“Операционные системы”
Лабораторная работа №1 (часть 2)
Авдейкина ИУ7-53Б

Процесс “зомби”

```
sheglar@sheglar-fx506ii:~/bmstu/05/os/lab_01/02$ ps -al
F S   UID    PID   PPID  C PRI  NI ADDR SZ WCHAN  TTY          TIME CMD
4 S   1000   2419   2416  2  80   0 - 233111 ep_pol tty2     00:03:03 Xorg
0 S   1000   2561   2416  0  80   0 - 55760 do_pol tty2      00:00:00 gnome-session-b
4 S   1000  22765  18604  1  80   0 - 1302032 do_pol pts/0   00:01:30 anki
0 S   1000  22796  22765  0  80   0 - 70914 do_pol pts/0     00:00:00 QtWebEngineProc
4 S   1000  22797  22765  0  80   0 - 70914 do_wai pts/0     00:00:00 QtWebEngineProc
5 S   1000  22799  22797  0  80   0 - 70921 do_pol pts/0     00:00:00 QtWebEngineProc
1 S   1000  22818  22799  0  80   0 - 296404599 futex_ pts/0 00:00:00 QtWebEngineProc
1 S   1000  22826  22799  0  80   0 - 296530510 futex_ pts/0 00:00:02 QtWebEngineProc
1 S   1000  22827  22799  0  80   0 - 296530115 futex_ pts/0 00:00:01 QtWebEngineProc
1 S   1000  24605  22799  0  80   0 - 296607108 futex_ pts/0 00:00:07 QtWebEngineProc
0 R   1000  25227  25103 35  80   0 -   693 -      pts/1     00:00:01 a.out
1 R   1000  25228  25227 35  80   0 -   693 -      pts/1     00:00:01 a.out
4 R   1000  25229  25145  0  80   0 -  3168 -      pts/2     00:00:00 ps
sheglar@sheglar-fx506ii:~/bmstu/05/os/lab_01/02$ kill 25228
sheglar@sheglar-fx506ii:~/bmstu/05/os/lab_01/02$ kill 25228
sheglar@sheglar-fx506ii:~/bmstu/05/os/lab_01/02$ ps -al
F S   UID    PID   PPID  C PRI  NI ADDR SZ WCHAN  TTY          TIME CMD
4 S   1000   2419   2416  2  80   0 - 233111 -    tty2      00:03:04 Xorg
0 S   1000   2561   2416  0  80   0 - 55760 do_pol tty2      00:00:00 gnome-session-b
4 S   1000  22765  18604  1  80   0 - 1302032 do_pol pts/0   00:01:30 anki
0 S   1000  22796  22765  0  80   0 - 70914 do_pol pts/0     00:00:00 QtWebEngineProc
4 S   1000  22797  22765  0  80   0 - 70914 do_wai pts/0     00:00:00 QtWebEngineProc
5 S   1000  22799  22797  0  80   0 - 70921 do_pol pts/0     00:00:00 QtWebEngineProc
1 S   1000  22818  22799  0  80   0 - 296404599 futex_ pts/0 00:00:00 QtWebEngineProc
1 S   1000  22826  22799  0  80   0 - 296530510 futex_ pts/0 00:00:02 QtWebEngineProc
1 S   1000  22827  22799  0  80   0 - 296530115 futex_ pts/0 00:00:01 QtWebEngineProc
1 S   1000  24605  22799  0  80   0 - 296607108 futex_ pts/0 00:00:07 QtWebEngineProc
0 R   1000  25227  25103 39  80   0 -   693 -      pts/1     00:00:04 a.out
1 Z   1000  25228  25227 26  80   0 -     0 -      pts/1     00:00:02 a.out <defunct>
4 R   1000  25230  25145  0  80   0 -  3168 -      pts/2     00:00:00 ps
sheglar@sheglar-fx506ii:~/bmstu/05/os/lab_01/02$ kill 25227
sheglar@sheglar-fx506ii:~/bmstu/05/os/lab_01/02$ ps -al
F S   UID    PID   PPID  C PRI  NI ADDR SZ WCHAN  TTY          TIME CMD
4 R   1000   2419   2416  2  80   0 - 233111 futex_ tty2     00:03:04 Xorg
0 S   1000   2561   2416  0  80   0 - 55760 do_pol tty2      00:00:00 gnome-session-b
4 S   1000  22765  18604  1  80   0 - 1302032 do_pol pts/0   00:01:30 anki
0 S   1000  22796  22765  0  80   0 - 70914 do_pol pts/0     00:00:00 QtWebEngineProc
4 S   1000  22797  22765  0  80   0 - 70914 do_wai pts/0     00:00:00 QtWebEngineProc
5 S   1000  22799  22797  0  80   0 - 70921 do_pol pts/0     00:00:00 QtWebEngineProc
1 S   1000  22818  22799  0  80   0 - 296404599 futex_ pts/0 00:00:00 QtWebEngineProc
1 S   1000  22826  22799  0  80   0 - 296530510 futex_ pts/0 00:00:02 QtWebEngineProc
1 S   1000  22827  22799  0  80   0 - 296530115 futex_ pts/0 00:00:01 QtWebEngineProc
1 S   1000  24605  22799  0  80   0 - 296607108 futex_ pts/0 00:00:07 QtWebEngineProc
4 R   1000  25232  25145  0  80   0 -  3168 -      pts/2     00:00:00 ps
```

