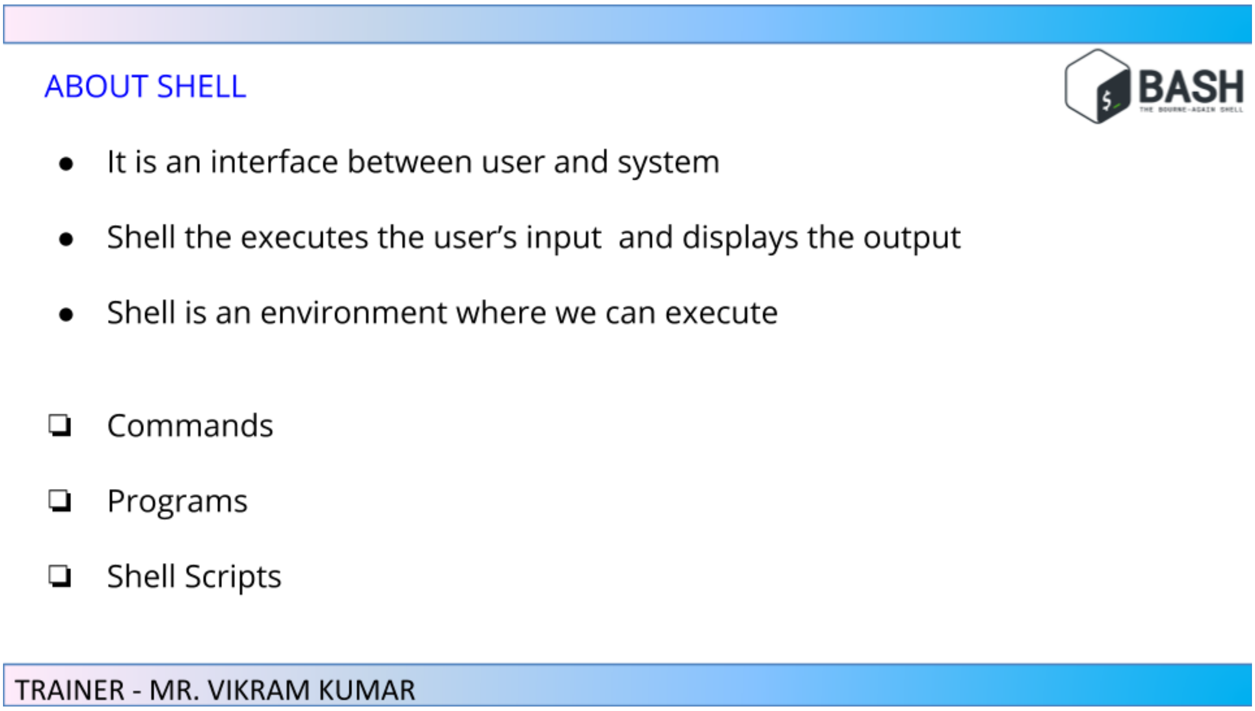
Shell Scripting



ABOUT SHELL

- It is an interface between user and system
- Shell the executes the user’s input and displays the output
- Shell is an environment where we can execute

❑ Commands

❑ Programs

❑ Shell Scripts

TRAINER - MR. VIKRAM KUMAR

SHELL SCRIPTING

- ıt is a group of unix commands and shell keywords
- These are executed in Sequence of order
- These are not complied but interpreted by O.S
- It is always advisable to use #sign (comment) to describe about the shell

PURPOSE OF SHELL SCRIPTING

- To handle text files
- Create new commands
- Automate the system administration tasks
- To perform the Repetitive tasks, deployments etc.

VARIOUS TYPES OF SHELLS

SHELL NAME	BY	PROMPT	INTERPRETER NAME	DEFAULT SHELL
Bourne shell	Stephen bourne	$	sh	Sco-Unix, Solaris, HP- UX
Korn shell	David korn	$	ksh	IBM AIX
C shell	Bill joy	%	csh	IRIX
Bash Shell	Stephen Bourne	$	bash	Linux
Z shell	Paul	$	zsh	--

Q. How to know what shell scripting supported by system ?

- # cat /etc/shells
- Execute the command, it will show all the shell scripts supported by system

Q. How to shift to various shells ?

```
# ksh
```

```
# sh
```

Q. How to check current Child Shell or Subshell ?

```
# echo $0
```

Q. How to exit from a shell ?

```
# exit
```

GENERIC WORKFLOW OF BASH SCRIPTING

Step 1 - Create a script file with .sh extension

Note : Extension .sh is not mandatory, however it is recommend to use standard conventions

Step 2 - Write the script content

Step 3 - Change the permission to script file

Step 4 - Execute the Script file

FILE PERMISSIONS ON SCRIPT FILE

- Make sure that script does have read and execute permission at a user level as a convention
- However, x permission is mandatory to script file
- Use chmod command to provide read and execute permissions

Example :

```
# chmod u+rx <script_filename.sh>
```

EXECUTE SCRIPT FILE

Method 1 - ./<script_filename.sh>

Here, script file needs to be at current path and generally used for relative path execution of script file

Method 2 - # sh <script_filename.sh>

Here, this command can be applied when the file is at current path or located at Absolute path location and generally used for Absolute Path execution of script file

EXERCISE ON CREATING A SAMPLE SCRIPT FILE

- Create a file called sample.sh
- Then add the below content

```
date
ls-l
```

- Save the file
- Change the permissions
- Execute the script file

ABOUT SHEBANG OR HASH BANG

Step 1 : find the location of bash shell using below command

```
# which bash
```

Note - make a note of the location of bash

Step 2 : create a file with .sh extension to create a script file called helloworld.sh

Write the below code

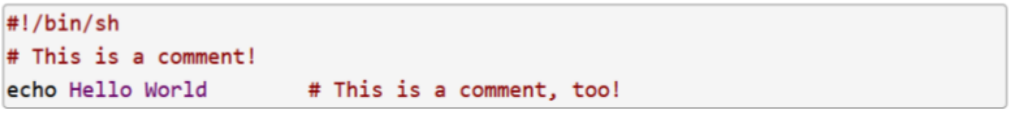
```
#! /usr/bin/bash
echo “Hello World”
```

