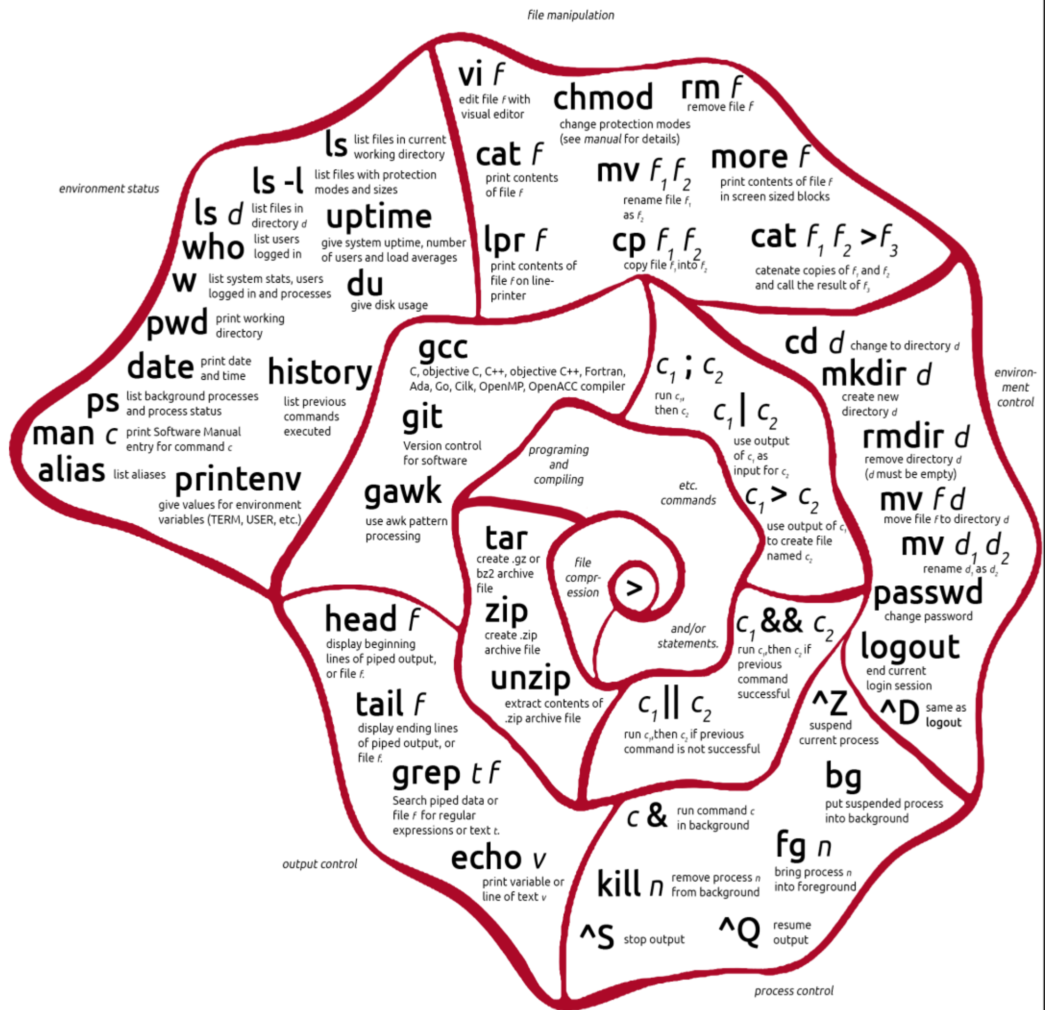
SHELL PROGRAMMING - 2



file manipulation
vi f
edit file f with visual editor
chmod
change protection modes (see manual for details)
rm f
remove file f
cat f
print contents of file f
mv f1 f2
rename file f1 as f2
more f
print contents of file f in screen sized blocks
lpr f
print contents of file f on line-printer
cp f1 f2
copy file f1 into f2
cat f1 f2 >f3
catenate copies of f1 and f2 and call the result of f3
environment status
ls
list files in current working directory
ls -l
list files with protection modes and sizes
ls d
list files in directory d
uptime
give system uptime, number of users and load averages
who
list users logged in
w
list system stats, users logged in and processes
du
give disk usage
pwd
print working directory
date
print date and time
history
list previous commands executed
ps
list background processes and process status
man c
print Software Manual entry for command c
alias
list aliases
printenv
give values for environment variables (TERM, USER, etc.)
gcc
C, objective C, C++, objective C++, Fortran, Ada, Go, Cilk, OpenMP, OpenACC compiler
git
Version control for software
gawk
use awk pattern processing
programing and compiling
etc. commands
c1 ; c2
run c1, then c2
c1 | c2
use output of c1 as input for c2
c1 > c2
use output of c1 to create file named c2
tar
create .gz or bz2 archive file
zip
create .zip archive file
unzip
extract contents of .zip archive file
file compr-ession
and/or statements.
c1 && c2
run c1, then c2 if previous command successful
c1 || c2
run c1, then c2 if previous command is not successful
environ-ment control
cd d
change to directory d
mkdir d
create new directory d
rmdir d
remove directory d (d must be empty)
mv f d
move file f to directory d
mv d1 d2
rename d1 as d2
passwd
change password
logout
end current login session
^D
same as logout
^Z
suspend current process
output control
head f
