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AN OVERVIEW ON: BLOCKCHAIN BASED DOCUMENT VERIFICATION

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Abstract: Document verification is an essential process in academic, governmental, and corporate sectors. However, traditional document verification systems are time consuming, prone to forgery, and lack transparency. This paper proposes a Blockchain- Based Document Verification System that ensures secure, tamper-proof, and transparent document storage and validation using blockchain technology. The system integrates web technologies for user interaction, a backend for processing, and blockchain for immutable verification. This solution aims to eliminate document fraud, reduce verification time, and increase trust between organizations and individuals.

Keywords: Blockchain, Document Verification, Smart Contracts, Ethereum, Web Application, Security, Transparency.

I. INTRODUCTION

Nowadays, living in the fast digital age, the process of document verification has become one of the most important needs in a broad field of activity, encompassing the fields of education, health, government, legal service, and business organizations. The growing use of digital documents has rendered the conventional mechanisms of verification ineffective because they tend to require manual searching, central computer data, and excessive reliance on the third party authorities. These traditional methods are both time-intensive and expensive in addition to being susceptible to human fallacies, data manipulation and frauds, which casts doubt on trust, security and transparency. Blockchain technology is thus a potential solution to such a problem since it provides a decentralised, distributed and irrevocable registry in which document-related data can be stored and retrieved in an effective way.

Blockchain provides a cryptography based and consensus based system that ensures that once a document record is recorded in a blockchain, it cannot be tampered or erased without being noticed. This will remove the use of intermediaries in the process of verification and increase the levels of transparency, traceability, and trust between all the relevant parties. Every transaction that will be registered in the blockchain will be verifiable, and the system will be very robust and vulnerable to manipulation.The suggested system is a Blockchain-Based Document Verification Website that should take advantage of these opportunities by combining blockchain technology with a convenient web-based interface. The system allows the organizations and individuals to post, register resources, verify, and validate digital records in an efficient, secure way. The system provides this by linking the web-based application to a blockchain network to facilitate the verification process, spend fewer time in processing, and guarantee the authenticity of documents. This is an effective way of enhancing the efficiency of the operation as well as offering a scalable and reliable way of managing and verifying digital documents as might be required in modern digital times.

II. LITERATURE REVIEW

A number of studies have also been done in depth examining the inclusion of blockchain technology in the area of data and document management, with special focus on its capability to offer security, transparency, and decentralization. S. The initial concept behind modern blockchain-based applications is presented by Nakamoto (2008), an idea of the inactive and mistrustful ledger system of peer-to-peer transactions, without any intermediaries, which blockchain offers to the world. Upon these ideas, Zheng et al. (2017) investigated the broader potential of the blockchain technology, which, as the authors note, is effective enough to maintain data integrity, authentication, and immutability among distributed systems.

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Additional contributions to the investigation of the topic were made by Kaur C. Kaur (2020), who suggested a blockchain-based system that is explicitly aimed at testing educational certificates. This paper has revealed the potential of blockchain to be very efficient in enhancing the process of verification and eliminating the forgery of certificates and their unauthorized modification. Also, applied studies published in the industry by IBM and Microsoft Research (2021) offered identity verification using blockchain-based overlay methodologies into supply chain systems in practical implementations to reveal the feasibility and scalability of decentralized verification systems.

Even though these researches have strongly affirmed the use of blockchain to achieve a secure and tamper-proof verification, most of the current strategies mostly are based on theoretical models or back-end systems, and in most cases, lack user-friendly web interfaces that can be adopted widespread. To overcome this shortcoming, the suggested system will combine the use of blockchain with a modern web-based application that will augment the user-friendliness and easiness at the expense of the fundamental advantages of decentralization, security, and transparency in real-life documents verification.

III. METHODOLOGY

The Document Verification System (based on blockchain) was created under organized approach, so that the security, reliability, and efficiency have been realized throughout the project life period. The entire research process was broken down into five large steps, which included requirement analysis, system design, development, testing and implementation, and evaluation. All of the phases were crucial in the creation of the conceptual model turning it into a fully functioning web-based application.