Step 3 - save and exit the script file, then give execute permission to script file

Step 4 - execute the script file

HOW TO COMMENT IN SHELL SCRIPTING

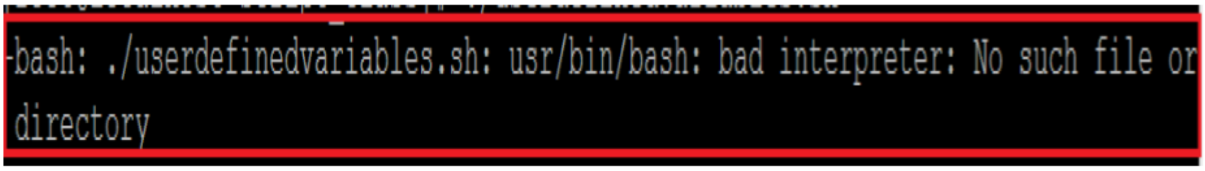
- To comment in Bash Scripting use #



```
#!/bin/sh
# This is a comment!
echo Hello World        # This is a comment, too!
```

CASE STUDY - BAD INTERPRETER ERROR MESSAGES

- We get below error message when shebang information in script file is not correct
- When the path of shell location is incorrect



```
-bash: ./userdefinedvariables.sh: usr/bin/bash: bad interpreter: No such file or
directory
```

VARIABLES

- Variables store the any type data in them
- There are no data types in Shell Scripting
- The value of variable can be assigned inbuilt or can be assigned at the execution time
- There are two types of variables -

1. User Defined Variables
2. System Defined Variables (Environment Variables)

DIFFERENCE BETWEEN SYSTEM AND USER DEFINED VARIABLES

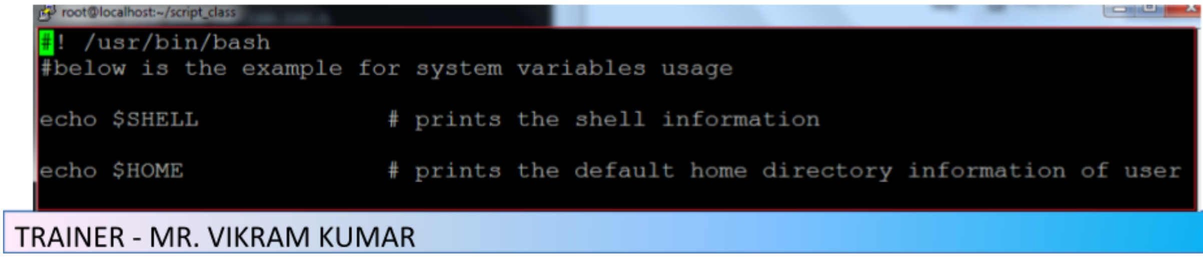
System Variables	User Defined Variables
• Created and maintained by Linux system	• Created by user
• These are used by system	• Mostly created in lower format but also can use CAPS
• These are mostly in CAPS format	• However, as a convention need to use lower case. • * user defined variables are case sensitive

FEW NOTABLE SYSTEM VARIABLES

- echo $SHELL
- echo $HOME

.. etc

Example of system variables -



```
#! /usr/bin/bash
#below is the example for system variables usage

echo $SHELL              # prints the shell information

echo $HOME               # prints the default home directory information of user
```

USER DEFINED VARIABLE

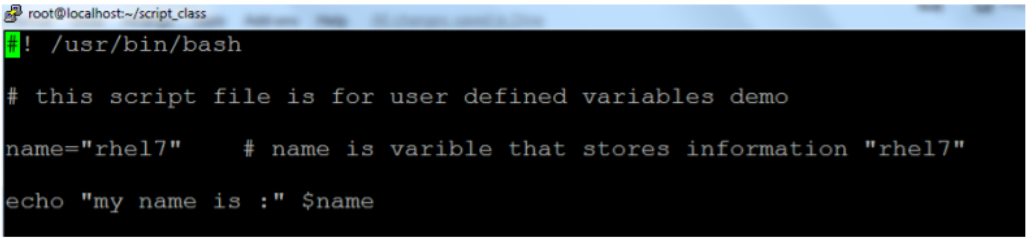
Syntax for Variable Declaration :

variable=value

** Note that there must be no spaces around the "=" sign

VAR=value works

VAR = value doesn't work



root@localhost:~/script_class

```
#! /usr/bin/bash

# this script file is for user defined variables demo

name="rhel7"     # name is varible that stores information "rhel7"

echo "my name is :" $name
```

NAMING CONVENTIONS TO DECLARE A VARIABLE

- The name of a variable can contain only be

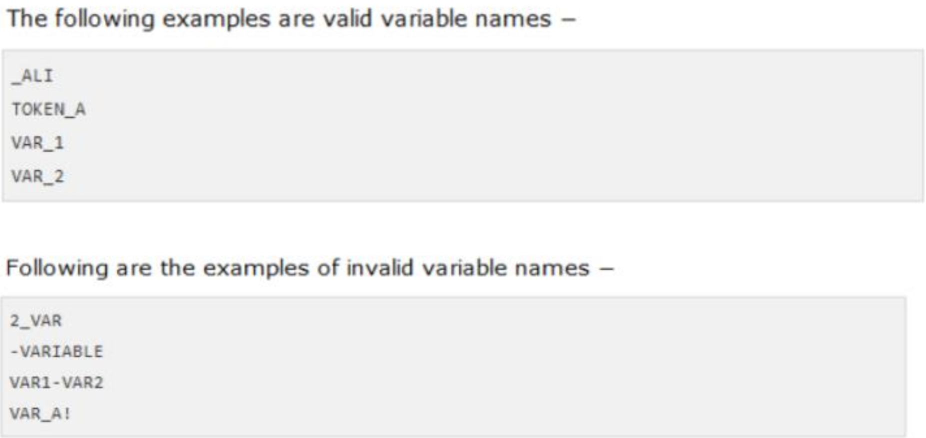
❏ letters (a to z or A to Z)

❏ numbers (0 to 9)

