

LAB 02

Operating Systems - T3

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Section 2

```
administrator@administrator-virtual-machine:~$ ls -l lab02.sh
lab02.sh
administrator@administrator-virtual-machine:~$ ls -l lab02.sh
-rw-rw-r-- 1 administrator administrator 57 15:54 27 اگست lab02.sh
administrator@administrator-virtual-machine:~$ chmod +x lab02.sh
administrator@administrator-virtual-machine:~$ ls -l lab02.sh
-rwxrwxr-x 1 administrator administrator 57 15:54 27 اگست lab02.sh
administrator@administrator-virtual-machine:~$ ./lab02.sh
Hello World!
administrator@administrator-virtual-machine:~$ lab02.sh
lab02.sh: command not found
administrator@administrator-virtual-machine:~$ echo $PATH
/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin:/usr/games:/usr/local/games:/snap/bin:/snap/bin
administrator@administrator-virtual-machine:~$ sudo mv lab02.sh /usr/local/bin
[sudo] password for administrator:
administrator@administrator-virtual-machine:~$ lab02.sh
Hello World!
administrator@administrator-virtual-machine:~$ ps
  PID TTY          TIME CMD
  3759 pts/0        00:00:00 bash
  4156 pts/0        00:00:00 ps
administrator@administrator-virtual-machine:~$ export PATH=$PATH:.
administrator@administrator-virtual-machine:~$
administrator@administrator-virtual-machine:~$ VAR=2
administrator@administrator-virtual-machine:~$ sherlock="221B Baker Street"
administrator@administrator-virtual-machine:~$ echo $sherlock
221B Baker Street
administrator@administrator-virtual-machine:~$ echo sherlock
sherlock
administrator@administrator-virtual-machine:~$ touch bq08283.sh
administrator@administrator-virtual-machine:~$ nano bq08283.sh
administrator@administrator-virtual-machine:~$ full_name="Breeha Qasim"; echo $full_name
Breeha Qasim
administrator@administrator-virtual-machine:~$ set | grep full_name
full_name='Breeha Qasim'
administrator@administrator-virtual-machine:~$ full_name=""
administrator@administrator-virtual-machine:~$ set | grep full_name
full_name=
administrator@administrator-virtual-machine:~$ unset full_name
administrator@administrator-virtual-machine:~$ set | grep full_name
_=full_name
administrator@administrator-virtual-machine:~$ printenv
SHELL=/bin/bash
SESSION_MANAGER=local/administrator-virtual-machine:~/tmp/.ICE-unix/1709,unix/administrator-virtual-machine:/tmp/.ICE-unix/1709
QT_ACCESSIBILITY=1
COLORTERM=truecolor
XDG_CONFIG_DIRS=/etc/xdg/xdg-ubuntu:/etc/xdg
SSH_AGENT_LAUNCHER=gnome-keyring
XDG_MENU_PREFIX=gnome-
GNOME_DESKTOP_SESSION_ID=this-is-deprecated
LANGUAGE=en_US:
LC_ADDRESS=ur_PK
```

```
administrator@administrator-virtual-machine:~$ printenv USER
administrator
administrator@administrator-virtual-machine:~$ SET
SET: command not found
administrator@administrator-virtual-machine:~$ set
BASH=/usr/bin/bash
BASHOPTS=checkwinsize:cmdhist:complete_fullquote:expand_aliases:extglob:extquote:force_fignor
e:globasciiranges:histappend:interactive_comments:progcomp:promptvars:sourcepath
BASH_ALIASES=()
BASH_ARGC=( [0]="0" )
BASH_ARGV=()
BASH_CMDS=()
BASH_COMPLETION_VERSINFO=( [0]="2" [1]="11" )
BASH_LINENO=()
BASH_SOURCE=()
BASH_VERSINFO=( [0]="5" [1]="1" [2]="16" [3]="1" [4]="release" [5]="x86_64-pc-linux-gnu" )
BASH_VERSION='5.1.16(1)-release'
COLORTERM=truecolor
COLUMNS=93
DBUS_SESSION_BUS_ADDRESS=unix:path=/run/user/1000/bus
DESKTOP_SESSION=ubuntu
DIRSTACK=()
DISPLAY=:0
EUID=1000
GDMSESSION=ubuntu
GNOME_DESKTOP_SESSION_ID=this-is-deprecated
GNOME_SETUP_DISPLAY=:1
GNOME_SHELL_SESSION_MODE=ubuntu
GNOME_TERMINAL_SCREEN=/org/gnome/Terminal/screen/6942bcb7_301c_48bf_8690_169c27dda0d8
GNOME_TERMINAL_SERVICE=:1.112
GROUPS=()
```

```
administrator@administrator-virtual-machine:~$ set | grep USER
USER=administrator
USERNAME=administrator
local -a dirs=({BASH_COMPLETION_USER_DIR:-${XDG_DATA_HOME:-$HOME/.local/share}/bash-comp
letion}/completions);
