Design and Development of Group Access for User Based Secure File System

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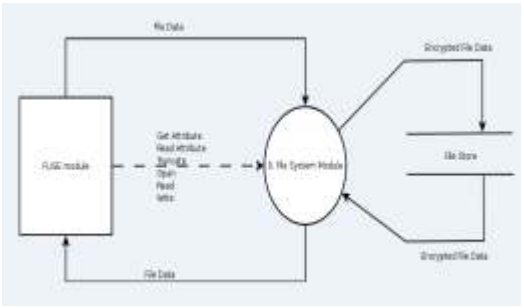
Abstract:

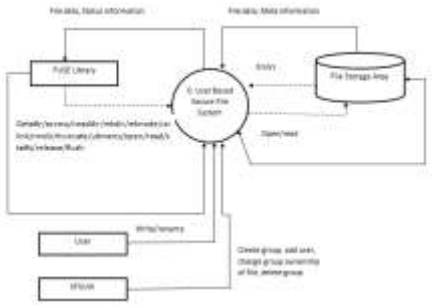
Personal computer contains a lot of confidential user data including account passwords, photos, etc. While operating systems do provide authentication and access control to the personal computer, this control can be bypassed easily by booting in to a live boot disk, such as Ubuntu, and mounting the local hard disk to access the information. User Based Secure FileSystem (UBSFS) was created to provide uniform access and data security across multiple operating systems. UBSFS maintain its user information and relate it with the operating system's user access control. However, UBSFS does not have provision for group management. This is a major drawback as group access is one of the most essential requirements of modern file systems. This project investigates the ways to provide secure group access in user based secure file system.

In this project, group access control mechanisms for UBSFS are designed and developed. Based on literature survey, a design of a file system based group access control mechanisms for UBSFS is created. This design is then developed using file system in USEr space (FUSE) and OpenSSL libraries. The functionality of the developed system is validated with multiple test cases. Performance test cases are applied to validate performance degradation due to the addition of group access mechanisms.

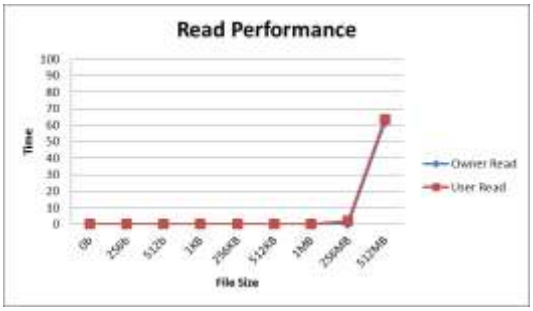
There is a negligible performance degradation noticed in the UBSFS due to addition of group access control. The recommended file size for this file system is 256 KB. This size can be increased in the future by using parallel block encryption instead of the existing stream encryption scheme. Also, since group management is part of file system, the file system can be further enhanced with addition of multi-group file sharing schemes.



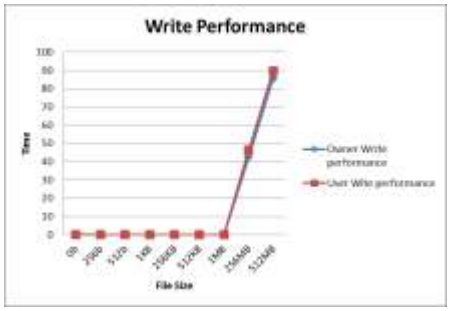
Context level diagram



Context level diagram of group access secure file system



Read performance degradation due to group access



Write performance degradation due to group access