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Module – Operating Systems Fundamental
Class – Software Development
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Assessment 2 Part 2
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Question 1

Write your second shell script program, construct it so it will run as a program.

Note: As with all QUESTIONS, do not forget to record your progress by copying

your progress to your

report. Please ask your lab lecturer if you have any questions or require assistance.

- Open a terminal.

- Go to the Part3 directory (i.e. type cd Part3).

- Type nano MySecondScript

and then enter the following data for the 6 line file (caution: the script is case sensitive, so small 'e' for echo....) :

```
#!/bin/bash
```

```
echo My second script program
```

```
echo Todays date is $(date)
```

```
echo The Linux version is $(ver)
```

```
echo The calendar for March 2018 is
```

```
echo $(cal March 2018)
```

- Save the file and exit nano.

- Look at the file permissions of the file -r w -r w -r -- by typing ls -l.

- Change the file permissions of the file to make it a program by typing chmod u+x MySecondScript.

- Look at the file permissions of the file, which should now be: -r w xr w -r -- by typing ls -l

```
mohammed@mohammed-virtual-machine: ~/OperatingSystem/Assignment2/part3
File Edit View Search Terminal Help

mohammed@mohammed-virtual-machine:~/OperatingSystem/Assignment2/part3$ nano MySecondScript
mohammed@mohammed-virtual-machine:~/OperatingSystem/Assignment2/part3$ ls -l
total 24
-rw-rw-r-- 1 mohammed mohammed 18761 Apr 12 14:02 MohammedAlomA2Part3.odt
-rw-rw-r-- 1 mohammed mohammed 163 Apr 12 14:10 MySecondScript
mohammed@mohammed-virtual-machine:~/OperatingSystem/Assignment2/part3$ chmod u+x MySecondScript
mohammed@mohammed-virtual-machine:~/OperatingSystem/Assignment2/part3$ ls -l
total 24
-rw-rw-r-- 1 mohammed mohammed 18761 Apr 12 14:02 MohammedAlomA2Part3.odt
-rwxr--r-- 1 mohammed mohammed 163 Apr 12 14:10 MySecondScript
mohammed@mohammed-virtual-machine:~/OperatingSystem/Assignment2/part3$
```

. Note: the change to rwx for the user.

•Run the script as a program by typing ./MySecondScript.

```
mohammed@mohammed-virtual-machine: ~/OperatingSystem/Assignment2/part3
File Edit View Search Terminal Help

mohammed@mohammed-virtual-machine:~/OperatingSystem/Assignment2/part3$ ./MySecondScript
My second script program
Today's date is Thu Apr 12 14:31:16 IST 2018
The Linux version is 4.13.0-36-generic
The calendar for April 2018 is
April 2018 Su Mo Tu We Th Fr Sa 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
26 27 28 29 30
mohammed@mohammed-virtual-machine:~/OperatingSystem/Assignment2/part3$
```

Question 2

Examine system variables. Default system variables can be viewed with, env, printenv and \$variable_name. You can define your own variables.

- Open a terminal.
- Go to the Part3 directory (i.e. type cd Part3).
- Exercise: Type the following two lines at the terminal:

env

```
mohammed@mohammed-virtual-machine:~/OperatingSystem/Assignment2/part3$ env
XDG_VTNR=7
SSH_AGENT_PID=1672
XDG_SESSION_ID=c2
XDG_GREETER_DATA_DIR=/var/lib/lightdm-data/mohammed
QT_STYLE_OVERRIDE=gtk
TERM=xterm-256color
SHELL=/bin/bash
```

printenv

```
mohammed@mohammed-virtual-machine:~/OperatingSystem/Assignment2/part3$ printenv
XDG_VTNR=7
SSH_AGENT_PID=1672
XDG_SESSION_ID=c2
XDG_GREETER_DATA_DIR=/var/lib/lightdm-data/mohammed
QT_STYLE_OVERRIDE=gtk
TERM=xterm-256color
SHELL=/bin/bash
VTE_VERSION=4205
```