administrator@administrator-virtual-machine:~$ echo $PATH
/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin:/usr/games:/usr/local/games:/sna
p/bin:/snap/bin:.
administrator@administrator-virtual-machine:~$ alias
alias alert='notify-send --urgency=low -i "${[ $? = 0 ]} && echo terminal || echo error)" "${H
istory|tail -n1|sed -e '\''s/^\s*[0-9]\+\s*//;s/[\&|]\s*alert$//'\`"'
alias egrep='egrep --color=auto'
alias fgrep='fgrep --color=auto'
alias grep='grep --color=auto'
alias l='ls -CF'
alias la='ls -A'
alias ll='ls -alF'
alias ls='ls --color=auto'
administrator@administrator-virtual-machine:~$ vegetable="carrot"
administrator@administrator-virtual-machine:~$ printenv | grep vegetable
administrator@administrator-virtual-machine:~$ export vegetable
administrator@administrator-virtual-machine:~$ printenv | grep vegetable
vegetable=carrot
```

```

administrator@administrator-virtual-machine:~$ posit-param.sh "Breeha Qasim" "Hasan Iqbal" "M
omina Jamil"
posit-param.sh: command not found
administrator@administrator-virtual-machine:~$ touch bqlab02.sh
administrator@administrator-virtual-machine:~$ nano bqlab02.sh
administrator@administrator-virtual-machine:~$ bash bqlab02.sh
Filename = bqlab02.sh
The 1st Argument is =
The 2nd Argument is =
The 3rd Argument is =
administrator@administrator-virtual-machine:~$ posit-param.sh "Breeha Qasim" "Ashbah Faisal"
"Namel Shahid"
posit-param.sh: command not found
administrator@administrator-virtual-machine:~$ posit-bqlab02.sh "Breeha Qasim" "Ashbah Faisal
" "Namel Shahid"
posit-bqlab02.sh: command not found
administrator@administrator-virtual-machine:~$ ^C
administrator@administrator-virtual-machine:~$ ^C
administrator@administrator-virtual-machine:~$ bash posit-param.sh "Breeha Qasim" "Ashbah Fai
sal" "Namel Shahid"
bash: posit-param.sh: No such file or directory
administrator@administrator-virtual-machine:~$ bash bqlab02.sh "Breeha Qasim" "Ashbah Faisal"
"Namel Shahid"
Filename = bqlab02.sh
The 1st Argument is = Breeha Qasim
The 2nd Argument is = Ashbah Faisal
The 3rd Argument is = Namel Shahid
administrator@administrator-virtual-machine:~$ 
administrator@administrator-virtual-machine:~$ touch breelab.sh
administrator@administrator-virtual-machine:~$ nano breelab.sh
administrator@administrator-virtual-machine:~$ chmod +x breelab.sh
administrator@administrator-virtual-machine:~$ ./spec-param.sh a "b c" d
bash: ./spec-param.sh: No such file or directory
administrator@administrator-virtual-machine:~$ ./breelab.sh a "b c" d
Number of arguments: 3
List of arguments (unquoted): a b c d
List of arguments (unquoted, alternative): a b c d
List of arguments (quoted): "a b c d"
List of arguments (quoted, alternative): "a b c d"
administrator@administrator-virtual-machine:~$ 
administrator@administrator-virtual-machine:~$ echo *
6.1.c 6.2.1.c 6.2.2.c 6.2.c bq08283.sh bq08283.txt bqlab02.sh Desktop Documents Downloads Lab
_02 Lab02_tasks Lab_03 lab05 lab_05_as07313 Lab06 Lab11 lab12 mine Music myouput myoutput mys
cript.sh output out.txt Pictures Public q2.6 q2.6_2.c q2.6.c q2.6_c sample.txt snap Templates
test.c test_dir testdir text.c Videos yo
administrator@administrator-virtual-machine:~$ echo D*
Desktop Documents Downloads
administrator@administrator-virtual-machine:~$ echo *s
Documents Downloads Lab02_tasks Pictures Templates Videos
administrator@administrator-virtual-machine:~$ echo .*
. .. .6.2.1.c.swp .bash_history .bash_history.save .bash_logout .bashrc .cache .config .gnupg
.lesshst .local .profile .ssh .sudo_as_admin_successful
administrator@administrator-virtual-machine:~$ echo ~
/home/administrator
administrator@administrator-virtual-machine:~$ echo ~/D*
/home/administrator/Desktop /home/administrator/Documents /home/administrator/Downloads
administrator@administrator-virtual-machine:~$ echo Top-{A,B,C}-Bottom
Top-A-Bottom Top-B-Bottom Top-C-Bottom

