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Review on: Smart URL Shortener

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Abstract - In this paper, we discuss the need for URL shortening when using and sharing links on various platforms. URLs are often long and unattractive, especially on social media. Long URLs can take up character space, increase costs, and look outdated or spammy to users. To solve this, we propose a URL shortening service that converts a long web address into a shorter, more manageable link. This shortened link won't break when shared across platforms, and it's more appealing, specific, and easy to track.

Our service also includes features like generating a QR code for the link, tracking the number of visitors, supporting custom slugs, allowing link editing, ensuring the shortened link doesn't expire, only accepting HTTPS URLs, and providing the service for free.

Keywords: *URL shortening, URL sharing, QR code generation, URL management, Link tracking, URL customization, HTTPS URLs.*

INTRODUCTION

In the digital age, the sharing of links has become an integral part of communication, content distribution, and online marketing. However, long and complex URLs often present challenges for users and businesses alike. These lengthy URLs are cumbersome, unattractive, and may even reduce user engagement due to their unappealing appearance, especially when shared on social media platforms with limited character counts. Moreover, long URLs can consume valuable space in posts, emails, and text messages, and are sometimes perceived as spammy or untrustworthy by end-users.

URL shortening is a technique that addresses these challenges by converting long and complicated web addresses into shorter, more manageable forms. A URL shortener service creates concise, custom URLs that are easier to share, remember, and track. Shortened URLs are often more visually appealing, which can improve user engagement, especially in platforms with stringent character limits like. Twitter. They also offer additional features, such as tracking the number of clicks, monitoring user behavior, and providing analytics for businesses and digital marketers.

This paper focuses on developing a URL shortening service that not only shortens long URLs but also provides valuable features like QR code generation, unique slug creation, and editable links. Additionally, it ensures that the shortened URLs remain functional across various platforms without breaking or becoming outdated. The service also emphasizes security by accepting only HTTPS URLs and guarantees that shortened links do not expire, making them reliable for long-term use.

With a user-friendly, free-of-cost solution, this URL shortener aims to simplify the process of link sharing while offering essential tracking and customization options, helping both individuals and organizations streamline their digital communication and marketing strategies. In addition, our service will offer advanced features like custom expiration dates, detailed visitor tracking, real-time analytics, and seamless integration with multiple platforms. This will give users, including businesses, more control over their link sharing and online presence. By making it easy to create, track, and share links, this URL shortener project aims to enhance digital communication, improve online marketing, and offer a better web experience for users world wide. By empowering users with the tools to create, track, and share links more efficiently, this URL shortener project will contribute to improving digital communications, enhancing online marketing efforts, and providing a more streamlined web experience for users across the globe.

In the rapidly evolving landscape of digital communication, link sharing has become fundamental to how we connect, share content, and market online. As businesses and individuals strive to maximize their reach and engagement, the need for concise, reliable, and trackable URLs has become more critical than ever. Lengthy and complex URLs are not only difficult to share but can also detract from a user's experience, reducing the appeal and accessibility of shared content, particularly on platforms with strict character limits. To address these challenges, URL shortening has emerged as a valuable tool, streamlining the sharing process and adding functionality that benefits both casual users and businesses alike.

This paper seeks to go beyond simple URL shortening by creating an advanced, feature-rich service that empowers users with customization, tracking, and security options—delivering an optimized solution that makes sharing links effortless, efficient, and effective across all digital channels. Our URL shortener is designed to adapt to the needs of modern digital users, Through this service, we aim to enhance digital connectivity and provide foundation for smoother, more meaningful online interactions and marketing strategies.

