
**Computer System Engineering**
**50.005**

**Week 1: Lab 4 (25 marks)**
**Objective:** File Operation in Shell Interface

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# The Goal of this lab

- In this lab, we will continue our work on lab1 by implementing file operation in Shell Interface using Java or C language.
- We extend the Shell Interface with several file operation methods.

# What to do!

- In this lab your code should handle four main requirements:
  1. Implement functions to create, delete, display a file
  2. Implement function to list a directory
  3. Implement function to find files under current directory and subdirectories
  4. Implement function to list subdirectories and files in a tree structure

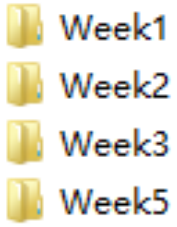
# From where to start!

- Open your eDimension and download the report for lab4
- Decide which language do you prefer based on your background
  - Java or C language
- Read the tasks one by one and use the help code provided in the report and the starting code in eDimention

- Don’t hesitate to ask for help from the teachers in the lab!
- Complete the shell with the required features and upload the Java or C file to eDimension before next lab

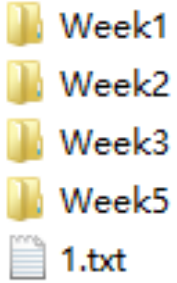
# Create

File and folders under current directory:




When we type in the following command:

jsh>create 1.txt or csh>create 1.txt



# Create

Java:

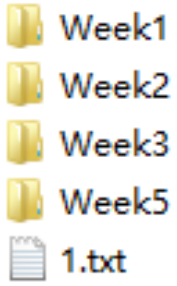
```
File file = new File(File dir, String name);
file.createNewFile();
```

C:

```
FILE *fp;
fp = fopen(fileName,"w+");
```

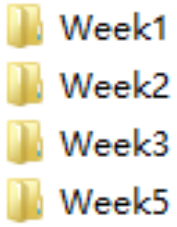
# Delete

File and folders under current directory:




When we type in the following command:

jsh>delete 1.txt or csh>delete 1.txt



# Delete

Java:

File file = new File(File dir, String name);

file.delete();

**C:**

~~system("rm filename");~~

You can use one of the two following functions to do that:

1- unlink function:

int unlink(const char *filename);

2- remove function:

int remove(const char *filename);

# Display

When we type in the following command:

jsh>display test.txt csh>display test.txt

The content inside “test.txt” will be displayed:

Hello.
This is the content inside test.txt file.

# Display

Java:

```
File file = new File(File dir, String name);
FileReader fileReader = new FileReader(file);
BufferedReader in = new BufferedReader(fileReader);
String line;

while((line = in.readLine())!= null){
        System.out.println(line);
}

in.close();
```

# Display

**C:**

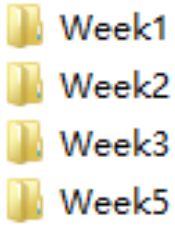
~~system(“cat filename”);~~

You can use different ways to do that, the easiest one it to read the file content line by line or char by char, either by scanf function or fget function:

```
FILE *fp;
fp =fopen(filename,”r”);
char ch;
while((ch=fgetc(fp) )!=EOF)
        printf(“c”,ch);
```

# List

File and folders under current directory:




When we type in the following command:

jsh>list or csh>list

The files under current directory will be printed out:

Week1
Week2
Week3
Week5

# List

## Show property of files

When we type in the following command:

jsh>list property or csh>list property

The files under current directory will be printed out:

| | | |
|---|---|---|
| Week1 | Size: 4096 | Last Modified: Mon Jan 26 13:10:47 SGT 2015 |
| Week2 | Size: 4096 | Last Modified: Sun Jan 18 21:09:22 SGT 2015 |
| Week3 | Size: 4096 | Last Modified: Thu Feb 05 16:43:57 SGT 2015 |
| Week5 | Size: 0 | Last Modified: Thu Feb 12 16:16:27 SGT 2015 |

# List

## Sort the file list by different property

When we type in the following command:

jsh>list property time

The files under current directory will be printed out:

| | | |
|---|---|---|
| Week2 | Size: 4096 | Last Modified: Sun Jan 18 21:09:22 SGT 2015 |
| Week1 | Size: 4096 | Last Modified: Mon Jan 26 13:10:47 SGT 2015 |
| Week3 | Size: 4096 | Last Modified: Thu Feb 05 16:43:57 SGT 2015 |
| Week5 | Size: 0 | Last Modified: Thu Feb 12 16:16:27 SGT 2015 |

# List

Java:

Get file list:

```
File dir;
File[] list = dir.listFiles();
```

Get file property:

```
File file;
file.getName();
file.length();
new Date(file.lastModified());
```

Sort file list:

Function is provided:

```
private static File[] sortFileList(File[] list, String sort_method);
```

