守护进程的编写 systemctl和rpm

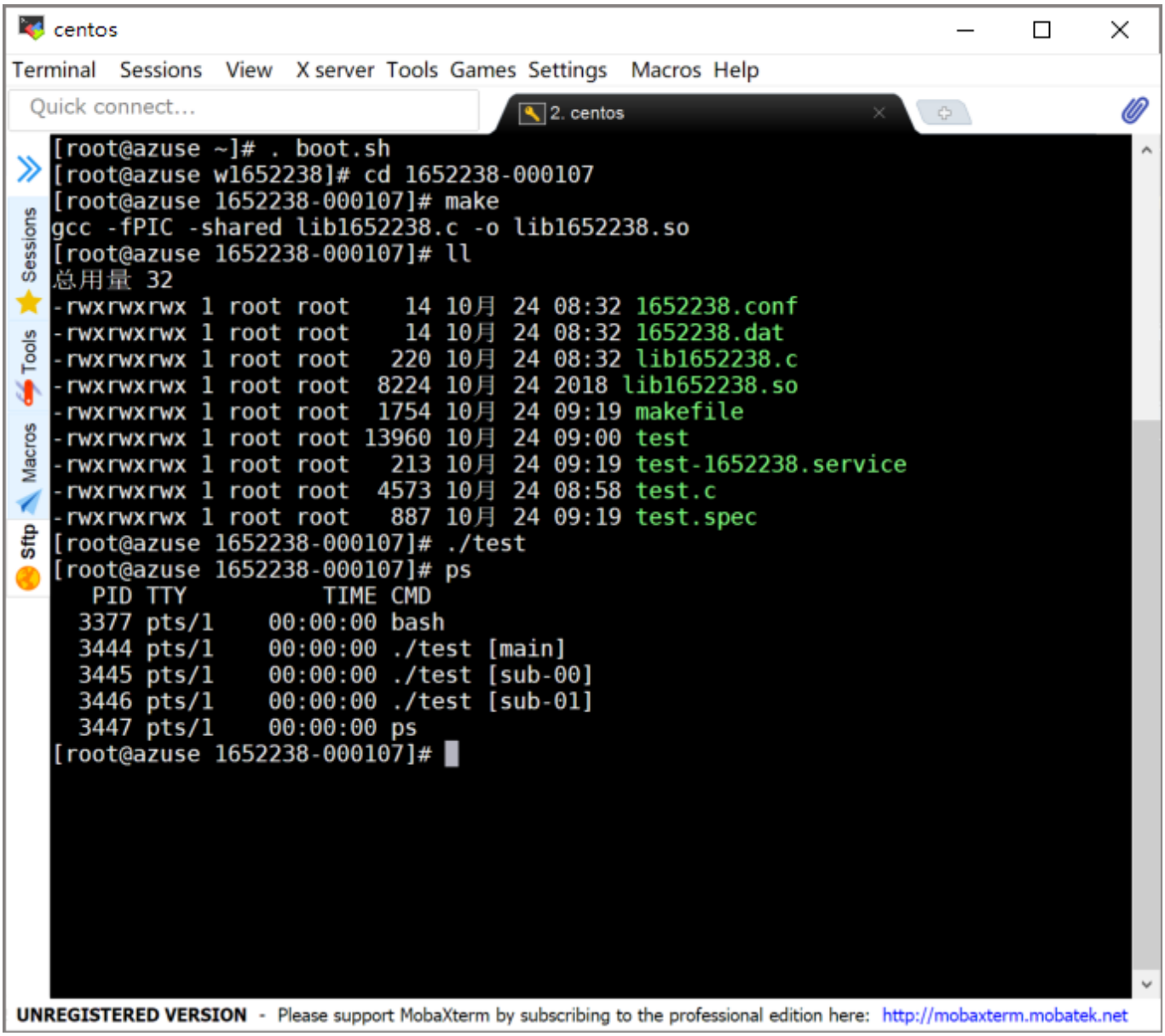
1 test运行后成为进程，但是不完全脱离控制台

fork两次并且不setid()，就可以让程序成为后台进程而不脱离控制台

手动成为守护进程的函数：

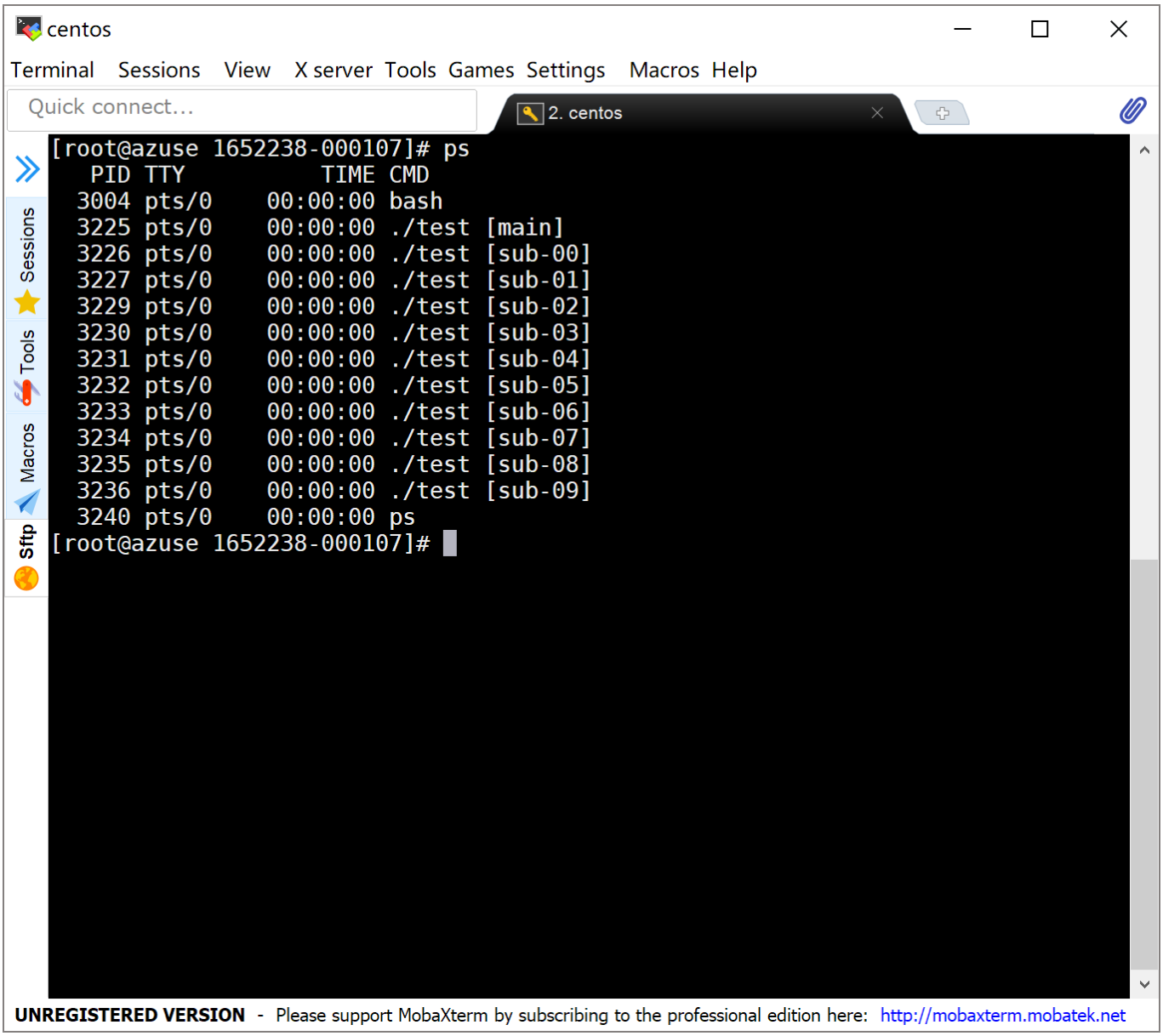
```
void daemon_by_hand()
{
        pid_t pid;
        pid = fork();
        if (pid == 0)
        {
        }
        else
                exit(0);
        //skip setsid
        //setsid();

        //fork twice
        pid = fork();
        if (pid == 0)
        {
        }
        else
        {
                FILE *fp;
                fp = fopen("/var/run/test-1652238.pid", "w");
                fprintf(fp, "%d", pid);
                fclose(fp);
                exit(0);
        }

        chdir("/");
        umask(0);

        int j = open("/dev/null", O_RDWR);
        dup2(j, 0);
        dup2(j, 1);
        dup2(j, 2);

        signal(SIGCHLD, SIG_IGN);
}
```

运行，成为不脱离终端的守护进程：



2 主进程main分裂出n个子进程

使用fork分裂子进程



3 修改进程名,每秒更新自己的运行时间

(1) 修改ps -ef现实的需要先修改argv[0]，因为argv[0]原来大小只有16字节所以要重新分配并且搬运environ。
(2) 修改ps显示的结果使用`prctl(PR_SET_NAME, comm_name);`函数，最长16字节。

重新分配argv空间的函数:

```
void setproctitle_init(int argc, char **argv, char **envp)
{
        int i;

        for (i = 0; envp[i] != NULL; i++) // calc envp num
                continue;
        environ = (char **)malloc(sizeof(char *) * (i + 1)); // malloc envp
pointer

        for (i = 0; envp[i] != NULL; i++)
        {
                environ[i] = malloc(sizeof(char) * strlen(envp[i]));
```

