET 2016
trainee@ubuntu1604:~$ echo `date`
Mon 28 Nov 16:19:33 CET 2016
```

```
[trainee@centos7 ~]$ echo date
date
[trainee@centos7 ~]$ echo $(date)
Mon 28 Nov 16:19:35 CET 2016
[trainee@centos7 ~]$ echo `date`
```

```
Mon 28 Nov 16:19:35 CET 2016
```

```
trainee@SLES12SP1:~> echo date
date
trainee@SLES12SP1:~> echo $(date)
Mon 28 Nov 16:19:53 CET 2016
trainee@SLES12SP1:~> echo `date`
Mon 28 Nov 16:19:53 CET 2016
```

## Conditional Command Execution

Commands can be grouped using brackets:

```
$ (ls -l; ps; who) > list
```

Conditional command execution can be obtained by using the exit status value and either **&&** or **||**.

For example,

- Command1 && Command2,
  - Command2 will execute if the exit status of Command1 is 0,
- Command1 || Command2,
  - Command2 will execute if the exit status of Command1 anything other than 0.

## Environment Variables

The contents of a shell variable can be displayed on standard output using the **echo** command:

```
$ echo $VARIABLE [Enter]
```

## Principal Variables

Variable	Description
BASH	Complete path to current shell.
BASH_VERSION	Shell version.
EUID	EUID of the current user.
UID	UID of the current user.
PPID	PID of the parent of the current process.
PWD	The current directory.
OLDPWD	The previous current directory ( like the <b>cd</b> -command ).
RANDOM	A random number between 0 and 32767.
SECONDS	The numbers of seconds since the shell was started.
LINES	The number of lines in a screen.
COLUMNS	The number of columns in a screen .
HISTFILE	The history file.
HISTFILESIZE	The history file size.
HISTSIZE	The number of commands that can be saved to the history file.
HISTCMD	The current command's number in the History.
HISTCONTROL	<b>ignorespace</b> or <b>ignoredups</b> or <b>ignoreboth</b>
HOME	The user's home directory.
HOSTTYPE	Machine type.
OSTYPE	The OS type.
MAIL	The file containing the user's mail.
MAILCHECK	Frequency in seconds that a user's mail is checked.
PATH	The paths to executables.
PROMPT_COMMAND	Command executed before each prompt is displayed.
PS1	User's default prompt.
PS2	User's 2nd level default prompt.
PS3	User's 3rd level prompt.
PS4	User's 4th level prompt.
SHELL	User's current shell.

Variable	Description
SHLVL	The number of shell instances.
TMOU	The number of seconds less 60 before an unused terminal gets sent the <b>exit</b> command.

## Internationalisation and Localisation

**Internationalisation**, also called **i18n** since there are 18 letters between the **I** and **n**, consists of modifying software so that it conforms to regional parameters:

- Text processing differences,
- Writing direction,
- Different systems of numerals,
- Telephone numbers, addresses and international postal codes,
- Weights and measures,
- Date/time format,
- Paper sizes,
- Keyboard layout,
- etc ...

**Localisation**, also called **L10n** since there are 10 letters between the **L** and **n**, consists of modifying the Internationalisation so that it conforms to a specific locale:

- en\_GB = Great Britain,
- en\_US = USA,
- en\_AU = Australia,
- en\_NZ = New Zealand,
- en\_ZA = South Africa,
- en\_CA = Canada.

The most important variables are:

```
trainee@debian8:~$ echo $LC_ALL
en_GB.UTF-8
trainee@debian8:~$ echo $LC_CTYPE
```

```
trainee@debian8:~$ echo $LANG
en_GB.UTF-8
```

```
trainee@debian8:~$ locale
LANG=en_GB.UTF-8
LANGUAGE=en_GB:en
LC_CTYPE="en_GB.UTF-8"
LC_NUMERIC="en_GB.UTF-8"
LC_TIME="en_GB.UTF-8"
LC_COLLATE="en_GB.UTF-8"
LC_MONETARY="en_GB.UTF-8"
LC_MESSAGES="en_GB.UTF-8"
LC_PAPER="en_GB.UTF-8"
LC_NAME="en_GB.UTF-8"
LC_ADDRESS="en_GB.UTF-8"
LC_TELEPHONE="en_GB.UTF-8"
LC_MEASUREMENT="en_GB.UTF-8"
LC_IDENTIFICATION="en_GB.UTF-8"
LC_ALL=en_GB.UTF-8
```

```
trainee@ubuntu1604:~$ echo $LC_ALL
en_GB.UTF-8
trainee@ubuntu1604:~$ echo $LC_CTYPE

trainee@ubuntu1604:~$ echo $LANG
en_GB.UTF-8
```

```
trainee@ubuntu1604:~$ locale
LANG=en_GB.UTF-8
LANGUAGE=
LC_CTYPE="en_GB.UTF-8"
LC_NUMERIC="en_GB.UTF-8"
LC_TIME="en_GB.UTF-8"
LC_COLLATE="en_GB.UTF-8"
```

```
LC_MONETARY="en_GB.UTF-8"  
LC_MESSAGES="en_GB.UTF-8"  
LC_PAPER="en_GB.UTF-8"  
LC_NAME="en_GB.UTF-8"  
LC_ADDRESS="en_GB.UTF-8"  
LC_TELEPHONE="en_GB.UTF-8"  
LC_MEASUREMENT="en_GB.UTF-8"  
LC_IDENTIFICATION="en_GB.UTF-8"  
LC_ALL=en_GB.UTF-8
```

```
[trainee@centos7 ~]$ echo $LC_ALL  
en_GB.UTF-8  
[trainee@centos7 ~]$ echo $LC_CTYPE
```

```
[trainee@centos7 ~]$ echo $LANG  
en_GB.UTF-8
```

```
[trainee@centos7 ~]$ locale  
LANG=en_GB.UTF-8  
LC_CTYPE="en_GB.UTF-8"  
LC_NUMERIC="en_GB.UTF-8"  
LC_TIME="en_GB.UTF-8"  
LC_COLLATE="en_GB.UTF-8"  
LC_MONETARY="en_GB.UTF-8"  
LC_MESSAGES="en_GB.UTF-8"  
LC_PAPER="en_GB.UTF-8"  
LC_NAME="en_GB.UTF-8"  
LC_ADDRESS="en_GB.UTF-8"  
LC_TELEPHONE="en_GB.UTF-8"  
LC_MEASUREMENT="en_GB.UTF-8"  
LC_IDENTIFICATION="en_GB.UTF-8"  
LC_ALL=en_GB.UTF-8
```

```
trainee@SLES12SP1:~> echo $LC_ALL
```

```
en_GB.UTF-8
trainee@SLES12SP1:~> echo $LC_CTYPE

trainee@SLES12SP1:~> echo $LANG
en_GB.UTF-8

trainee@SLES12SP1:~> locale
LANG=en_GB.UTF-8
LC_CTYPE="en_GB.UTF-8"
LC_NUMERIC="en_GB.UTF-8"
LC_TIME="en_GB.UTF-8"
LC_COLLATE="en_GB.UTF-8"
LC_MONETARY="en_GB.UTF-8"
LC_MESSAGES="en_GB.UTF-8"
LC_PAPER="en_GB.UTF-8"
LC_NAME="en_GB.UTF-8"
LC_ADDRESS="en_GB.UTF-8"
LC_TELEPHONE="en_GB.UTF-8"
LC_MEASUREMENT="en_GB.UTF-8"
LC_IDENTIFICATION="en_GB.UTF-8"
LC_ALL=en_GB.UTF-8
```

## Special Variables

Variable	Description
\$LINENO	Contains the current line number of the script or function being executed
\$\$	Contains the PID of the current process
\$PPID	Contains the PID of the parent of the current process
\$0	Contains the name of the current script
\$1, \$2 ...	Contains respectively the 1st, 2nd etc arguments passed to the script
\$#	Contains the total number of arguments passed to the script
\$*	Contains all of the arguments passed to the script
\$@	Contains all of the arguments passed to the script

## The env Command

The **env** command can be used to run a program in a modified environment or just list the values of all environmental variables associated with the user calling the program env:

```
trainee@debian8:~$ env
XDG_SESSION_ID=1
TERM=xterm-256color
SHELL=/bin/bash
SSH_CLIENT=10.0.2.2 44524 22
OLDPWD=/home/trainee/training
SSH_TTY=/dev/pts/0
LC_ALL=en_GB.UTF-8
USER=trainee
LS_COLORS=rs=0:di=01;34:ln=01;36:mh=00:pi=40;33:so=01;35:do=01;35:bd=40;33;01:cd=40;33;01:or=40;31;01:su=37;41:sg
=30;43:ca=30;41:tw=30;42:ow=34;42:st=37;44:ex=01;32:*.tar=01;31:*.tgz=01;31:*.arc=01;31:*.arj=01;31:*.taz=01;31:*
.lha=01;31:*.lz4=01;31:*.lzh=01;31:*.lzma=01;31:*.tlz=01;31:*.txz=01;31:*.tzo=01;31:*.t7z=01;31:*.zip=01;31:*.z=0
1;31:*.Z=01;31:*.dz=01;31:*.gz=01;31:*.lrz=01;31:*.lz=01;31:*.lzo=01;31:*.xz=01;31:*.bz2=01;31:*.bz=01;31:*.tbz=0
1;31:*.tbz2=01;31:*.tz=01;31:*.deb=01;31:*.rpm=01;31:*.jar=01;31:*.war=01;31:*.ear=01;31:*.sar=01;31:*.rar=01;31:
*.alz=01;31:*.ace=01;31:*.zoo=01;31:*.cpio=01;31:*.7z=01;31:*.rz=01;31:*.cab=01;31:*.jpg=01;35:*.jpeg=01;35:*.gif
=01;35:*.bmp=01;35:*.pbm=01;35:*.pgm=01;35:*.ppm=01;35:*.tga=01;35:*.xbm=01;35:*.xpm=01;35:*.tif=01;35:*.tiff=01;
35:*.png=01;35:*.svg=01;35:*.svgz=01;35:*.mng=01;35:*.pcx=01;35:*.mov=01;35:*.mpg=01;35:*.mpeg=01;35:*.m2v=01;35:
*.mkv=01;35:*.webm=01;35:*.ogm=01;35:*.mp4=01;35:*.m4v=01;35:*.mp4v=01;35:*.vob=01;35:*.qt=01;35:*.nuv=01;35:*.wm
v=01;35:*.asf=01;35:*.rm=01;35:*.rmvb=01;35:*.flc=01;35:*.avi=01;35:*.fli=01;35:*.flv=01;35:*.gl=01;35:*.dl=01;35
:*.xcf=01;35:*.xwd=01;35:*.yuv=01;35:*.cgm=01;35:*.emf=01;35:*.axv=01;35:*.anx=01;35:*.ogv=01;35:*.ogx=01;35:*.aa
c=00;36:*.au=00;36:*.flac=00;36:*.m4a=00;36:*.mid=00;36:*.midi=00;36:*.mka=00;36:*.mp3=00;36:*.mpc=00;36:*.ogg=00
;36:*.ra=00;36:*.wav=00;36:*.axa=00;36:*.oga=00;36:*.spx=00;36:*.xspf=00;36:
MAIL=/var/mail/trainee
PATH=/usr/local/bin:/usr/bin:/bin:/usr/local/games:/usr/games
PWD=/home/trainee
LANG=en_GB.UTF-8
SHLVL=1
HOME=/home/trainee
```

