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**PROJECT REPORT ON**

# DEVELOPMENT OF SECURE FOLDER APP FOR DESKTOP WITH ONE-PASSWORD AUTHENTICATION

**BY**

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**CHAPTER ONE INTRODUCTION**

# Background to the Study

Nakkeeran (2015) states that the proliferation of networked devices and internet services has led to concerns regarding the security of data stored on desktop computers. Bawa(2012) suggests that traditional computing methods rely on portable storage media and machine robustness for security, whereas cloud computing offers a distributed environment with enhanced security features. Alshsayeji et al. (2018) highlight the importance of addressing reliability issues in cloud computing systems, as service outages can result from failures, which can affect the reliability and availability of cloud services. Kalanirnika and Sivagami (2015) propose proactive fault tolerance policies to predict and replace faults before they occur, ensuring the continuous operation of cloud computing systems. Deng et al. (2012) emphasize the need for reliable fault tolerance techniques in cloud computing, particularly for scientific computations where accuracy and dependability are critical. Paul and Visuswasm (2012) introduce a smart checkpoint infrastructure for cloud service providers to enhance fault tolerance in real-time computing scenarios. Guler and Ozkasap (2017) develop compressed incremental checkpointing algorithms to reduce communication costs and improve throughput in replicated key-value stores deployed on cloud infrastructure. Sutaria et al. (2017) conduct a comprehensive survey on fault prediction and mitigation techniques in cloud computing, highlighting the importance of proactive measures to enhance system reliability.

In light of this findings, it is evident that ensuring the security and reliability of data stored on desktop computers, particularly in cloud-based environments, required robust fault tolerance mechanisms.

* 1. **Motivation**

The necessity for improved data security and privacy in contemporary computer environments led to the development of a desktop secure folder application with one-time password authentication. The weaknesses of conventional password-based authentication systems, which can be breached by phishing, brute force attacks, or password theft, have been brought to light by earlier cyber security research.

Researchers and Developers have looked into several authentication techniques to strengthen security in order to address these worries. One such technique is authentication using a one-time password (OTPs), methods that rely on time, event-based triggers, or a mix of the two are employed to make sure that every password is distinct and cannot be used again by hackers.

The need to safeguard private or sensitive files from unauthorized access is the driving force behind the integration of OTP authentication into a desktop secure folder application. By requiring users to enter a one-time password generated through a secure mechanism, the app adds an extra layer of security beyond traditional password protection, mitigating the risk of password theft or interception, as the OTPs are not reusable. The development of this type of application was made possible by prior research in secure file storage and access control, which looked into methods like encryption, access control lists, and biometric authentication to secure files and folders on desktop systems. However, the incorporation of OTP authentication adds a new dimension to the process enhancing resilience against various attack vectors and insider threats.

Furthermore, the necessity of protecting data kept on local devices has grown due to the spread of cloud storage services and remote work policies. Instead of depending exclusively on cloud-based security measures, users can protect important data in their desktops with ease and strength by using a desktop secure folder application with OTP authentication.

In conclusion, the need to bolster data security in the face of emerging cyber dangers is the driving force for the creation of a desktop safe folder app with one-time password authentication. The program improves the confidentiality and integrity of saved files by using OTPs as an extra authentication element, making sure that only authorized users may access important data. This expands on earlier cyber security ad access control studies, providing a proactive method of safeguarding data on desktop systems in an increasingly interconnected digital landscape.

* 1. **Objectives**

The specific objectives of the research are to:

* + 1. design a secure folder app for desktop using one-time password authentication;
    2. implement (a); and
    3. evaluate the performance of the developed application based on performance metrics.
  1. **Methodology**

The proposed application comprises four (4) layers namely the user, task controller, fault detector, and fault tolerance layers. In the user layer, the use submits a request (R) along with quality of service (QoS) parameters via cloud clients to the controller layers as follows:

1. **User Layer:**
2. User submits a request (R) comprising a set of tasks (S) and QoS parameters.
3. Request (R) includes tasks such as inventory taking, data analysis, and language processing.
4. QoS parameters include turnaround time, monetary cost, and computing resources.
5. **Task controller Layer**:
6. Houses the service manager (Sm) and the fault tolerance scheduler module (Fm).
7. Service manage(Sm) checks the database (Db) for computing capacity (cc), storage capacity(sc), usage history(uh), and failure history(fh).
8. Virtual Machine and forwards it to the scheduler module.
9. **Fault Detector and Fault Tolerance Layer:**
10. Fault detector module checks VM reliability based on failure probability.
11. VMs are ranked according to failure probability values.
12. Fault tolerance scheduler module selects appropriate fault tolerance technique (replication or check pointing) based on VM rankings.
13. **Replication and Checkpointing:**
14. Replication module creates replicas of the request on the VM with the least failure probability.
15. Number of replicas (p) for a request is determined dynamically based on failure probability thresholds.
16. Check-pointing module saves request data for resumption in case of failure
17. **FTScheduler Algorithm:**
18. Determines fault tolerance technique (replication or checkpointing) based on VM availability and request type.
19. Utilizes a partitioned check-pointing strategy for optimal check-pointings.
20. **Evaluation:**
21. The proposed model will be simulated using CloudSim.
22. Evaluation metrics include throughput response time, robustness, and trend analysis.

