同济大学计算机网络 实验报告



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题目: <u>守护进程的编写以及 systemct I 的使用、rpm 安装包的生成</u>

- 二.写一个满足以下要求的 test 程序:
- 2.1.运行后成为进程,但是不要完全脱离控制台,即在启动控制台上用 ps 仍能查到: 答:

Make 进行编译生成可执行文件运行后使用 ps 命令查询结果如下:

```
[root@RHEL74-SVR 1652262-000107]# make
cc read.c -fPIC -shared -o lib1652262.so
cc -g -Wall -o test test.c -L. -l1652262 -Wl,-rpath .
[root@RHEL74-SVR 1652262-000107]# ./test
[root@RHEL74-SVR 1652262-000107]# ps
   PID TTY
                          TIME CMD
                    00:00:00 bash
  2224 pts/0
  2302 pts/0
2303 pts/0
                                         [main]
[sub-01]
[sub-02]
                    00:00:00 ./test
                    00:00:00 ./test
  2304 pts/0
                    00:00:00 ./test
  2305 pts/0
2306 pts/0
                    00:00:00 ./test [sub-03]
2306 pts/0 00:00:00 ps
[root@RHEL74-SVR 1652262-000107]#
```

2.2.修改进程名,使用 ps 命令查看时,在父进程的后面加[main],随后每隔一秒,分裂出一个子进程,共 n 个,每个子进程在后面加[sub-xx]:

答:

一共生成十个子进程,查询结果如下:

```
[root@RHEL74-SVR 1652262-000107]# ps
   PID TTY
                          TIME CMD
                     00:00:00 bash
  2224 pts/0
                     00:00:00 ./test [main]
00:00:00 ./test [sub-01]
00:00:00 ./test [sub-02]
  2302 pts/0
2303 pts/0
  2304 pts/0
                     00:00:00 ./test
                     00:00:00 ./test
                                           [sub-03]
  2305 pts/0
  2307 pts/0
2308 pts/0
                     00:00:00 ./test
                                           [sub-04]
[sub-05]
                     00:00:00 ./test
  2309 pts/0
                     00:00:00 ./test
                                           [sub-06]
                     00:00:00 ./test
  2310 pts/0
                                            [sub-07
  2311 pts/0
2312 pts/0
                     00:00:00 ./test
00:00:00 ./test
                                            [sub-08]
                                           sub-09
                     00:00:00 ./test [sub-10]
  2313 pts/0
2314 pts/0 00:00:00 ps
[root@RHEL74-SVR 1652262-000107]#
```

2.3.修改进程名,使用 ps -ef 命令查看时,父进程与子进程名称后面加上自己的已运行时间:

修改进程名, 使用 ps -ef 查询结果如下, 随后跟的是子进程/父进程已运行时间:

```
0 19:51 :
0 19:54 pts/0
                                                              00:00:01 [kworker/0:3]
00:00:00 ./test [main 00:02:21]
LOOF
                               1
                 2302
root
                                   0 19:54 pts/0
0 19:54 pts/0
                                                                                      [sub-01 00:02:20]
[sub-02 00:02:19]
                 2303
                                                              00:00:00 ./test
                           2302
root
                 2304
                           2302
                                                              00:00:00 ./test
root
                                                                                      [sub-03 00:02:18]
[sub-04 00:02:17]
                                    0 19:54 pts/0
0 19:54 pts/0
                 2305
                           2302
                                                              00:00:00 ./test
root
root
                 2307
                           2302
                                                              00:00:00 ./test
root
                 2308
                           2302
                                    0 19:55 pts/0
                                                              00:00:00 ./test
                                                                                      [sub-05 00:02:16]
                                                              00:00:00 ./test
                                                                                      [sub-06 00:02:15
[sub-07 00:02:14
root
                 2309
                           2302
                                    0 19:55 pts/0
                 2310
                           2302
                                    0 19:55 pts/0
                                                              00:00:00 ./test
root
                                                             00:00:00 ./test [sub-08 00:02:14]
00:00:00 ./test [sub-09 00:02:12]
00:00:00 ./test [sub-10 00:02:11]
00:00:00 [kworker/0:1]
                                   0 19:55 pts/0
0 19:55 pts/0
                           2302
root
                 2311
                           2302
root
                 2312
                                   0 19:55 pts/0
0 19:56 ?
                           2302
root
                 2313
root
```

