Gebze Technical University

Department of Computer Engineering

CSE 312 /CSE 504

Operating Systems

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PART-1

Define your directory structure and directory entries;

```
struct BootSec
{
    int BS_JmpBoot : 3 * 8;
    char BS_OEMName[8];
    int BPB_BytsPerSec : 2 * 8;
    int BPB_SecPerClus : 1 * 8;
    int BPB_RsvdSecCnt : 2 * 8;
    int BPB_NumFATs : 1 * 8;
    int BPB_RootEntCnt : 2 * 8;
    int BPB_TotSec16 : 2 * 8;
    int BPB_Media : 1 * 8;
    int BPB_FATSz16 : 2 * 8;
    int BPB_SecPerTrk : 2 * 8;
    int BPB_NumHeads : 2 * 8;
    int BPB_HiddSec : 4 * 8;
    int BPB_TotSec32 : 4 * 8;
};

struct DirEntry
{
    char Filename[11];
    int Attributes : 1 * 8;
    int Reserved : 2 * 8;
    uint32_t CreationTimeAndDate;
    int LastAccessDate : 2 * 8;
    int Ignore : 2 * 8;
    uint32_t LastWriteTimeAndDate;
    int FirstLogicalCluster : 2 * 8;
    int FileSize : 4 * 8;
};
```

Define how and where you keep the free blocks;

- In the FAT table as a BİT MAP.

Define your superblock(Boot Sector?) that contains crucial information about the file system such as the block size, root directory position, block positions, etc.

-Block size = BPB_BytsPerSec;

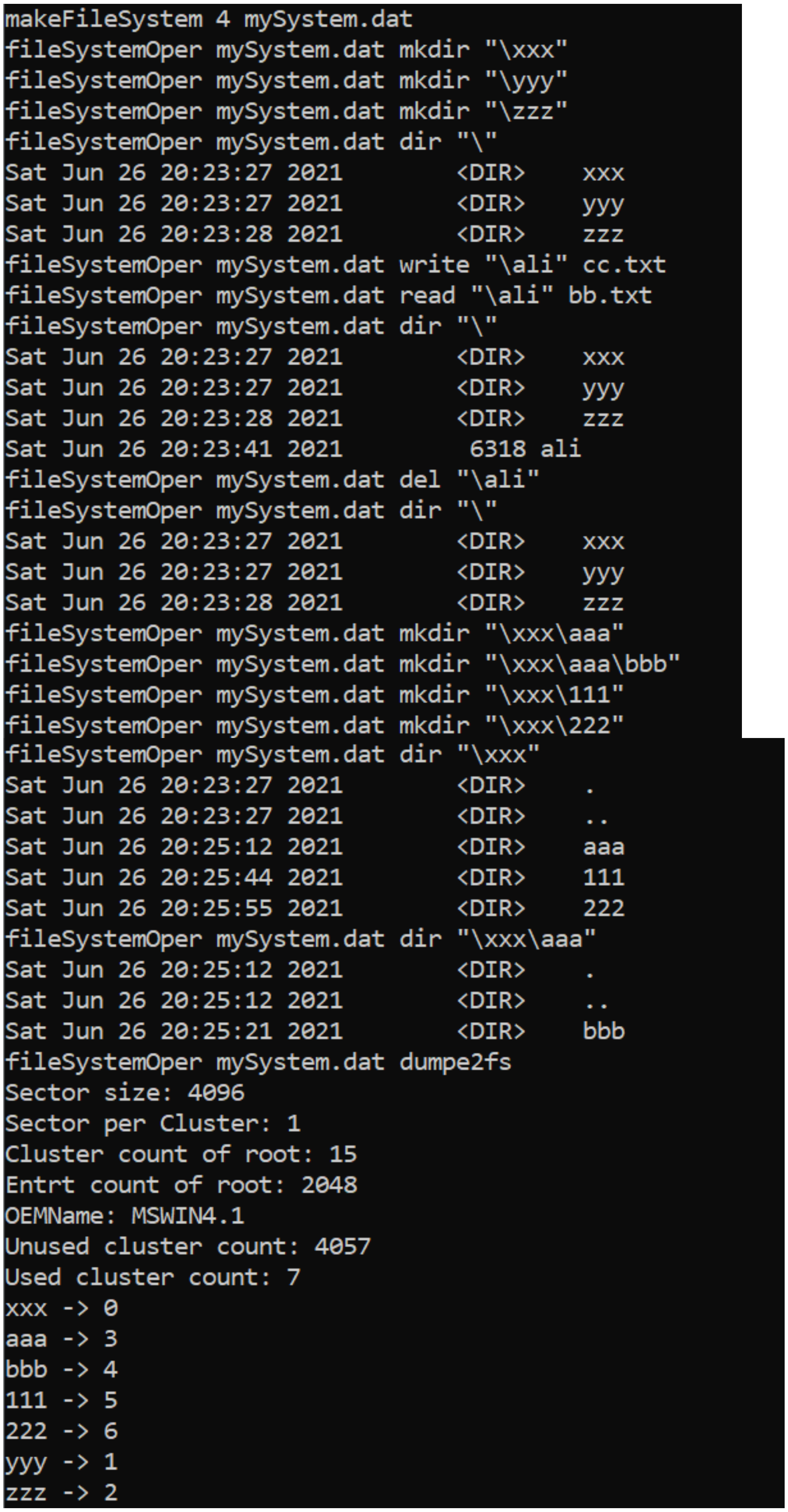
-Root directory= (BPB_NumFATs + 1)* BPB_BytsPerSec; (reserve 15 block for Fat table and 1 is boot sector)

