Master Boot Record

Block zero on the disk

0000h

Boot Code

0. BIOS transfers to location 0000h
1. Locate "active" partition
2. Load 1st sector of partition into memory
3. Transfer execution to that code

0100h - 010Fh

Partition 1

0110h - 011Fh

Partition 2

0120h - 012Fh

Partition 3

0130h - 013Fh

Partition 4

0140h

Signature

DOS Partition

Disk Partition

Boot Block Contents
0x00 0x08 <jump to bootstrap>
0x08 0x10 Remaining block size
0x10 0x14 Bytes per block (bps)
0x14 0x18 Blocks/cluster (bps)
0x18 0x1C Reserved bytes (for
      boot record) (16)
0x1C 0x20 # of FATs (16bit)
0x20 0x24 # of root directory
      entries (word)
0x24 0x28 # of logical blocks
0x28 0x2C Volume Descr:
0x2C 0x30 # of blocks/FAT (byte)
0x30 0x34 Master/track
0x34 0x38 # of heads (surfaces)
0x38 0x3C # of hidden blocks (16)
0x3C 0x40 .... Bootstrap program

0x00

First block in first FAT

Blocks in any
  directory chain

First block in
  root directory

Last block in
  root directory

Beginning of
  data area on disk
DOS Directory Entry

8 bytes

<table>
<thead>
<tr>
<th>Name</th>
<th>Ext</th>
<th>Reserved</th>
<th>T</th>
<th>B</th>
<th>CN</th>
<th>Size</th>
</tr>
</thead>
</table>

Attribute:
- Read-only (read);
- Hidden (hidden);
- System (system file);
- Volume label (volume label file);
- Directory (directory file);
- Archive (archive file);
- Unused;
- Unused.

8 entries per block

FAT Values

0x000 - Unused block
0xFF0 - 0xFFF - Reserved
0xFF7 - Bad Cluster
0xFFF - 0xFFF - Last cluster in file
Anything else - next cluster in file
12 Bit FAT Example

The following is the FAT table for a 1300 byte file.
1 block/cluster, 512 bytes/block, starting at
cluster number 2. DOS values are stored "little endian."

<table>
<thead>
<tr>
<th>Byte No.</th>
<th>10</th>
<th>9</th>
<th>8</th>
<th>7</th>
<th>6</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>00 00 00 OF FF</td>
<td>00 40 03</td>
<td>FF FF F0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Cluster No

Cluster number 2

---

Boot Sector Example

<table>
<thead>
<tr>
<th>F</th>
<th>E</th>
<th>D</th>
<th>C</th>
<th>B</th>
<th>A</th>
<th>8</th>
<th>7</th>
<th>6</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>01</td>
<td>01</td>
<td>02</td>
<td>00</td>
<td>30</td>
<td>2E</td>
<td>35</td>
<td>53</td>
<td>4F</td>
<td>44</td>
<td>53</td>
<td>4D</td>
<td>90</td>
<td>3C</td>
</tr>
</tbody>
</table>

rb bpo bbp Migr Name jmp <bootcode>

<table>
<thead>
<tr>
<th>1F</th>
<th>1E</th>
<th>1D</th>
<th>1C</th>
<th>1B</th>
<th>1A</th>
<th>19</th>
<th>18</th>
<th>17</th>
<th>16</th>
<th>15</th>
<th>14</th>
<th>13</th>
<th>12</th>
<th>11</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>00</td>
<td>00</td>
<td>00</td>
<td>00</td>
<td>00</td>
<td>12</td>
<td>00</td>
<td>09</td>
<td>FO</td>
<td>0B</td>
<td>40</td>
<td>00</td>
<td>E0</td>
<td>02</td>
<td></td>
</tr>
</tbody>
</table>

hb heada bpt bpl MD nbiks nerk nPMT
Some Equations

Location of first FAT
\[ \text{FAT}\text{first} = \text{hb} + \text{rb} \]

Location of \(i\)-th FAT
\[ \text{FAT}\text{first}[i] = \text{hb} + \text{rb} + i \times \text{bp} \]

Number of blocks in root directory
\[ \text{nRoot} = (\text{sector} \times 32 + \text{bp} - 1) / \text{bp} \]

Logical block number of first block in a cluster
\[ \text{ln} = \text{hb} + \text{rb} + \text{nFAT} \times \text{bp} + \text{nRoot} + \text{ln} - 2 \times \text{bp} \]

VFAT Long File Names

Diagram showing the structure of VFAT long file names.
### Example Long File Name

<table>
<thead>
<tr>
<th>Directory Entry No</th>
<th>Name</th>
<th>Ext</th>
<th>Reserved</th>
<th>T</th>
<th>D</th>
<th>CN</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>File 1</strong></td>
<td>1</td>
<td></td>
<td></td>
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<td></td>
</tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>5 Unicode Char</td>
<td>6 Unicode Char</td>
<td>00</td>
<td>3 Chars</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>5 Unicode Char</td>
<td>6 Unicode Char</td>
<td>00</td>
<td>3 Chars</td>
<td></td>
<td></td>
</tr>
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<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>5 Unicode Char</td>
<td>6 Unicode Char</td>
<td>00</td>
<td>3 Chars</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td><strong>File 2</strong></td>
<td>5</td>
<td></td>
<td></td>
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<td></td>
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</table>