

# Learning Report – C and Linux OS programming



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**Document History**

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## INTRODUCTION

This is an attempt to learn and build c code and Linux programming we have implemented many problem statement and worked on some group activity project as well as Individual project.

## BASIC COMMANDS FOR LINUX

### What Is Linux?

Linux is an operating system's kernel. You might have heard of UNIX. Well, Linux is a UNIX clone. But it was actually created by Linus Torvalds from Scratch. Linux is free and open-source, that means that you can simply change anything in Linux and redistribute it in your own name! There are several Linux Distributions, commonly called “distros”.

- Ubuntu Linux
- Red Hat Enterprise Linux
- Linux Mint
- Debian
- Fedora

### Linux Shell or “Terminal”

a shell is a program that receives commands from the user and gives it to the OS to process, and it shows the output. Linux's shell is its main part.

## Linux Commands

### Basic Commands

```
nayso@Alok-Aspire:~$ ls
Desktop      itsuserguide.desktop  reset-settings  VCD_Copy
Documents    Music                  School_Resources  Videos
Downloads    Pictures               Students_Works_10
examples.desktop  Public                 Templates
GplatesProject  Qgis Projects         TuxPaint-Pictures
```

**ls** — Use the "ls" command to know what files are in the directory you are in.

**pwd** — When you first open the terminal, you are in the home directory of your user.

```
nayso@Alok-Aspire:~$ pwd
/home/nayso
```

Q1. Write a function to break the given string and return the correct string between '\$' and ';' with no '\$' or ';' in between.

```
#include <stdio.h>
int main() {
    char str_input[1000];
    int start=0,end=0;
    printf("Enter a string_input ");
    fgets(str_input, sizeof(str_input), stdin);

    for (int i = 0; str_input[i] != '\0'; ++i) {
```

```
        if (str_input[i] == '$')
            start=i;

        if (str_input[i] == ';') {
            end=i;
            break;
        }
    }

for (int k = start; k<=end; ++k) {
    printf("%c",str_input[k]);
}
return 0;
}
```

### The Build Process - C/C++

Sequence of Events : **Editor => Type the Code => Press Build & Run => Wait[Build Process]... => Prompt/Window**

### Group Coding Activity

Marker Tools | Presenter Info | Resources

## Sample Coding Activity

A weighted colored Box is associated with following attributes  
– unique id, length, breadth, height, color, weight

- ☐ Create a structure to define Box as encapsulated unit (user define type)
- ☐ Create an array of boxes using dynamic memory
- ☐ Perform the following operations
  - ☐ Add a box at end of array
  - ☐ Display the state of all boxes
  - ☐ Find the box with given id
  - ☐ Count all boxes with specified color
  - ☐ Find average volume of all boxes
  - ☐ Find the difference between min and max volume
  - ☐ Find the box with maximum height
  - ☐ Update weight of box with specific id
  - ☐ Remove the Box with given id

We'll share few more samples periodically and demonstrate the expected solution, best practices, tool usage for one problem during connect session.

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26. Sample MCQs

27. Sample MCQs

28. Sample Coding Activity

29. Sample Coding Activity

30. Coding Activity – Guidelines & Criteria














31. Coding Activity – Guidelines & Criteria

32. Sample Coding Problem – 2 (State Machine)

33. Test Your C Knowledge

**Git Link :-** [https://github.com/99003774/BOX\\_ACTIVITY.git](https://github.com/99003774/BOX_ACTIVITY.git)

 99003774 / BOX\_ACTIVITY[Code](#) [Issues](#) [Pull requests](#) [Actions](#) [Projects](#) [Wiki](#) [Security](#) [Insights](#)[main](#) [1 branch](#) [0 tags](#)[Go to file](#)[Add file](#)[Code](#)

	99003763 Update new_codde	942beaf 2 days ago	 35 commits
	Inc	Add files via upload	4 days ago
	src	Update Box_Main.h	3 days ago
	test	Add files via upload	4 days ago
	unity	Add files via upload	6 days ago
	Box_Main.c	Add files via upload	7 days ago
	README.md	Update README.md	6 days ago
	addArr.c	Add files via upload	5 days ago
	box_operation.c	Update box_operation.c	7 days ago
	cuboid.c	Add files via upload	6 days ago
	memory.c	Create memory.c	7 days ago
	new_codde	Update new_codde	2 days ago