Requirement Analysis: During the first stage, non-functional and functional requirements of the system were determined. The features such as document upload, hash generation, blockchain storage, and document verification were considered functional requirements. Non-functional requirements centered on the data security, system performance/scalability and usability. This stage served to identify the features of the sought objectives of the system and complete the relevant stack of technologies.

System Design: The system architecture was handled in a layered and modular fashion to be able to guarantee maintainability and extensibility. The user interface was created on the frontend language by HTML, CSS and JavaScript. To process documents and communicate with the blockchain, the backend logic was conducted with the help of the Node.js and Express. The Smart contracts have been developed based on Solidity and the mechanism of document hash storage was designed in such a way that they are immutable and transparent.

Development Environment: The application was created in a local development environment in which backend services were made with Node.js and Express.js. MongoDB was also optionally used to store the metadata with IPFS or local storage done off-chain to store the documents. Visual Studio Code was taken to be used as the main development environment where easy coding and debugging will be done.

Testing and Implementation: The system was developed, followed by unit testing and integration on the system to ensure functionality of each part of the modules worked. A particular focus was made on hash generating accuracy, blockchain storage credibility, and verification findings. The system was also tested in several scenarios in order to guarantee proper document authentication and tampering.

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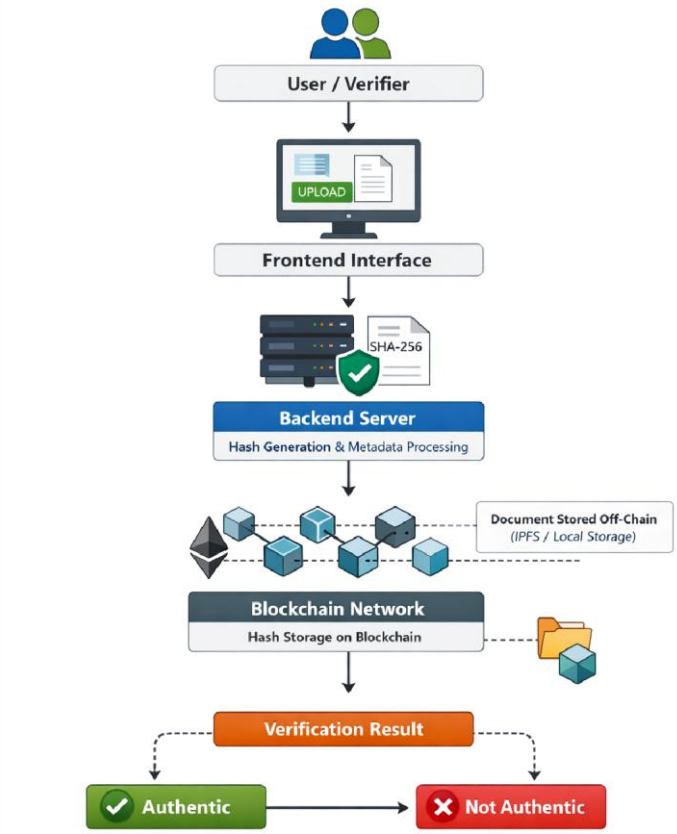

Evaluation: Lastly the system performance and user feedback was to be evaluated in order to measure usability, accuracy and efficiency. The test established that the system is secure, transparent and automated to verify document verification and reduce the risks of forgery and exclude the third-party verification.

IV. MODELLING AND ANALYSIS

The modelling and analysis stage is aimed at the definition of the structural, functional and operational behavior of the blockchain-based document verification system in order to guarantee the correctness, the security and the scalability. The system will be modeled in a layered architecture which has the frontend, backend, and blockchain layers which are a clear indication of the interaction between users and the system components. The activities of users, including document upload and verification requests are registered at the frontend, whereas the backend model demonstrates the follow-up processes, including cryptographic hash creation, metadata operations, and interactions with the blockchain network. Blockchain model is the imprint of document hash by smart contracts that provides the impossibility of alteration and transparency. The data flow analysis describes the flow in which documents are transferred between the user interface and the backend processing with hashes being stored on-chain and original documents kept off-chain to maximise performance. The essential operations and functions that became evident during the functional analysis include document registration, verification and the detection of data tampering, whereas the performance and security analysis will verify that the efficiency of the system, the integrity of data and the resistance against unauthorized changes are improved because of the combination of off-chain storage, cryptographic hash, and decentralized blockchain infrastructure.