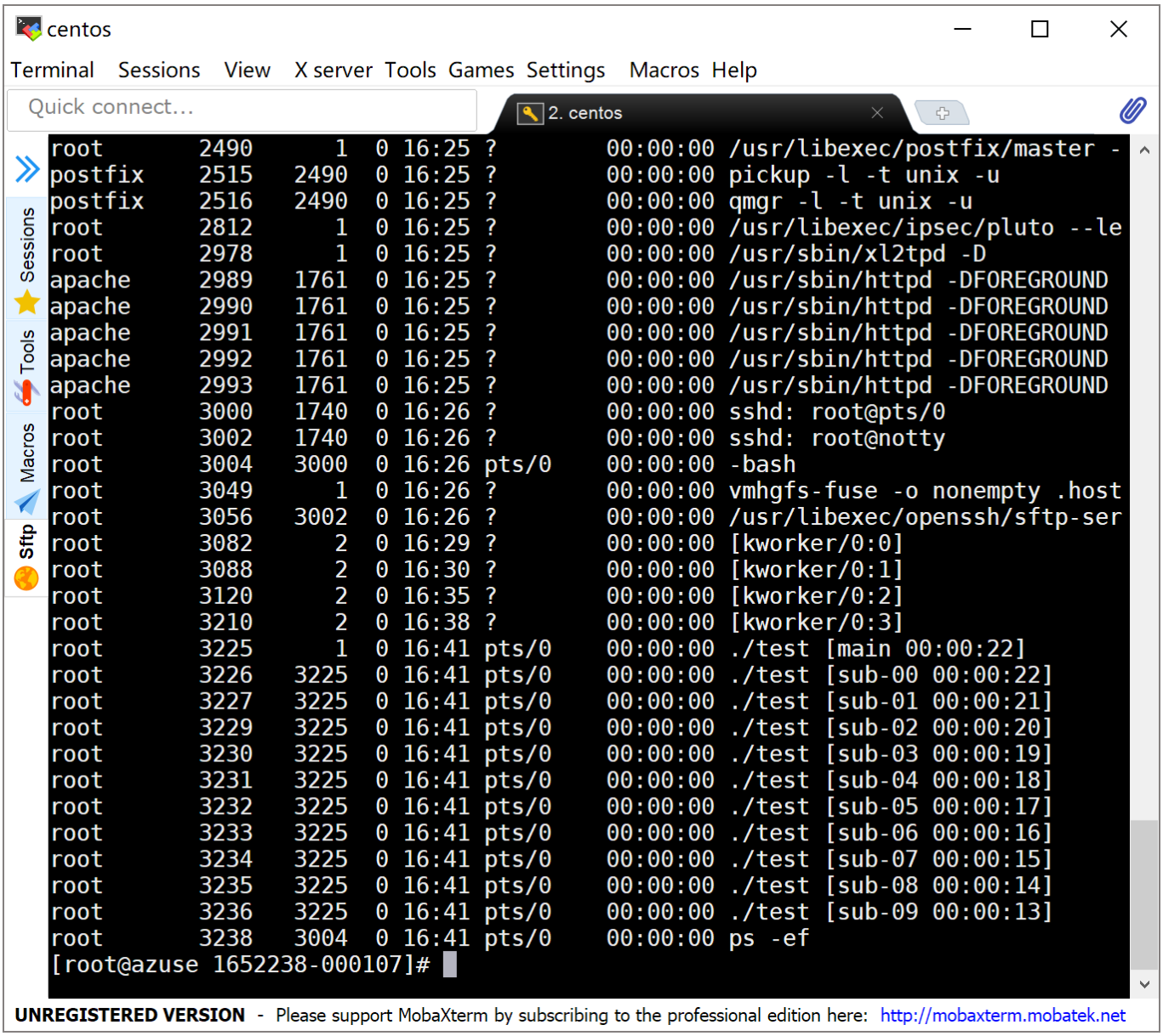
```
                strcpy(environ[i], envp[i]);
        }
        environ[i] = NULL;

        g_main_Argv = argv;
        if (i > 0)
                g_main_LastArgv = envp[i - 1] + strlen(envp[i - 1]);
        else
                g_main_LastArgv = argv[argc - 1] + strlen(argv[argc - 1]);
}
```

在main函数中:

```
        char argv_buf[MAXLINE] = {0}; // save argv paramters
        int i;
        for (i = 1; i < argc; i++)
        {
                strcat(argv_buf, argv[i]);
                strcat(argv_buf, " ");
        }
        //修改argv[0]所指向的内存空间的内容
        setproctitle_init(argc, argv, environ);

        char pid_name[MAXLINE];
        char comm_name[MAXLINE];
        time(&now_t);
        diff_t = difftime(now_t, start_t);
        snprintf(pid_name, 40, "%s [main %02d:%02d:%02d]",pid_name_origin, diff_t
/ 3600, (diff_t % 3600 - diff_t % 60) / 60, diff_t % 60);
        snprintf(comm_name, 16, "%s [main]",pid_name_origin);
        prctl(PR_SET_NAME, comm_name);
        strcpy(g_main_Argv[0], pid_name);
```

改名效果:

`ps -ef`


centos
Terminal Sessions View X server Tools Games Settings Macros Help
Quick connect...
2. centos
Sessions
Tools
Macros
Sftp
root 2490 1 0 16:25 ? 00:00:00 /usr/libexec/postfix/master -
postfix 2515 2490 0 16:25 ? 00:00:00 pickup -l -t unix -u
postfix 2516 2490 0 16:25 ? 00:00:00 qmgr -l -t unix -u
root 2812 1 0 16:25 ? 00:00:00 /usr/libexec/ipsec/pluto --le
root 2978 1 0 16:25 ? 00:00:00 /usr/sbin/xl2tpd -D
apache 2989 1761 0 16:25 ? 00:00:00 /usr/sbin/httpd -DFOREGROUND
apache 2990 1761 0 16:25 ? 00:00:00 /usr/sbin/httpd -DFOREGROUND
apache 2991 1761 0 16:25 ? 00:00:00 /usr/sbin/httpd -DFOREGROUND
apache 2992 1761 0 16:25 ? 00:00:00 /usr/sbin/httpd -DFOREGROUND
apache 2993 1761 0 16:25 ? 00:00:00 /usr/sbin/httpd -DFOREGROUND
root 3000 1740 0 16:26 ? 00:00:00 sshd: root@pts/0
root 3002 1740 0 16:26 ? 00:00:00 sshd: root@notty
root 3004 3000 0 16:26 pts/0 00:00:00 -bash
root 3049 1 0 16:26 ? 00:00:00 vmhgfs-fuse -o nonempty .host
root 3056 3002 0 16:26 ? 00:00:00 /usr/libexec/openssh/sftp-ser
root 3082 2 0 16:29 ? 00:00:00 [kworker/0:0]
root 3088 2 0 16:30 ? 00:00:00 [kworker/0:1]
root 3120 2 0 16:35 ? 00:00:00 [kworker/0:2]
root 3210 2 0 16:38 ? 00:00:00 [kworker/0:3]
root 3225 1 0 16:41 pts/0 00:00:00 ./test [main 00:00:22]
root 3226 3225 0 16:41 pts/0 00:00:00 ./test [sub-00 00:00:22]
root 3227 3225 0 16:41 pts/0 00:00:00 ./test [sub-01 00:00:21]
root 3229 3225 0 16:41 pts/0 00:00:00 ./test [sub-02 00:00:20]
root 3230 3225 0 16:41 pts/0 00:00:00 ./test [sub-03 00:00:19]
root 3231 3225 0 16:41 pts/0 00:00:00 ./test [sub-04 00:00:18]
root 3232 3225 0 16:41 pts/0 00:00:00 ./test [sub-05 00:00:17]
root 3233 3225 0 16:41 pts/0 00:00:00 ./test [sub-06 00:00:16]
root 3234 3225 0 16:41 pts/0 00:00:00 ./test [sub-07 00:00:15]
root 3235 3225 0 16:41 pts/0 00:00:00 ./test [sub-08 00:00:14]
root 3236 3225 0 16:41 pts/0 00:00:00 ./test [sub-09 00:00:13]
root 3238 3004 0 16:41 pts/0 00:00:00 ps -ef
[root@azuse 1652238-000107]#
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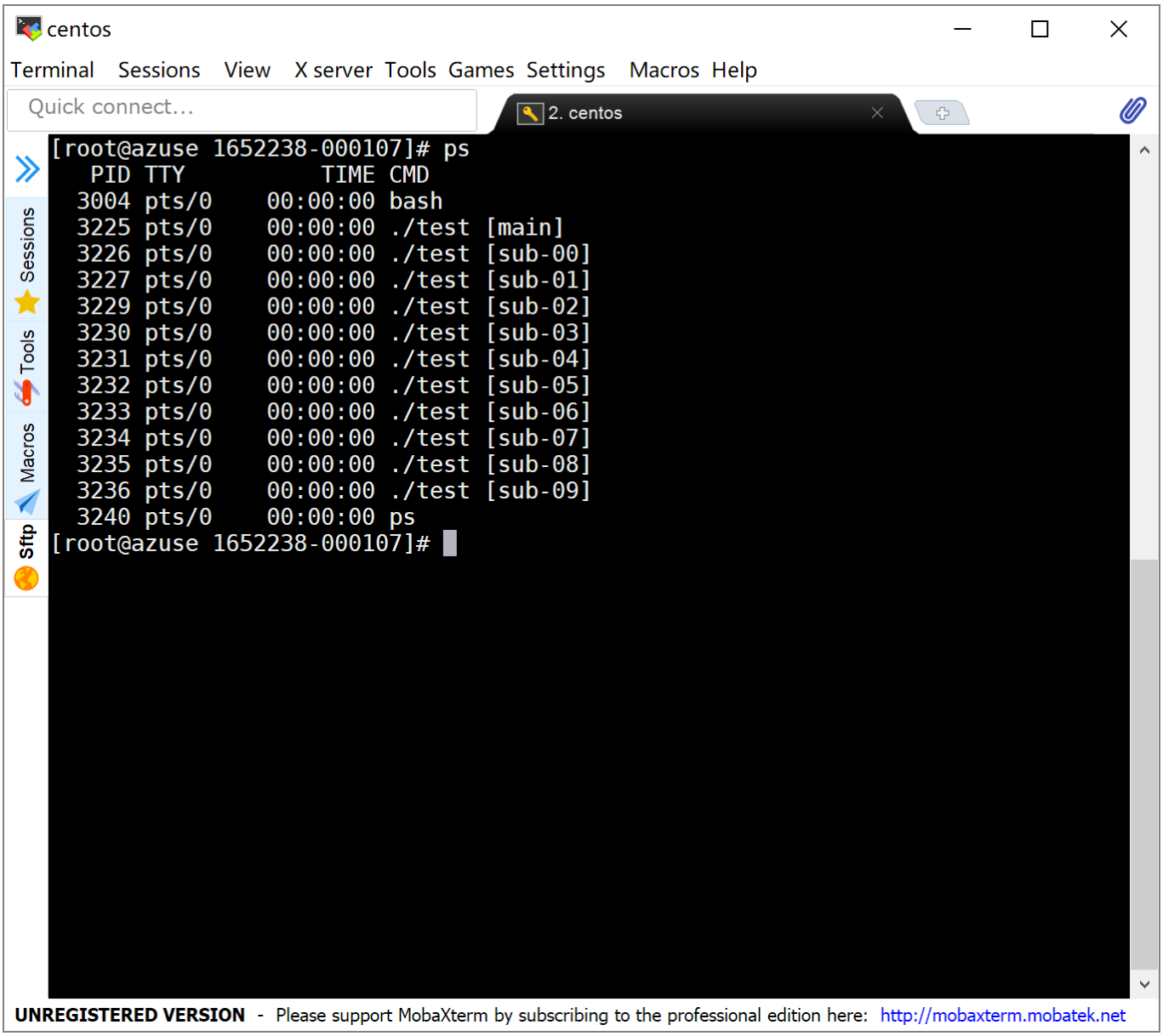
ps



