



Computer Engineering Department &
Information Technology Engineering Department

Academic Year: 2021-2022

Class: S.Y.B.Tech Sem.: 4 Course: OS

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Experiment No.	10		

AIM:	Write a program to prevent destructive update of files by locking as follows: Suppose the I node contains a new permission setting such that it allows only one process at a time to open the file for writing, but many processes can open the file for reading.
THEORY:	<p>File management is one of the basic and important features of operating system. Operating system is used to manage files of computer system. All the files with different extensions are managed by operating system. A file is collection of specific information stored in the memory of computer system. File management is defined as the process of manipulating files in computer system, it management includes the process of creating, modifying and deleting the files.</p> <p>File locking is a mechanism that restricts access to a computer file, or to a region of a file, by allowing only one user or process to modify or delete it at a specific time and to prevent reading of the file while it's being modified or deleted.</p> <p>Systems implement locking to prevent the classic interceding update scenario, which is a typical example of a race condition, by enforcing the serialization of update processes to any given file. The following example illustrates the interceding update problem:</p>



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- Process A reads a customer record from a file containing account information, including the customer's account balance and phone number.
- Process B now reads the same record from the same file, so it has its own copy.
- Process A changes the account balance in its copy of the customer record and writes the record back to the file.
- Process B, which still has the original stale value for the account balance in its copy of the customer record, updates the account balance and writes the customer record back to the file.
- Process B has now written its stale account-balance value to the file, causing the changes made by process A to be lost.

Two kinds of locks are offered: shared locks and exclusive locks. In the case of `fcntl`, different kinds of locks may be applied to different sections (byte ranges) of a file, or else to the whole file.

Shared locks can be held by multiple processes at the same time, but an exclusive lock can only be held by one process, and cannot coexist with a shared lock. To acquire a shared lock, a process must wait until no processes hold any exclusive locks.

To acquire an exclusive lock, a process must wait until no processes hold either kind of lock. Unlike locks created by `fcntl`, those created by `flock` are preserved across forks, making them useful in forking servers.

It is therefore possible for more than one process to hold an exclusive lock on the same file, provided these processes share a filial relationship and the exclusive lock was initially created in a single process before being duplicated across a fork.



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EXPERIMENT 10

CODE:

PROGRAM:

read.c:

```
#include <stdio.h>
#include <stdlib.h>
#include <sys/file.h>
#include <unistd.h>
int main()
{
    FILE * file;
    char string;
    int mode;
    file = fopen ("./newFile.txt", "r");
    printf("Select the mode 1.Shared 2.Exclusive: ");
    scanf("%d",&mode);
    while(1)
    {
        select(mode)
        {
            case 1:
                while(flock(fileno(file), LOCK_SH) != 0)
                {
                    continue;
                }
                break;
            case 2:
                while(flock(fileno(file), LOCK_EX) != 0)
                {
                    continue;
                }
                break;
            default: break;
        }
        string = fgetc(file);
        iffeof(file))
```



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```
        {
            break;
        }
        printf("%c\n", string);
        sleep(1);
        flock(fileno(file), LOCK_UN);
    }
    fclose(file);
    return 0;
}