LITERATURE SURVEY

[1] Aeesha Sdeek Shaheen, Najla Matti Issac (2022). [1] Journal of Global Scientific Research in Information Technology. In this survey PAPER review they describes the methodology of URL shortener and working of this. and explains the URL functionality with creating and redirecting working and Shows analytical tracking. URL helps visitors to find the site and Google knows the website's pages. One of The URL parts of HTTPS (Hypertext Transfer Protocol Secure) is to encrypt any information entered on the page, like passwords, and credit card information, to protect website visitors and the site rank better on Google. In this paper They shows the feature of analytical tracking for privacy purpose. The authors may discuss the importance of URL shorteners in improving user experience and engagement across digital platforms by making URLs more shareable, visually appealing, and easy to track. Additionally, the paper may cover technical aspects of URL shortening, such as methods to ensure shortened links are reliable, secure, and adaptable for various use cases.

[2] Rohit Sankhala, Manan Kharbanda, Ankit Yadav, Pardeep Suthar, Parampreet Kaur (2022). [2] International Journal Of Creative Research Thoughts (IJCRT). In this paper, they shown the importance of URL shortening at the time of sharing on various platforms. shorter URL that will not break when share on different platforms and make them more manageable by using flask framework base62 algorithm. In this paper, they also provided a way that helps during digital marketing, social campaigning, and posting by giving the stats of the number of clicks made to the shortened URL as it shows the number of people interested in clicking the URL.

[3] Chung, J., & Kim, S. (2021). [3] Journal of Information Processing Systems, 17(3), 678–685. The reference provided is a citation for a research paper by Chung and Kim titled "Scalable architecture for URL shortening with high availability and low latency," published in the Journal of Information Processing Systems in 2021. This paper, found in volume 17, issue 3, pages 678–685, likely discusses the technical architecture required for a URL shortening service to be both scalable and efficient. The authors focus on creating a system that ensures high availability (always accessible) and low latency (fast response times), which are essential characteristics for handling a large number of URL shortening requests quickly and reliably. In the context of URL shortening services, such a scalable architecture might involve database management strategies, load balancing, and efficient handling of read/write operations to support millions of users without compromising speed or stability.

PROBLEM STATEMENT

“This paper aims to address issues by developing a URL shortener that simplifies link management while offering enhanced features such as analytics and customization. The main issues with long URLs are their unwieldiness, difficulty in sharing, and susceptibility to errors when typed manually”. Additionally, the lack of tracking, customization, and management features in existing URL systems hinders users from fully leveraging the power of URL management in marketing, analytics, and user engagement.

METHODOLOGY

1. **1. Requirements Analysis**
2.

Define Core Requirements: Outline the essential functionalities like URL shortening, redirection, and storage. Define additional features such as analytics, custom short links, user accounts, and API access.
Identify Non-functional Requirements: Consider performance (speed of redirection), scalability (ability to handle millions of URLs), security (protection against malicious use), and usability (easy-to-use interface).

2. System Architecture Design

URL Encoding and Hashing Mechanism: Decide on a unique ID generation method for each URL, which could be hashing or Unique ID or Base62 encoding to create short links. Ensure it is collision-resistant and efficient.
Database Design: Design the schema for storing long URLs, short codes, user data (if applicable), and analytics data. Choose a database solution (e.g., SQL for structured storage or NoSQL for high scalability). Consider caching frequently accessed links to reduce database load.
Redirection Logic: Implement a URL redirection service that maps each shortened URL to its original URL and performs HTTP 301 or 302 redirection. By using its ID. Consider latency reduction methods like caching or CDNs for faster redirects

3. Frontend Development

User Interface: Create a simple, user-friendly interface for shortening URLs and managing shortened links. Users should be able to view shortened links, access analytics (if available), and delete or edit links if logged in.(React JS)
Custom Link Feature: Provide an option for users to create custom short URLs (e.g., yourdomain.com/custom-name) if specified in the requirements.(Unique Slug).
Mobile Responsiveness: Ensure the frontend is responsive and optimized for different screen sizes.

4. Backend Development

I Development: Develop APIs for core functionalities:
POST /shorten: To shorten a given URL and generate a short link.
GET /{short_code}: To retrieve and redirect to the original URL.
Optional APIs for analytics, user management, and custom URL creation.