display beginning lines of piped output, or file f.
tail f
display ending lines of piped output, or file f.
grep t f
Search piped data or file f for regular expressions or text t.
echo v
print variable or line of text v
c &
run command c in background
bg
put suspended process into background
fg n
bring process n into foreground
kill n
remove process n from background
^S
stop output
^Q
resume output
process control

LINUX SHELL COMMANDS

Another use of brackets [ ]
(alterative for expr)

- [ ] in place of expr
- We generally use:

```
var1=`expr 5 \* 2`
```

- Instead now let's type:

```
var1=$[ 5 * 2 ]                        echo $var1
var2=$[ $var1 + 1 ]                    echo $var2
var3=$[ $var1 * ($var2 - $var1) ]      echo $var3
```

Syntax: **$[operation]**

An example for **File** operation

```
$ cat scr6_1
#!/bin/bash
if [ -f letter1 ]          #letter1 is the filename
then
     echo "We have found the evidence, here it is!"
     cat letter1
else
     echo "Keep looking!"
fi

$ ./scr6_1
We have found the evidence!
How much would it cost to buy an Apple Computer?
Best,
Bill
```

And, Or, Not

You can **combine and negate expressions** with:

-a	And
-o	Or
!	Not

```
$ cat test10
#!/bin/bash
if [ `who | grep Mark | wc -l` -ge 1 -a `whoami` != "Bill" ]
then
   echo "Who else but Mark is loading down the machine again!"
else
   echo "All is well!"
fi
```

```
$ ./test10
Who else but Mark is loading down
the machine again!
```

And, or and not

You can combine **two conditional checks** with:

&&	**And**
||	**Or**
!	**Not (!= not equal)**

```
$ cat test10
#!/bin/bash
n1=4 n2=4 n3=4
if       [ $n1 -eq $n2 ] && [ $n1 -eq $n3 ]; then
  echo “Equals rule”
else
echo “Un-equals do not have much to say!”
fi
```

```
$ ./test10
Equals rule
```

The *while* loop

The `while` statement loops indefinitely, while the condition is true, such as a user-controlled condition.

