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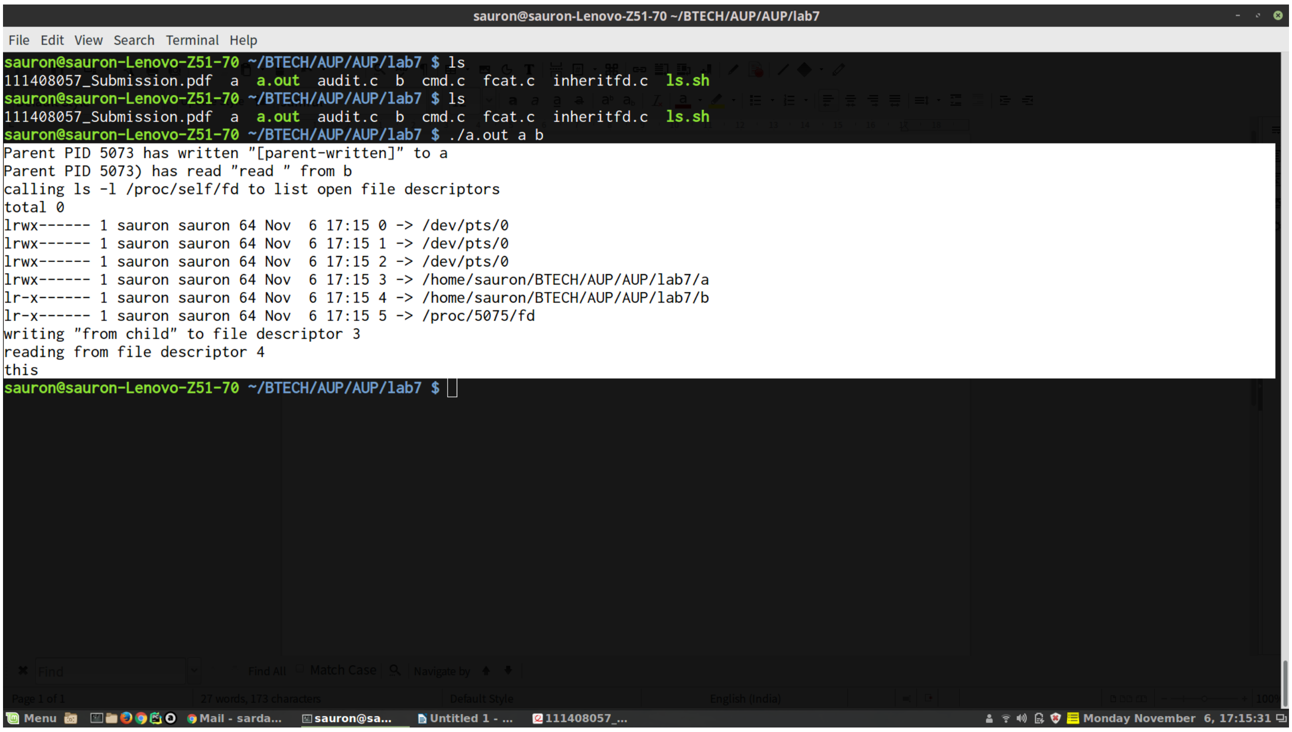
Question 1

“The child “exec” call inherits the file descriptors of parent if Close_on_exec is not set“.



sauron@sauron-Lenovo-Z51-70 ~/BTECH/AUP/AUP/lab7
File Edit View Search Terminal Help

