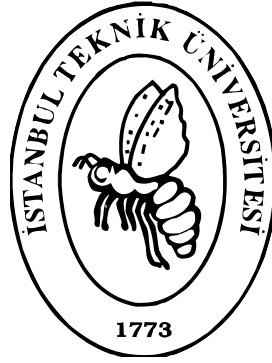


# **ISTANBUL TECHNICAL UNIVERSITY**

## **COMPUTER ENGINEERING DEPARTMENT**



BLG-413E  
**SYSTEM PROGRAMMING  
PROJECT 3**

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## INTRODUCTION

In this project, it is expected to implement a fuse filesystem which has capability of containing website files and serves it as html files are tidied using libtidy. Only constraint is html directory must be read only.



Figure-1: Expected Structure

## FIRST STEP

In the first step, we worked on libtidy. First we installed libtidy by using following commands.

```
git clone git@github.com:htacg/tidy-html5.git
cd {your-tidy-html5-directory}/build/cmake
cmake ../../ -DCMAKE_BUILD_TYPE=Release -DCMAKE_INSTALL_PREFIX=/usr
make
sudo make install
```

Figure-2: Install libtidy

After installation of libtidy we created a “new.c” file to use and learn libtidy. When we tried to compile the file we understood that “-I/usr/include/tidy -ltidy” must be written. In this file we wrote a code that takes a file content and gives the output as tidied. After reading some configuration header files we implemented our code output as giving xhtml with 4 indentation spaces.

```
ok = tidyOptSetBool( tdoc, TidyXhtmlOut, yes ); // Convert to XHTML
ind = tidyOptSetInt(tdoc,TidyIndentContent,yes); // Make indentation possible
indentation = tidyOptSetInt(tdoc,TidyIndentSpaces,4); // set indent space to 4
```

Figure-3: Xhtml and Indentation Configuration

## SECOND STEP

In this step, we tried to compile given examples in the lecture. We compiled and run them. After that we worked on them and we understood given functions in them and we made our filesystem for a try. After our basic filesystem we added read only option to our filesystem and we made all filesystem read only. So we completed our first target in Html directory. After that we added our tidy implementation and tested for different input files. In this step I must say that, we changed input part of our code because input was in buffer. So we tested this step by using debug screen.

## THIRD STEP

In this step, we wrote the tidied output into buffer by using tidySaveString() function. After that we made our returned byte number output size. After that we tested our buffer in the debug screen. Also we used memset function at the start of the read function because buffer must be cleared before filled.

```
(void)0;
memset(buf,0,size); // clear the last content for reading properly
// clear the buffer for reading properly
```

Figure-4: Clear the buffer

```
// print the result in the debug screen
tidySaveString(tdoc,buf,&output.size); // save tidy output to buffer to show user
res = output.size; // make res equals to output size for returning byte number
global_file_size = res; // make global file size number returned byte
printf("RESULT IS: \n %s %d\n",buf,res); // see the result in the buffer in debug screen
}
```

Figure-5: Write into buffer

## FOURTH STEP

In this step, we changed getatttr() function, because for a true output we need to give a true size and true file permissions to it. So, we used stat structure to specify paths attributes.