4 kill子进程后父进程自动补全

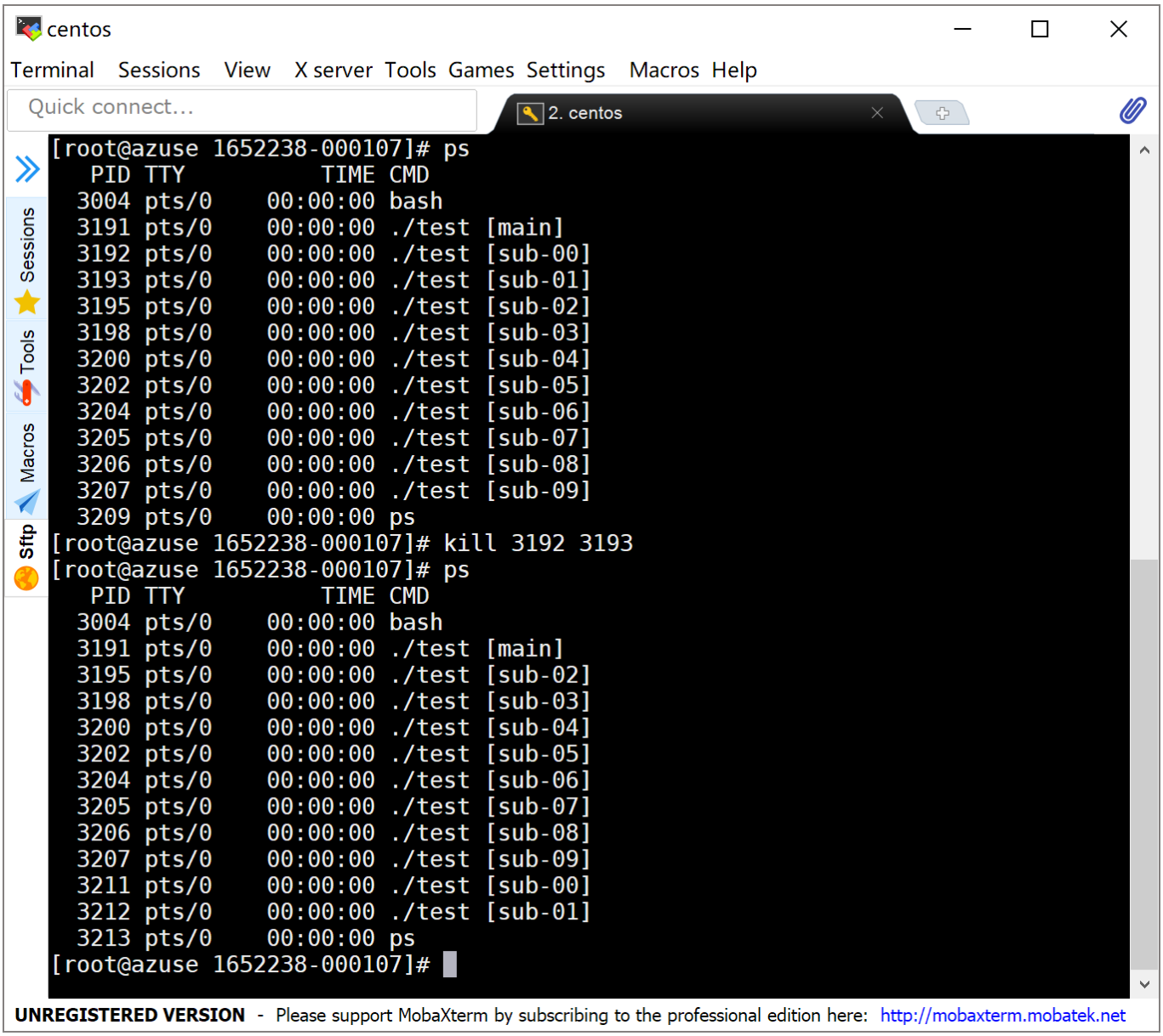
这个实现方法有很多，我是用记录下所有子进程的pid，让父进程每次sleep醒来后检查一遍子进程是不是都还在，如果有子进程不在了就重新补齐。

