

## 守护进程的编写和使用方法 03

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### 守护进程再次分裂子进程（僵尸进程的处理

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#### 00 在03目录下编写test3-1.c

```
// test3-1.c
#include <stdio.h>
#include <unistd.h>
#include <time.h>

int main(){
    int pid;
    int i;
    for(i=0;i<10;i++){
        pid = fork();
        if(pid == 0)break;
        else sleep(3);
    }
    int counter = 0;
    while(1){

        if(pid == 0){
            printf("%d %d 1652238 sub\n",getpid(),getppid());
            fflush(stdout);
            sleep(25);
            counter++;
            if(counter == 2){
                printf("sub %d exiting\n",getpid());
                fflush(stdout);
                break;
            }
        }else{
            printf("%d %d 1652238 main\n",getpid(),getppid());
            fflush(stdout);
            sleep(5);
        }
    };
    return 0;
}
```

[illegible]

## 01 分裂出的子进程和守护进程id有何关联？

分裂出的子进程id从守护进程id开始递增，他们的父进程都是守护进程

## 02 什么叫僵尸进程？僵尸进程产生的原因？

僵尸进程就是在子进程退出之后，此时子进程的数据段、代码段已经被释放，但是PCB还存在，process结构中的p\_stat变为SZOMB，等待父进程收集pcb中的状态信息。而父进程没有调用wait或waitpid获取子进程的

状态信息，所以僵尸进程的pcb块就一直得不到释放，就一直占着一个pid和一个process[i]。

## 03 如何杀死僵尸进程？

杀掉他们的父进程

## 04 子进程退出后不存在僵尸进程的test3-2.c

使子进程后不存在僵尸进程有两种方法，一是在父进程监听子进程退出时SIGCHLD信号，二是fork()两次之后父进程waitpid()等待子进程退出，孙进程变成孤儿进程，由init接管，孙进程退出之后会被init回收不会形成僵尸进程。

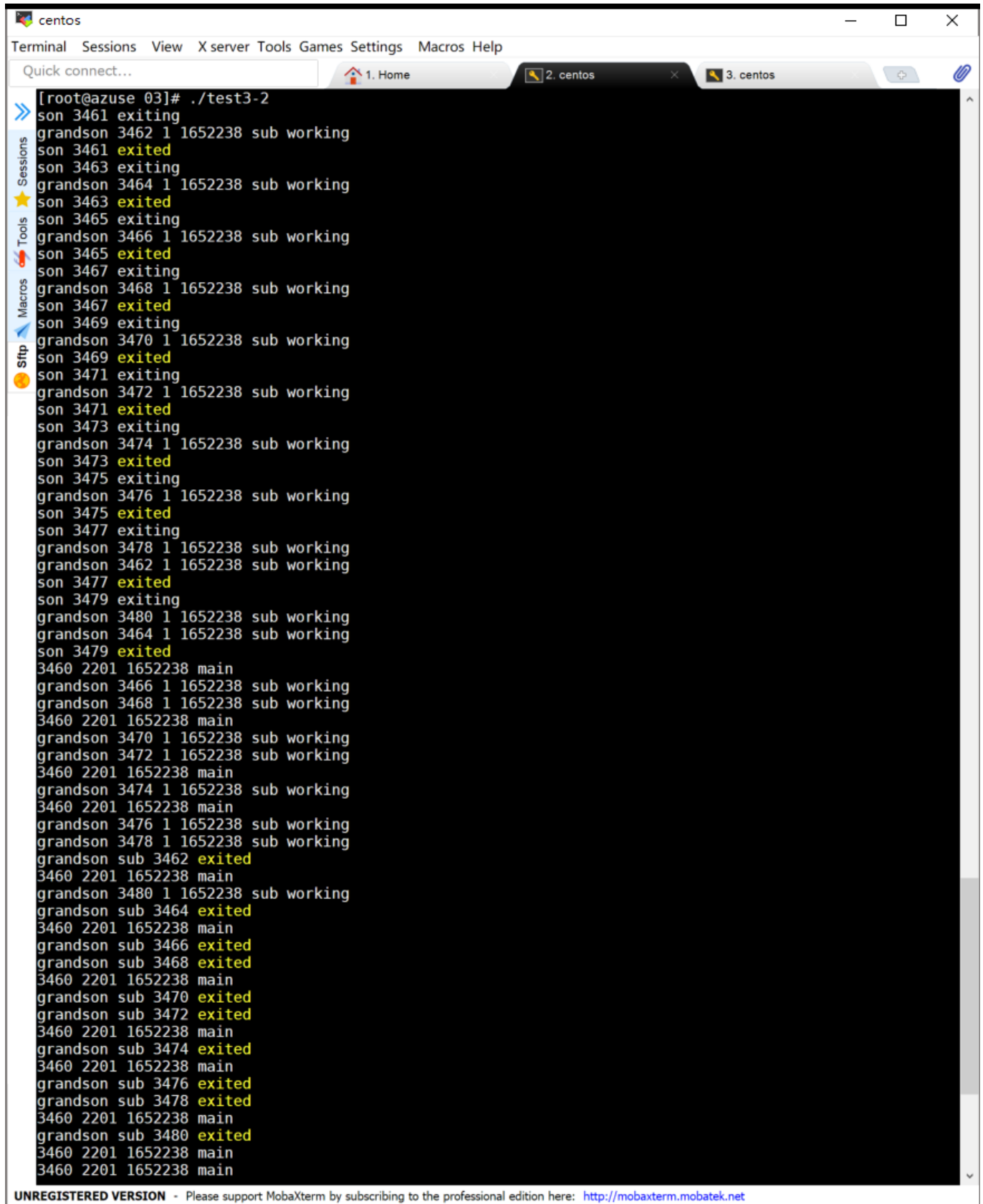
这里采用第二种方法

```
// test3-2.c
#include <stdio.h>
#include <unistd.h>
#include <time.h>

int main(){
    int pid;
    int i;
    for(i=0;i<10;i++){
        pid = fork();
        if(pid == 0){
            pid = fork();
            if(pid == 0)
                break;
            else{
                printf("son %d exiting\n",getpid());
                fflush(stdout);
                return 0;
            }
        }
        else sleep(3);
        waitpid(pid, NULL, 0);
        printf("son %d exited\n",pid);
        fflush(stdout);
    }
    int counter = 0;
    while(1){
        if(pid == 0){
            printf("grandson %d %d 1652238 sub\n",getpid(),getppid());
            fflush(stdout);
            sleep(25);
            counter++;
            if(counter == 2){
                printf("grandson sub %d exited\n",getpid());
                fflush(stdout);
                break;
            }
        }
    }
}
```

```
        }else{
            printf("%d %d 1652238 main\n",getpid(),getppid());
            fflush(stdout);
            sleep(5);
        }
    };
    return 0;
}
```

