OS Lab3

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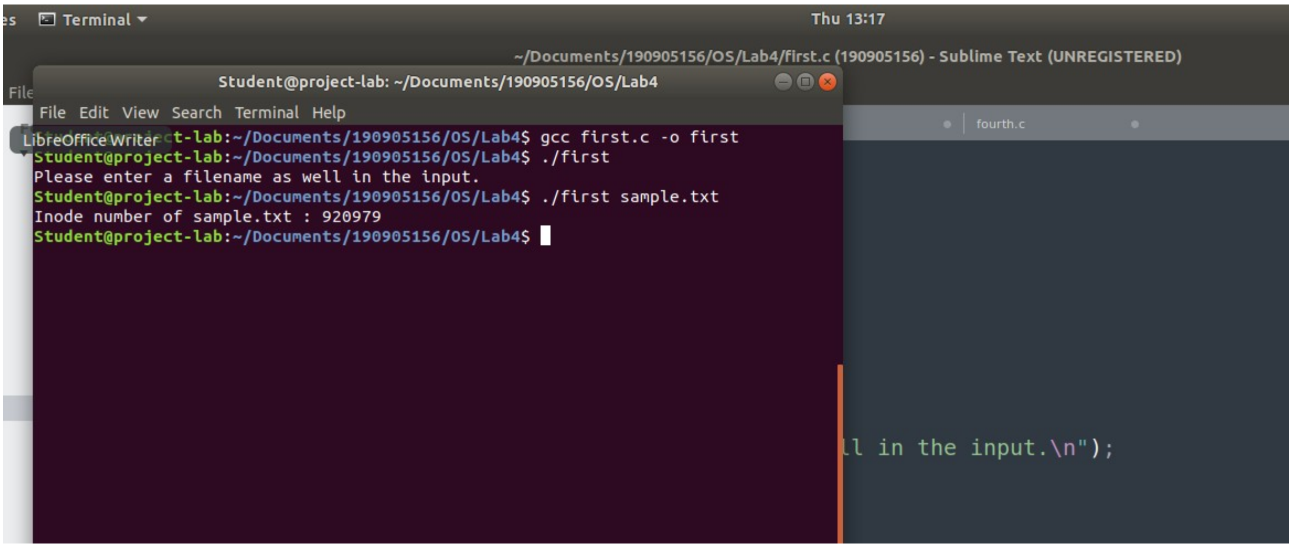
Section CSE-D

Q1)Write a program to find the inode number of an existing file in a directory. Take the input as a filename and print the inode number of the file.

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

int main(int argc, char *argv[])
{
    struct stat sb;
    int ret;
    if (argc < 2)
    {
        printf("Please enter a filename as well in the input.\n");
        return 1;
    }
    ret = stat(argv[1], &sb);
    if (ret)
    {
        perror("stat");
        return 1;
    }
    printf("Inode number of %s : %ld\n", argv[1], sb.st_ino);
    return 0;
}
```


Terminal
Thu 13:17
~/Documents/190905156/OS/Lab4/first.c (190905156) - Sublime Text (UNREGISTERED)
Student@project-lab: ~/Documents/190905156/OS/Lab4
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LibreOffice Writer
fourth.c
ll in the input.\n");