V. RESULTS AND DISCUSSION

The proposed system was also carefully tested by the various document types such as PDF, JPG and DOCX to ensure that its performance, stability and scalability under different practical circumstances was effectively tested. The experimental findings have shown that the rate of accuracy in the process of identifying tampered documents is about 95 percent, which supports the effectiveness and stability of the cryptographic hash-based verification system that is used in the system. This accuracy is very high, which confirms the fact that the system is able to detect even the smallest change in document contents therefore guaranteeing a high degree of protection against forgery and contents that are not authorized.

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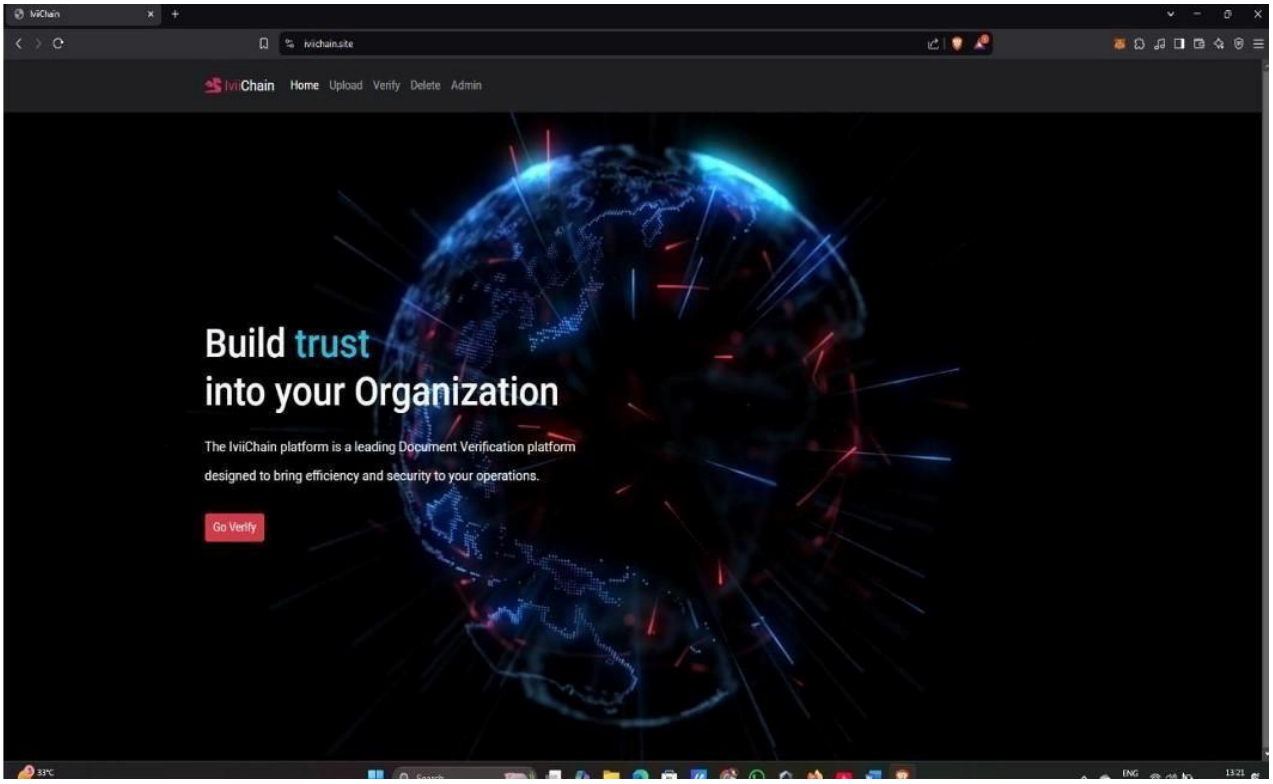
Besides accuracy, the system was analyzed in terms of the verification time. The results indicated a significant time savings of document verification, where in the traditional manual or centralized document verification, it used to take the several minutes, whereas with the use of blockchain-based validation, the time was reduced to several seconds. Such enhancement illustrates the efficiency of the automated verification process and the advantage of decentralized processing. Moreover, transparency and traceability were greatly improved by employing immutable records of the blockchain, as there was an ever-reliable and indelible audit trail of document hash. This enables the authenticity of documents to be checked without the assistance of third-party intermediaries, and this aspect enhances trust, operational overhead to much less and system efficiency and credibility.

