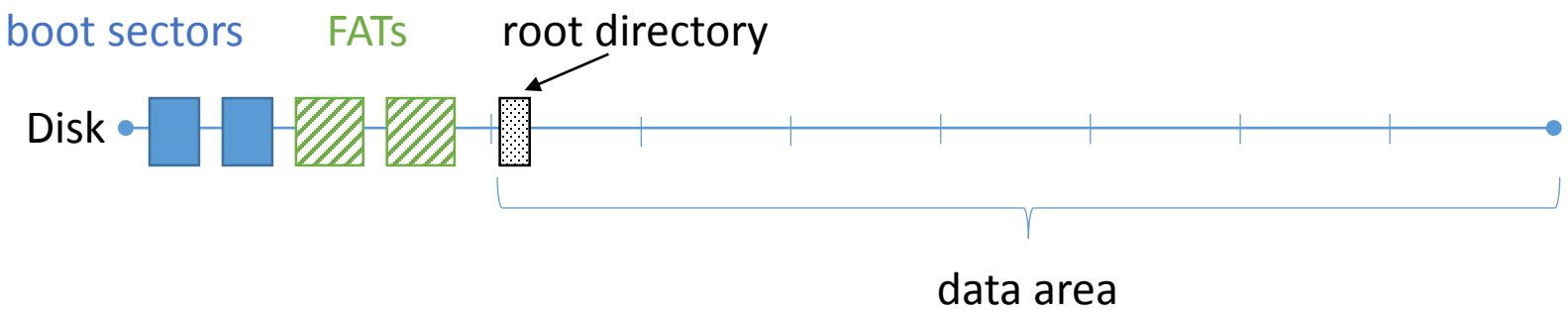
FAT, File Allocation Table

FAT8 – used 8 bits
FAT12 – used 12 bits
FAT16 – uses 16 bits
FAT32 – uses 28 bits
differ in the number of bits used for cluster numbers

exFAT – uses 32-bit cluster numbers
uses different format of directories

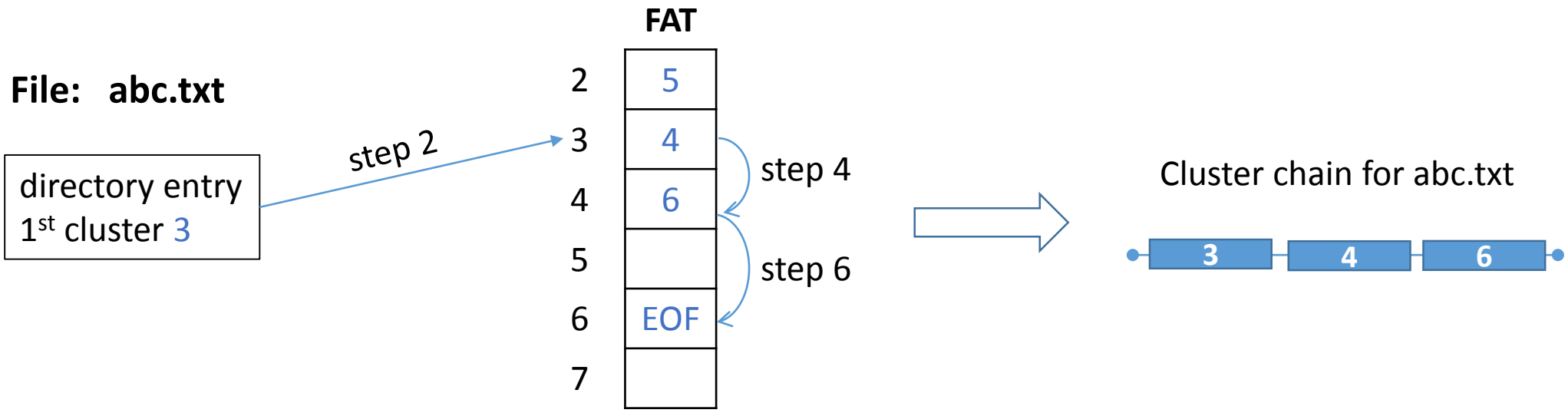
FAT volume layout



Filesystem elements	Data stored
Boot sectors	cluster size, volume size, FAT location and size
FAT tables	file content location
Directories	file names, sizes, timestamps, numbers of 1st clusters for files

FAT, File Allocation Table

read operation



Steps for reading abc.txt

1. Read data from cluster 3
2. Go to the element 3 of FAT table to find the next cluster (cluster 4)
3. Read cluster 4
4. Go to the element 4 of FAT table to find the next cluster (cluster 6)
5. Read cluster 6
6. Go to the element 6 of FAT table to find the next cluster – EOF (End Of File) – stop reading

FAT, File Allocation Table

two formats of FAT directory entry

Old Format, called 8.3. Standard

A directory entry stores

- short file name: 8 symbols for file name and 3 symbols for extension
- 1st cluster number
- file size
- date and time of file creation
- attributes

New Format

A directory entry stores

- long file name: stored in elements each holding 13 symbols of file name

Modern FAT directory entry
New format element: the end of the long name
New format element
…
New format element: the beginning of the long name
Old format element: short file name, 1st cluster, size,…

FAT, File Allocation Table

file deletion

Changes in directory entry

Directory entry for file abc.txt	
1	abc.txt
a	bc.txt

delete abc.txt

Directory entry for file abc.txt	
~~1~~	abc.txt
~~a~~	bc.txt

file deletion does not cause much damage in a directory entry

Changes in FAT table

	FAT
2	5
3	4
4	6
5	
6	EOF
7	

delete abc.txt

	FAT
2	5
3	0
4	0
5	
6	0
7	

FAT elements related to a file are zeroed. It is impossible to recover fragmented files