

OS Lab 2

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Q1. Write a C program to emulate the ls -l UNIX command that prints all files in a current directory and lists access privileges, etc. DO NOT simply exec ls -l from the program.

how to run: . / q1 path

```
#include <unistd.h>
#include <sys/stat.h>
#include <sys/types.h>
#include <stdlib.h>
#include <stdio.h>
#include <dirent.h>
#include <string.h>

void main(int agrv, char ** arg) {
    DIR *mydir = opendir(arg[1]);

    struct dirent *myfile;
    struct stat fileStat;
    stat(".", &fileStat);

    while ((myfile = readdir(mydir)) != NULL) {
        stat(myfile->d_name, &fileStat);

        if (strcmp(".", myfile->d_name) == 0 || strcmp("../", myfile->d_name) == 0)
            continue;
        else {
            printf("Filename: %s\n", myfile->d_name);
            printf("Permission: ");
            printf( (_ISDIR(fileStat.st_mode)) ? "d" : "-");
            printf( (fileStat.st_mode & S_IRUSR) ? "r" : "-");
            printf( (fileStat.st_mode & S_IWUSR) ? "w" : "-");
            printf( (fileStat.st_mode & S_IXUSR) ? "x" : "-");
            printf( (fileStat.st_mode & S_IRGRP) ? "r" : "-");
            printf( (fileStat.st_mode & S_IWGRP) ? "w" : "-");
            printf( (fileStat.st_mode & S_IXGRP) ? "x" : "-");
            printf( (fileStat.st_mode & S_IROTH) ? "r" : "-");
            printf( (fileStat.st_mode & S_IWOTH) ? "w" : "-");
            printf( (fileStat.st_mode & S_IXOTH) ? "x" : "-");
            printf("\n\n");
        }
    }

    closedir(mydir);
}
```

```
student@lplab-Lenovo-Product: ~/Desktop/OS-Lab/Lab2
student@lplab-Lenovo-Product:~/Desktop/OS-Lab/Lab2$ ./q1 ../Lab1/codes
Filename: in.txt
Permission: drwxrwxr-x

Filename: q2_more.c
Permission: drwxrwxr-x

Filename: q3_conversion_specifier.c
Permission: drwxrwxr-x

Filename: q4_copy.c
Permission: drwxrwxr-x

Filename: q1_grep.c
Permission: drwxrwxr-x

Filename: sample.c
Permission: drwxrwxr-x

Filename: out.txt
Permission: drwxrwxr-x

student@lplab-Lenovo-Product:~/Desktop/OS-Lab/Lab2$
```

Q2. Write a program that will list all files in a current directory and all files in subsequent subdirectories (like tree)

how to run: ./q2 path

```
#include <unistd.h>
#include <sys/stat.h>
#include <stdlib.h>
#include <stdio.h>
#include <string.h>
#include <dirent.h>

void printSpace(int depth) {
    for (int i = 0 ; i < depth ; i++) {
        printf("  ");
    }
}

void printRecursive(char *dir, int depth) {

    DIR* fd = opendir(dir);

    if (fd == NULL) {
        fprintf(stderr, "Error! Can't open %s\n", dir);
        exit(0);
    }

    chdir(dir);

    struct dirent* entry;
    struct stat buffer;

    while ((entry = readdir(fd)) != NULL) {
        lstat(entry->d_name, &buffer);

        if (S_ISDIR(buffer.st_mode)) {

            if (strcmp(".", entry->d_name) == 0 || strcmp("../", entry->d_name) == 0) {
                continue;
            }

            // print
            printSpace(depth);
            printf("%s \n", entry->d_name);

            printRecursive(entry->d_name, depth + 1);
        }
    }
}
```

```

        else {

            // print
            printSpace(depth);
            printf("%s \n", entry->d_name);

        }

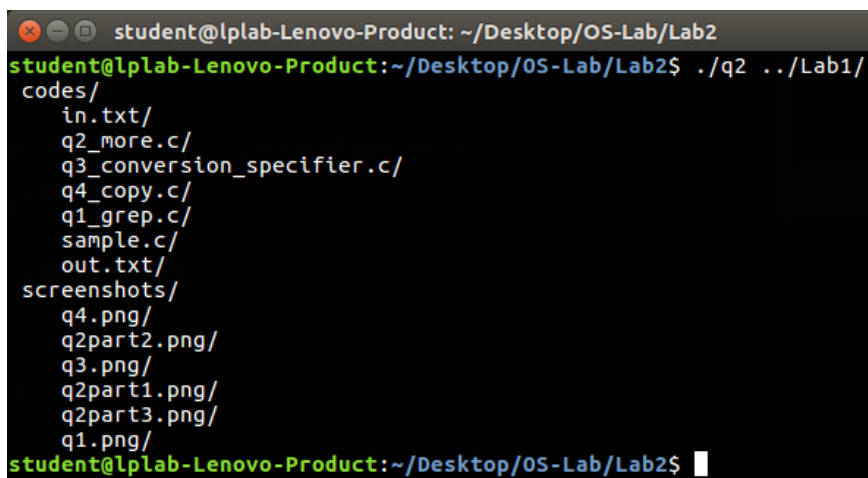
        chdir("..");
        closedir(fd);
    }

    void main(int argv, char** arg) {

        // must have path
        if (argv != 2) {
            printf("Invalid syntax.\nFormat: ./q2 path \n");
            exit(0);
        }

        printRecursive(arg[1], 0);
    }