程序运行情况:



```
[root@azuse 03]# ./test3-2
son 3461 exiting
grandson 3462 1 1652238 sub working
son 3461 exited
son 3463 exiting
grandson 3464 1 1652238 sub working
son 3463 exited
son 3465 exiting
grandson 3466 1 1652238 sub working
son 3465 exited
son 3467 exiting
grandson 3468 1 1652238 sub working
son 3467 exited
son 3469 exiting
grandson 3470 1 1652238 sub working
son 3469 exited
son 3471 exiting
grandson 3472 1 1652238 sub working
son 3471 exited
son 3473 exiting
grandson 3474 1 1652238 sub working
son 3473 exited
son 3475 exiting
grandson 3476 1 1652238 sub working
son 3475 exited
son 3477 exiting
grandson 3478 1 1652238 sub working
grandson 3462 1 1652238 sub working
son 3477 exited
son 3479 exiting
grandson 3480 1 1652238 sub working
grandson 3464 1 1652238 sub working
son 3479 exited
3460 2201 1652238 main
grandson 3466 1 1652238 sub working
grandson 3468 1 1652238 sub working
3460 2201 1652238 main
grandson 3470 1 1652238 sub working
grandson 3472 1 1652238 sub working
3460 2201 1652238 main
grandson 3474 1 1652238 sub working
3460 2201 1652238 main
grandson 3476 1 1652238 sub working
grandson 3478 1 1652238 sub working
grandson sub 3462 exited
3460 2201 1652238 main
grandson 3480 1 1652238 sub working
grandson sub 3464 exited
3460 2201 1652238 main
grandson sub 3466 exited
grandson sub 3468 exited
3460 2201 1652238 main
grandson sub 3470 exited
grandson sub 3472 exited
3460 2201 1652238 main
grandson sub 3474 exited
3460 2201 1652238 main
grandson sub 3476 exited
grandson sub 3478 exited
3460 2201 1652238 main
grandson sub 3480 exited
3460 2201 1652238 main
3460 2201 1652238 main
```

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进程退出情况：

zombie：0

centos

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Quick connect...

1. Home 2. centos 3. centos

Sessions

Tools

Macros

Sftp

```

top - 23:24:08 up 5:50, 2 users, load average: 0.00, 0.01, 0.05
Tasks: 127 total, 1 running, 126 sleeping, 0 stopped, 0 zombie
%Cpu(s): 0.0 us, 0.3 sy, 0.0 ni, 99.7 id, 0.0 wa, 0.0 hi, 0.0 si, 0.0 st
KiB Mem : 997956 total, 483780 free, 247400 used, 266776 buff/cache
KiB Swap: 2097148 total, 2097148 free, 0 used. 554924 avail Mem

