NOTRE DAME UNIVERSITY
BANGLADESH

Operating System Final Lab Test

Course Code: CSE-3206
Course Title: Operating System Lab
Lab Task Topic: Shell Programming & Linux Commands

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Submission Date: June 16, 2025

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Question 01. Linux Commands

a) List all files and directories, including hidden ones, in the current directory.

$ ls -a

Output in `Linux Terminal` :

```
┌──(spyder㉿kali)-[~]
└─$ ls -la

total 1612
drwx------ 40 spyder spyder    4096 Jun 16 16:08 .
drwxr-xr-x  4 root   root      4096 Jun 14 19:31 ..
drwxrwxr-x  3 spyder spyder    4096 Jun 14 21:57 .8pecxstudios
drwxrwxr-x  9 spyder spyder    4096 Jun 14 22:28 Arduino
drwxrwxr-x  7 spyder spyder    4096 Jun 14 21:57 .arduino15
drwxrwxr-x  7 spyder spyder    4096 Jun 14 21:57 .arduinoIDE
-rwxrwxrwx  1 spyder spyder  164023 Mar 11  2023 art.jpg
-rwxrwxrwx  1 spyder spyder     683 Jun 15 01:33 .bash_history
-rwxrwxrwx  1 spyder spyder     220 Jul 24  2023 .bash_logout
-rwxrwxrwx  1 spyder spyder      50 May 18  2024 .bash_profile
-rwxrwxrwx  1 spyder spyder    5621 Mar 18 20:25 .bashrc
-rwxrwxrwx  1 spyder spyder    3526 Jul 24  2023 .bashrc.original
drwxrwxr-x 26 spyder spyder    4096 Jun 16 16:06 .cache
-rwxrwxr-x  1 spyder spyder    1062 Mar 12 00:02 calculator.sh
-rw-rw-r--  1 spyder spyder    4026 May  6 00:28 .candidate-selections.json
drwxr-xr-x 66 spyder spyder    4096 Jun 16 15:59 .config
drwx------  3 spyder spyder    4096 Jun 14 21:24 .dbus
drwxr-xr-x  2 spyder spyder    4096 Jun 16 15:59 Desktop
-rw-------  1 spyder spyder      64 Jan 21 18:23 .directory
-rw-r--r--  1 spyder spyder      28 Apr 19 12:54 .dmrc
drwxr-xr-x 17 spyder spyder    4096 Jun 15 17:28 Documents
drwxrwxr-x  3 spyder spyder    4096 Jun 14 22:02 .dotnet
drwxr-xr-x  3 spyder spyder    4096 Jun 16 14:38 Downloads
drwxrwxr-x  4 spyder spyder    4096 Jun 14 22:02 .eide
-rw-r--r--  1 spyder spyder   11759 Jan 20 22:34 .face
lrwxrwxrwx  1 spyder spyder       5 Jun 14 22:57 .face.icon -> .face
drwxrwxr-x  3 spyder spyder    4096 Jun 14 22:02 .fltk
```

b) Count the number of lines, words, and characters in a file named `sample.txt`.

$ wc sample.txt

Output in `Linux Terminal` :

```
┌──(spyder㉿kali)-[~/Istiak_OS_Lab]
└─$ touch sample.txt

┌──(spyder㉿kali)-[~/Istiak_OS_Lab]
└─$ cat sample.txt
Operating System: Kali GNU/Linux 2025.2
KDE Plasma Version: 6.3.4
KDE Frameworks Version: 6.13.0
Qt Version: 6.8.2
Kernel Version: 6.12.25-amd64 (64-bit)
Graphics Platform: X11
Processors: 12 × 12th Gen Intel® Core™ i5-12450H
Memory: 15.3 GiB of RAM
Graphics Processor 1: Intel® Graphics
Graphics Processor 2: NVIDIA GeForce RTX 2050
Manufacturer: Micro-Star International Co., Ltd.
Product Name: Thin 15 B12UCX
System Version: REV:1.0

┌──(spyder㉿kali)-[~/Istiak_OS_Lab]
└─$ wc sample.txt
 13  61 441 sample.txt

┌──(spyder㉿kali)-[~/Istiak_OS_Lab]
└─$
```

c) Display all lines that contain the word `ERROR` from `log.txt`.

```
grep 'ERROR' log.txt
```

Sample `log.txt` Content:

```
[INFO] System boot completed successfully.
[INFO] User logged in: Istiaq-Alam
[WARNING] Disk space running low on /dev/sda1
[ERROR] Failed to load configuration file: config.yaml
[INFO] Background services started.
[ERROR] Unable to connect to database server.
[DEBUG] Cache initialized.
[INFO] Update check completed.
[ERROR] Invalid user input on form submission.
[INFO] Scheduled backup completed.
```