```

```

administrator@administrator-virtual-machine:~$ mkdir {2018..2020}-0{1..9} {2018..2020}-{10..12}
administrator@administrator-virtual-machine:~$ ls
2018-01 2018-11 2019-09 2020-07 bq08283.sh lab05 output Templates
2018-02 2018-12 2019-10 2020-08 bq08283.txt lab_05_as07313 out.txt test.c
2018-03 2019-01 2019-11 2020-09 bqlab02.sh Lab06 Pictures test_dir
2018-04 2019-02 2019-12 2020-10 breeLab.sh Lab11 Public testdir
2018-05 2019-03 2020-01 2020-11 Desktop lab12 q2.6 text.c
2018-06 2019-04 2020-02 2020-12 Documents mine q2.6_2.c Videos
2018-07 2019-05 2020-03 6.1.c Downloads Music q2.6.c yo
2018-08 2019-06 2020-04 6.2.1.c Lab_02 myoutput q2.6_c
2018-09 2019-07 2020-05 6.2.2.c Lab02_tasks myoutput sample.txt
2018-10 2019-08 2020-06 6.2.c Lab_03 myscript.sh snap
administrator@administrator-virtual-machine:~$ echo $(ls)
2018-01 2018-02 2018-03 2018-04 2018-05 2018-06 2018-07 2018-08 2018-09 2018-10 2018-11 2018-12 2019-01 2019-02 2019-03 2019-04 2019-05 2019-06 2019-07 2019-08 2019-09 2019-10 2019-11 2019-12 2020-01 2020-02 2020-03 2020-04 2020-05 2020-06 2020-07 2020-08 2020-09 2020-10 2020-11 2020-12 6.1.c 6.2.1.c 6.2.2.c bq08283.sh bq08283.txt bqlab02.sh breeLab.sh Desktop Documents Downloads Lab_02 Lab02_tasks Lab_03 lab05 lab_05_as07313 Lab06 Lab11 lab12 mine Music myoutput myoutput myscript.sh output out.txt Pictures Public q2.6 q2.6_2.c q2.6.c q2.6_c sample.txt snap Templates test.c test_dir testdir text.c Videos yo
administrator@administrator-virtual-machine:~$ ls -l $(which cp)
-rwxr-xr-x 1 root root 141824 2022 7 فروری /usr/bin/cp
administrator@administrator-virtual-machine:~$ echo "$((3 + 4 * 5 ))" "$(( (3 + 4) * 5 ))"
23 35
administrator@administrator-virtual-machine:~$ echo $(( A=1,B=0,(A&&B)))
0
administrator@administrator-virtual-machine:~$ echo $((1<<10)); echo $((1024>>5))
1024
32
administrator@administrator-virtual-machine:~$ echo $((6**2)*4)))
bash: syntax error near unexpected token `)'
administrator@administrator-virtual-machine:~$ echo $((6**2*4))
144
administrator@administrator-virtual-machine:~$ echo eight divided by four equals $((8/4))
eight divided by four equals 2
administrator@administrator-virtual-machine:~$

administrator@administrator-virtual-machine:~$ name=
administrator@administrator-virtual-machine:~$ echo "My name is ${name:?\"Error! Please provide your name.\"}"
bash: name: Error! Please provide your name.
administrator@administrator-virtual-machine:~$ name="Bree"
administrator@administrator-virtual-machine:~$ echo "My name is ${name:?\"Error! Please provide your name.\"}"
My name is Bree
administrator@administrator-virtual-machine:~$ bookName="Linux Programming for the Faint of Hearts"
administrator@administrator-virtual-machine:~$ echo "'$bookName' is ${#bookName} characters in length."
'Linux Programming for the Faint of Hearts' is 41 characters in length.
administrator@administrator-virtual-machine:~$ foo="Fruits: 100 oranges"
administrator@administrator-virtual-machine:~$ echo ${foo:8}
100 oranges
administrator@administrator-virtual-machine:~$ echo ${foo:8:3}
100
administrator@administrator-virtual-machine:~$ sec2dhms.sh 140000
sec2dhms.sh: command not found
administrator@administrator-virtual-machine:~$ touch sec2dhms.sh
administrator@administrator-virtual-machine:~$ nano sec2dhms.sh
administrator@administrator-virtual-machine:~$ chmod +x sec2dhms.sh
administrator@administrator-virtual-machine:~$ ./sec2dhms.sh 140000
1:00:00:00