Syntax:

```
while [ condition ]
do
        #body of loop
done
```

The **while** loop

```
$ cat test11
#!/bin/bash
response=“no”          #variable creation and assignment
while [ $response != "yes" ]
do
        echo "Wakeup [yes/no]?"
        read response
done
```

```
$ ./test11
    Wakeup [yes/no]?
    no
    Wakeup [yes/no]?
    y
    Wakeup [yes/no]?
    yes
    $
```

The *while* loop as **normal incrementing loops** ?

```
$ cat factorial
#!/bin/bash
# Back to factorials!
read -p "Enter number: “ number
fact=1
i=1        #control variable
while [ $i -le $number ]
do
    fact=`expr $fact \* $i`
    i=`expr $i + 1`
done
echo "The factorial of $n is $fact"
```

Is there an alternate to using expr?

```
$ factorial
Enter number:
5
The factorial of 5 is 120
```

Using **break** statement

- The **break** command works like in C++, breaking out of the innermost loop :

```
$ cat test12
#!/bin/bash
while [ 1 ]
        do
   echo "Wakeup [yes/no]?“
   read resp
   if [ $resp = "yes" ]
   then
         break
   fi
Done
echo “Out of while loop”
echo “Terminating shell script”
```

True Loop

```
$  ./test12
   Wakeup [yes/no]? no
   Wakeup [yes/no]? Y
   Wakeup [yes/no]?Yes
   Out of while loop
   Terminating shell script
   $
```

The *date* command

Wed Feb 23 09:01:09 IST 2022

date **+%z**	Displays numeric time zone (+0530)	
date **+%Z**	Displays alpha time zone (IST or EST)	
date **+%a**	Displays Weekday name in short (like Mon, Tue, Wed)	Wed
date **+%A**	Displays Weekday name in full short (like Monday, Tuesday)	Wednesday
date **+%b**	Displays Month name in short (like Jan, Feb, Mar)	Feb
date **+%B**	Displays Month name in full short (like January, February)	February
date **+%d**	Displays Day of month (e.g., 01)	23

The *date* command

Wed Feb 23 09:02:29 IST 2022

date **+%D**	Displays Current Date; shown in MM/DD/YY	01/23/22
date **+%d**	Displays Current Date; shown in MM/DD/YY	23
date **+%F**	Displays Date; shown in YYYY-MM-DD	2020-01-23
date **+%m**	Displays month (01..12)	02
date **+%Y**	Displays full year i.e. YYYY	2022
date **+%u**	Displays day of week (1..7); 1 is Monday	3
date **+%U**	Displays week number of year, with Sunday as first day of week (00..53)	08
date **+%j**	Displays day of year (001..366)	054

The *date* command with **time**

Wed Feb 24 09:10:18 IST 2022

date **+%T**	Displays time; shown as HH:MM:SS (Hours in 24 Format)	09:10:18
date **+%H**	Displays hour in (00..23) format	09
date **+%I**	Displays hour (01..12) format	09
date **+%M**	Displays minute (00..59)	10
date **+%S**	Displays second (00..60)	18

Now, try to display the date in dd/mm/yyyy format: 23/02/2022

```
$ date +%d\/%m\/%Y
```

Now, try to display the date in dd-mm-yyyy format: 23-02-2022

```
$ date +%d\-%m\-%Y
```

The **exit** command vs. break

- The `exit` command works like in C++, breaking out of the program:

```
$ cat test13
#!/bin/bash
while [ 1 ]
     do
          echo "Wakeup [yes/no]?"
               read resp
               if [ $resp = "yes" ]
               then
                    exit
               fi
      done
 echo “Out of while loop”
 echo “Terminating shell script”
```

True Loop

```
$ ./test13
    Wakeup [yes/no]?          no
    Wakeup [yes/no]?          y
    Wakeup [yes/no]?          yes
    $
```

Try these shell scripts

1. Write a shell script to find the largest of three numbers
2. Write script to print numbers as 5,4,3,2,1 using while loop
3. Write script to print given number in reverse order
4. Write script to print the sum of digits of a given number
5. Write script to print contents of file with user input as number of lines from the beginning/end of the file.

The *until* loop

- The **until loop** continues running commands as long as condition is true. Once condition is false, the loop is exited.
- *Syntax:*

```
until [ condition ]
do
        //body of loop
done
```

Difference between **while** & **until** loops?