-Block positions= RootDir + 16* BPB_BytsPerSec (reserved 16 block for root and Clusters start from 32.cluster physically – virtually 0 (it should be 2 but))

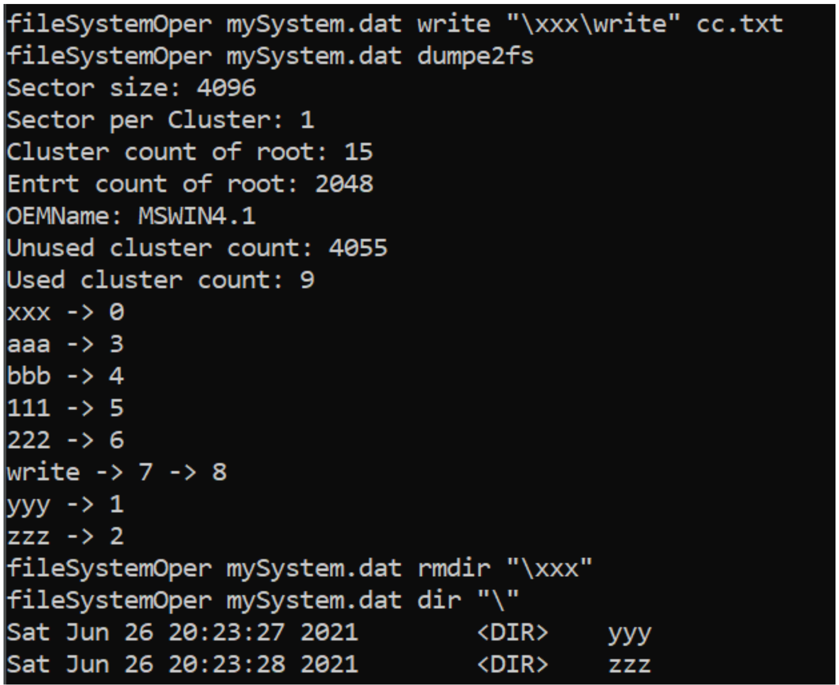
```
vector<string> parse(string str, string delim);
+parse string

vector<string> get_line_parse(string delim)
+read string from console and parse it

int toPhysAddr(int cluster)
+convert virtual cluster address to physical

void read_fat(int *arr)
+read Fat table to buffer

void write_fat(int *arr)
+write buffer to fat table

void read_root(void *buff)
+read root to buffer

void write_root(void *buff)
+write buffer to root

int count_unused()
+ return unused clusters count

int get_next_unused(bool isLast = false)
+it find an get first unused cluster index

void read_from_cluster(int clusterid, void *buff)
+ read cluster to buffer

void write_to_cluster(int clusterid, void *buff)
+write buffer to cluster by the clustered

void create_parent_dir(int clusterid, int parentdir)
+ after creation directory, this func add it “.” And “..”

int find_dir_size(struct DirEntry *dirs, int arrLen)
+returns how many there DirEntry are in the cluster

int find_dir_cluster(struct DirEntry *dirs, int size, string dirname)
+returns cluster id specified by dirname if it is found in cluster

int get_last_dir(string path)
+returns parent directory’s cluster id of added dir or file

void mkdir(string path)
+
void recursivermdir(int clusterid)
+it is helper method for rmdir
```

```
void rmdir(string path)
+
void listdir(struct DirEntry *dirs, int size)
+it is helper method for dir

void dir(string path)
+

void write_file(string path, string otherfile)
+
void read_file(string path, string otherfile)
+

void del(string path)
+
void create_disk(string sizekb, string filename)
+create disk after command

void recursive_traverser(int clusterid)
+it is helper function for dumpe2fs
void dumpe2fs()
+
```