Процесс-сирота

```
sheglar@sheglar-fx506ii:~/bmstu/05/os/lab_01/02$ ps -al
F S   UID    PID   PPID  C PRI  NI ADDR SZ WCHAN   TTY          TIME CMD
4 S  1000   2419   2416  2  80   0 - 233111 ep_pol tty2     00:03:04 Xorg
0 S  1000   2561   2416  0  80   0 - 55760 do_pol tty2      00:00:00 gnome-session-b
4 S  1000  22765  18604  1  80   0 - 1302032 do_pol pts/0   00:01:30 anki
0 S  1000  22796  22765  0  80   0 - 70914 do_pol pts/0     00:00:00 QtWebEngineProc
4 S  1000  22797  22765  0  80   0 - 70914 do_wai pts/0     00:00:00 QtWebEngineProc
5 S  1000  22799  22797  0  80   0 - 70921 do_pol pts/0     00:00:00 QtWebEngineProc
1 S  1000  22818  22799  0  80   0 - 296404599 futex_ pts/0 00:00:00 QtWebEngineProc
1 S  1000  22826  22799  0  80   0 - 296522314 futex_ pts/0 00:00:02 QtWebEngineProc
1 S  1000  22827  22799  0  80   0 - 296521919 futex_ pts/0 00:00:01 QtWebEngineProc
1 S  1000  24605  22799  0  80   0 - 296607108 futex_ pts/0 00:00:07 QtWebEngineProc
0 R  1000  25236  25103 34  80   0 -   693 -        pts/1    00:00:01 a.out
1 R  1000  25237  25236 34  80   0 -   693 -        pts/1    00:00:01 a.out
4 R  1000  25238  25145  0  80   0 -  3168 -        pts/2    00:00:00 ps
sheglar@sheglar-fx506ii:~/bmstu/05/os/lab_01/02$ kill 25236
sheglar@sheglar-fx506ii:~/bmstu/05/os/lab_01/02$ ps -al
F S   UID    PID   PPID  C PRI  NI ADDR SZ WCHAN   TTY          TIME CMD
4 S  1000   2419   2416  2  80   0 - 233623 ep_pol tty2     00:03:04 Xorg
0 S  1000   2561   2416  0  80   0 - 55760 do_pol tty2      00:00:00 gnome-session-b
4 S  1000  22765  18604  1  80   0 - 1302032 do_pol pts/0   00:01:30 anki
0 S  1000  22796  22765  0  80   0 - 70914 do_pol pts/0     00:00:00 QtWebEngineProc
4 S  1000  22797  22765  0  80   0 - 70914 do_wai pts/0     00:00:00 QtWebEngineProc
5 S  1000  22799  22797  0  80   0 - 70921 do_pol pts/0     00:00:00 QtWebEngineProc
1 S  1000  22818  22799  0  80   0 - 296404599 futex_ pts/0 00:00:00 QtWebEngineProc
1 S  1000  22826  22799  0  80   0 - 296522314 futex_ pts/0 00:00:02 QtWebEngineProc
1 S  1000  22827  22799  0  80   0 - 296521919 futex_ pts/0 00:00:01 QtWebEngineProc
1 S  1000  24605  22799  0  80   0 - 296607108 futex_ pts/0 00:00:07 QtWebEngineProc
1 S  1000  25237   2283 36  80   0 -   693 wait_w pts/1     00:00:06 a.out
4 R  1000  25240  25145  0  80   0 -  3168 -        pts/2    00:00:00 ps
sheglar@sheglar-fx506ii:~/bmstu/05/os/lab_01/02$ kill 25237
```

