## 同济大学计算机网络 实验报告



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四.如何杀死守护进程?如何杀死守护进程的子进程?

1.在 04 子目录下写 test4-1.c,循环 10 次,每个 3 秒产生一个子进程……写配套的 makefile,make 后生成 test4-1 可执行文件:

## 答:

根据目标功能编写的 test4-1.c 如下:

```
#include <stdio.h>
#include <sys/types.h>
#include <signal.h>
#include <string.h>
#include <sys/wait.h>
int main()
     int i,j;
pid_t pid1;
pid1=fork();
if(pid1==-1)
     return 0;
if(pid1==0)
        for (i=0; i<10;)
           pid_t pid = fork();
if (pid == 0)
           {
for(;;)
                printf("%d %d 1652262 sub\n",(int)getppid(),(int)getpid());
                 sleep(15);
           i++;
           sleep(3);
     while(1)
           printf("%d %d 1652262 main\n",(int)getppid(),(int)getpid());
           sleep(5);
     return 0;
     if(pid1>0)
     return 0;
}
```

编写的 makefile 文件如下:

执行 make 操作,并运行生成的 test4-1 可执行文件并将输出的打印信息到 output1 文件,进程的生成如下:

```
[root@RHEL74-SVR 04]# ./test4-1 >output1 &
[1] 2342
             -SVR 04]# ps -a
[root@RHEL74
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      UID
              PID
                     PPID
                              PRI
                                    NI ADDR SZ WCHAN
                                                                        TIME CMD
                            0
                                           1052 hrtime pts/0
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                                     0 - 38293
                                                                   00:00:00 ps
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                                    test4-1 > output1
[1]+
       完成
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              -SVR 04]# ps
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                                    NI ADDR SZ WCHAN
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[root@RHEL74
             -SVR 04]# ps
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[root@RHEL74-SVR 04]# ps
                            -a
```

通过 kill+子进程号杀死子进程,此处杀死的是 2343 子进程:

```
[root@RHEL74-SVR 04]# kill 2
F S UTD DTD 04]# ps -a
[root@RHEL74-SVR 04]# kill 2343
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[root@RHEL74-SVR 04]#
```

- 3.如何快速杀死 test4-1 分裂出来的全部子进程? 答:
- (1)首先在 test4-1.c 中加入 func waitpid 函数:

```
#include <stdio.h>
#include <sys/types.h>
#include <signal.h>
#include <string.h>
#include <sys/wait.h>
void func_waitpid(int signo) {
    pid_t pid;
int stat;
    while( (pid = waitpid(-1, &stat, WNOHANG)) > 0 );
     return;
}
int main()
     signal(SIGCHLD, &func_waitpid);
    int i,j;
pid_t pid1;
pid1=fork();
if(pid1==-1)
     return 0:
     if(pid1==0)
       for (i=0; i<10;)
          pid_t pid = fork();
if (pid == 0)
            for (;;)
              printf("%d %d 1652262 sub\n",(int)getppid(),(int)getpid());
              sleep(15);
        }
          i++:
         sleep(3);
     while(1)
          printf("%d %d 1652262 main\n",(int)getppid(),(int)getpid());
          sleep(5);
     return 0;
     if(pid1>0)
     return 0:
}
```

(2)执行 test4-1 可执行文件,执行 For p\_pid in `ps -ef|grep test4-1|egrep -v grep|awk '{print \$2}``杀死所有 test4-1 的子进程:

```
[root@RHEL74-SVR 04]# ps -a -1
                                     C PRI
0 80
         UID
                            PPID
                                               NI ADDR SZ WCHAN
                                                                                             TIME CMD
                                                                                       00:00:00 test4-1
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00:00:00 test4-1
1 S
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                            2436
                                        80
                  2448
                            2436
                                     0 80
                                                        1053 hrtime pts/1
                                                                                       00:00:00 test4-1
0 R 0 2449 2394 0 80 0 - 38293 - pts/1 00:00:00 ps
[root@RHEL74-SVR 04]# for p_pid in `ps -ef|grep test4-1|egrep -v grep|awk '{print $2}'`
> pkill -9 -P $p_pid
> done
> done
[root@RHEL74-SVR 04]# ps -a -1
F S UID PID PPID C PRI
1 S 0 2436 1 0 80
0 R 0 2475 2394 0 80
                                               NI ADDR SZ WCHAN TTY
0 - 1053 hrtime pts/1
                                                                                             TIME CMD
                                                                                       00:00:00 test4-1
00:00:00 ps
                                                0 - 38293 -
                                                                          pts/1
[root@RHEL74-SVR 04]#
```

4.如何杀死 test4-1, 其子进程会发生哪些变化?

