

# Лабораторная работа №6

## Управление процессами

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## Цель работы

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- Продолжение изучения ОС Linux. Изучение и получение навыков по управлению процессами ОС.

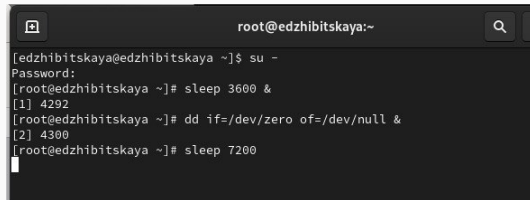
## **Выполнение работы**

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## 6.4.1. Управление заданиями

Получим полномочия администратора и введем команды

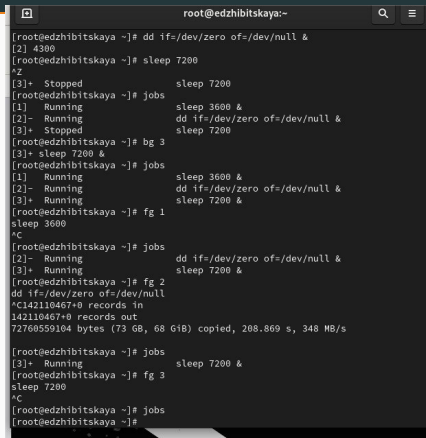
Последняя команда была запущена не в фоновом режиме, поэтому для выхода понадобится сочетание клавиш `ctr Z`

A terminal window titled 'root@edzhibitskaya:~' with a search icon and a menu icon in the top right. The terminal shows a user switching to root with 'su -', then running 'sleep 3600 &' which returns PID 4292, then 'dd if=/dev/zero of=/dev/null &' which returns PID 4300, and finally 'sleep 7200'.

```
root@edzhibitskaya:~  
[edzhibitskaya@edzhibitskaya ~]$ su -  
Password:  
[root@edzhibitskaya ~]# sleep 3600 &  
[1] 4292  
[root@edzhibitskaya ~]# dd if=/dev/zero of=/dev/null &  
[2] 4300  
[root@edzhibitskaya ~]# sleep 7200
```

**Рис. 1:** Запуск в фоновом режиме и на переднем плане

## 6.4.1



```
root@edzhibitskaya:~  
[root@edzhibitskaya ~]# dd if=/dev/zero of=/dev/null &  
[2] 4300  
[root@edzhibitskaya ~]# sleep 7200  
^Z  
[3]+  Stopped                  sleep 7200  
[root@edzhibitskaya ~]# jobs  
[1]  Running                  sleep 3600 &  
[2]-  Running                  dd if=/dev/zero of=/dev/null &  
[3]+  Stopped                  sleep 7200  
[root@edzhibitskaya ~]# bg 3  
[3]+ sleep 7200 &  
[root@edzhibitskaya ~]# jobs  
[1]  Running                  sleep 3600 &  
[2]-  Running                  dd if=/dev/zero of=/dev/null &  
[3]+  Running                  sleep 7200 &  
[root@edzhibitskaya ~]# fg 1  
sleep 3600  
^C  
[root@edzhibitskaya ~]# jobs  
[2]-  Running                  dd if=/dev/zero of=/dev/null &  
[3]+  Running                  sleep 7200 &  
[root@edzhibitskaya ~]# fg 2  
dd if=/dev/zero of=/dev/null  
^C142110467+0 records in  
142110467+0 records out  
72760559104 bytes (73 GB, 68 GiB) copied, 208.869 s, 348 MB/s  
[root@edzhibitskaya ~]# jobs  
[3]+  Running                  sleep 7200 &  
[root@edzhibitskaya ~]# fg 3  
sleep 7200  
^C  
[root@edzhibitskaya ~]# jobs  
[root@edzhibitskaya ~]#
```

Командой `jobs` посмотрим на состояние заданий. Затем, используя `bg 3`, продолжим выполнение 3 задания. Переместим командой `fg 1` задание 1 на передний план, отменим его и проверим с помощью `jobs`. Выполним аналогичные действия для заданий 2 и 3

