CSC414
COMPUTER SYSTEM FUNDAMENTALS

EXPLORING THE FAT FILE SYSTEM

PART II: FAT BOOT SECTOR

DIGITAL FORENSICS CENTER
DEPARTMENT OF COMPUTER SCIENCE AND STATICS

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THE UNIVERSITY OF RHODE ISLAND

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00:00

FAT PARTITION FORMAT

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- **Boot Record**
  - **Boot** Sector
    - BIOS Parameter Block (***BPB***)
  - Two extra sectors for **FAT32**:
    - File System Information Sector
      - **FSInfo** Sector
    - **Reserved** (empty) Sector
  - **FAT32** maintains copy of the three boot sectors
  - Starts at **Sector #6**
- **File Allocation Table**
  - Two copies for safety (**FAT1** & **FAT2**)
- **Root Directory of File System**
  - Directory of files and their attributes
- **Data Area**
  - Divided into clusters
    - Starts at **Cluster #2**
  - For **FAT32**,
    - Root Directory is part of the data area

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FAT BOOT SECTOR

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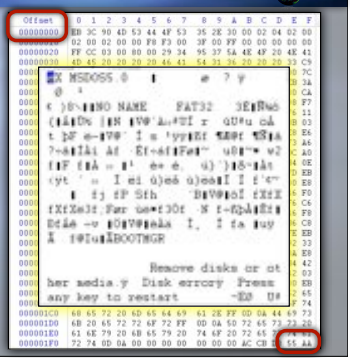
- **Located at `Sector 0` of Partition**
- **BIOS Parameter Block (BPB)**
  - Size and number of logical sectors
  - Size of clusters
  - Size and number of file allocation tables (FATs)
  - Size and location of root directory
  - Volume identification information
    - Serial number
    - Label
    - File System
  - Signature (`55 AA`)



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BIOS PARAMETER BLOCK

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BPB Parameter (First 32 bytes)	Offset (in Hex)	Offset (Decimal)	Length (in Bytes)	Common Values
Jump Instruction	00	0	2	0xEB 0x3C
NOP Instruction	02	2	1	0x90
OEM Name (ID of OS that formatted partition)	03	3	8	MSDOS5.0
Bytes Per Sector	0B	11	2	512
Sectors per Cluster	0D	13	1	2 to 64
Reserved Sectors (# of sectors that make up the Boot Record)	0E	14	2	varies
Number of File Allocation Tables (original + copy)	10	16	1	2
Number of Root Directory Entries (N/A for FAT32)	11	17	2	512
Number of Sectors in Partition (if partition < 32MB) (N/A for FAT32)	13	19	2	0
Media Descriptor (0xF8 for Hard Disks)	15	21	1	0xF8
Number of Sectors per FAT (N/A for FAT32)	16	22	2	varies
Number of Sectors Per Track	18	24	2	varies
Number of Heads	1A	26	2	varies
Number of Hidden Sectors	1C	28	4	0
Number of Sectors in Partition (if partition > 32MB)	20	32	4	varies

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BIOS PARAMETER BLOCK

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BPB Parameter (FAT12 / FAT16)	Offset (in Hex)	Offset (Decimal)	Length (in Bytes)	Common Values
Drive Number	24	36	1	0x80
Reserved	25	37	1	N/A
Signature (Extended boot sector description)	26	38	1	0x29
Volume ID (Volume Serial Number)	27	39	4	varies
Volume Label (if not present, see first entry in Root Directory)	2B	43	11	VARIES
File System Type	36	54	8	FAT16
Executable Code	3E	62	448	
End of Boot Sector Marker	01FE	510	2	0x55 0xAA

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BIOS PARAMETER BLOCK

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BPB Parameter (FAT32)	Offset (in Hex)	Offset (Decimal)	Length (in Bytes)	Common Values
Number of Sectors Per FAT	24	36	4	varies
Flags	28	40	2	0
Version of FAT32 Drive (High Byte = Major Version, Low Byte = Minor)	2A	42	2	0
Cluster Number of the Start of the Root Directory	2C	44	4	2
Sector Number of File System Information Sector	30	48	2	1
Sector Number of Backup Boot Sector	32	50	2	6
Reserved	34	52	12	00 … 00
Logical Drive Number of Partition	40	64	1	0x80
Unused	41	65	1	0
Extended Signature (0x29)	42	66	1	0x29
Serial Number of Partition	43	67	4	varies
Volume Name of Partition	47	71	11	VARIES
FAT Name (FAT32)	52	82	8	FAT32
Executable Code	5A	90	420	
End of Boot Sector Marker [0x55 0xAA]	01FE	510	2	0x55 0xAA

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File System Info Sector

- **FSInfo Sector (FAT32 only)**
  - Immediately follows the first sector, (BIOS Parameter Block)

FSInfo Sector for FAT32	Offset (in Hex)	Offset (Decimal)	Length (in Bytes)
Signature for FSInfo Sector (0x52 0x52 0x61 0x41) RRaA	00	0	4
Reserved	04	4	480
Signature for Start of FSInfo Data (0x72 0x72 0x41 0x61) rrAa	01E4	484	4
Number of Free Clusters on Partition (Set to -1 or FF FF FF FF if unknown)	01E8	488	4
Cluster Number of Cluster that was most recently Allocated (Set to -1 or FF FF FF FF if unknown)	01EC	492	4
Reserved	01F0	496	14
End of FSInfo Sector Marker [0x55 0xAA]	01FE	510	2

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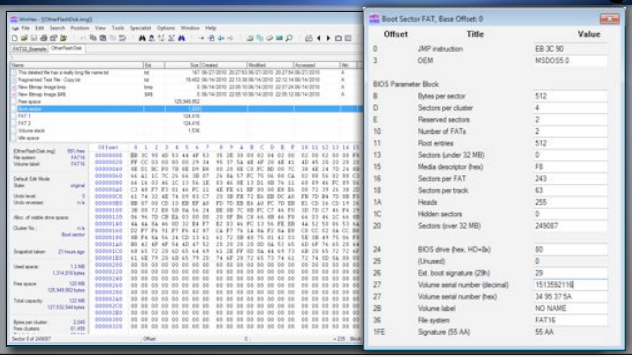
FAT16 BPB Information



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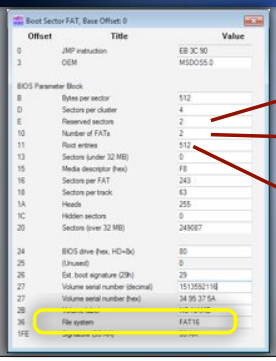
FAT16 BPB Information



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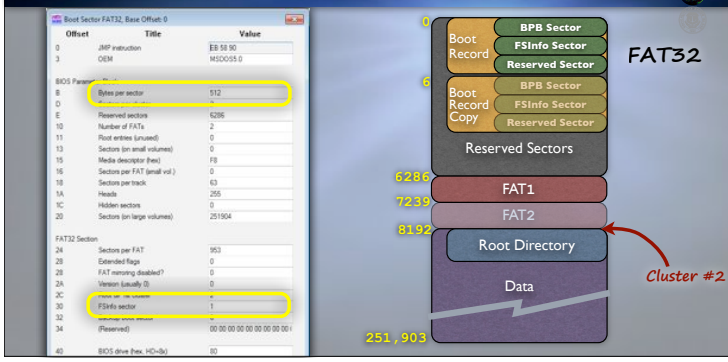
FAT32 BPB Information



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Exploring The FAT File System

Part II: FAT Boot Sector

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