Bash

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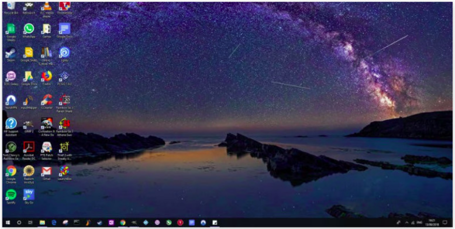
Outline

1. Introduction
2. Entering Linux commands
3. Forms of Linux help

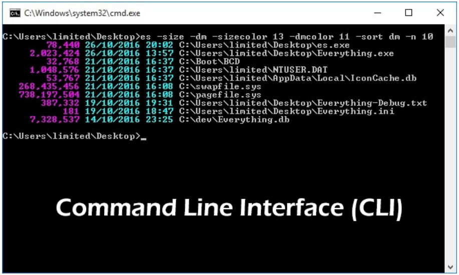
Introduction to Shells in Linux

- What is a Shell ?
  - A shell is a **user interface** that allows interaction with the operating system.
  - Types of User Interfaces:
    - ★ **Graphical User Interface (GUI):** Popular and user-friendly.
    - ★ **Command-Line Interface (CLI):** Preferred by many Linux users for flexibility and efficiency.
    - ★ **Text-Based Menu Interface:** Less common today, replaced by GUI.
- Why learn the CLI in Linux ?
  - Provides greater control and flexibility.
  - Many Linux commands do not have GUI equivalents.
  - Essential for mastering Linux.

Example: GUI

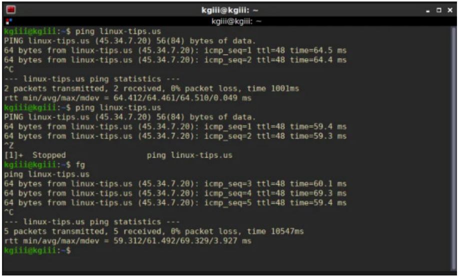


Example: CLI



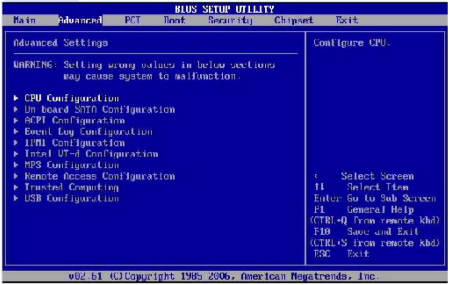
```
C:\Users\limited\Desktop>es -size -dm -sizecolor 13 -dmcolor 11 -sort dm -n 10
       78,440 26/10/2016 20:02 C:\Users\limited\Desktop\es.exe
    2,023,424 26/10/2016 13:57 C:\Users\limited\Desktop\Everything.exe
       32,768 21/10/2016 16:37 C:\Boot\BCD
    1,048,576 21/10/2016 16:37 C:\Users\limited\NTUSER.DAT
       53,767 21/10/2016 16:37 C:\Users\limited\AppData\Local\IconCache.db
  268,435,456 21/10/2016 16:08 C:\swapfile.sys
  738,197,504 21/10/2016 16:08 C:\pagefile.sys
      387,332 19/10/2016 19:31 C:\Users\limited\Desktop\Everything-Debug.txt
          181 19/10/2016 18:47 C:\Users\limited\Desktop\Everything.ini
    7,328,537 14/10/2016 23:25 C:\dev\Everything.db

C:\Users\limited\Desktop>_
```

Command Line Interface (CLI)