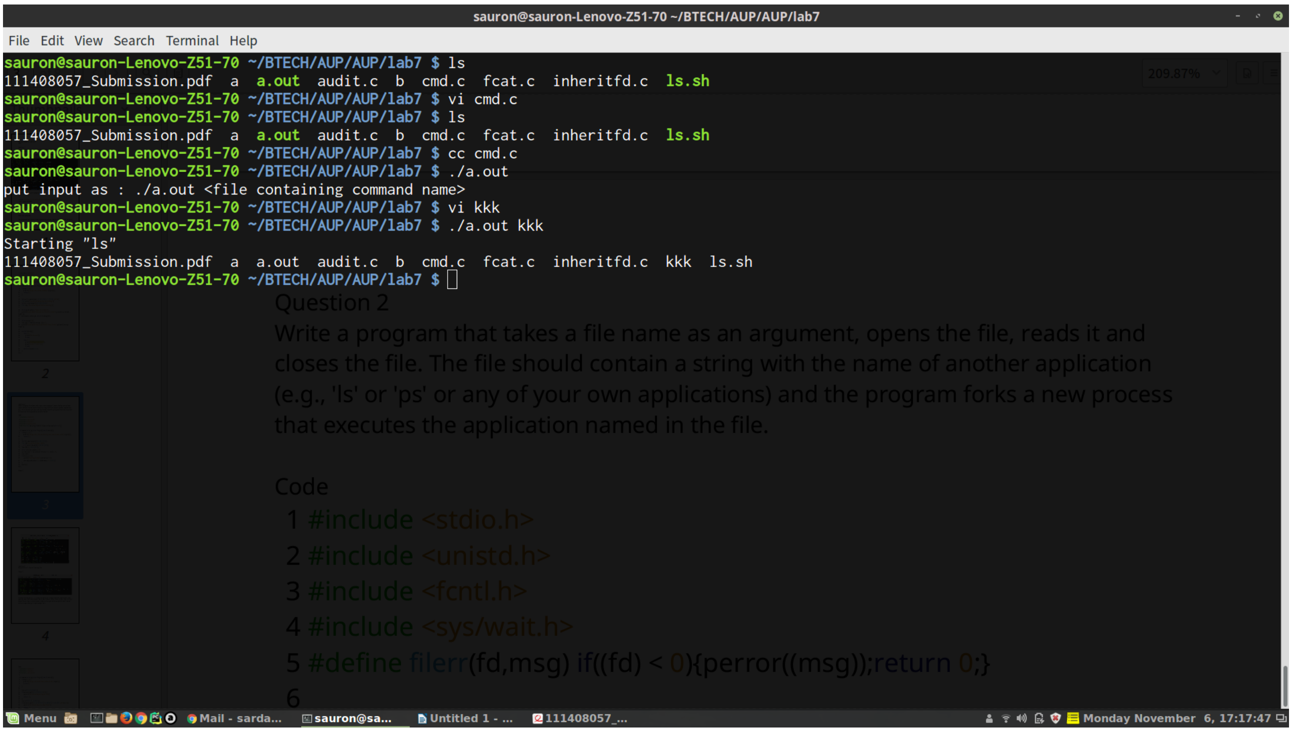
```
sauron@sauron-Lenovo-Z51-70 ~/BTECH/AUP/AUP/lab7 $ ls
111408057_Submission.pdf  a  a.out  audit.c  b  cmd.c  fcat.c  inheritfd.c  ls.sh
sauron@sauron-Lenovo-Z51-70 ~/BTECH/AUP/AUP/lab7 $ ls
111408057_Submission.pdf  a  a.out  audit.c  b  cmd.c  fcat.c  inheritfd.c  ls.sh
sauron@sauron-Lenovo-Z51-70 ~/BTECH/AUP/AUP/lab7 $ ./a.out a b
Parent PID 5073 has written "[parent-written]" to a
Parent PID 5073) has read "read " from b
calling ls -l /proc/self/fd to list open file descriptors
total 0
lrwx------ 1 sauron sauron 64 Nov  6 17:15 0 -> /dev/pts/0
lrwx------ 1 sauron sauron 64 Nov  6 17:15 1 -> /dev/pts/0
lrwx------ 1 sauron sauron 64 Nov  6 17:15 2 -> /dev/pts/0
lrwx------ 1 sauron sauron 64 Nov  6 17:15 3 -> /home/sauron/BTECH/AUP/AUP/lab7/a
lr-x------ 1 sauron sauron 64 Nov  6 17:15 4 -> /home/sauron/BTECH/AUP/AUP/lab7/b
lr-x------ 1 sauron sauron 64 Nov  6 17:15 5 -> /proc/5075/fd
writing "from child" to file descriptor 3
reading from file descriptor 4
this
sauron@sauron-Lenovo-Z51-70 ~/BTECH/AUP/AUP/lab7 $ 
```

```
#include <stdio.h>
#include <fcntl.h>
#include <unistd.h>
#include <sys/wait.h>
#define filerr(fd,msg) if((fd) < 0){perror((msg));return 0;}

int main(int argc, char *argv[], char *envp[]) {
	if (argc < 3) {
		printf("Usage: %s outfile infile\n", argv[0]);
		return 0;
	}

	int out = open(argv[1], O_RDWR | O_CREAT, 0777);
	int in = open(argv[2], O_RDONLY);
```

```
    char outmsg0[] = "[parent-written]";
    printf("Parent PID %d has written \"%s\" to %s\n", getpid(),
outmsg0, argv[1]);
    write(out, outmsg0, sizeof (outmsg0));

    char inmsg[16];
    inmsg[1 + read(in, inmsg, 5)] = 0;
    printf("Parent PID %d) has read \"%s\" from %s\n", getpid(), inmsg,
argv[2]);

    switch (fork()) {
        case -1:
            printf("Fork error");
            break;
        case 0:
            printf("Calling exec ls.sh");
            execl("ls.sh", "ls.sh", 0);
            break;
        default: wait(NULL);
    }
}
```