```
LANGUAGE=en_GB:en
LOGNAME=trainee
SSH_CONNECTION=10.0.2.2 44524 10.0.2.15 22
XDG_RUNTIME_DIR=/run/user/1000
_=/usr/bin/env
```

```
trainee@ubuntu1604:~$ env
LC_PAPER=fr_FR.UTF-8
LC_ADDRESS=fr_FR.UTF-8
XDG_SESSION_ID=1
LC_MONETARY=fr_FR.UTF-8
TERM=xterm-256color
SHELL=/bin/bash
SSH_CLIENT=10.0.2.2 40266 22
LC_NUMERIC=fr_FR.UTF-8
OLDPWD=/home/trainee/training
SSH_TTY=/dev/pts/8
LC_ALL=en_GB.UTF-8
USER=trainee
LS_COLORS=rs=0:di=01;34:ln=01;36:mh=00:pi=40;33:so=01;35:do=01;35:bd=40;33;01:cd=40;33;01:or=40;31;01:mi=00:su=37
;41:sg=30;43:ca=30;41:tw=30;42:ow=34;42:st=37;44:ex=01;32:*.tar=01;31:*.tgz=01;31:*.arc=01;31:*.arj=01;31:*.taz=0
1;31:*.lha=01;31:*.lz4=01;31:*.lzh=01;31:*.lzma=01;31:*.tlz=01;31:*.txz=01;31:*.tzo=01;31:*.t7z=01;31:*.zip=01;31
:*.z=01;31:*.Z=01;31:*.dz=01;31:*.gz=01;31:*.lrz=01;31:*.lz=01;31:*.lzo=01;31:*.xz=01;31:*.bz2=01;31:*.bz=01;31:*
.tbz=01;31:*.tbz2=01;31:*.tz=01;31:*.deb=01;31:*.rpm=01;31:*.jar=01;31:*.war=01;31:*.ear=01;31:*.sar=01;31:*.rar=
01;31:*.alz=01;31:*.ace=01;31:*.zoo=01;31:*.cpio=01;31:*.7z=01;31:*.rz=01;31:*.cab=01;31:*.jpg=01;35:*.jpeg=01;35
:*.gif=01;35:*.bmp=01;35:*.pbm=01;35:*.pgm=01;35:*.ppm=01;35:*.tga=01;35:*.xbm=01;35:*.xpm=01;35:*.tif=01;35:*.ti
ff=01;35:*.png=01;35:*.svg=01;35:*.svgz=01;35:*.mng=01;35:*.pcx=01;35:*.mov=01;35:*.mpg=01;35:*.mpeg=01;35:*.m2v=
01;35:*.mkv=01;35:*.webm=01;35:*.ogm=01;35:*.mp4=01;35:*.m4v=01;35:*.mp4v=01;35:*.vob=01;35:*.qt=01;35:*.nuv=01;3
5:*.wmv=01;35:*.asf=01;35:*.rm=01;35:*.rmvb=01;35:*.flc=01;35:*.avi=01;35:*.fli=01;35:*.flv=01;35:*.gl=01;35:*.dl
=01;35:*.xcf=01;35:*.xwd=01;35:*.yuv=01;35:*.cgm=01;35:*.emf=01;35:*.ogv=01;35:*.ogx=01;35:*.aac=00;36:*.au=00;36
:*.flac=00;36:*.m4a=00;36:*.mid=00;36:*.midi=00;36:*.mka=00;36:*.mp3=00;36:*.mpc=00;36:*.ogg=00;36:*.ra=00;36:*.w
av=00;36:*.oga=00;36:*.opus=00;36:*.spx=00;36:*.xspf=00;36:
LC_TELEPHONE=fr_FR.UTF-8
MAIL=/var/mail/trainee
```

```
PATH=/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin:/usr/games:/usr/local/games:/snap/bin
QT_QPA_PLATFORMTHEME=appmenu-qt5
LC_IDENTIFICATION=fr_FR.UTF-8
PWD=/home/trainee
LANG=en_US.UTF-8
LC_MEASUREMENT=fr_FR.UTF-8
SHLV=1
HOME=/home/trainee
LOGNAME=trainee
SSH_CONNECTION=10.0.2.2 40266 10.0.2.15 22
LESSOPEN=| /usr/bin/lesspipe %s
XDG_RUNTIME_DIR=/run/user/1000
LESSCLOSE=/usr/bin/lesspipe %s %s
LC_TIME=fr_FR.UTF-8
LC_NAME=fr_FR.UTF-8
_=/usr/bin/env
```

```
[trainee@centos7 ~]$ env
XDG_SESSION_ID=1
HOSTNAME=centos7.fenestros.loc
SELINUX_ROLE_REQUESTED=
TERM=xterm-256color
SHELL=/bin/bash
HISTSIZE=1000
SSH_CLIENT=10.0.2.2 33896 22
SELINUX_USE_CURRENT_RANGE=
SSH_TTY=/dev/pts/0
LC_ALL=en_GB.UTF-8
USER=trainee
LS_COLORS=rs=0:di=38;5;27:ln=38;5;51:mh=44;38;5;15:pi=40;38;5;11:so=38;5;13:do=38;5;5:bd=48;5;232;38;5;11:cd=48;5;232;38;5;3:or=48;5;232;38;5;9:mi=05;48;5;232;38;5;15:su=48;5;196;38;5;15:sg=48;5;11;38;5;16:ca=48;5;196;38;5;226:tw=48;5;10;38;5;16:ow=48;5;10;38;5;21:st=48;5;21;38;5;15:ex=38;5;34:*.tar=38;5;9:*.tgz=38;5;9:*.arc=38;5;9:*.arj=38;5;9:*.taz=38;5;9:*.lha=38;5;9:*.lz4=38;5;9:*.lzh=38;5;9:*.lzma=38;5;9:*.tlz=38;5;9:*.txz=38;5;9:*.tzo=38;5;9:*.t7z=38;5;9:*.zip=38;5;9:*.z=38;5;9:*.Z=38;5;9:*.dz=38;5;9:*.gz=38;5;9:*.lrz=38;5;9:*.lz=38;5;9:*.lzo=38;5;9:*.x
```

```
z=38;5;9:* .bz2=38;5;9:* .bz=38;5;9:* .tbz=38;5;9:* .tbz2=38;5;9:* .tz=38;5;9:* .deb=38;5;9:* .rpm=38;5;9:* .jar=38;5;9:*
.war=38;5;9:* .ear=38;5;9:* .sar=38;5;9:* .rar=38;5;9:* .alz=38;5;9:* .ace=38;5;9:* .zoo=38;5;9:* .cpio=38;5;9:* .7z=38;5
;9:* .rz=38;5;9:* .cab=38;5;9:* .jpg=38;5;13:* .jpeg=38;5;13:* .gif=38;5;13:* .bmp=38;5;13:* .pbm=38;5;13:* .pgm=38;5;13:
* .ppm=38;5;13:* .tga=38;5;13:* .xbm=38;5;13:* .xpm=38;5;13:* .tif=38;5;13:* .tiff=38;5;13:* .png=38;5;13:* .svg=38;5;13:
* .svgz=38;5;13:* .mng=38;5;13:* .pcx=38;5;13:* .mov=38;5;13:* .mpg=38;5;13:* .mpeg=38;5;13:* .m2v=38;5;13:* .mkv=38;5;13
:* .webm=38;5;13:* .ogm=38;5;13:* .mp4=38;5;13:* .m4v=38;5;13:* .mp4v=38;5;13:* .vob=38;5;13:* .qt=38;5;13:* .nuv=38;5;13
:* .wmv=38;5;13:* .asf=38;5;13:* .rm=38;5;13:* .rmvb=38;5;13:* .flc=38;5;13:* .avi=38;5;13:* .fli=38;5;13:* .flv=38;5;13:
* .gl=38;5;13:* .dl=38;5;13:* .xcf=38;5;13:* .xwd=38;5;13:* .yuv=38;5;13:* .cgm=38;5;13:* .emf=38;5;13:* .axv=38;5;13:* .a
nx=38;5;13:* .ogv=38;5;13:* .ogx=38;5;13:* .aac=38;5;45:* .au=38;5;45:* .flac=38;5;45:* .mid=38;5;45:* .midi=38;5;45:* .m
ka=38;5;45:* .mp3=38;5;45:* .mpc=38;5;45:* .ogg=38;5;45:* .ra=38;5;45:* .wav=38;5;45:* .axa=38;5;45:* .oga=38;5;45:* .spx
=38;5;45:* .xspf=38;5;45:
MAIL=/var/spool/mail/trainee
PATH=/usr/local/bin:/usr/bin:/usr/local/sbin:/usr/sbin:/home/trainee/.local/bin:/home/trainee/bin
PWD=/home/trainee
LANG=fr_FR.UTF-8
SELINUX_LEVEL_REQUESTED=
HISTCONTROL=ignoredups
SHLVL=1
HOME=/home/trainee
LOGNAME=trainee
SSH_CONNECTION=10.0.2.2 33896 192.168.1.99 22
LESSOPEN=||/usr/bin/lesspipe.sh %s
XDG_RUNTIME_DIR=/run/user/1000
_=/usr/bin/env
OLDPWD=/home/trainee/training
```

```
trainee@SLES12SP1:~> env
LESSKEY=/etc/lesskey.bin
NNTPSERVER=news
MANPATH=/usr/local/man:/usr/share/man
XDG_SESSION_ID=1
HOSTNAME=SLES12SP1
XKEYSYMDB=/usr/X11R6/lib/X11/XKeysymDB
HOST=SLES12SP1
```

```
TERM=xterm-256color
SHELL=/bin/bash
PROFILEREAD=true
HISTSIZE=1000
SSH_CLIENT=10.0.2.2 46258 22
MORE=-s1
SSH_TTY=/dev/pts/0
LC_ALL=en_GB.UTF-8
USER=trainee
LS_COLORS=no=00:fi=00:di=01;34:ln=00;36:pi=40;33:so=01;35:do=01;35:bd=40;33;01:cd=40;33;01:or=41;33;01:ex=00;32:*
.cmd=00;32:*.exe=01;32:*.com=01;32:*.bat=01;32:*.btm=01;32:*.dll=01;32:*.tar=00;31:*.tbz=00;31:*.tgz=00;31:*.rpm=
00;31:*.deb=00;31:*.arj=00;31:*.taz=00;31:*.lzh=00;31:*.lzma=00;31:*.zip=00;31:*.zoo=00;31:*.z=00;31:*.Z=00;31:*.
gz=00;31:*.bz2=00;31:*.tb2=00;31:*.tz2=00;31:*.tbz2=00;31:*.xz=00;31:*.avi=01;35:*.bmp=01;35:*.fli=01;35:*.gif=01
;35:*.jpg=01;35:*.jpeg=01;35:*.mng=01;35:*.mov=01;35:*.mpg=01;35:*.pcx=01;35:*.pbm=01;35:*.pgm=01;35:*.png=01;35:
*.ppm=01;35:*.tga=01;35:*.tif=01;35:*.xbm=01;35:*.xpm=01;35:*.dl=01;35:*.gl=01;35:*.wmv=01;35:*.aiff=00;32:*.au=0
0;32:*.mid=00;32:*.mp3=00;32:*.ogg=00;32:*.voc=00;32:*.wav=00;32:
XNLSPATH=/usr/share/X11/nls
QEMU_AUDIO_DRV=pa
HOSTTYPE=x86_64
FROM_HEADER=
PAGER=less
CSHEDIT=emacs
XDG_CONFIG_DIRS=/etc/xdg
LIBGL_DEBUG=quiet
MINICOM=-c on
MAIL=/var/mail/trainee
PATH=/home/trainee/bin:/usr/local/bin:/usr/bin:/bin:/usr/bin/X11:/usr/games
CPU=x86_64
SSH_SENDS_LOCALE=yes
INPUTRC=/home/trainee/.inputrc
PWD=/home/trainee
LANG=fr_FR.UTF-8
PYTHONSTARTUP=/etc/pythonstart
GPG_TTY=/dev/pts/0
```