```

```

administrator@administrator-virtual-machine:~$ ls -d /usr/share
/usr/share
administrator@administrator-virtual-machine:~$ echo $?
0
administrator@administrator-virtual-machine:~$ ls -d /share/usr
ls: cannot access '/share/usr': No such file or directory
administrator@administrator-virtual-machine:~$ echo $?
2
administrator@administrator-virtual-machine:~$ true
administrator@administrator-virtual-machine:~$ echo $?
0
administrator@administrator-virtual-machine:~$ false
administrator@administrator-virtual-machine:~$ echo $?
1

```

```

administrator@administrator-virtual-machine:~$ ls -d /share/usr
ls: cannot access '/share/usr': No such file or directory
administrator@administrator-virtual-machine:~$ echo $?
2
administrator@administrator-virtual-machine:~$ true
administrator@administrator-virtual-machine:~$ echo $?
0
administrator@administrator-virtual-machine:~$ false
administrator@administrator-virtual-machine:~$ echo $?
1
administrator@administrator-virtual-machine:~$ touch exit-status.sh
administrator@administrator-virtual-machine:~$ nano exit-status.sh
administrator@administrator-virtual-machine:~$ bash exit-status.sh
administrator@administrator-virtual-machine:~$ echo $?
110
administrator@administrator-virtual-machine:~$ string1 =~ expression

```

```

#!/bin/bash
if [[ $1 =~ [0-9] ]]; then
    echo "$1 expression has a digit"
else
    echo "$1 expression does not have a digit"
fi

```

```

administrator@administrator-virtual-machine:~$ touch digit_check.sh
administrator@administrator-virtual-machine:~$ nano digit_check.sh
administrator@administrator-virtual-machine:~$ chmod +x digit_check.sh
administrator@administrator-virtual-machine:~$ ./digit_check.sh 4
4 expression has a digit
administrator@administrator-virtual-machine:~$ ./digit_check.sh A
A expression does not have a digit
administrator@administrator-virtual-machine:~$ ./digit_check.sh A4
A4 expression has a digit
administrator@administrator-virtual-machine:~$ (( 2 - 2 )); echo $?
1
administrator@administrator-virtual-machine:~$ (( 2 - 3 )); echo $?
0
administrator@administrator-virtual-machine:~$ touch grading.sh
administrator@administrator-virtual-machine:~$ nano grading.sh
administrator@administrator-virtual-machine:~$ bash grading.sh
grading.sh: line 2: [: -gt: unary operator expected
administrator@administrator-virtual-machine:~$ nano grading.sh
administrator@administrator-virtual-machine:~$ ./grading.sh 40
bash: ./grading.sh: Permission denied
administrator@administrator-virtual-machine:~$ bash grading.sh
grading.sh: line 2: [: -gt: unary operator expected
administrator@administrator-virtual-machine:~$ ./grading.sh 40
bash: ./grading.sh: Permission denied
administrator@administrator-virtual-machine:~$ bash grading.sh 40
Grade A
administrator@administrator-virtual-machine:~$ bash grading.sh 92
Grade A