在main的while循环中，用kill命令循环对每个子进程发0信号，若进程pid不存在就判定为子进程被kill，fork出新的子进程后，让子进程进入死循环，main继续循环检查。

```
for (i = 0; i < 10; i++)
                        {
                                if (kill(myson[i], 0) == -1)
                                {
                                        pid = fork();
                                        if (pid == 0)
                                        {

                                                prctl(PR_SET_PDEATHSIG, SIGHUP);
                                                time(&start_t);
                                                break;
```

```
                                        }
                                        else
                                        {
                                                myson[i] = pid;
                                        }
                                }
                        }
```

使用效果：kill之后自动恢复子函数



5 从/etc/1652238.conf中读取子进程数量=

读取config文件的函数放在lib1652238.c中
使用`gcc -fPIC -shared lib1652238.c -o lib1652238.so`编译成共享库
使用`gcc test.c -L. -l1652238 -o test`使用共享库编译test
再把编译好的lib1652238.so放到/usr/lib64中

```
//lib1652238.so
#include <stdio.h>
#include <stdlib.h>
int readconf()
{
        int i;
        FILE *fp;
        fp = fopen("/etc/1652238.conf", "r");
        fscanf(fp, "子进程数量=%d", &i);
        fclose(fp);
a'w'd
        if (i > 20 || i < 5)
                i = 5;
        return i;
}
```

6 makefile文件和rpm文件编写

makefile install需要放置可执行文件，动态链接库，配置文件和数据文件还有service文件
if分支是为了避免在编译rpm文件的过程中误启动systemctl

```
install : all
        mkdir -p $(DIRROOT)/usr $(DIRROOT)/usr/sbin $(DIRROOT)/usr/lib64
$(DIRROOT)/etc $(DIRROOT)/usr/lib $(DIRROOT)/usr/lib/systemd
$(DIRROOT)/usr/lib/systemd/system
        cp test $(DIRROOT)/usr/sbin/$(EXECNAME)
        cp lib1652238.so $(DIRROOT)/usr/lib64
        mkdir -p $(DIRROOT)/usr/1652238
        cp 1652238.dat $(DIRROOT)/usr/1652238
        cp 1652238.conf $(DIRROOT)/etc
        cp test-1652238.service $(DIRROOT)/usr/lib/systemd/system/
ifeq ($(DIRROOT), )
        systemctl daemon-reload
        systemctl enable test-1652238
        systemctl start test-1652238
endif
```

makeuninstall需要移除上述文件，注意要先停止服务确保程序不在运行后再移除

```
uninstall       :
        systemctl stop test-1652238
        rm -f $(DIRROOT)/usr/sbin/$(EXECNAME) $(DIRROOT)/usr/lib64/lib1652238
$(DIRROOT)/etc/1652238.conf $(DIRROOT)/usr/1652238/1652238.dat
        rm -df $(DIRROOT)/usr/1652238
        rm -f *.o test lib1652238.so
        rm -f $(DIRROOT)/usr/lib/systemd/system/test-1652238.service
```

