MOUNTAINS OF THE MOON UNIVERSITY

FACULTY OF SCIENCE, TECHNOLOGY AND INNOVATION

DEPARTMENT OF COMPUTER SCIENCES

PRACTICAL ASSIGNMENT

Deadline : 4th October 2025

September 27, 2025

INSTRUCTIONS

- This is a practical examination to be completed on Ubuntu Server
- All commands must be executed in the terminal/console
- Attempt all questions in the order given
- Document your commands and outputs where specified
- Work individually and maintain academic integrity
- Ensure your Ubuntu Server virtual machine is properly configured
- Use appropriate commands for each task - marks will be deducted for inefficient solutions

LEARNING OBJECTIVES

Upon completion of this assignment, students will demonstrate proficiency in:

- Linux file system navigation using various commands (pwd, cd, ls, find, locate, which, whereis)
- File and directory management using comprehensive command sets
- Text file operations using cat, redirection operators, and nano editor
- Understanding file content manipulation and output redirection

1 NAVIGATION

1.1 Basic Navigation and Directory Listing (12 Marks)

1. Display your current working directory using the appropriate command. Then use `ls` with different options to:

   - List all files including hidden ones
   - Show detailed information with file sizes
   - Display files in human-readable format

   Write all commands used. **(4 Marks)**

2. Navigate to the root directory and use `ls` to list directories. Then use `ls -la /usr` to show detailed listing of /usr directory without changing your location. **(3 Marks)**

3. From your current location, navigate to your home directory using three different methods:

   - Using `cd` alone
   - Using `cd ~`
   - Using `cd $HOME`

   (3 Marks)

4. Use `ls -R` to recursively list the contents of `/etc/systemd` directory. Count how many subdirectories are displayed. **(2 Marks)**

1.2 Advanced Navigation and Search Commands (18 Marks)

5. Create directory structure `practice/level1/level2/level3` in your home directory. Navigate through each level using both relative and absolute paths, demonstrating `cd`, `cd ..`, `cd ../..`, and `cd -` commands. **(5 Marks)**

6. Use the `find` command to:

   - Find all directories named ”bin” starting from root directory
   - Find all files with .conf extension in /etc directory
   - Find all files larger than 1MB in your home directory

   (6 Marks)

7. Use `locate` command to find files containing ”bash” in their names. If locate database is not updated, update it first using `sudo updatedb`. **(3 Marks)**

8. Use `which` and `whereis` commands to locate the following programs and compare the outputs:

   - nano
   - ls
   - find

   (4 Marks)

2 FILE & DIRECTORY MANAGEMENT

2.1 Directory Operations

1. In your home directory, use `mkdir` command to create the following structure in a single command: `LinuxLab/Assignment1/{Documents,Scripts,Backups}` `LinuxLab/Assignment2/{Reports,Data,Temp}` **(5 Marks)**

2. Use `tree` command to display the directory structure you created. If tree is not installed, use `ls -R` instead. **(2 Marks)**

3. Copy the entire `/etc/network` directory to `LinuxLab/Assignment1/Backups/` using `cp -r`. Verify the copy was successful using appropriate listing commands. **(4 Marks)**

4. Create symbolic links using `ln -s`:

   - Link `LinuxLab/Assignment1/Documents` as `docs` in your home directory
   - Link `LinuxLab/Assignment2/Reports` as `reports` in Assignment1 directory

   (4 Marks)

5. Use `rmdir` to remove the `Temp` directory. Then use `rm -r` to remove the entire `Scripts` directory and its contents. **(3 Marks)**

6. Move `Backups` directory from Assignment1 to Assignment2 using `mv` command. **(2 Marks)**

2.2 File Operations and Management

7. Create files using different methods:

   - Use `touch` to create three empty files: `file1.txt`, `file2.txt`, `file3.txt` in Documents directory
   - Use `> filename` to create `empty.txt`
   - Use `echo` command to create `greeting.txt` containing "Hello Linux World"

   (5 Marks)

8. Use `cp` command variations:

   - Copy `file1.txt` to `file1_backup.txt`
   - Copy multiple files (file1.txt, file2.txt) to Reports directory
   - Copy `/etc/passwd` to Documents directory and rename it to `users.txt`

   (4 Marks)

9. Create hard and soft links:

   - Create a hard link of `greeting.txt` named `greeting_hard`

- Create a soft link of `greeting.txt` named `greeting_soft`
- Use `ls -li` to display inode numbers and verify the links

(4 Marks)

10. Use `stat` command to display detailed information about `greeting.txt` including timestamps, permissions, and size. **(2 Marks)**

11. Demonstrate file globbing and wildcards:

- List all .txt files using `ls *.txt`
- Copy all files starting with "file" to Data directory using `cp file* destination`
- List files that have exactly 5 characters in their name using `ls ?????.*`

(4 Marks)

12. Use `file` command to determine the type of the following files:

- `/etc/passwd`
- `/bin/ls`
- One of your created .txt files

(3 Marks)