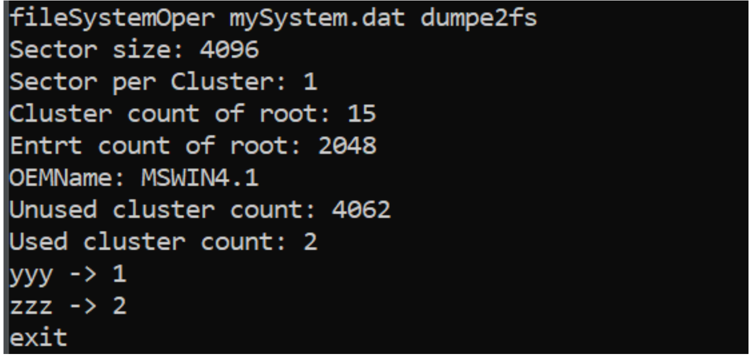
Tests



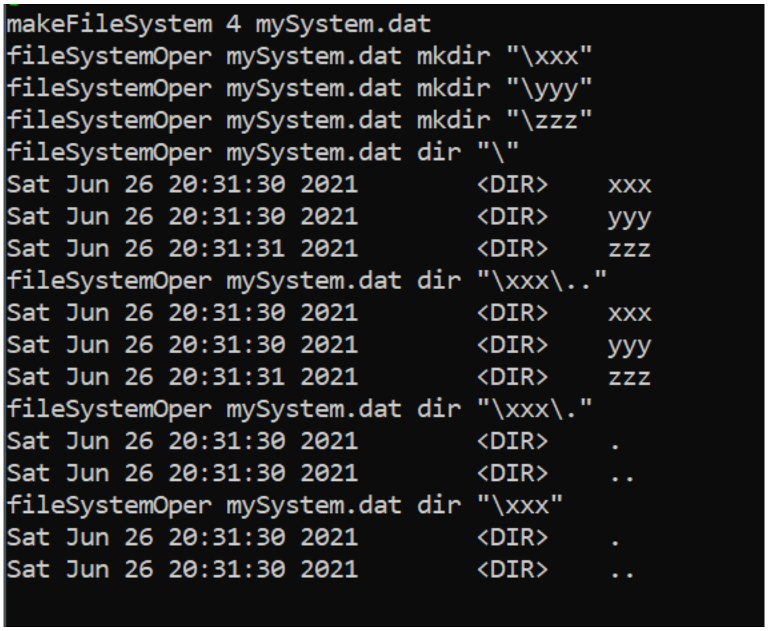
```
makeFileSystem 4 mySystem.dat
fileSystemOper mySystem.dat mkdir "\xxx"
fileSystemOper mySystem.dat mkdir "\yyy"
fileSystemOper mySystem.dat mkdir "\zzz"
fileSystemOper mySystem.dat dir "\"
Sat Jun 26 20:23:27 2021        <DIR>    xxx
Sat Jun 26 20:23:27 2021        <DIR>    yyy
Sat Jun 26 20:23:28 2021        <DIR>    zzz
fileSystemOper mySystem.dat write "\ali" cc.txt
fileSystemOper mySystem.dat read "\ali" bb.txt
fileSystemOper mySystem.dat dir "\"
Sat Jun 26 20:23:27 2021        <DIR>    xxx
Sat Jun 26 20:23:27 2021        <DIR>    yyy
Sat Jun 26 20:23:28 2021        <DIR>    zzz
Sat Jun 26 20:23:41 2021         6318 ali
fileSystemOper mySystem.dat del "\ali"
fileSystemOper mySystem.dat dir "\"
Sat Jun 26 20:23:27 2021        <DIR>    xxx
Sat Jun 26 20:23:27 2021        <DIR>    yyy
Sat Jun 26 20:23:28 2021        <DIR>    zzz
fileSystemOper mySystem.dat mkdir "\xxx\aaa"
fileSystemOper mySystem.dat mkdir "\xxx\aaa\bbb"
fileSystemOper mySystem.dat mkdir "\xxx\111"
fileSystemOper mySystem.dat mkdir "\xxx\222"
fileSystemOper mySystem.dat dir "\xxx"
Sat Jun 26 20:23:27 2021        <DIR>    .
Sat Jun 26 20:23:27 2021        <DIR>    ..
Sat Jun 26 20:25:12 2021        <DIR>    aaa
Sat Jun 26 20:25:44 2021        <DIR>    111
Sat Jun 26 20:25:55 2021        <DIR>    222
fileSystemOper mySystem.dat dir "\xxx\aaa"
Sat Jun 26 20:25:12 2021        <DIR>    .
Sat Jun 26 20:25:12 2021        <DIR>    ..
Sat Jun 26 20:25:21 2021        <DIR>    bbb
fileSystemOper mySystem.dat dumpe2fs
Sector size: 4096
Sector per Cluster: 1
Cluster count of root: 15