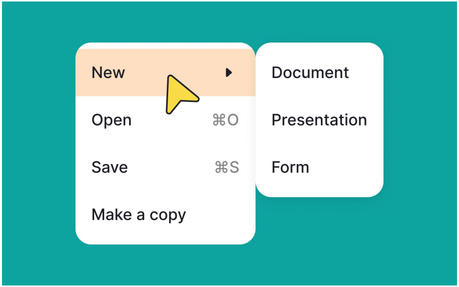


```
kgiii@kgiii:~$ ping linux-tips.us
PING linux-tips.us (45.34.7.20) 56(84) bytes of data.
64 bytes from linux-tips.us (45.34.7.20): icmp_seq=1 ttl=48 time=64.5 ms
64 bytes from linux-tips.us (45.34.7.20): icmp_seq=2 ttl=48 time=64.4 ms
^C
--- linux-tips.us ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1001ms
rtt min/avg/max/mdev = 64.412/64.461/64.510/0.049 ms
kgiii@kgiii:~$ ping linux-tips.us
PING linux-tips.us (45.34.7.20) 56(84) bytes of data.
64 bytes from linux-tips.us (45.34.7.20): icmp_seq=1 ttl=48 time=59.4 ms
64 bytes from linux-tips.us (45.34.7.20): icmp_seq=2 ttl=48 time=59.3 ms
^Z
[1]+  Stopped                 ping linux-tips.us
kgiii@kgiii:~$ fg
ping linux-tips.us
64 bytes from linux-tips.us (45.34.7.20): icmp_seq=3 ttl=48 time=60.1 ms
64 bytes from linux-tips.us (45.34.7.20): icmp_seq=4 ttl=48 time=69.3 ms
64 bytes from linux-tips.us (45.34.7.20): icmp_seq=5 ttl=48 time=59.4 ms
^C
--- linux-tips.us ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 10547ms
rtt min/avg/max/mdev = 59.312/61.492/69.329/3.927 ms
kgiii@kgiii:~$
```

Example: Menu Interface



```
                        BIOS SETUP UTILITY
 Main   Advanced   PCI   Boot   Security   Chipset   Exit

 Advanced Settings                               Configure CPU.
 ----------------------------------------------
 WARNING: Setting wrong values in below sections
          may cause system to malfunction.

 ▶ CPU Configuration
 ▶ On board SATA Configuration
 ▶ ACPI Configuration
 ▶ Event Log Configuration
 ▶ IPMI Configuration
 ▶ Intel VT-d Configuration
 ▶ MPS Configuration
 ▶ Remote Access Configuration                   ←     Select Screen
 ▶ Trusted Computing                             ↑↓    Select Item
 ▶ USB Configuration                             Enter Go to Sub Screen
                                                 F1    General Help
                                                (CTRL+Q from remote kbd)
                                                 F10   Save and Exit
                                                (CTRL+S from remote kbd)
                                                 ESC   Exit

          v02.61 (C)Copyright 1985-2006, American Megatrends, Inc.
```



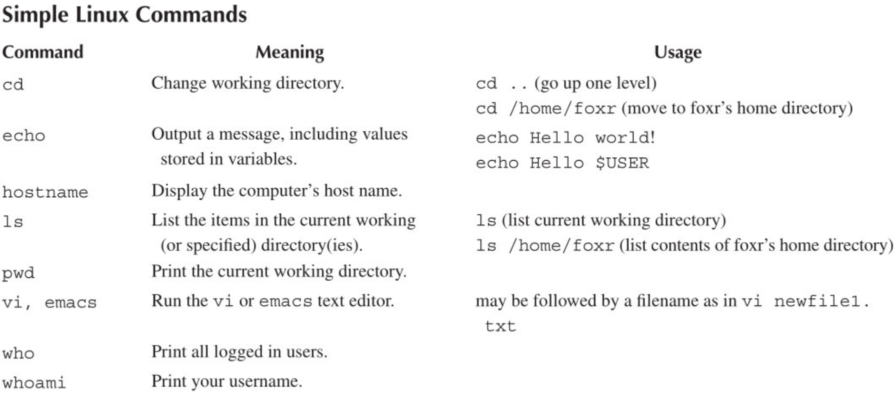
The Role of Shells in Linux

- Bash Shell:
  - Bash (Bourne Again Shell) is the default shell in Linux.
  - Shell Features:
    - **Interpreter:** Executes user commands by parsing and executing statements.
    - **Environment:** Captures previous commands and definitions for easier user interaction.
- Shell Commands:
  - Shell allows commands like **redirection** (changing input/output locations) and **pipes** (redirecting output to another program).
  - **Wildcards:** Used to refer to multiple files, e.g., a* for files starting with 'a'.

Understanding the Linux Terminal and Bash Shell

- While logging into Linux through the GUI, we can run programs, but using the **terminal** window provides more control via the command-line interface (CLI).
- Understanding the Shell Prompt:
  - A typical prompt looks like: **[minhtd@localhost ∼]$**
  - **minhtd**: The username of the person logged in.
  - **localhost**: indicating the machine is the local computer unless logged in remotely.
  - ∼ **(tilde)**: showing that we are in the home directory (/home/minhtd).

