Green University of Bangladesh

Department of Computer Science and Engineering (CSE)
Semester: (Fall, Year: 2023), B.Sc. in CSE (Day)

File Compression and decompression Using Huffman Algorithm.

Course Title: Algorithm Lab
Course Code: CSE-206
Section: 221-D13

Students Details

Name	ID
Md Golam_Rabbi	221902328

Submission Date: 08-01-2024
Course Teacher's Name: Md. Riad Hassan

[For teachers use only: Don't write anything inside this box]

Lab Project Status	
Marks:	**Signature:**
Comments:	**Date:**

Contents

1 Introduction 2

1.1 Title 2

1.2 Motivation 2

1.3 Problem Definition 2

1.4 Design Goals/Objectives 2

1.5 Application 3

2 Design/Development/Implementation of the Project 4

2.1 Introduction 4

2.2 Implementation 5

3 Conclusion 8

3.1 Discussion 8

3.1.1 Future Directions 8

3.1.2 Reference 8

Chapter 1

Introduction

1.1 Title

File Compression and decompression Using Huffman Algorithm.

1.2 Motivation

In this project I am going to build a file compreesing technic using Huffman coding. By this we can to zip a file and reduced its size and also can unzip to resize it. Huffman coding, with its adaptive nature, ensures that frequently occurring patterns in data are represented more efficiently. In a world where data is continuously expanding, the need for efficient file compression solutions is more critical than ever. I think I will enjoy to complete this project.

1.3 Problem Definition

In this project is to develop a file compression system using Huffman coding, a widely used and efficient algorithm for lossless data compression. Huffman coding assigns variable-length codes to input characters, with shorter codes assigned to more frequent characters, resulting in a compact representation of the data.

1.4 Design Goals/Objectives

- Implement Huffman coding algorithm for file compression.
- Develop a user-friendly interface for file compression and decompression.
- • Optimize the compression process to achieve maximum efficiency.
- Perform comprehensive testing to ensure the reliability and accuracy of the com- pression and decompression processes.

1.5 Application

- File Zip and unzip
- Facebook Lite

Chapter 2

Design/Development/Implementation of the Project

2.1 Introduction

File compression is a fundamental aspect of data management and transmission. The reduction of file sizes not only optimizes storage but also facilitates faster data transfer over networks. One of the widely used compression algorithms is the Huffman algo- rithm, which is known for its efficiency in achieving lossless compression.

Huffman Compression:

The compression process involves the following steps:

- **Frequency Analysis:** Calculate the frequency of each character in the input file.
- **Priority Queue:** Build a priority queue of nodes, where each node represents a character and its frequency.
- **Huffman Tree:** Build a Huffman tree based on the priority queue..
- Replace characters in the original file with their corresponding Huffman codes.