**Рис. 2:** `jobs` и перевод на другой план

```

root@edzhbitskaya:~
edzhbitskaya@edzhbitskaya:~
[edzhbitskaya@edzhbitskaya ~]$ dd if=/dev/zero of=/dev/null &
[1] 4360
[edzhbitskaya@edzhbitskaya ~]$ exit

```

Рис. 3: Запуск процесса в другом терминале

```

root@edzhbitskaya:~
edzhbitskaya@edzhbitskaya:~
top - 22:13:23 up 40 min, 2 users, load average: 1.24, 0.90, 0.56
Tasks: 202 total, 3 running, 199 sleeping, 0 stopped, 0 zombie
%Cpu0 : 27.3 us, 63.6 sy, 0.0 ni, 0.0 id, 0.0 wa, 9.1 hi, 0.0 si, 0.0 st
%Cpu1 : 3.1 us, 3.1 sy, 0.0 ni, 92.3 id, 0.0 wa, 1.5 hi, 0.0 si, 0.0 st
MiB Mem : 1967.5 total, 689.6 free, 1084.1 used, 375.6 buff/cache
MiB Swap: 2096.0 total, 1652.9 free, 443.1 used, 883.4 avail Mem
PID to signal/kill [default pid = 49] 4360

```

PID	USER	PR	NI	VIRT	RES	SHR	S	%CPU	%MEM	TIME+	COMMAND
49	root	0	-20	0	0	0	I	1.5	0.0	0:00.82	kworke+
4188	edzhibi+	20	0	762492	49264	36644	S	1.5	2.4	0:02.78	gnome-t+
<b>4402</b>	<b>edzhibi+</b>	<b>20</b>	<b>0</b>	<b>225896</b>	<b>3968</b>	<b>3200</b>	<b>R</b>	<b>1.5</b>	<b>0.2</b>	<b>0:00.32</b>	<b>top</b>
1	root	20	0	173996	9828	6496	S	0.0	0.5	0:02.07	systemd
2	root	20	0	0	0	0	S	0.0	0.0	0:00.00	kthreadd
3	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	rcu_gp
4	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	rcu_par+
5	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	slub_fl+
6	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	netns
8	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	kworke+
10	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	mm_perc+
12	root	20	0	0	0	0	I	0.0	0.0	0:00.00	rcu_tas+
13	root	20	0	0	0	0	I	0.0	0.0	0:00.00	rcu_tas+
14	root	20	0	0	0	0	I	0.0	0.0	0:00.00	rcu_tas+
15	root	20	0	0	0	0	S	0.0	0.0	0:00.17	ksofttir
16	root	20	0	0	0	0	S	0.0	0.0	0:00.01	pr/tty0
<b>17</b>	<b>root</b>	<b>20</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>R</b>	<b>0.0</b>	<b>0.0</b>	<b>0:00.73</b>	<b>rcu_pre+</b>
18	root	rt	0	0	0	0	S	0.0	0.0	0:02.87	migrati+
19	root	-51	0	0	0	0	S	0.0	0.0	0:00.00	idle_in+
21	root	20	0	0	0	0	S	0.0	0.0	0:00.00	cpuhp/0
22	root	20	0	0	0	0	S	0.0	0.0	0:00.00	cpuhp/1
23	root	-51	0	0	0	0	S	0.0	0.0	0:00.00	idle_in+
24	root	rt	0	0	0	0	S	0.0	0.0	0:02.90	migrati+
25	root	20	0	0	0	0	S	0.0	0.0	0:00.12	ksofttir
27	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	kworke+
29	root	20	0	0	0	0	S	0.0	0.0	0:00.00	kdevtmp

