

- : OS-LAB-4 :-**EXCERCISE :**

1. 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.

pgm1.c

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

int main(int argc, char *argv[])
{
    struct stat status;
    int returnValue;

    if (argc < 2)
    {
        fprintf(stderr, "usage : %s <file>\n", argv[0]);
        return 1;
    }
    returnValue = stat(argv[1], &status);
    if (returnValue)
    {
        perror("stat");
        return 1;
    }
    printf("Inode number for %s is = %ld ", argv[1], status.st_ino);
    printf("\n");

    return 0;
}
```

OUTPUT

```
Student@prg33: ~/190905514/FIFTH-SEM/OS-LAB/LAB4
File Edit View Search Terminal Help
Student@prg33:~/190905514/FIFTH-SEM/OS-LAB/LAB4$ ls
pgm1  pgm1.c  samplepgm1.c
Student@prg33:~/190905514/FIFTH-SEM/OS-LAB/LAB4$ gcc pgm1.c -o pgm1
Student@prg33:~/190905514/FIFTH-SEM/OS-LAB/LAB4$ ./pgm1 pgm1.c
Inode number for pgm1.c is = 2228682
Student@prg33:~/190905514/FIFTH-SEM/OS-LAB/LAB4$
```

2.write a program to print out the complete stat structure of a file.

pgm2.c

```
#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>
#include <error.h>

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

int main(int argc, char *argv[])
{
    struct stat status;

    if (argc < 2)
    {
        printf("Insufficient arguments!\n");
        return 1;
    }

    int retValue;
    char date[36];
    retValue = stat(argv[1], &status);

    if (retValue)
    {
        perror("stat");
        return 1;
    }

    printf("ID of device is : %d\n", status.st_dev);
```

```
printf("INO Number is : %llu\n", status.st_ino);
printf("File mode : %hu\n", status.st_mode);
printf("Number of hard links : %d\n", status.st_nlink);
printf("User ID : %d\n", status.st_uid);
printf("Group owner : %d\n", status.st_gid);
printf("File size : %lld\n", status.st_size);
printf("Blocksize : %d\n", status.st_blksize);
printf("Number of Blocks : %lld\n", status.st_blocks);
printf("Last access time : %s\n", formatDate(date, status.st_atime));
printf("Last modification time : %s\n", formatDate(date,
status.st_mtime));
printf("Last change time : %s\n", formatDate(date, status.st_ctime));
```

```
DIR *myDirectory;
```

```
struct dirent *entry;
struct stat statusBuffer;
```

```
if ((myDirectory = opendir(".")) == NULL)
{
printf("Cannot open directory \n");
return 0;
}
```

```
chdir(".");
```

```
while ((entry = readdir(myDirectory)) != NULL)
{
lstat(entry->d_name, &statusBuffer);
```


```
if (!S_ISDIR(statusBuffer.st_mode))
{
if (strcmp(entry->d_name, argv[1]) == 0)
{
printf("Permissions\t");
printf((S_ISDIR(statusBuffer.st_mode)) ? "d" : "-");
printf((statusBuffer.st_mode & S_IRUSR) ? "r" : "-");
printf((statusBuffer.st_mode & S_IWUSR) ? "w" : "-");
printf((statusBuffer.st_mode & S_IXUSR) ? "x" : "-");
printf((statusBuffer.st_mode & S_IRGRP) ? "r" : "-");
```

```

printf((statusBuffer.st_mode & S_IWGRP) ? "w" : "-");
printf((statusBuffer.st_mode & S_IXGRP) ? "x" : "-");
printf((statusBuffer.st_mode & S_IROTH) ? "r" : "-");
printf((statusBuffer.st_mode & S_IWOTH) ? "w" : "-");
printf((statusBuffer.st_mode & S_IXOTH) ? "x" : "-");
printf("\n\n");
}}}}

```

OUTPUT