- The ***while*** loop versus the ***until*** loop:
  - The until loop executes until a nonzero status is returned.
  - The while command executes until a zero status is returned.
  - The until loop always executes at least once.

Advanced if-then features

- Double parentheses for mathematical expressions
- Double square brackets for String handling functions

The Double Parentheses Command Symbols

Symbol	Description
val++	post-increment
val--	post-decrement
++*val*	pre-increment
--*val*	pre-decrement
!	logical negation
~	bitwise negation
**	exponentiation

Double parentheses

- Syntax: ((expression))
- **Good news:**
  - a ++ and ++ a   valid
  - a - -   and - - a valid
  - ! a Valid
  - Logical and && is valid
  - Logical or | | is valid

(Script 18)

Double square brackets

- Syntax: [[expression]]

Examples

```
#!/bin/bash
clear
val1=10
if (( val1 ** 2 > 90 ))  #exponentiation
then
        echo "inside if"
        (( val2 = val1 ** 2 ))
        echo $val2
else
        (( val2 = val1 ** 2 ))
        echo "The square of $val1 is $val2"
fi
((val3 = val2 * 4))
echo "The final solution is $val3"
```

Examples

```
# for advanced string manipulation (pattern matching)
#!/bin/bash
#echo $USER
name="andrea"
if [[ name == p?? ]]
then
   echo "Hello $USER"
else
  echo "System detects a new user $name"
fi
```

case – esac construct

- To perform a specific set of instructions depending on a value of a variable:

General syntax:

```
case $variable-name in
    value1|value2) command ;;
    value3) command ;;
    *) command;;
    esac
```

case – esac construct

```
$ cat test15
#!/bin/bash
read -n "Enter value of variable:" x
case $x in
dozen) echo "12";;
score) echo "20"
esac
```

```
$ ./test15
Enter value of variable: dozen    12
Enter value of variable: score    20
Enter value of variable: 34
```

case – esac construct

```
$ cat test15
#!/bin/bash
read -n “Enter value of variable:” x
case $x in
dozen) echo “12”;;
score) echo “20”;;
*) echo “ Invalid choice!”
esac
```

```
$ ./test15
Enter value of variable: dozen    12
Enter value of variable: score    20
Enter value of variable: 34  Invalid choice
```

Try these shell scripts now

1. Write a shell script called **listing** that includes the following commands:
   a. Display long listing of files
   b. Display long listing of files including hidden files
   c. Delete files from directory
   d. Exit from shell script only when user enters ‘y’ to “do you wish to quit?”
2. Write a shell script will:
   a. Ask the user to enter a filename and read the file name
   b. Change the FAP for user to executable for the given filename

Try these shell scripts now

1. Write a shell script which accepts two strings and compares the two strings for equality. Display appropriate messages
   - Check if the given strings are empty or not.
   - If empty, display appropriate messages
2. Write a shell script to accept many filenames through command line. Do the following for each filename
   - If it is an ordinary file, display its content and also check whether it has execute permission.
   - If it is directory, display the number of files in it.
   - If the file/directory does not exist, display a message

For loop

```
#!/bin/bash
# another example
for var in Paris "New York" London "New Delhi" Tokyo
do
echo "Now going to $var"
done
```

For loop

```
#!/bin/bash
# iterate through all the files in a directory
for file in ./*  #files in the current directory
do
if [ -d "$file" ]
then
   echo "$file is a directory"
     elif [ -f "$file" ]
     then
          echo "$file is a file"
fi
done
```

For loop

```
#!/bin/bash
#Breaking out of an outer loop
#break n
#n indicates the level of the loop to break out of.
#By default, n is one, indicating to break
# out of the current loop.
clear
for (( a = 1; a < 4; a++ )) #outer for loop a
do
	echo "Outer loop: $a"
		for (( b = 1; b < 100; b++ )) #inner loop b
		do
			if [ $b -gt 4 ]
			then
				break 5
			fi
		echo " Inner loop: $b"
		done
done
```