Application Design using Shell Scripting

Introduction:

This project contains a collection of shell scripts that automate common tasks such as network monitoring system,file management system and disk management system which improves productivity. The scripts are written in the Bash shell and are compatible with most Linux and Unix systems.

Network Monitoring:

Network monitoring tools are software programs that monitor network traffic and activity. These tools can help identify performance issues and bottlenecks, detect network anomalies, and provide alerts and notifications in real-time. Network monitoring tools can be used to troubleshoot network problems, optimize network performance, and improve network security.

Features:

1. Packet capturing: Bash network monitoring tools can capture and analyze network packets, which can be used to troubleshoot network problems and detect network anomalies.
2. Network analysis: Bash network monitoring tools can perform analysis on network traffic and provide useful insights into network usage and performance.
3. Resource utilization monitoring: Bash network monitoring tools can monitor the utilization of network resources, such as bandwidth, CPU, and memory, which can help in optimizing network performance.
4. Log file analysis: Bash network monitoring tools can analyze log files generated by network devices, such as routers and switches, to detect network problems and identify potential security threats.

File management system:

File management systems are software programs that help users manage and organize files on their computer or network. These systems can create, delete, move, and rename files, as well as provide search and filter capabilities. File management systems can help users locate and access files quickly and easily, manage file permissions and access rights, and protect files from accidental deletion or unauthorized access.

Features:

1. File Operations: A file management system in bash can provide basic file operations such as creating, deleting, copying, moving, and renaming files.
2. Directory Operations: A file management system in bash can provide directory operations such as creating, deleting, copying, moving, and renaming directories.
3. File Search: A file management system in bash can provide a file search functionality that allows users to search for files based on various criteria such as name, size, and creation date.
4. File Permissions: A file management system in bash can provide file permission management, allowing users to set and modify file permissions for users and groups.
5. File Compression: A file management system in bash can provide file compression and decompression functionalities that allow users to compress and archive files for storage or transfer.

Disk Monitoring tools:

Disk monitoring tools are software programs that monitor the health and performance of computer hard drives or other storage devices. These tools can alert users when a disk is approaching capacity, provide early warning signs of disk failure, and help in data recovery. Disk monitoring tools can be used to optimize disk usage, improve system performance, and prevent data loss due to disk failure.

Features:

1. Disk Space Usage: A disk monitoring tool written in bash can display the amount of disk space used and available, allowing users to monitor their disk usage and avoid running out of space.
2. Disk Usage Alerts: A disk monitoring tool written in bash can provide disk usage alerts when a disk is reaching capacity or when certain thresholds are exceeded, allowing users to take action before disk space becomes an issue.
3. Disk I/O Statistics: A disk monitoring tool written in bash can display disk input/output statistics, allowing users to monitor the performance of their disks and identify bottlenecks.

Tech Stacks

File Management System:

- Operating System: Linux
- Scripting Language: Bash
- User Interface: Command-line interface (CLI)
- Libraries/Tools: Coreutils (e.g., cp, mv, rm), GNU Bash Shell, Tar, Gzip

Disk Monitoring System:

- Operating System: Linux
- Scripting Language: Bash
- Libraries/Tools: syslog

Network Monitoring Tool:

- Operating System: Linux
- Scripting Language: Bash
- Libraries/Tools: Ping

Project Link: https://github.com/Sarjack/OS_Project_Shell_Scripting

Output:

Network Monitoring tool:

```
shahjash25@DESKTOP-7GT1AIC:~/jash$ bash network.sh
Wed Apr 26 19:27:38 IST 2023: Network is UP
Wed Apr 26 19:27:52 IST 2023: Network is UP
Wed Apr 26 19:28:05 IST 2023: Network is UP
Wed Apr 26 19:28:19 IST 2023: Network is UP
Wed Apr 26 19:28:32 IST 2023: Network is UP
Wed Apr 26 19:28:46 IST 2023: Network is UP
Wed Apr 26 19:28:59 IST 2023: Network is UP
^C
```

```
shahjash25@DESKTOP-7GT1AIC:~/jash$ bash network.sh
ping: www.dummysunreachableserver.com: Name or service not known
Wed Apr 26 19:30:27 IST 2023: Network is DOWN
ping: www.dummysunreachableserver.com: Name or service not known
Wed Apr 26 19:30:38 IST 2023: Network is DOWN
ping: www.dummysunreachableserver.com: Name or service not known
Wed Apr 26 19:30:49 IST 2023: Network is DOWN
ping: www.dummysunreachableserver.com: Name or service not known
Wed Apr 26 19:31:00 IST 2023: Network is DOWN
ping: www.dummysunreachableserver.com: Name or service not known
Wed Apr 26 19:31:11 IST 2023: Network is DOWN
```

