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DIGITAL DOCUMENT SECURITY AND AUTHENTICITY: RECONNAISSANCE

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Abstract: In our country almost all kinds of educational certificates and government documents and certificates are issued in the physical paper form of documents. The security of documents is very important in any circumstances, as everything depends upon the authenticity and validity of the documents or certificates on the internet based platforms. The documents such as the statement of marks, certificates, licenses, authority letters and any kind of documents which has some importance in its lifecycle, therefore the security of the documents on an online platform is very crucial for its genuineness. Presently, there are various technologies available for ensuring security and authenticity of the digital documents and certificates such as cryptography, digital signatures with the online platform based on centralised server technologies. This paper discusses the concept of digital document management system for digital document storage and also presents a survey/comparative analysis on digital document management\\systems along with their application areas and functionalities, features, limitations and security aspects. It is proposed that there is a need to design a Blockchain technology based framework for the Digital Document Management System for educational documents and certificates storage and authentication.

Index Terms - Digital documents security, digital document management, cryptography, online document storage, Blockchain Technology.

I. INTRODUCTION:

In our country almost all the government issued documents are in physical paper form. Public key and private key cryptography, digital signatures are the existing technologies for providing security for digital documents storage. According to the Association for Intelligent Information Storage, document storage software "incorporates document and content capture, workflow, document repositories, output systems and information retrieval systems. Also, the processes used to track, store and control documents."

Now in the edge of digitalisation the technologies like digital document management empowers citizens of the country, which facilitate citizens to store their critical documents in a safe and secure environment. The documents encompass educational mark sheets, migration certificates, residential proofs, medical records, birth certificates, driving license, and much more. Digital document management system establishes a communication protocol for the government officials and allows them to access documents without having to see the hard copies of each document.

An online document storage system is used to capture, track and store e-documents such as word processing files and digital images of paper-based documents or certificates and portable document format (PDF) files. With the help of Online Documents organization's are able to manage their time and cost of processing and storage of information and also ensures the document security, access control, centralized storage upto certain extent. Digital lockers adhere to a high level of encryption to ensure the safety of stored documents.

II. REVIEW OF LITERATURE

The concept of digital document management is not totally new but it was earlier used in the banking sector for storing documents physically as well as digitally as per the requirements and needs of the customers of the bank. Presently there are various Digital Lockers available in the various sectors for varied kinds of applications. Such as Digilocker by the Government, E-locker by ICICI Bank, Kleeto-Document Storage System, FolderIT, TeamBox, e-Sanad, eFileCabinet, DocsWallet, etc.

1. Digital Locker

Digital Locker is designed and launched for minimizing the usage of physical documents and enable sharing of e-documents across agencies. Using this Portal, the sharing of the e-documents will be done through registered repositories thereby ensuring the authenticity of the documents online. Residents can also upload their own electronic documents and digitally sign them using the e-sign facility. These digitally signed documents can be shared with Government organizations or other entities. Government of India's Digital Locker is one of the key initiatives under the Digital India Programme- External website that opens in a new window. Digital Locker has been already released by the Department of Electronics and Information Technology (DeitY), Govt.

of India.[1] It has the major features such as- It Enable digital empowerment of residents by providing them with Digital Locker on the cloud, Enable e-Signing of documents and make them available electronically and online Minimize the use of physical documents, It Ensure authenticity of the e-documents and thereby eliminate usage of fake documents. It provides secure access to Govt. issued documents through a web portal and mobile application for residents. It reduces administrative overhead of Govt. departments and agencies and makes it easy for the residents to receive services. It provides anytime, anywhere access to the documents by the resident. It is based on an open and interoperable standards based architecture to support a well-structured standard document format to support easy sharing of documents across departments and agencies. It also ensures privacy and authorized access to residents' information.[1]

