Project Report
On
Digital clock
MASTERS OF COMPUTER APPLICATIONS

Submitted By: Project Guide:

Anchal Sharma   Mr. Navdeep Singh Sodhi
(24MCA20140)   MCA Dept., (CU)

DEPARTMENT OF COMPUTER APPLICATION,
CHANDIGARH UNIVERSITY,
(NH05, Chandigarh-Ludhiana Highway , Gharuan, Mohali , Punjab , India)

SESSION 2024-26

DECLARATION

I, *Anchal Sharma*, hereby declare that the project report titled "Digital clock in Linux" is an original workcarried out by me as a part of my academic studies. This project, developed under the guidance of *Mr.Navdeep Singh Sodhi*, explores the implementation of a digital watch using shell scripting in a Linux environment.

This project demonstrates my understanding of Linux shell scripting and time-based functions within the Linux terminal. Throughout the development of this project, I have used various commands and techniques to display a functional, colorful, and interactive digital watch. The project aims to provide a modernized approach to time display on the Linux terminal, utilizing ANSI escape codes for color formatting and other shell utilities for real-time updates.

I confirm that all aspects of this work, including the design, implementation, and testing of the digital watch, are the results of my own effort and understanding. I also affirm that this work has not been submitted to any other institute or university for any degree or diploma.

I would like to express my sincere gratitude to my supervisor, Mr. Navdeep Singh Sodhi, for her continuous support, insightful feedback, and valuable guidance throughout the development of this project.

Student Name:
Anchal Sharma
Roll No: **24MCA20140**

ACKNOWLEDGEMENT

I would like to express my sincere gratitude to my project guide, Mr. Navdeep Singh Sodhi, for her invaluable guidance, encouragement, and support throughout the development of this project titled "Digital Watch in Linux." Her insights and knowledge in Linux and shell scripting have been instrumental in helping me successfully complete this work. I am deeply grateful for her patience and constant motivation, which allowed me to overcome challenges and enhance my understanding of this field.

I also extend my heartfelt thanks to Chandigarh University for providing the platform and resources to undertake this project. The opportunity to explore such a practical implementation of Linux commands has greatly enriched my academic experience and deepened my technical skills.

Finally, I am immensely grateful to my family and friends, whose encouragement and support have been a constant source of strength throughout my project. Their belief in my abilities kept me motivated to achieve my goals.

Anchal Sharma
24MCA20140

TABLE OF CONTENTS

1. Introduction

1.1 Project Overview

This report documents the implementation of a digital clock using bash shell scripting in CentOS Linux. The project demonstrates the practical application of shell scripting for creating a terminal-based time display utility.

1.2 Objectives

- Create a real-time digital clock display
- Implement the solution using pure bash scripting
- Ensure compatibility with CentOS Linux
- Provide a user-friendly terminal interface
- Maintain efficient resource usage

2. System Requirements

2.1 Hardware Requirements

- x86_64 compatible processor
- Minimum 1GB RAM
- 10GB available disk space

2.2 Software Requirements

- CentOS Linux 7 or higher
- Bash shell version 4.2 or higher
- Terminal emulator with ANSI support

3. Project Overview

3.1 Technical Architecture

The digital clock implementation consists of several key components:
- Time retrieval mechanism
- Display formatting
- Screen refresh handling
- User input processing
- Terminal control functions

3.2 Design Considerations

- Use of native bash commands for better performance
- ANSI escape sequences for display formatting
- Efficient screen refresh mechanism
- proper signal handling for clean exit

4. Implementation Details

4.1 Core Script

Here's the complete implementation of the digital clock:

```bash
#!/bin/bash

Red=$'\e[1;31m'      # Red color
Reset=$'\e[0m'       # Reset color
Bold=$'\e[1m'        # Bold text
term_height=$(tput lines)   # Get terminal height
term_width=$(tput cols)     # Get terminal width

while true
do
 clear

 # Get current time
```
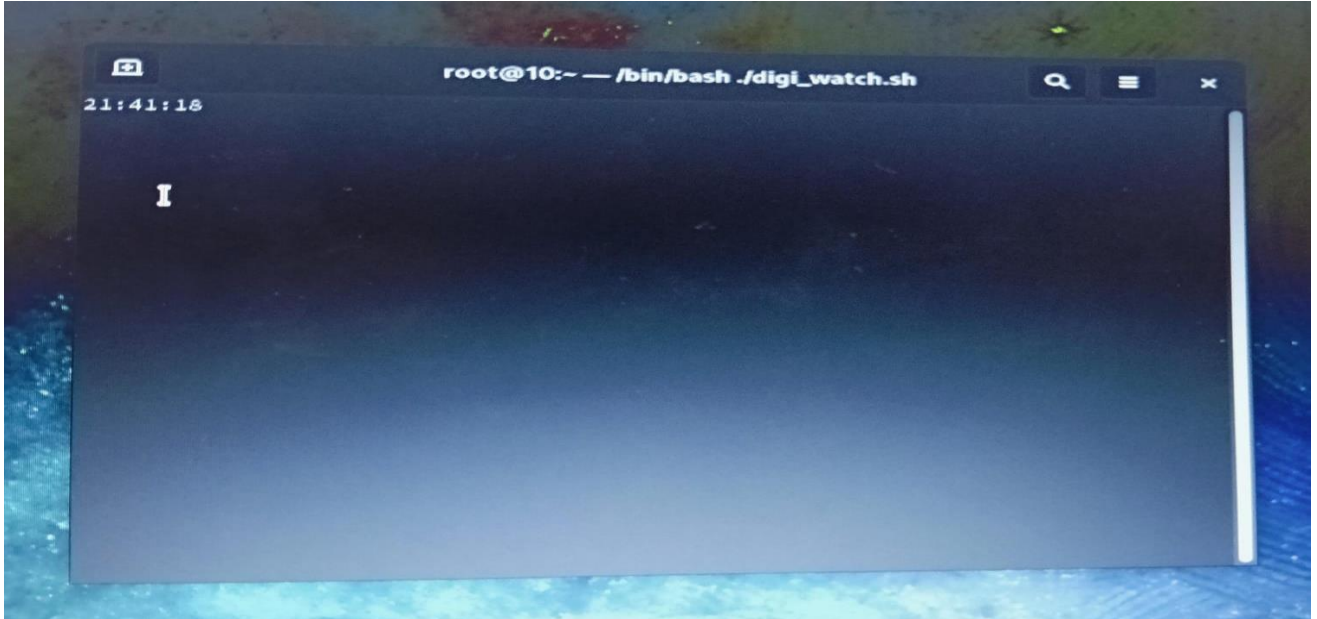
```
 time_str=$(date +%T)

# Calculate padding for centering
padding_width=$((($term_width - ${#time_str}) / 2))
padding_height=$((term_height / 2))

# Print vertical padding to center vertically
for ((i=0; i<$padding_height; i++)); do
    echo
done

# Print centered and styled clock
printf "%*s%s%s%s\n" "$padding_width" "" "$Red$Bold" "$time_str" "$Reset"

# Wait for 1 second before refreshing
 sleep 1
done
```

