Java File Security System (JFSS)

By Brijender Kahanwal, Kanishak Dua & Girish Pal Singh

Maharaja Ganga Singh University, Bikaner India

Abstract - Nowadays, storage systems are increasingly subject to attacks. So the security system is quickly becoming mandatory feature of the data storage systems. For the security purpose we are always dependent on the cryptography techniques. These techniques take the performance costs for the complete system. So we have proposed the Java File Security System (JFSS). It is based on the on-demand computing system concept, because of the performance issues. It is a great comeback for the system performance. The concept is used because, we are not always in need to secure the files, but the selected one only.

In this paper, we have designed a file security system on Windows XP. When we use the operating system, we have to secure some important data. The data is always stored in the files, so we secure the important files well. To check the proposed functionality, we experiment the above said system on the Windows operating system. With these experiments, we have found that the proposed system is working properly, according to the needs of the users.

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I. INTRODUCTION

The access control is one of the fundamental security services in the computer system. It is a mechanism for constraining the interaction between users and protected resources. File is one of the important resources of the computer system. That must be protected from the unauthorized access that it can’t be tempered or stolen by intruders. The file security can enforced using cryptographic techniques. With the help of these techniques the important files are encrypted and authorized users are given appropriate cryptographic keys.

The cryptographic techniques can be applied at any level of the storage systems because they use the layered architecture. The level may be the block or virtual one in the operating system. Basically, file management is an important task of the computer system. We have designed the Java File Security System (JFSS) [1-5] for files on the Windows XP.

The suggested file security system storing encrypted files using Rijndael Algorithm (AES) [6], so an unauthorized user can’t access the important data. The encryption takes place for the selected files (important ones which requires the security) only.

We are using the concept of on-demand computing which results in the high performance of the computer system. The proposed system is working properly for all types of the files. In this paper there are more sections. Next section is section II which is about the related works. In section III, the design of the system is shown. In section IV, the evaluation is done. In section V, there is conclusion.

II. RELATED WORKS

So many approaches are applied to solve the problem of information security. The approaches may be the user space or kernel space or the combined one. The kernel approach is sensitive to implement because any small mistake done by the programmer can harm the overall functioning of the system. The user space one is secure and compatible with the system and the independent one and comfortable in the implementation and are the highly portable if we are using the best portable platform like Java.

There are so many implementations in the literature review and every one has there advantages and disadvantages with them. BestCrypt [7], is designed as a loopback device driver which creates a raw block device with a single file. The single file acts as a container (the backing store). There is an associated cipher key for each container. Cryptographic File System (CFS) [8], provides a transparent UNIX file system interface to directory hierarchies that are automatically encrypted with user supplied keys. It is implemented as a user level NFS server. User needs to create an encrypted directory and assign its key which is required for cryptographic transformations, when the directory is created for the first time. Transparent Cryptographic File System (TCFS) [9], works as a layer under the Virtual File System (VFS) layer, making it completely transparent to the application. The security is applied by means of the Data Encryption Standard (DES) algorithm [10].

III. DESIGN

The main design goals of our research are as follows:

a) The proposed system should have better system performance as well as expand it for the existing file system.

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b) It should be independent of File System (it should not require the modifications in the other file systems or user applications).

c) It should offer strong storage security against most trivial and moderately sophisticated attacks.

d) It should be compatible with the future technology for separate key management just like smart cards for storing the encryption keys which are directly in the possession of authorized users.

e) It should be compatible with the existing file system services as the encrypted files should behave normally as of the other files within the system.

f) It should be developed as a user level file system and be convenient for users.

We have used the Windows XP operating system to design the functionality of file security system. The programming language to be used is the Sun Microsystems Java technology. To design it there is a function design form which has the necessary buttons on it.

The login form, that is used to login with the file security system. After entering the user id and password we are linking to the security execution program. We always need the user registration with the file security system. The registration is done by the program administrator who has the only permission to make number of users for the system. He or she will give the username and the password to the user. That is displayed in the Figure 3.1.

We performe test and evaluation on the proposed file security system for files and the directories. For experiment the computer system was with the configurations as Pentium 4 processor, Windows XP operating system.

The system has been tested for its functioning. In the first login window the user enter his or her userid and the password. If that is correct then he or she will get a message login successful or not. As in the Figure 4.1 the login is a successful one.
encryptes the specified file and save the encryption key to the smart card which is a separate location of storage from the encrypted file. It increases security of the data. It is shown in the Figure 4.2.

![Encryption tab display](image.png)

**Figure 4.2:** Encryption tab display

This is the Figure 4.3 which shows the decryption process of the system. It has two file selection buttons on it. One file selection button for the specified encrypted file to whom the user is going to decrypt. Another one is for the key selection of the specified file. Because every file has its own independent key to encrypt or to decrypt it.

![Decryption tab display](image.png)

**Figure 4.3:** Decryption tab display

We have seen the file's look how it will behave after the encryption. The system is highly secure that we can not delete the encrypted file and also can not change data which shows the integrity. The encrypted file’s view is shown in the Figure 4.4.

![Display screen of an encrypted file](image.png)

**Figure 4.4:** Display screen of an encrypted file

### V. Conclusion

We have contributed in the designing and development of a user space cryptographic file system. We have balanced the design goals like security, performance, convenient and independability of the system.

We have achieved the high security by including the support of the Rijndael Algorithm (AES) and we have saved the keys on the portable smart cards for the documents which are important.

The performance is achieved with the help of on-demand computing concept which is that we are not going to encrypt all the files on the computer system, but we are going to encrypt only the important documents only. It saves the performance overhead of the system.

The system is very convenient to the users as described in the study done in the reference [2]. And the independability is achieved with the help of the Java technology which is highly portable. So the complete system is a highly independent of the configuration.

### Acknowledgement

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