```
t-lab:~/Documents/190905156/OS/Lab4$ gcc first.c -o first
Student@project-lab:~/Documents/190905156/OS/Lab4$ ./first
Please enter a filename as well in the input.
Student@project-lab:~/Documents/190905156/OS/Lab4$ ./first sample.txt
Inode number of sample.txt : 920979
Student@project-lab:~/Documents/190905156/OS/Lab4$
```

Q2)Write a program to print out the complete stat structure of a file.

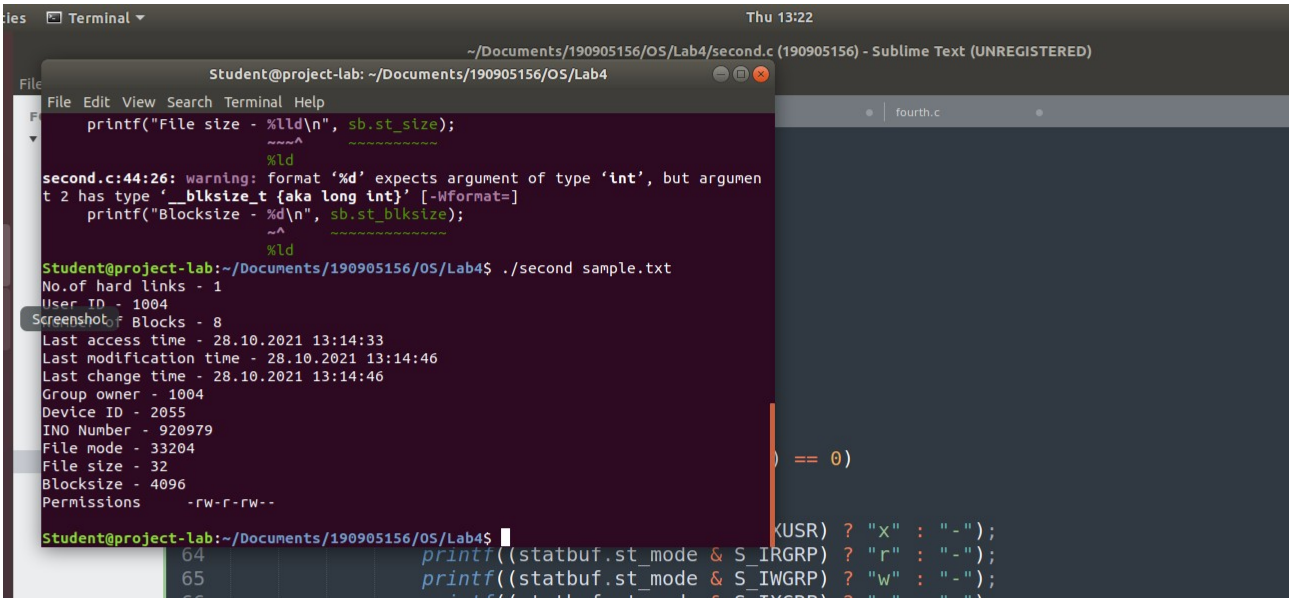
```
#include <sys/types.h>
#include <sys/stat.h>
#include <unistd.h>
#include <stdio.h>
#include <time.h>
#include <stdlib.h>
#include <dirent.h>
#include <string.h>

char *formatDate(char *str, time_t val)
{
    strftime(str, 36, "%d.%m.%Y %H:%M:%S", localtime(&val));
    return str;
}

int main(int argc, char *argv[])
{
    struct stat sb;
    if (argc < 2)
    {
        printf("Insufficient arguments!\n");
        return 1;
    }
    int ret;
    char date[36];
    ret = stat(argv[1], &sb);
    if (ret)
    {
        perror("stat");
        return 1;
    }

    printf("No.of hard links - %d\n", sb.st_nlink);
    printf("User ID - %d\n", sb.st_uid);
    printf("Number of Blocks - %lld\n", sb.st_blocks);
    printf("Last access time - %s\n", formatDate(date, sb.st_atime));
    printf("Last modification time - %s\n", formatDate(date, sb.st_mtime));
    printf("Last change time - %s\n", formatDate(date, sb.st_ctime));
    printf("Group owner - %d\n", sb.st_gid);
    printf("Device ID - %d\n", sb.st_dev);
    printf("INO Number - %llu\n", sb.st_ino);
    printf("File mode - %hu\n", sb.st_mode);
    printf("File size - %lld\n", sb.st_size);
    printf("Blocksize - %d\n", sb.st_blksize);