答: 杀死身为父进程的 test4-1,可以观察到子进程正常运行并未发生退出但是由 test4-1 产生的子进程的 PPID(父进程标识)全部变为 1,即 init 进程:

```
[root@RHEL74-
[1] 2477
[root@RHEL74-
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   [root@RHEL74-SVR 04]# ./test4-1 >output1 &
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0 R 0 2496 2394 0 80
[1]+ 完成
[root@RHEL74-SVR 04]# kill 2478
[root@RHEL74-SVR 04]# ps -a -l
F S UID PID PPID C PRI
1 S 0 2436 1 0 80
1 S 0 2479 1 0 80
1 S 0 2480 1 0 80
1 S 0 2481 1 0 80
1 S 0 2482 1 0 80
1 S 0 2482 1 0 80
1 S 0 2483 1 0 80
1 S 0 2484 1 0 80
1 S 0 2485 1 0 80
1 S 0 2486 1 0 80
1 S 0 2486 1 0 80
1 S 0 2487 1 0 80
1 S 0 2487 1 0 80
1 S 0 2488 1 0 80
0 R 0 2510 2394 0 80
[root@RHEL74-SVR 04]# ■
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   [root@RHEL74-SVR 04]#
```

5.写 test4-2.c,要求与 test4-1 相同,但是要求杀死 test4-2 后,它的全部子进程自动退出:

答:

(1)编写 test4-2.c,在 test4-1.c 的基础上,在子进程生成中加入信号控制函数 ptctrl:

```
#include <stdio.h>
#include <sys/types.h>
#include <signal.h>
#include <string.h>
#include <string.h>
#include <stdlib.h>
#include <sys/wait.h>
#include <sys/prctl.h>
void func_waitpid(int signo) {
   pid_t pid;
   int stat;
   while( (pid = waitpid(-1, &stat, WNOHANG)) > 0 );
   return;
         return;
 int main()
         signal(SIGCHLD, &func_waitpid);
int i,j;
pid_t pid1;
pid1=fork();
if(pid1==-1)
         return 0;
          if(pid1==0)
                  for(i=0;i<10;)
                     pid_t pid = fork();
if (pid == 0)
                          while(1)
                            prctl(PR_SET_PDEATHSIG, SIGHUP);
printf("%d %d 1652262 sub\n",
                              printf("%d
sleep(15);
                                                                                 sub\n',(int)getppid(),(int)getpid());
                      exit(0);
                 }
i++;
sleep(3);
         while(1)
                  \begin{array}{lll} printf("\%d \%d 1652262 & main\n",(int)getppid(),(int)getpid()); \\ sleep(5); \end{array} 
         exit(0);
system("killall test4-2");
 }
         if(pid1>0)
return 0;
 }
```