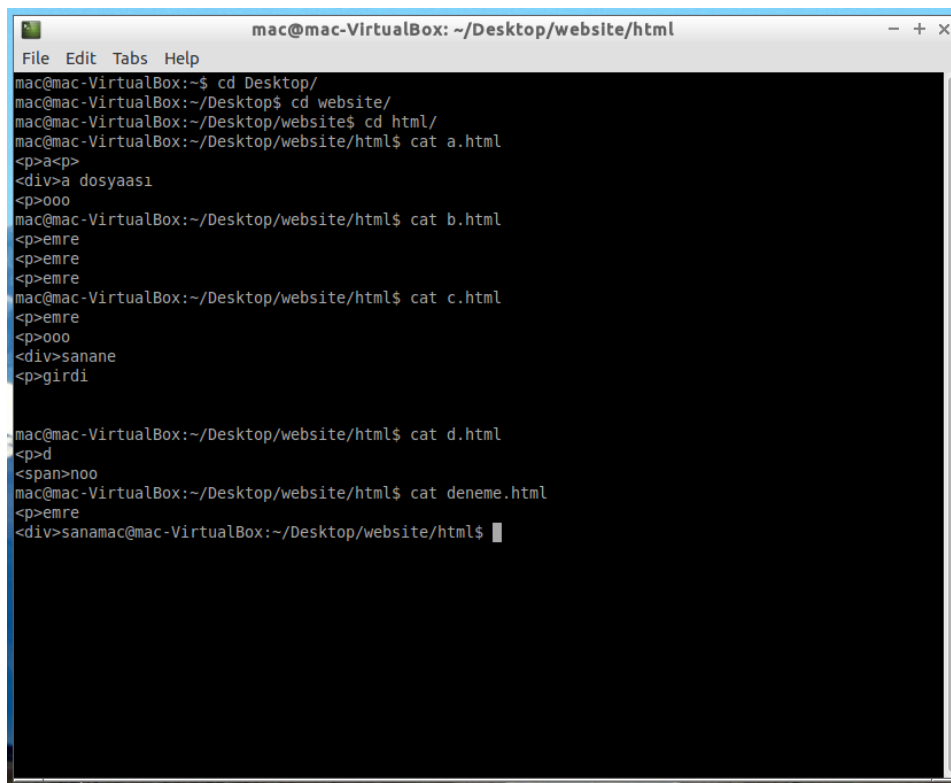
```
// make initialization for stat structure
memset(st_data, 0, sizeof(struct stat));
// if path include .html string then it needs to be tidied
// else it no tidy operation
if(strstr(upath,".html")==NULL)
{
    res = lstat(upath, st_data);
}
else
{
    st_data->st_mode = S_IFREG | 0444; // it shows it is a regular file and just read
    st_data->st_nlink = 1; // give one hardlink to point it
    st_data->st_size = global_file_size; // set the bytes for reading file
}
```

Figure-6: getatttr() function

## OUTPUTS

### 1. Picture

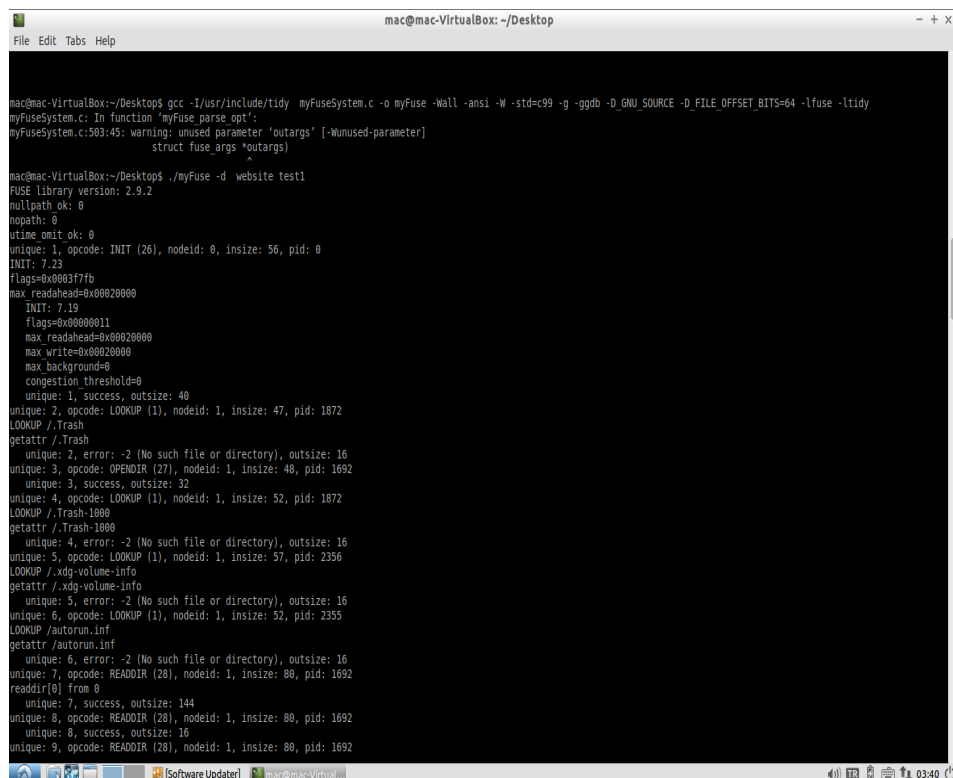
This picture shows that in our website/html/ path html files are not tidied.



```
mac@mac-VirtualBox: ~/Desktop/website/html
File Edit Tabs Help
mac@mac-VirtualBox:~$ cd Desktop/
mac@mac-VirtualBox:~/Desktop$ cd website/
mac@mac-VirtualBox:~/Desktop/website$ cd html/
mac@mac-VirtualBox:~/Desktop/website/html$ cat a.html
<p>a<p>
<div>a dosyaasi
<p>ooo
mac@mac-VirtualBox:~/Desktop/website/html$ cat b.html
<p>emre
<p>emre
<p>emre
mac@mac-VirtualBox:~/Desktop/website/html$ cat c.html
<p>emre
<p>ooo
<div>sanane
<p>girdi
mac@mac-VirtualBox:~/Desktop/website/html$ cat d.html
<p>d
<span>noo
mac@mac-VirtualBox:~/Desktop/website/html$ cat deneme.html
<p>emre
<div>sanamac@mac-VirtualBox:~/Desktop/website/html$
```

