

Operating System: System Call & Fork()

By: Vishvadeep Gothi



VISHVADEEP GOTHI SIR

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in GATE**



**ME from IISc Bangalore
Mtech BITS Pilani in Data
Science**



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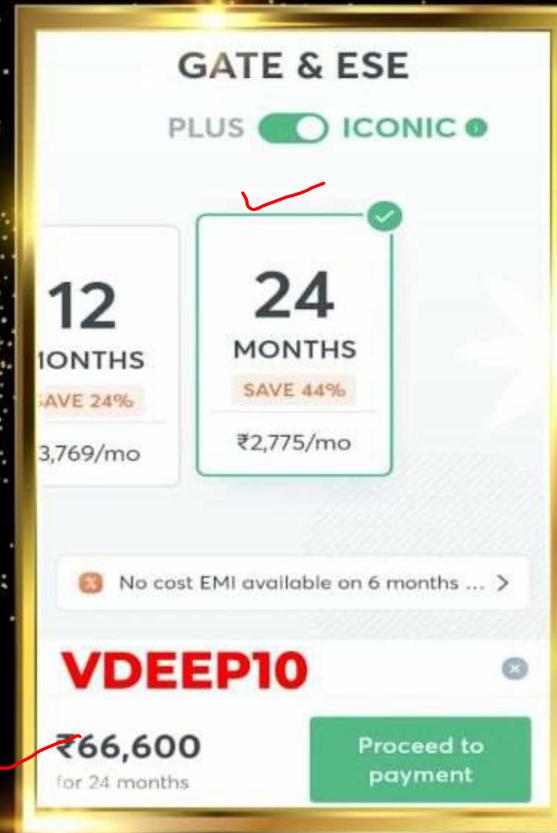
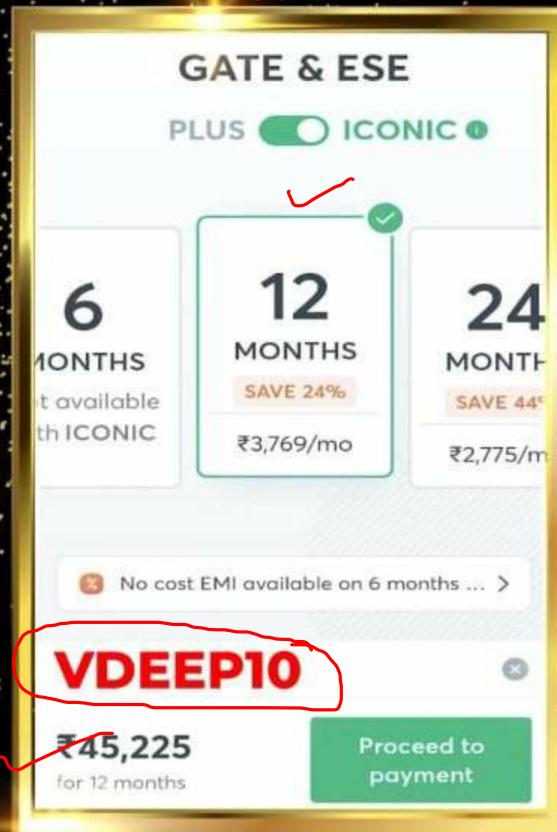
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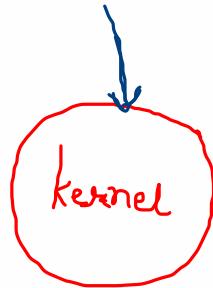
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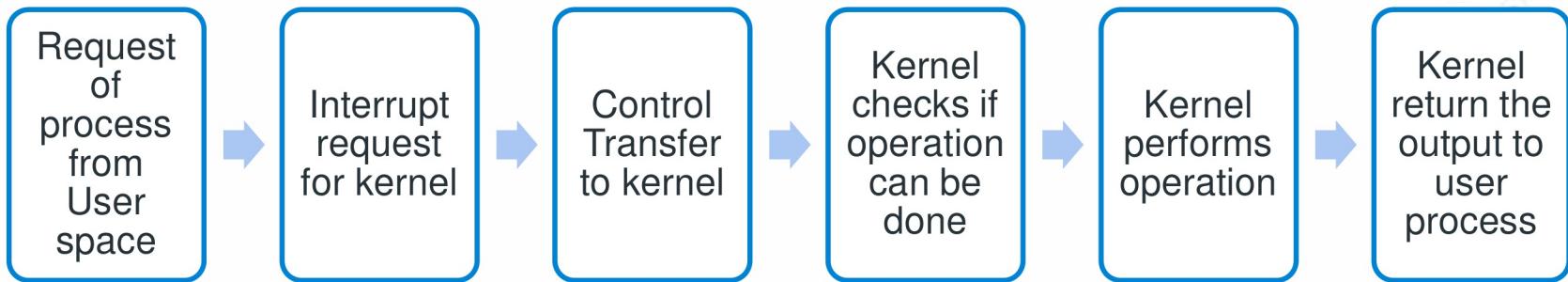
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System Call

Programmatic way in which a computer program requests a service from the kernel



How System Call Works



Services Provided by System Calls

1. Process creation and management
2. Main memory management
3. File Access, Directory and File system management
4. Device handling(I/O)
5. Protection
6. Networking

System Calls Category

Process control

1. create process (for example, fork on Unix-like systems, or NtCreateProcess in the Windows NT Native API)
2. terminate process
3. load, execute
4. get/set process attributes
5. wait for time, wait event, signal event
6. allocate and free memory

System Calls Category

File Management

1. create file, delete file
2. open, close
3. read, write, reposition
4. get/set file attributes

System Calls Category

Device Management

1. request device, release device
2. read, write, reposition
3. get/set device attributes
4. logically attach or detach devices

System Calls Category

Information Maintenance

1. get/set total system information (including time, date, computer name, enterprise etc.)
2. get/set process, file, or device metadata (including author, opener, creation time and date, etc.)