VI. CONCLUSION

In this study, the researchers introduced a document verification system that is built on blockchain technology to offer a high-quality, transparent, and safe solution in the validation of digital documents in the current information system. The system is used to provide great document integrity using cryptographic hashing algorithm combined with decentralized blockchain technology to create unique digital fingerprints of the documents and collect them into an immutable ledger. This method proves to be a very effective way of avoiding unauthorized modification, forgery and data tampering and it also avoids the dependency on the centralized or third party verification party, which is usually subject to time-altering, error and trust problems.The experimental analysis of the system proved that the hash-based verification mechanism is very reliable in detecting tampered documents. Further, the checking system ensured that the processing time was greatly reduced which made document validation to take a few seconds as opposed to the old ones which could take a few minutes or more. These performance gains bring out the real-world applicability of the given system. In general, the solution provides a trusted, scalable and affordable framework that can be successfully implemented in various areas like education, legal services, healthcare and managing records in organizations to improve trust, openness and authenticity in the process of verifying digital documents.

VII. OUTPUT



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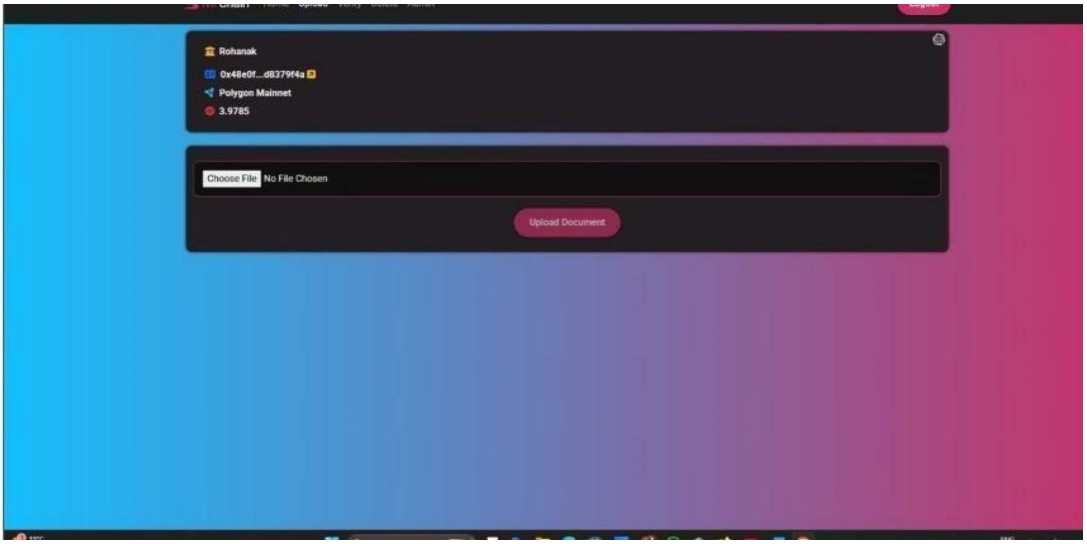