```



```
administrator@administrator-virtual-machine:~$
administrator@administrator-virtual-machine:~$ touch grade-all.sh
administrator@administrator-virtual-machine:~$ nano grade-all.sh
administrator@administrator-virtual-machine:~$ nano grade-all.sh
administrator@administrator-virtual-machine:~$ bash grade-all.sh 99
Grade A
administrator@administrator-virtual-machine:~$ bash grade-all.sh 65
Grade D
administrator@administrator-virtual-machine:~$ bash grade-all.sh 58
Grade F
administrator@administrator-virtual-machine:~$
```

```
#!/bin/bash
echo -n "Do you accept the license agreement? [y or n]: "
read yn
case $yn in
    y) echo "You can proceed with installation";
        exit
        ;;
    n) echo "You can't proceed with the installation ";
        exit 1
        ;;
    *) echo "Invalid input"
        exit 5
        ;;
esac
```

```
administrator@administrator-virtual-machine:~$ touch license.sh
administrator@administrator-virtual-machine:~$ nano license.sh
administrator@administrator-virtual-machine:~$ nano license.sh
administrator@administrator-virtual-machine:~$ y
y: command not found
administrator@administrator-virtual-machine:~$ bash license.sh
Do you accept the license agreement? [y or n]: y
You can proceed with installation
administrator@administrator-virtual-machine:~$ bash license.sh
Do you accept the license agreement? [y or n]: n
You can't proceed with the installation
administrator@administrator-virtual-machine:~$ bash license.sh
Do you accept the license agreement? [y or n]: blah
Invalid input
administrator@administrator-virtual-machine:~$ bash license.sh
Do you accept the license agreement? [y or n]: Y
Invalid input
administrator@administrator-virtual-machine:~$
```

```
#!/bin/bash
OS=$(grep "PRETTY_NAME" /etc/os-release | cut -d '"' -f2 )
echo "Your Distribution: $OS"
case $OS in
    *Ubuntu*) echo "Installing software for Ubuntu"
        ;;
    *openSUSE*) echo "Installing software for Ubuntu"
        ;;
    *Fedora) echo "Installing software for Ubuntu"
        ;;
    *) echo "Distribution or OS not supported"
esac
```

```
administrator@administrator-virtual-machine:~$ nano distro-case.sh
administrator@administrator-virtual-machine:~$
administrator@administrator-virtual-machine:~$ nano counter.sh
administrator@administrator-virtual-machine:~$ bash counter.sh 20
counter.sh: line 3: [: missing `']'
```

```
administrator@administrator-virtual-machine:~$ nano counter.sh
administrator@administrator-virtual-machine:~$ bash counter.sh 20
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
administrator@administrator-virtual-machine:~$
```

```
administrator@administrator-virtual-machine:~$ nano read-file.sh
administrator@administrator-virtual-machine:~$ read-file.sh /etc/os-release
bash: ./read-file.sh: Permission denied
administrator@administrator-virtual-machine:~$ ^C
administrator@administrator-virtual-machine:~$ sudo read-file.sh /etc/os-release
[sudo] password for administrator:
sudo: read-file.sh: command not found
administrator@administrator-virtual-machine:~$ sudo read-file.sh /etc/os-release
sudo: read-file.sh: command not found
administrator@administrator-virtual-machine:~$ bash read-file.sh /etc/os-release
PRETTY_NAME="Ubuntu 22.04.2 LTS"
NAME="Ubuntu"
VERSION_ID="22.04"
VERSION="22.04.2 LTS (Jammy Jellyfish)"