❏ underscore character (_)

❏ Variable name cannot start with number

CASE STUDY ON DECLARATION OF VALID AND INVALID USER DEFINED VARIABLES



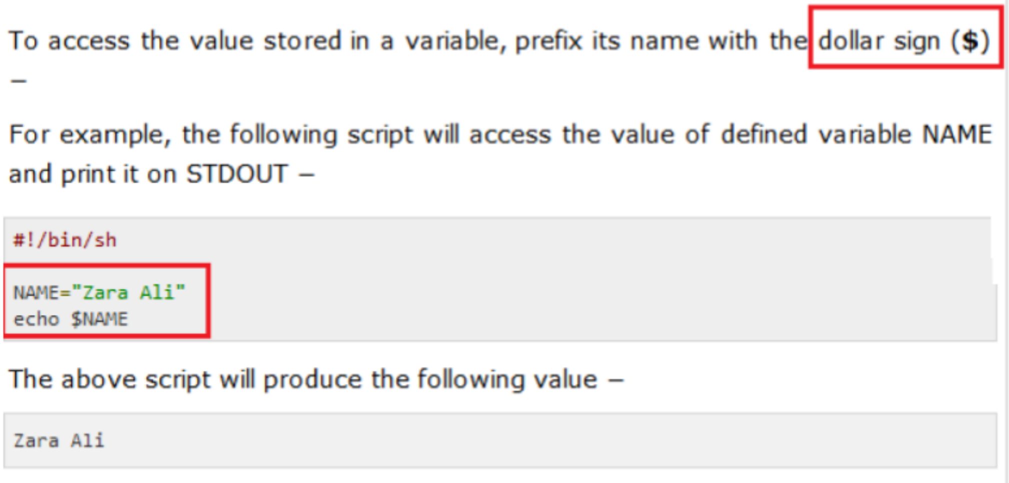
The following examples are valid variable names –

```
_ALI
TOKEN_A
VAR_1
VAR_2
```

Following are the examples of invalid variable names –

```
2_VAR
-VARIABLE
VAR1-VAR2
VAR_A!
```

HOW TO ACCESSING VARIABLES



To access the value stored in a variable, prefix its name with the dollar sign (**$**) –

For example, the following script will access the value of defined variable NAME and print it on STDOUT –

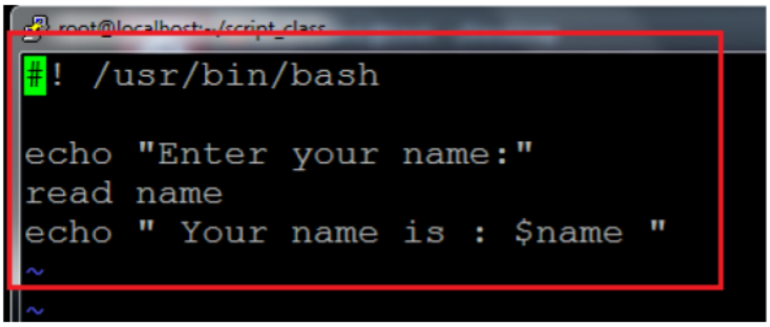
```
#!/bin/sh

NAME="Zara Ali"
echo $NAME
```

The above script will produce the following value –

```
Zara Ali
```

READING INPUT FROM PROMPT

- To read the input from standard input need to use read Command
- Below is the example for reading single variable

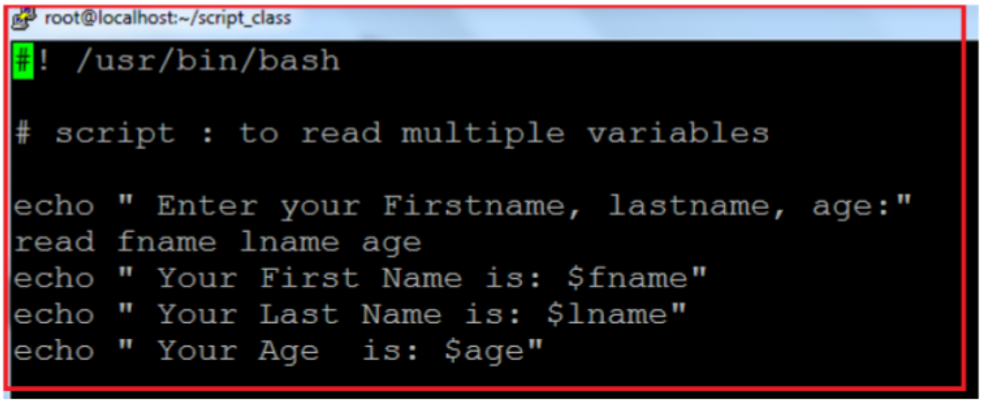


root@localhost:~/script_class

```
#! /usr/bin/bash

echo "Enter your name:"
read name
echo " Your name is : $name "
~
~
```

Reading Multiple Variables

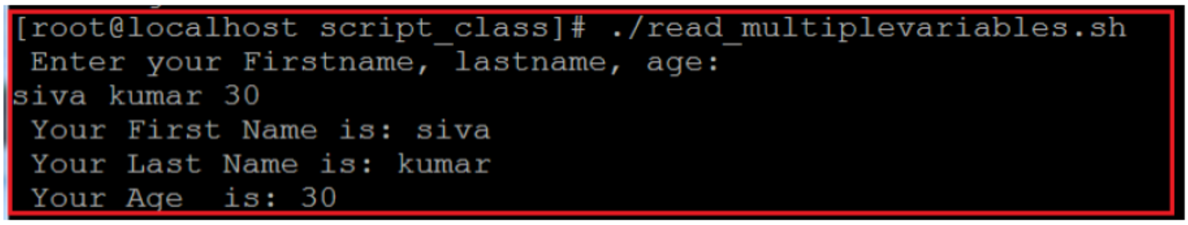
- Enter the data for multiple variables at runtime using spaces between them



root@localhost:~/script_class

```
#! /usr/bin/bash

# script : to read multiple variables

echo " Enter your Firstname, lastname, age:"
read fname lname age
echo " Your First Name is: $fname"
echo " Your Last Name is: $lname"
echo " Your Age  is: $age"
```