Simple Linux Commands



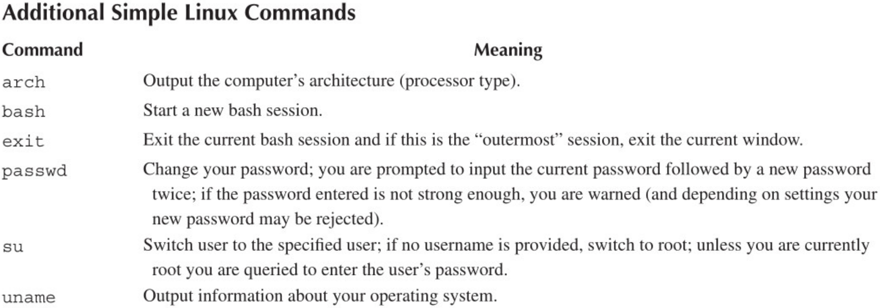
Simple Linux Commands

Command	Meaning	Usage
`cd`	Change working directory.	`cd ..` (go up one level) `cd /home/foxr` (move to foxr's home directory)

`echo`	Output a message, including values stored in variables.	`echo Hello world!`
		`echo Hello $USER`

`hostname`	Display the computer's host name.	
`ls`	List the items in the current working (or specified) directory(ies).	`ls` (list current working directory) `ls /home/foxr` (list contents of foxr's home directory)
`pwd`	Print the current working directory.	
`vi, emacs`	Run the `vi` or `emacs` text editor.	may be followed by a filename as in `vi newfile1.txt`
`who`	Print all logged in users.	
`whoami`	Print your username.	

Additional Simple Linux Commands



Additional Simple Linux Commands

Command	Meaning
`arch`	Output the computer's architecture (processor type).
`bash`	Start a new bash session.
`exit`	Exit the current bash session and if this is the "outermost" session, exit the current window.
`passwd`	Change your password; you are prompted to input the current password followed by a new password twice; if the password entered is not strong enough, you are warned (and depending on settings your new password may be rejected).
`su`	Switch user to the specified user; if no username is provided, switch to root; unless you are currently root you are queried to enter the user's password.
`uname`	Output information about your operating system.

Commands with options and parameters

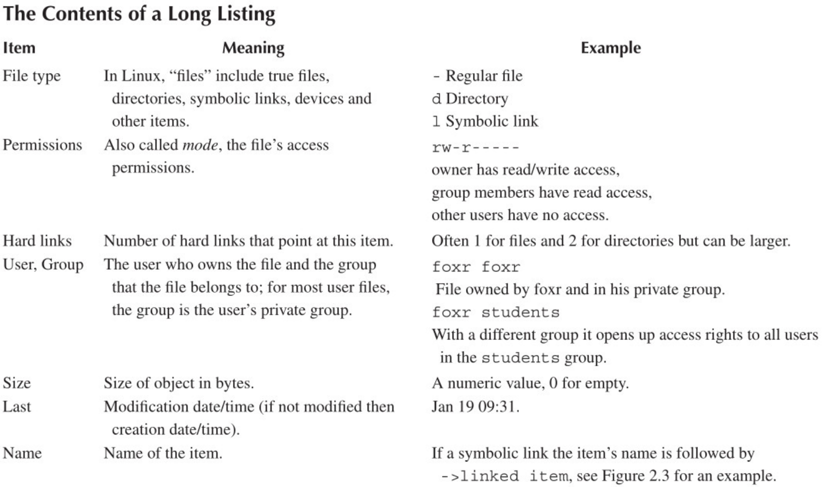
- Basic Command Format:
  - Linux commands follow a general structure:

    command [options] [parameter(s)]
  - Options:
    - ★ Typically follow a **hyphen (-)**.
    - ★ Often represented by a **single letter** or sometimes a **digit**.
    - ★ Some commands have longer options (e.g., -f can also be written as –force).
- Common Options:
  - **-f** or **–force**: Used in commands like cp, mv, and rm to force an operation.
  - **-i** or **–interactive**: Used for interactive mode in commands like cp, mv, and rm.
  - **-r** or **–recursive**: Used for recursive operations in cp and rm.
  - **-a**: Often used to refer to "all" in various commands.
  - **-h** or **–help**: Displays help for commands.

