

Sistemas Operativos

Licenciatura Engenharia Informática
Licenciatura Engenharia Computacional

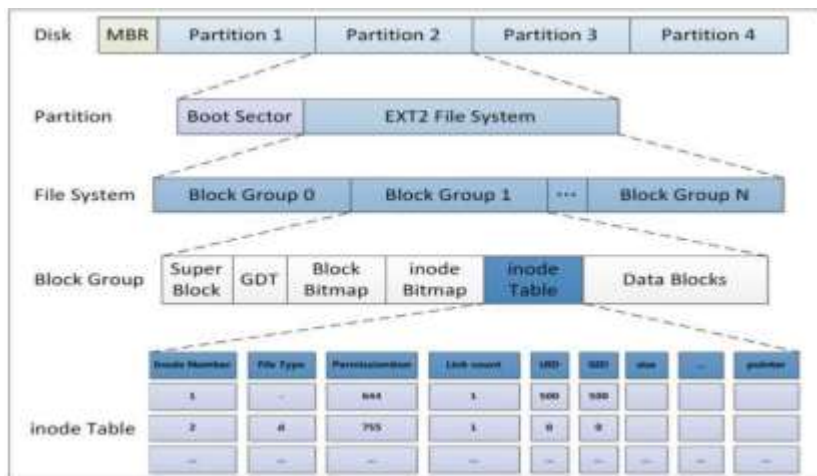
Ano letivo 2024/2025

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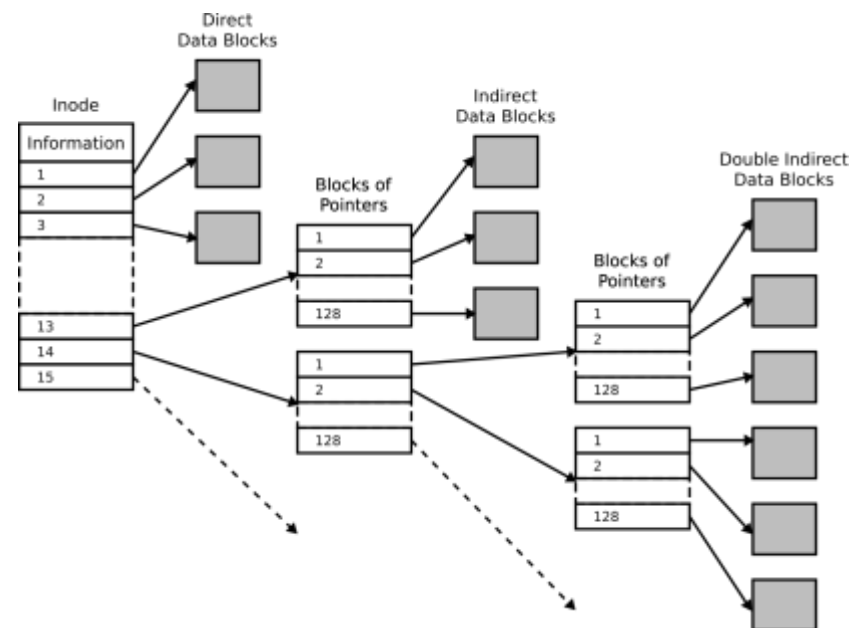
- Sistema de Ficheiros FAT32
 - Organização do disco
 - Boot sector (boot loader, partition table, BIOS parameter block, etc.)
 - 2 cópias da FAT
 - Zona de dados (diretoria raiz no início da zona de dados)
 - Como encontrar conteúdo de um ficheiro?
 - Cluster inicial indicado na entrada de diretoria
 - Clusters seguintes **numa lista ligada** através da FAT
 - FAT
 - Array de números de clusters (cada um com 32 bits)
 - Para cada cluster indica:
 - Cluster seguinte; Final ou Livre
 - Diretorias
 - Constituídas por entradas de diretoria de tamanho fixo
 - Entradas definem nome e metadados de ficheiros e diretorias
 - Entradas definem cluster inicial