```

Student@prg33: ~/190905514/FIFTH-SEM/OS-LAB/LAB4
File Edit View Search Terminal Help
Student@prg33:~/190905514/FIFTH-SEM/OS-LAB/LAB4$ ls
pgm1      pgm1.png  pgm21.png  pgm2.png
pgm1.c    pgm2      pgm2.c     samplepgm1.c
Student@prg33:~/190905514/FIFTH-SEM/OS-LAB/LAB4$ gcc pgm2.c -o pgm2
pgm2.c: In function 'main':
pgm2.c:36:32: warning: format '%d' expects argument of type 'int', but
argument 2 has type '__dev_t {aka long unsigned int}' [-Wformat=]
    printf("ID of device is : %d\n", status.st_dev);
                                ~^      ~~~~~
                                %ld
pgm2.c:37:34: warning: format '%llu' expects argument of type 'long
long unsigned int', but argument 2 has type '__ino_t {aka long unsig
ned int}' [-Wformat=]
    printf("INO Number is  : %llu\n", status.st_ino);
                                ~~~^      ~~~~~
                                %lu
pgm2.c:39:37: warning: format '%d' expects argument of type 'int', b
ut argument 2 has type '__nlink_t {aka long unsigned int}' [-Wforma
t=]
    printf("Number of hard links : %d\n", status.st_nlink);
                                ~^      ~~~~~
                                %ld
pgm2.c:42:28: warning: format '%lld' expects argument of type 'long
long int', but argument 2 has type '__off_t {aka long int}' [-Wforma
t=]
    printf("File size : %lld\n", status.st_size);
                                ~~~^      ~~~~~
                                %ld
pgm2.c:43:26: warning: format '%d' expects argument of type 'int', b
ut argument 2 has type '__blksize_t {aka long int}' [-Wformat=]
    printf("Blocksize : %d\n", status.st_blksize);
                                ~^      ~~~~~
                                %ld
pgm2.c:44:35: warning: format '%lld' expects argument of type 'long
long int', but argument 2 has type '__blkcnt_t {aka long int}' [-Wfo
rmat=]
    printf("Number of Blocks : %lld\n", status.st_blocks);

```

```

=]
    printf("Number of hard links : %d\n", status.st_nlink);
                                ~^~~~~~
                                %ld
pgm2.c:42:28: warning: format '%lld' expects argument of type 'long
long int', but argument 2 has type '__off_t {aka long int}' [-Wforma
t=]
    printf("File size : %lld\n", status.st_size);
                        ~~~^~~~~~
                        %ld
pgm2.c:43:26: warning: format '%d' expects argument of type 'int', b
ut argument 2 has type '__blksize_t {aka long int}' [-Wformat=]
    printf("Blocksize : %d\n", status.st_blksize);
                        ~^~~~~~
                        %ld
pgm2.c:44:35: warning: format '%lld' expects argument of type 'long
long int', but argument 2 has type '__blkcnt_t {aka long int}' [-Wfo
rmat=]
    printf("Number of Blocks : %lld\n", status.st_blocks);
                        ~~~^~~~~~
                        %ld

```

```

Student@prg33:~/190905514/FIFTH-SEM/OS-LAB/LAB4$ ./pgm2 pgm2.c

```

```

ID of device is : 2056
INO Number is : 2228393
File mode : 33204
Number of hard links : 1
User ID : 1001
Group owner : 1001
File size : 2570
Blocksize : 4096
Number of Blocks : 8
Last access time : 29/10/2021 11:46:01
Last modification time : 29/10/2021 11:45:47
Last change time : 29/10/2021 11:45:47
Permissions -rw-rw-r--

```

```

Student@prg33:~/190905514/FIFTH-SEM/OS-LAB/LAB4$ █

```


3. write a program to create a new hard link to an existing file and unlink the same. Accept the hold path as input and print the new path.

pgm3.c

```
#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 newPath[100] = "pgm3.c";
    struct stat status;
    int returnValue1 = stat(argv[1], &status);
    printf("Number of hard links:%ld\n", status.st_nlink);
    system("ls");
    printf("Linking..\n");
    int returnValue2 = link(argv[1], newPath);
    struct stat intermediate;
    int ret3 = stat(argv[1], &intermediate);
    printf("Number of hard links are : %ld\n", intermediate.st_nlink);
    printf("New path:%s\n", newPath);
    system("ls");
    int returnValue4 = unlink(argv[1]);
    struct stat ending;
    int returnValue5 = stat(newPath, &ending);
    printf("Unlinking...\n");
    printf("Number of hard links after unlinking:%ld\n", ending.st_nlink);
    system("ls");
}
```

OUTPUT