```
AUDIODRIVER=pulseaudio
QT_SYSTEM_DIR=/usr/share/desktop-data
SHLVL=1
HOME=/home/trainee
ALSA_CONFIG_PATH=/etc/alsa-pulse.conf
SDL_AUDIODRIVER=pulse
LESS_ADVANCED_PREPROCESSOR=no
OSTYPE=linux
LS_OPTIONS=-N --color=tty -T 0
XCURSOR_THEME=DMZ
WINDOWMANAGER=env GNOME_SHELL_SESSION_MODE=sle-classic gnome-session --session sle-classic
G_FILENAME_ENCODING=@locale,UTF-8,ISO-8859-15,CP1252
LESS=-M -I -R
MACHTYPE=x86_64-suse-linux
LOGNAME=trainee
XDG_DATA_DIRS=/usr/share
SSH_CONNECTION=10.0.2.2 46258 10.0.2.15 22
LESSOPEN=lessopen.sh %s
XDG_RUNTIME_DIR=/run/user/1000
NO_AT_BRIDGE=1
LESSCLOSE=lessclose.sh %s %s
G_BROKEN_FILENAMES=1
COLORTERM=1
_=/usr/bin/env
OLDPWD=/home/trainee/training
```

To run a program, such as **xterm** in a modified environment the command is:

```
$ env EDITOR=vim xterm
```

## Bash Shell Options

To view all the options of the bash shell, use the command **set**:

```
trainee@debian8:~$ set -o
allexport      off
braceexpand   on
emacs         on
errexit       off
errtrace      off
functrace     off
hashall       on
histexpand    on
history       on
ignoreeof     off
interactive-comments  on
keyword       off
monitor       on
noclobber     off
noexec       off
noglob       off
nolog        off
notify       off
nounset      off
onecmd       off
physical     off
pipefail     off
posix        off
privileged   off
verbose      off
vi           off
xtrace       off
```

```
trainee@ubuntu1604:~$ set -o
allexport      off
braceexpand   on
emacs         on
errexit       off
errtrace      off
functrace     off
hashall       on
histexpand    on
history       on
ignoreeof     off
interactive-comments  on
keyword       off
monitor       on
noclobber     off
noexec        off
noglob        off
nolog         off
notify        off
nounset       off
onecmd        off
physical      off
pipefail      off
posix         off
privileged    off
verbose       off
vi            off
xtrace        off
```

```
[trainee@centos7 ~]$ set -o
allexport      off
braceexpand   on
emacs         on
errexit       off
```

```
errtrace      off
functrace     off
hashall       on
histexpand    on
history       on
ignoreeof     off
interactive-comments  on
keyword       off
monitor       on
noclobber     off
noexec        off
noglob        off
nolog         off
notify        off
nounset       off
onecmd        off
physical      off
pipefail      off
posix         off
privileged    off
verbose       off
vi            off
xtrace        off
```

```
trainee@SLES12SP1:~> set -o
allexport     off
braceexpand   on
emacs         on
errexit       off
errtrace      off
functrace     off
hashall       on
histexpand    on
history       on
```

```
ignoreeof      off
interactive-comments  on
keyword        off
monitor        on
noclobber      off
noexec         off
noglob         off
nolog          off
notify         off
nounset        off
onecmd         off
physical       off
pipefail       off
posix          off
privileged     off
verbose        off
vi             off
xtrace         off
```

To turn on an option you need to specify which option as an argument to the previous command:

```
trainee@debian8:~$ set -o allexport
trainee@debian8:~$ set -o
allexport      on
braceexpand    on
...
```

```
trainee@ubuntu1604:~$ set -o allexport
trainee@ubuntu1604:~$ set -o
allexport      on
braceexpand    on
...
```

```
[trainee@centos7 ~]$ set -o allexport
```

```
[trainee@centos7 ~]$ set -o  
allexport      on  
braceexpand   on  
...
```

```
trainee@SLES12SP1:~> set -o allexport  
trainee@SLES12SP1:~> set -o  
allexport      on  
braceexpand   on  
...
```

To turn off an option, use set with the **+o** option:

```
trainee@debian8:~$ set +o allexport  
trainee@debian8:~$ set -o  
allexport      off  
braceexpand   on  
...
```

```
trainee@ubuntu1604:~$ set +o allexport  
trainee@ubuntu1604:~$ set -o  
allexport      off  
braceexpand   on  
...
```

```
[trainee@centos7 ~]$ set +o allexport  
[trainee@centos7 ~]$ set -o  
allexport      off  
braceexpand   on  
...
```

```
trainee@SLES12SP1:~> set +o allexport  
trainee@SLES12SP1:~> set -o  
allexport      off
```

```
braceexpand    on
...
```

These are the most interesting options:

Option	Default value	Description
allexport	off	The shell automatically exports all variables
emacs	on	emacs editing mode
noclobber	off	Simple re-directions do not squash the target file if it exists
noglob	off	Turns off special characters
nounset	off	The shell will return an error if the variable is not set
verbose	off	Echos back the typed command
vi	off	vi editing mode

## noclobber

```
trainee@debian8:~$ set -o noclobber
trainee@debian8:~$ pwd > file
-bash: file: cannot overwrite existing file
trainee@debian8:~$ pwd > file
-bash: file: cannot overwrite existing file
trainee@debian8:~$ pwd >| file
trainee@debian8:~$ set +o noclobber
```

```
trainee@ubuntu1604:~$ set -o noclobber
trainee@ubuntu1604:~$ pwd > file
trainee@ubuntu1604:~$ pwd > file
-bash: file: cannot overwrite existing file
trainee@ubuntu1604:~$ pwd >| file
trainee@ubuntu1604:~$ set +o noclobber
```

```
[trainee@centos7 ~]$ set -o noclobber
[trainee@centos7 ~]$ pwd > file
```

```
-bash: file: cannot overwrite existing file
[trainee@centos7 ~]$ pwd > file
-bash: file: cannot overwrite existing file
[trainee@centos7 ~]$ pwd >| file
[trainee@centos7 ~]$ set +o noclobber
```

```
trainee@SLES12SP1:~> set -o noclobber
trainee@SLES12SP1:~> pwd > file
trainee@SLES12SP1:~> pwd > file
-bash: file: cannot overwrite existing file
trainee@SLES12SP1:~> pwd >| file
trainee@SLES12SP1:~> set +o noclobber
```



**Important** : Note that the **noclobber** option can be overridden by using a pipe.

## noglob

```
trainee@debian8:~$ set -o noglob
trainee@debian8:~$ echo *
*
trainee@debian8:~$ set +o noglob
trainee@debian8:~$ echo *
aac abc bca codes Desktop Documents Downloads errorlog file file1 Music Pictures Public Templates training Videos
vitext xyz
```

```
trainee@ubuntu1604:~$ set -o noglob
trainee@ubuntu1604:~$ echo *
*
trainee@ubuntu1604:~$ set +o noglob
trainee@ubuntu1604:~$ echo *
```

```
aac abc bca codes Desktop Documents Downloads errorlog examples.desktop file file1 Music Pictures Public
Templates training Videos vitext xyz
```

```
[trainee@centos7 ~]$ set -o noglob
```

```
[trainee@centos7 ~]$ echo *
```

```
*
```

```
[trainee@centos7 ~]$ set +o noglob
```

```
[trainee@centos7 ~]$ echo *
```

```
aac abc bca codes Desktop Documents Downloads errorlog file file1 Music Pictures Public Templates training Videos
vitext xyz
```

```
trainee@SLES12SP1:~> set -o noglob
```

```
trainee@SLES12SP1:~> echo *
```

```
*
```

```
trainee@SLES12SP1:~> set +o noglob
```

```
trainee@SLES12SP1:~> echo *
```

```
aac abc bca bin codes Desktop Documents Downloads errorlog file file1 Music Pictures Public public_html Templates
training Videos vitext xyz
```



**Important** : Note that metacharacters are turned off when the **noglob** option is set.

## nounset

```
trainee@debian8:~$ set -o nounset
```

```
trainee@debian8:~$ echo $FENESTROS
```

```
-bash: FENESTROS: unbound variable
```

```
trainee@debian8:~$ set +o nounset
```

```
trainee@debian8:~$ echo $FENESTROS
```

```
trainee@debian8:~$
```

```
trainee@ubuntu1604:~$ set -o nounset
trainee@ubuntu1604:~$ echo $FENESTROS
-bash: FENESTROS: unbound variable
trainee@ubuntu1604:~$ set +o nounset
trainee@ubuntu1604:~$ echo $FENESTROS
```

```
trainee@ubuntu1604:~$
```

```
[trainee@centos7 ~]$ set -o nounset
[trainee@centos7 ~]$ echo $FENESTROS
-bash: FENESTROS: unbound variable
[trainee@centos7 ~]$ set +o nounset
[trainee@centos7 ~]$ echo $FENESTROS
```

```
[trainee@centos7 ~]$
```

```
trainee@SLES12SP1:~> set -o nounset
trainee@SLES12SP1:~> echo $FENESTROS
-bash: FENESTROS: unbound variable
trainee@SLES12SP1:~> set +o nounset
trainee@SLES12SP1:~> echo $FENESTROS
```

```
trainee@SLES12SP1:~>
```



**Important** : Note that the inexistant variable **\$FENESTROS** is identified as such when the **nounset** option is set.

# Basic Shell Scripting

## Execution

A script is a text file that is read by the system and its contents executed. There are five ways to execute a script:

By stipulating the shell that will execute the script:

**/bin/bash myscript**

by a reverse redirection:

**/bin/bash < myscript**

By calling the script by its name, provided that the script is executable and that it resides in a directory specified by your path :

**myscript**

By placing yourself in the directory where the script resides and using one of the two following possibilities :

**. myscript** et **./myscript**



**Important:** In the first case the script is executed in the parent shell. In the second case the script is executed in a child shell.

Comments in a script are lines starting with **#**. However, each script starts with a pseudo-comment that informs the system which shell should be used to execute the script:

```
#!/bin/sh
```

Since a script in its simplest form is a list of commands that are sequentially executed, it is often useful to test those commands prior to writing the script. Linux has a command that can help you debug a future script. The **script** command can be used to generate a log file, called **typescript**, that

contains a record of everything occurred on standard output. To exit the recording mode, use **exit**:

```
trainee@debian8:~$ script
Script started, file is typescript
trainee@debian8:~$ pwd
/home/trainee
trainee@debian8:~$ ls
aac  bca    Desktop  Downloads  fichier1  file  Music    Public    training  Videos  xyz
abc  codes  Documents errorlog   fichier2  file1 Pictures Templates typescript vitext
trainee@debian8:~$ exit
exit
Script done, file is typescript
trainee@debian8:~$ cat typescript
Script started on Tue 29 Nov 2016 02:56:33 GMT
trainee@debian8:~$ pwd
/home/trainee
trainee@debian8:~$ ls
aac  bca    Desktop  Downloads  fichier1  file  Music    Public    training  Videos  xyz
abc  codes  Documents errorlog   fichier2  file1 Pictures Templates typescript vitext
trainee@debian8:~$ exit
exit

Script done on Tue 29 Nov 2016 02:56:44 GMT
```

```
trainee@ubuntu1604:~$ script
Script started, file is typescript
trainee@ubuntu1604:~$ pwd
/home/trainee
trainee@ubuntu1604:~$ ls
aac  codes    Downloads      fichier1  file1    Public    typescript  xyz
abc  Desktop  errorlog      fichier2  Music    Templates  Videos
bca  Documents examples.desktop  file      Pictures  training  vitext
trainee@ubuntu1604:~$ exit
exit
```

```
Script done, file is typescript
trainee@ubuntu1604:~$ cat typescript
Script started on Tue 29 Nov 2016 03:57:47 CET
trainee@ubuntu1604:~$ pwd
/home/trainee
trainee@ubuntu1604:~$ ls
aac  codes      Downloads      fichier1  file1      Public      typescript  xyz
abc  Desktop    errorlog      fichier2  Music      Templates   Videos
bca  Documents  examples.desktop  file      Pictures   training    vitext
trainee@ubuntu1604:~$ exit
exit
```

```
Script done on Tue 29 Nov 2016 03:57:58 CET
```

```
[trainee@centos7 ~]$ script
Script started, file is typescript
[trainee@centos7 ~]$ pwd
/home/trainee
[trainee@centos7 ~]$ ls
aac  bca  Desktop  Downloads  fichier1  file  Music  Public  training  Videos  xyz
abc  codes  Documents  errorlog  fichier2  file1  Pictures  Templates  typescript  vitext
[trainee@centos7 ~]$ exit
exit
Script done, file is typescript
[trainee@centos7 ~]$ cat typescript
Script started on Tue 29 Nov 2016 03:58:33 CET
[trainee@centos7 ~]$ pwd
/home/trainee
[trainee@centos7 ~]$ ls
aac  bca  Desktop  Downloads  fichier1  file  Music  Public  training  Videos  xyz
abc  codes  Documents  errorlog  fichier2  file1  Pictures  Templates  typescript  vitext
[trainee@centos7 ~]$ exit
exit
```

```
Script done on Tue 29 Nov 2016 03:58:40 CET
```

```
trainee@SLES12SP1:~> script
Script started, file is typescript
trainee@SLES12SP1:~> pwd
/home/trainee
trainee@SLES12SP1:~> ls
aac  bin      Documents  fichier1  file1     Public    training  vitext
abc  codes    Downloads  fichier2  Music     public_html  typescript  xyz
bca  Desktop  errorlog   file      Pictures  Templates  Videos
trainee@SLES12SP1:~> exit
exit
Script done, file is typescript
trainee@SLES12SP1:~> cat typescript
Script started on Tue 29 Nov 2016 03:59:24 CET
trainee@SLES12SP1:~> pwd
/home/trainee
trainee@SLES12SP1:~> ls
aac  bin      Documents  fichier1  file1     Public    training  vitext
abc  codes    Downloads  fichier2  Music     public_html  typescript  xyz
bca  Desktop  errorlog   file      Pictures  Templates  Videos
trainee@SLES12SP1:~> exit
exit

Script done on Tue 29 Nov 2016 03:59:31 CET
```

Lets start by creating a simple script called **myscript**:

```
$ vi myscript [Enter]
```

Edit the file as follows:

```
pwd
```

```
ls
```



**Important:** Note that in the above example, the script does not start with a pseudo-comment. As a result, the script will be executed by the shell of the user that invokes it unless a different shell is specified.

Save the file and use the five ways to execute it.

As an argument de /bin/bash:

```
trainee@debian8:~$ vi myscript
trainee@debian8:~$ /bin/bash myscript
/home/trainee
aac codes Downloads fichier2 myscript Public typescript xyz
abc Desktop errorlog file Music Templates Videos
bca Documents fichier1 file1 Pictures training vitext
```

```
trainee@ubuntu1604:~$ vi myscript
trainee@ubuntu1604:~$ /bin/bash myscript
/home/trainee
aac codes Downloads fichier1 file1 Pictures training vitext
abc Desktop errorlog fichier2 myscript Public typescript xyz
bca Documents examples.desktop file Music Templates Videos
```

```
[trainee@centos7 ~]$ vi myscript
[trainee@centos7 ~]$ /bin/bash myscript
/home/trainee
aac codes Downloads fichier2 myscript Public typescript xyz
abc Desktop errorlog file Music Templates Videos
bca Documents fichier1 file1 Pictures training vitext
```

```
trainee@SLES12SP1:~> vi myscript
```

```
trainee@SLES12SP1:~> /bin/bash myscript
/home/trainee
aac bin Documents fichier1 file1 Pictures Templates Videos
abc codes Downloads fichier2 myscript Public training vitext
bca Desktop errorlog file Music public_html typescript xyz
```

Using a redirection:

```
trainee@debian8:~$ /bin/bash < myscript
/home/trainee
aac codes Downloads fichier2 myscript Public typescript xyz
abc Desktop errorlog file Music Templates Videos
bca Documents fichier1 file1 Pictures training vitext
```

```
trainee@ubuntu1604:~$ /bin/bash < myscript
/home/trainee
aac codes Downloads fichier1 file1 Pictures training vitext
abc Desktop errorlog fichier2 myscript Public typescript xyz
bca Documents examples.desktop file Music Templates Videos
```

```
[trainee@centos7 ~]$ /bin/bash < myscript
/home/trainee
aac codes Downloads fichier2 myscript Public typescript xyz
abc Desktop errorlog file Music Templates Videos
bca Documents fichier1 file1 Pictures training vitext
```

```
trainee@SLES12SP1:~> /bin/bash < myscript
/home/trainee
aac bin Documents fichier1 file1 Pictures Templates Videos
abc codes Downloads fichier2 myscript Public training vitext
bca Desktop errorlog file Music public_html typescript xyz
```

In order to be able to call the script by its name from another directory, such as **/tmp**, you need to move the script into the **/home/trainee/bin** directory and make it executable. Note that in this case, the value of the environmental variable **\$PATH** should contain a reference to

**/home/trainee/bin:**

```
trainee@debian8:~$ echo $PATH
/usr/local/bin:/usr/bin:/bin:/usr/local/games:/usr/games
```

```
trainee@ubuntu1604:~$ echo $PATH
/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin:/usr/games:/usr/local/games:/snap/bin
```

```
[trainee@centos7 ~]$ echo $PATH
/usr/local/bin:/usr/bin:/usr/local/sbin:/usr/sbin:/home/trainee/.local/bin:/home/trainee/bin
```

```
trainee@SLES12SP1:~> echo $PATH
/home/trainee/bin:/usr/local/bin:/usr/bin:/bin:/usr/bin/X11:/usr/games
```

As you can see, in the case of Debian and Ubuntu, this is not the case. The reason for this becomes apparent when viewing the contents of the **.profile** file in **/home/trainee**:

```
trainee@debian8:~$ cat .profile
# ~/.profile: executed by the command interpreter for login shells.
...
# set PATH so it includes user's private bin if it exists
if [ -d "$HOME/bin" ] ; then
    PATH="$HOME/bin:$PATH"
fi
```

```
trainee@ubuntu1604:~$ cat .profile
# ~/.profile: executed by the command interpreter for login shells.
...
# set PATH so it includes user's private bin if it exists
if [ -d "$HOME/bin" ] ; then
    PATH="$HOME/bin:$PATH"
fi
```

As you can see PATH is set so it includes the user's private bin only if the directory exists:

```
# set PATH so it includes user's private bin if it exists
if [ -d "$HOME/bin" ] ; then
    PATH="$HOME/bin:$PATH"
fi
```

To fix the value of the PATH variable, create the \$HOME/bin directory and re-load the .profile file:

```
trainee@debian8:~$ mkdir bin
trainee@debian8:~$ source .profile
trainee@debian8:~$ echo $PATH
/home/trainee/bin:/usr/local/bin:/usr/bin:/bin:/usr/local/games:/usr/games
```

```
trainee@ubuntu1604:~$ mkdir bin
trainee@ubuntu1604:~$ source .profile
trainee@ubuntu1604:~$ echo $PATH
/home/trainee/bin:/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin:/usr/games:/usr/local/games:/snap/bin
```

In the case of RHEL/CentOS, even though PATH contains \$HOME/bin, the directory is not present:

```
[trainee@centos7 ~]$ ls
aac  codes      Downloads  fichier2  myscript  Public     typescript  xyz
abc  Desktop    errorlog   file      Music     Templates  Videos
bca  Documents  fichier1   file1     Pictures   training   vitext
```

So you need to create the directory:

```
[trainee@centos7 ~]$ mkdir bin
```

Now you need to move the script to \$HOME/bin and make it executable:

```
trainee@debian8:~$ mv myscript ~/bin
trainee@debian8:~$ chmod u+x ~/bin/myscript
```

```
trainee@ubuntu1604:~$ mv myscript ~/bin
trainee@ubuntu1604:~$ chmod u+x ~/bin/myscript
```

```
[trainee@centos7 ~]$ mv myscript ~/bin
[trainee@centos7 ~]$ chmod u+x ~/bin/myscript
```

```
trainee@SLES12SP1:~> mv myscript ~/bin
trainee@SLES12SP1:~> chmod u+x ~/bin/myscript
```

Move to **/tmp** and can call the script by just using it's name:

```
trainee@debian8:/tmp$ myscript
/tmp
hsperfdata_root pulse-PKdhtXMmr18n
```

```
trainee@ubuntu1604:/tmp$ myscript
/tmp
hsperfdata_root
systemd-private-2596faf2be00473d9dc6da53af5711d5-color.service-K4xRp2
systemd-private-2596faf2be00473d9dc6da53af5711d5-rtkit-daemon.service-iKio6G
systemd-private-2596faf2be00473d9dc6da53af5711d5-systemd-timesyncd.service-Al0q91
```

```
[trainee@centos7 tmp]$ myscript
/tmp
hsperfdata_root systemd-private-e526abcf335b40949dfc725f28456502-cups.service-u0xGiL
```

