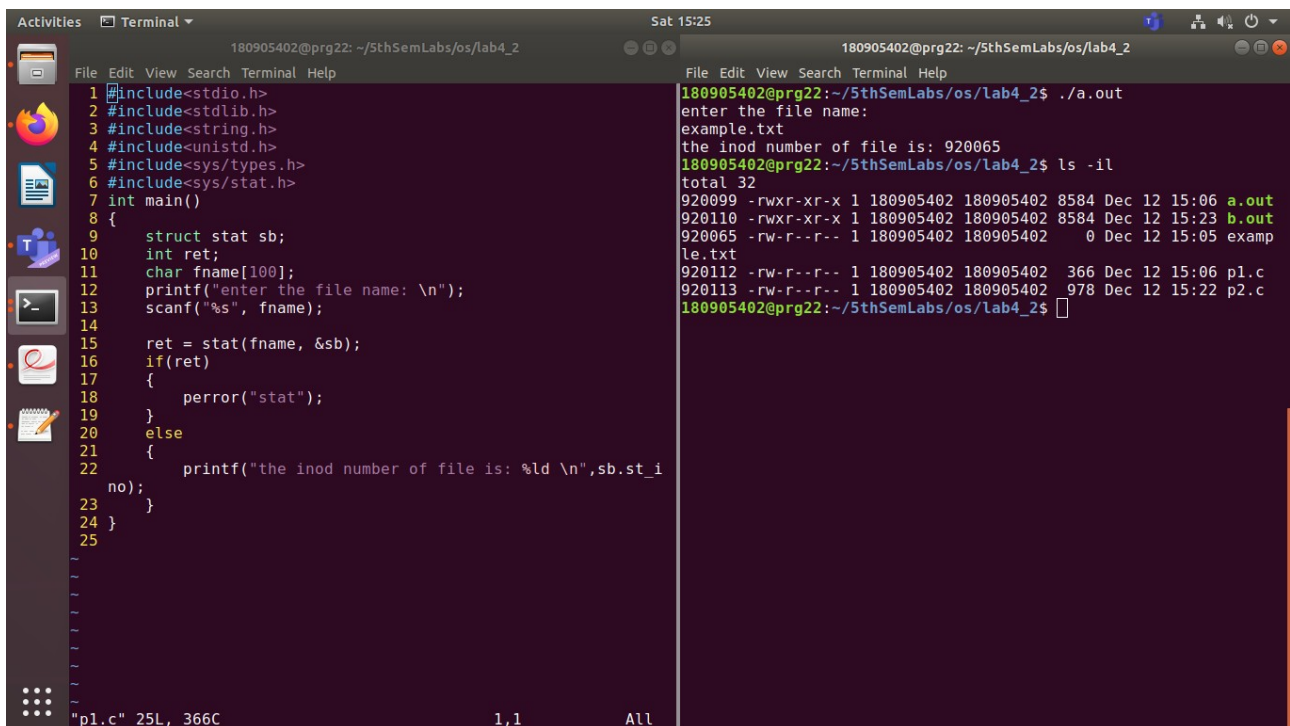


LAB4: FILE SYSTEM

Q1) Find inode number of an existing file

```
#include<stdio.h>
#include<stdlib.h>
#include<string.h>
#include<unistd.h>
#include<sys/types.h>
#include<sys/stat.h>
int main()
{
    struct stat sb;
    int ret;
    char fname[100];
    printf("enter the file name: \n");
    scanf("%s", fname);

    ret = stat(fname, &sb);
    if(ret)
    {
        perror("stat");
    }
    else
    {
        printf("the inode number of file is: %ld \n",sb.st_ino);
    }
}
```



```
180905402@prg22: ~/5thSemLabs/os/lab4_2
1 #include<stdio.h>
2 #include<stdlib.h>
3 #include<string.h>
4 #include<unistd.h>
5 #include<sys/types.h>
6 #include<sys/stat.h>
7 int main()
8 {
9     struct stat sb;
10    int ret;
11    char fname[100];
12    printf("enter the file name: \n");
13    scanf("%s", fname);
14
15    ret = stat(fname, &sb);
16    if(ret)
17    {
18        perror("stat");
19    }
20    else
21    {
22        printf("the inode number of file is: %ld \n",sb.st_i
23    no);
24    }
25
180905402@prg22: ~/5thSemLabs/os/lab4_2$ ./a.out
enter the file name:
example.txt
the inode number of file is: 920065
180905402@prg22: ~/5thSemLabs/os/lab4_2$ ls -il
total 32
920099 -rwxr-xr-x 1 180905402 180905402 8584 Dec 12 15:06 a.out
920110 -rwxr-xr-x 1 180905402 180905402 8584 Dec 12 15:23 b.out
920065 -rw-r--r-- 1 180905402 180905402 0 Dec 12 15:05 exam
le.txt
920112 -rw-r--r-- 1 180905402 180905402 366 Dec 12 15:06 p1.c
920113 -rw-r--r-- 1 180905402 180905402 978 Dec 12 15:22 p2.c
180905402@prg22: ~/5thSemLabs/os/lab4_2$
```

Q2) print the complete stat structure of the file

```

#include<stdio.h>
#include<stdlib.h>
#include<string.h>
#include<unistd.h>
#include<sys/types.h>
#include<sys/stat.h>
int main()
{
    struct stat sb;
    int ret;
    char fname[100];
    printf("enter the file name: \n");
    scanf("%s", fname);

    ret = stat(fname, &sb);
    if(ret)
    {
        perror("stat");
    }
    else
    {
        printf("ID of device containing file: %ld \n", sb.st_dev);
        printf("the inod number of file is: %ld \n", sb.st_ino);
        printf("the permissions: %d \n", sb.st_mode);
        printf("the number of hard links: %ld, \n", sb.st_nlink);
        printf("user id of owner: %d \n", sb.st_uid);
        printf("groud id of owner: %d \n", sb.st_gid);