Hardlink, softlink

```
sheglar@sheglar-fx506ii:~/bmstu/05/os/lab_01/02$ ln main.c hardlink
sheglar@sheglar-fx506ii:~/bmstu/05/os/lab_01/02$ ll
total 32
drwxrwxr-x 2 sheglar sheglar  4096 окт  3 11:16 ./
drwxrwxr-x 4 sheglar sheglar  4096 сен 12 17:05 ../
-rwxrwxr-x 1 sheglar sheglar 16088 сен 26 17:49 a.out*
-rw-rw-r-- 2 sheglar sheglar   320 сен 26 17:49 hardlink
-rw-rw-r-- 2 sheglar sheglar   320 сен 26 17:49 main.c
sheglar@sheglar-fx506ii:~/bmstu/05/os/lab_01/02$ ls -li
total 24
527198 -rwxrwxr-x 1 sheglar sheglar 16088 сен 26 17:49 a.out
527201 -rw-rw-r-- 2 sheglar sheglar   320 сен 26 17:49 hardlink
527201 -rw-rw-r-- 2 sheglar sheglar   320 сен 26 17:49 main.c
sheglar@sheglar-fx506ii:~/bmstu/05/os/lab_01/02$ ln -s main.c softlink
sheglar@sheglar-fx506ii:~/bmstu/05/os/lab_01/02$ ls -li
total 24
527198 -rwxrwxr-x 1 sheglar sheglar 16088 сен 26 17:49 a.out
527201 -rw-rw-r-- 2 sheglar sheglar   320 сен 26 17:49 hardlink
527201 -rw-rw-r-- 2 sheglar sheglar   320 сен 26 17:49 main.c
525354 lrwxrwxrwx 1 sheglar sheglar     6 окт  3 11:16 softlink -> main.c
```

Pipeline

```
sheglar@sheglar-fx506ii:~/bmstu/05/os/lab_01/02$ ll
total 32
drwxrwxr-x 2 sheglar sheglar  4096 окт  3 11:17 ./
drwxrwxr-x 4 sheglar sheglar  4096 сен 12 17:05 ../
-rwxrwxr-x 1 sheglar sheglar 16088 сен 26 17:49 a.out*
-rw-rw-r-- 2 sheglar sheglar   320 сен 26 17:49 hardlink
-rw-rw-r-- 2 sheglar sheglar   320 сен 26 17:49 main.c
prw-rw-r-- 1 sheglar sheglar     0 окт  3 11:17 pipe|
lrwxrwxrwx 1 sheglar sheglar     6 окт  3 11:16 softlink -> main.c
sheglar@sheglar-fx506ii:~/bmstu/05/os/lab_01/02$ echo "Test!" > pipe
```

```
sheglar@sheglar-fx506ii:~/bmstu/05/os/lab_01/02$ tee < pipe
Test!
sheglar@sheglar-fx506ii:~/bmstu/05/os/lab_01/02$ 
```