Рис. 4: Команда top

## 6.4.2. Управление процессами

```
[root@edzhbitskaya ~]# dd if=/dev/zero of=/dev/null &
[2] 4497
[root@edzhbitskaya ~]# dd if=/dev/zero of=/dev/null &
[3] 4500
[root@edzhbitskaya ~]# ps aux | grep dd
root      2  0.0  0.0   0   0 ?        S   21:33   0:00 [kthreadd]
root     67  0.0  0.0   0   0 ?        I<  21:33   0:00 [ipv6_addrcon
f]
dbus      723  0.0  0.1 10108 3884 ?        S   21:33   0:00 dbus-broker -
-log 4 --controller 9 --machine-id 4be477a317dd4d2f9d4e164ed15963e2 --max-bytes
536870912 --max-fds 4096 --max-matches 131072 --audit
edzhibi+ 2736  0.0  0.1  6720 2560 ?        S   21:56   0:00 dbus-broker -
-log 4 --controller 9 --machine-id 4be477a317dd4d2f9d4e164ed15963e2 --max-bytes
1000000000000000 --max-fds 2500000000000000 --max-matches 5000000000
edzhibi+ 2862  0.0  0.0  4988 1792 ?        S   21:56   0:00 dbus-broker -
-log 4 --controller 9 --machine-id 4be477a317dd4d2f9d4e164ed15963e2 --max-bytes
1000000000000000 --max-fds 64000000 --max-matches 5000000000
edzhibi+ 2974  0.0  0.5 880196 10344 ?      Ssl  21:56   0:00 /usr/libexec/
evolution-addressbook-factory
edzhibi+ 3773  0.0  1.3 249372 27008 ?      Sl   21:57   0:00 /usr/lib64/fi
refox/firefox -contentproc -parentBuildID 20240418173117 -prefsLen 32334 -prefMa
pSize 236567 -appDir /usr/lib64/firefox/browser {865b6532-0f4e-49e5-9406-b967473
2bdcf} 3440 red
edzhibi+ 4360 95.5  0.0 220988 1664 ?        R   22:10   5:21 dd if=/dev/ze
ro of=/dev/null
root     4489 53.1  0.0 220988 1664 pts/3      R   22:15   0:37 dd if=/dev/ze
ro of=/dev/null
root     4497 37.3  0.0 220988 1664 pts/3      R   22:15   0:18 dd if=/dev/ze
ro of=/dev/null
root     4500 31.7  0.0 220988 1664 pts/3      R   22:15   0:08 dd if=/dev/ze
ro of=/dev/null
root     4502  0.0  0.1 221796 2176 pts/3      S+  22:16   0:00 grep --color=
auto dd
[root@edzhbitskaya ~]#
```

Рис. 5: Процессы dd



```

root@edzhibitskaya ~# renice -n 5 4500
4500 (process ID) old priority 0, new priority 5
root@edzhibitskaya ~# ps fax | grep -B5 dd
  PID TTY          STAT TIME   COMMAND
    2 ?            S      0:00   [kthreadd]

  61 ?           I<      0:00   \_ [acpi_thermal_pm]
  62 ?           I<      0:00   \_ [kmpath_rdadcd]
  63 ?           I<      0:00   \_ [kaluad]
  64 ?           I      0:02   \_ [kworker/u4:3-events_unbound]
  66 ?           I<      0:00   \_ [mld]
  67 ?           I<      0:00   \_ [ip6v6_addrconf]

  600 ?          Ss      0:00   /usr/lib/systemd/systemd-journald
  615 ?          Ss      0:00   /usr/lib/systemd/systemd-udev
  699 ?          Sscl    0:00   /sbin/auditd
  701 ?          S<      0:00   \_ /usr/sbin/sedispatch
  722 ?          Ss      0:00   /usr/bin/dbus-broker-launch --scope system --aud
  723 ?          S       0:00   \_ dbus-broker --log 4 --controller 9 --machine-
4be477a317dd4d2f9d4e164ed15963e2 --max-bytes 536870912 --max-fds 4096 --max-
ches 131672 --audit