Question 2

Write a program that takes a file name as an argument, opens the file, reads it and closes the file. The file should contain a string with the name of another application (e.g., 'ls' or 'ps' or any of your own applications) and the program forks a new process that executes the application named in the file.


sauron@sauron-Lenovo-Z51-70 ~/BTECH/AUP/AUP/lab7
File Edit View Search Terminal Help
209.87%
Menu
Mail - sarda...
sauron@sa...
Untitled 1 - ...
111408057_...
Monday November 6, 17:17:47

```
sauron@sauron-Lenovo-Z51-70 ~/BTECH/AUP/AUP/lab7 $ ls
111408057_Submission.pdf  a  a.out  audit.c  b  cmd.c  fcat.c  inheritfd.c  ls.sh
sauron@sauron-Lenovo-Z51-70 ~/BTECH/AUP/AUP/lab7 $ vi cmd.c
sauron@sauron-Lenovo-Z51-70 ~/BTECH/AUP/AUP/lab7 $ ls
111408057_Submission.pdf  a  a.out  audit.c  b  cmd.c  fcat.c  inheritfd.c  ls.sh
sauron@sauron-Lenovo-Z51-70 ~/BTECH/AUP/AUP/lab7 $ cc cmd.c
sauron@sauron-Lenovo-Z51-70 ~/BTECH/AUP/AUP/lab7 $ ./a.out
put input as : ./a.out <file containing command name>
sauron@sauron-Lenovo-Z51-70 ~/BTECH/AUP/AUP/lab7 $ vi kkk
sauron@sauron-Lenovo-Z51-70 ~/BTECH/AUP/AUP/lab7 $ ./a.out kkk
Starting "ls"
111408057_Submission.pdf  a  a.out  audit.c  b  cmd.c  fcat.c  kkk  ls.sh
sauron@sauron-Lenovo-Z51-70 ~/BTECH/AUP/AUP/lab7 $ 
```

Question 2

Write a program that takes a file name as an argument, opens the file, reads it and closes the file. The file should contain a string with the name of another application (e.g., 'ls' or 'ps' or any of your own applications) and the program forks a new process that executes the application named in the file.