```
Student@prg33: ~/190905514/FIFTH-SEM/OS-LAB/LAB4
File Edit View Search Terminal Help
Student@prg33:~/190905514/FIFTH-SEM/OS-LAB/LAB4$ ls
190905514_mohammad_tofik_62_OS_lab4.odt  pgm1.c      pgm2.c
21.png                                   pgm1.png    pgm2.png
22.png                                   pgm2        pgm3.c
pgm1                                     pgm21.png   samplepgm1.c
Student@prg33:~/190905514/FIFTH-SEM/OS-LAB/LAB4$ gcc pgm3.c -o pgm3
Student@prg33:~/190905514/FIFTH-SEM/OS-LAB/LAB4$ ./pgm3 pgm3.c
Number of hard links:1
190905514_mohammad_tofik_62_OS_lab4.odt  pgm1.png    pgm3
21.png                                   pgm2        pgm3.c
22.png                                   pgm21.png   samplepgm1.c
pgm1                                     pgm2.c
pgm1.c                                   pgm2.png
Linking..
Number of hard links are : 1
New path:pgm3.c
190905514_mohammad_tofik_62_OS_lab4.odt  pgm1.png    pgm3
21.png                                   pgm2        pgm3.c
22.png                                   pgm21.png   samplepgm1.c
pgm1                                     pgm2.c
pgm1.c                                   pgm2.png
Unlinking...
Number of hard links after unlinking:0
190905514_mohammad_tofik_62_OS_lab4.odt  pgm1.c      pgm2.c
21.png                                   pgm1.png    pgm2.png
22.png                                   pgm2        pgm3
pgm1                                     pgm21.png   samplepgm1.c
Student@prg33:~/190905514/FIFTH-SEM/OS-LAB/LAB4$ █
```


4. write a program to print a new soft link to an existing file and unlink the same. Accept the old path as input and print the newpath.

pgm4.c

```
#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 newPath[100] = "pgm4.c";
    struct stat status;
    int returnValue1 = stat(argv[1], &status);
    system("ls");
    printf("Linking..\n");
    int returnValue2 = symlink(argv[1], newPath);
    struct stat intermediate;
    int returnValue3 = stat(argv[1], &intermediate);
    printf("New path : %s\n", newPath);
    system("ls");
    int returnValue4 = unlink(argv[1]);
    struct stat ending;
    int ret5 = stat(newPath, &ending);
    printf("Unlinking...\n");
    system("ls");
    printf("\n");
}
```

OUTPUT

```
Student@prg33: ~/190905514/FIFTH-SEM/OS-LAB/LAB4
File Edit View Search Terminal Help
Student@prg33:~/190905514/FIFTH-SEM/OS-LAB/LAB4$ ls
190905514_mohammad_tofik_62_OS_lab4.odt  pgm1.png  pgm3
21.png                                   pgm2      pgm3.png
22.png                                   pgm21.png pgm4
pgm1                                     pgm2.c    pgm4.c
pgm1.c                                 pgm2.png  samplepgm1.c
Student@prg33:~/190905514/FIFTH-SEM/OS-LAB/LAB4$ gcc pgm4.c -o pgm4
Student@prg33:~/190905514/FIFTH-SEM/OS-LAB/LAB4$ ./pgm4 pgm4.c
190905514_mohammad_tofik_62_OS_lab4.odt  pgm1.png  pgm3
21.png                                   pgm2      pgm3.png
22.png                                   pgm21.png pgm4
pgm1                                     pgm2.c    pgm4.c
pgm1.c                                 pgm2.png  samplepgm1.c
Linking..
New path : pgm4.c
190905514_mohammad_tofik_62_OS_lab4.odt  pgm1.png  pgm3
21.png                                   pgm2      pgm3.png
22.png                                   pgm21.png pgm4
pgm1                                     pgm2.c    pgm4.c
pgm1.c                                 pgm2.png  samplepgm1.c
Unlinking...
190905514_mohammad_tofik_62_OS_lab4.odt  pgm1.png  pgm3
21.png                                   pgm2      pgm3.png
22.png                                   pgm21.png pgm4
pgm1                                     pgm2.c    samplepgm1.c
pgm1.c                                 pgm2.png

Student@prg33:~/190905514/FIFTH-SEM/OS-LAB/LAB4$
```

```

Student@prg33:~/190905514/FIFTH-SEM/OS-LAB/LAB4$ ./pgm4 pgm4.c pgm3.
c
190905514_mohammad_tofik_62_OS_lab4.odt  pgm1.png  pgm3
21.png  pgm2  pgm3.png
22.png  pgm21.png  pgm4
pgm1  pgm2.c  pgm4.png
pgm1.c  pgm2.png  samplepgm1.c
Linking..
New path : pgm4.c
190905514_mohammad_tofik_62_OS_lab4.odt  pgm2  pgm4
21.png  pgm21.png  pgm4.c
22.png  pgm2.c  pgm4.png
pgm1  pgm2.png  samplepgm1.c
pgm1.c  pgm3
pgm1.png  pgm3.png
Unlinking...
190905514_mohammad_tofik_62_OS_lab4.odt  pgm1.png  pgm3
21.png  pgm2  pgm3.png
22.png  pgm21.png  pgm4
pgm1  pgm2.c  pgm4.png
pgm1.c  pgm2.png  samplepgm1.c

Student@prg33:~/190905514/FIFTH-SEM/OS-LAB/LAB4$ █

```