2.4.用 kill 杀掉若干子进程之后,父进程会再次分裂,补齐 n 个,且子进程的编号占用之前被 kill 子进程的编号:

答: 杀死部分子进程之后, 10s 后最新生成的子进程占用了之前杀死的子进程的编号:

```
[root@RHEL74-SVR 1652262-000107]# kill 2303
root@RHEL74-SVR 1652262-000107]# kill
                                          2304
root@RHEL74-SVR 1652262-000107]# kill
                                          2305
root@RHEL74-SVR 1652262-000107]# kill
root@RHEL74-SVR 1652262-000107]# kill
                                          2307
                                          2308
root@RHEL74-SVR 1652262-000107]# kill
                                          2309
root@RHEL74-SVR 1652262-000107]# kill 2310
[root@RHEL74-SVR 1652262-000107]# ps
  PID TTY
                     TIME CMD
  2224 pts/0
                 00:00:00 bash
  2302 pts/0
                 00:00:00 ./test
                                  [main]
  2311 pts/0
                 00:00:00 ./test
                                   sub-08
  2312 pts/0
                 00:00:00 ./test
                                   sub-09
  2313 pts/0
                 00:00:00 ./test
                                   [sub-10]
                 00:00:00 ./test
                                   sub-01
  2323 pts/0
                 00:00:00 ./test
  2324 pts/0
                                   sub-02
                 00:00:00 ./test
  2325 pts/0
                                   sub-03
  2326 pts/0
                 00:00:00 ./test
                                   sub-04
                 00:00:00 ./test
  2327
       pts/0
                                   sub-05
  2328 pts/0
                 00:00:00 ./test
                                   sub-06
                 00:00:00 ./test
  2342 pts/0
                                  [sub-07]
  2343 pts/0
                 00:00:00 ps
[root@RHEL74-SVR 1652262-000107]# ps
  PID TTY
                     TIME CMD
                 00:00:00 bash
  2224 pts/0
  2302 pts/0
                 00:00:00 ./test
                                  [main]
                                   [sub-08]
  2311 pts/0
                 00:00:00 ./test
  2312 pts/0
                 00:00:00 ./test
                                   sub-09
                 00:00:00 ./test
  2313 pts/0
                                   sub-10
  2323 pts/0
                 00:00:00 ./test
                                   sub-01
  2324 pts/0
                 00:00:00 ./test
                                   sub-02
  2325 pts/0
                 00:00:00 ./test
                                   sub-03
                 00:00:00 ./test
  2326 pts/0
                                   sub-04
       pts/0
                                   sub-05
                 00:00:00 ./test
  2327
                 00:00:00 ./test
  2328 pts/0
                                   sub-06
  2342 pts/0
                 00:00:00 ./test
                                  [sub-07]
  2344 pts/0
                 00:00:00 ps
[root@RHEL74-SVR 1652262-000107]# ps
```

2.5.kill 父进程后,所有子进程自动结束:

答: 杀死进程编号为 2302 的父进程之后进程入下, 所有子进程均被杀死:

```
[root@RHEL74-SVR 1652262-000107]# ps
                 TIME CMD
00:00:00 bash
  PID TTY
  2224 pts/0
 2302 pts/0
                 00:00:00 ./test
                                   [main]
  2311 pts/0
                 00:00:00 ./test
                                   [sub-08]
                 00:00:00 ./test
  2312 pts/0
                                    sub-09
  2313 pts/0
                 00:00:00 ./test
                                    sub-10
 2323 pts/0
                 00:00:00 ./test
                                    sub-01
                 00:00:00 ./test
  2324 pts/0
                                    sub-02
  2325 pts/0
                 00:00:00 ./test
                                    sub-03
  2326 pts/0
                 00:00:00 ./test
                                    sub-04
                 00:00:00 ./test
 2327 pts/0
                                    sub-05
                 00:00:00 ./test
  2328 pts/0
                                   sub-06
  2342 pts/0
                 00:00:00 ./test [sub-07]
2344 pts/0 00:00:00 ps
[root@RHEL74-SVR 1652262-000107]# kill 2302
[root@RHEL74-SVR 1652262-000107]# ps
  PID TTY
                      TIME CMD
  2224 pts/0
2347 pts/0
                 00:00:00 bash
                 00:00:00 ps
[root@RHEL74-SVR 1652262-000107]#
```