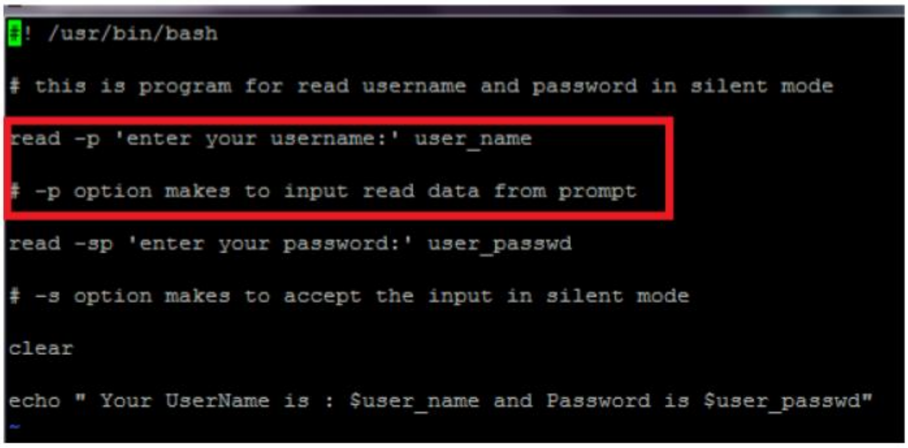
output



```
[root@localhost script_class]# ./read_multiplevariables.sh
 Enter your Firstname, lastname, age:
siva kumar 30
 Your First Name is: siva
 Your Last Name is: kumar
 Your Age  is: 30
```

Reading Variables from input prompt

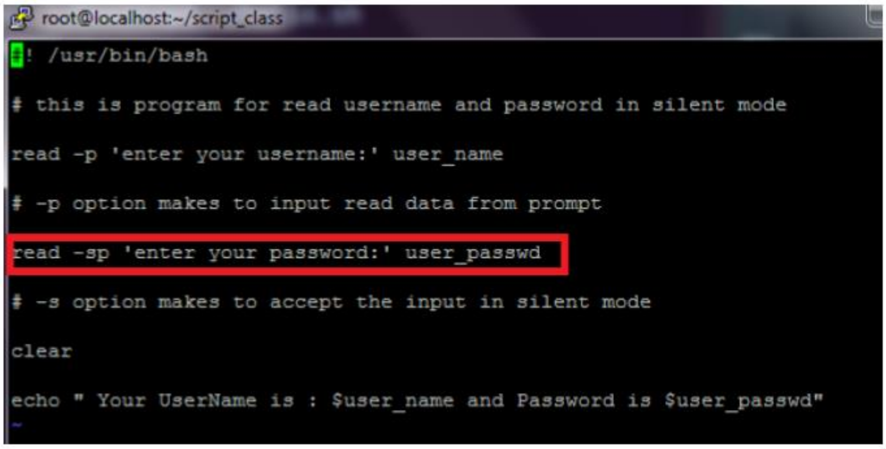
- Use -p option as below



```
#! /usr/bin/bash

# this is program for read username and password in silent mode

read -p 'enter your username:' user_name

# -p option makes to input read data from prompt

read -sp 'enter your password:' user_passwd

# -s option makes to accept the input in silent mode

clear

echo " Your UserName is : $user_name and Password is $user_passwd"
~
```

Reading Variables in Silent Mode

- Use -s option as below



```
#! /usr/bin/bash

# this is program for read username and password in silent mode

read -p 'enter your username:' user_name

# -p option makes to input read data from prompt

read -sp 'enter your password:' user_passwd

# -s option makes to accept the input in silent mode

clear

echo " Your UserName is : $user_name and Password is $user_passwd"
~
```

Reading Variables in form of Array

- While reading an array use the option -a

Example - read -a ....

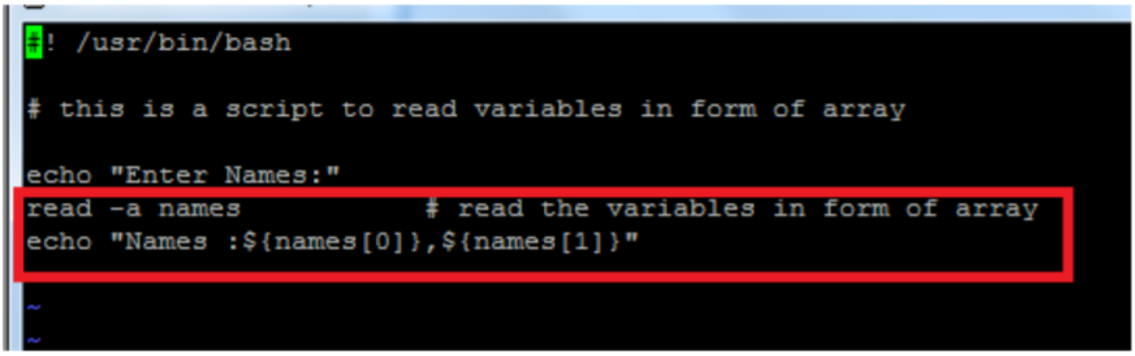
- While print the data from an array, call the array element using index value
- Index value starts from Zero

Syntax - ${array_variable_name[index_value]}

Example - echo “names are:” ${names[0]}

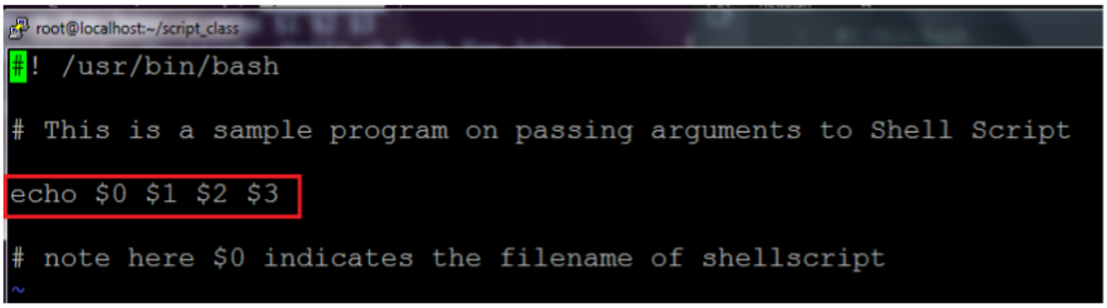
- Calling all variables in this type of array is ${variable_name[@]}

