



Nagar Yuwak Shikshan Sanstha's

# Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

Hingna Road, Wanadongri, Nagpur - 441 110

Ph.: 07104-237919, 234623, 329249, 329250 Fax: 07104-232376, Website: [www.ycce.edu](http://www.ycce.edu)

## Department of Computer Science and Engineering (IOT)

### YCCE

#### **Vision**

"To become the most preferred institution providing innovative, research and value based, professional education for the society at large".

#### **Mission**

##### **YCCE is committed to**

- Attract best talent and create learning ambience
- Practice Innovative teaching-learning & research
- Integrate Industry-Institute Collaborations
- Nurture students towards holistic development and choicest career

### Department

#### **Vision of the Department**

To be a well-known center for pursuing computer education through innovative pedagogy, value-based education and industry collaboration.

#### **Mission of the Department**

To establish learning ambience for ushering in computer engineering professionals in core and multidisciplinary arena by developing problem-solving skills through emerging technologies.



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<b>23CT1402</b>		<b>Lab: Operating Systems</b>										
<b>Name of the Student:</b> Puneet K Raut		<b>Semester/ Section:</b> 5 A										
<b>Roll No:</b> 58		<b>Enrollment Number:</b> 23070647										

Sr. No.	COs	Course Outcomes	POs											PSOs	
			1	2	3	4	5	6	7	8	9	10	11	PSO 1	PSO2
1	CO1	Demonstrate the ability to execute Linux process management, memory management, and shell commands to manage system resources efficiently.	3	3	3	-	-	-	-	-	-	-	3	3	
2	CO2	Develop programs utilizing system calls, thread programming, and page replacement algorithms to simulate and analyze operating system functionalities.	3	3	3	-	-	-	-	-	-	-	3	3	
3	CO3	Design and implement process scheduling, memory allocation, and deadlock detection algorithms to address real-world operating system challenges.	3	3	3	-	-	-	-	-	-	-	3	3	
		Avg	3	3	-								3	3	



### Practical No. 2

**Aim:** : Execute linux system calls process management ,memory management , file management system calls

#### Theory:

##### Process management:

This system calls perform the task of process creation, process termination, etc. The Linux System calls under this are fork(), exit(), exec().

- **fork():**

- A new process is created by the fork() system call.
- A new process may be created with fork() without a new program being run-the new sub-process simply continues to execute exactly the same program that the first (parent) process was running.
- It is one of the most widely used system calls under process management.

- **exit():**

- The exit() system call is used by a program to terminate its execution.
- The operating system reclaims resources that were used by the process after the exit() system call.

- **exec():**

- A new program will start executing after a call to exec()
- Running a new program does not require that a new process be created first: any process may call exec() at any time. The currently running program is immediately terminated, and the new program starts executing in the context of the existing process.

- **File Management :**

File management system calls handle file manipulation jobs like creating a file, reading, and writing, etc. The Linux System calls under this are open(), read(), write(), close()

- **open():**

- It is the system call to open a file.
- This system call just opens the file, to perform operations such as read and write, we need to execute different system call to perform the operations.

- **read():**

- This system call opens the file in reading mode
- We can not edit the files with this system call.
- Multiple processes can execute the read() system call on the same file simultaneously.



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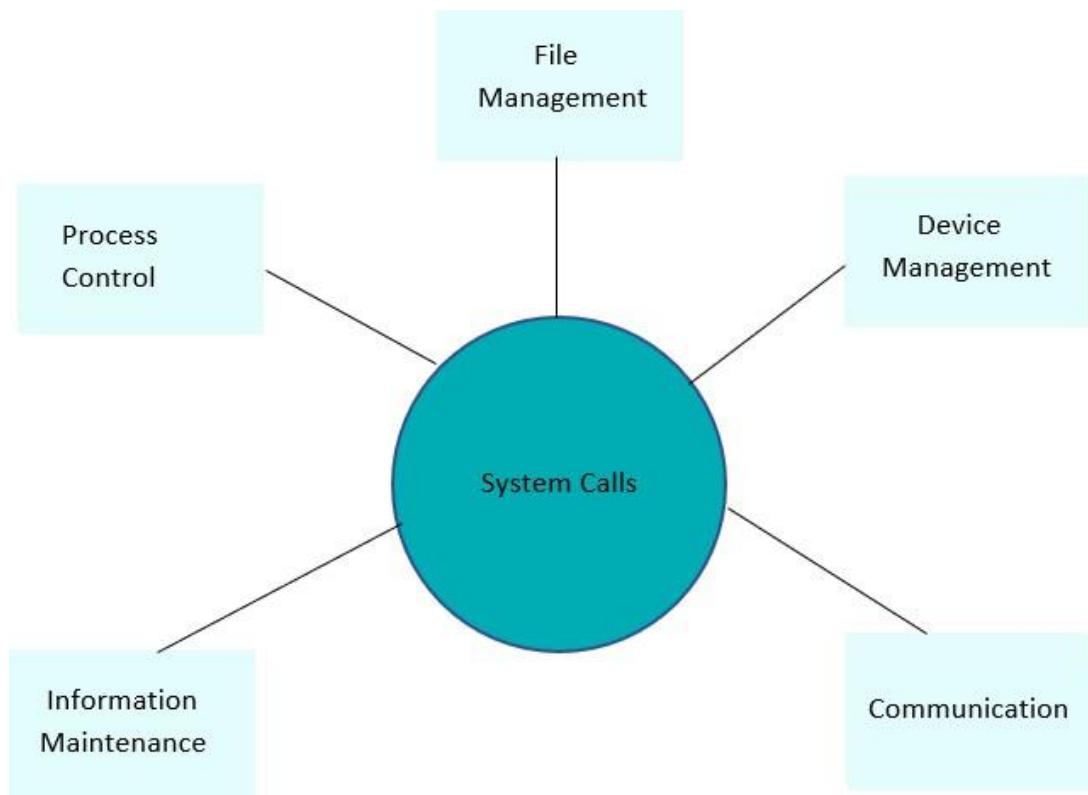
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### • write():