```
trainee@SLES12SP1:/tmp> myscript
/tmp
hsperfdata_root
inode
```

```
managera1411267841657715235client
managera3336001029897679475server
managera4847938942232964844client
managera5050357016347721452server
systemd-private-04f820fa26c745be8ddba814c6292f21-rtkit-daemon.service-o4lKP5
systemicontmp5578677472245134133dat
systemicontmp7082392205020802884dat
```

Now move back to ~/bin and use the following two commands to execute myscript:

- ./myscript
- . myscript

```
trainee@debian8:/tmp$ cd ~/bin
trainee@debian8:~/bin$ ./myscript
/home/trainee/bin
myscript
trainee@debian8:~/bin$ . myscript
/home/trainee/bin
myscript
```

```
trainee@ubuntu1604:/tmp$ cd ~/bin
trainee@ubuntu1604:~/bin$ ./myscript
/home/trainee/bin
myscript
trainee@ubuntu1604:~/bin$ . myscript
/home/trainee/bin
myscript
```

```
[trainee@centos7 tmp]$ cd ~/bin
[trainee@centos7 bin]$ ./myscript
/home/trainee/bin
myscript
[trainee@centos7 bin]$ . myscript
```

```
/home/trainee/bin  
myscript
```

```
trainee@SLES12SP1:/tmp> cd ~/bin  
trainee@SLES12SP1:~/bin> ./myscript  
/home/trainee/bin  
myscript  
trainee@SLES12SP1:~/bin> . myscript  
/home/trainee/bin  
myscript
```



**To do:** Note the difference in the output of these two commands and explain that difference.

## The read command

The read command reads the standard input and stores the information in the variables that are specified as arguments. The separator between fields is a space, a tab or a carriage return:

```
trainee@debian8:~/bin$ read var1 var2 var3 var4  
fenestros edu is great!  
trainee@debian8:~/bin$ echo $var1  
fenestros  
trainee@debian8:~/bin$ echo $var2  
edu  
trainee@debian8:~/bin$ echo $var3  
is  
trainee@debian8:~/bin$ echo $var4  
great!
```

```
trainee@ubuntu1604:~/bin$ read var1 var2 var3 var4
```

```
fenestros edu is great!  
trainee@ubuntu1604:~/bin$ echo $var1  
fenestros  
trainee@ubuntu1604:~/bin$ echo $var2  
edu  
trainee@ubuntu1604:~/bin$ echo $var3  
is  
trainee@ubuntu1604:~/bin$ echo $var4  
great!
```

```
[trainee@centos7 bin]$ read var1 var2 var3 var4  
fenestros edu is great!  
[trainee@centos7 bin]$ echo $var1  
fenestros  
[trainee@centos7 bin]$ echo $var2  
edu  
[trainee@centos7 bin]$ echo $var3  
is  
[trainee@centos7 bin]$ echo $var4  
great!
```

```
trainee@SLES12SP1:~/bin> read var1 var2 var3 var4  
fenestros edu is great!  
trainee@SLES12SP1:~/bin> echo $var1  
fenestros  
trainee@SLES12SP1:~/bin> echo $var2  
edu  
trainee@SLES12SP1:~/bin> echo $var3  
is  
trainee@SLES12SP1:~/bin> echo $var4  
great!
```





**Important:** Note that each field has been placed in a separate variable. Note also that by convention, user declared variables are in lower case in order to distinguish them from system variables.

```
trainee@debian8:~/bin$ read var1 var2
fenestros edu is great!
trainee@debian8:~/bin$ echo $var1
fenestros
trainee@debian8:~/bin$ echo $var2
edu is great!
```

```
trainee@ubuntu1604:~/bin$ read var1 var2
fenestros edu is great!
trainee@ubuntu1604:~/bin$ echo $var1
fenestros
trainee@ubuntu1604:~/bin$ echo $var2
edu is great!
```

```
[trainee@centos7 bin]$ read var1 var2
fenestros edu is great!
[trainee@centos7 bin]$ echo $var1
fenestros
[trainee@centos7 bin]$ echo $var2
edu is great!
```

```
trainee@SLES12SP1:~/bin> read var1 var2
fenestros edu is great!
trainee@SLES12SP1:~/bin> echo $var1
fenestros
trainee@SLES12SP1:~/bin> echo $var2
edu is great!
```





**Important:** Note that in this case, \$var2 contains three fields.

## Code de retour

The contents of a variable can also be empty:

```
trainee@debian8:~/bin$ read var
```

```
↵ Enter
```

```
trainee@debian8:~/bin$ echo $?  
0  
trainee@debian8:~/bin$ echo $var  
  
trainee@debian8:~/bin$
```

```
trainee@ubuntu1604:~/bin$ read var
```

```
↵ Enter
```

```
trainee@ubuntu1604:~/bin$ echo $?  
0  
trainee@ubuntu1604:~/bin$ echo $var  
  
trainee@ubuntu1604:~/bin$
```

```
[trainee@centos7 bin]$ read var
```

```
↵ Enter
```

```
[trainee@centos7 bin]$ echo $?
```

```
0  
[trainee@centos7 bin]$ echo $var  
  
[trainee@centos7 bin]$
```

```
trainee@SLES12SP1:~/bin> read var
```

↵ Enter

```
trainee@SLES12SP1:~/bin> echo $?  
0  
trainee@SLES12SP1:~/bin> echo $var  
  
trainee@SLES12SP1:~/bin>
```

But not null:

```
trainee@debian8:~/bin$ read var
```

Ctrl+D

```
trainee@debian8:~/bin$ echo $?  
1  
trainee@debian8:~/bin$ echo $var  
  
trainee@debian8:~/bin$
```

```
trainee@ubuntu1604:~/bin$ read var
```

Ctrl+D

```
trainee@ubuntu1604:~/bin$ echo $?  
1
```

```
trainee@ubuntu1604:~/bin$ echo $var  
trainee@ubuntu1604:~/bin$
```

```
[trainee@centos7 bin]$ read var
```

**Ctrl+D**

```
[trainee@centos7 bin]$ echo $?  
1  
[trainee@centos7 bin]$ echo $var  
[trainee@centos7 bin]$
```

```
trainee@SLES12SP1:~/bin> read var
```

**Ctrl+D**

```
trainee@SLES12SP1:~/bin> echo $?  
1  
trainee@SLES12SP1:~/bin> echo $var  
trainee@SLES12SP1:~/bin>
```

## The IFS Variable

The IFS variable contains the default separator characters: **SpaceBar**, **Tab ↵** and **↵ Enter**:

```
trainee@debian8:~/bin$ echo "$IFS" | od -c  
0000000  \t \n \n  
0000004
```

```
trainee@ubuntu1604:~/bin$ echo "$IFS" | od -c
00000000      \t  \n  \n
00000004
```

```
[trainee@centos7 bin]$ echo "$IFS" | od -c
00000000      \t  \n  \n
00000004
```

```
trainee@SLES12SP1:~/bin> echo "$IFS" | od -c
00000000      \t  \n  \n
00000004
```



**Important:** The **od** command (*Octal Dump*) returns the contents of a file in octal format. The **-c** switch prints to standard output any ASCII characters or backslashes contained within the file.

It is possible to change the contents of this variable:

```
trainee@debian8:~/bin$ OLDIFS="$IFS"
trainee@debian8:~/bin$ IFS=":"
trainee@debian8:~/bin$ echo "$IFS" | od -c
00000000   :  \n
00000002
```

```
trainee@ubuntu1604:~/bin$ OLDIFS="$IFS"
trainee@ubuntu1604:~/bin$ IFS=":"
trainee@ubuntu1604:~/bin$ echo "$IFS" | od -c
00000000   :  \n
00000002
```

```
[trainee@centos7 bin]$ OLDIFS="$IFS"
[trainee@centos7 bin]$ IFS=":"
```

```
[trainee@centos7 bin]$ echo "$IFS" | od -c
00000000  :  \n
00000002
```

```
trainee@SLES12SP1:~/bin> OLDFIFS="$IFS"
trainee@SLES12SP1:~/bin> IFS=":"
trainee@SLES12SP1:~/bin> echo "$IFS" | od -c
00000000  :  \n
00000002
```

Now test the new configuration:

```
trainee@debian8:~/bin$ read var1 var2 var3
fenestros:edu is:great!
trainee@debian8:~/bin$ echo $var1
fenestros
trainee@debian8:~/bin$ echo $var2
edu is
trainee@debian8:~/bin$ echo $var3
great!
```

```
trainee@ubuntu1604:~/bin$ read var1 var2 var3
fenestros:edu is:great!
trainee@ubuntu1604:~/bin$ echo $var1
fenestros
trainee@ubuntu1604:~/bin$ echo $var2
edu is
trainee@ubuntu1604:~/bin$ echo $var3
great!
```

```
[trainee@centos7 bin]$ read var1 var2 var3
fenestros:edu is:great!
[trainee@centos7 bin]$ echo $var1
fenestros
```

```
[trainee@centos7 bin]$ echo $var2
edu is
[trainee@centos7 bin]$ echo $var3
great!
```

```
trainee@SLES12SP1:~/bin> read var1 var2 var3
fenestros:edu is:great!
trainee@SLES12SP1:~/bin> echo $var1
fenestros
trainee@SLES12SP1:~/bin> echo $var2
edu is
trainee@SLES12SP1:~/bin> echo $var3
great!
```

Restore the old value of IFS before proceeding further: IFS="\$OLDIFS"

```
trainee@debian8:~/bin$ IFS="$OLDIFS"
trainee@debian8:~/bin$ echo "$IFS" | od -c
0000000    \t  \n  \n
0000004
```

```
trainee@ubuntu1604:~/bin$ IFS="$OLDIFS"
trainee@ubuntu1604:~/bin$ echo "$IFS" | od -c
0000000    \t  \n  \n
0000004
```

```
[trainee@centos7 bin]$ IFS="$OLDIFS"
[trainee@centos7 bin]$ echo "$IFS" | od -c
0000000    \t  \n  \n
0000004
```

```
trainee@SLES12SP1:~/bin> IFS="$OLDIFS"
trainee@SLES12SP1:~/bin> echo "$IFS" | od -c
0000000    \t  \n  \n
```

```
0000004
```

## The test Command

The **test** command uses two forms:

**test** *expression*

or

[SpaceBar*expression*SpaceBar]

## Testing Files

Test	Description
-f file	Returns true if file is an ordinary file
-d file	Returns true if file is a directory
-r file	Returns true if user can read file
-w file	Returns true if user can write file
-x file	Returns true if user can execute file
-e file	Returns true if file exists
-s file	Returns true if file is not empty
file1 -nt file2	Returns true if file1 is newer than file2
file1 -ot file2	Returns true if file1 is older than file2
file1 -ef file2	Returns true if file1 is identical to file2

### LAB #1

Test whether the **a100** file is an ordinary file:

```
trainee@debian8:~/bin$ cd ../training/
```

```
trainee@debian8:~/training$ test -f a100
trainee@debian8:~/training$ echo $?
0
trainee@debian8:~/training$ [ -f a100 ]
trainee@debian8:~/training$ echo $?
0
```

```
trainee@ubuntu1604:~/bin$ cd ../training/
trainee@ubuntu1604:~/training$ test -f a100
trainee@ubuntu1604:~/training$ echo $?
0
trainee@ubuntu1604:~/training$ [ -f a100 ]
trainee@ubuntu1604:~/training$ echo $?
0
```