By following this methodology, the secure desktop folder app can be developed with robust fault tolerance mechanism to ensure data integrity and availability.

**Mathematical model:**

Let’s denote the total time required for syncing notes with cloud storage as Tcloud\_sync.

The model can be represented as follows:

Tcloud\_sync == Bsize X (Tupload + Tdownload)1.14

Where:

Bsize is the storage capacity provided by the cloud service.

Tupload and Tdownload are functions of internet speed (x),

Server response time(y), and network congestion level(z).

The functions Tupload and Tdownload can be represented as:

Tupload, Tdownload = f(x,y,z)

Now, let’s break down the components:

1. Internet speed(x): This factor represents the upload and download speeds of the user’s internet connection. Higher speeds result in faster syncing times.
2. Server response time(y): This factor indicates how quickly the cloud server responds to requests from the application. Lower response times lead to faster syncing.
3. Network congestion level(z): This factor reflects the congestion level of the network through which data is being transmitted. Higher congestion levels can slow down data transfer.

* 1. **Organization of Project**

The rest of this project is organized as follows:

Chapter Two presents the related works and extensively reviewed existing literature, to investigate existing loopholes and justify the need to carry out this research. Chapter Three discusses the methodology used in the design and the overall analysis of the system. Chapter Four presents the implementation and results and evaluation while Chapter Five concludes the research with recommendations drawn from this research and the contributions made to knowledge.

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CHAPTER TWO

LITERATURE REVIEW

* 1. Preamble

The Proliferation of digital data and the increasing reliance on desktop computers for storing sensitive information have underscored the importance of ensuring the security and confidentiality of digital files. With the rise of cyber threats and data breaches, there is growing demand for secure solutions that safeguard personal and business data from unauthorized access and malicious attacks. In response to these challenges, developers have introduced secure folder applications designed to provide users with enhanced protection for their sensitive files and folders. According to Nakkeeran(2015), the proliferation of networked devices and internet services has heightened concerns about the security of data stored on desktop computers. Traditional methods of data protection, such as password encryption and file access controls, are no longer sufficient to defend against sophisticated cyber threats.

The development of secure folder app for desktop represent a promising avenue for data security for desktop computing environment.

Authentication is a process of verifying a user’s identity, device, or other entity in a computer system. It is a pre-requisite process to allow access to the resources in the computer system (Velasquez et al., 2018) Authentication ensures that only authenticate identities can log on to access system resources (Bhoyar, 2012). As time goes by, the technology in this world is slowly advancing to a whole new level. Nowadays, creators are fighting to build the most minor, slimmest phones and computers from huge, thick phones and computers (Jacobi, 2011).

With the imporovement of technology, the internet is used more and more by everyone. For this reasons, methods of authentication are required for these platforms. Almost every single web and person in this world has an online account to access something. Therefore, this will involve a password . A password is used as the central defense against crooks or attackers. Up until now, Password based authentication is still widely used for online authentication on the internet and other systems. Password is still preferable to use because now the password is designed based on a password strength meter to help users pick a strong password to ensure the security level of the password (Golla & Dumuth, 2018). It is just like how people letting their door unlocked led to a burglary or theft. There is some personnel information about users that the we or company needs to use or the user themselves.

Generally, nowadays, the increasing threat to the computer system and the information they store and process are valuable resouces that need to be protected. Athentication refers to the techniques where isers must prove the claim of their identity to the identifier. There are many techniques which user can can be authenticated. Some password authentication techniques are text passwords and sending a notification in the user’s email to discover that their application is being hacked. The primary purpose of this project is to prevent shoulder-surfing attacks, key-logger exploitation, and password cracking issues by using an adaptation of one-password authentication. This project is also evaluated and compared to demonstrate the security strength and robustness.

Using a password is a common practice for user authentication. Users need to memorize the password, and it can still be considered safe as long as only the users know the password. However, in reality, the passwords cannot always be kept safely as the human brain cannot manage passwords for many services at once (Erdem & Sandikkaya, 2019). A text password is a secret password or string of characters used for user authentication to prove the identity or for access approval to gain access to a resource. The easier a password is for the owner to remember generally means it will be easier for an attacker to guess. However, passwords that are difficult to remember may also reduce the security of a system. Because users might need to write down or electronically store the password, users will need frequent password resets, and users are more likely to reuse the same password. Unfortunately, intruders break these passwords mercilessly by several simple means: masquerading, eavesdropping, shoulder-surfing, and social engineering attacks.

Therefore, thus project will implement a one-time password authentication during the user login to the application.

2.2 One Time Password Authentication

A one time password (OTP) is an automatically generated numeric or alphanumeric string of characters that authenticates a user for a single transactions or login session. An OTP is more secure than a static, especially a user-created password , which can be weak and reused across multiple accounts. OTP security tokens can be implemented using hardware, software or on demand.