```



A terminal window titled 'student@lplab-Lenovo-Product: ~/Desktop/OS-Lab/Lab2'. The user has executed the command './q2 ../Lab1/'. The output lists the contents of the 'Lab1' directory, which are organized into two categories: 'codes/' and 'screenshots/'. Under 'codes/', there are files: 'in.txt/', 'q2_more.c/', 'q3_conversion_specifier.c/', 'q4_copy.c/', 'q1_grep.c/', 'sample.c/', 'out.txt/'. Under 'screenshots/', there are files: 'q4.png/', 'q2part2.png/', 'q3.png/', 'q2part1.png/', 'q2part3.png/', and 'q1.png/'.

```

student@lplab-Lenovo-Product: ~/Desktop/OS-Lab/Lab2
student@lplab-Lenovo-Product:~/Desktop/OS-Lab/Lab2$ ./q2 ../Lab1/
codes/
  in.txt/
  q2_more.c/
  q3_conversion_specifier.c/
  q4_copy.c/
  q1_grep.c/
  sample.c/
  out.txt/
screenshots/
  q4.png/
  q2part2.png/
  q3.png/
  q2part1.png/
  q2part3.png/
  q1.png/
student@lplab-Lenovo-Product:~/Desktop/OS-Lab/Lab2$

```

Q3. How do you list all installed programs in Linux?

```
./q1 usr/lib
```

```
paawan@paawan: ~/Desktop/OS-Lab/Lab2/codes
File Edit View Search Terminal Help
paawan@paawan:~/Desktop/OS-Lab/Lab2/codes$ ./q1 /usr/lib
Filename: valgrind
Permission: drwxr-xr-x

Filename: at-spi2-core
Permission: drwxr-xr-x

Filename: mozilla
Permission: drwxr-xr-x

Filename: python3.8
Permission: drwxr-xr-x

Filename: cups
Permission: drwxr-xr-x

Filename: mysql
Permission: drwxr-xr-x

Filename: xserver-xorg-video-intel-hwe-18.04
Permission: drwxr-xr-x

Filename: pcmciautils
Permission: drwxr-xr-x

Filename: fwupd
Permission: drwxr-xr-x

Filename: gst-install-plugins-helper
Permission: drwxr-xr-x

Filename: libgimpmodule-2.0.so.0
Permission: drwxr-xr-x

Filename: compat-ld
Permission: drwxr-xr-x

Filename: gnupg2
```

Q4. How do you find out what RPM packages are installed on Linux?

```
./q1 /var/lib/rpm
```

```
paawan@paawan: ~/Desktop/OS-Lab/Lab2/codes
File Edit View Search Terminal Help
paawan@paawan:~/Desktop/OS-Lab/Lab2/codes$ ./q1 /var/lib/rpm
paawan@paawan:~/Desktop/OS-Lab/Lab2/codes$
```