```

PID	USER	PR	NI	VIRT	RES	SHR	S	%CPU	%MEM	TIME+	COMMAND
1056	root	20	0	301148	6452	5044	S	0.3	0.6	0:34.84	vmtoolsd
3359	root	20	0	0	0	0	S	0.3	0.0	0:00.89	kworker/0:2
1	root	20	0	43516	3564	2316	S	0.0	0.4	0:04.67	systemd
2	root	20	0	0	0	0	S	0.0	0.0	0:00.01	kthreadd
3	root	20	0	0	0	0	S	0.0	0.0	0:00.29	ksoftirqd/0
5	root	0	-20	0	0	0	S	0.0	0.0	0:00.00	kworker/0:0H
7	root	rt	0	0	0	0	S	0.0	0.0	0:00.00	migration/0
8	root	20	0	0	0	0	S	0.0	0.0	0:00.00	rcu_bh
9	root	20	0	0	0	0	S	0.0	0.0	0:01.03	rcu_sched
10	root	0	-20	0	0	0	S	0.0	0.0	0:00.00	lru-add-drain
11	root	rt	0	0	0	0	S	0.0	0.0	0:00.22	watchdog/0
13	root	20	0	0	0	0	S	0.0	0.0	0:00.00	kdevtmpfs
14	root	0	-20	0	0	0	S	0.0	0.0	0:00.00	netns
15	root	20	0	0	0	0	S	0.0	0.0	0:00.01	khungtaskd
16	root	0	-20	0	0	0	S	0.0	0.0	0:00.00	writeback
17	root	0	-20	0	0	0	S	0.0	0.0	0:00.00	kintegrityd
18	root	0	-20	0	0	0	S	0.0	0.0	0:00.00	bioaset
19	root	0	-20	0	0	0	S	0.0	0.0	0:00.00	kblockd
20	root	0	-20	0	0	0	S	0.0	0.0	0:00.00	md
21	root	0	-20	0	0	0	S	0.0	0.0	0:00.00	edac-poller
27	root	20	0	0	0	0	S	0.0	0.0	0:00.00	kswapd0
28	root	25	5	0	0	0	S	0.0	0.0	0:00.00	ksmd
29	root	39	19	0	0	0	S	0.0	0.0	0:00.40	khugepaged
30	root	0	-20	0	0	0	S	0.0	0.0	0:00.00	crypto
38	root	0	-20	0	0	0	S	0.0	0.0	0:00.00	kthrotld
39	root	20	0	0	0	0	S	0.0	0.0	0:00.14	kworker/u256:1
40	root	0	-20	0	0	0	S	0.0	0.0	0:00.00	kmpath_rdacd
41	root	0	-20	0	0	0	S	0.0	0.0	0:00.00	kaluad
42	root	0	-20	0	0	0	S	0.0	0.0	0:00.00	kpsmouse
44	root	0	-20	0	0	0	S	0.0	0.0	0:00.00	ipv6_addrconf
57	root	0	-20	0	0	0	S	0.0	0.0	0:00.00	deferwq
89	root	20	0	0	0	0	S	0.0	0.0	0:00.00	kauditd
266	root	0	-20	0	0	0	S	0.0	0.0	0:00.00	mpt_poll_0
267	root	0	-20	0	0	0	S	0.0	0.0	0:00.00	mpt/0
268	root	0	-20	0	0	0	S	0.0	0.0	0:00.00	ata_sff
274	root	20	0	0	0	0	S	0.0	0.0	0:00.00	scsi_ah_0
275	root	0	-20	0	0	0	S	0.0	0.0	0:00.00	scsi_tm_0
277	root	20	0	0	0	0	S	0.0	0.0	0:00.01	scsi_ah_1
278	root	0	-20	0	0	0	S	0.0	0.0	0:00.00	scsi_tm_1
279	root	20	0	0	0	0	S	0.0	0.0	0:00.00	scsi_ah_2
281	root	0	-20	0	0	0	S	0.0	0.0	0:00.00	scsi_tm_2
284	root	0	-20	0	0	0	S	0.0	0.0	0:00.00	ttm_swap
285	root	-51	0	0	0	0	S	0.0	0.0	0:00.00	irq/16-vmwgfx
363	root	0	-20	0	0	0	S	0.0	0.0	0:00.00	kdmflush
364	root	0	-20	0	0	0	S	0.0	0.0	0:00.00	bioaset
373	root	0	-20	0	0	0	S	0.0	0.0	0:00.00	kdmflush
374	root	0	-20	0	0	0	S	0.0	0.0	0:00.00	bioaset
387	root	0	-20	0	0	0	S	0.0	0.0	0:00.00	bioaset
388	root	0	-20	0	0	0	S	0.0	0.0	0:00.00	xfsalloc
389	root	0	-20	0	0	0	S	0.0	0.0	0:00.00	xfs_mru_cache
390	root	0	-20	0	0	0	S	0.0	0.0	0:00.00	xfs-buf/dm-0
391	root	0	-20	0	0	0	S	0.0	0.0	0:00.00	xfs-data/dm-0
392	root	0	-20	0	0	0	S	0.0	0.0	0:00.00	xfs-conv/dm-0
393	root	0	-20	0	0	0	S	0.0	0.0	0:00.00	xfs-cil/dm-0
394	root	0	-20	0	0	0	S	0.0	0.0	0:00.00	xfs-reclaim/dm-
395	root	0	-20	0	0	0	S	0.0	0.0	0:00.00	xfs-log/dm-0

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