Parameters in Linux Commands

- What are Parameters ?
  - Parameters can be required or optional.
  - They can represent different entities such as:
    - ★ **Usernames**: In commands like passwd and su.
    - ★ **Process IDs**: Used in commands like kill.
    - ★ **Files and Directories**: Common in commands like ls, cp, mv, and rm.
- For example: ls Command
  - **Without a parameter**: Lists the contents of the current directory.
  - **With parameters**: Lists the contents of specific directories or files.
    Example: ls /home/foxr /home/minhtd /etc/sysconfig

The ls Command



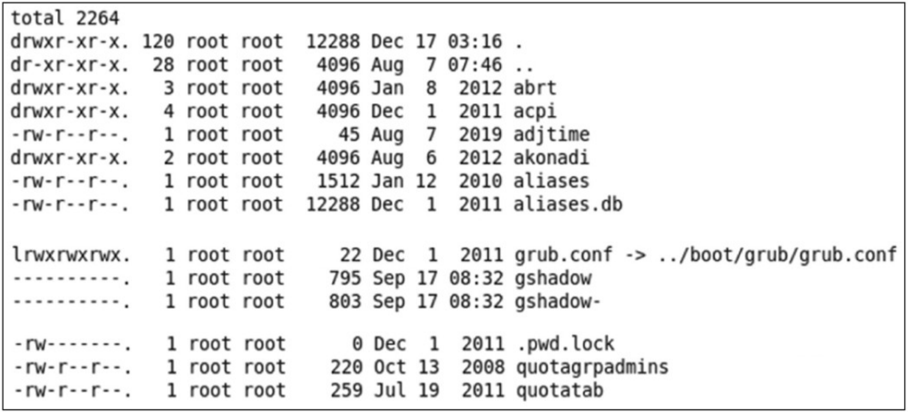
The Contents of a Long Listing

Item	Meaning	Example
File type	In Linux, "files" include true files, directories, symbolic links, devices and other items.	`-` Regular file `d` Directory `l` Symbolic link
Permissions	Also called *mode*, the file's access permissions.	`rw-r-----` owner has read/write access, group members have read access, other users have no access.
Hard links	Number of hard links that point at this item.	Often 1 for files and 2 for directories but can be larger.

User, Group	The user who owns the file and the group that the file belongs to; for most user files, the group is the user's private group.	`foxr foxr`
		File owned by foxr and in his private group.
		`foxr students`
		With a different group it opens up access rights to all users in the `students` group.

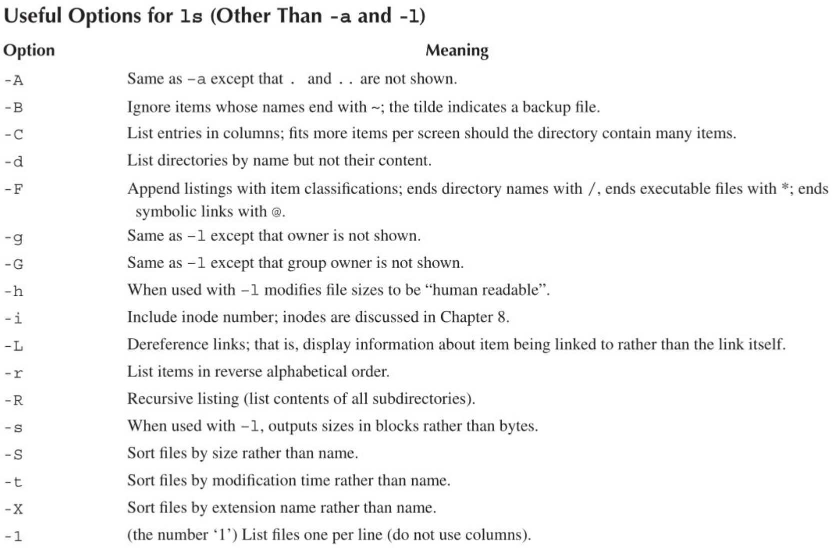
Size	Size of object in bytes.	A numeric value, 0 for empty.
Last	Modification date/time (if not modified then creation date/time).	Jan 19 09:31.
Name	Name of the item.	If a symbolic link the item's name is followed by `->linked item`, see Figure 2.3 for an example.