2. E-Locker

For digital storage, ICICI Bank offers a document storage facility called e-Lockers. ICICI e-Locker is an online document storage facility to store all the valuable documents at one central secure location. It provides facility of storage and anytime convenient access to documents like birth or marriage certificate, passbook statement, life insurance policy, PAN card copy or any other certificates. But the limitation of this e-locker is that this facility is available to only customers of ICICI Bank. The major feature of this e-locker includes-It provides Secures and Accessible-Documents are stored in a secure manner and accessible only via a secured login. Anywhere, Anytime Access -Documents are accessible through ICICI Bank Internet Banking or ICICI Direct account login anywhere, anytime. Safety and Longevity -Documents are stored online safely, which facilitates future retrieval in an easy manner.[2]

3.Kleeto

It is a document storage system that offers customers digital and physical data storage solutions. It provides a secure online platform for document storage, giving a instant access to all the important documents. Users can access their documents upon logging into the system. As a part of their digital locker features, Kleeto offers intelligent indexing and optional restricted access to select users.[3]

4.Folderit

The most user-friendly cloud document management system in the World -Keeping paperless office documents only on computer or local server poses the risks of hard drive failure, fire, flood or burglary. And if we want to access one of those important files away from the office then Folderit will be very useful and which can be use as online document management system for small, medium and large businesses and organizations.[4] Features of folderit includes Access Control & Office integration, Powerful Search with multilingual OCR, Approval Workflow & Automated Retention, Document Numbering, Notifications & Audit Trails, Associate Files & Add Metadata, File Versions, Mobile Friendly DMS, Safe & Secure, Roles or Sub-Accounts.[4]

5.Teembox

It is a document management system for start-ups and enterprises. It provides access anywhere & everywhere -Get essential data available for better utilization. Permission based version control -Secure the data with features like authorized data access to employees. Drag & Drop function -A user-friendly interface easy to manage and understand the system. Mobile friendly -Drive the business and analyze the data with handy smartphones. Access Control -Manage access control using a predefined and custom template, for smarter granular access permissions. Audit Trails & Versioning -With any updates in documents, new versions are created with capturing old versions in an Audit Trail along with username and timestamp. Subscription-based Pricing Model -Our pricing model is developed in such a way that it is quite friendly to the user's pocket. no need to worry about specific hardware and software requirements. Cloud ready -The cloud-based systems are the new trend and we are completely ready for it. Exclusive Search Capabilities and equipped with built-in OCR and, full-text indexing capabilities, search all documents, and get real-time, accurate results.[5]

6.E-Sanad

Verification of documents and certificates. e-Sanad provides a centralized platform for contactless, faceless, cashless and paperless document verification/attestation service for Indian citizens, foreigners who have obtained documents from document issuing authorities (DIAs) in India. These include all types of documents i.e personal, educational and commercial. The system ensures that the foreign employers/other verification agencies get digitally verified genuine documents. The primary requirement for the attestation through e-Sanad is the availability of the document in digital depository.[6]

7.eFileCabinet

It is an online document management system for organizing, securing, capturing, digitizing, tagging, approving, and completing tasks with the business files. Although most document storage systems store data in the cloud, a document management system is much more than just cloud storage. The Document storage system eFileCabinet, handles the large amounts of paper flowing into the business processes and activities.[7]

8.Docswallet

It provides the facility of online verification of document using ‘Direct Verify Portal – Online Certificate verification System. It is designed with the help of web based technologies.[8]

Table1: Comparison of available Digital Document Management Systems for Document Storage and Verification:

Sr. No.	Name of Digital document management system	Description	Technology used	Major features available	Limitations	Application area
1.	e-Locker	e-Document locker provided by ICICI Bank	Web development tools	● Digital document storage, ● Provide secure access to documents through login ● Anywhere, anytime availability ● No charges required	● Facility available to only ICICI bank account holders. ● Based on client server technology	Banking sector
2.	Kleeto	Online document Management system	Web Technology development tools	● Provides online facility for storing e-documents	● Based on client server technology	Business/ corporate sector
3.	Folderit	Cloud based document storage system (DMS)	Cloud Computing, Web technology tools	● Powerful Search facility with multilingual OCR ● Document Numbering, Notifications & Audit Trails ● Access Control & Office 365 integration ● Approval Workflow & Automated Retention ● Associate Files & Add Metadata ● Provides File Versions	Client Server technology tools	Business / Corporate sector
4.	Teambox	DMS for start-ups , MSME's and enterprises	Cloud Computing tools, Web technology tools	● Access anywhere & everywhere ● Permission based version control ● A user-friendly interface easy to manage and understand the system ● Mobile friendly -Drive the business and analyze the data with any handy smartphones. ● Manage access control using a predefined and custom templates	Client Server technology tools	Business / Corporate sector
5.	E-Sanad	E-Sanad for Verification of Documents and Certificates	Cloud Computing tools, Web technology tools	● Provides verification/ attestation service to Indian citizens and foreigners.	Client Server technology tools	Government/ Legal/ Educational Sector
6.	eFileCabinet	document storage system	Cloud Computing tools, Web technology tools	● Provides an automated software solution for organizing, ● Securing, capturing, digitizing, tagging, approving digital documents.	Centralised Server Based System	General Documents Management
7.	Docswallet	DirectVerify Portal – Online Certificate verification System	Cloud Computing tools, Web technology tools	● Provides facility for online Certificate verification System	Centralised Server based system	Educational Sector

III. VARIOUS SECURITY PARADIGMS:

Passcode security to the documents, use of watermarking in documents as original document security measures, blockchain, hash functions, cryptography and digital signatures are as security paradigms for online storage and authentication of documents.

Hash function is nothing but the algorithm that takes an arbitrary amount of data as input and produces a fixed sized output text called a hash. This generated text can be used instead of password and then used to verify the user.

Blockchains are one kind of data structure which is written only one time with no administrative permissions for editing or deleting of the data. This structure of data is in the form of blocks and is distributed in a peer to peer network. Each block contains the cryptographic hash function of the previous block and which is used to create a link between them. As all the linked blocks look like a chain, therefore it is called a blockchain. The hash function is used to provide the security, integrity and immutability to the blockchain. [11],[12].

Meerja vali Shaik, et. Al[9] presented a blockchain-based certificate solution for developing an open standard that can create or issue, revoke and verify academic certificates on online platforms. For this they created an interface where anybody can share their certificates and verify from anywhere and anytime. Here they used smart contracts for issue, verification and revoke the certificates along with the blockchain for achieving the transparency.[9]

Cryptography plays a key role in blockchain by providing the security, immutability and rightful ownership of the transactions stored on the block. It provides the security and immutability by linking the blocks in a chronological order using the hash function. The hash only provides the encrypted form of the original transaction from which it is not possible to drive the original transaction data. The examples of hash functions include the family of Secure Hash Algorithms [13].

Digital signatures are the most widely used security mechanism for documents which provides a very strong evidence of sign-off and approval, document authentication, and integrity. Digital signature locks the document against unauthorised change for long-term and which ensures the evidence remains valid for many years into the future and embeds the trusted time of signing in the form of a timestamp within the document. Digitally signed documents have such a long-term signature on the last page that is verifiable by the Adobe Reader product.[14] The digital signatures provide the ownership to the transactions. It also helps the receiver to verify the authenticity and integrity of the transactions on the network.[15]

IV. CONCLUSION:

The concept of digital document management includes an online facility to store, retrieve and authenticate important documents, certificates for the purpose of storage, verification and authentication. In this paper various online available systems which are especially used for digital document storage and verification have been studied. It is observed that the available digital document management systems are mainly based on web oriented centralised server based technologies and some are using cloud computing technologies. We have also studied various security paradigms useful for digital document management mainly cryptography, digital signatures and blockchain technology and its applicability for online document storage, verification and authenticity of digital document management. Also we intend to take an exploration in the future to design the digital locker framework for the purpose of storage and authentication of digital documents using blockchain technology.

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