File Systems

Objectives:

At the end of this episode, I will be able to:

1. Describe the file systems available in macOS including APFS, Mac OS Extended, exFAT and NTFS.
2. Differentiate between the file systems and identify their benefits and drawbacks.

> Additional resources used during the episode can be obtained using the download link on the overview episode.

- Apple File System (APFS)

  - Introduced in macOS High Sierra
  - Designed for all Apple platforms (iOS, macOS, tvOS and watchOS)
  - Better encryption

    - Single key and multi-key

  - Supports more files and larger partitions
  - Case sensitive
  - Initially only supported on SSD

    - Now supported on Fusion as well
    - Not supported on spinning disk (HDD)

- Mac OS Extended

  - Most basic Apple format
  - Unicode filenames
  - File permissions
  - Links and aliases

- Mac OS Extended (Journaled)

  - Same as above, but with journaling support
  - Journaling protects from unexpected failures

    - Power outage
    - Improper drive removal

  - Write operations are committed to a protected area
  - Writes are not committed until they are 100% received
  - Write failure results in a roll-back of the change
  - Leaves the original file intact

- Mac OS Extended (Journaled, Case-Sensitive)

  - Same as above, but obeys UNIX/POSIX case rules
  - These are different files:

    - `/Users/dpezet/Documents/FileName.txt`
    - `/Users/dpezet/Documents/filename.txt`
    - `/Users/dpezet/Documents/FILENAME.txt`

- Mac OS Extended (Journaled, Encrypted)

  - Same as above, but with full disk encryption applied
  - FileVault

- FAT32

- File Allocation Table (32-bit)
- Developed for DOS/Windows systems
- Considered the most compatible file system for removable media
- Not supported for boot volumes under macOS
- Very fragile with improper removal

- NTFS

  - New Technology File System
  - Developed for Windows NT systems

    - Windows XP, Vista, 7, 8, 10

  - Microsoft Proprietary
  - macOS can read NTFS, but not write

- ExFAT

  - Extended File Allocation Table
  - Replacement for FAT32
  - Large disk support
  - High degree of compatibility
  - Useful for removable disks that go between Macs and PCs
  - Fragile with improper removal
  - Supported in macOS since v10.6

- UFS

  - UNIX File System
  - Supported up through v10.5
  - Could still be read by v10.13
  - Support removed
  - DiskUtility cannot format UFS anymore