    DIR *dp;
    struct dirent *entry;
    struct stat statbuf;
    if ((dp = opendir(".")) == NULL)
    {
        printf("Cannot open directory \n");
        return 0;
    }
    chdir(".");
    while ((entry = readdir(dp)) != NULL)
    {
        lstat(entry->d_name, &statbuf);
        if (!S_ISDIR(statbuf.st_mode))
        {
            if (strcmp(entry->d_name, argv[1]) == 0)
            {
                printf("Permissions\t");
                printf((statbuf.st_mode & S_IXUSR) ? "x" : "-");
                printf((statbuf.st_mode & S_IRGRP) ? "r" : "-");
                printf((statbuf.st_mode & S_IWGRP) ? "w" : "-");
                printf((statbuf.st_mode & S_IXGRP) ? "x" : "-");
                printf((statbuf.st_mode & S_IROTH) ? "r" : "-");
                printf((statbuf.st_mode & S_IWOTH) ? "w" : "-");
                printf((statbuf.st_mode & S_IRUSR) ? "r" : "-");
                printf((statbuf.st_mode & S_IWUSR) ? "w" : "-");
                printf((statbuf.st_mode & S_IXOTH) ? "x" : "-");
                printf((S_ISDIR(statbuf.st_mode)) ? "d" : "-");
                printf("\n\n");
            }
        }
    }
}
```



Terminal
Thu 13:22
~/Documents/190905156/OS/Lab4/second.c (190905156) - Sublime Text (UNREGISTERED)
Student@project-lab: ~/Documents/190905156/OS/Lab4
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fourth.c
Screenshot

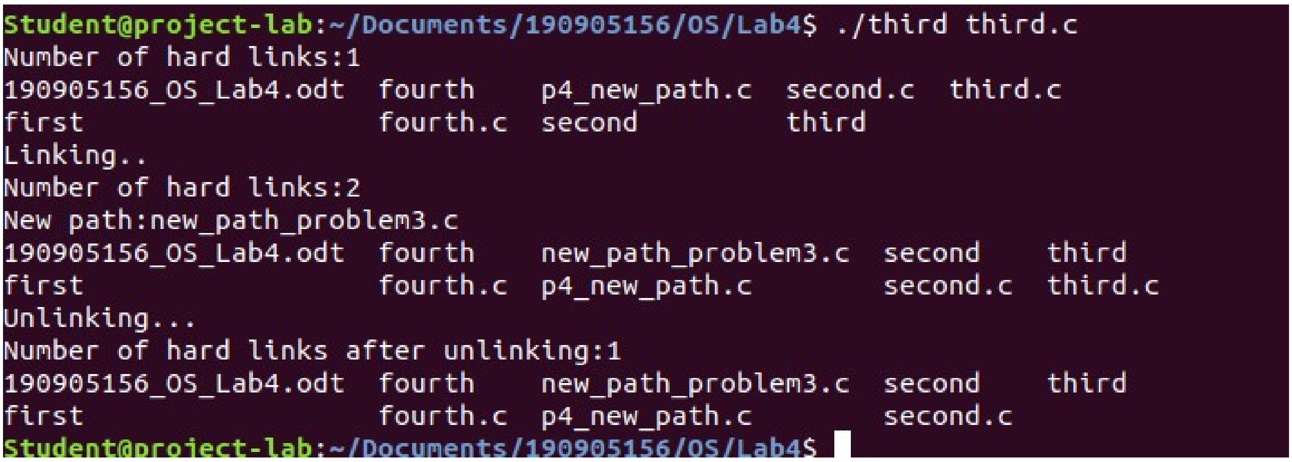
```
    printf("File size - %lld\n", sb.st_size);
                        ~~~^     ~~~~~~~~~~
                        %ld
second.c:44:26: warning: format ‘%d’ expects argument of type ‘int’, but argumen
t 2 has type ‘__blksize_t {aka long int}’ [-Wformat=]
    printf("Blocksize - %d\n", sb.st_blksize);
                        ~^     ~~~~~~~~~~~~~
                        %ld
Student@project-lab:~/Documents/190905156/OS/Lab4$ ./second sample.txt
No.of hard links - 1
User ID - 1004
Number of Blocks - 8
Last access time - 28.10.2021 13:14:33
Last modification time - 28.10.2021 13:14:46
Last change time - 28.10.2021 13:14:46
Group owner - 1004
Device ID - 2055
INO Number - 920979
File mode - 33204
File size - 32
Blocksize - 4096
Permissions     -rw-r-rw--

Student@project-lab:~/Documents/190905156/OS/Lab4$ 
```

```
) == 0)
XUSR) ? "x" : "-");
printf((statbuf.st_mode & S_IRGRP) ? "r" : "-");
printf((statbuf.st_mode & S_IWGRP) ? "w" : "-");
```

Q3)Write a program to create a new hard link to an existing file and unlink the same. Accept the old path as input and print the newpath.

```
#include <sys/types.h>
#include <sys/stat.h>
#include <unistd.h>
#include <stdio.h>
#include <inttypes.h>
#include <stdlib.h>
void main(int argc, char *argv[])
{
    if (argc < 2)
    {
        printf("Insufficient arguments\n");
        return;
    }

    char new_path[100] = "new_path_problem3.c";
    struct stat start;