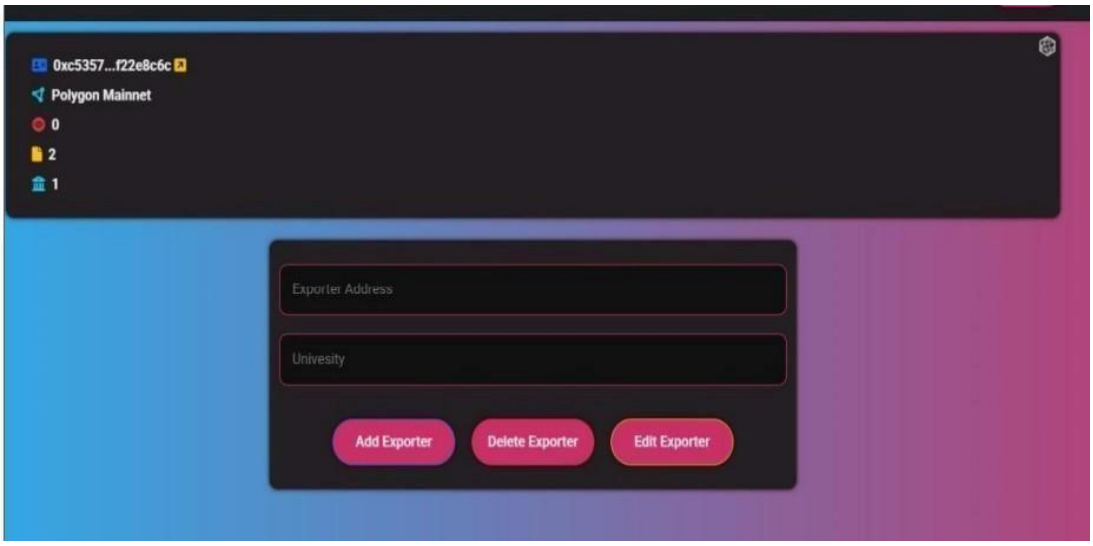

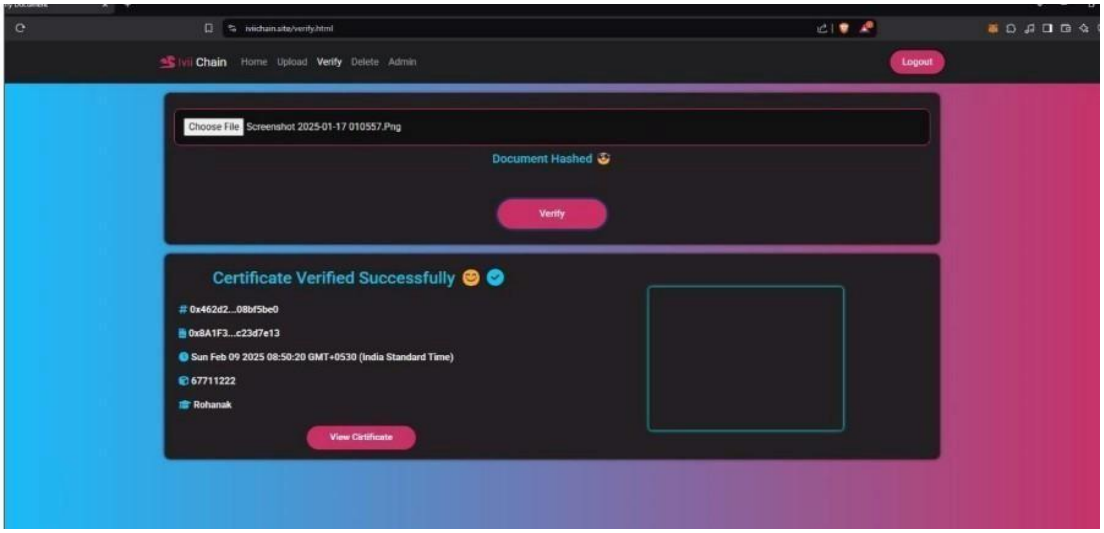

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