

CM1604

Computer Systems Fundamentals

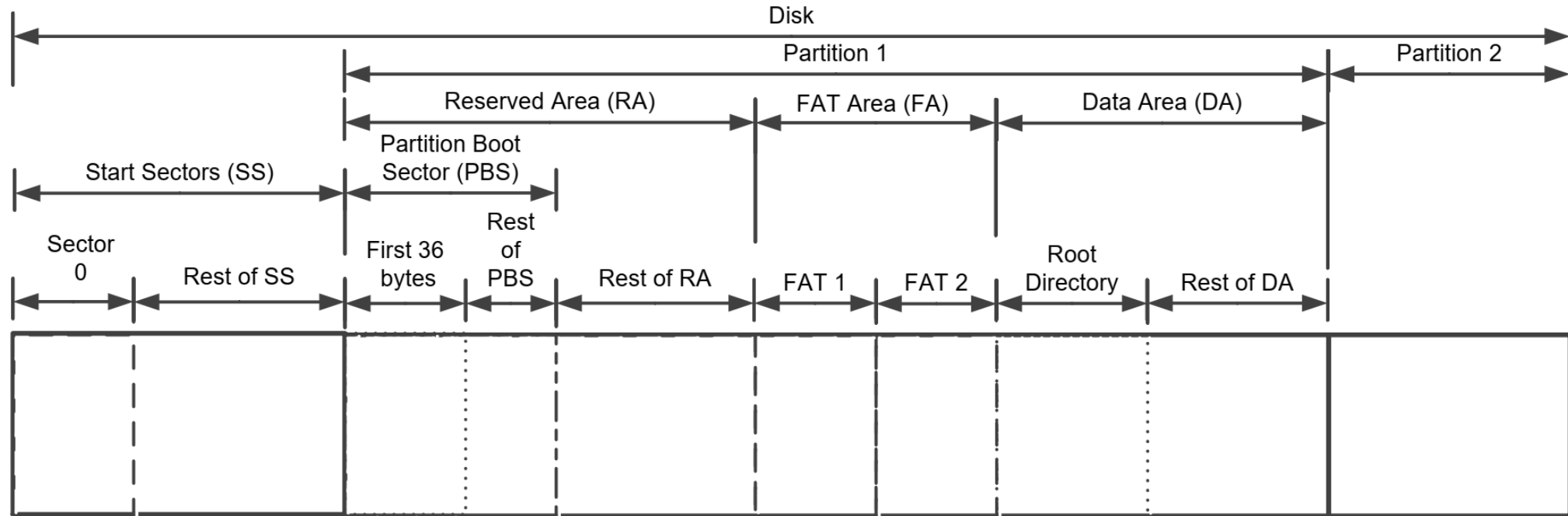
Partition Boot Sector

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In this week lecture..

