

Task 9: Directory Operations in C

1. Objective

The objective of this task is to understand directory-related system calls in C. The program demonstrates how to list directory contents, change the working directory, and create a new directory with specific permissions.

2. Problem Statement

Write a C program to:

- List all files and directories in the current working directory.
- Change the current working directory to "/tmp".
- Create a new directory named "testdir" inside "/tmp".
- Set the permissions of the directory to 755.

3. C Program Code

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

int main() {
    DIR *dir;
    struct dirent *entry;

    // List files in current directory
    printf("Listing files in current directory:\n");
    dir = opendir(".");

    if (dir == NULL) {
        perror("Unable to open directory");
        return 1;
    }

    while ((entry = readdir(dir)) != NULL) {
        printf("%s\n", entry->d_name);
    }
    closedir(dir);

    // Change directory to /tmp
```

```

if (chdir("/tmp") != 0) {
    perror("Failed to change directory");
    return 1;
}

printf("\nChanged working directory to /tmp\n");

// Create directory testdir with permission 755
if (mkdir("testdir", 0755) == 0) {
    printf("Directory 'testdir' created successfully with permissions 755\n");
} else {
    perror("Failed to create directory");
}

return 0;
}

```

4. Explanation of the Code

- `opendir()`: Opens the current directory.
- `readdir()`: Reads directory entries one by one.
- `closedir()`: Closes the directory stream.
- `chdir()`: Changes the current working directory.
- `mkdir()`: Creates a new directory with specified permissions.
- 0755: Owner has full permissions; group and others have read and execute permissions.

5. Output

```

student@student-virtual-machine:~/25SUB4508_LSP/25SUB4508_56133/Assignments/day24$ gcc directory_operations.c -o directory_operation
s
student@student-virtual-machine:~/25SUB4508_LSP/25SUB4508_56133/Assignments/day24$ ./directory_operations
Listing files in current directory:
.
directory_operations
file_operations.c
..
directory_operations.c

Changed working directory to /tmp
Directory 'testdir' created successfully with permissions 755

student@student-virtual-machine:~/25SUB4508_LSP/25SUB4508_56133/Assignments/day24$ cd /tmp
student@student-virtual-machine:/tmp$ ls -l
total 92
drwxr-xr-x 2 student student 4096 Jan  7 12:39 [107C6FA6-2929-4216-858F-287383987486]
drwxr-xr-x 2 student student 4096 Jan  7 10:29 [26E4AEF1-ED7C-4E0F-80E9-7469F0BC47E3]
drwxr-xr-x 2 student student 4096 Dec 30 22:57 [62515D0D-D349-427A-8315-A9177A98EC23]
drwxr-xr-x 2 student student 4096 Jan  7 12:38 [7438C7CB-7560-49F0-B508-E373D498D2EE]
drwxr-xr-x 2 student student 4096 Dec 29 15:16 [89BA2058-CF17-40A5-AC5D-B5E62067555A]
drwxr-xr-x 2 student student 4096 Jan  7 12:39 [AB21872F-FB93-4E45-ABEC-8496D161A702]
drwxr-xr-x 2 student student 4096 Jan  7 12:38 [834F937D-707C-4771-895B-F4B12AFA3830]
drwxr-xr-x 2 student student 4096 Jan  7 12:38 [C78F62E8-F973-4785-BC87-3D7D75021822]
drwxr-xr-x 2 student student 4096 Jan 12 09:44 [C97905AF-EA5D-489F-AFC7-701AEA2FBEE4]
drwxrwxr-x 2 student student 4096 Jan 15 11:10 myfiles
drwx----- 5 root      root      4096 Dec 26 08:56 snap-private-tmp
drwx----- 3 root      root      4096 Dec 24 18:02 systemd-private-fa1ae4839dd4447c96bc601ff193e23f-color.service-4G16rr
drwx----- 3 root      root      4096 Dec 24 18:02 systemd-private-fa1ae4839dd4447c96bc601ff193e23f-ModemManager.service-q8V0yl
drwx----- 3 root      root      4096 Dec 24 18:02 systemd-private-fa1ae4839dd4447c96bc601ff193e23f-power-profiles-daemon.service-pwZYJk
drwx----- 3 root      root      4096 Dec 24 18:02 systemd-private-fa1ae4839dd4447c96bc601ff193e23f-switcheroo-control.service-PNGDgX
drwx----- 3 root      root      4096 Dec 24 18:02 systemd-private-fa1ae4839dd4447c96bc601ff193e23f-systemd-logind.service-LNwyJF
drwx----- 3 root      root      4096 Dec 24 17:57 systemd-private-fa1ae4839dd4447c96bc601ff193e23f-systemd-oond.service-EUKkYQ
drwx----- 3 root      root      4096 Dec 24 17:57 systemd-private-fa1ae4839dd4447c96bc601ff193e23f-systemd-resolved.service-8P8NFI
drwx----- 3 root      root      4096 Dec 24 17:57 systemd-private-fa1ae4839dd4447c96bc601ff193e23f-systemd-timesyncd.service-P6l68f
drwx----- 3 root      root      4096 Dec 24 18:02 systemd-private-fa1ae4839dd4447c96bc601ff193e23f-upower.service-XcoSrK
drwxr-xr-x 2 student student 4096 Jan 16 00:16 testdir

```

6. Conclusion

This program demonstrates essential directory operations using system calls in C. Such operations are crucial in system programming, file management tools, and operating system development.