

## CSCI2160DiskLayout Handout and Worksheet

| Order of<br>Info on<br>Disk | Starts<br>Absolute<br>Sector | Size in<br>Sectors                                                                                                                                                                                                                                                     |
|-----------------------------|------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Boot Sector                 | 0                            | 1                                                                                                                                                                                                                                                                      |
| FAT1                        | 1                            | determine from Bios Parameter Block (BPB) in the Boot sector                                                                                                                                                                                                           |
| FAT2                        |                              | same as FAT1                                                                                                                                                                                                                                                           |
| FAT3                        |                              | same as FAT1 (if there are MORE than 2 FATs)                                                                                                                                                                                                                           |
| FATn                        |                              |                                                                                                                                                                                                                                                                        |
| ROOT                        |                              | The max entries are found in BPB (in Boot Sector). In the earlier versions of DOS the entries were 32 bytes each. To determine how many sectors the Root occupies, multiply the number of entries * 32 bytes / number of bytes per sector (often 512 bytes per sector) |
| Data Cluster 2 (DC2)        |                              | first sector beyond the ROOT. There is NO DC1                                                                                                                                                                                                                          |
| Data Cluster 3 (DC3)        |                              | next cluster beyond DC2                                                                                                                                                                                                                                                |

Example: Suppose that the Boot Sector reveals the following:

0200h bytes/sector

02h FATS

09h sectors/FAT

00E0h max entries (easier to do the arithmetic if you do it in hex. 512bytes = 200h bytes/sector, 32 bytes for each entry = 20h bytes/entry)

Number of sectors=  $\frac{00E0h \text{ entries} * 20h \text{ bytes/entry}}{200h \text{ bytes/sector}} = \frac{00E0h * 20h}{200h} = 0Eh \text{ (14 dec)}$   
in the ROOT

2 Sectors/Cluster

Describe the Disk Layout

Boot    FAT1                FAT2        ROOT        DC2    DC3        DC4 etc

|   |   |     |             |     |     |         |
|---|---|-----|-------------|-----|-----|---------|
| 1 | 9 | 9   | 0Eh sectors | 2   | 2   |         |
| 0 | 1 | 0Ah | 13h         | 21h | 23h | 25h.... |

Calculating the Absolute Data Sector of a given Data Cluster:

$DCn = DC2 + (n-2) * \text{Cluster Size}$

In the above example,  $DC4 = 21h + (4-2) * 2 = 21h + 4h = 25h$

### Finding all the sectors of a file on a FAT12 Disk

Each entry in a directory is 32 bytes in size. Among other information in each entry is the DataCluster for the very first cluster of the file. This can be found in the word at 1Ah in the entry.

Successive clusters for the file are found by referencing the FAT. An important thing to remember is that the FAT contains the **clusters** for a file and NOT the absolute sectors. Thus, if you actually want to load into memory a particular file, you must find each cluster, convert that to an absolute sector value, then load that sector into memory. Each time you find a cluster, that value will be used to determine the OFFSET into the FAT where the NEXT cluster can be found. You use the formula below to find the "next" cluster.

### Formula for determining the offset into the FAT where the NEXT cluster number can be found

Current Cluster number is N

If N is even, use

$N * 1.8h = \text{offset into FAT}$ . Add this number to the starting address for FAT. Find the word at that point UVXY and reverse: XYUVh since N is even, the next cluster is YUVh

If N is odd, use

$(N-1) * 1.8h + 1 = \text{offset into FAT}$ . At that offset, take the word UVXY and reverse: XYUV. Since N is odd, the next cluster is XYU