Code

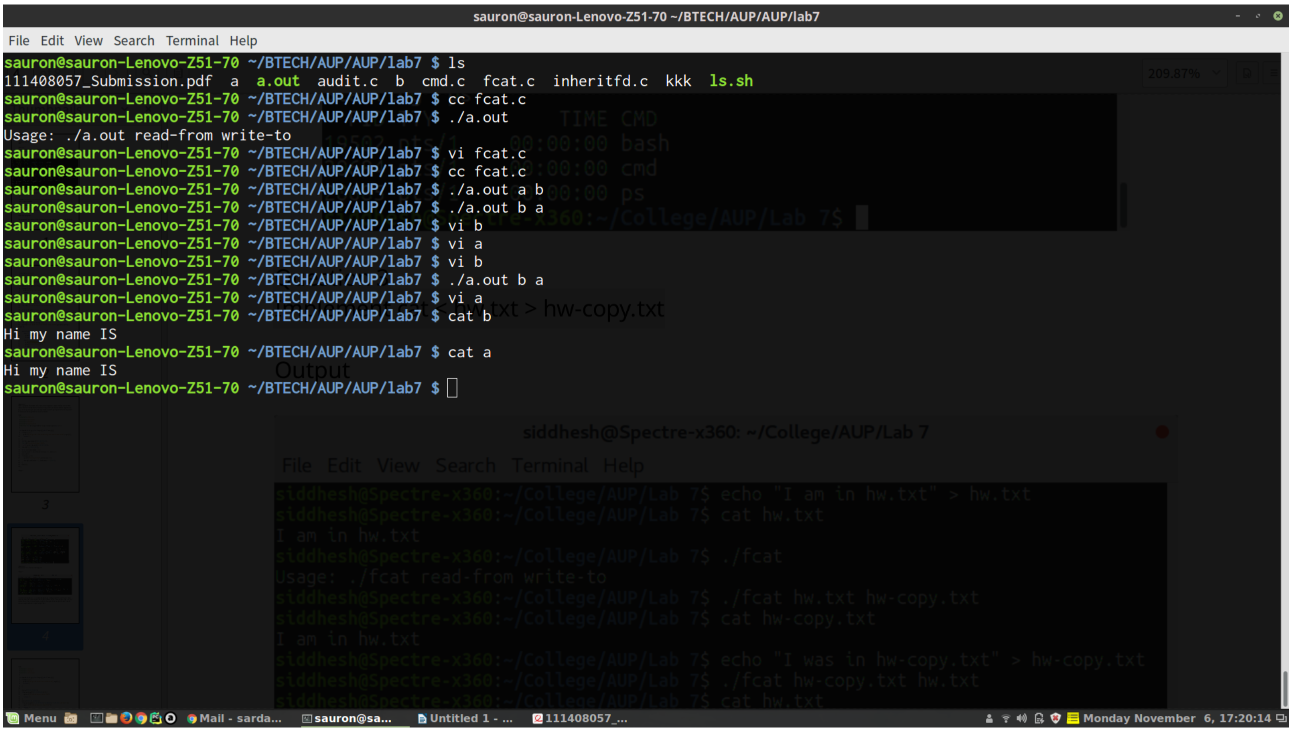
```
#include <stdio.h>
#include <unistd.h>
#include <fcntl.h>
#include <sys/wait.h>
#define filerr(fd,msg) if((fd) < 0){perror((msg));return 0;}
```

```
#include <stdio.h>
#include <unistd.h>
#include <fcntl.h>
#include <sys/wait.h>
#include <ctype.h>
#define filerr(fd,msg) if((fd) < 0){perror((msg));return 0;}

int main(int argc, char *argv[], char *envp[]) {
        if (argc < 2) {
                printf("put input as : %s <file containing command name>\n",
argv[0]);
                return 0;
        }
        int fd = open(argv[1], O_RDONLY);
        filerr(fd, "could not open file");
        __off_t end = lseek(fd, 0, SEEK_END);
        lseek(fd, 0, SEEK_SET);
        char cmdname[end + 2];
        cmdname[1 + read(fd, cmdname + 1, end)] = 0;
        char *c = cmdname + 1;
        while (*c) {
                if (isspace(*c)) {
```

```
                *c = 0;
                break;
            }
            c++;
        }

        close(fd);
        if (fork() == 0) {
            printf("Starting \"%s\"\n", cmdname + 1);
            int execret = execlp(cmdname + 1, cmdname + 1, NULL);
            //if error
            printf("Exec returned %d", execret);
        }
        wait(0);
}
```