VERSION_CODENAME=jammy
ID=ubuntu
ID_LIKE=debian
HOME_URL="https://www.ubuntu.com/"
SUPPORT_URL="https://help.ubuntu.com/"
BUG_REPORT_URL="https://bugs.launchpad.net/ubuntu/"
PRIVACY_POLICY_URL="https://www.ubuntu.com/legal/terms-and-policies/privacy-policy"
UBUNTU_CODENAME=jammy
administrator@administrator-virtual-machine:~$
```

```
administrator@administrator-virtual-machine:~$ nano num.sh
administrator@administrator-virtual-machine:~$ bash num.sh
Number is {6
Number is 7
Number is 8
Number is 9
Number is 10}
administrator@administrator-virtual-machine:~$ for ((i = 0; i <= 50; i++)); do echo "x = $i";
done
x = 0
x = 1
x = 2
x = 3
x = 4
x = 5
x = 6
x = 7
x = 8
x = 9
x = 10
x = 11
x = 12
x = 13
x = 14
x = 15
x = 16
x = 17
x = 18
```

```
administrator@administrator-virtual-machine:~$ nano num-break.sh
administrator@administrator-virtual-machine:~$ bash num-break.sh
1 2 3 4 Broken
```

```
administrator@administrator-virtual-machine:~$ nano num-continue.sh
nano-continue.sh: command not found
administrator@administrator-virtual-machine:~$ nano num-continue.sh
administrator@administrator-virtual-machine:~$ bash num-continue.sh
num-continue.sh: line 4: syntax error in conditional expression: unexpected token `|'
num-continue.sh: line 4: syntax error near `|'
num-continue.sh: line 4: `if [[ $value = 4 | $value = 8 ]]'
administrator@administrator-virtual-machine:~$ nano num-continue.sh
administrator@administrator-virtual-machine:~$ bash num-continue.sh
num-continue.sh: line 4: syntax error in conditional expression: unexpected token `|'
num-continue.sh: line 4: syntax error near `|'
num-continue.sh: line 4: `      if [[ $value = 4 | $value = 8 ]]'
administrator@administrator-virtual-machine:~$ num-continue.sh
bash: ./num-continue.sh: Permission denied
administrator@administrator-virtual-machine:~$ nano num-continue.sh
administrator@administrator-virtual-machine:~$ bash num-continue.sh
1 2 3 5 6 7 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 3
6 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 6
7 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 9
8 99 100
administrator@administrator-virtual-machine:~$
```

```
administrator@administrator-virtual-machine:~$ nano pattern-gen.sh
administrator@administrator-virtual-machine:~$ bash pattern-gen.sh
*
**
***
****
*****
```

```
administrator@administrator-virtual-machine:~$ nano software-inst.sh
administrator@administrator-virtual-machine:~$ bash software-inst.sh "2:4:6" ":"
Installing software 2
Installing software 4
Installing software 6
administrator@administrator-virtual-machine:~$
```

```
administrator@administrator-virtual-machine:~$ nano pattern-gen2.sh
administrator@administrator-virtual-machine:~$ bash pattern-gen2.sh
0
10
210
3210
43210
```

```
ubuntu@tryit:~$ gcc --version
gcc (Ubuntu 11.4.0-1ubuntu1~22.04) 11.4.0
Copyright (C) 2021 Free Software Foundation, Inc.
This is free software; see the source for copying conditions. There is NO
warranty; not even for MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.

ubuntu@tryit:~$ ls -l $(which gcc g++)
lrwxrwxrwx 1 root root 6 Aug  5 2021 /usr/bin/gcc -> gcc-11
ubuntu@tryit:~$ python3 --version
Python 3.10.12
ubuntu@tryit:~$ ls -l $(which python python3)
lrwxrwxrwx 1 root root 10 Aug  8 12:28 /usr/bin/python3 -> python3.10
ubuntu@tryit:~$
```