Output in `Linux Terminal` :

```
┌──(spyder㉿kali)-[~/Istiak_OS_Lab]
└─$ cat log.txt
[INFO] System boot completed successfully.
[INFO] User logged in: Istiaq-Alam
[WARNING] Disk space running low on /dev/sda1
[ERROR] Failed to load configuration file: config.yaml
[INFO] Background services started.
[ERROR] Unable to connect to database server.
[DEBUG] Cache initialized.
[INFO] Update check completed.
[ERROR] Invalid user input on form submission.
[INFO] Scheduled backup completed.

┌──(spyder㉿kali)-[~/Istiak_OS_Lab]
└─$ grep 'ERROR' log.txt
[ERROR] Failed to load configuration file: config.yaml
[ERROR] Unable to connect to database server.
[ERROR] Invalid user input on form submission.

┌──(spyder㉿kali)-[~/Istiak_OS_Lab]
└─$
```

Question 02. Basic Shell Script

Objective: A shell script that takes a file name as input and performs the following:

- Checks if the file exists.
- Displays the number of lines, words, and characters.
- Shows the first 5 lines and last 5 lines.

Shell Script:

```
#!/bin/bash
# Take file name as input
echo "Enter filename:"
read filename
# Check if file exists
if [ -f "$filename" ]; then
    echo "File exists: $filename"
    # Display number of lines, words, and characters
    echo "Lines, Words, Characters:"
    wc "$filename"
    echo -e "\n--- First 5 Lines ---"
    head -n 5 "$filename"
    echo -e "\n--- Last 5 Lines ---"
    tail -n 5 "$filename"
else
    echo "File not found!"
fi
```

Output in `Linux Terminal` :

```
┌──(spyder㉿kali)-[~/Istiak_OS_Lab]
└─$ ./question2.sh
Enter filename:
log.txt
File exists: log.txt
Lines, Words, Characters:
 10  53 401 log.txt

--- First 5 Lines ---
[INFO] System boot completed successfully.
[INFO] User logged in: Istiaq-Alam
[WARNING] Disk space running low on /dev/sda1
[ERROR] Failed to load configuration file: config.yaml
[INFO] Background services started.

--- Last 5 Lines ---
[ERROR] Unable to connect to database server.
[DEBUG] Cache initialized.
[INFO] Update check completed.
[ERROR] Invalid user input on form submission.
[INFO] Scheduled backup completed.
```

Question 03. Shell Script Using Conditional and Loop

Objective: A shell script that:

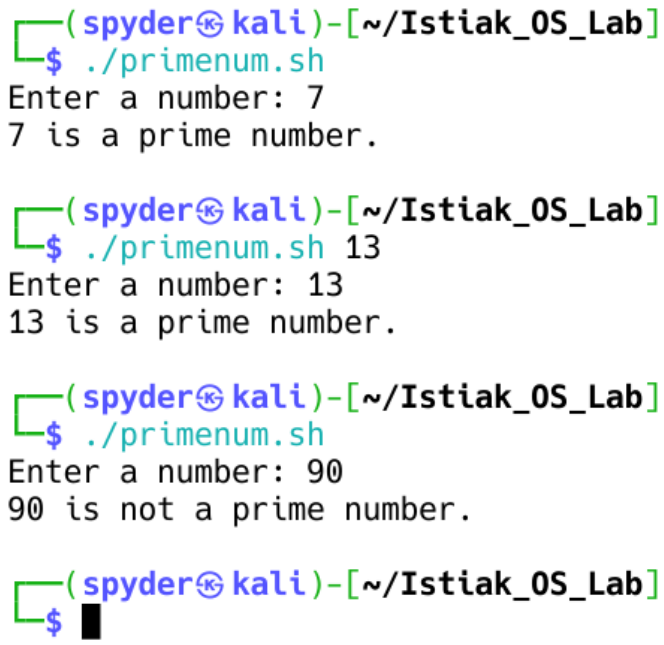
- Prompts the user to input a number.
- Checks whether the number is a prime number.
- Displays a message indicating the result.
- Includes input validation and comments.

Shell Script: [primenum.sh]

```
#!/bin/bash
# Prompt for input
read -p "Enter a number: " num
# Check if input is a valid integer
if ! [[ "$num" =~ ^[0-9]+$ ]]; then
    echo "Invalid input. Please enter a positive integer."
    exit 1
fi
# 0 and 1 are not prime numbers
if [ "$num" -lt 2 ]; then
    echo "$num is not a prime number."
    exit 0
fi
# Prime check using loop
is_prime=1
for (( i=2; i*i<=num; i++ ))
do
    if [ $((num % i)) -eq 0 ]; then
        is_prime=0
        break
    fi
done
# Result
if [ $is_prime -eq 1 ]; then
    echo "$num is a prime number."
else
    echo "$num is not a prime number."
fi
```

Note: All shell scripts are tested in a Linux environment (e.g., Kali Linux). Make sure to give execution permissions using `sudo chmod +x primenum.sh` before running.

Output in `Linux Terminal` :



THE END