SINGAPORE UNIVERSITY OF
TECHNOLOGY AND DESIGN

Established in collaboration with MIT

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.

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

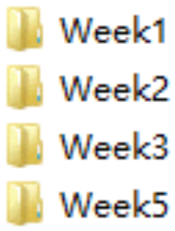
- Don’t hesitate to ask for help from the teachers in the lab!
- Complete the shell with the required features and upload the Java or C file to eDimension before 1 March 2016 at 11:59 PM

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

Create

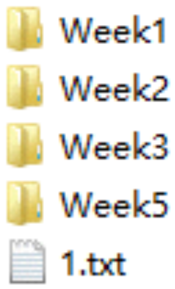
File and folders under current directory:



Week1
Week2
Week3
Week5

When we type in the following command:

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



Week1
Week2
Week3
Week5
1.txt

Create

Java:

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

http://docs.oracle.com/javase/7/docs/api/java/io/File.html

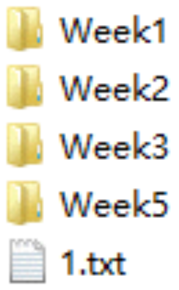
C:

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

http://www.thegeekstuff.com/2012/07/c-file-handling/

Delete

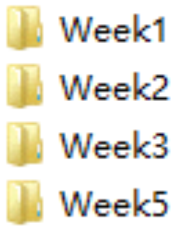
File and folders under current directory:



Week1
Week2
Week3
Week5
1.txt

When we type in the following command:

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



Week1
Week2
Week3
Week5

Delete

Java:

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

C:

```
system(“rm filename”);
```

Display

- When we type 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();
```

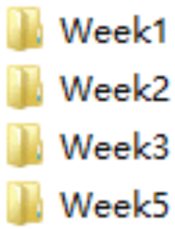
Display

C:

```
system(“cat filename”);
```

List

File and folders under current directory:



Week1
Week2
Week3
Week5

When we type in the following command:

```
jsh>list
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
```

The list function should be able to sort the files according to different property!

```
    list property time
    list property size
    list property name
```

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:

```
ls
```

Get file property:

```
ls -l
```

Sort file list:

Function is provided by typing the ls command options:
By time: ls -t -l
By Size: ls -S -l
By Name: ls -l

Find

When we type 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 options.

Example:

```
find -name '*.txt'
```

Tree

When we type 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 Levels

- 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 Levels

- 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:

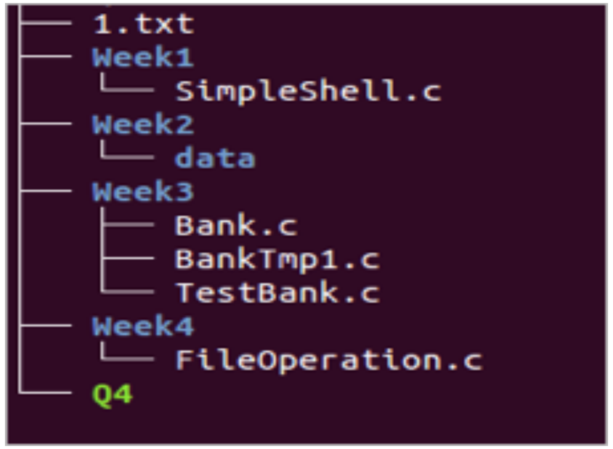
```
Week1
  |-SimpleShell.java
Week2
  |-data
  |-MergeSortThreaded.java
  |-MultiThread.java
Week3
  |-Bank.java
  |-BankImpl.java
  |-TestBank.java
Week5
  |-FileOperation.java
```

Tree Levels and Properties

- 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 the last time modified:



```
├── 1.txt
├── Week1
│   └── SimpleShell.c
├── Week2
│   └── data
├── Week3
│   ├── Bank.c
│   ├── BankTmp1.c
│   └── TestBank.c
├── Week4
│   └── FileOperation.c
└── Q4
```

Questions 1, 2, 3 & 4

- Complete the program and upload the Java file or C file(for Q1 to Q4) to eDimension before 1 March 2016 at 11:59 PM

- Good Luck ☺️ !