- FAT File Systems
- FAT File System Structure
- FAT Boot Sector

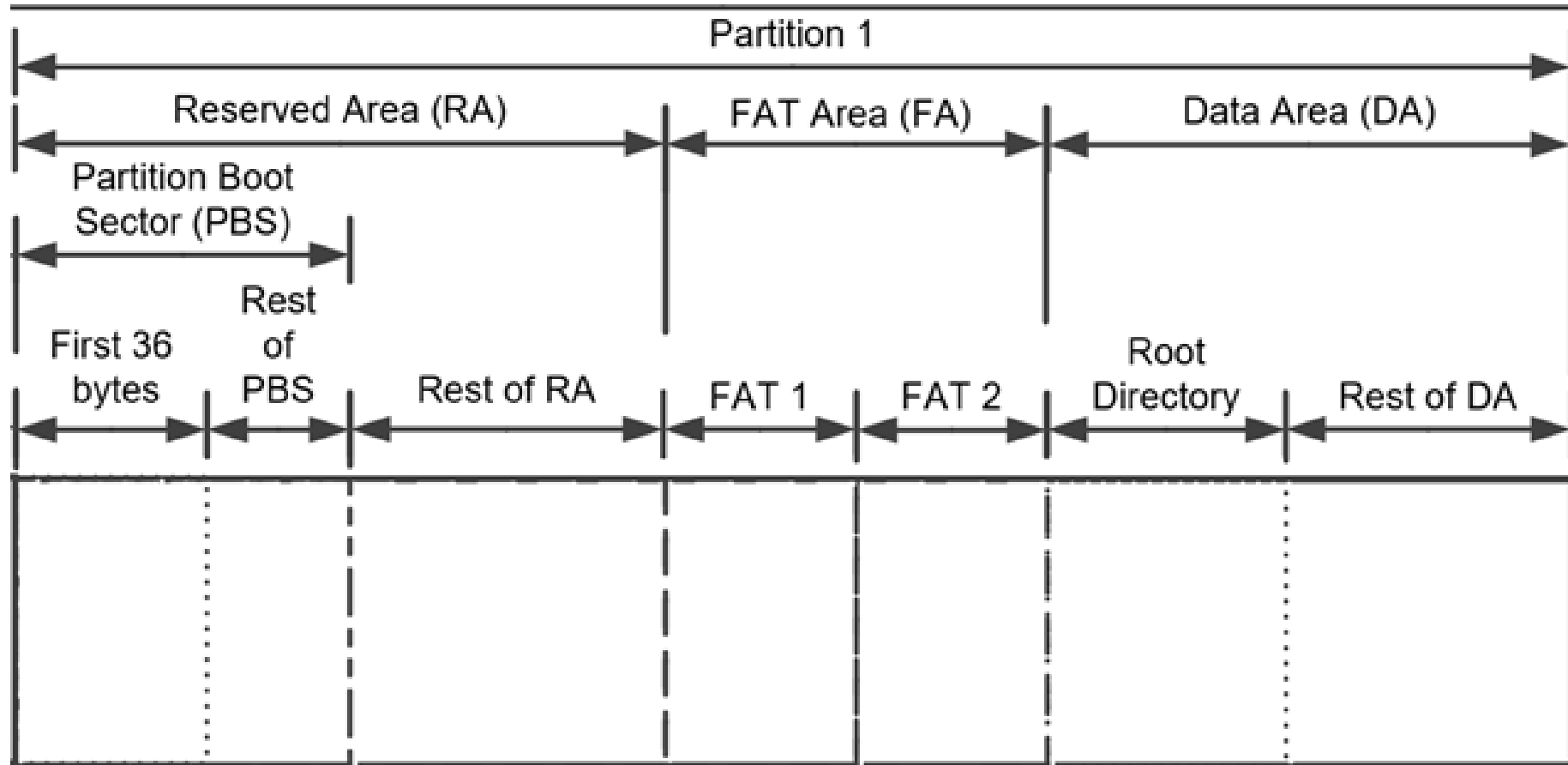
Schematic View of a Disk



FAT File Systems

- File Allocation Table (FAT) is a file system developed for personal computers.
- FAT 12 / FAT 16 / FAT32
- FAT is no longer the default file system for Windows Operating System.
- NTFS

FAT File System Structure



FAT File System Structure



- FAT Area contains the FATs. Generally there are 2 FATs
- Root Directory falls within the Data Area
- ✓ FAT12/16, Root Directory at beginning of Data Area
- ✓ FAT32, Root Directory can be anywhere in Data Area, but generally at beginning

FAT Boot Sector

Byte Range	Description
0-2	Jump instruction
3-10	OEM_Identifier
11-12	Bytes Per Sector
13 – 13	Sectors Per Cluster
14-15	Reserved Area Size in Sectors
16-16	Number of FATs
17-18	Root Entries
19-20	Number Of Sectors (Small Sectors)
21 -21	Media Type
22-23	Sectors per file allocation table (FAT)
24-25	Sectors Per Track
26-27	Number of Heads
28-31	Hidden Sectors - Number of sectors on the physical disk preceding the start of the volume
32-35	Number Of Sectors (Large Sectors)

FAT Boot Sector

File Edit Search View Analysis Tools Window Help

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Bytes per Sector

- The size of a hardware sector. For most disks, the value of this field is 512.
- Byte Range 11-12
- Little Endian: 00 02
- Big Endian: 02 00
- Bytes per Sector = 512

Offset (d)	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
00323584	EB	3C	90	4D	53	44	4F	53	35	2E	30	00	02	10	01	00
00323600	02	00	02	00	00	F8	F1	00	3F	00	FF	00	78	02	00	00
00323616	88	05	0F	00	00	00	29	5F	D9	73	9C	4E	4F	20	4E	41

Reserved Area Size in Sectors

- The number of sectors from the Partition Boot Sector to the start of the first file allocation table, including the Partition Boot Sector.
- Byte Range 14-15
- Little Endian: 01 00
- Big Endian: 00 01
- Reserved Area Size in Sectors = 1