**Topic we have learned :**

1. OS and its features
2. Process and Process Life cycle
3. Types of Kernel
4. Scheduling

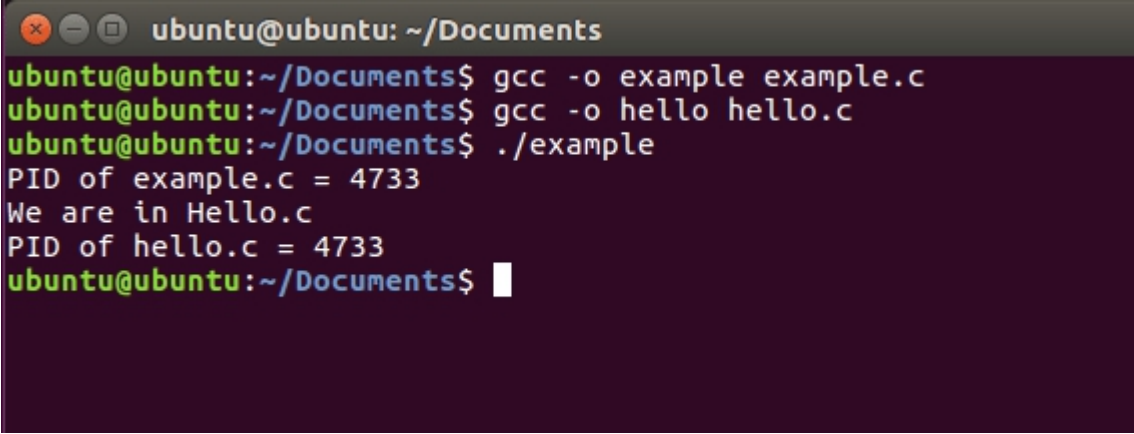
**Linux Exec System Call**

The exec system call is used to execute a file which is residing in an active process. When exec is called the previous executable file is replaced and new file is executed.  
the standard names for these functions are as follows:

1. **execl**
2. **execle**
3. **execlp**
4. **execv**
5. **execve**
6. **execvp**

## Getpid code Example : -

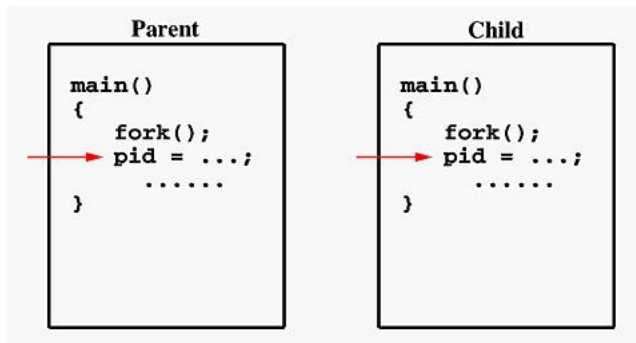
```
#include <stdio.h>
#include <unistd.h>
#include <stdlib.h>
int main(int argc, char *argv[])
{
    printf("We are in Hello.c\n");
    printf("PID of hello.c = %d\n", getpid());
    return 0;
}
```



```
ubuntu@ubuntu: ~/Documents
ubuntu@ubuntu:~/Documents$ gcc -o example example.c
ubuntu@ubuntu:~/Documents$ gcc -o hello hello.c
ubuntu@ubuntu:~/Documents$ ./example
PID of example.c = 4733
We are in Hello.c
PID of hello.c = 4733
ubuntu@ubuntu:~/Documents$
```

## fork() System Call :-

System call **fork()** is used to create processes. It takes no arguments and returns a process ID



## Threads and Signals

Thread has its own signal mask, but the signal disposition is shared by all threads in the process.

If the signal is related to a hardware fault or expiring timer, the signal is sent to the thread whose action caused the event.

## REFERENCES –

[https://www.youtube.com/watch?v=kjvy\\_zwhBuA](https://www.youtube.com/watch?v=kjvy_zwhBuA)

<https://www.csl.mtu.edu/cs4411.ck/www/NOTES/process/fork/create.html>

<https://linuxhint.com/linux-exec-system-call/>

<https://www.youtube.com/watch?v=83M5-NPDeWs>

Inter Process Communication: <https://www.youtube.com/watch?v=G2vwkBZy894>

Locking (Software Solutions): [https://www.youtube.com/watch?v=B\\_IH2Xov\\_g4](https://www.youtube.com/watch?v=B_IH2Xov_g4)

Semaphores: <https://www.youtube.com/watch?v=UM4tk3J6WxQ>

Mutex: <https://www.youtube.com/watch?v=xKqO04SN6C0>