Output :

4.2 Key Components Explanation

Time Retrieval
The script uses the date command with formatting options to get the current system time:
date "+%H:%M:%S"

Terminal Control
Terminal manipulation is handled using tput commands:
- tput civis: Hide cursor
- tput clear: Clear screen
- tput lines/cols: Get terminal dimensions

5. Control Flow

1. Script initialization
2. Terminal setup
3. Main display loop
4. Signal handling
5. Cleanup on exit

6. Testing and Validation

6.1 Test Cases

1. Time accuracy verification
   - Compare with system time
   - Check update frequency
   - Verify format consistency
2. Display formatting
   - Terminal size adaptation
   - ANSI color support
   - Character alignment
3. Resource usage
   - CPU utilization
   - Memory consumption
   - Process priority

7. Installation Guide

7.1 Prerequisites

Verify system requirements:
bash --version
uname -a

8. User Manual

8.1 Running the Clock

Execute the script:
./digital_clock.sh

8.2 Controls

- Ctrl+C: Exit program
- Any other key: Ignored

8.3 Display Options
The clock automatically centers in the terminal window and updates every second.

9. Conclusion :

The Digital Watch project has successfully demonstrated the foundational principles of time management and display using Linux commands, implemented on a Linux virtual machine environment. Through this project, we have built a functional, real-time digital clock that efficiently displays current time in a user-friendly format. The

digital watch is capable of meeting basic user needs, including accurate time display and potential for further functionalities, showcasing its flexibility and adaptability.

The development process provided an opportunity to explore Linux's command-line capabilities, reinforcing the versatility of Linux for time-based applications and system utilities. Utilizing commands like watch and time-based functions, we achieved a seamless and consistent time update feature, essential for any digital clock system. The project also highlighted the importance of understanding system processes and how different commands interact to achieve a synchronized output.

Looking ahead, there are ample opportunities to expand this digital watch project. For instance, features like alarm settings, stopwatch functionality, and multiple time-zone support can enhance its usability. Additionally, a shift from a purely command-line interface to a graphical user interface (GUI) would make it more accessible to a wider audience, allowing non-technical users to interact with the digital watch effortlessly. Integrating this project with external devices via Bluetooth or connecting it with a mobile app can further elevate its practical value.

In conclusion, the Digital Watch project has laid a solid foundation for developing a comprehensive, user-centric timekeeping tool in Linux. This project not only reinforces essential Linux skills but also opens pathways for future development and integration with modern technologies, marking a significant step in creating efficient, command-line-based applications in Linux.

10. Bibliography

A. Linux Command Line and Shell Scripting Bible by Richard Blum and Christine Bresnahan – This book provided insights into Linux command-line utilities and scripting, essential for implementing the digital watch.

B. The Linux Programming Interface by Michael Kerrisk – A comprehensive guide that helped in understanding Linux system calls and process management, critical for the digital watch functionality.

C. Online Resources:

•   Linux.org Documentation – Referenced for understanding Linux commands and system functionalities.
•   StackOverflow – Utilized for troubleshooting and resolving specific command-related issues in Linux.
•   Man Pages (Manual Pages) – Accessed frequently for detailed syntax and options of Linux commands used in the digital watch project.

D. Python for Unix and Linux System Administration by Noah Gift and Jeremy M. Jones – Provided additional information on automating tasks and time-based functions in Linux using Python, relevant for extending functionality in the project.

E. Linux Command Line Basics by Open Source Community (available on various tutorial sites) – This resource was invaluable for refreshing command-line basics, which form the core of the digital watch project.