System Calls Category

Communication

1. create, delete communication connection
2. send, receive messages
3. transfer status information
4. attach or detach remote devices

System Calls Category

Protection

1. get/set file permissions

Example

	Windows	Unix
Process Control	CreateProcess() ExitProcess() WaitForSingleObject()	fork() exit() wait()
File Manipulation	CreateFile() ReadFile() WriteFile() CloseHandle()	open() read() write() close()
Device Manipulation	SetConsoleMode() ReadConsole() WriteConsole()	ioctl() read() write()
Information Maintenance	GetCurrentProcessID() SetTimer() Sleep()	getpid() alarm() sleep()
Communication	CreatePipe() CreateFileMapping() MapViewOfFile()	pipe() shmget() mmap()
Protection	SetFileSecurity() InitializeSecurityDescriptor() SetSecurityDescriptorGroup()	chmod() umask() chown()

fork()

Fork system call is used for creating a new process, which is called child process.

- ◎ Which runs concurrently with the process that makes the fork() call (parent process).

→ child & parent both execute further, from next
stmt. of fork().

Parameters & Return Value

It takes no parameters and returns an integer value

- ◎ **Negative Value:** creation of a child process was unsuccessful
- ◎ **Zero:** Returned to the newly created child process
- ◎ **Positive value:** Returned to parent or caller. The value contains process ID of newly created child process

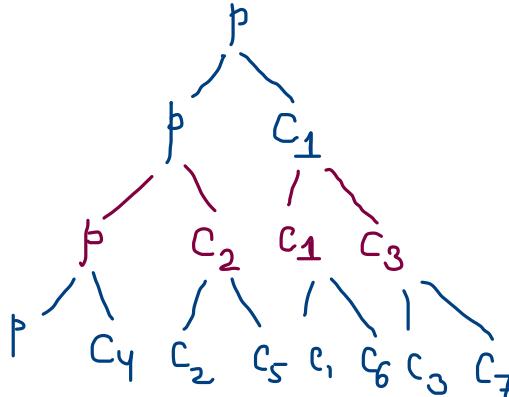
Question

A process executes the code

```
fork();
```

```
fork();
```

```
fork();
```



The total number of child processes created is

- (A) 3
- (B) 4
- (C) 7
- (D) 8

Total number of processes = 8

Question

$$\text{no. of child processes} = 2^n - 1$$

A process executes the code

fork();

:

fork();

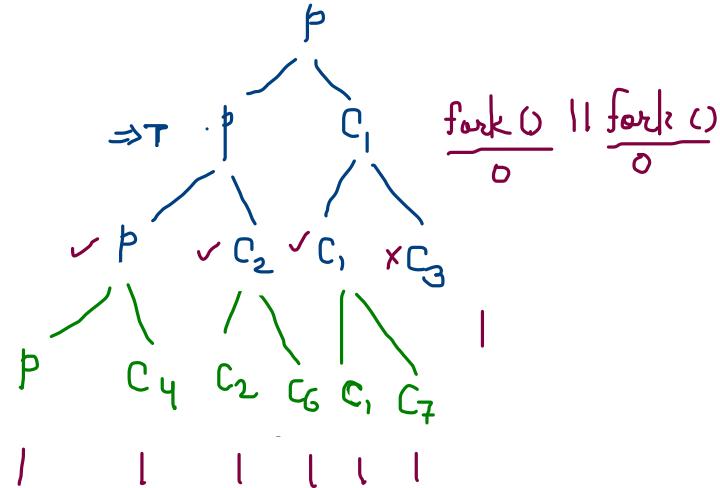
$$\text{Total no. of processes} = 2^n$$

There are n such statements. The total number of child processes created is?

Question

What is the output of the following code?

```
#include <stdio.h>
#include <unistd.h>
int main()
{
    if(fork() || fork())
        fork();
    printf("1 ");
    return 0;
}
```



Next Class

Memory Management

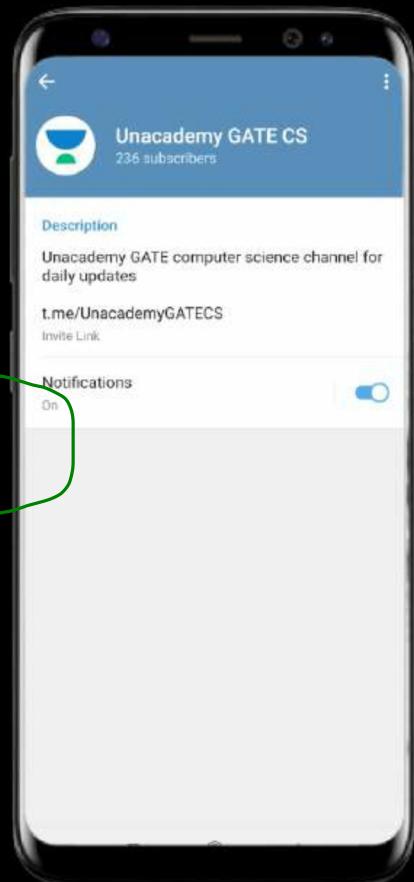


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