2.6.n 值从/etc 目录下的 1652262.conf 文件中读取,文件仅一行,存放运行时需要分裂的数量,合理范围为 5-100 如果超过合理范围,缺省为 5:

答:由于此处设置的子进程数量为10,所以上面的最大分裂子进程数目为10

♦ 文本编辑器 - D:\Desktop\2458048592\FileRecv\计网\安装\FlashFXP 5.4.

```
文件(F) 编辑(Z) 搜索(Y) 格式(O) 查看(V)
|子进程数量=10
```

2.7.读配置文件的函数编译为动态编译库, 命名为 lib1652262.so, 放在/usr/lib64 中:

答: make 之后生成的动态编译库如下:

2.8.在/usr 下新建 1652262 子目录,放入 1652262.dat 文件,内容为学号+姓名 2.9.makefile 满足 make, make install, make rpm, make uninstall, make clean 指令对应要求:

答:

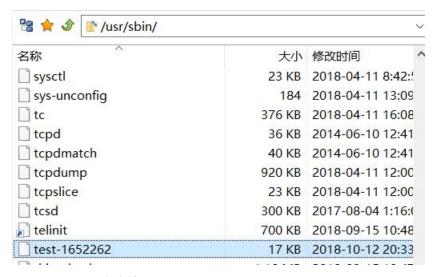
(1)Make 执行结果:

```
[root@RHEL74-SVR 1652262-000107]# make cc read.c -fpIC -shared -o lib1652262.so cc -g -Wall -o test test.c -L. -l1652262 -Wl,-rpath . [root@RHEL74-SVR 1652262-000107]# ll 总用量 44 -rwxr-xr-x. 1 root root 8168 10月 12 20:31 lib1652262.so -rw-r--r-. 1 root root 1072 10月 12 16:38 makefile -rw-r--r-. 1 root root 355 10月 12 16:39 read.c -rwxr-xr-x. 1 root root 18272 10月 12 20:31 test -rw-r--r-. 1 root root 5247 10月 12 16:39 test.c [root@RHEL74-SVR 1652262-000107]# ■
```

(2)Make install 执行结果:

```
[root@RHEL74-SVR 1652262-000107]# make install cp test /usr/sbin/test-1652262 cp lib1652262.so /usr/lib64 mkdir -p /usr/1652262 cp 1652262.dat /usr/1652262 cp 1652262.conf /etc [root@RHEL74-SVR 1652262-000107]# ■
```

/usr/sbin 中 test-1652262:



Lib1652262.so 移动结果:



1652262.dat 移动结果:



1652262.conf 移动结果:



(3)make rpm 执行结果:

首 先 将 service , dat , conf , makefile 文 件 以 及 read/test.c 文 件 压 缩 得 到 test-1652262.tar.bz2 文件,然后 make rpm 得到如下结果:

```
[root@RHEL74-SVR 1652262-000107]# make rpm
 mkdir -pv ~/rpmbuild/{BUILD,BUILDROOT,RPMS,SOURCES,SPECS,SRPMS}
cp test-1652262.tar.bz2 /root/rpmbuild/SOURCES
cp test.spec /root/rpmbuild/SPECS
rpmbuild -ba /root/rpmbuild/SPECS/test.spec
 执行(%prep): /bin/sh -e /var/tmp/rpm-tmp.PdWxKA
 + umask 022
 + cd /root/rpmbuild/BUILD
 + cd /root/rpmbuild/BUILD
 + rm -rf test-1652262
 + /usr/bin/tar -xf
 + /usr/bin/bzip2 -dc /root/rpmbuild/SOURCES/test-1652262.tar.bz2
 + STATUS=0
+ '[' 0 -ne 0 ']
 + cd test-1652262
 + /usr/bin/chmod -Rf a+rx,u+w,g-w,o-w .
  exit 0
 执行(%build): /bin/sh -e /var/tmp/rpm-tmp.1MYt2x
 + umask 022
 + cd /root/rpmbuild/BUILD
 + cd test-1652262
 + make
make[1]: Entering directory `/root/rpmbuild/BUILD/test-1652262'
cc read.c -fPIC -shared -o lib1652262.so
cc -g -Wall -o test test.c -L. -l1652262 -Wl,-rpath .
make[1]: Leaving directory `/root/rpmbuild/BUILD/test-1652262'
 + exit 0
 执行(%install): /bin/sh -e /var/tmp/rpm-tmp.96bPHv
 + umask 022
+ cd /root/rpmbuild/BUILD
1X) <= 4.U-1 rpmIID(CompressedFileNames) <= 3.U.4-1
检查未打包文件: /usr/lib/rpm/check-files /root/rpmbuild/BUILDROOT/test-16522
62-Typ.x86_64
52-1yp.x86_64
写道:/root/rpmbuild/SRPMS/test-1652262-Typ.src.rpm
写道:/root/rpmbuild/RPMS/x86_64/test-1652262-Typ.x86_64.rpm
写道:/root/rpmbuild/RPMS/x86_64/test-debuginfo-1652262-Typ.x86_64.rpm
执行(%clean): /bin/sh -e /var/tmp/rpm-tmp.lSdVsP
 + umask 022
+ cd /root/rpmbuild/BUILD
+ cd test-1652262
 + rm -rf /root/rpmbuild/BUILDROOT/test-1652262-Typ.x86_64
 + exit 0
cp /root/rpmbuild/RPMS/x86_64/test-1652262-Typ.x86_64.rpm test-1652262.rpm [root@RHEL74-SVR 1652262-000107]#
在 1652262-000107 文件夹下也生成了 test-1652262.rpm 文件:
 😤 🍁 🥩 🎼 /home/homework_second/1652262-000107/
名称
                                                                         属
                                        大小 修改时间
€ 上级目录
 * test-1652262
                                              2018-10-12 20:44:58
                                                                         dr
 1652262.conf
                                          14 2017-12-19 15:10:55
                                                                         -rv
1652262.dat
                                          14 2018-10-12 16:38:13
                                                                         -rv
makefile
                                        1 KB 2018-10-12 20:53:38
                                                                          -rv
                                         355 2018-10-12 16:39:16
 read.c
                                                                          -rv
 c test.c
                                        5 KB 2018-10-12 16:39:59
                                                                          -rv
test.spec
                                        1 KB 2018-10-12 16:36:20
                                                                          -rv
 test-1652262.rpm
                                        9 KB 2018-10-12 20:54:04
                                                                         -rv
test-1652262.service
                                        292 2018-10-12 20:47:01
                                                                         -rv
```

2 KB 2018-10-12 20:50:23

-rv

test-1652262.tar.bz2

(4)make uninstall 执行结果:

```
[root@RHEL74-SVR 1652262-000107]# make uninstall
rm -rf /etc/1652262.conf /usr/sbin/test-1652262 /usr/lib64/lib1652262.so /usr/1652262/1652262.dat /usr/lib/system/system/test-1652262.service/root/rpmbuild/RPMS/x86_
64/test-1652262-0.x86_64.rpm /root/rpmbuild/RPMS/x86_64/1652262-debuginfo-test-0.x86_64.rpm /root/rpmbuild
if [ "`ls -A /usr/1652262'" = "" ]; then `rm -rf /usr/1652262';fi;
[root@RHEL74-SVR 1652262-000107]# 
[root@RHEL74-SVR 1652262-000107]# ]
```

(5)make clean 执行结果:

```
[root@RHEL74-SVR 1652262-000107]# make clean
rm -rf lib1652262.so test test-1652262.rpm
[root@RHEL74-SVR 1652262-000107]# 11
总用量 36
-rw-r--r-- 1 root root 14 12月 19 2017 1652262.conf
-rw-r--r-- 1 root root 14 10月 12 16:38 1652262.dat
-rw-r--r-- 1 root root 1072 10月 12 20:53 makefile
-rw-r--r-- 1 root root 355 10月 12 16:39 read.c
drwxr-xr-x. 2 root root 117 10月 12 20:44 test-1652262
-rw-r--r-- 1 root root 292 10月 12 20:47 test-1652262.service
-rw-r--r-- 1 root root 2685 10月 12 20:50 test-1652262.tar.bz2
-rw-r--r-- 1 root root 5247 10月 12 16:39 test.c
-rw-r--r-- 1 root root 1070 10月 12 16:36 test.spec
[root@RHEL74-SVR 1652262-000107]# ■
```