### 2. Picture

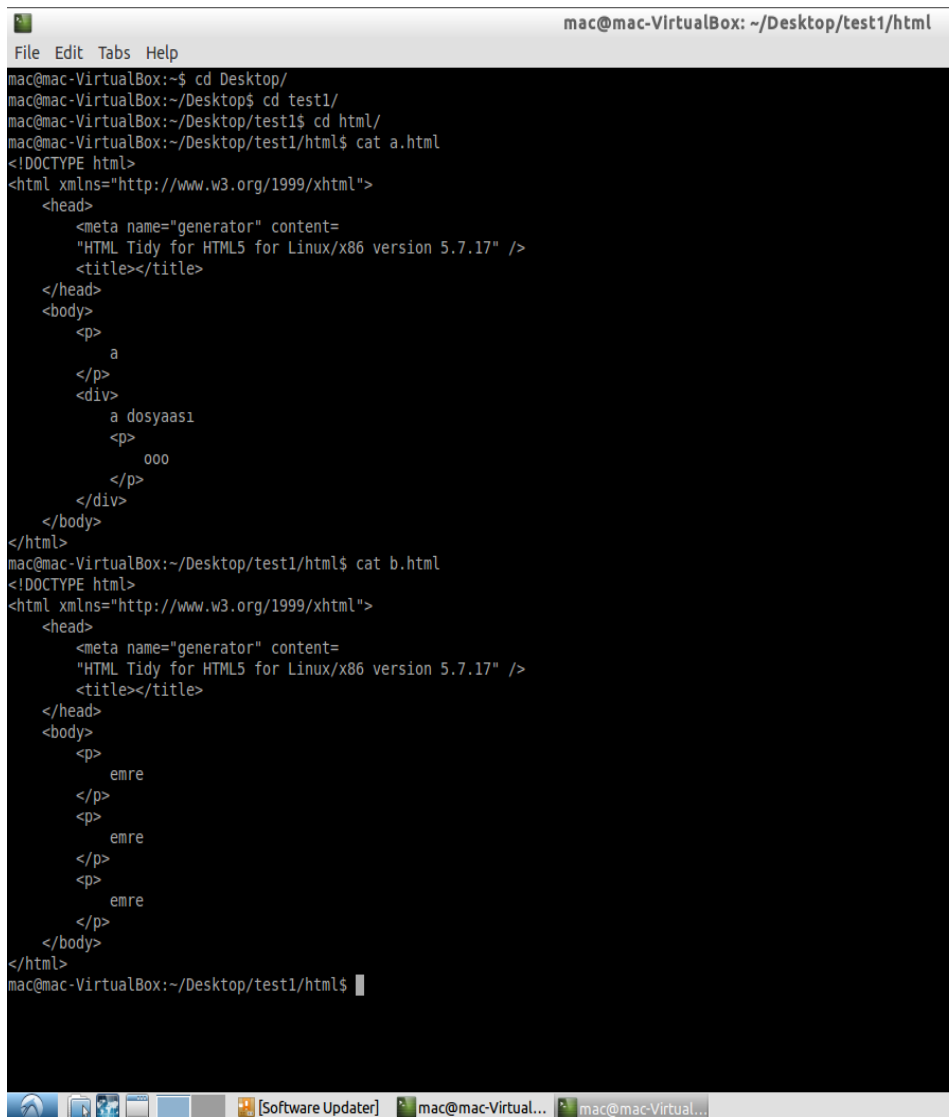
This picture shows that how to compile and run our filesystem.



```
mac@mac-VirtualBox: ~/Desktop
File Edit Tabs Help
mac@mac-VirtualBox:~/Desktop$ gcc -I/usr/include/tydi myFuseSystem.c -o myFuse -Wall -ansi -W -std=c99 -g -ggdb -D_GNU_SOURCE -D_FILE_OFFSET_BITS=64 -lfuse -ltidy
myFuseSystem.c: In function 'myFuse parse opt':
myFuseSystem.c:503:49: warning: unused parameter 'outargs' [-Wunused-parameter]
    struct fuse_args *outargs)
                              ^
mac@mac-VirtualBox:~/Desktop$ ./myFuse -d website test1
FUSE library version: 2.9.2
mountpath: ok: 0
nopath: 0
write omit ok: 0
unique: 1, opcode: INIT (26), nodeid: 0, insize: 56, pid: 0
INIT: 7.23
flags=0x00037fb
max_readahead=0x00020000
INIT: 7.19
flags=0x00000011
max_readahead=0x00020000
max_write=0x00020000
max_background=0
congestion_threshold=0
unique: 1, success, outsize: 40
unique: 2, opcode: LOOKUP (1), nodeid: 1, insize: 47, pid: 1872
LOOKUP /.Trash
getattr /.Trash
unique: 2, error: -2 (No such file or directory), outsize: 16
unique: 3, opcode: OPENDIR (27), nodeid: 1, insize: 48, pid: 1692
unique: 3, success, outsize: 32
unique: 4, opcode: LOOKUP (1), nodeid: 1, insize: 52, pid: 1872
LOOKUP /.Trash-1000
getattr /.Trash-1000
unique: 4, error: -2 (No such file or directory), outsize: 16
unique: 5, opcode: LOOKUP (1), nodeid: 1, insize: 57, pid: 2356
LOOKUP /.xdg-volume-info
getattr /.xdg-volume-info
unique: 5, error: -2 (No such file or directory), outsize: 16
unique: 6, opcode: LOOKUP (1), nodeid: 1, insize: 52, pid: 2355
LOOKUP /autorun.inf
getattr /autorun.inf
unique: 6, error: -2 (No such file or directory), outsize: 16
unique: 7, opcode: REaddir (28), nodeid: 1, insize: 80, pid: 1692
readdir[0] from 0
unique: 7, success, outsize: 144
unique: 8, opcode: REaddir (28), nodeid: 1, insize: 80, pid: 1692
unique: 8, success, outsize: 16
unique: 9, opcode: REaddir (28), nodeid: 1, insize: 80, pid: 1692
```

