Task 1.5P -Introduction to File Systems and Virtual Machines

Introduction

- Concepts Review: Once more, I described the role of files, directories, and permissions into file system. As these are the building blocks of each operating system data structure, access, and security it is crucial to understand all of them.

File Exploration. File Explorer Analysis:

- Operating System: Using Windows 11 was the operating system I was employing. When engaging in browsing these four directories; “Pictures,” “Documents,” “Program files,” and “Windows,” I searched.
- Options for File Types: I saw a variety of file types, including:

✓ Image - .png
✓ Text - .txt
✓ Executable - .exe
✓ System data file - .sys

- Extensions and Features: As was mentioned above and could be remembered, the files with the executable code are usually presented by files with the.exe extension while system files are normally hidden by default as they are the part of the operating system.

Directory Structure Analysis. Default Organization:

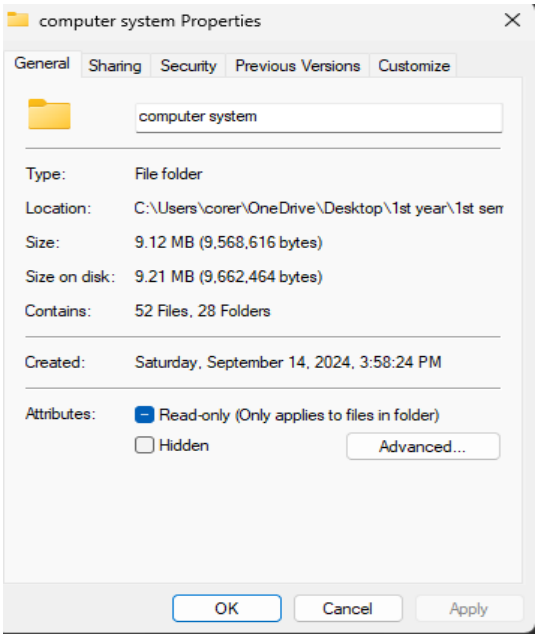
- This folder called “Program Files” where folder is categorized by application and it contains subfolders for various versions or part of applications installed in the computer.
- What I noticed was that there are default folders that the operating system creates and assigns labels such as; Documents, Music, Pictures. In order to prevent the files of the system to undergo simple modification, passwords are created to secure the directories where the files are stored.

File Permissions Investigation. Permission Analysis:

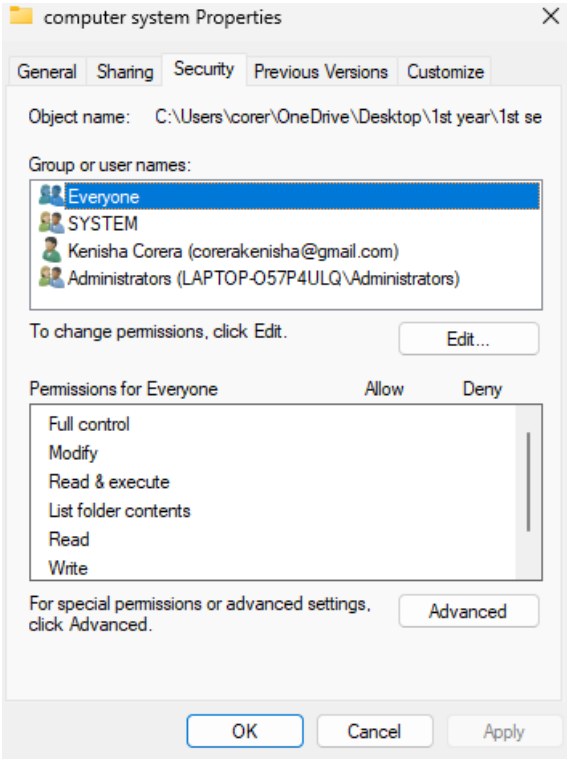
- Modification Attempt: I had tried to change the permission setting of an innocuous hypertext file. Permission settings plays a crucial role in security since one has to get an administrator approval to change the permission.
- Contemplation of Permissions: Access authorities play a very important role in system’s security because they can specify the amount of openness of certain procedures for some people. It supports its function to avoid various modifications that can compromise the system’s performance.
- Permissions Verified: I compared the attributes of these files in various folders. As a rule, only administrators are able to change files within the system.

Documentation of Findings. Observations Recorded

File Properties



File Permissions



- Most of them are hidden and protected through the system by default, which kind of shocked me and underlines their significance within the operating system.

