# UECS20CS254 Operating Systems

## Unit 5 Programming exercises

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**Q1**. Write a C program to change the permissions of files in a directory created after a certain date. Inputs to the program: directory, date and new permission to be set as run time

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

int main(int argc, char *argv[]) {
    if (argc != 4) {
        fprintf(stderr, "Usage: %s <directory> <date> <permissions>\n", argv[0]);
        exit(EXIT_FAILURE);
    }

    char *dir_path = argv[1];
    char *date_str = argv[2];
    mode_t new_mode = strtol(argv[3], NULL, 8);

    // Parse date argument
    struct tm target_time = {0};
    if (strptime(date_str, "%Y-%m-%d", &target_time) == NULL) {
        fprintf(stderr, "Invalid date: %s\n", date_str);
        exit(EXIT_FAILURE);
    }
    time_t target_timestamp = mktime(&target_time);

    // Open directory
    DIR *dir = opendir(dir_path);
    if (dir == NULL) {
        perror("opendir");
```

```c
            exit(EXIT_FAILURE);
    }

    // Iterate over directory entries
    struct dirent *entry;
    while ((entry = readdir(dir)) != NULL) {
        char *entry_path = malloc(strlen(dir_path) + strlen(entry->d_name) + 2);
        sprintf(entry_path, "%s/%s", dir_path, entry->d_name);

        // Get file status
        struct stat st;
        if (stat(entry_path, &st) == -1) {
            perror("stat");
            free(entry_path);
            continue;
        }

        // Check if file was created after target date
        if (st.st_mtime < target_timestamp) {
            free(entry_path);
            continue;
        }

        // Change file permissions
        if (chmod(entry_path, new_mode) == -1) {
            perror("chmod");
            free(entry_path);
            continue;
        }

        printf("Changed permissions of %s to %o\n", entry_path, new_mode);
        free(entry_path);
    }

    closedir(dir);

    return 0;
}
        arguments
```

```
                                nagavenigowda@ubuntu-1: ~/Documents/OS            Q    ≡    —    □    ×

