

## **Title: Advanced Shell Scripting and Optimization Assignment**

### **Assignment Description:**

In this assignment, you will design, optimize, and benchmark a feature-rich shell script that performs a complex task efficiently. The assignment focuses on Linux commands, shell scripting techniques, optimization strategies, and creating a user-friendly experience. It consists of three parts: implementation, optimization, and advanced feature integration.

### **Part 1: Implementation**

Design a shell script that accomplishes the following tasks:

- a. Accepts a directory path as an argument.
- b. Searches for all files with a specific extension (e.g., .txt) in the given directory and its subdirectories.
- c. Generates a comprehensive report that includes file details such as size, owner, permissions, and last modified timestamp.
- d. Groups the files by owner.
- e. Sorts the file groups by the total size occupied by each owner.
- f. Saves the report in a file named "file\_analysis.txt".

Implement the following user-friendly features:

- a. Create a command-line interface (CLI) with clear prompts and descriptive messages.
- b. Provide a help section that explains how to use the script and lists available options.
- c. Handle errors by displaying informative error messages and offering possible solutions.
- d. Validate user inputs and provide appropriate feedback for invalid or missing arguments.

### **Part 2: Optimization**

Analyze your initial implementation and identify areas for optimization.

Modify your shell script to improve its efficiency and performance while maintaining the same functionality.

### **Part 3: Advanced Feature Integration**

Enhance your shell script with additional advanced features:

- a. Implement support for multiple file extensions, allowing users to search for files with various extensions simultaneously.
- b. Include an option to filter files based on size, permissions, or last modified timestamp, allowing users to customize their search criteria.
- c. Enable the script to generate a summary report that displays total file count, total size, and other relevant statistics.

#### **Submission:**

- Submit your shell scripting file(s)
- Write a report (pdf) that covers the design choices, optimization techniques, advanced features, user-friendliness aspects, and their impact on performance. Include a reflection section discussing the lessons learned, difficulties encountered, and potential future improvements.
- Record a video (less than 10 mins, submit the URL of the video only) that shows your implementation and features, and how you optimized your solution.

#### **Assessment:**

Your submission will be assessed based on the following criteria:

- Correctness and completeness of the shell script in performing the required tasks.
- Clarity and depth of the explanations provided in the video.
- Demonstrated understanding and utilization of advanced shell scripting techniques.
- Effectiveness of the optimizations implemented and their impact on performance.
- Integration and functionality of the advanced features.
- User-friendliness of the script, including clear prompts, error handling, and help section.
- Quality and coherence of the report.