# List

**C:**

Get file list:

Use two functions opendir() and readdir():

```
#include<dirent.h>
DIR * opendir(const char * dirname);
struct dirent *readdir(DIR *drip);
int readdir_r(DIR *drip, struct dirent *entry, struct dirent **result);
```

Get file property:

stat function:

```
#include<sys/stat.h>
int state(const char *restrict path, struct stat *restrict buf);
```

then use the struct fields to find each property like:

st_size,st_mtime and etc…

# List C, continue …

Sort file list:

```
#include<dirent.h>
int scandir(char *dirp, struct dirent ***namelist, int (*filter)(struct dirent *), int (*compare)(struct dirent **, struct dirent **));
```

and int alphasort(const struct dirent **d1, const struct dirent **d2);

# Find

When we type in the following command:
jsh>find .java csh>find .java

All files with ".java" substring under current directory and subdirectories will be shown:
C:\CSE_Lab\src\Week1\SimpleShell.java
C:\CSE_Lab\src\Week2\MergeSortThreaded.java
C:\CSE_Lab\src\Week2\MultiThread.java
C:\CSE_Lab\src\Week3\Bank.java
C:\CSE_Lab\src\Week3\BankImpl.java
C:\CSE_Lab\src\Week3\TestBank.java
C:\CSE_Lab\src\Week5\FileOperation.java

# Find: Java

In order to find files in current directory and its subdirectories, we need to implement a recursive function.

Function to get path of a file:

```
File file;
file.getAbsolutePath();
```

Function to check whether a file is a directory(folder):

```
File file;
file.isDirectory();
```

# Find: C

In order to find files in current directory and its subdirectories, ~~we can use find command in C. Check the manual page for find command and its option~~
~~Example:~~
~~find -name '*.txt'~~

You need to compare your files names with your substring, using strstr function:

#include<string.c>
char *strstr(const char *haystack, const char *needle);

# Tree

When we type in the following command:
jsh>tree or csh>tree

All files under current directory and its subdirectories will be shown in a tree structure:

```
Week1
  |-SimpleShell.java
Week2
  |-data
    |-input_1.txt
    |-input_2.txt
  |-MergeSortThreaded.java
  |-MultiThread.java
Week3
  |-Bank.java
  |-BankImpl.java
  |-TestBank.java
Week5
  |-FileOperation.java
```

# Tree

Like the **find** function, the **tree** function should also be recursive. (show current directory and subdirectories)

# Tree

We should be able to control the maximum level of subdirectories to be shown.
When we type in the following command:
jsh>tree 1 or csh>tree 1

The top level files will be shown:
Week1
Week2
Week3
Week5

# Tree

We should be able to control the maximum level of subdirectories to be shown.
When we type in the following command:
jsh>tree 2 or csh>tree 2

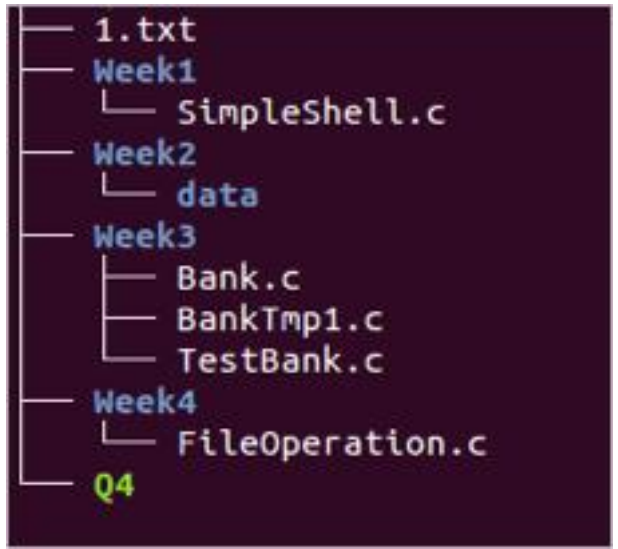
The files in top 2 levels will be shown:

```
Week1
  |-SimpleShell.java
Week2
  |-data
  |-MergeSortThreaded.java
  |-MultiThread.java
Week3
  |-Bank.java
  |-BankImpl.java
  |-TestBank.java
Week5
  |-FileOperation.java
```

# Tree

We should be able to control the maximum level of subdirectories to be shown based on specific property like Size, Time, Name …
When we type in the following command:
jsh>tree 2 time or csh>tree 2 time

The files in top 2 levels will be shown based on last time modified:



# Question 1, 2, 3 & 4

- Complete the program and upload the Java file or C file(for Q1 to Q4) to eDimension 4 March 2016

- Note that the due date is Thursday (two days more than usual).

- Sorry we had to disallow using the system() function

throughout for C. Thanks for bearing with us. Good Luck!