Example - reading the variable inform of array



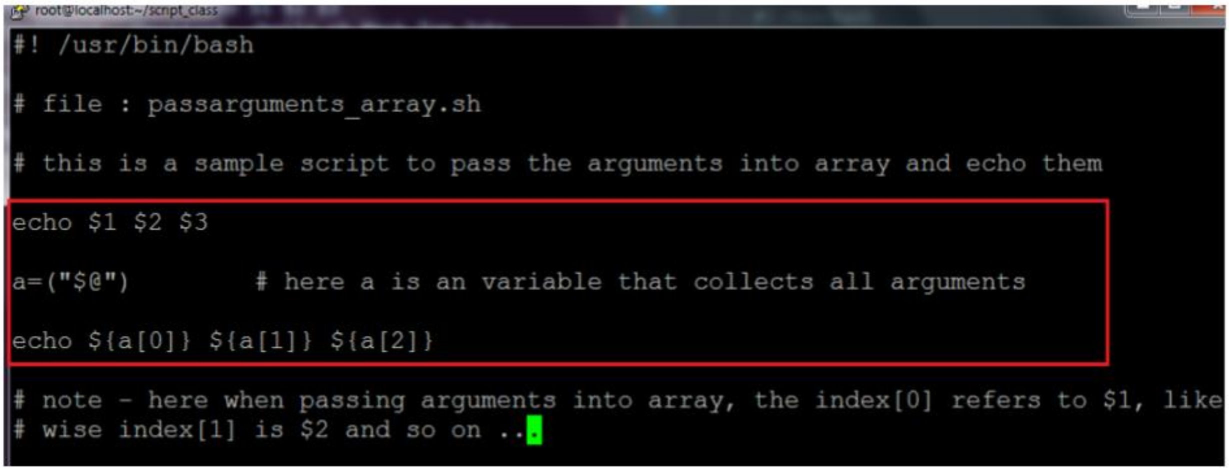
```
#! /usr/bin/bash

# this is a script to read variables in form of array

echo "Enter Names:"
read -a names           # read the variables in form of array
echo "Names :${names[0]},${names[1]}"

~
~
```

Passing Arguments to Shell Script



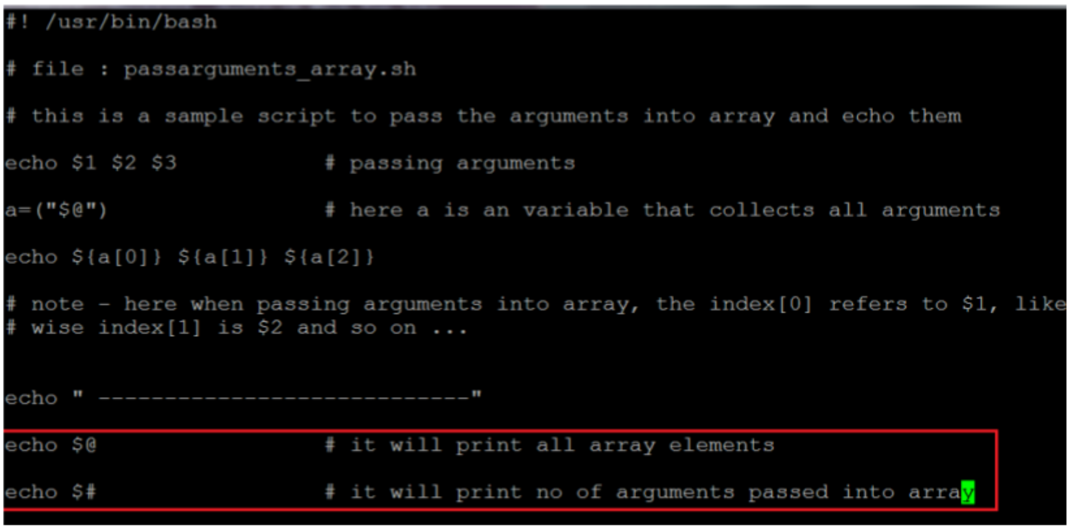
```
#! /usr/bin/bash

# This is a sample program on passing arguments to Shell Script

echo $0 $1 $2 $3

# note here $0 indicates the filename of shellscript
~
```

Passing arguments into Array -


root@localhost:~/script_class

```
#! /usr/bin/bash

# file : passarguments_array.sh

# this is a sample script to pass the arguments into array and echo them

echo $1 $2 $3

a=("$@")          # here a is an variable that collects all arguments

echo ${a[0]} ${a[1]} ${a[2]}

# note - here when passing arguments into array, the index[0] refers to $1, like
# wise index[1] is $2 and so on ...
```

Print all array arguments and count no. of array arguments



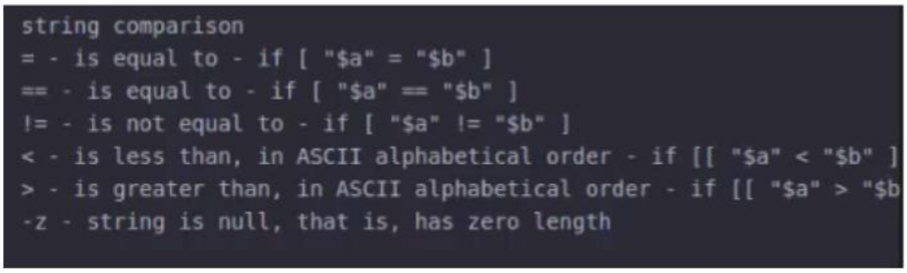
```
#! /usr/bin/bash

# file : passarguments_array.sh

# this is a sample script to pass the arguments into array and echo them

echo $1 $2 $3             # passing arguments

a=("$@")                  # here a is an variable that collects all arguments

echo ${a[0]} ${a[1]} ${a[2]}

# note - here when passing arguments into array, the index[0] refers to $1, like
# wise index[1] is $2 and so on ...


echo " ----------------------------"

echo $@                   # it will print all array elements

echo $#                   # it will print no of arguments passed into array
```