### 3. Picture

Tidied output of the html files.



```
mac@mac-VirtualBox: ~/Desktop/test1/html
File Edit Tabs Help
mac@mac-VirtualBox:~$ cd Desktop/
mac@mac-VirtualBox:~/Desktop$ cd test1/
mac@mac-VirtualBox:~/Desktop/test1$ cd html/
mac@mac-VirtualBox:~/Desktop/test1/html$ cat a.html
<!DOCTYPE html>
<html xmlns="http://www.w3.org/1999/xhtml">
  <head>
    <meta name="generator" content=
      "HTML Tidy for HTML5 for Linux/x86 version 5.7.17" />
    <title></title>
  </head>
  <body>
    <p>
      a
    </p>
    <div>
      a dosyaas1
      <p>
        000
      </p>
    </div>
  </body>
</html>
mac@mac-VirtualBox:~/Desktop/test1/html$ cat b.html
<!DOCTYPE html>
<html xmlns="http://www.w3.org/1999/xhtml">
  <head>
    <meta name="generator" content=
      "HTML Tidy for HTML5 for Linux/x86 version 5.7.17" />
    <title></title>
  </head>
  <body>
    <p>
      emre
    </p>
    <p>
      emre
    </p>
    <p>
      emre
    </p>
  </body>
</html>
mac@mac-VirtualBox:~/Desktop/test1/html$
```