



Green University of Bangladesh

*Department of Computer Science and Engineering (CSE)
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Data Integrity and Efficiency Framework

*Course Title: Data Communication Lab
Course Code: CSE- 308
Section: 212-D3*

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

<u>Lab Project Status</u>	
Marks:	Signature:
Comments:	Date:

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Chapter 1

Introduction

1.1 Overview

The "Data Integrity and Efficiency" framework employs bit and character stuffing/destuffing techniques in conjunction with Hamming distance parity checks to improve the dependability and efficacy of data communication. This all-inclusive structure guarantees precise data transfer, reducing mistakes and maximizing effectiveness across several communication channels.

1.2 Motivation

The project is driven by the urgent need for communication systems to have reliable data integrity. Data transmission mistakes can have serious repercussions in a number of areas, including information technology and telecommunications. Through a mix of Hamming distance parity checks and stuffing/destuffing processes, the project aims to address these issues and create a solid and dependable basis for secure data sharing.

1.3 Problem Definition

1.3.1 Problem Statement

Data corruption, noise, and interference are among the mistakes that can occur during data transmission over networks or channels. The following major issues are addressed by the project:

Data Integrity: ensuring, in the face of faults and noise, the completeness and accuracy of data delivered.

Efficiency: maximizing the effectiveness of data transfer by cutting costs and guaranteeing prompt and dependable communication.

Error Detection and Correction: identifying and, if practical, fixing mistakes that were created during the data transfer process in order to preserve data integrity.

1.3.2 Complex Engineering Problem

Table 1.1: Summary of the attributes touched by the mentioned projects

Name of the P Attributes	Explain how to address
P1: Depth of knowledge required	to know the algorithm of bit/character stuffing/destuffing, Hamming code and parrity check
P2: Range of conflicting requirements	Balancing conflicting requirements are easy to use and user experience.
P3: Depth of analysis required	Need to required data security algorithms
P4: Familiarity of issues	data conversion
P5: Extent of applicable codes	Ensuring this application communicate right modeling.
P6: Extent of stakeholder involvement and conflicting requirements	Stakeholders' diverse needs, including user-friendly and security, must be considered.
P7: Interdependence	Need to convert various type of data

1.4 Design Goals/Objectives

The "Data Integrity and Efficiency" framework's main objective is to build a reliable and adaptable system that guarantees the safe and effective transfer of data in the face of any mistakes and difficulties related to communication channels. By combining bit and character stuffing/destuffing techniques with Hamming distance parity tests, the design focuses on offering complete solutions for data integrity and efficiency.

1.5 Application

The "Data Integrity and Efficiency" framework finds applications in diverse domains:

1. Telecommunications: Improving the reliability of data transmission in telecommunication networks, reducing errors in voice and data communication.
2. Network Communication: Enhancing the efficiency and accuracy of data exchange in computer networks and internet communication.
3. Embedded Systems: Implementing robust data integrity measures in embedded systems for critical applications such as automotive communication, industrial automation, and IoT devices.
4. File Transfer Protocols: Integrating the framework into file transfer protocols to ensure the secure and error-free exchange of files and documents.
5. Healthcare Systems: Securing the transmission of sensitive health data to ensure patient records remain accurate and untampered.
6. Financial Transactions: Ensuring the integrity of financial data during transactions, preventing errors that could lead to financial discrepancies.

Chapter 2

Design/Development/Implementation of the Project

2.1 Introduction

Start the section with a general discussion of the project [1] [2] [3].

2.2 Project Details

In this section, you will elaborate on all the details of your project, using subsections if necessary.

2.2.1 Subsection_name



Figure 2.1: Figure name

You can fix the height, width, position, etc., of the figure accordingly.

2.3 Implementation

All the implementation details of your project should be included in this section, along with many subsections.

2.3.1 Subsection_name

This is just a sample subsection. Subsections should be written in detail. Subsections may include the following, in addition to others from your own project.

The workflow

Tools and libraries

Implementation details (with screenshots and programming codes)

Each subsection may also include subsubsections.

2.4 Algorithms

The algorithms and the programming codes in detail should be included . Pseudo-codes are also encouraged very much to be included in this chapter for your project.

- Bullet points can also be included anywhere in this project report.

Algorithm 1: Sample Algorithm

Input: Your Input

Output: Your output

Data: Testing set x

```
1  $\sum_{i=1}^{\infty} := 0$  // this is a comment
  /* Now this is an if...else conditional loop */
2 if Condition 1 then
3   | Do something // this is another comment
4   | if sub-Condition then
5   | | Do a lot
6 else if Condition 2 then
7   | Do Otherwise
  /* Now this is a for loop */
8   | for sequence do
9   | | loop instructions
10 else
11 | Do the rest
  /* Now this is a While loop */
12 while Condition do
13 | Do something
```

Chapter 3

Performance Evaluation

3.1 Simulation Environment/ Simulation Procedure

Discuss the experimental setup and environment installation needed for the simulation of your outcomes.

3.1.1 Subsection

3.1.2 Subsection

3.2 Results Analysis/Testing

Discussion about your various results should be included in this chapter in detail.

3.2.1 Result_portion_1

The results of any specific part of your project can be included using subsections.

3.2.2 Result_portion_2

Each result must include screenshots from your project. In addition to screenshots, graphs should be added accordingly to your project.

3.2.3 Result_portion_3

Each result must have a single paragraph describing your result screenshots or graphs or others. This is a simple discussion of that particular portion/part of your result.

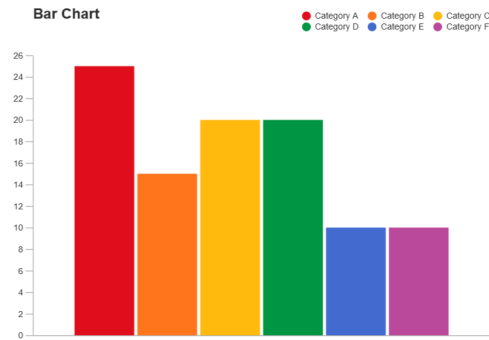


Figure 3.1: A graphical result of your project

3.3 Results Overall Discussion

A general discussion about how your result has arrived should be included in this chapter. Where the problems detected from your results should be included as well.

3.3.1 Complex Engineering Problem Discussion

[OPTIONAL] In this subsection, if you want, you can discuss in details the attributes that have been touched by your project problem in details. This has already been mentioned in the Table ??.

Chapter 4

Conclusion

4.1 Discussion

Discuss the contents of this chapter and summarized the description of the work and the results and observation. Generally, it should be in one paragraph.

4.2 Limitations

Discuss the limitations of the project. Limitations must be discussed, with the help of some critical analysis.

4.3 Scope of Future Work

Discuss the future work of the project, that is your plans for more work and extension of your project.

References

- [1] Uthayasankar Sivarajah, Muhammad Mustafa Kamal, Zahir Irani, and Vishanth Weerakkody. Critical analysis of big data challenges and analytical methods. *Journal of Business Research*, 70:263–286, 2017.
- [2] Douglas Laney. 3d data management: controlling data volume, velocity and variety. gartner, 2001.
- [3] MS Windows NT kernel description. <http://web.archive.org/web/20080207010024/http://www.808multimedia.com/winnt/kernel.htm>. Accessed Date: 2010-09-30.