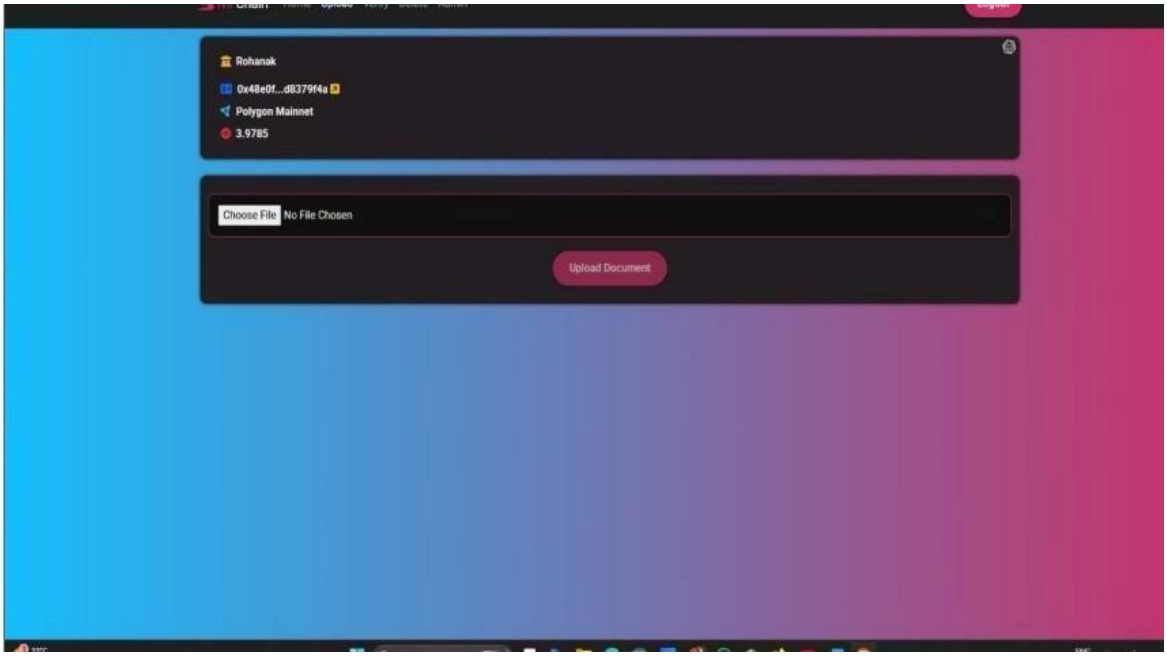

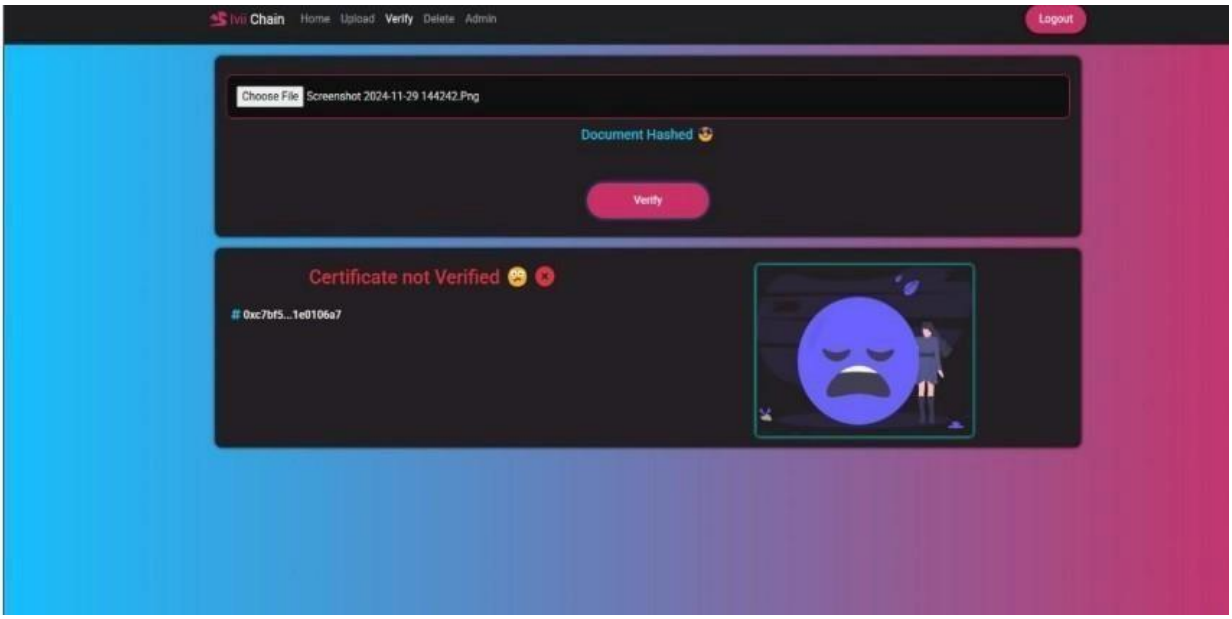

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