BASIC LINUX SHELL IMPLEMENTATION

Internal Commands

Internal commands are those which are interpreted by the shell program itself, without requiring a different program to handle the expected operations (of the said command). Examples of internal commands are ‘cd’, ‘pwd’, ‘exit’ etc.

cd

Description

cd is used to change the current working directory to a specified folder.

Flags used

1. “~” or”--” - gets to the home directory
2. “-” - brings to the parent directory

Corner cases handled

1. The specified directory doesn’t exist
2. Too many operands to handle

Usage

To navigate to the home directory, use “~” or “--” and to the root directory “/” and to parent directory “-” or “..” and to stay in the current directory. “.”.

Syscalls used

1. getenv()
2. opendir()
3. closedir();
4. chdir()

echo

Description

echo is used to display a certain piece of string or it can also be used to print pwd too.

Flags used

1. “-e” - here enables the interpretation of backslash escapes
2. “-n” - this option is used to omit echoing trailing newline
3. “$PWD” - to navigate to pwd.

Corner cases handled

1. String might not have been ended properly.
2. Missing operands
3. Input might be given incorrectly

Usage

To allow the interpretation of backslash escapes use “-e” and to to omit echoing trailing newline use “-n” and to navigate to pwd use “$PWD” else it can be simply used to display text.

Syscalls used

1. getcwd()
2. printf()

pwd

Description

pwd prints the path of the working directory, starting from the root.

Flags used

1. pwd -L: Prints the symbolic path.
2. pwd -P: Prints the actual path
3. -v : Detailed information about pwd command

Corner cases handled

1. Input might be given incorrectly
2. Too many operands

Usage

pwd prints the path of the working directory, starting from the root and pwd-L is used to print symbolic path and pwd-P is used to print the actual physical path

Syscalls used

1. getcwd()
2. getenv();

External Commands

External commands on the other hand relate to commands which are not handled directly by the shell program but by an external program. Common examples include ‘ls’, ‘cat’, ‘grep’ etc.

mkdir

Description

mkdir command in Linux allows the user to create directories (also referred to as folders in some operating systems). This command can create multiple directories at once.

Flags used

1. -p: A flag which enables the command to create parent directories as necessary. If the directories exist, no error is specified.
2. -v : It displays a message for every directory created.
3. -m :This option is used to set the file modes, i.e. permissions, etc. for the created directories. The syntax of the mode is the same as the chmod command.

Corner cases handled

1. Missing operands or directories not specified
2. mkdir() error
3. Directory name not specified
4. Mode not specifeied

Usage

mkdir command in Linux allows the user to create directories (also referred to as folders in some operating systems). This command can create multiple directories at once. “-p” enables the command to create parent directories as necessary. If the directories exist, no error is specified.and “-v” displays a message for every directory created. -m :n is used to set the file modes, i.e. permissions, etc. for the created directories. The syntax of the mode is the same as the chmod command.

Syscalls used

1. mkdir()
2. opendir()
3. closedir()
4. getenv()
5. chdir()

rm

Description

rm stands for remove here. rm command is used to remove objects such as files, directories, symbolic links and so on from the file system like UNIX. To be more precise, rm removes references to objects from the filesystem, where those objects might have had multiple references (for example, a file with two different names). By default, it does not remove directories.

Flags used

1. -i: makes the command ask the user for confirmation before removing each file, you have to press y for confirm deletion, any other key leaves the file un-deleted
2. -f :overrides this minor protection and removes the file forcefully.

3. -r :performs a tree-walk and will delete all the files and sub-directories recursively of the parent directory.

Corner cases handled

1. Missing operands
2. remove() error

Usage

rm stands for remove here. rm command is used to remove objects such as files-i: makes the command ask the user for confirmation before removing each file, you have to press y for confirm deletion, any other key leaves the file un-deleted.-f :overrides this minor protection and removes the file forcefully.-r :performs a tree-walk and will delete all the files and sub-directories recursively of the parent directory.

Syscalls used

1. system()
2. remove()

cat

Description

Cat(concatenate) command is very frequently used in Linux. It reads data from the file and gives their content as output. It helps us to create, view, concatenate files

Flags used

1. -k: normal cat command
2. -n :To view contents of a file preceding with line numbers\
3. > as first argument: Create a file
4. > as second argument : Copy the contents of one file to another file
5. >> as second argument : append the contents of one file to the end of another file
6. -E : can highlight the end of line

Corner cases handled

1. Missing operands
2. File doesn't exist
3. File cannot be opened

Usage

Cat(concatenate) command is very frequently used in Linux. It reads data from the file and gives their content as output. It helps us to create, view, concatenate files. -k: normal cat command

-n :To view contents of a file preceding with line numbers, > as first argument: Create a file, > as second argument : Copy the contents of one file to another file, >> as second argument : append the contents of one file to the end of another file and -E : can highlight the end of line

Syscalls used

1. fopen()
2. fclose()
3. access()

date

Description

date command is used to display the system date and time. By default the date command displays the date in the time zone on which unix/linux operating system is configured.

Flags used

1. -u : prints the coordinated universal time (UTC)
2. -r : prints date and time in RFC 5322 format
3. -n: normal date command

Corner cases handled

1. time() and locatime() fails to return valid answers
2. Too many operands

Usage

date command is used to display the system date and time. By default the date command displays the date in the time zone on which unix/linux operating system is configured.
-u : prints the coordinated universal time (UTC) and -r : prints date and time in RFC 5322 format

Syscalls used

1. localtime()
2. memset()
3. time()

ls

Description

lists directory contents of files and directories

Flags used

1. -a : To show all the hidden files in the directory

2. -A : To show the hidden files, but not the ‘.’ (current directory) and ‘..’ (parent directory).
3. -n: standard ls command

Corner cases handled

1. Directory may not exist
2. opendir() and readdir() errors

Usage

ls is used to list the files and directories

Syscalls used

1. readdir()
2. opendir()

TEST CASES:

```
cd
cd ~
cd --
cd -
cd /
cd ..
cd .
echo "str"
echo "str
cd iop
cd iok uik
echo -e "hui \njik"
echo -n "jkio dfdd"
echo $PWD
echo
pwd
pwd -L
pwd -P
pwd -v
pwd oo
pwd io iop
mkdir -p home/opi/op
mkdir -p home/opi/opee
mkdir yui
mkdir -v bh
mkdir -m a=0777 iooo
mkdir -p
mkdir -m
mkdir home
```

```
rm a.txt
rm b.txt c.txt
rm -i op.txt
rm -f im.txt
rm -r uik
cat -k a.txt
cat -n yu.txt ui.txt
cat > io.txt
cat io.txt > ui.txt
cat io.txt >> ui.txt
cat -E io.txt
cat -k
cat -k io.txt ui.txt
date -n
date -r
date -u
date er yu
ls -n
ls -a
ls -A
```