rpm包编写 先编写.spec文件

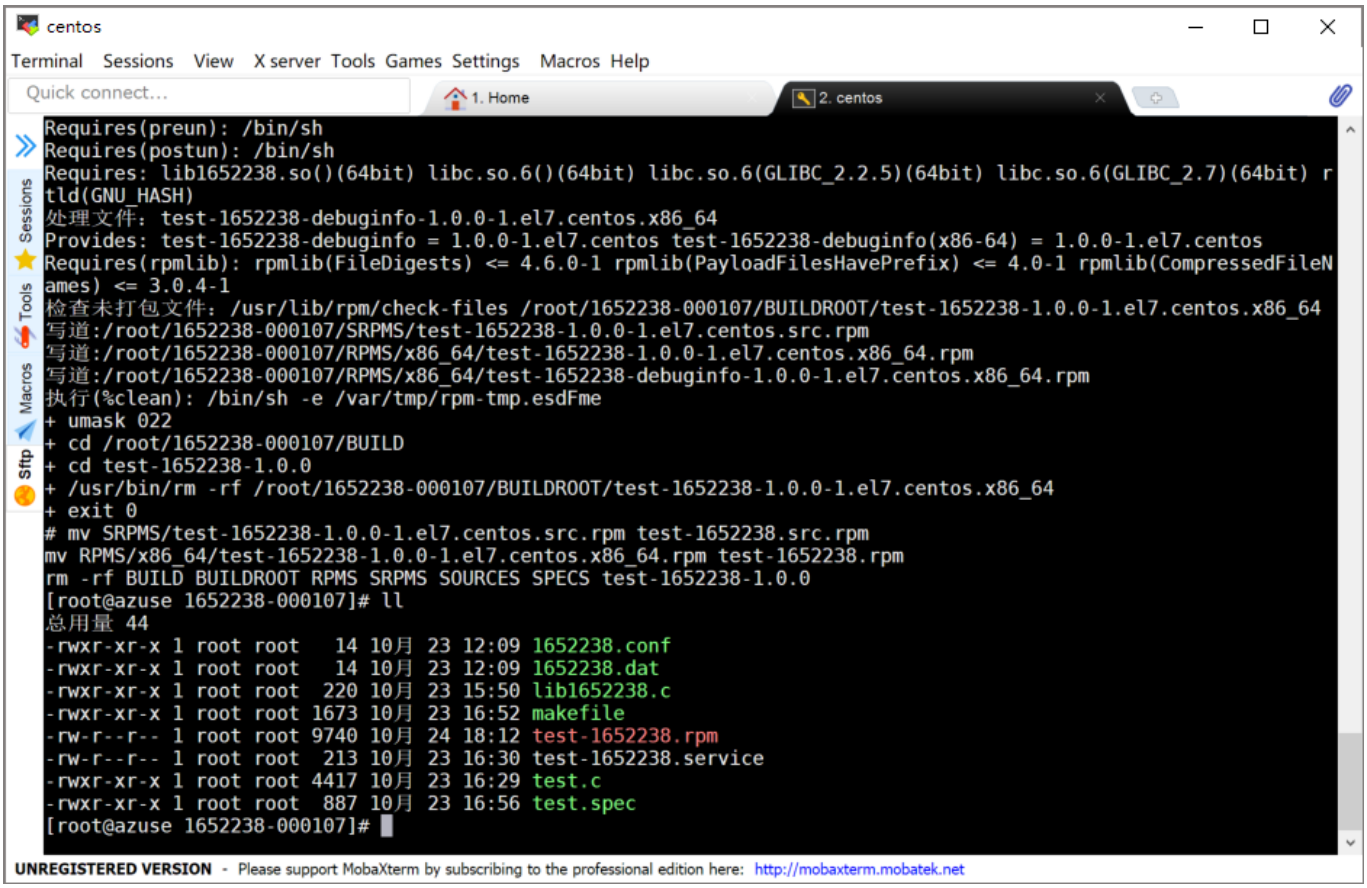
```
Name:           test-1652238
Version:        1.0.0
Release:        1%{?dist}
Summary:       test-1652238
License:        GPL
Packager:       abel
Source0:        %_sourcedir/test.tar.bz2
%description
%prep
%setup -q
%build
make
%install
make install DIRROOT=%{buildroot}
%pre
echo "准备安装 test-1652238"
%post
systemctl daemon-reload
systemctl enable test-1652238
systemctl start test-1652238
echo "完成安装 test-1652238s"
%preun
echo "准备卸载 test-1652238"
systemctl stop test-1652238
%postun
echo "完成卸载 test-1652238"
%files
%{_sbindir}/test-1652238
%{_libdir}/lib1652238.so
%{_prefix}/1652238/1652238.dat
%{_sysconfdir}/1652238.conf
%{_unitdir}/test-1652238.service
%changelog
```

然后再makefile中创建好源码包，复制到SOURCE中，再让rpm build时make install到BUILDROOT下，完成编译后清楚rpm临时目录
用`--define "_topdir $(CURDIR)"`来让rpm在当前目录编译