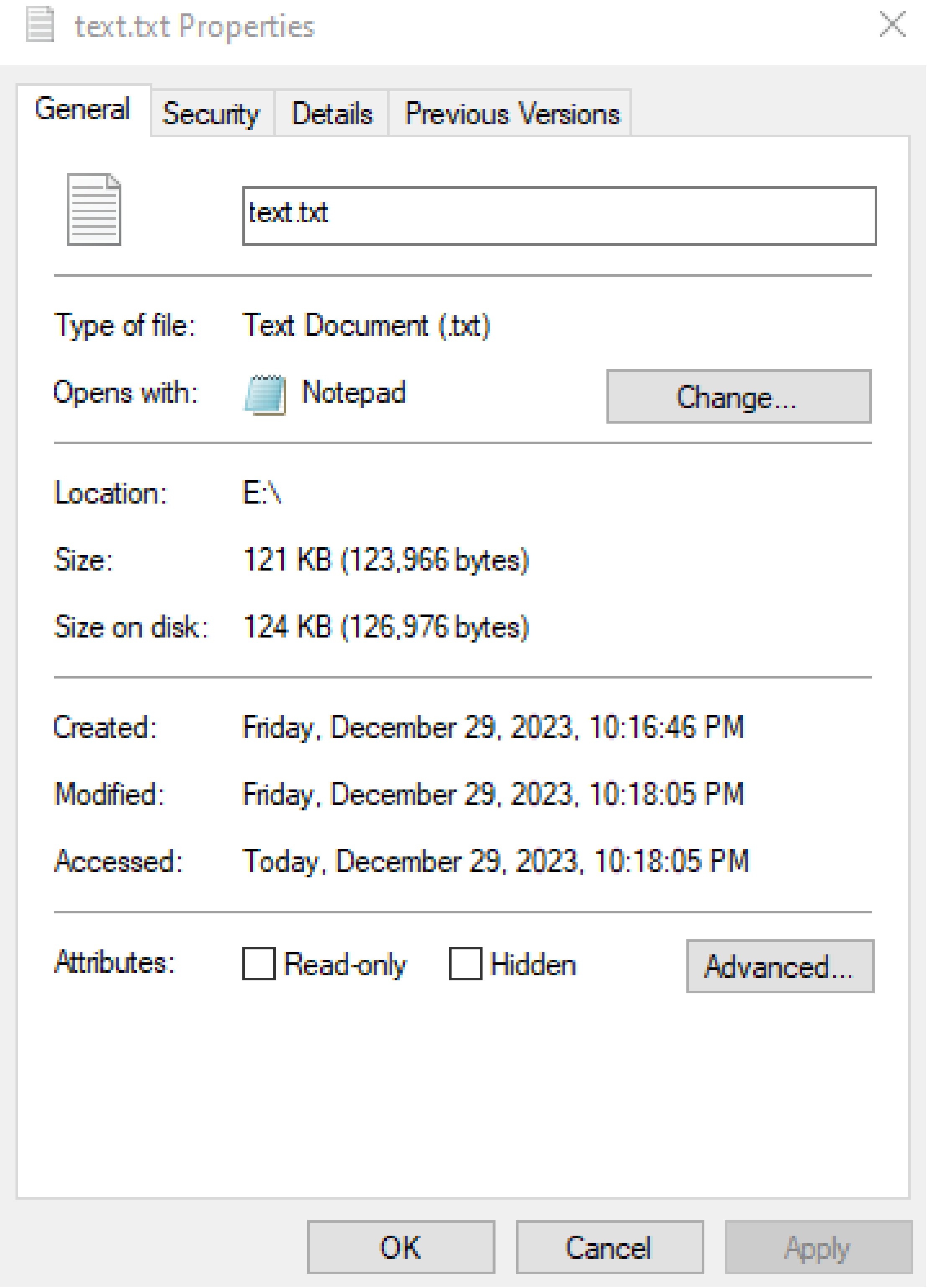
Huffman Decompression:

The decompression process involves the following steps:

- **Huffman Tree Reconstruction:** Rebuild the Huffman tree from the compressed file.
- **Decode File:** Traverse the tree to decode the compressed file and reconstruct the original file.

2.2 Implementation

Here is a Source text file named "text.txt" and destination file named "compress.txt". If no compress.txt is present in our local drive FileOutPutStream automatically created this file.



text.txt

Type of file: Text Document (.txt)

Opens with: Notepad

Location: E:\

Size: 121 KB (123,966 bytes)

Size on disk: 124 KB (126,976 bytes)

