URL Shortener Web Application – Project Report

1. Introduction

A URL Shortener Web Application is a practical tool that converts long and complex URLs into short, manageable links.

This project was developed to understand full-stack web development concepts using Flask and database ORM.

The application allows users to shorten URLs, store them, and view previously shortened links.

2. Problem Statement

Long URLs are difficult to share and manage. Copying long links can be inconvenient and error-prone.

The goal of this project is to build a web application that generates short URLs while maintaining a record of original URLs.

3. Objectives

• Shorten long URLs

• Store URLs using a database

• Validate URLs before shortening

• Display URL history

• Provide easy copy functionality

4. Technologies Used

Frontend: HTML, CSS, Bootstrap

Backend: Python Flask

Database: SQLite with Flask-SQLAlchemy ORM

5. System Architecture

The system follows a client-server architecture. The frontend interacts with Flask routes, which handle logic and database operations using ORM.

6. Project Workflow

1. User enters URL

2. URL validation is performed

3. Short URL is generated

4. Data is stored in database

5. Short URL is displayed and can be copied

7. Database Design

The database contains a table with fields for ID, original URL, and shortened URL.

Flask-SQLAlchemy ORM is used for database interaction.

8. Validation & Testing

Validators library is used to ensure valid URLs.

Various test cases including valid and invalid URLs were tested successfully.

9. Challenges Faced

• Dependency installation issues

• URL validation handling

• Database integration errors

10. Learning Outcomes

• Flask routing and request handling

• ORM-based database management

• Frontend-backend integration

• Debugging real-world issues

11. Conclusion

The URL Shortener Web Application meets all project objectives.

It demonstrates practical usage of Flask, ORM, and frontend technologies.

This project improved understanding of full-stack development and real-world application design.