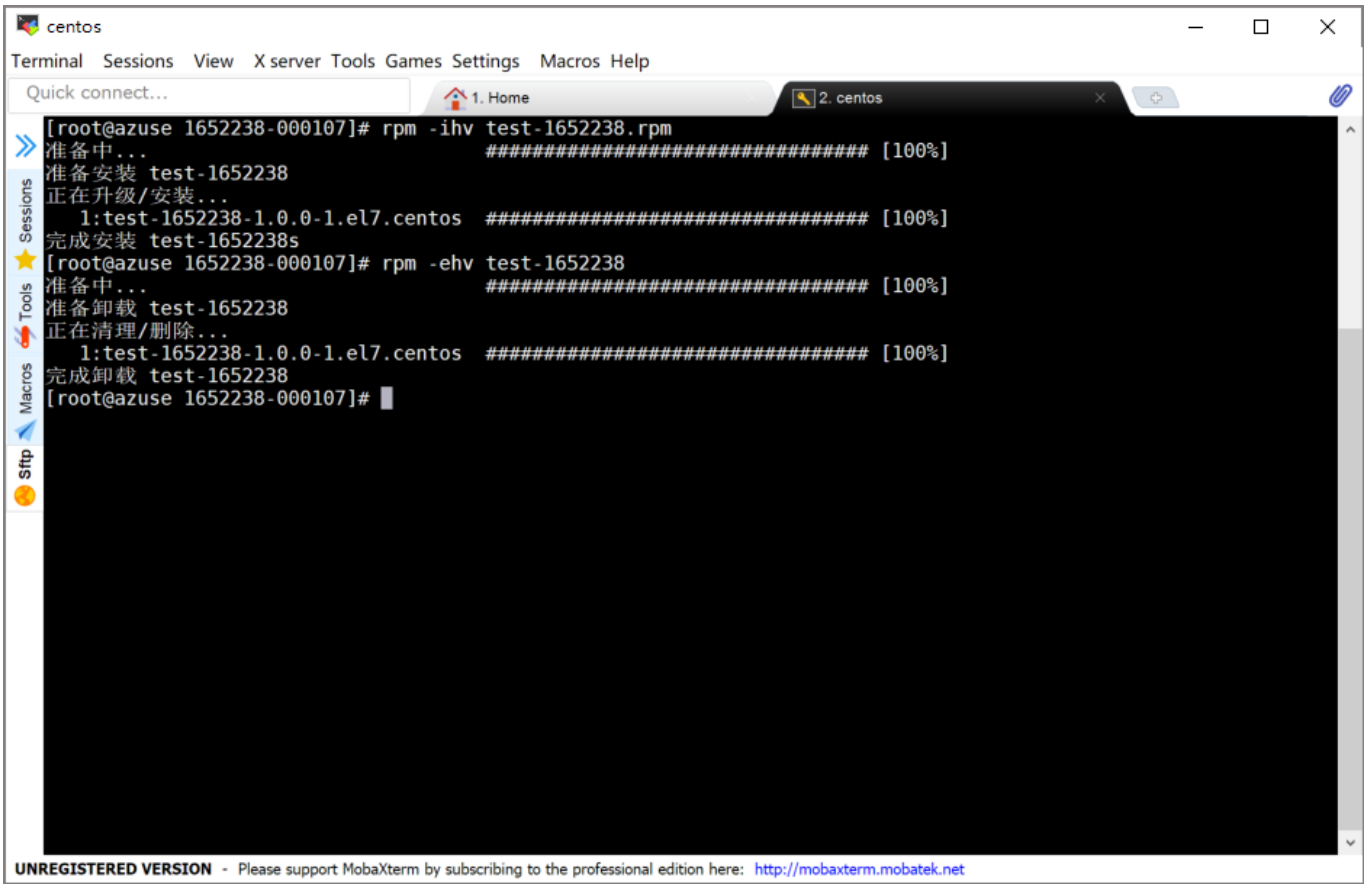
```
rpm     :
        mkdir -p SOURCES
        mkdir -p BUILD
        mkdir -p BUILDROOT
        mkdir -p RPMS
        mkdir -p SRPMS
        mkdir -p test-1652238-1.0.0
        cp makefile test.c lib1652238.c 1652238.dat 1652238.conf test-
1652238.service test-1652238-1.0.0/
        # cp makefile test.c lib1652238.c 1652238.dat 1652238.conf test-
```

```
1652238.service SOURCES/
        tar -cjf test.tar.bz2 test-1652238-1.0.0
        mv test.tar.bz2 SOURCES

        rpmbuild -ba test.spec --define "_topdir $(CURDIR)"

        # mv SRPMS/test-1652238-1.0.0-1.el7.centos.src.rpm test-1652238.src.rpm
        mv RPMS/x86_64/test-1652238-1.0.0-1.el7.centos.x86_64.rpm test-1652238.rpm

        rm -rf BUILD BUILDROOT RPMS SRPMS SOURCES SPECS test-1652238-1.0.0
```

正常生成rpm



rpm正常安装与卸载(注意卸载时必须用test-1652238)



make clean部分
清除可执行文件和动态链接库
清除rpm包

```
clean:
        rm -rf BUILD BUILDROOT RPMS SRPMS SOURCES SPECS test-1652238-1.0.0
        rm -f *.o test lib1652238.so *.rpm
```

7 service文件编写

service文件编写比较简单，难点在于模式设置成forking之后systemctl会默认把第二次fork的中间进程作为父进程，无法正常启动，所以程序启动时自己去写个pid文件

```
[Unit]
Description=test-1652238.service

[Service]
Type=forking
ExecStart=/usr/sbin/test-1652238
PIDFile=/var/run/test-1652238.pid
StandardOutput=syslog
StandardError=inherit

[Install]
WantedBy=multi-user.target
```

在`daemon_by_hand()`函数中写pid的方法：

```
//fork twice
        pid = fork();
        if (pid == 0)
        {
        }
        else
        {
                FILE *fp;
                fp = fopen("/var/run/test-1652238.pid", "w");
                fprintf(fp, "%d", pid);
                fclose(fp);
                exit(0);
        }
```

systemctl正常使用