13. Use `wc` command to count:

- Lines, words, and characters in `/etc/passwd`
- Number of files in your Documents directory

(3 Marks)

3 FILE EDITING AND TEXT OPERATIONS

3.1 Using cat Command and Output Redirection

1. Use `cat` command in different ways:

- Display contents of `/etc/hostname` using `cat`
- Display contents with line numbers using `cat -n /etc/passwd | head -10`
- Use `cat > myinfo.txt` to create a file with your personal information (name, student ID, course), then display it

(6 Marks)

2. Practice output redirection with > (overwrite):

- Redirect output of `date` command to `current_date.txt`
- Redirect list of files in home directory to `home_files.txt` using `ls > home_files.txt`
- Use `echo "System Information" > system.txt` to create a header file

(5 Marks)

3. Practice output redirection with >> (append):

   - Append current username to `system.txt` using `whoami >> system.txt`
   - Append system uptime to `system.txt` using `uptime >> system.txt`
   - Append disk usage information using `df -h >> system.txt`

   (5 Marks)

4. Combine `cat` with redirection:

   - Use `cat file1.txt file2.txt > combined.txt` to combine two files
   - Use `cat /etc/passwd | tail -5 >> combined.txt` to append last 5 lines of passwd file
   - Display the final combined.txt using `cat`

   (4 Marks)

3.2 Text File Operations and Viewing

5. Use different commands to view file contents:

   - Use `head` to display first 15 lines of `/var/log/syslog`
   - Use `tail` to display last 10 lines of the same file
   - Use `more` and `less` to paginate through `/etc/services` file

   (5 Marks)

6. Use `grep` command to search within files:

   - Search for ”root” in `/etc/passwd`
   - Search for lines containing ”ssh” in `/etc/services`
   - Count occurrences of ”tcp” in `/etc/services` using `grep -c`

   (5 Marks)

3.3 Advanced Nano Text Editing

7. Create a comprehensive configuration file using nano:

- Open nano and create `server_config.txt`
- Add the following content with proper formatting:

```
# Server Configuration File
# Created by: [Your Name]
# Student ID: [Your ID]
# Date: [Current Date]

[NETWORK]
hostname=ubuntu-server
ip_address=192.168.1.100
gateway=192.168.1.1

[SERVICES]
web_server=apache2
database=mysql
ssh_port=22

[USERS]
admin=administrator
guest=visitor

# End of Configuration
```

(6 Marks)

8. Edit existing files with nano:

- Open `system.txt` (created earlier) with nano
- Add a new section at the beginning: "=== SYSTEM REPORT ==="
- Add your name and current timestamp at the end
- Save using Ctrl+O and exit using Ctrl+X

(4 Marks)

9. Create a log file using nano with multiple entries:

- Create `activity_log.txt`
- Document all major commands you've used in this assignment
- Organize by sections (Navigation, File Management, Text Operations)
- Include timestamps for each section

(5 Marks)

SUBMISSION REQUIREMENTS

PDF Documentation Report

Create a comprehensive PDF document named `StudentID_LinuxAssignment_Report.pdf` that must include:

Cover Page

- Student Name and Registration Number
- Course Code and Name (BCS3101 - Systems Administration)
- Assignment Title: ”Linux Ubuntu Server Practical Assignment”
- Date of Completion

Command Documentation (Organized by Sections)

For each section of the assignment, document the following in chronological order:

Section 1: Navigation Commands

- List every command executed in the exact order used
- Include the full command syntax with all options/parameters
- Provide screenshots of command execution and outputs
- Number each command (Command 1, Command 2, etc.)
- Brief explanation of what each command accomplishes

Section 2: File & Directory Management Commands

- Complete chronological list of all mkdir, cp, mv, rm, ln, touch commands
- Screenshot evidence of directory structures created (using ls -la or tree)
- Screenshot proof of file operations (before and after states)
- Document any error messages encountered and how they were resolved

Section 3: File Editing and Text Operations Commands

- All commands used
- Screenshots of file contents created using cat command
- Screenshot evidence of redirection operations showing file contents before and after
- Screenshots of nano editor interface during file creation/editing
- Final screenshots showing completed files using cat or less commands

Screenshot Requirements

- Minimum 30 screenshots total across all sections
- Each screenshot must be clearly labeled with figure numbers
- Screenshots must show:
  - Terminal window with command prompt visible
  - Complete command typed
  - Full output/result of command execution
  - Timestamp visible in terminal (use 'date' command before screenshots)
- Include screenshots of directory structures using 'ls -la' or 'tree'
- Screenshot file contents using 'cat' command to verify successful operations

Technical Submission Requirements

- PDF must be generated using a word processor (LibreOffice Writer, MS Word, or LaTeX)
- File size should not exceed 50MB
- All screenshots must be readable with sufficient resolution
- Use consistent formatting throughout the document
- Include page numbers and a table of contents
- Submit via designated learning management system by deadline

— END OF ASSIGNMENT —

Good Luck!