Integer Comparisons -

-eq	is equal to	if ["$a" -eq "$b"]
-ne	is not equal to	if ["$a" -ne "$b"]
-gt	is greater than	if ["$a" -gt "$b"]
-ge	is greater than or equal to	if ["$a" -ge "$b"]
-lt	is less than	if ["$a" -lt "$b"]
-le	is less than or equal to	if ["$a" -le "$b"]

<	is less than	if (("$a" < "$b"))
<=	is less than or equal to	if (("$a" <= "$b"))
>	is greater than	if (("$a" > "$b"))
>=	is greater than or equal to	if (("$a" >= "$b"))

String Comparisons -

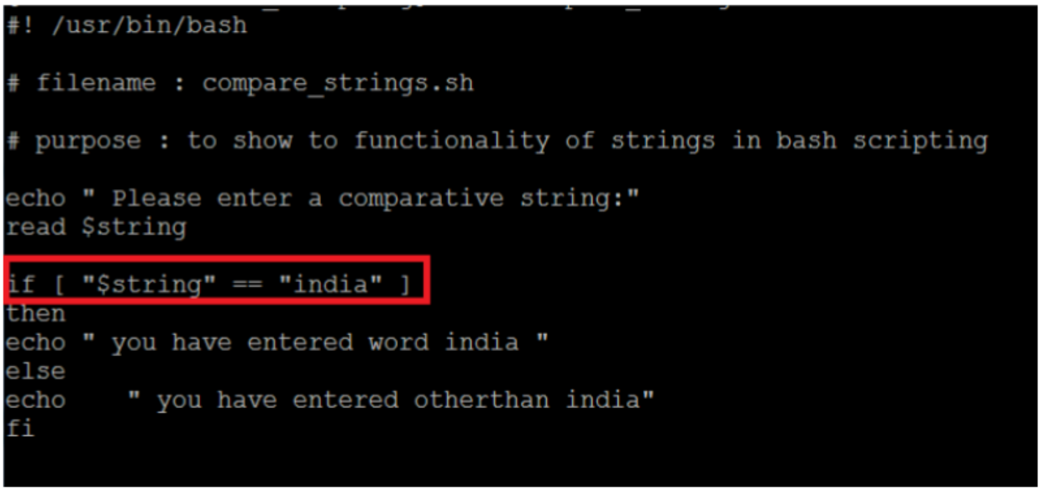


```
string comparison
= - is equal to - if [ "$a" = "$b" ]
== - is equal to - if [ "$a" == "$b" ]
!= - is not equal to - if [ "$a" != "$b" ]
< - is less than, in ASCII alphabetical order - if [[ "$a" < "$b" ]
> - is greater than, in ASCII alphabetical order - if [[ "$a" > "$b
-z - string is null, that is, has zero length
```

=	is equal to	if ["$a" = "$b"]
=	is equal to	if ["$a" == "$b"]
!=	is not equal to	if ["$a" != "$b"]
<	is less than in ASCII ORDER	if [["$a" < "$b"]]
>	is greater than in ASCII ORDER	if [["$a" > "$b"]]
-z	is string is NULL or string is of Zero Length	

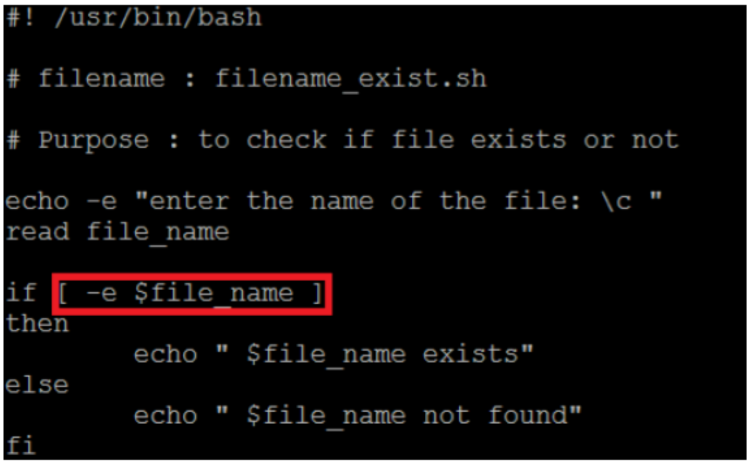
Note : there is a space in syntax if <sp> [<sp>condition <sp>]

Compare Strings in Bash Scripting

- 

```
#! /usr/bin/bash

# filename : compare_strings.sh

# purpose : to show to functionality of strings in bash scripting

echo " Please enter a comparative string:"
read $string

if [ "$string" == "india" ]
then
echo " you have entered word india "
else
echo    " you have entered otherthan india"
fi
```

File Operations using option -e to check existence of file



```
#! /usr/bin/bash

# filename : filename_exist.sh

# Purpose : to check if file exists or not

echo -e "enter the name of the file: \c "
read file_name

if [ -e $file_name ]
then
        echo " $file_name exists"
else
        echo " $file_name not found"
fi
```

Other File operations

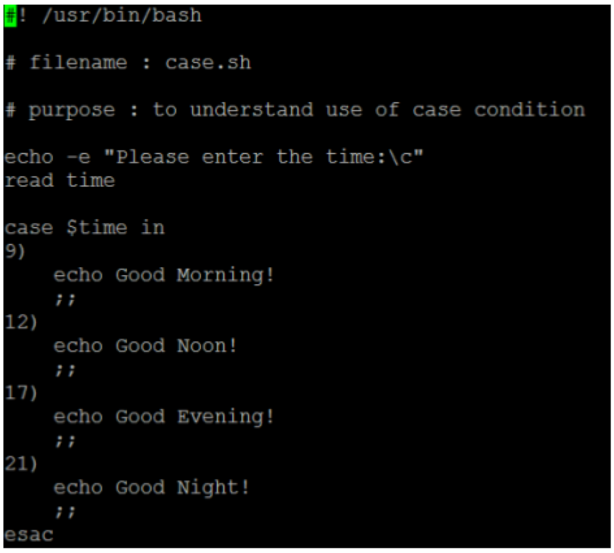
-f	to check if file is regular file type or not
-d	to check if the expression is directory or not
-b	to check if the file is Block special file or not
-s	to check if the file is empty or not
-r	to check read permission of the file
-w	to check write permissions of file
-x	to check execute permission of the file

