第十八讲：文件系统实例

第 1 节：FAT 文件系统

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提纲

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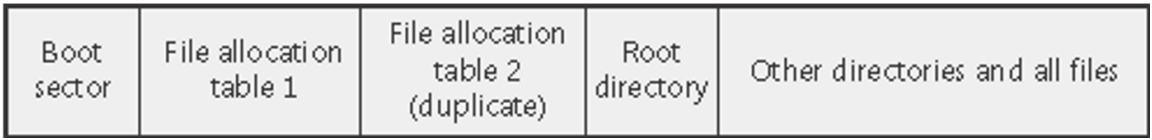
- To protect the volume, two copies of the table are kept, in case one becomes damaged.
- The file allocation tables and the root folder must be stored in a fixed location so that the files needed to start the system can be correctly located.

Structure of a FAT Volume



- Boot sector

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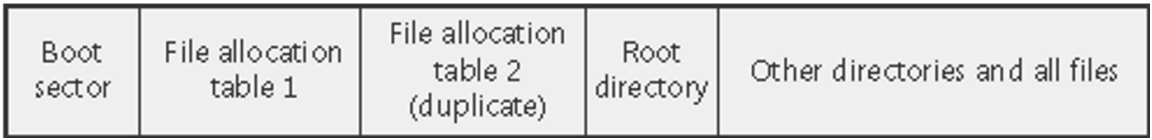

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- FAT2
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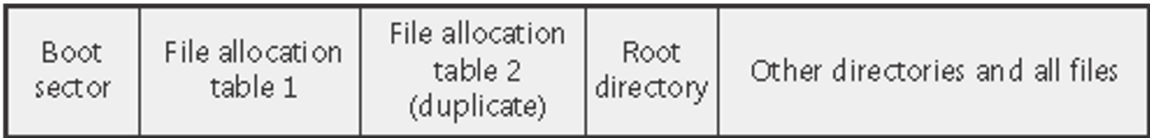

- Boot sector
- FAT1
- FAT2
- Root directory
- Other directories and all files

Differences Between FAT Systems

System	Bytes Per Cluster Within File Allocation Table	Cluster limit
FAT12	1.5	Fewer than 4087 clusters.
FAT16	2	Between 4087 and 65526 clusters, inclusive.
FAT32	4	Between 65526 and 268,435,456 clusters, inclusive.

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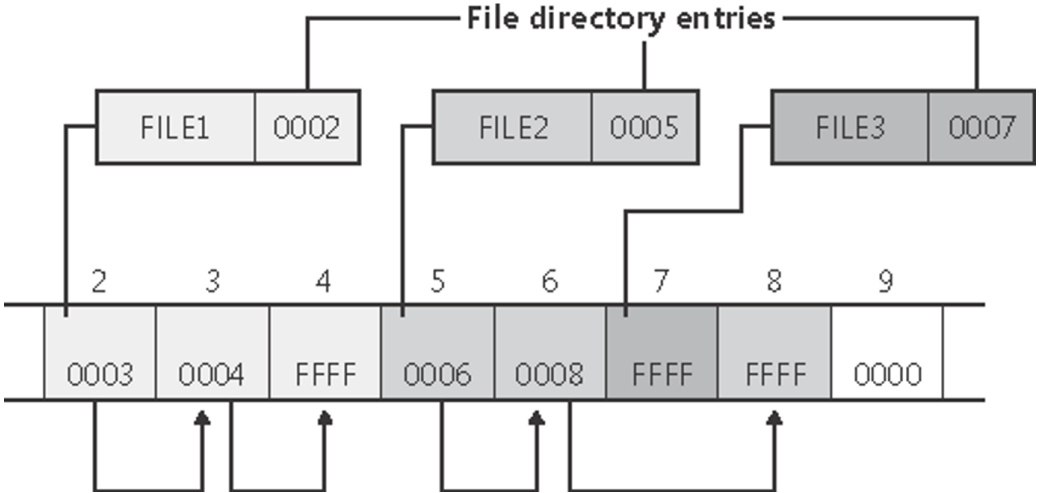
- FAT32 is a derivative of the File Allocation Table (FAT) file system that supports drives with over 2GB of storage.
- FAT32 drives can contain more than 65,526 clusters and results in more efficient space allocation on the FAT32 drive.

Example of File Allocation Table



File Allocation System

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- Unused (0x0000)
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- Unused (0x0000)
- Cluster in use by a file
- Bad cluster (0xFFF7)
- Last cluster in a file (0xFFF8-0xFFFF)

FAT Root Folder

The root folder contains an entry for each file and folder on the root. The only difference between the root folder and other folders is that the root folder is on a specified location on the disk and has a fixed size (512 entries for a hard disk, number of entries on a floppy disk depends on the size of the disk).

Folder Entry

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- Starting cluster number in the file allocation table (16 bits)
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- Attribute byte (8 bits worth of information)
- Create time (24 bits)
- Create date (16 bits)
- Last access date (16 bits)
- Last modified time (16 bits)
- Last modified date (16 bits)

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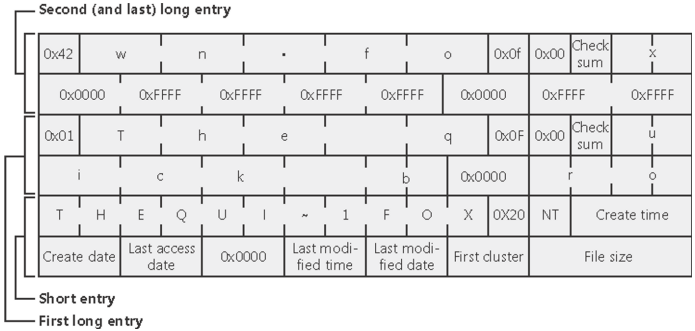
- FAT creates one or more secondary folder entries for the file, one for each 13 characters in the long filename. Each of these secondary folder entries stores a corresponding part of the long filename in Unicode.
- FAT sets the volume, read-only, system, and hidden file attribute bits of the secondary folder entry to mark it as part of a long filename.

Folder Entries for the long filename



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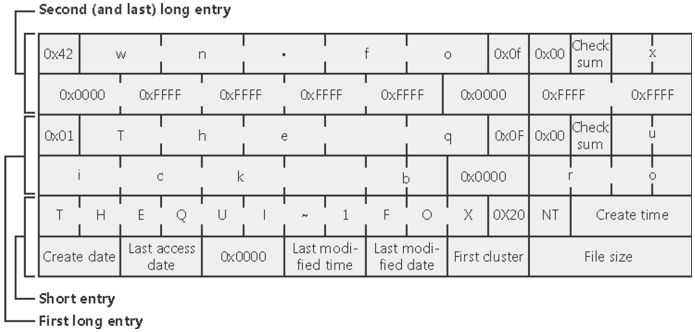

Figure shows all of the folder entries for the file Thequi~1.fox, which has a long name of The quick brown.fox. The long name is in Unicode, so each character in the name uses two bytes in the folder entry. The attribute field for the long name entries has the value 0x0F. The attribute field for the short name is 0x20.