```
[trainee@centos7 bin]$ cd ../training/
[trainee@centos7 training]$ test -f a100
[trainee@centos7 training]$ echo $?
0
[trainee@centos7 training]$ [ -f a100 ]
[trainee@centos7 training]$ echo $?
0
```

```
trainee@SLES12SP1:~/bin> cd ../training/
trainee@SLES12SP1:~/training> test -f a100
trainee@SLES12SP1:~/training> echo $?
0
trainee@SLES12SP1:~/training> [ -f a100 ]
trainee@SLES12SP1:~/training> echo $?
0
```



**Important:** The value contained in \$? is 0. This indicates **true**.

Test whether the **a101** file is an ordinary file:

```
trainee@debian8:~/training$ [ -f a101 ]
trainee@debian8:~/training$ echo $?
1
```

```
trainee@ubuntu1604:~/training$ [ -f a101 ]
trainee@ubuntu1604:~/training$ echo $?
1
```

```
[trainee@centos7 training]$ [ -f a101 ]
[trainee@centos7 training]$ echo $?
1
```

```
trainee@SLES12SP1:~/training> [ -f a101 ]
trainee@SLES12SP1:~/training> echo $?
1
```



**Important:** The value contained in  `$?`  is 1. This indicates **false**. This is obvious since `a101` does not exist.

Test whether **/home/trainee/training** is a directory:

```
trainee@debian8:~/training$ [ -d /home/trainee/training ]
trainee@debian8:~/training$ echo $?
0
```

```
trainee@ubuntu1604:~/training$ [ -d /home/trainee/training ]
trainee@ubuntu1604:~/training$ echo $?
0
```

```
[trainee@centos7 training]$ [ -d /home/trainee/training ]
```

```
[trainee@centos7 training]$ echo $?  
0
```

```
trainee@SLES12SP1:~/training> [ -d /home/trainee/training ]  
trainee@SLES12SP1:~/training> echo $?  
0
```



**Important:** The value contained in \$? is 0. This indicates **true**.

## Testing Strings

Test	Description
-n string	Returns true if string is not zero in length
-z string	Returns true if string is zero in length
string1 = string2	Returns true if string1 is equal to string2
string1 != string2	Returns true if string1 is different to string2
string1	Returns true if string1 is not empty

## LAB #2

Test whether two strings are identical:

```
trainee@debian8:~/training$ string1="root"  
trainee@debian8:~/training$ string2="fenestros"  
trainee@debian8:~/training$ [ $string1 = $string2 ]  
trainee@debian8:~/training$ echo $?  
1
```

```
trainee@ubuntu1604:~/training$ string1="root"
```

```
trainee@ubuntu1604:~/training$ string2="fenestros"
trainee@ubuntu1604:~/training$ [ $string1 = $string2 ]
trainee@ubuntu1604:~/training$ echo $?
1
```

```
[trainee@centos7 training]$ string1="root"
[trainee@centos7 training]$ string2="fenestros"
[trainee@centos7 training]$ [ $string1 = $string2 ]
[trainee@centos7 training]$ echo $?
1
```

```
trainee@SLES12SP1:~/training> string1="root"
trainee@SLES12SP1:~/training> string2="fenestros"
trainee@SLES12SP1:~/training> [ $string1 = $string2 ]
trainee@SLES12SP1:~/training> echo $?
1
```



**Important:** The value contained in \$? is 1. This indicates **false**.

Test if string1 is not zero in length:

```
trainee@debian8:~/training$ [ -n $string1 ]
trainee@debian8:~/training$ echo $?
0
```

```
trainee@ubuntu1604:~/training$ [ -n $string1 ]
trainee@ubuntu1604:~/training$ echo $?
0
```

```
[trainee@centos7 training]$ [ -n $string1 ]
[trainee@centos7 training]$ echo $?
0
```

```
0
```

```
trainee@SLES12SP1:~/training> [ -n $string1 ]  
trainee@SLES12SP1:~/training> echo $?  
0
```



**Important:** The value contained in \$? is 0. This indicates **true**.

Test if string1 is zero in length:

```
trainee@debian8:~/training$ [ -z $string1 ]  
trainee@debian8:~/training$ echo $?  
1
```

```
trainee@ubuntu1604:~/training$ [ -z $string1 ]  
trainee@ubuntu1604:~/training$ echo $?  
1
```

```
[trainee@centos7 training]$ [ -z $string1 ]  
[trainee@centos7 training]$ echo $?  
1
```

```
trainee@SLES12SP1:~/training> [ -z $string1 ]  
trainee@SLES12SP1:~/training> echo $?  
1
```



**Important:** The value contained in \$? is 1. This indicates **false**.

## Testing Numbers

Test	Description
value1 -eq value2	Returns true if value1 is equal to value2
value1 -ne value2	Returns true if value1 is not equal to value2
value1 -lt value2	Returns true if value1 is less than value2
value1 -le value2	Returns true if value1 is less than or equal to value2
value1 -gt value2	Returns true if value1 is greater than value2
value1 -ge value2	Returns true if value1 is greater than or equal to value2

### LAB #3

Compare the two numbers **value1** and **value2** :

```
trainee@debian8:~/training$ read value1
35
trainee@debian8:~/training$ read value2
23
trainee@debian8:~/training$ [ $value1 -lt $value2 ]
trainee@debian8:~/training$ echo $?
1
trainee@debian8:~/training$ [ $value2 -lt $value1 ]
trainee@debian8:~/training$ echo $?
0
trainee@debian8:~/training$ [ $value2 -eq $value1 ]
trainee@debian8:~/training$ echo $?
1
```

```
trainee@ubuntu1604:~/training$ read value1
35
trainee@ubuntu1604:~/training$ read value2
23
trainee@ubuntu1604:~/training$ [ $value1 -lt $value2 ]
```

```
trainee@ubuntu1604:~/training$ echo $?  
1  
trainee@ubuntu1604:~/training$ [ $value2 -lt $value1 ]  
trainee@ubuntu1604:~/training$ echo $?  
0  
trainee@ubuntu1604:~/training$ [ $value2 -eq $value1 ]  
trainee@ubuntu1604:~/training$ echo $?  
1
```

```
[trainee@centos7 training]$ read value1  
35  
[trainee@centos7 training]$ read value2  
23  
[trainee@centos7 training]$ [ $value1 -lt $value2 ]  
[trainee@centos7 training]$ echo $?  
1  
[trainee@centos7 training]$ [ $value2 -lt $value1 ]  
[trainee@centos7 training]$ echo $?  
0  
[trainee@centos7 training]$ [ $value2 -eq $value1 ]  
[trainee@centos7 training]$ echo $?  
1
```

```
trainee@SLES12SP1:~/training> read value1  
35  
trainee@SLES12SP1:~/training> read value2  
23  
trainee@SLES12SP1:~/training> [ $value1 -lt $value2 ]  
trainee@SLES12SP1:~/training> echo $?  
1  
trainee@SLES12SP1:~/training> [ $value2 -lt $value1 ]  
trainee@SLES12SP1:~/training> echo $?  
0  
trainee@SLES12SP1:~/training> [ $value2 -eq $value1 ]
```

```
trainee@SLES12SP1:~/training> echo $?  
1
```

## Expressions

Test	Description
!expression	Returns true if expression is false
expression1 -a expression2	Represents a logical OR between expression1 and expression2
expression1 -o expression2	Represents a logical AND between expression1 and expression2
\(expression\)	Parenthesis let you group together expressions

## LAB #4

Test if \$file is not a directory:

```
trainee@debian8:~/training$ file=a100  
trainee@debian8:~/training$ [ ! -d $file ]  
trainee@debian8:~/training$ echo $?  
0
```

```
trainee@ubuntu1604:~/training$ file=a100  
trainee@ubuntu1604:~/training$ [ ! -d $file ]  
trainee@ubuntu1604:~/training$ echo $?  
0
```

```
[trainee@centos7 training]$ file=a100  
[trainee@centos7 training]$ [ ! -d $file ]  
[trainee@centos7 training]$ echo $?  
0
```

```
trainee@SLES12SP1:~/training> file=a100  
trainee@SLES12SP1:~/training> [ ! -d $file ]
```

```
trainee@SLES12SP1:~/training> echo $?  
0
```

Test if \$directory is a directory and if trainee can cd into it:

```
trainee@debian8:~/training$ directory=/usr  
trainee@debian8:~/training$ [ -d $directory -a -x $directory ]  
trainee@debian8:~/training$ echo $?  
0
```

```
trainee@ubuntu1604:~/training$ directory=/usr  
trainee@ubuntu1604:~/training$ [ -d $directory -a -x $directory ]  
trainee@ubuntu1604:~/training$ echo $?  
0
```

```
[trainee@centos7 training]$ directory=/usr  
[trainee@centos7 training]$ [ -d $directory -a -x $directory ]  
[trainee@centos7 training]$ echo $?  
0
```

```
trainee@SLES12SP1:~/training> directory=/usr  
trainee@SLES12SP1:~/training> [ -d $directory -a -x $directory ]  
trainee@SLES12SP1:~/training> echo $?  
0
```

Test if trainee has the write permission for the a100 file **and** test if /usr is a directory **or** test if /tmp is a directory:

```
trainee@debian8:~/training$ [ -w a100 -a \( -d /usr -o -d /tmp \) ]  
trainee@debian8:~/training$ echo $?  
0
```

```
trainee@ubuntu1604:~/training$ [ -w a100 -a \( -d /usr -o -d /tmp \) ]  
trainee@ubuntu1604:~/training$ echo $?
```

```
0
```

```
[trainee@centos7 training]$ [ -w a100 -a \( -d /usr -o -d /tmp \) ]  
[trainee@centos7 training]$ echo $?
```

```
0
```

```
trainee@SLES12SP1:~/training> [ -w a100 -a \( -d /usr -o -d /tmp \) ]  
trainee@SLES12SP1:~/training> echo $?
```

```
0
```

## Testing the User Environment

Test	Description
-o option	Returns true if the shell option "option" is on

### LAB #5

```
trainee@debian8:~/training$ [ -o allexport ]  
trainee@debian8:~/training$ echo $?
```

```
1
```

```
trainee@ubuntu1604:~/training$ [ -o allexport ]  
trainee@ubuntu1604:~/training$ echo $?
```

```
1
```

```
[trainee@centos7 training]$ [ -o allexport ]  
[trainee@centos7 training]$ echo $?
```

```
1
```

```
trainee@SLES12SP1:~/training> [ -o allexport ]  
trainee@SLES12SP1:~/training> echo $?
```

```
1
```

## The `[[ expression ]]` Command

The `[[SpaceBar]expression[SpaceBar]]` command is an improved **test** command with some minor changes to syntax:

Test	Description
<code>expression1 &amp;&amp; expression2</code>	Represents a logical OR between <code>expression1</code> and <code>expression2</code>
<code>expression1    expression2</code>	Represents a logical AND between <code>expression1</code> and <code>expression2</code>
<code>(expression)</code>	Parenthesis let you group together expressions

and some additional operators :

Test	Description
<code>string = model</code>	Returns true if <code>string</code> corresponds to <code>model</code>
<code>string != model</code>	Returns true if <code>string</code> does not correspond to <code>model</code>
<code>string1 &lt; string2</code>	Returns true if <code>string1</code> is lexicographically before <code>string2</code>
<code>string1 &gt; string2</code>	Returns true if <code>string1</code> is lexicographically after <code>string2</code>

### LAB #6

Test if `trainee` has the write permission for the `a100` file **and** test if `/usr` is a directory **or** test if `/tmp` is a directory:

```
trainee@debian8:~/training$ [[ -w a100 && ( -d /usr || -d /tmp ) ]]  
trainee@debian8:~/training$ echo $?  
0
```

```
trainee@ubuntu1604:~/training$ [[ -w a100 && ( -d /usr || -d /tmp ) ]]  
trainee@ubuntu1604:~/training$ echo $?  
0
```

```
[trainee@centos7 training]$ [[ -w a100 && ( -d /usr || -d /tmp ) ]]  
[trainee@centos7 training]$ echo $?  
0
```

```
trainee@SLES12SP1:~/training> [[ -w a100 && ( -d /usr || -d /tmp ) ]]  
trainee@SLES12SP1:~/training> echo $?  
0
```

## Shell Operators

Operator	Description
Command1 && Command2	Command2 is executed if the exit code of Command1 is zero
Command1    Command2	Command2 is executed if the exit code of Command1 is not zero

### LAB #7

```
trainee@debian8:~/training$ [[ -d /root ]] && echo "The root directory exists"  
The root directory exists  
trainee@debian8:~/training$ [[ -d /root ]] || echo "The root directory exists"  
trainee@debian8:~/training$
```

```
trainee@ubuntu1604:~/training$ [[ -d /root ]] && echo "The root directory exists"  
The root directory exists  
trainee@ubuntu1604:~/training$ [[ -d /root ]] || echo "The root directory exists"  
trainee@ubuntu1604:~/training$
```

```
[trainee@centos7 training]$ [[ -d /root ]] && echo "The root directory exists"  
The root directory exists  
[trainee@centos7 training]$ [[ -d /root ]] || echo "The root directory exists"  
[trainee@centos7 training]$
```

```
trainee@SLES12SP1:~/training> [[ -d /root ]] && echo "The root directory exists"  
The root directory exists  
trainee@SLES12SP1:~/training> [[ -d /root ]] || echo "The root directory exists"  
trainee@SLES12SP1:~/training>
```

## The expr Command

The **expr** command's syntax is as follows :

expr `SpaceBar` number1 `SpaceBar` operator `SpaceBar` number2 `SpaceBar`

ou

expr `Tab ↵` number1 `Tab` operator `Tab ↵` number2 `↵ Enter`

ou

expr `SpaceBar` string `SpaceBar` : `SpaceBar` regular\_expression `SpaceBar`

or

expr `Tab ↵` string `Tab ↵` : `Tab ↵` regular\_expression `↵ Enter`

## Maths

Operator	Description
+	Addition
-	Subtraction
\*	Multiplication
/	Division
%	Modulo
\( \)	Parentheses

## Comparisons

Operator	Description
\<	Less than
\<=	Less than or equal to

---

Operator	Description
\>	Greater then
\>=	Greater then or equal to
=	Equal to
!=	Not equal to

## Logic

Operator	Description
\	Logical OR
\&	Logical AND

## LAB #8

Add two to the value of \$x:

```
trainee@debian8:~/training$ x=2
trainee@debian8:~/training$ expr $x + 2
4
```

```
trainee@ubuntu1604:~/training$ x=2
trainee@ubuntu1604:~/training$ expr $x + 2
4
```

```
[trainee@centos7 training]$ x=2
[trainee@centos7 training]$ expr $x + 2
4
```

```
trainee@SLES12SP1:~/training> x=2
trainee@SLES12SP1:~/training> expr $x + 2
4
```

If the surrounding spaces are removed, the result is completely different:

---

```
trainee@debian8:~/training$ expr $x+2
2+2
```

```
trainee@ubuntu1604:~/training$ expr $x+2
2+2
```

```
[trainee@centos7 training]$ expr $x+2
2+2
```

```
trainee@SLES12SP1:~/training> expr $x+2
2+2
```

Certain operators need to be protected:

```
trainee@debian8:~/training$ expr $x * 2
expr: syntax error
trainee@debian8:~/training$ expr $x \* 2
4
```

```
trainee@ubuntu1604:~/training$ expr $x * 2
expr: syntax error
trainee@ubuntu1604:~/training$ expr $x \* 2
4
```

```
[trainee@centos7 training]$ expr $x * 2
expr: syntax error
[trainee@centos7 training]$ expr $x \* 2
4
```

```
trainee@SLES12SP1:~/training> expr $x * 2
expr: syntax error
trainee@SLES12SP1:~/training> expr $x \* 2
4
```

Now put the result of a calculation in a variable:

```
trainee@debian8:~/training$ resultat=`expr $x + 10`  
trainee@debian8:~/training$ echo $resultat  
12
```

```
trainee@ubuntu1604:~/training$ resultat=`expr $x + 10`  
trainee@ubuntu1604:~/training$ echo $resultat  
12
```

```
[trainee@centos7 training]$ resultat=`expr $x + 10`  
[trainee@centos7 training]$ echo $resultat  
12
```

```
trainee@SLES12SP1:~/training> resultat=`expr $x + 10`  
trainee@SLES12SP1:~/training> echo $resultat  
12
```

## The let Command

The let command is equivalent to ((expression)). The ((expression)) command provides the following additional features when compared with the **expr** command :

- greater number of operators,
  - no need for spaces or tabulations between arguments,
  - no need to prefix variables with the **\$** character,
  - the shell's special characters do not need to be escaped,
  - variables are defined directly in the command,
  - faster execution time.
-

## Maths

Operator	Description
+	Addition
-	Subtraction
*	Multiplication
/	Division
%	Modulo
^	Power

## Comparisons

Operator	Description
<	Less than
<=	Less than or equal to
>	Greater than
>=	Greater than or equal to
==	Equal
!=	Not Equal

## Logic

Operator	Description
&&	Logical AND
	Logical OR
!	Logical negation

## Binary

Opérateur	Description
~	Binary negation
>>	décalage binaire à droite
<<	décalage binaire à gauche

---

Opérateur	Description
&	Binary AND
	Binary OR
^	Exclusive binary OR

**LAB #9**

```
trainee@debian8:~/training$ x=2
trainee@debian8:~/training$ ((x=$x+10))
trainee@debian8:~/training$ echo $x
12
trainee@debian8:~/training$ ((x=$x+20))
trainee@debian8:~/training$ echo $x
32
```

```
trainee@ubuntu1604:~/training$ x=2
trainee@ubuntu1604:~/training$ ((x=$x+10))
trainee@ubuntu1604:~/training$ echo $x
12
trainee@ubuntu1604:~/training$ ((x=$x+20))
trainee@ubuntu1604:~/training$ echo $x
32
```

```
[trainee@centos7 training]$ x=2
[trainee@centos7 training]$ ((x=$x+10))
[trainee@centos7 training]$ echo $x
12
[trainee@centos7 training]$ ((x=$x+20))
[trainee@centos7 training]$ echo $x
32
```

```
trainee@SLES12SP1:~/training> x=2
trainee@SLES12SP1:~/training> ((x=$x+10))
```

```
trainee@SLES12SP1:~/training> echo $x
12
trainee@SLES12SP1:~/training> ((x=$x+20))
trainee@SLES12SP1:~/training> echo $x
32
```

## Control Structures

### If

The syntax is as follows:

```
if condition
then
    command(s)
else
    command(s)
fi
```

or:

```
if condition
then
    command(s)
    command(s)
fi
```

or finally:

```
if condition
then
    command(s)
```

```
elif condition
then
    command(s)
elif condition
then
    command(s)
else
    command(s)

fi
```

## case

The syntax is as follows:

```
case $variable in
model1) function
    ...
    ;;
model2) function
    ...
    ;;
model3 | model4 | model5 ) function
    ...
    ;;
esac
```

## Loops

## for

The syntax is as follows:

```
for variable in variable_list
do
    command(s)
done
```

## while

The syntax is as follows:

```
while condition
do
    command(s)
done
```

## Example

```
U=1
while [ $U -lt $MAX_ACCOUNTS ]
do
useradd fenestros"$U" -c fenestros"$U" -d /home/fenestros"$U" -g staff -G audio,fuse -s /bin/bash 2>/dev/null
useradd fenestros"$U"$ -g machines -s /dev/false -d /dev/null 2>/dev/null
echo "Compte fenestros$U créé"
let U=U+1
done
```

## Start-up Scripts

When Bash is called as a login shell it executes the start-up scripts in the following order:

- **/etc/profile**,
- **~/.bash\_profile** or **~/.bash\_login** or **~/.profile** dependant upon the distribution,

In the case of RHEL/CentOS, Bash executes **~/.bash\_profile**. In the cas of Debian, Ubuntu and SLES, Bash executes **~/.profile**.

When a login shell is terminated, Bash executes the **~/.bash\_logout** file if it exists.

Whan Bash is called as an interactive shell as opposed to a login shell, it executes only the **~/.bashrc** file.

## LAB #11



**To do** : Using the knowledge you have acquired in this unit, explain each of the following scripts.

### ~/.profile and ~/.bash\_profile

```
trainee@debian8:~/training$ cat ~/.profile
# ~/.profile: executed by the command interpreter for login shells.
# This file is not read by bash(1), if ~/.bash_profile or ~/.bash_login
# exists.
# see /usr/share/doc/bash/examples/startup-files for examples.
# the files are located in the bash-doc package.

# the default umask is set in /etc/profile; for setting the umask
# for ssh logins, install and configure the libpam-umask package.
#umask 022
```

```
# if running bash
if [ -n "$BASH_VERSION" ]; then
    # include .bashrc if it exists
    if [ -f "$HOME/.bashrc" ]; then
        . "$HOME/.bashrc"
    fi
fi

# set PATH so it includes user's private bin if it exists
if [ -d "$HOME/bin" ] ; then
    PATH="$HOME/bin:$PATH"
fi
```

```
trainee@ubuntu1604:~/training$ cat ~/.profile
# ~/.profile: executed by the command interpreter for login shells.
# This file is not read by bash(1), if ~/.bash_profile or ~/.bash_login
# exists.
# see /usr/share/doc/bash/examples/startup-files for examples.
# the files are located in the bash-doc package.