Case Condition

Syntax :

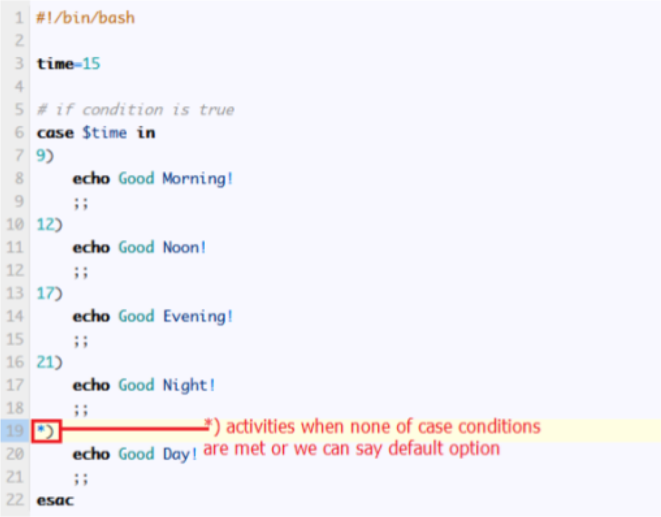
```
case EXPRESSION in

 case1)
             COMMAND-LIST
              ;;
case2)
             COMMAND-LIST
              ;;


casen)
             COMMAND-LIST
              ;;
*)
             Command-list
             ;;
esac
```

Example for Case Condition -



```
#! /usr/bin/bash

# filename : case.sh

# purpose : to understand use of case condition

echo -e "Please enter the time:\c"
read time

case $time in
9)
    echo Good Morning!
    ;;
12)
    echo Good Noon!
    ;;
17)
    echo Good Evening!
    ;;
21)
    echo Good Night!
    ;;
esac
```

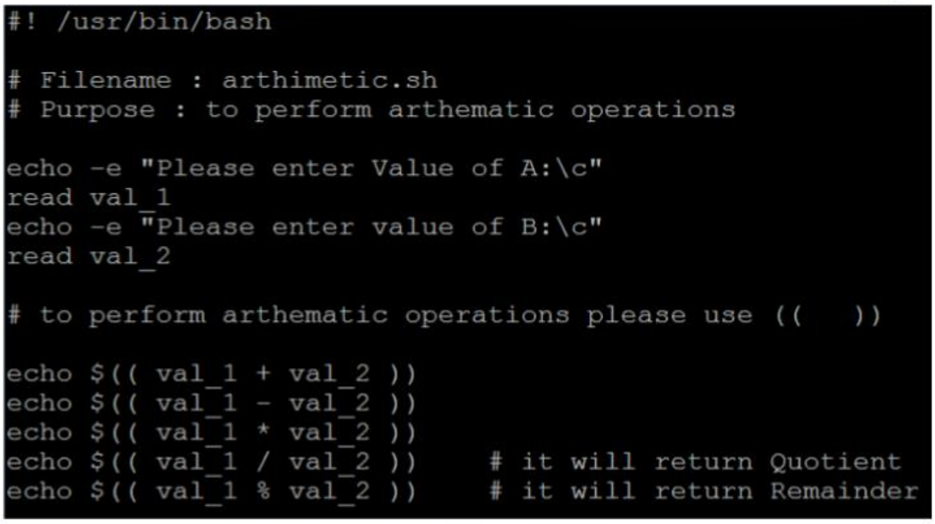
Case with default option



```
#!/bin/bash

time=15

# if condition is true
case $time in
9)
    echo Good Morning!
    ;;
12)
    echo Good Noon!
    ;;
17)
    echo Good Evening!
    ;;
21)
    echo Good Night!
    ;;
*)
    echo Good Day!
    ;;
esac
```

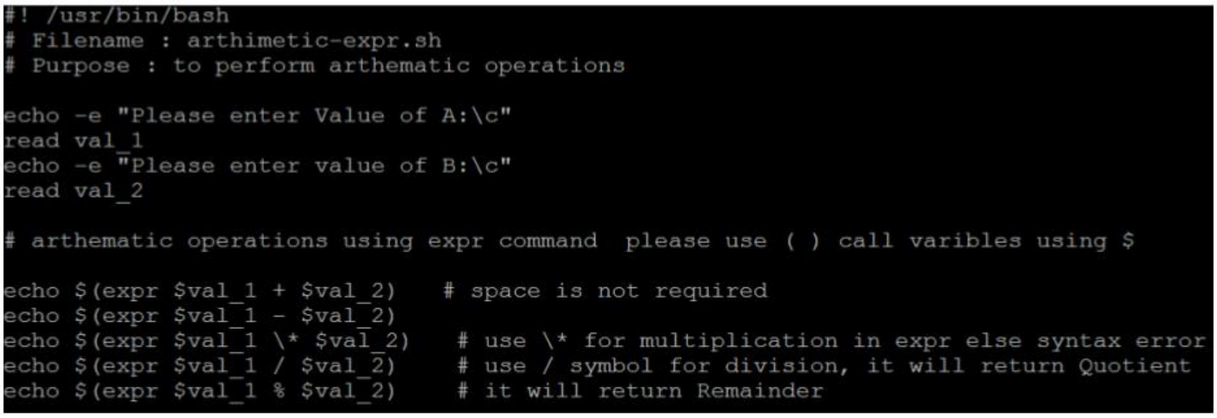
*) activities when none of case conditions are met or we can say default option