Sistema de ficheiros ext2

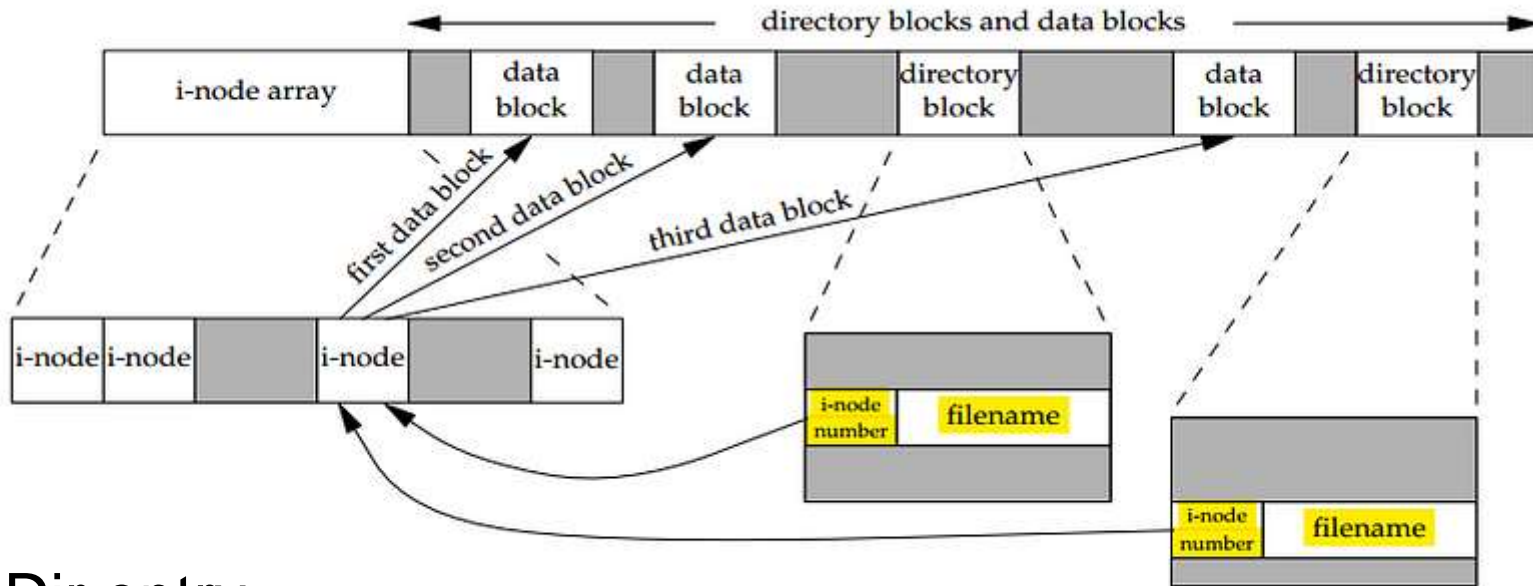
Disco



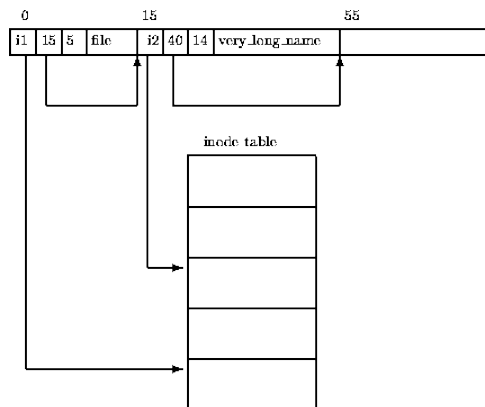
inode



Sistema de ficheiros ext2



Dir entry



Alguns Sistemas de Ficheiros

| File System | Operating System |
|-------------|--|
| NTFS | Windows NT, Windows 2000, Windows XP, Windows 2003 Server, Windows 2008, Windows Vista, Windows 7 |
| NTFS5 | Windows 2000, Windows XP, Windows 2003 Server, Windows 2008, Windows Vista, Windows 7, 8, 10, 11 |
| exFAT | Windows CE 6.0, Windows Vista SP1, Windows 7, WinXP+KB955704 |
| FAT32 | DOS 7.0 and higher, Windows 98, Windows ME, Windows 2000, Windows XP, Windows Server 2003, 2008, 2012, 2016, 2019, 2022, Windows Vista, Windows 7, 8, 10, 11 |
| FAT16 | DOS, All versions of Microsoft Windows |
| FAT12 | DOS, All versions of Microsoft Windows |

http://www.ntfs.com/ntfs_vs_fat.htm (com modificações)