nagavenigowda@ubuntu-1:~/Documents/OS$ gcc OS5_1.c
OS5_1.c: In function 'main':
OS5_1.c:20:9: warning: implicit declaration of function 'strptime'; did you mean 'strftime'? [-W
implicit-function-declaration]
   20 |       if (strptime(date_str, "%Y-%m-%d", &target_time) == NULL) {
      |           ^~~~~~~~
      |           strftime
OS5_1.c:20:54: warning: comparison between pointer and integer
   20 |       if (strptime(date_str, "%Y-%m-%d", &target_time) == NULL) {
      |                                                        ^~
nagavenigowda@ubuntu-1:~/Documents/OS$ ./a.out   /home/nagavenigowda/Desktop/OS 2022-01-02 755
Changed permissions of /home/nagavenigowda/Desktop/OS/OS1.c to 755
Changed permissions of /home/nagavenigowda/Desktop/OS/. to 755
Changed permissions of /home/nagavenigowda/Desktop/OS/.. to 755
nagavenigowda@ubuntu-1:~/Documents/OS$ ls -l
total 56
-rwxrwxr-x 1 nagavenigowda nagavenigowda 16680 Apr 22 18:59 a.out
-rw-rw-r-- 1 nagavenigowda nagavenigowda     0 Apr  8 18:05 OS1.c
-rw-rw-r-- 1 nagavenigowda nagavenigowda     0 Apr  8 18:05 OS2.c
-rw-rw-r-- 1 nagavenigowda nagavenigowda   753 Mar 18 10:49 OS3.c
-rw-rw-r-- 1 nagavenigowda nagavenigowda   632 Apr  8 18:22 OS4.c
-rwxrwxr-x 1 nagavenigowda nagavenigowda 16432 Apr 22 18:52 OS5_1
-rw-rw-r-- 1 nagavenigowda nagavenigowda  1734 Apr 22 18:59 OS5_1.c
-rw-rw-r-- 1 nagavenigowda nagavenigowda  1734 Apr 22 18:43 OS5_2.c
nagavenigowda@ubuntu-1:~/Documents/OS$ ▮
```

**Q2.** Write a C program to truncate the files in a directory created after a certain
Date to half its original size. Inputs to the program: directory and date as run time
arguments

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

int main(int argc, char *argv[]) {
    // check if all required arguments have been provided
    if (argc != 3) {
        printf("Usage: %s <directory> <date>\n", argv[0]);
        exit(EXIT_FAILURE);
    }

    // get the directory path and date
    char *dir_path = argv[1];
