UCF "Practice" Local Contest — Aug 29, 2015

File/Directory Manipulation

Filename: `fildir`
(*Difficulty Level:* `Medium`)

Operating systems typically allow a user to organize his/her files in a hierarchical (tree structure) fashion. This provides better organization and it makes it easy to locate a file. Your program is to process some basic commands for file and directory manipulation in such operating systems. The commands are as follows:

init

This command appears at the beginning of the input to indicate initialization, i.e., we are starting an empty file system. An empty file system contains only the 'root' directory, which is always designated as '/home'. This will also become the current directory. The init command is used later on in the input when we wish to start with an empty file system again, i.e., all files and directories are deleted (go away).

end

This command indicates end of the input (your program terminates).

mkfile filename

This command creates a file in the current directory. The filename will be at least one and at most 10 characters long, and will consist of only letters (upper case and lower case) and digits.

mkdir dirname

This command creates a directory (subdirectory) in the current directory. The dirname will be at least one and at most 10 characters long, and will consist of only letters (upper case and lower case) and digits. The mkdir command will not be used to create more than five levels of subdirectories in the file system hierarchy (tree), i.e., the file system hierarchy (tree) will have at most five levels (precluding the root directory).

cd path

This command is used to change to a different directory. The path can be '..' which indicates go up to the parent directory, a dirname which goes down to the specified subdirectory, or any combination of '..' and dirnames, separated by '/', to go up and/or down the tree multiple times in one command. There will be at most five '/' in path, and the result will always be a valid directory.

ls

This command is used to list the file/directory names in the current directory (i.e., where we are). List the names in increasing order (by using a string comparison function such as strcmp for sorting). Assume that there will be at most 20 names (i.e., at most 20 file/directory names in any directory), that these names are distinct (i.e.,

no duplicate names in any directory), and that there will be at most 5000 user-created names in the entire file system.
If the current directory is empty (i.e., contains no files or directories), print a message indicating so.

The Input:

Each input command starts in column one. If an input line consists of two parts, there will be exactly one space separating the two parts. Assume that all the commands are syntactically and semantically correct, i.e., no error checking.

The Output:

Only the commands init and ls produce output. The init command generates only a heading. The ls command generates a heading and the information requested. Note that, for ls, the heading includes the current directory. At the top level, this will be /home. At the lower levels, it will include the rest of the path as well. Assume that every file system will have one or more ls commands, i.e., there will be one or more ls after each init. The program output (including the headings and spacing) are illustrated in Sample Output; follow the given format.

(Sample Input/Output on the next two pages)

Sample Input:

```
init
mkfile temp
mkdir COURSES
mkfile junk
mkdir CONTESTS
ls
cd COURSES
mkdir COP4020
cd COP4020
mkfile exam1
mkfile exam3
mkfile exam2
mkfile EXAM1
ls
cd ..
mkdir COT4810
cd COT4810
cd ../../CONTESTS
mkdir REAL
mkfile scoring
mkdir PRACTICE
ls
cd REAL
mkfile temp
mkdir junk
cd ../../COURSES/COT4810
ls
cd ..
ls
init
mkfile aaa
mkfile bbb
mkdir Level1
cd Level1
mkdir Level2a
mkdir Level2b
cd Level2a
mkdir Level3
cd Level3
mkdir Level4
cd ../../..
ls
end
```

Sample Output:

```
File system #1:

Listing for /home:
CONTESTS
COURSES
junk
temp

Listing for /home/COURSES/COP4020:
EXAM1
exam1
exam2
exam3

Listing for /home/CONTESTS:
PRACTICE
REAL
scoring

Listing for /home/COURSES/COT4810:
There are no files/directories.

Listing for /home/COURSES:
COP4020
COT4810

File system #2:

Listing for /home:
Level1
aaa
bbb
```