Database Integration: Integrate the backend with the chosen database, implementing necessary CRUD operations for URLs and analytics.

Implement Analytics Tracking: If analytics are required, set up tracking of link clicks, geolocation, browser type, and referrer. Store these data points to generate insights and reports for users.

Security Measures: Implement security features like input validation to prevent injection attacks, rate limiting to avoid abuse, and a malicious URL scanner to prevent phishing.

ALGORITHMS

Hashing (MD5 or SHA) : MD5 or SHA algorithms create a fixed-size hash of the original URL. This hash is then truncated to a shorter length and encoded to form shorten URL.

Bcrypt: For storing user's sensitive data we use an encryption by using bcrypt library.

Direct Mapping: URL Shortener stores the original URLs in key-value database. When a user accesses the shortened URL, the system retrieves the original URL based on the unique identifier and performs a 301 redirect to it.

Caching (Redis): To improve efficiency, popular or frequently accessed shortened URLs stored in memory caches like Redis or Memcached.

SYSTEM ARCHITECTURE

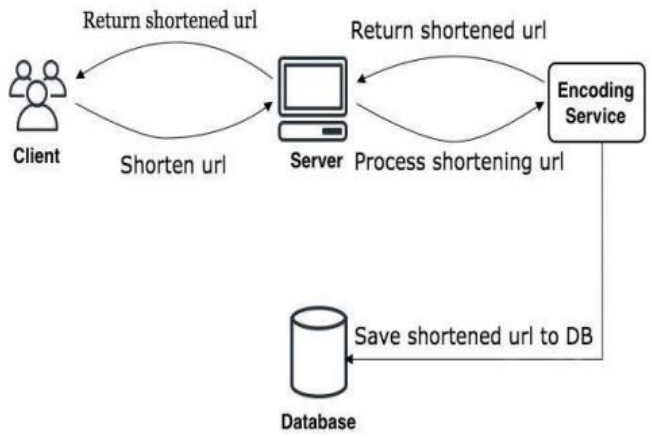

Fig -1: System Workflow diagram

A URL shortening service converts a long URL into a shorter one and stores both versions in a database. When someone clicks the shortened URL, the service retrieves the original long URL from the database and redirects the user to that web address, often with added analytics to track the URL usage.

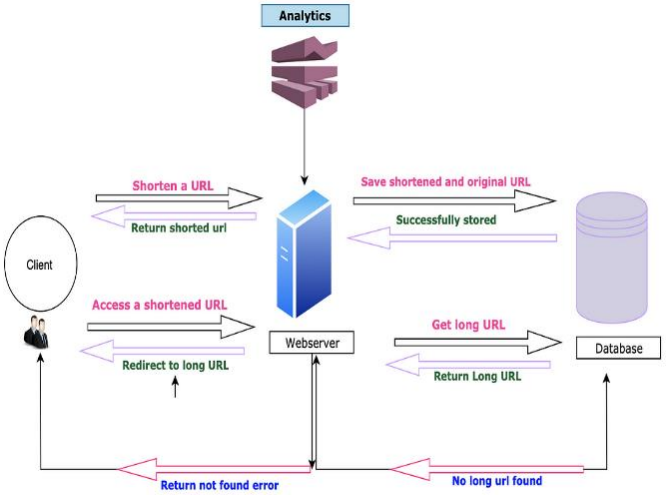

Fig -2: System Architecture

A URL shortening service works by taking a long URL and generating a shorter version, which is stored in a database along with the original URL. When someone accesses the shortened URL, the service retrieves the corresponding long URL from the database and redirects the user to the original website. This process is often accompanied by analytics to track the usage of the shortened URL.

CONCLUSIONS

This paper presents The URL shortener project met its objectives, delivering a functional and user-centric tool that simplifies link sharing and provides valuable analytics. The implementation of key features has enhanced user experience and offered insights into link performance, contributing to better decision-making and marketing strategies. Moving forward, the focus will be on refining the application based on user feedback and exploring new features to further improve its utility and effectiveness.

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