

Filesystems

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Mines Linux Users Group

Introduction

What are Filesystems?

- Filesystems manage the storage and retrieval of files from storage media.
- Filesystems are an abstraction layer between storage media (SSDs, HDDs, disk drives, even tape drives).
- Filesystems exist on *partitions*, physically contiguous segments of the disk.

Filesystems are Responsible for...

- **Space management:** filesystems allocate and manage space in discrete chunks. Filesystems must keep track of what data is stored at each chunk.
- **Filenames:** identify a storage location in the file system. Can be case sensitive (ext4) or case insensitive (HFS, NTFS).
- **Directories (folders):** group files into separate collections. Modern filesystems allow arbitrary nesting of directories.
- **Metadata:** filesystems store book-keeping information about their contents (e.g. file sizes, last accessed date, owner and permissions, etc.).
- **Access Control:** prevent unauthorized access to files on disk.
- **Data Integrity:** filesystems must be resilient to failure, some are better at this than others.

History of Filesystems

Current Filesystems

Linux

Windows & mac

Flashdrives

Other Options

Alternative Filesystems

Network Filesystems

What is a network filesystem?

You can access remote storage devices over the internet using a *network filesystem*.

Virtual Filesystems

What is a virtual filesystem?

There is no reason why a filesystem needs to be backed by a real partition on a real storage device. There exist plenty of *virtual filesystems* that are purely procedural or abstract other kinds of devices.

- Filesystem in Userspace (FUSE) is an interface for creating filesystems without writing any kernel-level code
- Available in Linux, FreeBSD, OpenBSD, NetBSD, OpenSolaris, Minix 3, Android, and macOS
- Access through libfuse for C (bindings exist for Python, Rust, etc.)

- Implemented using FUSE
- Mount a directory on a remote system through SSH

Configuration/maintenance

Questions?

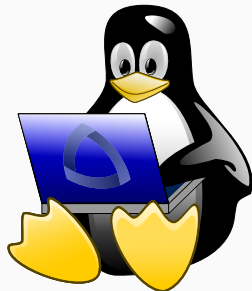
References

- https://en.wikipedia.org/wiki/File_system
- <http://www.tldp.org/LDP/sag/html/filesystems.html>

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