    char *date_str = argv[2];

    // convert date string to time_t value
```

```c
    struct tm date = {0};
    strptime(date_str, "%Y-%m-%d", &date);
    time_t cutoff_time = mktime(&date);

    // open the directory
    DIR *dir = opendir(dir_path);
    if (dir == NULL) {
        perror("Failed to open directory");
        exit(EXIT_FAILURE);
    }

    // loop through each file in the directory
    struct dirent *entry;
    while ((entry = readdir(dir)) != NULL) {
        // construct the full path of the file
        char file_path[1024];
        snprintf(file_path, sizeof(file_path), "%s/%s", dir_path, entry->d_name);

        // get the creation time and size of the file
        struct stat file_stat;
        if (stat(file_path, &file_stat) < 0) {
            perror("Failed to get file stats");
            continue;
        }

        // check if the file was created after the cutoff time
        if (file_stat.st_mtime >= cutoff_time) {
            // truncate the file to half its original size
            if (truncate(file_path, file_stat.st_size / 2) < 0) {
                perror("Failed to truncate file");
                continue;
            }
            printf("Truncated file %s to half its original size\n", file_path);
        }
    }

    // close the directory
    closedir(dir);

    return 0;
}
```
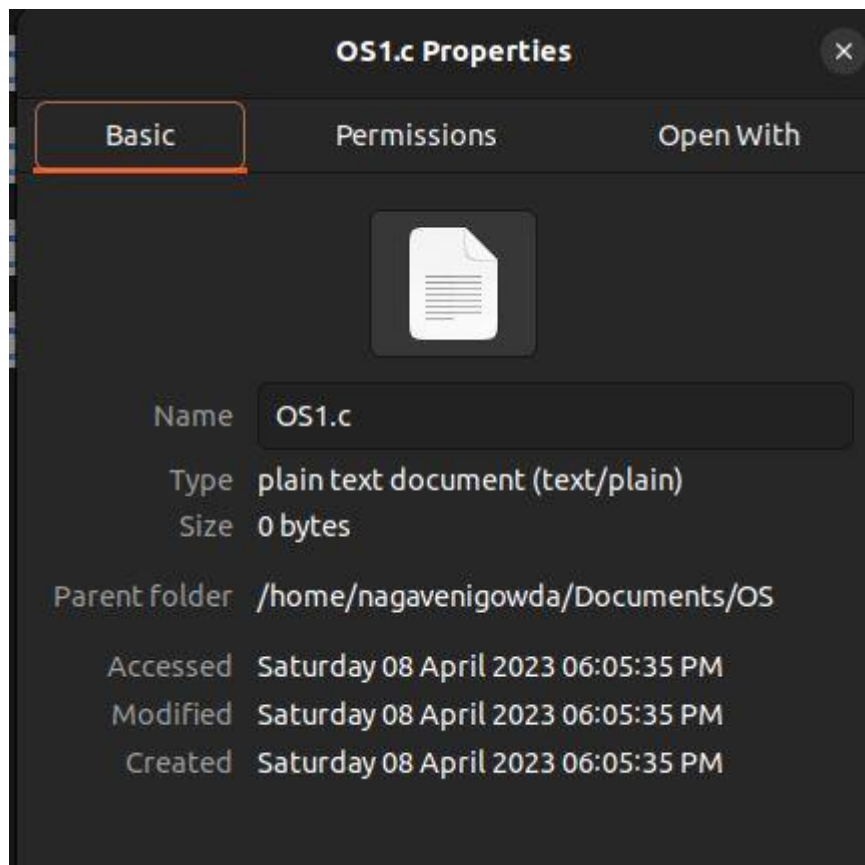
```
nagavenigowda@ubuntu-1:~/Documents/OS$ gcc OS5_2.c
OS5_2.c: In function 'main':
OS5_2.c:21:5: warning: implicit declaration of function 'strptime'; did you mean 'strftime'? [-W
implicit-function-declaration]
   21 |     strptime(date_str, "%Y-%m-%d", &date);
      |     ^~~~~~~~
      |     strftime
nagavenigowda@ubuntu-1:~/Documents/OS$ ./a.out  /home/nagavenigowda/Desktop/OS 2022-01-05
Truncated file /home/nagavenigowda/Desktop/OS/OS1.c to half its original size
Failed to truncate file: Is a directory
Failed to truncate file: Is a directory
nagavenigowda@ubuntu-1:~/Documents/OS$
```



