



**2021-2022 Academic Year
Spring Semester**

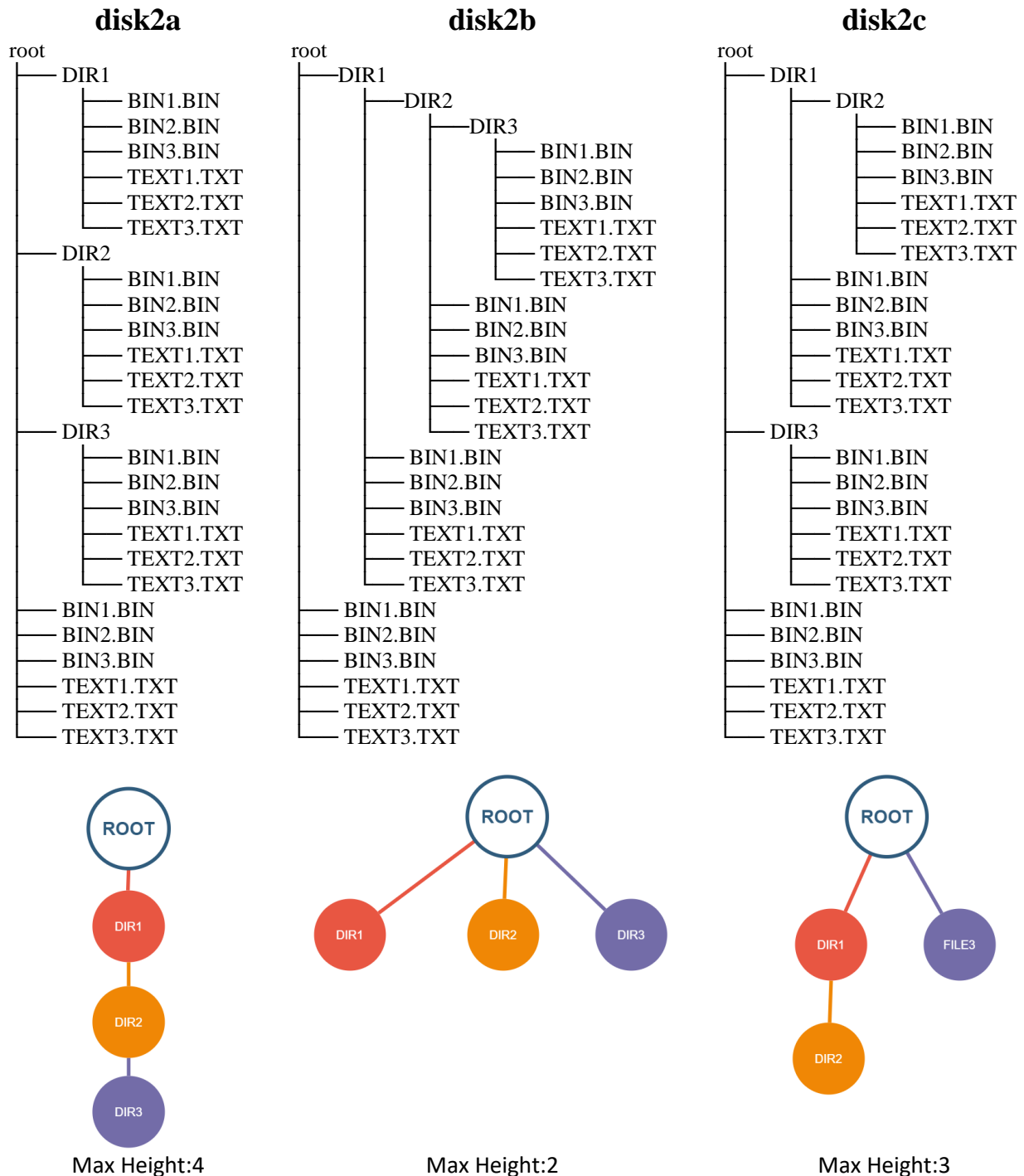
CS 342 PROJECT 4

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In this project, we implemented read-only operations that performs on FAT32 disk image. In this report, we tested operations on different disks, on different conditions and different parameters. We recorded their time and all of them are measured in microseconds (μ s). All of the operations are tested. Tests made in a virtual machine with 2GB ram in a machine that has 16GB ram and AMD Ryzen 5 3600 processor.