Изменение приоритета (NI, nice)

$ ./a.out:

```
sheglar@sheglar-fx506ii:~/bmstu/05/os/lab_01/02$ ps -al
F S   UID     PID    PPID  C PRI  NI ADDR SZ WCHAN   TTY          TIME CMD
4 S   1000    2419    2416  2  80   0 - 233112 ep_pol tty2      00:03:12 Xorg
0 S   1000    2561    2416  0  80   0 - 55760 do_pol tty2       00:00:00 gnome-session-b
4 S   1000   22765   18604  1  80   0 - 1302032 do_pol pts/0   00:01:30 anki
0 S   1000   22796   22765  0  80   0 - 70914 do_pol pts/0     00:00:00 QtWebEngineProc
4 S   1000   22797   22765  0  80   0 - 70914 do_wai pts/0     00:00:00 QtWebEngineProc
5 S   1000   22799   22797  0  80   0 - 70921 do_pol pts/0     00:00:00 QtWebEngineProc
1 S   1000   22818   22799  0  80   0 - 296404599 futex_ pts/0 00:00:00 QtWebEngineProc
1 S   1000   22826   22799  0  80   0 - 296522314 futex_ pts/0 00:00:02 QtWebEngineProc
1 S   1000   22827   22799  0  80   0 - 296521919 futex_ pts/0 00:00:01 QtWebEngineProc
1 S   1000   24605   22799  0  80   0 - 296607108 futex_ pts/0 00:00:07 QtWebEngineProc
0 R   1000   25306   25103 30  80   0 -   693 -       pts/1    00:00:01 a.out
1 R   1000   25307   25306 30  80   0 -   693 -       pts/1    00:00:01 a.out
4 R   1000   25308   25145  0  80   0 -  3168 -       pts/2    00:00:00 ps
```

$ nice -n 10 ./a.out

```
sheglar@sheglar-fx506ii:~/bmstu/05/os/lab_01/02$ ps -al
F S   UID     PID    PPID  C PRI  NI ADDR SZ WCHAN   TTY          TIME CMD
4 S   1000    2419    2416  2  80   0 - 233111 ep_pol tty2      00:03:12 Xorg
0 S   1000    2561    2416  0  80   0 - 55760 do_pol tty2       00:00:00 gnome-session-b
4 S   1000   22765   18604  1  80   0 - 1302032 do_pol pts/0   00:01:30 anki
0 S   1000   22796   22765  0  80   0 - 70914 do_pol pts/0     00:00:00 QtWebEngineProc
4 S   1000   22797   22765  0  80   0 - 70914 do_wai pts/0     00:00:00 QtWebEngineProc
5 S   1000   22799   22797  0  80   0 - 70921 do_pol pts/0     00:00:00 QtWebEngineProc
1 S   1000   22818   22799  0  80   0 - 296404599 futex_ pts/0 00:00:00 QtWebEngineProc
1 S   1000   22826   22799  0  80   0 - 296522314 futex_ pts/0 00:00:02 QtWebEngineProc
1 S   1000   22827   22799  0  80   0 - 296521919 futex_ pts/0 00:00:01 QtWebEngineProc
1 S   1000   24605   22799  0  80   0 - 296607108 futex_ pts/0 00:00:07 QtWebEngineProc
0 R   1000   25320   25103 30  90  10 -   693 -       pts/1    00:00:00 a.out
1 R   1000   25321   25320 30  90  10 -   693 -       pts/1    00:00:00 a.out
4 R   1000   25322   25145  0  80   0 -  3168 -     _ pts/2    00:00:00 ps
```