        printf("the total size in bytes: %ld \n", sb.st_size);
        printf("blocksize for file system %ld \n", sb.st_blksize);
        printf("number of blocks allocated: %ld \n", sb.st_blocks);
        printf("last access time: %ld \n", sb.st_atime);
        printf("last modification time %ld \n", sb.st_mtime);
        printf("last status change time %ld \n", sb.st_ctime);
    }
}

```

```

180905402@prg22: ~/5thSemLabs/os/lab4_2
File Edit View Search Terminal Help
1 #include<stdio.h>
2 #include<stdlib.h>
3 #include<string.h>
4 #include<unistd.h>
5 #include<sys/types.h>
6 #include<sys/stat.h>
7 int main()
8 {
9     struct stat sb;
10    int ret;
11    char fname[100];
12    printf("enter the file name: \n");
13    scanf("%s", fname);
14
15    ret = stat(fname, &sb);
16    if(ret)
17    {
18        perror("stat");
19    }
20    else
21    {
22        printf("ID of device containing file: %ld \n", sb.st_dev);
23        printf("the inode number of file is: %ld \n", sb.st_ino);
24        printf("the permissions: %ld \n", sb.st_mode);
25        printf("the number of hard links: %ld, \n", sb.st_nlink);
26        printf("user id of owner: %ld \n", sb.st_uid);
27        printf("group id of owner: %ld \n", sb.st_gid);
28        printf("the total size in bytes: %ld \n", sb.st_size);
29        printf("blocksize for file system %ld \n", sb.st_blksize);
30    }
31}

180905402@prg22: ~/5thSemLabs/os/lab4_2$ ls -il
total 32
920099 -rwxr-xr-x 1 180905402 180905402 8584 Dec 12 15:06 a.out
920110 -rwxr-xr-x 1 180905402 180905402 8584 Dec 12 15:23 b.out
920065 -rw-r--r-- 1 180905402 180905402 0 Dec 12 15:05 example.txt
920112 -rw-r--r-- 1 180905402 180905402 366 Dec 12 15:06 p1.c
920113 -rw-r--r-- 1 180905402 180905402 978 Dec 12 15:22 p2.c
180905402@prg22: ~/5thSemLabs/os/lab4_2$ gcc p2.c -o b.out
180905402@prg22: ~/5thSemLabs/os/lab4_2$ ./b.out
enter the file name:
p1.c
ID of device containing file: 2054
the inode number of file is: 920112
the permissions: 33188
the number of hard links: 1,
user id of owner: 1002
group id of owner: 1002
the total size in bytes: 366
blocksize for file system 4096
number of blocks allocated: 8
last access time: 1607765784
last modification time 1607765783
last status change time 1607765783
180905402@prg22: ~/5thSemLabs/os/lab4_2$