**OS1.c Properties**  ✕

| Basic | Permissions | Open With |

Name   OS1.c

Type   plain text document (text/plain)
Size   0 bytes

Parent folder   /home/nagavenigowda/Documents/OS

Accessed   Saturday 08 April 2023 06:05:35 PM
Modified   Saturday 08 April 2023 06:05:35 PM
Created   Saturday 08 April 2023 06:05:35 PM

**Q3**. Write a C program to change the ownership of files in a directory created after a certain date. Inputs to the program: directory, date and new permission to be set as run time arguments

```
#include <stdio.h>
#include <stdlib.h>
#include <dirent.h>
#include <sys/stat.h>
#include <string.h>
#include <time.h>
#include <pwd.h>
#include <grp.h>
```

```c
#include <errno.h>

int main(int argc, char *argv[]) {
    if (argc != 4) {
        printf("Usage: %s <directory> <date> <new_owner:new_group>\n", argv[0]);
        return 1;
    }
    char *dir_path = argv[1];
    char *date_str = argv[2];
    char *owner_group_str = argv[3];
    char *new_owner_str = strtok(owner_group_str, ":");
    char *new_group_str = strtok(NULL, ":");
    struct passwd *new_owner = getpwnam(new_owner_str);
    struct group *new_group = getgrnam(new_group_str);
    if (new_owner == NULL) {
        printf("Error: invalid new owner %s\n", new_owner_str);
        return 1;
    }
    if (new_group == NULL) {
        printf("Error: invalid new group %s\n", new_group_str);
        return 1;
    }
    time_t cutoff_time;
    struct tm tm_cutoff;
    if (strptime(date_str, "%Y-%m-%d", &tm_cutoff) == NULL) {
        printf("Error: invalid date format\n");
        return 1;
    }
    cutoff_time = mktime(&tm_cutoff);
    DIR *dir = opendir(dir_path);
    if (dir == NULL) {
        printf("Error: could not open directory %s\n", dir_path);
        return 1;
    }
    struct dirent *ent;
    char file_path[1024];
    while ((ent = readdir(dir)) != NULL) {
        if (ent->d_type == DT_REG) {
            snprintf(file_path, sizeof(file_path), "%s/%s", dir_path, ent->d_name);
            struct stat file_stat;
            if (stat(file_path, &file_stat) != -1) {
                time_t file_time = file_stat.st_mtime;
                if (difftime(file_time, cutoff_time) > 0) {
                    if (chown(file_path, new_owner->pw_uid, new_group->gr_gid) == -1) {
```
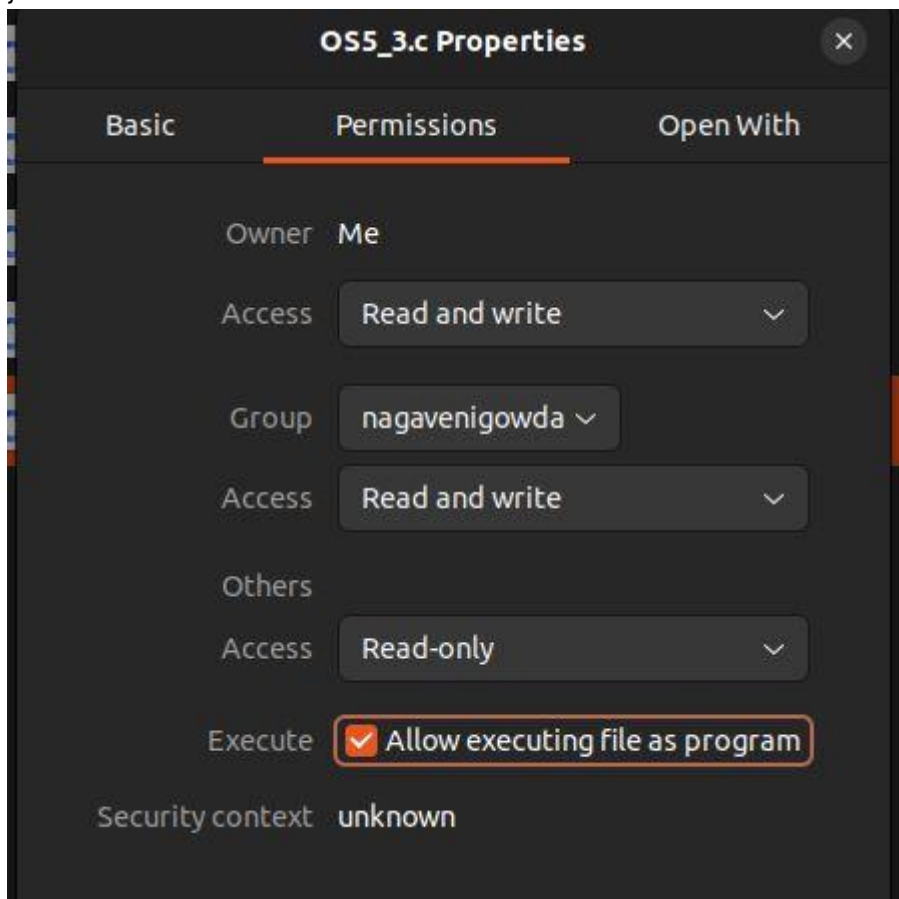
```c
                printf("Error: could not change ownership of file %s. %s\n", file_path,
strerror(errno));
            }
        }
    }
}
closedir(dir);
printf("Ownership changed for files created after %s in directory %s\n", date_str, dir_path);
return 0;
}
```

```
nagavenigowda@ubuntu-1:~/Documents/OS$ gedit OS5_3.c
nagavenigowda@ubuntu-1:~/Documents/OS$ gcc OS5_3.c
OS5_3.c: In function 'main':
OS5_3.c:33:9: warning: implicit declaration of function 'strptime'; did you mean 'strftime'? [-W
implicit-function-declaration]
   33 |      if (strptime(date_str, "%Y-%m-%d", &tm_cutoff) == NULL) {
      |          ^~~~~~~~
      |          strftime
OS5_3.c:33:52: warning: comparison between pointer and integer
   33 |      if (strptime(date_str, "%Y-%m-%d", &tm_cutoff) == NULL) {
      |                                                     ^~
OS5_3.c:52:25: warning: implicit declaration of function 'chown' [-Wimplicit-function-declaratio
n]
   52 |                    if (chown(file_path, new_owner->pw_uid, new_group->gr_gid) == -1) {
      |                        ^~~~~
nagavenigowda@ubuntu-1:~/Documents/OS$ ./a.out /home/nagavenigowda/Desktop/OS 2022-01-01 root:su
do
Error: could not change ownership of file /home/nagavenigowda/Desktop/OS/OS1.c. Operation not pe
rmitted
Ownership changed for files created after 2022-01-01 in directory /home/nagavenigowda/Desktop/OS
nagavenigowda@ubuntu-1:~/Documents/OS$
```