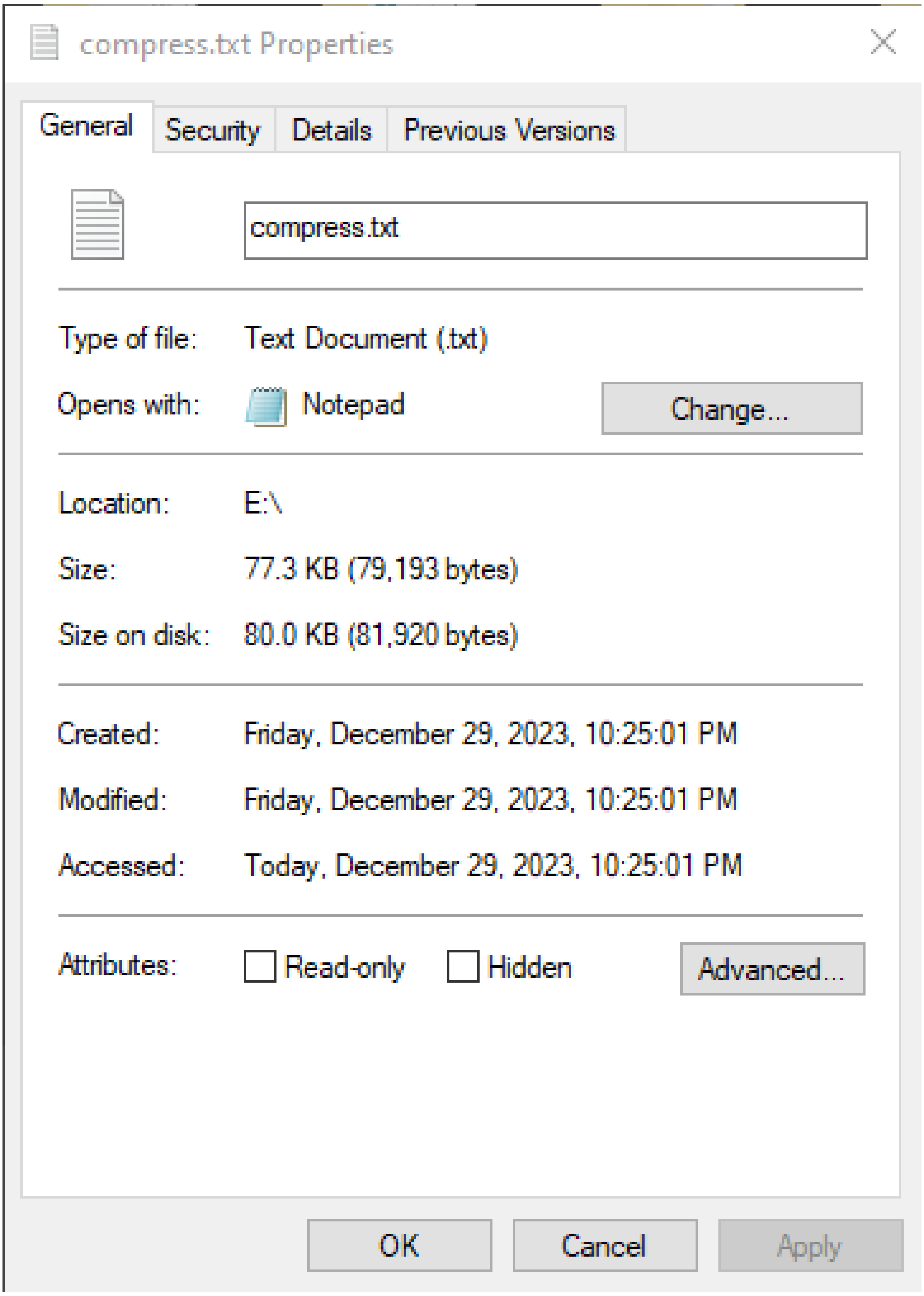
Created: Friday, December 29, 2023, 10:16:46 PM

Modified: Friday, December 29, 2023, 10:18:05 PM

Accessed: Today, December 29, 2023, 10:18:05 PM

Attributes: □ Read-only □ Hidden

figure: This is text.txt file before Compress with size 121KB.



compress.txt Properties

compress.txt

Type of file: Text Document (.txt)

Opens with: Notepad

Location: E:\

Size: 77.3 KB (79,193 bytes)

Size on disk: 80.0 KB (81,920 bytes)