```

Рис. 6: Иерархия отношений между процессами

```

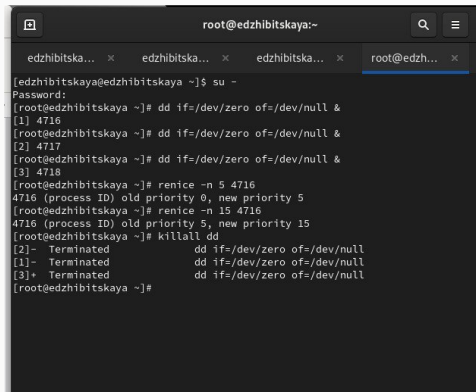
edzhibitskaya@e... x edzhibitskaya@ed... x edzhibitskaya@ed... x
3773 ?          Sl      0:00 | \_ /usr/lib64/firefox/firefox -contentproc
-parentBuildID 20240418173117 -prefsLen 32334 -prefMapSize 236567 -appDir /usr/
lib64/firefox/browser {865b6532-0f4e-49e5-9406-b9674732bdfc} 3440 rdd
3793 ?          Sl      0:35 | \_ /usr/lib64/firefox/firefox -contentproc
-childID 7 -isForBrowser -prefsLen 29040 -prefMapSize 236567 -jsInitLen 240916
-parentBuildID 20240418173117 -appDir /usr/lib64/firefox/browser {20d066e1-42e2-
4f19-8330-2184afaea446} 3440 tab
2837 ?          Ssl     0:00 \_ /usr/libexec/gvfsd
2845 ?          Sl      0:00 \_ /usr/libexec/gvfsd-fuse /run/user/1000/gvfs -f
2855 ?          Ssl     0:00 \_ /usr/libexec/at-spi-bus-launcher
2861 ?          S       0:00 | \_ /usr/bin/dbus-broker-launch --config-file=/
usr/share/defaults/at-spi2/accessibility.conf --scope user
2862 ?          S       0:00 | \_ dbus-broker --log 4 --controller 9 --ma
chine-id 4be477a317dd4d2f9d4e164ed15963e2 --max-bytes 1000000000000000 --max-fds
64000000 --max-matches 5000000000
--
2930 ?          Ssl     0:00 \_ /usr/libexec/evolution-calendar-factory
2933 ?          Ssl     0:00 \_ /usr/libexec/goa-identity-service
2951 ?          Ssl     0:00 \_ /usr/libexec/gvfs-udisks2-volume-monitor
2962 ?          Ssl     0:00 \_ /usr/libexec/gvfs-goa-volume-monitor
2968 ?          Ssl     0:00 \_ /usr/libexec/dconf-service
2974 ?          Ssl     0:00 \_ /usr/libexec/evolution-addressbook-factory
--
4264 pts/0      S+      0:00 | | \_ -bash
4367 pts/2      Ss+     0:00 | \_ bash
4424 pts/3      Ss      0:00 | \_ bash
4450 pts/3      S       0:00 | \_ su -
4461 pts/3      S       0:00 | \_ -bash
4489 pts/3      R       1:35 | \_ dd if=/dev/zero of=/dev/null
4497 pts/3      R       1:15 | \_ dd if=/dev/zero of=/dev/null
4500 pts/3      RN      0:55 | \_ dd if=/dev/zero of=/dev/null
4520 pts/3      R+      0:00 | \_ ps fax
4521 pts/3      S+      0:00 | \_ grep --color=auto -B5 dd
4360 ?          R       7:55 \_ dd if=/dev/zero of=/dev/null
[root@edzhibitskaya ~]# kill -9 4264
[root@edzhibitskaya ~]# kill -9 4360
[root@edzhibitskaya ~]# kill -9 4461
Killed
[edzhibitskaya@edzhibitskaya ~]$

```

Рис. 7: Прекращение процессов

# Самостоятельная работа. Задание 1

Запустим команду `dd if=/dev/zero of=/dev/null` в фоновом режиме трижды. Командой `renice` изменим приоритет процесса сначала на 5, затем на 15. Завершим все процессы командой `killall dd`.



```
root@edzhbitskaya:~  
edzhbitska... x edzhbitska... x edzhbitska... x root@edzh... x  
[edzhbitskaya@edzhbitskaya ~]$ su -  
Password:  
[root@edzhbitskaya ~]# dd if=/dev/zero of=/dev/null &  
[1] 4716  
[root@edzhbitskaya ~]# dd if=/dev/zero of=/dev/null &  
[2] 4717  
[root@edzhbitskaya ~]# dd if=/dev/zero of=/dev/null &  
[3] 4718  
[root@edzhbitskaya ~]# renice -n 5 4716  
4716 (process ID) old priority 0, new priority 5  
[root@edzhbitskaya ~]# renice -n 15 4716  
4716 (process ID) old priority 5, new priority 15  
[root@edzhbitskaya ~]# killall dd  
[2]- Terminated dd if=/dev/zero of=/dev/null  
[1]- Terminated dd if=/dev/zero of=/dev/null  
[3]+ Terminated dd if=/dev/zero of=/dev/null  
[root@edzhbitskaya ~]#
```