The ls Command



```
total 2264
drwxr-xr-x. 120 root root  12288 Dec 17 03:16 .
dr-xr-xr-x.  28 root root   4096 Aug  7 07:46 ..
drwxr-xr-x.   3 root root   4096 Jan  8  2012 abrt
drwxr-xr-x.   4 root root   4096 Dec  1  2011 acpi
-rw-r--r--.   1 root root     45 Aug  7  2019 adjtime
drwxr-xr-x.   2 root root   4096 Aug  6  2012 akonadi
-rw-r--r--.   1 root root   1512 Jan 12  2010 aliases
-rw-r--r--.   1 root root  12288 Dec  1  2011 aliases.db

lrwxrwxrwx.   1 root root     22 Dec  1  2011 grub.conf -> ../boot/grub/grub.conf
----------.   1 root root    795 Sep 17 08:32 gshadow
----------.   1 root root    803 Sep 17 08:32 gshadow-

-rw-------.   1 root root      0 Dec  1  2011 .pwd.lock
-rw-r--r--.   1 root root    220 Oct 13  2008 quotagrpadmins
-rw-r--r--.   1 root root    259 Jul 19  2011 quotatab
```

The ls Command



Useful Options for `ls` (Other Than `-a` and `-l`)

Option	Meaning
`-A`	Same as `–a` except that `.` and `..` are not shown.
`-B`	Ignore items whose names end with ~; the tilde indicates a backup file.
`-C`	List entries in columns; fits more items per screen should the directory contain many items.
`-d`	List directories by name but not their content.
`-F`	Append listings with item classifications; ends directory names with `/`, ends executable files with *; ends symbolic links with `@`.
`-g`	Same as `–l` except that owner is not shown.
`-G`	Same as `–l` except that group owner is not shown.
`-h`	When used with `–l` modifies file sizes to be “human readable”.
`-i`	Include inode number; inodes are discussed in Chapter 8.
`-L`	Dereference links; that is, display information about item being linked to rather than the link itself.
`-r`	List items in reverse alphabetical order.
`-R`	Recursive listing (list contents of all subdirectories).
`-s`	When used with `–l`, outputs sizes in blocks rather than bytes.
`-S`	Sort files by size rather than name.
`-t`	Sort files by modification time rather than name.
`-X`	Sort files by extension name rather than name.
`-1`	(the number ‘1’) List files one per line (do not use columns).

Introduction to the man Command

- What is the man Command ?
    - The man command is used to view the **manual pages** (man pages) for Linux commands.
    - The format for the man command is:
      man [command]
    - Example: **man ls** displays the manual page for the ls command.
- Viewing the Man Page:
    - The manual page is opened in the **vi text editor**.
    - You cannot edit the man page, only navigate and search through it.

Bash Built-in Commands and Their Man Pages

- What are Bash Built-ins?
  - **Bash Built-ins** are commands that are built into the Bash shell itself, rather than being standalone Linux commands.
  - Examples of Bash built-ins include alias, cd, exit, history, and jobs.
- Man Pages for Built-ins:
  - The man page for Bash built-ins is accessed by using the command: man bash
  - This man page includes descriptions of many built-in commands. Some built-in commands, like kill and pwd, have their own individual man pages.
- Navigating Man Pages for Built-ins:
  - The man page for Bash built-ins can be long, so you may need to scroll or search for specific commands using the same navigation techniques.

Navigating and Searching Man Pages

- Using vi to Navigate Man Pages:
  - The man command uses vi for viewing the manual page, and you can use basic vi movement commands.
  - The man page fills the entire terminal window with a colon : at the bottom as a prompt.
- Basic Movement Commands:
  - Use the arrow keys or j (down) and k (up) to move through the page.
  - Press q to quit and exit the man page.
- Search Commands:
  - Press / followed by the search term to search for a specific word in the man page.
  - Press n to go to the next search result.

Man Page Structure

- Sections of a Man Page:
  - A man page is divided into sections. Although specific sections may vary for each command, several sections appear in almost every man page:
    - **NAME**: Name of the command and a brief description.
    - **SYNOPSIS**: Shows how to use the command, including its options and parameters.
    - **DESCRIPTION**: Provides a detailed explanation of the command's behavior.
    - **OPTIONS**: Lists available options for the command.
- Example: ls Man Page:
  - The man page for ls includes sections such as:
    - The command's name and description.
    - A list of options like -l for long format.

Questions