Question 3

Implement cat < hw.txt > hw-copy.txt



```
sauron@sauron-Lenovo-Z51-70 ~/BTECH/AUP/AUP/lab7 $ ls
111408057_Submission.pdf  a  a.out  audit.c  b  cmd.c  fcat.c  inheritfd.c  kkk  ls.sh
sauron@sauron-Lenovo-Z51-70 ~/BTECH/AUP/AUP/lab7 $ cc fcat.c
sauron@sauron-Lenovo-Z51-70 ~/BTECH/AUP/AUP/lab7 $ ./a.out
Usage:  ./a.out read-from write-to
sauron@sauron-Lenovo-Z51-70 ~/BTECH/AUP/AUP/lab7 $ vi fcat.c
sauron@sauron-Lenovo-Z51-70 ~/BTECH/AUP/AUP/lab7 $ cc fcat.c
sauron@sauron-Lenovo-Z51-70 ~/BTECH/AUP/AUP/lab7 $ ./a.out a b
sauron@sauron-Lenovo-Z51-70 ~/BTECH/AUP/AUP/lab7 $ ./a.out b a
sauron@sauron-Lenovo-Z51-70 ~/BTECH/AUP/AUP/lab7 $ vi b
sauron@sauron-Lenovo-Z51-70 ~/BTECH/AUP/AUP/lab7 $ vi a
sauron@sauron-Lenovo-Z51-70 ~/BTECH/AUP/AUP/lab7 $ vi b
sauron@sauron-Lenovo-Z51-70 ~/BTECH/AUP/AUP/lab7 $ ./a.out b a
sauron@sauron-Lenovo-Z51-70 ~/BTECH/AUP/AUP/lab7 $ vi a
sauron@sauron-Lenovo-Z51-70 ~/BTECH/AUP/AUP/lab7 $ cat b
Hi my name IS
sauron@sauron-Lenovo-Z51-70 ~/BTECH/AUP/AUP/lab7 $ cat a
Hi my name IS
sauron@sauron-Lenovo-Z51-70 ~/BTECH/AUP/AUP/lab7 $ 
```

sauron@sauron-Lenovo-Z51-70 ~/BTECH/AUP/AUP/lab7
File Edit View Search Terminal Help
Menu
Mail - sarda...
sauron@sa...
Untitled 1 - ...
111408057_...
Monday November 6, 17:20:14

```
#include <stdio.h>
#include <fcntl.h>
#include <unistd.h>
```

```
int main(int argc, char *argv[], char *envp[]) {
        if (argc < 3) {
                printf("Input as %s read-from write-to\n", argv[0]);
                return 0;
        }

        close(STDIN_FILENO);
        if (open(argv[1], O_RDONLY) < 0) {
                perror("Could not open input file");
                return -1;
        }
        close(STDOUT_FILENO);
        if (open(argv[2], O_WRONLY | O_CREAT | O_TRUNC, 0644) < 0)
{
                perror("Could not open output file");
                return -1;
        }
        execl("/bin/cat", "cat", NULL);
}
```

4. Question 4

Bob works for an auditing agency needs to be able to read all the files in the system. The system admin has to protect the integrity of the system and should not allow Bob to modify or delete any file. Write a special SETUID program for the admin so that he can gave the executable permission of it to Bob. This program requires Bob to type a file name at the command line and then it will run /bin/cat to display the specified file.

```
#include <stdio.h>
#include <fcntl.h>
#include <unistd.h>

int main(int argc, char *argv[], char *envp[]) {
        if (argc < 2) {
                printf("Usage: %s <file to display>\n", argv[0]);
                uid_t uid = getuid();
                uid_t euid = geteuid();
                gid_t gid = getgid();
        gid_t  egid  =  getegid();
        printf("UID:%d  EUID:%d  GID:%d  EGID:%d\n",  uid,  euid,  gid,
egid);
        return  0;
    }
    execvp("/bin/cat",    argv);
}
```