Рис. 8: Задание 1

# Самостоятельная работа. Задание 2

```
root@edzhibitskaya:~  
edzhibitskaya@ed... x edzhibitskaya@ed... x root@edzhibitskay... x  
[edzhibitskaya@edzhibitskaya ~]$ su -  
Password:  
[root@edzhibitskaya ~]# yes > /dev/null &  
[1] 6305  
[root@edzhibitskaya ~]# yes > /dev/null  
^Z  
[2]+ Stopped yes > /dev/null  
[root@edzhibitskaya ~]# jobs  
[1]- Running yes > /dev/null &  
[2]+ Stopped yes > /dev/null  
[root@edzhibitskaya ~]# fg 1  
yes > /dev/null  
^C  
[root@edzhibitskaya ~]# yes > /dev/null  
^Z  
[3]+ Stopped yes > /dev/null  
[root@edzhibitskaya ~]# bg 3  
[3]+ yes > /dev/null &  
[root@edzhibitskaya ~]# jobs  
[2]+ Stopped yes > /dev/null  
[3]- Running yes > /dev/null &  
[root@edzhibitskaya ~]# nohup yes > /dev/null &  
[4] 6576  
[root@edzhibitskaya ~]# nohup: ignoring input and redirecting stderr to stdout
```

Рис. 9: Задание 2. 1-9

```
root@edzhibitskaya:~  
edzhibitskaya@ed... x edzhibitskaya@ed... x root@edzhibitskay... x  
top - 22:59:57 up 1:26, 2 users, load average: 3.31, 2.41, 2.12  
Tasks: 213 total, 4 running, 209 sleeping, 0 stopped, 0 zombie  
%Cpu(s): 24.4 us, 72.9 sy, 0.0 ni, 0.0 id, 0.0 wa, 2.7 hi, 0.0 si, 0.0 st  
MiB Mem : 1967.5 total, 232.3 free, 1481.6 used, 451.7 buff/cache  
MiB Swap: 2096.0 total, 1651.1 free, 444.9 used, 485.9 avail Mem  
  
PID USER PR NI VIRT RES SHR S %CPU %MEM TIME+ COMMAND  
6178 root 20 0 220948 1664 1664 R 88.1 0.1 6:45.78 yes  
6341 root 20 0 220948 1664 1664 R 47.7 0.1 3:58.52 yes  
6576 root 20 0 220948 1664 1664 R 47.4 0.1 0:36.82 yes  
3677 edzhibi+ 20 0 10.9g 266380 92052 S 7.3 13.2 1:13.22 Isolate+  
4826 root 20 0 0 0 0 I 2.3 0.0 0:01.84 kworker+  
6724 root 20 0 0 0 0 I 1.3 0.0 0:00.13 kworker+  
2806 edzhibi+ 20 0 4123968 246156 70664 S 1.0 12.2 4:43.78 gnome-s+  
4188 edzhibi+ 20 0 764000 51580 37040 S 0.7 2.6 0:12.35 gnome-t+  
3440 edzhibi+ 20 0 3549312 407404 132816 S 0.3 20.2 3:29.09 firefox  
6731 root 20 0 226012 3968 3200 R 0.3 0.2 0:00.03 top  
1 root 20 0 173996 9828 6496 S 0.0 0.5 0:02.24 systemd  
2 root 20 0 0 0 0 S 0.0 0.0 0:00.00 kthreadd  
3 root 0 -20 0 0 0 I 0.0 0.0 0:00.00 rcu_gp  
4 root 0 -20 0 0 0 I 0.0 0.0 0:00.00 rcu_par+  
5 root 0 -20 0 0 0 I 0.0 0.0 0:00.00 slub_fl+  
6 root 0 -20 0 0 0 I 0.0 0.0 0:00.00 netns  
8 root 0 -20 0 0 0 I 0.0 0.0 0:00.00 kworker+  
10 root 0 -20 0 0 0 I 0.0 0.0 0:00.00 mm_perc+  
12 root 20 0 0 0 0 I 0.0 0.0 0:00.00 rcu_tas+  
13 root 20 0 0 0 0 I 0.0 0.0 0:00.00 rcu_tas+  
14 root 20 0 0 0 0 I 0.0 0.0 0:00.00 rcu_tas+  
15 root 20 0 0 0 0 S 0.0 0.0 0:00.42 ksoftir+  
16 root 20 0 0 0 0 S 0.0 0.0 0:00.02 pr/tty0  
17 root 20 0 0 0 0 I 0.0 0.0 0:01.18 rcu_pre+  
18 root rt 0 0 0 0 S 0.0 0.0 0:02.88 migrati+  
19 root -51 0 0 0 0 S 0.0 0.0 0:00.00 idle_in+  
21 root 20 0 0 0 0 S 0.0 0.0 0:00.00 cpuhp/0  
22 root 20 0 0 0 0 S 0.0 0.0 0:00.00 cpuhp/1  
23 root -51 0 0 0 0 S 0.0 0.0 0:00.00 idle_in+  
24 root rt 0 0 0 0 S 0.0 0.0 0:02.92 migrati+  
25 root 20 0 0 0 0 S 0.0 0.0 0:00.15 ksoftir+  
27 root 0 -20 0 0 0 I 0.0 0.0 0:00.00 kworker+
```

