Project Report

Title: Bash Scripting Suite for System Maintenance -Capstone Project

Student Name: Chinmayya Priyadarshi

Registration No. : 2241016503

Course: B.Tech (CSIT)

Institution: ITER SOA University

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Abstract

This project focuses on automating essential system maintenance operations in a Linux environment through a set of Bash scripts.
The suite performs key tasks like **system backup, updates, cleanup, and log monitoring**, all accessible from a single menu-driven interface.
By using Bash scripting, the project eliminates repetitive manual commands and ensures the system remains up-to-date, secure, and efficient.
This simple yet effective automation demonstrates the practical use of shell scripting in real-time system administration.

Objective

The main objective of this project is to:

- Develop a Bash Scripting Suite that simplifies system maintenance tasks such as backup, update, and monitoring.
- Provide a menu-driven interface for easy execution of scripts.
- Ensure automation of repetitive administrative jobs to save time and reduce human errors.
- Enhance the understanding of Linux shell scripting and process automation

Tools & Technologies

1.Operating System: Ubuntu /Linux

2.Programming Language : Bash Shell Script

3.Tools Used : Terminal

4.Utilities: tar , mkdir , tail , apt-get , tee , grep

5.Concepts Applied: Automation, File Handling, Logging, Condition Checking, Menu-driven Programming.

System Overview

The System Maintenance Suite consists of four individual scripts, each performing a specific task:

1. backup.sh – Creates a compressed backup (.tar.gz) of the user's *Documents* folder and stores it safely in a backup directory.
2. update_cleanup.sh – Updates system packages, removes unused files, and cleans up old data to optimize performance.
3. log_monitor.sh – Monitors log files for any errors, warnings, or failures, and reports them in a dedicated log file.
4. maintenance_suite.sh – Acts as the main interface, allowing users to select and run any of the above tasks through a simple menu.

The suite ensures that all activities are recorded in log files for future reference, making the system's maintenance transparent and trackable.

Implementation & Code

backup.sh

```
#!/bin/bash
SOURCE="$HOME/Documents"
DESTINATION="$HOME/system_backups"
LOGFILE="$HOME/maintenance_suite/backup.log"

mkdir -p "$DESTINATION"
mkdir -p "$(dirname "$LOGFILE")"

echo "---------------------------------------" >> "$LOGFILE"
echo "$(date) - Starting Backup..." | tee -a "$LOGFILE"

if [ ! -d "$SOURCE" ]; then
  echo "Source folder not found: $SOURCE" | tee -a "$LOGFILE"
  exit 1
fi
FILENAME="backup_$(date +%Y%m%d_%H%M%S).tar.gz"
tar -czf "$DESTINATION/$FILENAME" "$SOURCE" 2>>"$LOGFILE"
```

```
if [ $? -eq 0 ]; then
  echo "$(date) - Backup completed successfully!" | tee -a "$LOGFILE"
  echo "File saved at: $DESTINATION/$FILENAME" | tee -a "$LOGFILE"
else
  echo "$(date) - Backup failed!" | tee -a "$LOGFILE"
fi
```

update_cleanup.sh

```
#!/bin/bash
LOGFILE="$HOME/maintenance_suite/update_cleanup.log"
mkdir -p "$(dirname "$LOGFILE")"

echo "----------------------------------------" >> "$LOGFILE"
echo "$(date) - Starting system update..." | tee -a "$LOGFILE"

sudo apt-get update -y >>"$LOGFILE" 2>&1
sudo apt-get upgrade -y >>"$LOGFILE" 2>&1
sudo apt-get autoremove -y >>"$LOGFILE" 2>&1
sudo apt-get autoclean -y >>"$LOGFILE" 2>&1
```

```
if [ $? -eq 0 ]; then
  echo "$(date) - System updated and cleaned successfully!" | tee -a "$LOGFILE"
else
  echo "$(date) - Update or cleanup failed!" | tee -a "$LOGFILE"
fi
```

log_monitor.sh

```
#!/bin/bash
LOG_DIR="$HOME/maintenance_suite"
MONITOR_LOG="$LOG_DIR/log_monitor.log"

mkdir -p "$LOG_DIR"
echo "----------------------------------------" >> "$MONITOR_LOG"
echo "$(date) - Starting log monitoring..." | tee -a "$MONITOR_LOG"

for file in "$LOG_DIR"/*.log; do
  if [ -f "$file" ]; then
    grep -Ei "error|fail|warn" "$file" >> "$MONITOR_LOG"
  fi
done
```

```
echo "$(date) - Log monitoring finished!" | tee -a "$MONITOR_LOG"
```

maintenance_suite.sh

```
#!/bin/bash
while true; do
  clear
  echo "========================================"
  echo "     SYSTEM MAINTENANCE SUITE"
  echo "========================================"
  echo "1. Run Backup"
  echo "2. Run Update & Cleanup"
  echo "3. Monitor Logs"
  echo "4. Exit"
  echo "----------------------------------------"
  read -p "Enter your choice [1-4]: " choice

  case $choice in
    1) bash "$HOME/maintenance_suite/backup.sh"; read -p "Press Enter to continue..." ;;
    2) bash "$HOME/maintenance_suite/update_cleanup.sh"; read -p "Press Enter to continue..." ;;
```

```
    3) bash "$HOME/maintenance_suite/log_monitor.sh"; read
-p "Press Enter to continue..." ;;
    4) echo "Goodbye!"; exit 0 ;;
    *) echo "Invalid option. Try again."; sleep 1 ;;
  esac
done
```

Results&Observations

Backup Script : Successfully created compressed backups of files and stored them with timestamps.

Update & Cleanup Script : Automatically updated all installed packages and removed unnecessary data.

Log Monitor Script: Efficiently scanned log files and identified warning/error messages.

Menu Script : Provided an easy interface to execute all operations from a single menu.

Observations:

- The suite works smoothly with basic Linux permissions.
- All log files are saved for future verification.
- The scripts are modular and can be reused independently.
- Minimal user input is required, making it beginner-friendly.

Conclusion

The Bash Scripting Suite for System Maintenance successfully demonstrates how Linux automation can reduce manual effort and improve system reliability.
It provides a simple, menu-driven interface to manage critical maintenance operations like backup, updates, and log monitoring efficiently.
This project strengthened the understanding of shell scripting concepts, system-level commands, and process control.
Overall, the implementation achieved its goal of building a reliable, reusable, and user-friendly maintenance tool suitable for real-world system administration.

Github Repository

https://github.com/chinmayyapmohapatra-jpg/Maintainance_suit