Entrt count of root: 2048
OEMName: MSWIN4.1
Unused cluster count: 4057
Used cluster count: 7
xxx -> 0
aaa -> 3
bbb -> 4
111 -> 5
222 -> 6
yyy -> 1
zzz -> 2
```



```
fileSystemOper mySystem.dat write "\xxx\write" cc.txt
fileSystemOper mySystem.dat dumpe2fs
Sector size: 4096
Sector per Cluster: 1
Cluster count of root: 15
Entrt count of root: 2048
OEMName: MSWIN4.1
Unused cluster count: 4055
Used cluster count: 9
xxx -> 0
aaa -> 3
bbb -> 4
111 -> 5
222 -> 6
write -> 7 -> 8
yyy -> 1
zzz -> 2
fileSystemOper mySystem.dat rmdir "\xxx"
fileSystemOper mySystem.dat dir "\"
Sat Jun 26 20:23:27 2021        <DIR>    yyy
Sat Jun 26 20:23:28 2021        <DIR>    zzz
```



```
fileSystemOper mySystem.dat dumpe2fs
Sector size: 4096
Sector per Cluster: 1
Cluster count of root: 15
Entrt count of root: 2048
OEMName: MSWIN4.1
Unused cluster count: 4062
Used cluster count: 2
yyy -> 1
zzz -> 2
exit
```



```
makeFileSystem 4 mySystem.dat
fileSystemOper mySystem.dat mkdir "\xxx"
fileSystemOper mySystem.dat mkdir "\yyy"
fileSystemOper mySystem.dat mkdir "\zzz"
fileSystemOper mySystem.dat dir "\"
Sat Jun 26 20:31:30 2021        <DIR>    xxx
Sat Jun 26 20:31:30 2021        <DIR>    yyy
Sat Jun 26 20:31:31 2021        <DIR>    zzz
fileSystemOper mySystem.dat dir "\xxx\.."
Sat Jun 26 20:31:30 2021        <DIR>    xxx
Sat Jun 26 20:31:30 2021        <DIR>    yyy
Sat Jun 26 20:31:31 2021        <DIR>    zzz
fileSystemOper mySystem.dat dir "\xxx\."
Sat Jun 26 20:31:30 2021        <DIR>    .
Sat Jun 26 20:31:30 2021        <DIR>    ..
fileSystemOper mySystem.dat dir "\xxx"
Sat Jun 26 20:31:30 2021        <DIR>    .
Sat Jun 26 20:31:30 2021        <DIR>    ..
```