Arithmetic Operations -



```
#! /usr/bin/bash

# Filename : arthimetic.sh
# Purpose : to perform arthematic operations

echo -e "Please enter Value of A:\c"
read val_1
echo -e "Please enter value of B:\c"
read val_2

# to perform arthematic operations please use ((   ))

echo $(( val_1 + val_2 ))
echo $(( val_1 - val_2 ))
echo $(( val_1 * val_2 ))
echo $(( val_1 / val_2 ))     # it will return Quotient
echo $(( val_1 % val_2 ))     # it will return Remainder
```

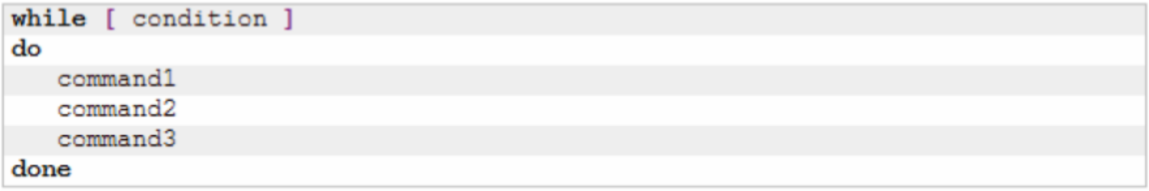
Arithmetic Operations using expr



```
#! /usr/bin/bash
# Filename : arthimetic-expr.sh
# Purpose : to perform arthematic operations

echo -e "Please enter Value of A:\c"
read val_1
echo -e "Please enter value of B:\c"
read val_2

# arthematic operations using expr command  please use ( ) call varibles using $

echo $(expr $val_1 + $val_2)   # space is not required
echo $(expr $val_1 - $val_2)
echo $(expr $val_1 \* $val_2)   # use \* for multiplication in expr else syntax error
echo $(expr $val_1 / $val_2)    # use / symbol for division, it will return Quotient
echo $(expr $val_1 % $val_2)    # it will return Remainder
```

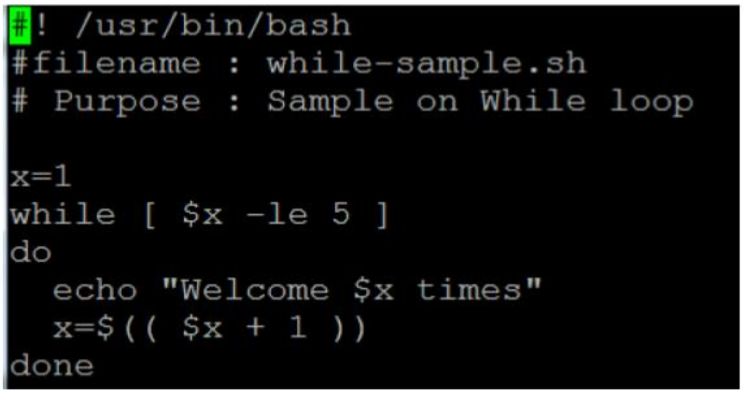
While Loop -

Syntax -



```
while [ condition ]
do
    command1
    command2
    command3
done
```

While loop sample program -



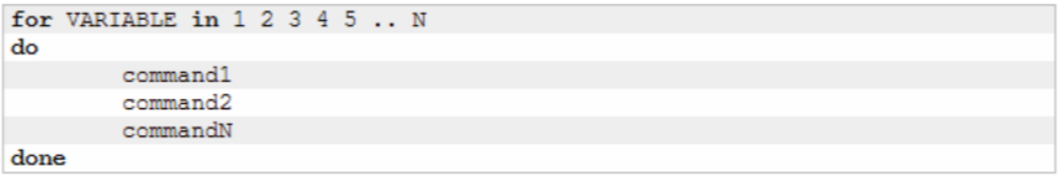
```
#! /usr/bin/bash
#filename : while-sample.sh
# Purpose : Sample on While loop

x=1
while [ $x -le 5 ]
do
  echo "Welcome $x times"
  x=$(( $x + 1 ))
done
```

While loop sample program - Generate Table

```
#! /usr/bin/bash

# Sample program on printing a Multiplication Table

echo "enter table_value:"
read table_value

echo "enter max_loop value:"
read max_loop

x=1

while [ $x -le $max_loop ]
do
  echo $table_value "*" $x "=" $(( $table_value * $x ))
  x=$(( $x + 1 ))
done
```

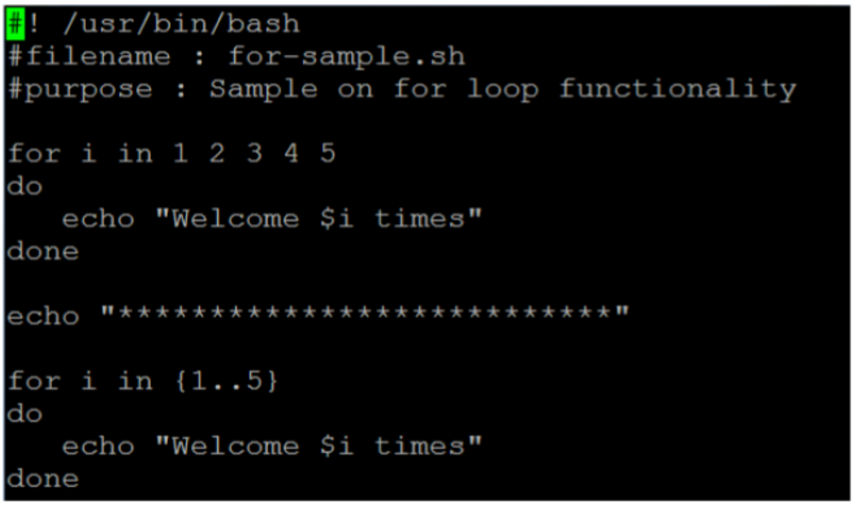
for Loop -

Syntax -



```
for VARIABLE in 1 2 3 4 5 .. N
do
        command1
        command2
        commandN
done
```

for loop sample program -



```
#! /usr/bin/bash
#filename : for-sample.sh
#purpose : Sample on for loop functionality

for i in 1 2 3 4 5
do
   echo "Welcome $i times"
done

echo "***************************"

for i in {1..5}
do
   echo "Welcome $i times"
done
```