- Type the following at the terminal:

```
printenv USER
printenv PATH
printenv HOME
```

```
mohammed@mohammed-virtual-machine:~/OperatingSystem/Assignment2/part3$ printenv USER
mohammed
mohammed@mohammed-virtual-machine:~/OperatingSystem/Assignment2/part3$ printenv PATH
/home/mohammed/bin:/home/mohammed/.local/bin:/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin:/usr/games:/usr/local/games:/snap/bin
mohammed@mohammed-virtual-machine:~/OperatingSystem/Assignment2/part3$ printenv HOME
/home/mohammed
mohammed@mohammed-virtual-machine:~/OperatingSystem/Assignment2/part3$
```

echo This is a test displaying the user \$USER name

echo This is a test displaying the home \$HOME directory

```
mohammed@mohammed-virtual-machine: ~/OperatingSystem/Assignment2/part3
File Edit View Search Terminal Help
mohammed@mohammed-virtual-machine:~/OperatingSystem/Assignment2/part3$ echo This is a test displaying
the user name is : $USER
This is a test displaying the user name is : mohammed
mohammed@mohammed-virtual-machine:~/OperatingSystem/Assignment2/part3$ echo This is a test displaying
the home directory is : $HOME
This is a test displaying the home directory is : /home/mohammed
mohammed@mohammed-virtual-machine:~/OperatingSystem/Assignment2/part3$
```

```
X=4
Y=5
Z=X+Y
echo X is $X, Y is $Y, Z is $Z
```

```
mohammed@mohammed-virtual-machine:~/OperatingSystem/Assignment2/part3$ let x=4;
mohammed@mohammed-virtual-machine:~/OperatingSystem/Assignment2/part3$ let y=5;
mohammed@mohammed-virtual-machine:~/OperatingSystem/Assignment2/part3$ let z=$x+$y;
mohammed@mohammed-virtual-machine:~/OperatingSystem/Assignment2/part3$ echo X=$x, y=$y and Z=$z
X=4, y=5 and Z=9
mohammed@mohammed-virtual-machine:~/OperatingSystem/Assignment2/part3$ █
```

•Choose any 4 default system variables that you clearly know the meaning of. Describe the 4 default system variables that you have chosen (you may start with USER and HOME if your wish).

HOME – Current users home directory. A home directory, also called a login directory is the directory on linux like operating systems that serves as the repository for a users personal files, directories and programs. It also the directory that a user is first in after logging into the system.

PATH – is an environment variable on linux operating systems, and specifying a set of directories where executable programs are located. IN general, each executing process or user session has its own PATH setting.

LOGNAME – Current user's name.

MAIL – The users electronic mail inbox location.

TEMP – location where processes can store temporary files.

•Describe your understanding of the user variables such as X, Y and Z above. Is there something unexpected about Z? Try to explain?

ANS: At first declare variable x =4 and y=5 and result of x and y stored in variable z. Later on all the variable value was displayed on the screen as well as result of z.

Question 3

Create 5 empty files and change their permissions.

- Open a terminal.
- Go to the Part3 directory (i.e. type `cd Part3`).
- Create 5 empty files called file1, file2, file3, file4 and file5 by typing `touch file1`, then type `touch file2`, and so on.
- Look at the permissions of the 5 files by typing `ls -l file*`
(Note: * is the wildcard).
- Each file will have the permissions `-r w -r w -r --`.

u g o

The first 3 are u for user permissions, the next 3 are g for group permissions and the last 3 are o for other permissions (i.e. everyone else).

```
File Edit View Search Terminal Help
mohammed@mohammed-virtual-machine:~/OperatingSystem/Assignment2/part3$ ls -l
total 316
-rw-rw-r-- 1 mohammed mohammed      0 Apr 13 00:07 file1
-rw-rw-r-- 1 mohammed mohammed      0 Apr 13 00:07 file2
-rw-rw-r-- 1 mohammed mohammed      0 Apr 13 00:07 file3
-rw-rw-r-- 1 mohammed mohammed      0 Apr 13 00:07 file4
-rw-rw-r-- 1 mohammed mohammed      0 Apr 13 00:07 file5
-rw-rw-r-- 1 mohammed mohammed 314097 Apr 12 17:29 MohammedAlomA2Part3.odt
-rwxrw-r-- 1 mohammed mohammed   167 Apr 12 14:30 MySecondScript
drwxrwxr-x 2 mohammed mohammed   4096 Apr 12 14:33 screenShots
mohammed@mohammed-virtual-machine:~/OperatingSystem/Assignment2/part3$
```

- Change permissions of file1 to `-rwxrw-r --`, by typing `chmod u+x file1`(plussign for add).
- Check permissions by typing `ls -l file*`

```
mohammed@mohammed-virtual-machine:~/OperatingSystem/Assignment2/part3$ chmod u+x file1
mohammed@mohammed-virtual-machine:~/OperatingSystem/Assignment2/part3$ ls -l
total 316
-rwxrw-r-- 1 mohammed mohammed      0 Apr 13 00:07 file1
```