三.写一个 test-1652262.service, 放在特定目录下, 能完成如下要求: 测试结果如下:

```
[root@RHEL74-SVR 1652262-000107]# systemctl enable test-1652262.service created symlink from /etc/systemd/system/multi-user.target.wants/test-165226 2.service to /etc/systemd/system/test-1652262.service.
[root@RHEL74-SVR 1652262-000107]# systemctl disable test-1652262.service Removed symlink /etc/systemd/system/multi-user.target.wants/test-1652262.service.

[root@RHEL74-SVR 1652262-000107]# systemctl start test-1652262.service [root@RHEL74-SVR 1652262-000107]# systemctl stop test-1652262.service [root@RHEL74-SVR 1652262-000107]# systemctl restart test-1652262.service [root@RHEL74-SVR 1652262-000107]# systemctl restart test-1652262.service [root@RHEL74-SVR 1652262-000107]#
```

四.将 test 程序及附件共同打包成一个 rpm 安装包:安装包名为 test-1652262.rpm,用 rpm -ivh 1652262-test.rpm 安装后目录分布符合要求,用 rpm -e 卸载后,要依次删除上面的 5 个文件及一个目录,并在安装 rpm 包时有相应提示:

答:

首先 rpmbuild -ba test.spec, 用当前目录下的 spec 文件生成 test-1652262.rpm 文件, 在 RPMS 中的 x86 64 文件夹下可以查看到该 rpm 文件:

```
+ make install DESTDIR=/root/rpmbuild/BUILDROOT/test-1652262-Typ.x86_64

cp test /root/rpmbuild/BUILDROOT/test-1652262-Typ.x86_64/usr/sbin/test-1652262

cp lib1652262.so /root/rpmbuild/BUILDROOT/test-1652262-Typ.x86_64/usr/lib64

mkdir -p /root/rpmbuild/BUILDROOT/test-1652262-Typ.x86_64/usr/1652262

cp 1652262.dat /root/rpmbuild/BUILDROOT/test-1652262-Typ.x86_64/usr/1652262

cp 1652262.conf /root/rpmbuild/BUILDROOT/test-1652262-Typ.x86_64/etc

+ /usr/lib/rpm/find-debuginfo.sh --strict-build-id -m --run-dwz --dwz-low-mem-die-limit 100

00000 --dwz-max-die-limit 110000000 /root/rpmbuild/BUILDROOT/test-1652262

extracting debug info from /root/rpmbuild/BUILDROOT/test-1652262-Typ.x86_64/usr/sbin/test-1

652262
  652262
  extracting debug info from /root/rpmbuild/BUILDROOT/test-1652262-Typ.x86_64/usr/lib64/lib16
  dwz: Too few files for multifile optimization
/usr/lib/rpm/sepdebugcrcfix: Updated 1 CRC32s, 1 CRC32s did match.
/usr/lib/rpm/sepdebugcrcfix: Updated 1 CRC32s, 1 CRC32s did match.
11 blocks
+ /usr/lib/rpm/check-buildroot
+ /usr/lib/rpm/redhat/brp-compress
+ /usr/lib/rpm/redhat/brp-strip-static-archive /usr/bin/strip
+ /usr/lib/rpm/redhat/brp-python-bytecompile /usr/bin/python 1
+ /usr/lib/rpm/redhat/brp-python-hardlink
+ /usr/lib/rpm/redhat/brp-java-repack-jars
处理文件: test-1652262-Typ.x86_64
Provides: lib1652262.so()(64bit) test = 1652262-Typ test(x86-64) = 1652262-Typ
Requires(interp): /bin/sh /bin/sh /bin/sh
Requires(rpmlib): rpmlib(compressedFileNames) <= 3.0.4-1 rpmlib(FileDigests) <= 4.6.0-1 rpm
Requires(pre): /bin/sh
lib(PayloadFilesHavePrefix) <= 4.0-1
Requires(pre): /bin/sh
Requires(post): /bin/sh
Requires(post): /bin/sh
Requires(postun): /bin/sh
= 1652262-Typ.x86_64
Provides: test-debuginfo-1652262-Typ test-debuginfo(x86-64) = 1652262-Typ
Requires(postun): /pmlib(FileDigests) <= 4.6.0-1 rpmlib(PayloadFilesHavePrefix) <= 4.0-1 rpmlib(CompressedFileNames) <= 3.0.4-1
Requires(post): /bin/shcek-files /root/rpmbuild/BUILDROOT/test-1652262-Typ.x86_64
Sii:/root/rpmbuild/RPMS/x86_64/test-1652262-Typ.x86_64.rpm
Sii:/root/rpmbuild/RPMS/x86_64/test-debuginfo-1652262-Typ.x86_64.rpm
Sii:/root/rpmbuild/RPMS/x86_64/test-debuginfo-1652262-Typ.x86_64.rpm
Aif(%Clean): /bin/sh -e /var/tmp/rpm-tmp.poII32
+ umask 022
+ cd /root/rpmbuild/BUILD
  + cd /root/rpmbuild/BUILD
+ cd test-1652262
  + rm -rf /root/rpmbuild/BUILDROOT/test-1652262-Typ.x86_64
          exit 0
   [root@RHEL74-SVR 1652262-000107]# |
                                                     /root/rpmbuild/RPMS/x86 64/
      名称
                                                                                                                                                                                                                                             大小 修改时间
     1 上级目录
      test-1652262-Typ.x86_64.rpm
                                                                                                                                                                                                                                           9 KB 2018-10
      test-debuginfo-1652262-Typ.x86 64.rpm
                                                                                                                                                                                                                                           9 KB 2018-10
```