(2)运行生成的 test4-2,并杀死其父进程,可以看到父进程生成的子进程全部被杀,说明测试成功:

```
[root@RHEL74-SVR 04]# ./test4-2 >output2 &
[1] 2521
  [root@RHEL74-SVR 04]# ps
                                    -a -1
                    PID
                                      PRI
                                             NI ADDR SZ WCHAN TTY
          UID
                                                                                      TIME CMD
             0
                  2436
                                    0
                                       80
                                              0
                                                     1053 hrtime pts/1
                                                                                 00:00:00 test4-1
  111111111111111111111111
                                                     1053 hrtime pts/1
1053 hrtime pts/1
             0
                  2479
                                    0
                                        80
                                              0
                                                                                 00:00:00 test4-1
                  2480
             0
                                    0
                                              0 -
                                                                                 00:00:00 test4-1
                                1
                                        80
                                    ō
                                                     1053 hrtime pts/1
                                                                                 00:00:00 test4-1
00:00:00 test4-1
     S
             0
                  2481
                                1
                                        80
     S
                  2482
                                    0
                                                     1053 hrtime
                                                                     pts/1
             0
                                        80
                  2483
                                    0
                                                     1053 hrtime pts/1
                                                                                  00:00:00 test4-1
             0
                  2484
                                1
                                    0
                                        80
                                              0 -
                                                     1053 hrtime pts/1
                                                                                 00:00:00 test4-1
     555555555555555
             0
                  2485
                               1
                                    0
                                        80
                                              0 -
                                                     1053 hrtime pts/1
                                                                                 00:00:00 test4-1
                                                     1053 hrtime pts/1
1053 hrtime pts/1
             0
                  2486
                               1
                                              0 -
                                                                                 00:00:00 test4-1
00:00:00 test4-1
                                        80
                  2487
                                    ŏ
             0
                                        80
                                              0 -
             0
                  2488
                                ī
                                    ō
                                        80
                                                     1053 hrtime pts/1
                                                                                  00:00:00 test4-1
             0
                  2522
                                        80
                                                     1053 hrtime
                                                                     pts/1
                                                                                  00:00:00 test4-2
                           2522
2522
2522
             0
                  2523
                                    0
                                        80
                                              0 -
                                                     1053 hrtime pts/1
                                                                                 00:00:00 test4-2
                                                                                 00:00:00 test4-2
00:00:00 test4-2
                  2524
2525
                                              0 -
             0
                                    0
                                        80
                                                     1053 hrtime pts/1
                                              0 -
             0
                                                     1053 hrtime pts/1
                                        80
                                                                                 00:00:00 test4-2
00:00:00 test4-2
                            2522
                                    0
                                                     1053 hrtime pts/1
             0
                  2526
                                        80
                                              0 -
             ō
                  2527
                            2522
                                    Ō
                                                     1053 hrtime pts/1
                                        80
             0
                  2528
                            2522
                                    0
                                        80
                                                 _
                                                     1053 hrtime pts/1
                                                                                  00:00:00 test4-2
                           2522
2522
2522
2522
2522
                  2529
2530
2531
             0
                                    0
                                        80
                                              0
                                                     1053 hrtime pts/1
                                                                                 00:00:00 test4-2
    SSSS
                                                                                 00:00:00 test4-2
00:00:00 test4-2
00:00:00 test4-2
                                              0 -
             0
                                    0
                                        80
                                                     1053 hrtime pts/1
                                                     1053 hrtime pts/1
1053 hrtime pts/1
                                              0 -
                                    0
                                        80
                  2532
                                       80
             0
                                    Ō
                                              0 -
  0 R 0 2533 2394 0 80

[1]+ 完成

[root@RHEL74-SVR 04]# kill 2522

[root@RHEL74-SVR 04]# ps -a -l

FS UID PID PPID C PRI
                                              0 - 38293 -
                                                                     pts/1
                                                                                 00:00:00 ps
                                             /test4-2 > output2
                                   -a -1
C PRI
0 80
F1111111110
                                             NI ADDR SZ WCHAN TTY
0 - 1053 hrtime pts/1
                                                                                      TIME CMD
                                                                                 00:00:00 test4-1
00:00:00 test4-1
             0
                  2436
                                       80
                                1
                  2479
                                                     1053 hrtime pts/1
                                    0
                                        80
             0
                  2480
                                    0
                                        80
                                                     1053 hrtime pts/1
                                                                                  00:00:00 test4-1
             0
                  2481
                                1
                                    0
                                        80
                                              0
                                                     1053 hrtime pts/1
                                                                                 00:00:00 test4-1
             0
                  2482
                                1
                                    0
                                        80
                                              0
                                                     1053 hrtime pts/1
                                                                                 00:00:00 test4-1
                                                                                 00:00:00 test4-1
00:00:00 test4-1
                  2483
                                              0 -
             0
                               1
                                        80
                                                     1053 hrtime pts/1
                  2484
                                ī
                                    O
                                                     1053 hrtime pts/1
             0
                                        80
                  2485
                                    0
                                        80
                                                     1053 hrtime pts/1
                                                                                  00:00:00 test4-1
             0
                  2486
                                    0
                                        80
                                                     1053 hrtime pts/1
                                                                                  00:00:00 test4-1
             0
                  2487
                                1
                                    0
                                        80
                                              0
                                                     1053 hrtime pts/1
                                                                                 00:00:00 test4-1
                  2488
             0
                                1
                                    0
                                        80
                                                     1053 hrtime pts/1
                                                                                 00:00:00 test4-1
                            2394
                  2534
             0
                                    0
                                       80
                                              0 - 38293 -
                                                                     pts/1
                                                                                 00:00:00 ps
  [root@RHEL74-SVR 04]#
```