- Change permissions of file2 to `-rw-r -xr --`, by typing `chmod g-w file2` (minus sign for subtract), followed by typing `chmod g+x file2`
- Check permissions by typing `ls -l file*`

```
mohammed@mohammed-virtual-machine:~/OperatingSystem/Assignment2/part3$ chmod g-w file2
mohammed@mohammed-virtual-machine:~/OperatingSystem/Assignment2/part3$ ls -l
total 384
-rwxrw-r-- 1 mohammed mohammed      0 Apr 13 00:07 file1
-rw-r-xr-- 1 mohammed mohammed      0 Apr 13 00:07 file2
```

```

mohammed@mohammed-virtual-machine:~/OperatingSystem/Assignment2/part3$ chmod g+x file2
mohammed@mohammed-virtual-machine:~/OperatingSystem/Assignment2/part3$ ls -l
total 384
-rwxrw-r-- 1 mohammed mohammed 0 Apr 13 00:07 file1
-rw-r-xr-- 1 mohammed mohammed 0 Apr 13 00:07 file2

```

- Change permissions of file3 to -rw-rw-rwx, by typing `chmod o+w file3`, followed by typing `chmod o+x file3`
- Check permissions by typing `ls -l file*`

```

mohammed@mohammed-virtual-machine:~/OperatingSystem/Assignment2/part3$ chmod o+w file3
mohammed@mohammed-virtual-machine:~/OperatingSystem/Assignment2/part3$ ls -l file*
-rwxrw-r-- 1 mohammed mohammed 0 Apr 13 00:07 file1
-rw-r-xr-- 1 mohammed mohammed 0 Apr 13 00:07 file2
-rw-rw-rw- 1 mohammed mohammed 0 Apr 13 00:07 file3
-rw-rw-r-- 1 mohammed mohammed 0 Apr 13 00:07 file4
-rw-rw-r-- 1 mohammed mohammed 0 Apr 13 00:07 file5
mohammed@mohammed-virtual-machine:~/OperatingSystem/Assignment2/part3$

```

```

mohammed@mohammed-virtual-machine:~/OperatingSystem/Assignment2/part3$ chmod o+x file3
mohammed@mohammed-virtual-machine:~/OperatingSystem/Assignment2/part3$ ls -l file*
-rwxrw-r-- 1 mohammed mohammed 0 Apr 13 00:07 file1
-rw-r-xr-- 1 mohammed mohammed 0 Apr 13 00:07 file2
-rw-rw-rwx 1 mohammed mohammed 0 Apr 13 00:07 file3
-rw-rw-r-- 1 mohammed mohammed 0 Apr 13 00:07 file4
-rw-rw-r-- 1 mohammed mohammed 0 Apr 13 00:07 file5
mohammed@mohammed-virtual-machine:~/OperatingSystem/Assignment2/part3$

```

- Repeat, and change permissions of file4 to -rwxrwxr--, and verify your answer.

```

mohammed@mohammed-virtual-machine:~/OperatingSystem/Assignment2/part3$ chmod 777 file4
mohammed@mohammed-virtual-machine:~/OperatingSystem/Assignment2/part3$ ls -l file*
-rwxrw-r-- 1 mohammed mohammed 0 Apr 13 00:07 file1
-rw-r-xr-- 1 mohammed mohammed 0 Apr 13 00:07 file2
-rw-rw-rwx 1 mohammed mohammed 0 Apr 13 00:07 file3
-rwxrwxrwx 1 mohammed mohammed 0 Apr 13 00:07 file4
-rw-rw-r-- 1 mohammed mohammed 0 Apr 13 00:07 file5
mohammed@mohammed-virtual-machine:~/OperatingSystem/Assignment2/part3$

```

- Repeat, and change permissions of file5 to -r w -r -----, and verify your answer.

```

mohammed@mohammed-virtual-machine:~/OperatingSystem/Assignment2/part3$ chmod 640 file5
mohammed@mohammed-virtual-machine:~/OperatingSystem/Assignment2/part3$ ls -l file*
-rwxrw-r-- 1 mohammed mohammed 0 Apr 13 00:07 file1
-rw-r-xr-- 1 mohammed mohammed 0 Apr 13 00:07 file2
-rw-rw-rwx 1 mohammed mohammed 0 Apr 13 00:07 file3
-rwxrwxrwx 1 mohammed mohammed 0 Apr 13 00:07 file4
-rw-r----- 1 mohammed mohammed 0 Apr 13 00:07 file5
mohammed@mohammed-virtual-machine:~/OperatingSystem/Assignment2/part3$

```


Question 4

Write a shell script program to display variables on a HTML webpage using firefox.