Section 3

Q1 a)

```
bk08432@DESKTOP-BRH2KGB:~$ nano console.c
bk08432@DESKTOP-BRH2KGB:~$ gcc console.c -o console
bk08432@DESKTOP-BRH2KGB:~$ ./console
This program has 3 parameters:
[1] Name of the program: <xyz>.exe or simple <xyz>
[2] Name of the person you want to print
[3] Times you want to repeat the name

For e.g.: Executing the following, prints "Bilal" 7 times
bk08432@DESKTOP-BRH2KGB:~$ ./console breeha 5
Let's start the program
Program Name: ./console
Name to be Repeated: breeha
Times: [5] -- [5]

[1]      breeha
[2]      breeha
[3]      breeha
[4]      breeha
[5]      breeha
bk08432@DESKTOP-BRH2KGB:~$ |
```

```
//Author: Breeha Qasim
//Date: 28 Aug. 2024
//Details:Parsing Console Parameters.
#include <stdio.h>
#include <stdlib.h>
#include <sys/time.h>
#include <assert.h>
void print_error ()
{
    printf("\nThis program has 3 parameters: \n");
    printf("[1] Name of the program: <xyz>.exe or simple <xyz> \n");
    printf("[2] Name of the input file \n");
    printf("[3] Name of the output file \n");
    printf("For e.g.: files input.txt output.txt \n");
    exit (1);
}
int main(int argc, char *argv[])
{
    if(argc != 3)
    {
        print_error ();
    }
    else
    {
        printf("Let's start the program \n");
        printf("Program Name: %s \n", argv[0]);
        printf("Name to be repeated: %s \n",argv[1]);
        // Convert string to integer
        int i;
        sscanf (argv[2],"%d", &i);
        printf ("Times: [%s] -- [%d]\n\n", argv[2], i);
        //Print x times
        for (int j=1; j<=i; j=j+1)
            printf("[%d] \t %s \n", j, argv[1]);
    }
    return 0;
}
```

Q1 b)

```
administrator@administrator-virtual-machine:~$ nano console.c
administrator@administrator-virtual-machine:~$ gcc console.c -o console
administrator@administrator-virtual-machine:~$ sudo ./console
```

```
This program has 3 parameters:
[1] Name of the program: <xyz>.exe or simpe <xyz>
[2] Name of the input file n[3] Name of the output file
For e.g.: files input.txt output.txt
administrator@administrator-virtual-machine:~$
```

```
//Author: Breeha Qasim
//Date: 28 Aug. 2024
//Details:Parsing Console Parameters.
#include <stdio.h>
#include <stdlib.h>
#include <sys/time.h>
#include <assert.h>
void print_error ()
{
    printf("\nThis program has 3 parameters: \n");
    printf("[1] Name of the program: <xyz>.exe or simpe <xyz> \n");
    printf("[2] Name of the input file \n");
    printf("[3] Name of the output file \n");
    printf("For e.g.: files input.txt output.txt \n");
    exit (1);
}
void print_output(char *program_name, char *name, char *times_str)
{
    printf("Let's start the program \n");
    printf("Program Name: %s \n", program_name);
    printf("Name to be repeated: %s \n", name);
    // Convert string to integer
    int i;
    sscanf (times_str,"%d", &i);
    printf ("Times: [%s] -- [%d]\n\n", times_str, i);
    //Print x times
    for (int j=1; j<=i; j=j+1)
        printf("[%d] \t %s \n", j, name);
}
int main(int argc, char *argv[])
{
    if(argc != 3)
    {
        print_error ();
    }
    else
    {
        print_output(argv[0],argv[1],argv[2]);
    }
    return 0;
}
```