There are 3 disks are created. Test disks and their folder tree:



All disks includes 3 directories, 12 text DIRs and 12 bin DIRs. In all text files have same text. However, the differences are the locations of the directories. In disk2a, all of the directories are nested (DIR3 in DIR2 and DIR2 in DIR1). In disk2b, DIR1 and DIR3 are in root and DIR2 in DIR1. Therefore, their max height are different.

1. operation: v

DiskImage\Try	first	second	third
disk2a	1404	58	60
disk2b	1538	65	63
disk2c	1655	57	54

Table 1.

In different disk images, this operation has similar time results. The differences are negligible because they are too small relative to their time however, first tries are too slow compare to other tries (25 times slower). The reason is when the program tries to access same disk again, it can easily find and return the necessary values.

2. operation: s

DiskImage\ Sectornum	0	1	2
disk2a	54	55	58
disk2b	66	54	62
disk2c	63	66	54

Table 2.

In different disk images, this operation has similar time results. Also, for the different sector numbers, time results are not changing. So, for the operation s, diskimage and sectornum does not change the time. The reason is that accessing for all sectors and disks has same speed or time differences are negligible and all operations prints same number of lines.

3. operation: c

DiskImage\ Clusternum	2	3	4
disk2a	108	91	98
disk2b	93	96	106
disk2c	119	95	105

Table 3.

Clusternum starts from 2 because cluster 0 and cluster 1 does not exists. In different disk images, this operation has similar time results. Also, for the different cluster numbers, time results are not changing. So, for the operation c, diskimage and sectornum does not change the time. The reason is this operation spends most of their time for printing the results and length of the results are same.

4. operation: t

DiskImage	Time(μ s)
disk2a	116
disk2b	100
disk2c	109

Table 4.

In different disk images, this operation has similar time results. The reason is in our test disks they have same number of directory and file. However, they have minor differences because their max height is different.

5. operation: a

DiskImage\ Path	/DIR1/TEXT1.TXT	/TEXT1.TXT
disk2a	23	17
disk2b	21	20
disk2c	23	19

Table 5.

In different disk images, this operation has similar time results. /TEXT1.TXT is slightly faster than /DIR1/TEXT1.TXT because their height is different.

Disk: disk2b

Path	/TEXT1.TXT	/DIR1/TEXT1.TXT	/DIR1/DIR2/TEXT1.TXT	/DIR1/DIR2/DIR3/TEXT1.TXT
Time (μs)	18	18	19	24

Table 6.

The height affect the time for operation a. When the height increases (path is longer), spending time is also increases slightly.

6. operation: b

disk2b -b

Path	/TEXT1.TXT	/DIR1/TEXT1.TXT	/DIR1/DIR2/TXT1.TXT	/DIR1/DIR2/DIR3/TEXT1.TXT
Time (μs)	87	101	105	108

Table 7.

The height affect the time for operation b. When the height increases (path is longer), spending time is also increases.

7. operation: l

disk2b -l

Path	/	/DIR1	/DIR1/DIR2	/DIR1/DIR2/DIR3
Time (μs)	19	23	27	33

Table 8.

The height affect the time for operation l. When the height increases (path is longer), spending time is also increases slightly.

8. operation: n

disk2b -n

Path	/	/DIR1	/DIR1/DIR2	/DIR1/DIR2/DIR3
Time (μs)	8	13	15	16

Table 9.

The height affect the time for operation n. When the height increases (path is longer), spending time is also increases slightly.

9. operation: d

disk2b -d

Path	/	/DIR1	/DIR1/DIR2	/DIR1/DIR2/DIR3
Time (µs)	14	16	18	20

Table 10.

The height affect the time for operation d. When the height increases (path is longer), spending time is also increases slightly.

10. operation: f

./fat DISKNAME -f -1

DiskImage	disk2a	disk2b	disk2c
Time (µs)	635989	633448	620270

Table 11.

