CS5243 Advanced UNIX Programming

Assignment 7(4 pts)

Group 4

Screenshot of codes:

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

int main(void){

    // Create pipe
    int link[2];
    if (pipe(link) == -1)
    {
        printf("Create Pipe fail\n");
        exit(-1);
    }

    // Create Child Process
    pid_t p = fork();
    char *arg[3] = {"ps", "-opid,pgid,tpgid,sid,command", NULL};
    // char *arg[2] = {"ps", NULL};
    if(p == 0){

    // Create New Session
    int new_sid = setsid();
    printf("New Session id: %d\n", new_sid);
    int new_pgid = getpgrp();
    printf("New Group id: %d\n", new_pgid);

    // Run 'ps' command

    close(link[0]);
    dup2(link[1], STDOUT_FILENO);
    execvp("ps", arg);
    }else{

        // Wait for pipe
        // sleep(1);
        close(link[1]);
        char buf[200];
        FILE * pipe_out;

        // Print output from ps command
        int nbytes = read(link[0], buf, 200);
        // printf("%d\n", nbytes);
        printf("Child Process: %d\n", p);
        printf("Parent Process: %d\n", getpid());
        printf("%s\n", buf);

    }

    return 0;
}
```

Screenshot of result:

```
freebsd@generic:~/Advanced-UNIX-Programming_Student/assignment7 % ./assignment7
New Session id: 62232
New Group id: 62232
Child Process: 62232
Parent Process: 62231
  PID  PGID TPGID   SID COMMAND
62227 62227 62231 62227 -csh (csh)
62231 62231 62231 62227 ./assignment7
```

1. In line 17, we forked a child process.
2. In line 23, we set a new session for the child process.
3. We called *ps* after creating a new session, and the screenshot shows that the child is a process group leader and no longer has a controlling terminal.
4. A process becomes a process group leader and no longer has a controlling terminal, which means it has disassociated itself from the terminal that started it. The PID, PGID, and TGPID are 62231. The child process has its unique PID. The PGRP will be the same as its PID. The TPGID becomes equal to its own PID. This indicates that the process group is not associated with any terminal.