Log file output

```
Wed Apr 26 19:27:38 IST 2023: Network is UP
Wed Apr 26 19:27:52 IST 2023: Network is UP
Wed Apr 26 19:28:05 IST 2023: Network is UP
Wed Apr 26 19:28:19 IST 2023: Network is UP
Wed Apr 26 19:28:32 IST 2023: Network is UP
Wed Apr 26 19:28:46 IST 2023: Network is UP
Wed Apr 26 19:28:59 IST 2023: Network is UP
Wed Apr 26 19:30:27 IST 2023: Network is DOWN
Wed Apr 26 19:30:38 IST 2023: Network is DOWN
Wed Apr 26 19:30:49 IST 2023: Network is DOWN
Wed Apr 26 19:31:00 IST 2023: Network is DOWN
Wed Apr 26 19:31:11 IST 2023: Network is DOWN
```

File Management system:

```
Welcome to the File Management System!
Please choose an option:
1. Create a new file
2. Delete a file
3. Rename a file
4. Copy a file
5. Move a file
6. Create a new directory
7. Delete a directory
8. Create a backup of a file/directory
9. Set permissions of a file/directory
10. List files in a directory
11. Search for a file in a directory
12. Compress a file
13. Extract files from a compressed archive
14. Edit a file
15. Securely delete a file
16. View file contents
17. Exit
1
Please enter the name of the file you wish to create:
hello.cpp
File created successfully
```

```
2
Please enter the name of the file you wish to delete:
hello.cpp
File deleted successfully
```

```
3
Please enter the name of the file you wish to rename:
log.txt
Please enter the new name for the file:
log1.txt
File renamed successfully
```

```
4
Please enter the name of the file you wish to copy:
log1.txt
Please enter the name of the new file:
log.txt
File copied successfully
```

```
5
Please enter the name of the file you wish to move:
log1.txt
Please enter the new path for the file:
Ubuntu\home\shahjash25
File moved successfully
```

```
6
Please enter the name of the directory you wish to create:
project
Directory created successfully
```

```
8
Please enter the name of the file/directory you wish to create a backup of:
log.txt
Please enter the name of the backup file/directory:
log_backuo.txt
log.txt
Backup created successfully
Do you want to create a recursive backup of subdirectories (y/n)?
n
```

```
9
Please enter the name of the file or directory whose permissions you wish to set:
log.txt
Please enter the new permissions in numeric format (e.g. 755):
755
Permissions set successfully
```

```
7
Please enter the name of the directory you wish to delete:
project
Directory deleted successfully
```

```
10
Please enter the name of the directory you wish to list the files of:
hello
total 0
-rw-r--r-- 1 shahjash25 shahjash25 0 Apr 26 19:53 sample.txt
```

```
11
Please enter the name of the file you wish to search for:
sample
Please enter the directory in which to search for the file:
hello
```

```
12
Please enter the name of the file you wish to compress:
log.txt
gzip: log.txt.gz already exists; do you wish to overwrite (y or n)? y
File compressed successfully
```

```
13
Please enter the name of the archive you wish to extract:
log.txt.gz
tar: This does not look like a tar archive
tar: Skipping to next header
tar: Exiting with failure status due to previous errors
Archive extracted successfully
```

```
Please enter the name of the file you wish to view:
disc.sh
#!/bin/bash

# System monitoring tool

# Display usage information
function display_usage {
    echo "Usage: $0 [-c cpu_threshold] [-m mem_threshold] [-d disk_threshold]"
    echo "  -c cpu_threshold    CPU usage threshold percentage (default: 80)"
    echo "  -m mem_threshold    Memory usage threshold percentage (default: 80)"
    echo "  -d disk_threshold   Disk usage threshold percentage (default: 80)"
    exit 1
}

# Set default values if not provided
cpu_threshold=0
mem_threshold=0
disk_threshold=0

# Parse command line arguments
while getopts ":c:m:d:" opt; do
    case $opt in
        c) cpu_threshold=$OPTARG ;;
        m) mem_threshold=$OPTARG ;;
```

```
Please enter the name of the file you wish to securely delete:
project.pdf
File securely deleted
```

```
Please enter the name of the file you wish to edit:
log.txt
File edited successfully
```

Disk Monitoring System:

```
shahjash25@DESKTOP-7GT1AIC:~/jash$ bash disc.sh
High CPU usage detected: 3%
High memory usage detected: 3%
High disk usage detected: 1%
```

Learning Outcomes:

- Learnt about Shell Scripting as a language
- Learnt to use LINUX OS
- Learnt to use Command Line Interface (CLI)
- Strengthened the knowledge of various LINUX commands such as
  1) PING
  2) TOP
  3) CHMOD
  4) GZIP
  5) TAR

  and some basic ones such as rm, mv, mkdir, cd, etc.