- Open a terminal.
- Go to the Part3 directory (i.e. type cd Part3).
- Type nano q4.bash and write a script program showing user variables as follows:

```
mohammed@mohammed-virtual-machine:~/OperatingSystem/Assignment2/part3$ ls -l
total 1128
-rw-rw-r-- 1 mohammed mohammed 538583 Apr 12 13:51 A2Part3.pdf
-rwxrw-r-- 1 mohammed mohammed 0 Apr 13 00:07 file1
-rw-r-xr-- 1 mohammed mohammed 0 Apr 13 00:07 file2
-rw-rw-rwx 1 mohammed mohammed 0 Apr 13 00:07 file3
-rwxrwxrwx 1 mohammed mohammed 0 Apr 13 00:07 file4
-rw-r----- 1 mohammed mohammed 0 Apr 13 00:07 file5
-rw-rw-r-- 1 mohammed mohammed 214 Apr 13 01:11 hold.html
-rw-rw-r-- 1 mohammed mohammed 595652 Apr 13 01:00 MohammedAlomA2Part3.odt
-rwxrw-r-- 1 mohammed mohammed 167 Apr 12 14:30 MySecondScript
-rwxrw-r-- 1 mohammed mohammed 459 Apr 13 01:11 q4.bash
drwxrwxr-x 2 mohammed mohammed 4096 Apr 12 14:33 screenShots
mohammed@mohammed-virtual-machine:~/OperatingSystem/Assignment2/part3$
```

```
#!/bin/bash
```

```
# Program to output HTML to firefox.
```

```
# First we redirect all the output displayed by echo to the  
file called 'hold.html'.
```

```
# Then we send this .html file to firefox for display.
```

```
TITLE="Create user variables and display the variables X  
and Y."
```

```
X=44
```

```
Y=28
```

```
echo "
```

```
<HTML>
```

```
    <HEAD>
```

```
        <TITLE>$TITLE</TITLE>
```

```
    </HEAD>
```

```
    <BODY>
```

```
        <H1>This is a HEADER to a paragraph</H1>
```

```
        <P>This paragraph displays X=$X and Y=$Y</P>
```

```
    </BODY>
```

```
</HTML>" > hold.html
```

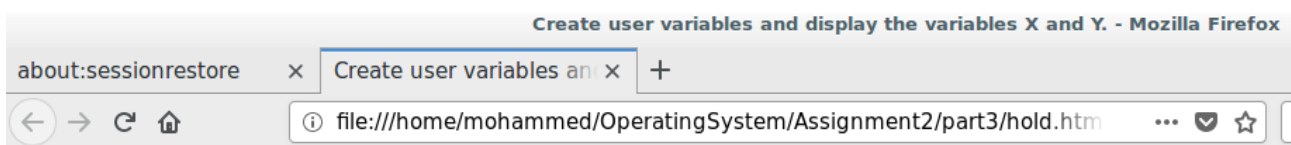
```
firefox hold.html
```

- Type `ls -l` and change the permissions of `q4.bash` to `rw-rw-r--` by typing `chmod u+x q4.bash`

```
#!/bin/bash
#Program to output HTML to firefox
#First we redirect all the output displayed by echo to the file called 'old.html'.
#Then we send this .html file to firefox for display.
TITLE="Create user variables and display the variables X and Y."
X=44
Y=28
echo "
<HTML>

    <HEAD>
        <TITLE>$TITLE</TITLE>
    </HEAD>
    <BODY>
        <H1>This is a HEADER to a paragraph</H1>
        <p>This paragraph display X=$X and Y=$Y</p>
    </BODY>
</HTML> " >hold.html
firefox hold.html
```

- Run the script as a program by typing `./q4.bash`



This is a HEADER to a paragraph

This paragraph display X=44 and Y=28

- Describe all the variables defined in the above program.