Analyzing Real-World Applications of Various File Systems

NTFS

- Historical Development as of NT OS 3, NTFS was released by Microsoft in 1993 for use in Windows NT 3.1 as a new filesystem to replace the old FAT. Technical Details Moreover, NTFS could support disk quotas and additional files attributes like compression and encryption, volumes that are large, and file name extended. Usage Scenarios NTFS is in widespread use in all types of Windows OS, home and business, owing to its stability and top-shelf feature set.

Real-World Applications Case Studies:

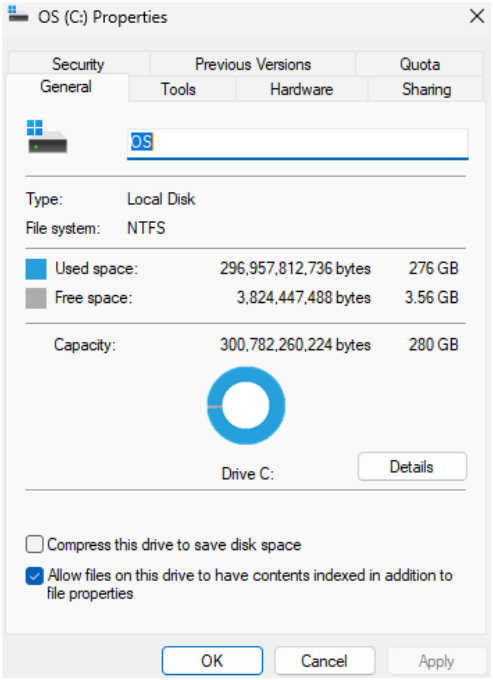
- Sur it is better to go with NTFS in commercial situations when data security, its irre CAD integrity and effective storage administration are paramount. And due to the logging capability that helps to avoid data corruption NTFS for instance is suitable for servers and databases.

Comparative Analysis. Comparison with FAT32

- Preference scenarios: That is why FAT32 is best used in cross platform situations like USB peripherals, however NTFS is preferred in cases where file size and data integrity are an issue.
- FAT32 is much easier and can be used on non-windows operating systems as much as possible even though NTFS is the recommended format for new windows computers due to efficiency, security and the ability to address large files and partitions.

Discussion and Feedback. Reflection on Discussion

NTFS Features in C drive



Comparative analysis Table

FEATURE	FAT32	NTFS
Max.Partition Size	2TB	2TB
Max.File Name	8.3 Characters	255 Characters
Max.File Size	4GB	16TB
File/Folder Encryption	No	Yes
Fault Tolerance	No	Auto Repair
Security	Only Network	Local and network
Compression	No	Yes
Conversion	Possible	Not Allowed
Compatibility	Win 95/98/2K/2K3/XP	Win NT/2K/XP/Vista/7

- Nevertheless, if necessary to operate the system with other systems, NTFS coping with complexities, however might not represent the optimal choice.

Summary

- Through the research, I was able to understand fully the workings of the virtual machines and the file systems that exist in a computer environment. File systems therefore act as the core in data management by providing structures of directories and files and methods facilitating secure and efficient retrieval of data. I was enlightened on numerous file systems- NTFS, FAT, ext4, HFS+ among others, which have special attributes suited the operating systems they support. For instance, Linux systems select ext4 file system just due to the stability and speed, whereas Windows employs NTFS most broadly because of its security measures and ability to work with very large files. It was therefore very enlightening when it showed how important it is to secure the system, regulate access to files as well as, prevent unauthorized alteration to files. On the other hand, virtual machines which only provide an additional layer or a 'virtual' computer can accommodate many operating systems within one physical computer. I discovered that virtual machines are good for testing and development environments and can also, if needs be, get the most out of hardware, with many environments running from a single server. Also included in this information is a discussion of how important they are for mimicking the role played by a physical machine while at the same time offer the host machine a completely different and secure environment. Most compelling were such ideas as, for instance, hypervisors – components that control the virtual machines and show the advantages of virtual machines for modern computing.

Reflection

- Today I am able to confidently explain and evaluate how different file systems operate as well as how virtual machines in computing function and therefore I am sure that I have comprehended all the learning objectives. I learned the most important lesson from this experience: file permission and security are essential parameters overriding the data integrity as well as system performance. I am now aware of the conceptual foundation for system security because of the knowledge I have gotten from the structure of permission and its functionality on various file systems. Namely, my previous knowledge of operating systems and data management is directly related to the gained new information from the course. This course expanded my knowledge by indicating the peculiarities of numerous file systems with relevant aspects and the use of virtual machines. The lesson will be very beneficial for me in my further work both in systems administration or any other post connected with IT, especially if it is necessary to manage several settings or to provide data protection. The knowledge in computers and skills mastered will be important while diagnosing file system issues or while setting up secure file systems and V.Ms or while trying to optimize resource utilization while installing V.Ms for independence application testing.