This operation is only tested with count -1 for different disks. -1 means print whole information. Their time results are similar because accessing times similar but the printing takes so much time.

11. operation: r

-r /DIR1/TEXT1.TXT (txt in folder)

DiskImage\ Offset, Count	100 64	1 30	10 50
disk2a	25	20	23
disk2b	26	19	23
disk2c	21	20	19

Table 12.

Changing the offset, count or diskimage does not affect much time for the operation r.

-r / TEXT1.TXT

DiskImage\ Offset, Count	100 64	1 30	10 50
disk2a	21	18	22
disk2b	24	19	25
disk2c	23	16	18

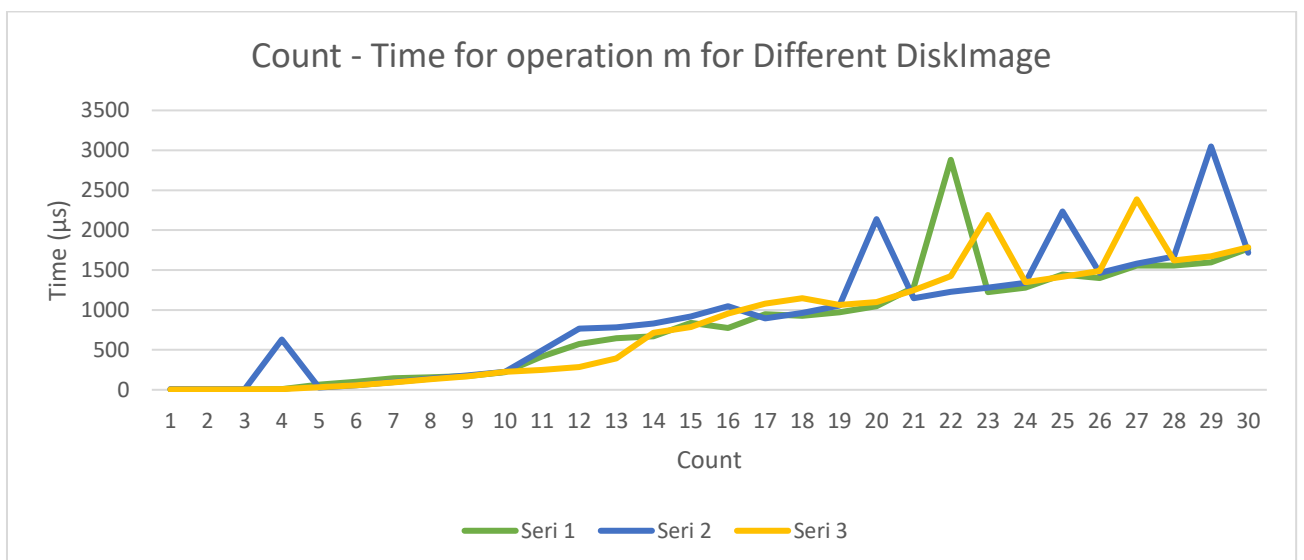
Table 13.

When Table 12 and 13 is compared, smaller path (-r / TEXT1.TXT) is slightly better than longer path (/DIR1/TEXT1.TXT)

12. operation: m

Count\ DiskImage	disk2a	disk2b	disk2c
1	6	9	4
2	4	7	5
3	5	7	5
4	10	628	9
5	66	29	33
6	100	56	58
7	145	97	94
8	158	140	131
9	172	182	167
10	219	226	223
11	417	492	247
12	574	766	284
13	646	783	393
14	671	831	714
15	840	920	785
16	776	1045	956
17	947	894	1079
18	925	961	1146
19	970	1053	1063
20	1045	2136	1099
21	1285	1146	1246
22	2881	1229	1422
23	1222	1279	2189
24	1278	1338	1349
25	1444	2232	1414
26	1401	1463	1487
27	1556	1580	2386
28	1557	1670	1619
29	1596	3048	1671
30	1767	1717	1785

Table 14.



In different disk images, this operation has similar time results. Some output is not regular however the general data shows that when the count increases, time increases.