```

Q3)create a new hard link to an existing file and unlink the old link

```

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

```

```

void main()
{
    char fname[100];
    char new_path[100]="newfile.txt";
    struct stat start;

    printf("enter the file name \n");
    scanf("%s", fname);
    int ret1 = stat(fname,&start);

    printf("Number of hard links:%ld\n", start.st_nlink);
    system("ls -il *.txt");
    printf("linking begins\n");

    int ret2 = link(fname,new_path);
    struct stat temp;
    int ret3 = stat(fname,&temp);
    printf("Number of hard links:%ld\n", temp.st_nlink);
    printf("New path:%s\n",new_path);
    system("ls -il *.txt");
    int ret4 = unlink(fname);
    struct stat end;
    int ret5 = stat(new_path,&end);
    printf("unlinking now\n");
}

```

```

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

```

The screenshot shows a Linux desktop with a terminal window and a code editor. The code editor displays the source code for a C program named `p3.c`. The program's logic is as follows:

- It includes `<unistd.h>`, `<sys/stat.h>`, and `<stdio.h>`.
- The `main` function prompts the user to enter a file name.
- It uses `stat` to get the initial file's statistics, including the number of hard links.
- It creates a new file path (e.g., `newfile.txt`) and uses `link` to create a hard link to the original file.
- It uses `stat` again to verify the new file's statistics.
- It then uses `unlink` to remove the original file.
- Finally, it uses `stat` to show that the original file's link count has decreased by one.

The terminal output shows the successful execution of the program, including the compilation with `gcc` and the runtime output of file statistics before and after the linking and unlinking process.

Q4)

```

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

```

```

void main()
{
    char fname[100];
    char new_path[100]="newfile.txt";
    struct stat start;

    printf("enter the file name \n");
    scanf("%s", fname);

    printf("before the linking: \n");
    system("ls -il *.txt");
    int ret = symlink(fname, new_path);

    ret = unlink(fname);
    printf("afterlinking: \n");
    system("ls -il *.txt");
}

```

Activities Terminal Sat 16:07

47 of 128 OS Lab Manual 20: 180905402@prg22: ~/5thSemLabs/os/lab4_2

File Edit View Search Terminal Help

~/5thSemLabs/os/lab4_2/p4.c - Sublime Text (UNREGISTERED)

Edit Selection Find View Goto Tools Project Preferences Help

p4.c

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

void main()
{
    char fname[100];
    char new_path[100]="newfile.txt";
    struct stat start;

    printf("enter the file name \n");
    scanf("%s", fname);

    printf("before the linking: \n");
    system("ls -il *.txt");
    int ret = symlink(fname, new_path);

    ret = unlink(fname);
    printf("afterlinking: \n");
    system("ls -il *.txt");
}
```

180905402@prg22:~/5thSemLabs/os/lab4_2\$ gcc p4.c -o d.out

180905402@prg22:~/5thSemLabs/os/lab4_2\$./d.out

enter the file name

example.txt

before the linking:

```
920146 -rw-r--r-- 1 180905402 180905402 0 Dec 12 16:06 example
2.txt
920112 lrwxrwxrwx 1 180905402 180905402 11 Dec 12 16:05 example
.txt -> example.txt
```

afterlinking:

```
920146 -rw-r--r-- 1 180905402 180905402 0 Dec 12 16:06 example
2.txt
920152 lrwxrwxrwx 1 180905402 180905402 11 Dec 12 16:06 newfile
.txt -> example.txt
```

180905402@prg22:~/5thSemLabs/os/lab4_2\$

Line 25, Column 2 Spaces: 4 C