write.c:
#include <sys/file.h>
#include <unistd.h>
#include <string.h>
#include <stdio.h>
#include <stdlib.h>
int main ()
{
    FILE * file;// create pointer
    file = fopen ("./newFile.txt", "w");
    while(flock(fileno(file), LOCK_EX) != 0)
    {
        continue;
    }
    char string[40];
    printf("Enter your string: ");
    scanf("%[^\n]s",string);
    fprintf(file, "%s", string);
    flock(fileno(file), LOCK_UN);
    fclose(file);
    return 0;
}
```



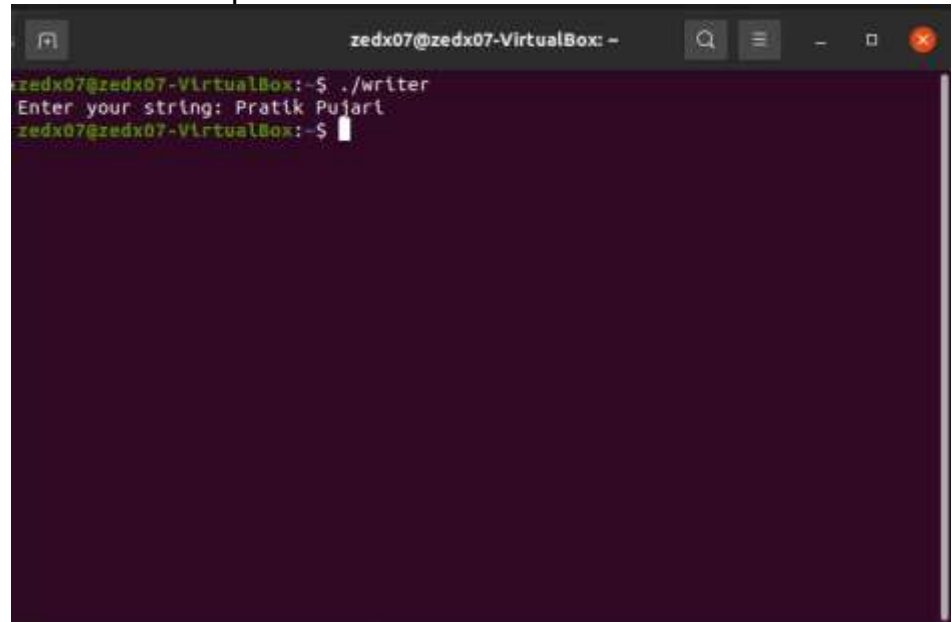
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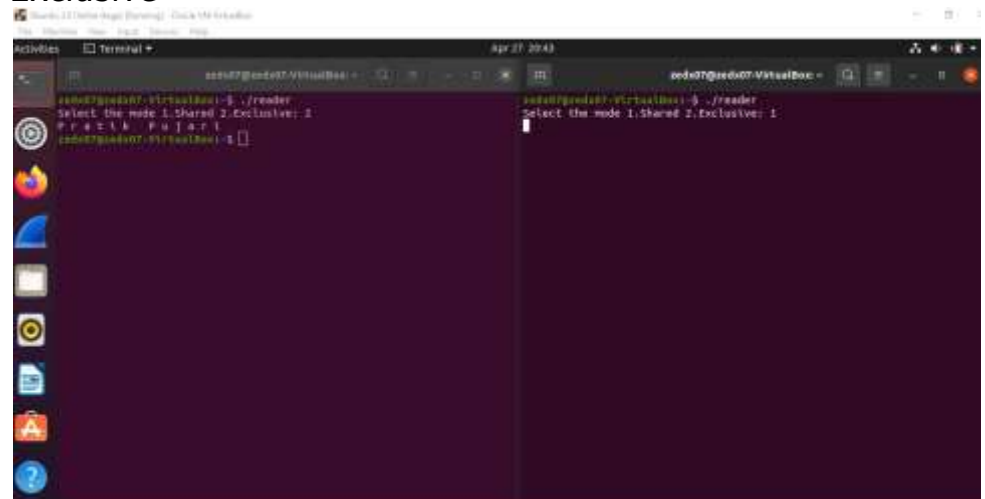
**OUTPUT
TABLE:**

Writer file compilation



```
zedx07@zedx07-VirtualBox: ~  
zedx07@zedx07-VirtualBox:~$ ./writer  
Enter your string: Pratik Pujari  
zedx07@zedx07-VirtualBox:~$
```

Trying to access using two readers 1.Shared and 2. Exclusive



```
zedx07@zedx07-VirtualBox: ~  
zedx07@zedx07-VirtualBox:~$ gcc -pthread reader.c -o reader  
zedx07@zedx07-VirtualBox:~$ ./reader  
Pratik Pujari  
zedx07@zedx07-VirtualBox:~$
```

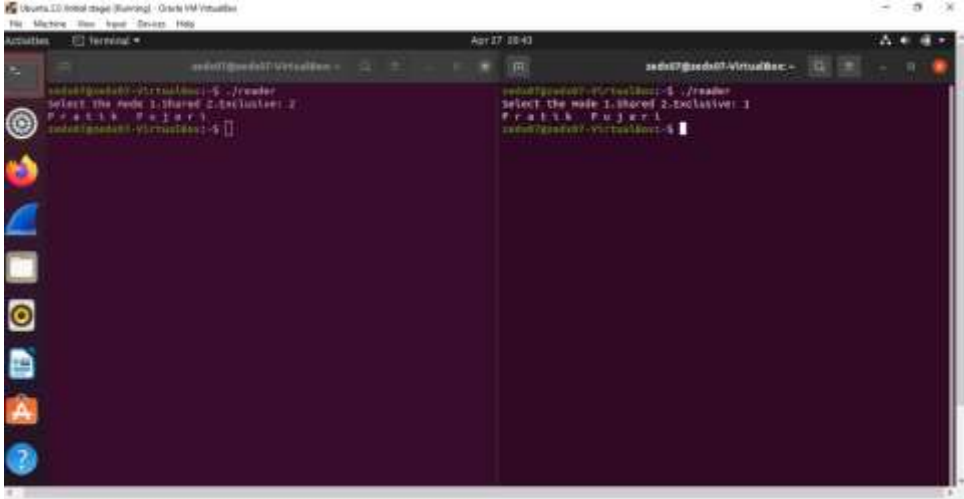
In the above screenshot the first reader compilation has exclusive lock and hence gets permission to print the data while the shared lock waits.



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	<p>Now after the exclusive lock has finished execution shared lock is given preference and it has finished execution too.</p> 
<p>RESULT: Learnt about the file handling system using the shared and exclusive lock. Learnt that both of the readers are trying to read the file then first exclusive lock is given access then the shared lock is given the access.</p>	