Q2 a)

```
bk08432@DESKTOP-BRH2KGB:~$ gcc files.c -o files
bk08432@DESKTOP-BRH2KGB:~$ nano files.c
bk08432@DESKTOP-BRH2KGB:~$ nano files.c
bk08432@DESKTOP-BRH2KGB:~$ gcc files.c -o files
bk08432@DESKTOP-BRH2KGB:~$ ./files console.c copy_console.c
// Author: Breeha Qasim
// Date: 27 Aug. 2024
// Details: Parsing Console Parameters.
#include <stdio.h>
#include <stdlib.h>
#include <sys/time.h>
#include <assert.h>

void print_error()
{
    printf("This program has 3 parameters: \n");
    printf("[1] Name of the program: <xyz>.exe or simple <xyz> \n");
    printf("[2] Name of the person you want to print \n");
    printf("[3] Times you want to repeat the name \n\n");
    printf("For e.g.: Executing the following, prints \"Bilal\" 7 times \n");
    exit(1);
}

void print_output(char *program_name, char *name, char *times_str)
{
    printf("Let's start the program \n");
    printf("Program Name: %s \n", program_name);
    printf("Name to be Repeated: %s \n", name);
    int i;
    // Convert string to integer
    sscanf(times_str, "%d", &i);
    printf("Times: [%s] -- [%d]\n\n", times_str, i);

    // Print x times
    for (int j = 1; j <= i; j++) {
        printf("[%d] \t %s \n", j, name);
    }
}

int main(int argc, char *argv[])
{
    if (argc != 3)
    {
        print_error();
    }
    else
    {
        print_output(argv[0], argv[1], argv[2]);
    }
    return 0;
}

bk08432@DESKTOP-BRH2KGB:~$ nano console.c
bk08432@DESKTOP-BRH2KGB:~$ diff console.c copy_console.c
```

Here the contents of one file (console.c) are being copied to a new file (copy_console.c). Then they are being compared by the “diff” command. The “diff” command compares the contents of the file line by line. Since here after writing this command and then pressing “Enter” gives **no output**, it means that two files are identical. They don't have any differences so hence the files match exactly.

Q2 b)

```
bk08432@DESKTOP-BRH2KGB:~$ cp console.c c_console.c
bk08432@DESKTOP-BRH2KGB:~$ diff c_console.c copy_console.c
bk08432@DESKTOP-BRH2KGB:~$ |
```

Q2 c)

```
#!/bin/bash

start_time=$(date +%s%N)
cp console.c cp_console.c
end=$(date +%s%N)
totaltime_cp=$((end-start_time))
echo "Time taken by cp command: ${totaltime_cp} in nanoseconds."

start_time_c=$(date +%s%N)
./files console.c copy_console.c
end_time_c=$(date +%s%N)
totaltime_c=$((end_time_c-start_time_c))
echo "Time taken by C command: ${totaltime_c} in nanoseconds."

if [ $totaltime_cp -gt $totaltime_c ]; then
    echo "Time taken by C command is faster than cp command."
elif [ $totaltime_cp -lt $totaltime_c ]; then
    echo "Time taken by cp command is faster than C command."
else
    echo "Both times taken are exactly the same."
fi
```

Here the execution times of “cp” and “C” commands are being measured in nanoseconds. Then their total duration is being stored in variable.

```
bk08432@DESKTOP-BRH2KGB:~$ nano compare_breeha.sh
bk08432@DESKTOP-BRH2KGB:~$ bash compare_breeha.sh
Time taken by cp command 4002962 in nanoseconds.
// Author: Breeha Qasim
// Date: 27 Aug. 2024
// Details: Parsing Console Parameters.
#include <stdio.h>
#include <stdlib.h>
#include <sys/time.h>
#include <assert.h>

void print_error()
{
    printf("This program has 3 parameters: \n");
    printf("[1] Name of the program: <xyz>.exe or simple <xyz> \n");
    printf("[2] Name of the person you want to print \n");
    printf("[3] Times you want to repeat the name \n\n");
    printf("For e.g.: Executing the following, prints \"Bilal\" 7 times \n");
    exit(1);
}

void print_output(char *program_name, char *name, char *times_str)
{
    printf("Let's start the program \n");
    printf("Program Name: %s \n", program_name);
    printf("Name to be Repeated: %s \n", name);
    int i;
    // Convert string to integer
    sscanf(times_str, "%d", &i);
    printf("Times: [%s] -- [%d]\n\n", times_str, i);

    // Print x times
    for (int j = 1; j <= i; j++) {
        printf("[%d] \t %s \n", j, name);
    }
}

int main(int argc, char *argv[])
{
    if (argc != 3)
    {
        print_error();
    }
    else
    {
        print_output(argv[0], argv[1], argv[2]);
    }
    return 0;
}

Time taken by C command 1985660 in nanoseconds.
Time taken by C command is faster than cp command.
```

Analysis: The time taken by “cp” command is 4ms while the time taken by “C” command is 1.98ms. Hence the “C” command is faster than “cp” command.