4.2.用 rpm -ivh 1652262-test.rpm 安装后,目录分布满足既定要求: 首先执行命令:

```
[root@RHEL/4-SVR nome]# cd /root/rpmbulld/RPMS/X86_64

[root@RHEL74-SVR x86_64]# rpm -ivh test-1652262-Typ.x86_64.rpm
准备中... ############################### [100%]
准备安装test-1652262

正在升级/安装... 1:test-1652262-Typ ############################ [100%]

完成安装test-1652262

[root@RHEL74-SVR x86_64]# ■
```

查看各个目录下文件的分布情况:

n /etc/		
名称	大小	修改时间
.updated	163	2018-09-15 1
1652262.conf		2018-10-12 2



cat: /usr/sbin/test-1652262: 没有那个文件或目录

cat: /usr/1652262/1652262.dat: 没有那个文件或目录

[root@RHEL74-SVR x86_64]# cat /usr/lib1652262.so cat: /usr/lib64/lib1652262.so: 没有那个文件或目录 [root@RHEL74-SVR x86_64]# cat /usr/1652262/l652262.dat

4.4.rpm 安装相应提示:

[root@RHEL74-SVR x86_64]#

```
准备中...
准备安装test-1652262
正在升级/安装...
1:test-1652262-Typ
                      ########## [100%]
[root@RHEL74-SVR x86_64]#
```

```
[root@RHEL74-SVR x86_64]# rpm -e test
准备卸载test-1652262
完成卸载test-1652262
[root@RHEL74-SVR x86_64]# 11 /usr/1652262
ls: 无法访问/usr/1652262: 没有那个文件或目录
[root@RHEL74-SVR x86_64]# cat /etc/1652262.conf
cat: /etc/1652262.conf: 没有那个文件或目录
[root@RHEL74-SVR x86_64]# cat /usr/sbin/test-1652262
cat: /usr/sbin/test-1652262: 没有那个文件或目录
[root@RHEL74-SVR x86_64]# cat /usr/lib64/lib1652262.so cat: /usr/lib64/lib1652262.so: 没有那个文件或目录 [root@RHEL74-SVR x86_64]# cat /usr/1652262/l652262.dat
cat: /usr/1652262/1652262.dat: 没有那个文件或目录
[root@RHEL74-SVR x86_64]#
```