# the default umask is set in /etc/profile; for setting the umask
# for ssh logins, install and configure the libpam-umask package.
#umask 022

# if running bash
if [ -n "$BASH_VERSION" ]; then
    # include .bashrc if it exists
    if [ -f "$HOME/.bashrc" ]; then
        . "$HOME/.bashrc"
    fi
fi

# set PATH so it includes user's private bin if it exists
if [ -d "$HOME/bin" ] ; then
```

```
PATH="$HOME/bin:$PATH"  
fi
```

```
[trainee@centos7 training]$ cat ~/.bash_profile  
# .bash_profile  
  
# Get the aliases and functions  
if [ -f ~/.bashrc ]; then  
    . ~/.bashrc  
fi  
  
# User specific environment and startup programs  
  
PATH=$PATH:$HOME/.local/bin:$HOME/bin  
  
export PATH
```

```
trainee@SLES12SP1:~/training> cat ~/.profile  
# Sample .profile for SuSE Linux  
# rewritten by Christian Steinruecken <cstein@suse.de>  
#  
# This file is read each time a login shell is started.  
# All other interactive shells will only read .bashrc; this is particularly  
# important for language settings, see below.  
  
test -z "$PROFILEREAD" && . /etc/profile || true  
  
# Most applications support several languages for their output.  
# To make use of this feature, simply uncomment one of the lines below or  
# add your own one (see /usr/share/locale/locale.alias for more codes)  
# This overwrites the system default set in /etc/sysconfig/language  
# in the variable RC_LANG.  
#  
#export LANG=de_DE.UTF-8    # uncomment this line for German output
```

```
#export LANG=fr_FR.UTF-8    # uncomment this line for French output
#export LANG=es_ES.UTF-8    # uncomment this line for Spanish output

# Some people don't like fortune. If you uncomment the following lines,
# you will have a fortune each time you log in ;-)

#if [ -x /usr/bin/fortune ] ; then
#   echo
#   /usr/bin/fortune
#   echo
#fi
```

## ~/bashrc

```
trainee@debian8:~/training$ cat ~/.bashrc
# ~/.bashrc: executed by bash(1) for non-login shells.
# see /usr/share/doc/bash/examples/startup-files (in the package bash-doc)
# for examples

# If not running interactively, don't do anything
case $- in
    *i*) ;;
    *) return;;
esac

# don't put duplicate lines or lines starting with space in the history.
# See bash(1) for more options
HISTCONTROL=ignoreboth

# append to the history file, don't overwrite it
shopt -s histappend
```

```
# for setting history length see HISTSIZE and HISTFILESIZE in bash(1)
HISTSIZE=1000
HISTFILESIZE=2000

# check the window size after each command and, if necessary,
# update the values of LINES and COLUMNS.
shopt -s checkwinsize

# If set, the pattern "*" used in a pathname expansion context will
# match all files and zero or more directories and subdirectories.
#shopt -s globstar

# make less more friendly for non-text input files, see lesspipe(1)
#[ -x /usr/bin/lesspipe ] && eval "$(SHELL=/bin/sh lesspipe)"

# set variable identifying the chroot you work in (used in the prompt below)
if [ -z "${debian_chroot:-}" ] && [ -r /etc/debian_chroot ]; then
    debian_chroot=$(cat /etc/debian_chroot)
fi

# set a fancy prompt (non-color, unless we know we "want" color)
case "$TERM" in
    xterm-color) color_prompt=yes;;
esac

# uncomment for a colored prompt, if the terminal has the capability; turned
# off by default to not distract the user: the focus in a terminal window
# should be on the output of commands, not on the prompt
#force_color_prompt=yes

if [ -n "$force_color_prompt" ]; then
    if [ -x /usr/bin/tput ] && tput setaf 1 >&/dev/null; then
        # We have color support; assume it's compliant with Ecma-48
        # (ISO/IEC-6429). (Lack of such support is extremely rare, and such
```

```
# a case would tend to support setf rather than setaf.)
color_prompt=yes
else
color_prompt=
fi
fi

if [ "$color_prompt" = yes ]; then
    PS1='${debian_chroot:+($debian_chroot)}\[\033[01;32m\]\u@\h\[\033[00m\]:\[\033[01;34m\]\w\[\033[00m\]\$ '
else
    PS1='${debian_chroot:+($debian_chroot)}\u@\h:\w\$ '
fi
unset color_prompt force_color_prompt

# If this is an xterm set the title to user@host:dir
case "$TERM" in
xterm*|rxvt*)
    PS1="\[\e]0;${debian_chroot:+($debian_chroot)}\u@\h: \w\a\]$PS1"
    ;;
*)
    ;;
esac

# enable color support of ls and also add handy aliases
if [ -x /usr/bin/dircolors ]; then
    test -r ~/.dircolors && eval "$(dircolors -b ~/.dircolors)" || eval "$(dircolors -b)"
    alias ls='ls --color=auto'
    #alias dir='dir --color=auto'
    #alias vdir='vdir --color=auto'

    #alias grep='grep --color=auto'
    #alias fgrep='fgrep --color=auto'
    #alias egrep='egrep --color=auto'
fi
```

```
# colored GCC warnings and errors
#export GCC_COLORS='error=01;31:warning=01;35:note=01;36:caret=01;32:locus=01:quote=01'

# some more ls aliases
#alias ll='ls -l'
#alias la='ls -A'
#alias l='ls -CF'

# Alias definitions.
# You may want to put all your additions into a separate file like
# ~/.bash_aliases, instead of adding them here directly.
# See /usr/share/doc/bash-doc/examples in the bash-doc package.

if [ -f ~/.bash_aliases ]; then
    . ~/.bash_aliases
fi

# enable programmable completion features (you don't need to enable
# this, if it's already enabled in /etc/bash.bashrc and /etc/profile
# sources /etc/bash.bashrc).
if ! shopt -oq posix; then
    if [ -f /usr/share/bash-completion/bash_completion ]; then
        . /usr/share/bash-completion/bash_completion
    elif [ -f /etc/bash_completion ]; then
        . /etc/bash_completion
    fi
fi
```

```
trainee@ubuntu1604:~/training$ cat ~/.bashrc
# ~/.bashrc: executed by bash(1) for non-login shells.
# see /usr/share/doc/bash/examples/startup-files (in the package bash-doc)
# for examples

# If not running interactively, don't do anything
```

```
case $- in
    *i*) ;;
    *) return;;
esac

# don't put duplicate lines or lines starting with space in the history.
# See bash(1) for more options
HISTCONTROL=ignoreboth

# append to the history file, don't overwrite it
shopt -s histappend

# for setting history length see HISTSIZE and HISTFILESIZE in bash(1)
HISTSIZE=1000
HISTFILESIZE=2000

# check the window size after each command and, if necessary,
# update the values of LINES and COLUMNS.
shopt -s checkwinsize

# If set, the pattern "*" used in a pathname expansion context will
# match all files and zero or more directories and subdirectories.
#shopt -s globstar

# make less more friendly for non-text input files, see lesspipe(1)
[ -x /usr/bin/lesspipe ] && eval "$(SHELL=/bin/sh lesspipe)"

# set variable identifying the chroot you work in (used in the prompt below)
if [ -z "${debian_chroot:-}" ] && [ -r /etc/debian_chroot ]; then
    debian_chroot=$(cat /etc/debian_chroot)
fi

# set a fancy prompt (non-color, unless we know we "want" color)
case "$TERM" in
```

```
xterm-color|*-256color) color_prompt=yes;;
esac

# uncomment for a colored prompt, if the terminal has the capability; turned
# off by default to not distract the user: the focus in a terminal window
# should be on the output of commands, not on the prompt
#force_color_prompt=yes

if [ -n "$force_color_prompt" ]; then
    if [ -x /usr/bin/tput ] && tput setaf 1 >&/dev/null; then
        # We have color support; assume it's compliant with Ecma-48
        # (ISO/IEC-6429). (Lack of such support is extremely rare, and such
        # a case would tend to support setf rather than setaf.)
        color_prompt=yes
    else
        color_prompt=
    fi
fi

if [ "$color_prompt" = yes ]; then
    PS1='${debian_chroot:+($debian_chroot)}\[\033[01;32m\]\u@\h\[\033[00m\]:\[\033[01;34m\]\w\[\033[00m\]\$ '
else
    PS1='${debian_chroot:+($debian_chroot)}\u@\h:\w\$ '
fi
unset color_prompt force_color_prompt

# If this is an xterm set the title to user@host:dir
case "$TERM" in
xterm*|rxvt*)
    PS1="\[\e]0;${debian_chroot:+($debian_chroot)}\u@\h: \w\a\]$PS1"
    ;;
*)
    ;;
esac
```

```
# enable color support of ls and also add handy aliases
if [ -x /usr/bin/dircolors ]; then
    test -r ~/.dircolors && eval "$(dircolors -b ~/.dircolors)" || eval "$(dircolors -b)"
    alias ls='ls --color=auto'
    #alias dir='dir --color=auto'
    #alias vdir='vdir --color=auto'

    alias grep='grep --color=auto'
    alias fgrep='fgrep --color=auto'
    alias egrep='egrep --color=auto'
fi

# colored GCC warnings and errors
#export GCC_COLORS='error=01;31:warning=01;35:note=01;36:caret=01;32:locus=01:quote=01'

# some more ls aliases
alias ll='ls -alF'
alias la='ls -A'
alias l='ls -CF'

# Add an "alert" alias for long running commands.  Use like so:
#   sleep 10; alert
alias alert='notify-send --urgency=low -i "$([ $? = 0 ] && echo terminal || echo error)" "$(history|tail -n1|sed -e '\''s/^\s*[0-9]\+\s*//;s/[\;&]\s*alert$//'\''")"'

# Alias definitions.
# You may want to put all your additions into a separate file like
# ~/.bash_aliases, instead of adding them here directly.
# See /usr/share/doc/bash-doc/examples in the bash-doc package.

if [ -f ~/.bash_aliases ]; then
    . ~/.bash_aliases
fi
```

```
# enable programmable completion features (you don't need to enable
# this, if it's already enabled in /etc/bash.bashrc and /etc/profile
# sources /etc/bash.bashrc).
if ! shopt -oq posix; then
  if [ -f /usr/share/bash-completion/bash_completion ]; then
    . /usr/share/bash-completion/bash_completion
  elif [ -f /etc/bash_completion ]; then
    . /etc/bash_completion
  fi
fi
```

```
[trainee@centos7 training]$ cat ~/.bashrc
```

```
# .bashrc
```

```
# Source global definitions
if [ -f /etc/bashrc ]; then
  . /etc/bashrc
fi
```

```
# Uncomment the following line if you don't like systemctl's auto-paging feature:
# export SYSTEMD_PAGER=
```

```
# User specific aliases and functions
```

```
trainee@SLES12SP1:~/training> cat ~/.bashrc
```

```
# Sample .bashrc for SuSE Linux
```

```
# Copyright (c) SuSE GmbH Nuernberg
```

```
# There are 3 different types of shells in bash: the login shell, normal shell
# and interactive shell. Login shells read ~/.profile and interactive shells
# read ~/.bashrc; in our setup, /etc/profile sources ~/.bashrc - thus all
# settings made here will also take effect in a login shell.
```

```
#
# NOTE: It is recommended to make language settings in ~/.profile rather than
```

```
# here, since multilingual X sessions would not work properly if LANG is over-
# ridden in every subshell.

# Some applications read the EDITOR variable to determine your favourite text
# editor. So uncomment the line below and enter the editor of your choice :-)
#export EDITOR=/usr/bin/vim
#export EDITOR=/usr/bin/mcedit

# For some news readers it makes sense to specify the NEWSSERVER variable here
#export NEWSSERVER=your.news.server

# If you want to use a Palm device with Linux, uncomment the two lines below.
# For some (older) Palm Pilots, you might need to set a lower baud rate
# e.g. 57600 or 38400; lowest is 9600 (very slow!)
#
#export PILOTPORT=/dev/pilot
#export PILOTRATE=115200

test -s ~/.alias && . ~/.alias || true
```

---

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