Рис. 10: Задание 2. 10

## Самостоятельная работа. Задание 2

```
edzhubitskaya@ed... x edzhubitskaya@ed... x root@edzhubitskay...
[root@edzhubitskaya ~]# yes > /dev/null &
[1] 6807
[root@edzhubitskaya ~]# yes > /dev/null &
[2] 6812
[root@edzhubitskaya ~]# yes > /dev/null &
[3] 6815
[root@edzhubitskaya ~]# kill -9 6807
[root@edzhubitskaya ~]# fg 2
yes > /dev/null
^C
[1] Killed yes > /dev/null
[root@edzhubitskaya ~]# ^C
[root@edzhubitskaya ~]# kill -1 6576
[root@edzhubitskaya ~]# kill -1 6815
[root@edzhubitskaya ~]# kill -1 6305
-bash: kill: (6305) - No such process
[3]+ Hangup yes > /dev/null
[root@edzhubitskaya ~]#
```

Рис. 11: Задание 2. 11-13

```
edzhubitskaya@ed... x edzhubitskaya@ed... x root@edzhubitskay... x
> [root@edzhubitskaya ~]# yes > /dev/null &
> [1] 7350
> [root@edzhubitskaya ~]# yes > /dev/null &
> [2] 7358
> [root@edzhubitskaya ~]# killall yes
> [1]- Terminated yes > /dev/null
> [2]+ Terminated yes > /dev/null
> [root@edzhubitskaya ~]# yes > /dev/null &
> [1] 7398
> [root@edzhubitskaya ~]# nice -n 5 yes > /dev/null &
> [2] 7700
> [root@edzhubitskaya ~]# ps -l | grep yes
0 R 0 7398 6696 96 80 0 - 55237 - pts/4 00:05:20 yes
0 R 0 7700 6696 83 85 5 - 55237 - pts/4 00:00:40 yes
> [root@edzhubitskaya ~]# renice -n 5 7398
7398 (process ID) old priority 0, new priority 5
> [root@edzhubitskaya ~]# ps -l | grep yes
0 R 0 7398 6696 96 85 5 - 55237 - pts/4 00:06:13 yes
0 R 0 7700 6696 87 85 5 - 55237 - pts/4 00:01:30 yes
> [root@edzhubitskaya ~]#
```

Рис. 12: Задание 2. 14-17

## Вывод

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- В ходе работы было произведено знакомство с принципами управления процессами, получены навыки и проделаны различные действия по запуску и остановке процессов, заданий.