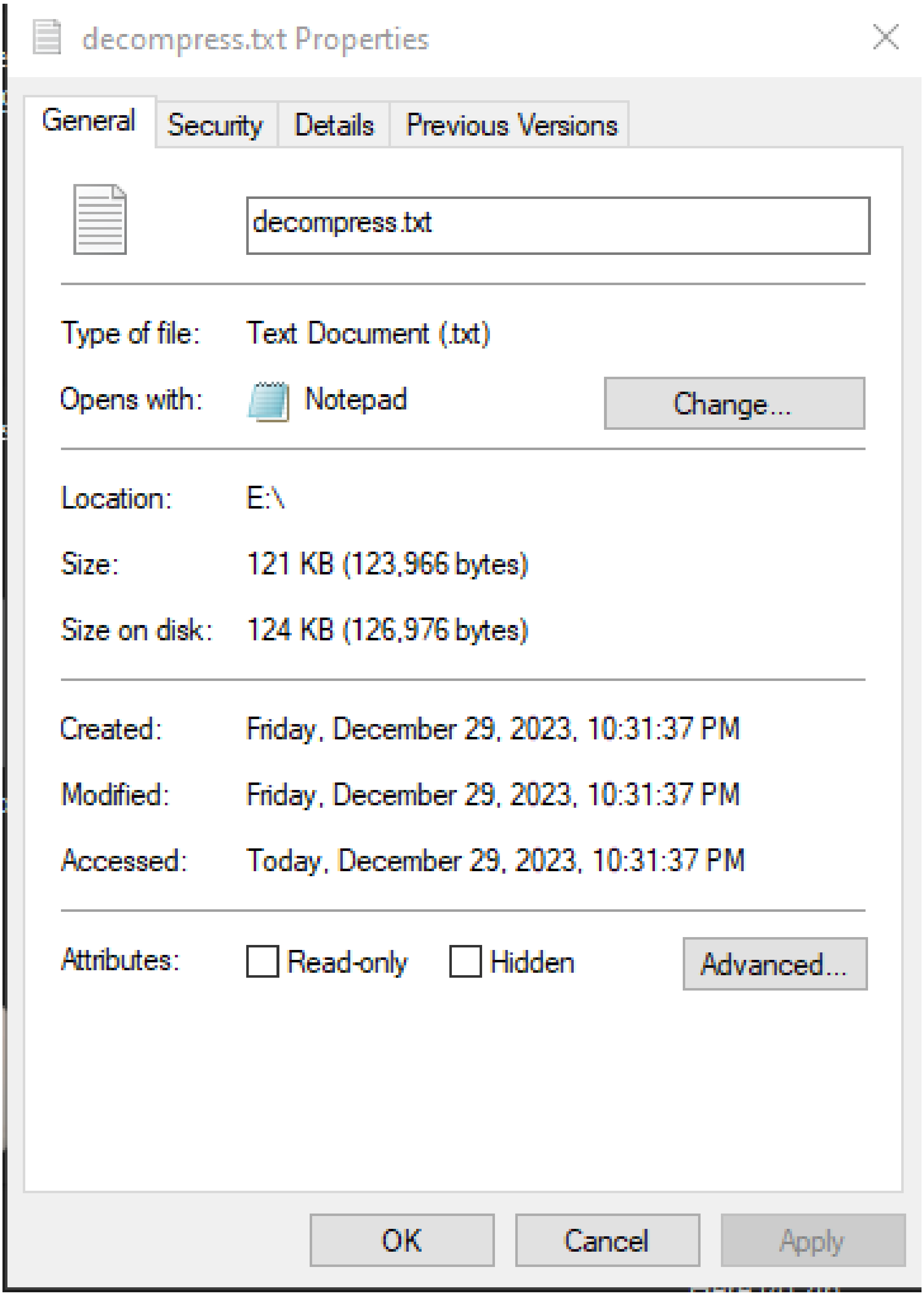
Created: Friday, December 29, 2023, 10:25:01 PM

Modified: Friday, December 29, 2023, 10:25:01 PM

Accessed: Today, December 29, 2023, 10:25:01 PM

Attributes: □ Read-only □ Hidden

figure: This is compress.txt file After Compress with size 77.3KB.



decompress.txt Properties

decompress.txt

Type of file: Text Document (.txt)

Opens with: Notepad

Location: E:\

Size: 121 KB (123,966 bytes)

Size on disk: 124 KB (126,976 bytes)

Created: Friday, December 29, 2023, 10:31:37 PM

Modified: Friday, December 29, 2023, 10:31:37 PM

Accessed: Today, December 29, 2023, 10:31:37 PM

Attributes: □ Read-only □ Hidden

figure: This is decompress.txt file After decompress with its original size 121KB.

Chapter 3

Conclusion

3.1 Discussion

Huffman algorithm provides an effective method for file compression while maintaining lossless data integrity. This project demonstrates the practical implementation of Huffman compression and decompression in Java, offering a valuable tool for data optimization and efficient file management.

3.1.1 Future Directions

To build upon the achievements and address the challenges identified, the following avenues for future development are recommended:

- Integration with a graphical user interface (GUI) for a more user-friendly experi- ence
- Performance optimizations for handling larger files.
- Support for parallel processing to improve compression and decompression speeds.

3.1.2 Reference

- Youtube