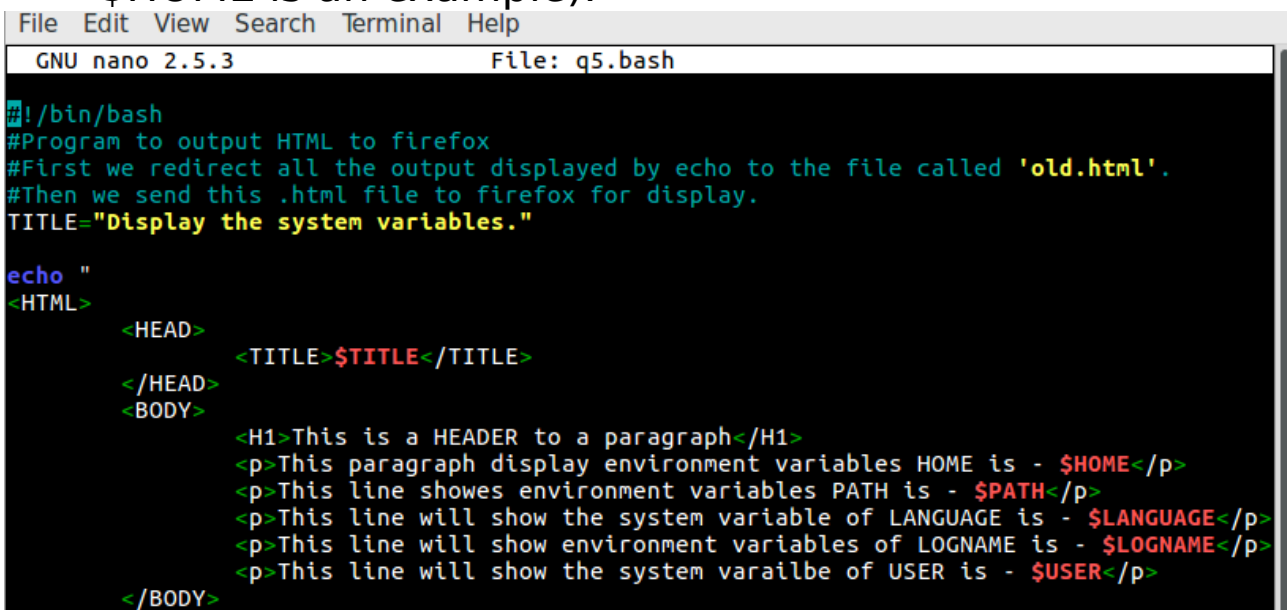
ANS:

- In this program first I created nano file `q4.bash`
- Then I wrote bash script with HTML tag
- There 3 variables were declared which are `TITLE`, `X` and `Y`
- Rest are HTML tag like `<HEAD>` `<TITLE>` `<BODY>` etc
- Finally script was opened by firefox web browser.

Question 5

Write a shell script program to display 5 system variables in a neat manner on a HTML webpage using firefox.

- Open a terminal.
- Go to the Part3 directory (i.e. type `cd Part3`).
- Copy the file `q4.bash` to `q5.bash` by using `cp q4.bash q5.bash`
- Type `nano q5.bash` and modify the script program to display 5 system variables in a neat manner (hint: `$HOME` is an example).



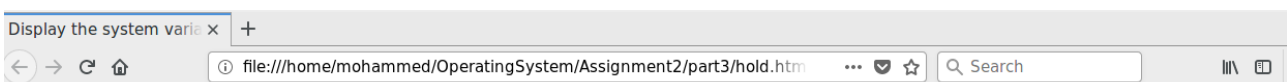
```
File Edit View Search Terminal Help
GNU nano 2.5.3 File: q5.bash

#!/bin/bash
#Program to output HTML to firefox
#First we redirect all the output displayed by echo to the file called 'old.html'.
#Then we send this .html file to firefox for display.
TITLE="Display the system variables."

echo "
<HTML>

    <HEAD>
        <TITLE>${TITLE}</TITLE>
    </HEAD>
    <BODY>
        <H1>This is a HEADER to a paragraph</H1>
        <p>This paragraph display environment variables HOME is - $HOME</p>
        <p>This line shows environment variables PATH is - $PATH</p>
        <p>This line will show the system variable of LANGUAGE is - $LANGUAGE</p>
        <p>This line will show environment variables of LOGNAME is - $LOGNAME</p>
        <p>This line will show the system varailbe of USER is - $USER</p>
    </BODY>
"
```

- Type `ls -l` and change the permissions of `q5.bash` to `rw-rw-r-` - if required.
- Run the script as a program by typing `./q5.bash`.



This is a HEADER to a paragraph

This paragraph display environment variables HOME is - /home/mohammed

This line shows environment variables PATH is - /home/mohammed/bin:/home/mohammed/.local/bin:/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin:/usr/games:/usr/local/games:/snap/bin

This line will show the system variable of LANGUAGE is - en_IE:en

This line will show environment variables of LOGNAME is - mohammed

This line will show the system varailbe of USER is - mohammed

