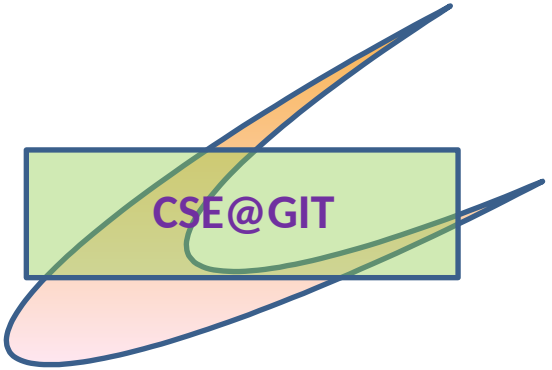
Experiment No. 9

Problem Definition:

Consider a child process that has been terminated but not yet been reaped leading to a resource leak. Write a C/C++ program to create a resource leak and also identify its presence.

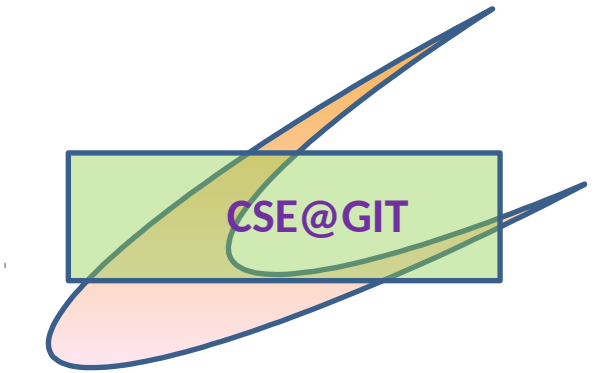


Objectives of the Experiment:

1) To demonstrate the creation of zombie process

2) To identify the zombie process

3) To understand the usage of ps command



Theoretical Background of the Experiment

Zombies are basically the leftover bits of dead processes that haven't been cleaned up properly. Zombie process is an inactive computer process.

On Unix operating systems, a zombie process or is a process that has completed execution but still has an entry in the process table.

Process Table

- A table containing all of the information that must be saved when the CPU switches from running one process to another in a multitasking system.

- The information in the process table allows the suspended process to be restarted at a later time.

- Every process has an entry in the table. These entries are known as process control block and contain the following information:
  process state ; memory state ; resource state;

Flow of implementation :

1. Declare required header files unistd.h, stdio.h.
2. Create the child process & check the condition for fork error.
3. Create the Zombie process & verify the process using ps command.

Psuedocode to create a Zombie Process

```
int main(void)
 {
    pid_t      pid;
    if ((pid = fork()) < 0)
       perror("fork error");

    else if (pid == 0)
        /* child */
        _exit(0);
   /* parent */
        sleep(4);

   system("ps -o pid,ppid,state,tty,command");

   _exit(0);
 }
```

ps Command

Process status displays the currently-running processes.

- How to know a Zombie Process

  $ps pid,ppid,**s**,tty,comm
- pid: its process id
- ppid: parent process id
- **s:state** – will be **Z**
- tty: controlling terminal

OUTPUT

```
PID PPID STAT CMD
1     0     S     init [5]
2     1     S     [migration/0]
3     1     S     [ksoftirqd/0]
3087 3084 S     gnome-pty-helper
3088 3084 S     bash
3166 3088 S     ./a.out
3167 3166 Z     [a.out] <defunct> //Zombie Process
3168 3166 R     ps -e -o pid,ppid,stat,cmd
```

Learning Outcomes of the Experiment

At the end of the session, students should be able to :

1) Demonstrate the creation of zombie process [L3].

2) Distinguish between process & Zombie process [L4].

Thank You