Limitações de Sistemas de Ficheiros

| | NTFS5 | NTFS | exFAT | FAT32 | FAT16 | FAT12 |
|----------------------|--|--|------------------|----------------------------------|--|----------------------------------|
| Max Volume Size | 2^{64} clusters – 1 cluster | 2^{32} clusters – 1 cluster | 128PB | 32GB for all OS, 2TB for some OS | 2GB for all OS, 4GB for some OS | 16MB |
| Max Files on Volume | 4,294,967,295 ($2^{32} - 1$) | 4,294,967,295 ($2^{32} - 1$) | Nearly Unlimited | 4194304 | 65536 | |
| Max File Size | 2^{64} bytes (16 ExaBytes) minus 1KB | 2^{44} bytes (16 TeraBytes) minus 64KB | 16EB | 4GB minus 2 Bytes | 2GB (Limit Only by Volume Size) | 16MB (Limit Only by Volume Size) |
| Max Clusters Number | 2^{64} clusters – 1 cluster | 2^{32} clusters – 1 cluster | 4294967295 | 4177918 | 65520 | 4080 |
| Max File Name Length | Up to 255 | Up to 255 | Up to 255 | Up to 255 | Standard - 8.3 Extended - up to 255 | Up to 254 |

http://www.ntfs.com/ntfs_vs_fat.htm (com modificações)

Características de Sistemas de Ficheiros

| | NTFS5 | NTFS | exFAT | FAT32 | FAT16 | FAT12 |
|-----------------------|------------------------|------------------------|----------------------------------|------------------------------------|----------------------|----------------------|
| Unicode File Names | Unicode Character Set | Unicode Character Set | Unicode Character Set | System Character Set | System Character Set | System Character Set |
| System Records Mirror | MFT Mirror File | MFT Mirror File | No | Second Copy of FAT | Second Copy of FAT | Second Copy of FAT |
| Boot Sector Location | First and Last Sectors | First and Last Sectors | Sectors 0 to 11 Copy in 12 to 23 | First Sector and Copy in Sector #6 | First Sector | First Sector |
| File Attributes | Standard and Custom | Standard and Custom | Standard Set | Standard Set | Standard Set | Standard Set |
| Alternate Streams | Yes | Yes | No | No | No | No |
| Compression | Yes | Yes | No | No | No | No |
| Encryption | Yes | No | No | No | No | No |
| Object Permissions | Yes | Yes | Yes | No | No | No |
| Disk Quotas | Yes | No | No | No | No | No |
| Sparse Files | Yes | No | No | No | No | No |
| Reparse Points | Yes | No | No | No | No | No |
| Volume Mount Points | Yes | No | No | No | No | No |

Desempenho de Sistemas de Ficheiros

| | NTFS5 | NTFS | exFAT | FAT32 | FAT16 | FAT12 |
|--------------------|------------------------------------|------------------------------------|-----------------------|------------------------------------|---------------------------------------|---------|
| Built-In Security | Yes | Yes | Yes minimal ACL only | No | No | No |
| Recoverability | Yes | Yes | Yes if TFAT activated | No | No | No |
| Performance | Low on small volumes High on Large | Low on small volumes High on Large | High | High on small volumes Low on large | Highest on small volumes Low on large | High |
| Disk Space Economy | Max | Max | Max | Average | Minimal on large volumes | Max |
| Fault Tolerance | Max | Max | Yes if TFAT activated | Minimal | Average | Average |

Limitações de Sistemas de Ficheiros

| Features | Ext2 | Ext3 | Ext4 |
|---------------------------|------------|---------------------|-----------------|
| Individual file size | 16GB-2TB | 16GB-2TB | 16GB-16TB |
| Volume file system size | 4TB-32TB | 4TB-32TB | 4TB-1EB |
| Default inode size | 128 bytes | 128 bytes | 256 bytes |
| Time Stamp | No support | Second | Nanosecond |
| Defragmentation | No | No | Yes |
| Directory Indexing | Disabled | Disabled | Enabled |
| Multiple Block Allocation | Basic | Basic | Advanced |
| Preallocation | No | In-core reservation | For extent file |
| Delayed Allocation | No | No | Yes |