- This system call opens the file in writing mode
- We can edit the files with this system call.
- Multiple processes can not execute the write() system call on the same file simultaneously.

### • close():

- This system call closes the opened file.





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### Source Code:

#### File Name:

#### **Sample code 1:**

```
#include <stdio.h>
#include <sys/types.h>
#include <unistd.h>
int main()
{
    fork();
    fork();
    fork();
    printf("hello\n");
    return 0;
}
```

#### **Sample code 2:**

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

int main() {
    pid_t p = fork();

    if (p == -1) {
        perror("fork failed");
        return 1;
    } else if (p == 0) {
        printf("Hello from child! My id is %d\n", getpid());
    } else {
        printf("Hello from parent! My id is %d\n", getpid());
    }

    return 0;
}
```



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### File Management 3:

```
#include <fcntl.h> // For open()
#include <unistd.h> // For write() and close()
#include <string.h> // For strlen()

int main() {
    int fd = open("example.txt", O_WRONLY | O_CREAT | O_TRUNC, 0644);
    if (fd < 0) {
        // Error handling
        return 1;
    }

    write(fd, "Hello, file system!\n", strlen("Hello, file system!\n"));
    close(fd);
    return 0;
}
```



### OUTPUT (SCREEN SHOT) IF ANY:

#### Sample Output 1:

The screenshot shows a code editor interface with a dark theme. On the left, there is a vertical toolbar with icons for various file types: Python, C/C++, C, JS, TS, ETL, SQL, C, C++, JS, TS, ETL, SQL, and PHP. The main area has tabs for 'main.c' and other files like 'main.cpp', 'main.java', etc. The code in 'main.c' is as follows:

```
1 #include <stdio.h>
2 #include <sys/types.h>
3 #include <unistd.h>
4 int main()
5 {
6     fork();
7     fork();
8     fork();
9     printf("hello\n");
10    return 0;
11 }
```

Below the code, there are several small icons: a copy/paste icon, a brightness icon, a share icon, a 'Run' button (which is blue), and a 'Clear' button. The 'Output' section on the right shows the following text:

```
hello
hello
hello
hello
hello
hello
hello
==== Code Execution Successful ===
```

#### Sample output 2:

The screenshot shows a code editor interface with a dark theme, similar to the previous one. The vertical toolbar on the left includes icons for Python, C/C++, C, JS, TS, ETL, SQL, C, C++, JS, TS, ETL, SQL, and PHP. The main area has tabs for 'main.c' and other files like 'main.cpp', 'main.java', etc. The code in 'main.c' is as follows:

```
1 #include <stdio.h>
2 #include <stdlib.h>
3 #include <sys/types.h>
4 #include <unistd.h>
5
6 int main() {
7     pid_t p = fork();
8
9     if (p == -1) {
10         perror("fork failed");
11         return 1;
12     } else if (p == 0) {
13         printf("Hello from child! My id is %d\n", getpid());
14     } else {
15         printf("Hello from parent! My id is %d\n", getpid());
16     }
17
18     return 0;
19 }
```

Below the code, there are several small icons: a copy/paste icon, a brightness icon, a share icon, a 'Run' button (which is blue), and a 'Clear' button. The 'Output' section on the right shows the following text:

```
Hello from parent! My id is 43566
Hello from child! My id is 43567
==== Code Execution Successful ===
```



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### File Management 3:

The screenshot shows a C IDE interface with two panes. The top pane displays the code for 'main.c' which opens a file named 'example.txt', writes the string "Hello, file system!\n" to it, and then closes the file. The bottom pane shows the terminal output of the program, which includes the message "...Program finished with exit code 0" and a prompt to press ENTER to exit the console.

```
main.c example.txt
1 #include <fcntl.h> // For open()
2 #include <unistd.h> // For write() and close()
3 #include <string.h> // For strlen()
4
5 int main() {
6     int fd = open("example.txt", O_WRONLY | O_CREAT | O_TRUNC, 0644);
7     if (fd < 0) {
8         // Error handling
9         return 1;
10    }
11
12    write(fd, "Hello, file system!\n", strlen("Hello, file system!\n"));
13    close(fd);
14    return 0;
15 }
16
```

...Program finished with exit code 0  
Press ENTER to exit console.[]

The bottom part of the screenshot shows a second instance of the IDE with the same code and output, indicating a comparison or repetition of the process.



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### Conclusion:

By running these programs, we learned how the Linux kernel provides low-level control over processes, memory, and file operations through system calls.

Github Link- <https://github.com/Puneet4382/Operating-System-Practicals>