Offset (d)	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
00323584	EB	3C	90	4D	53	44	4F	53	35	2E	30	00	02	10	01	00
00323600	02	00	02	00	00	F8	F1	00	3F	00	FF	00	78	02	00	00
00323616	88	05	0F	00	00	00	29	5F	D9	73	9C	4E	4F	20	4E	41

Number of FATs

- The number of copies of the file allocation table on the volume. Typically, the value of this field is 2.
- Byte Range 16-16
- Little Endian: 02
- Big Endian: 02
- Number of FATs = 2

Offset (d)	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
00323584	EB	3C	90	4D	53	44	4F	53	35	2E	30	00	02	10	01	00
00323600	02	00	02	00	00	F8	F1	00	3F	00	FF	00	78	02	00	00
00323616	88	05	0F	00	00	00	29	5F	D9	73	9C	4E	4F	20	4E	41

Root Entries

- The total number of file name entries that can be stored in the root folder of the volume.
- Byte Range 17-18
- Little Endian: 00 02
- Big Endian: 02 00
- Total number of file name entries that can be stored in the root folder = 512

Offset (d)	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
00323584	EB	3C	90	4D	53	44	4F	53	35	2E	30	00	02	10	01	00
00323600	02	00	02	00	00	F8	F1	00	3F	00	FF	00	78	02	00	00
00323616	88	05	0F	00	00	00	29	5F	D9	73	9C	4E	4F	20	4E	41

Number of Sectors in Partition i

- Small Sectors
- Byte Range : 19-20
- The number of sectors on the volume if the number fits in 16 bits (65535).
- Volumes larger than 65536 sectors, this field has a value of 0 and the Large Sectors field is used instead.

Offset (d)	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
00323584	EB	3C	90	4D	53	44	4F	53	35	2E	30	00	02	10	01	00
00323600	02	00	02	00	00	F8	F1	00	3F	00	FF	00	78	02	00	00
00323616	88	05	0F	00	00	00	29	5F	D9	73	9C	4E	4F	20	4E	41

Number of Sectors in Partition ii

- Large Sectors
- Byte Range : 32-35
- If the Small Sectors field is zero, this field contains the total number of sectors in the volume.
- If Small Sectors is nonzero, this field contains zero.

Number of Sectors in Partition iii

- Byte Range 32-35
- Little Endian: 88 05 0F 00
- Big Endian: 00 0F 05 88
- Number of Sectors in Partitions = 984,456

Offset (d)	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
00323584	EB	3C	90	4D	53	44	4F	53	35	2E	30	00	02	10	01	00
00323600	02	00	02	00	00	F8	F1	00	3F	00	FF	00	78	02	00	00
00323616	88	05	0F	00	00	00	29	5F	D9	73	9C	4E	4F	20	4E	41

Media type

- Provides information about the media being used.
- A value of 0xF8 indicates a hard disk.
- Byte Range: 21-21
- Media Type : Hard Drive

Offset (d)	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
00323584	EB	3C	90	4D	53	44	4F	53	35	2E	30	00	02	10	01	00
00323600	02	00	02	00	00	F8	F1	00	3F	00	FF	00	78	02	00	00
00323616	88	05	0F	00	00	00	29	5F	D9	73	9C	4E	4F	20	4E	41

Sectors per FAT

- Number of sectors occupied by each of the file allocation tables on the volume.
- Byte Range 22-23
- Little Endian: F1 00
- Big Endian: 00 F1
- Sector per FAT = 241

Offset (d)	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
00323584	EB	3C	90	4D	53	44	4F	53	35	2E	30	00	02	10	01	00
00323600	02	00	02	00	00	F8	F1	00	3F	00	FF	00	78	02	00	00
00323616	88	05	0F	00	00	00	29	5F	D9	73	9C	4E	4F	20	4E	41

Hidden Sectors

- This is the number of sectors on the physical disk preceding the start of the volume.
- Byte Range 28-31
- Little Endian: 78 02 00 00
- Big Endian: 00 00 02 78
- Number of Sectors before the start of volume = 632

Offset (d)	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
00323584	EB	3C	90	4D	53	44	4F	53	35	2E	30	00	02	10	01	00
00323600	02	00	02	00	00	F8	F1	00	3F	00	FF	00	78	02	00	00
00323616	88	05	0F	00	00	00	29	5F	D9	73	9C	4E	4F	20	4E	41

Further Reading