    int ret1 = stat(argv[1], &start);
```

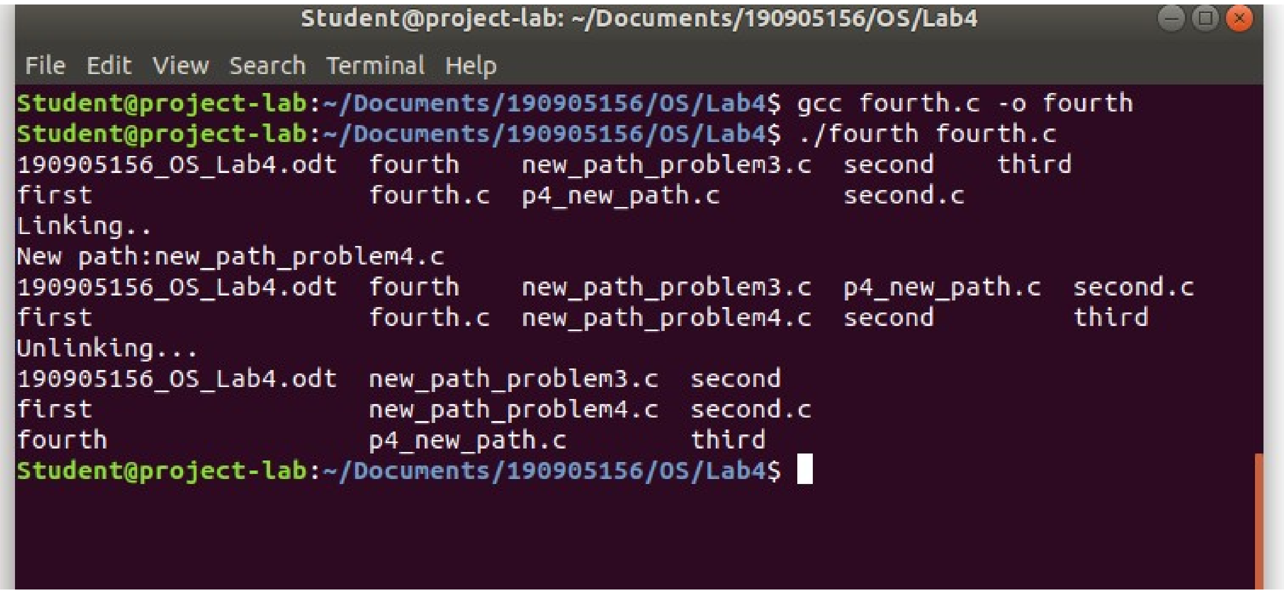
```
    printf("Number of hard links:%ld\n", start.st_nlink);
    system("ls");
    printf("Linking..\n");

    int ret2 = link(argv[1], new_path);

    struct stat intermediate;

    int ret3 = stat(argv[1], &intermediate);

    printf("Number of hard links:%ld\n", intermediate.st_nlink);
    printf("New path:%s\n", new_path);
    system("ls");

    int ret4 = unlink(argv[1]);
    struct stat ending;
    int ret5 = stat(new_path, &ending);

    printf("Unlinking...\n");

    printf("Number of hard links after unlinking:%ld\n", ending.st_nlink);

    system("ls");
}
```



```
Student@project-lab:~/Documents/190905156/OS/Lab4$ ./third third.c
Number of hard links:1
190905156_OS_Lab4.odt  fourth    p4_new_path.c  second.c  third.c
first                  fourth.c  second         third
Linking..
Number of hard links:2
New path:new_path_problem3.c
190905156_OS_Lab4.odt  fourth    new_path_problem3.c  second    third
first                  fourth.c  p4_new_path.c        second.c  third.c
Unlinking...
Number of hard links after unlinking:1
190905156_OS_Lab4.odt  fourth    new_path_problem3.c  second    third
first                  fourth.c  p4_new_path.c        second.c
Student@project-lab:~/Documents/190905156/OS/Lab4$ 
```

Q4)Write a program to create a new soft link to an existing file and unlink the same. Accept the old path as input and print the newpath.

```
#include <sys/types.h>
#include <sys/stat.h>
#include <unistd.h>
#include <stdio.h>
#include <inttypes.h>
#include <stdlib.h>
void main(int argc, char *argv[])
{
    if (argc < 2)
    {
        printf("Insufficient arguments\n");
        return;
    }
    char new_path[100] = "new_path_problem4.c";
    struct stat start;
    int ret1 = stat(argv[1], &start);
    system("ls");
    printf("Linking..\n");
    int ret2 = symlink(argv[1], new_path);
    struct stat intermediate;
    int ret3 = stat(argv[1], &intermediate);
    printf("New path:%s\n", new_path);
    system("ls");
    int ret4 = unlink(argv[1]);
    struct stat ending;
    int ret5 = stat(new_path, &ending);
    printf("Unlinking...\n");
    system("ls");
}
```



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```
Student@project-lab:~/Documents/190905156/OS/Lab4$ gcc fourth.c -o fourth
Student@project-lab:~/Documents/190905156/OS/Lab4$ ./fourth fourth.c
190905156_OS_Lab4.odt  fourth    new_path_problem3.c  second    third
first                  fourth.c  p4_new_path.c        second.c
Linking..
New path:new_path_problem4.c
190905156_OS_Lab4.odt  fourth    new_path_problem3.c  p4_new_path.c  second.c
first                  fourth.c  new_path_problem4.c  second         third
Unlinking...
190905156_OS_Lab4.odt  new_path_problem3.c  second
first                  new_path_problem4.c  second.c
fourth                 p4_new_path.c        third
Student@project-lab:~/Documents/190905156/OS/Lab4$
```