

# Лабораторная работа №5

## Управление системными службами

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## Цель работы

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- Продолжение изучения ОС Linux. Знакомство и получение навыков управления системными службами операционной системы посредством systemd.

## **Выполнение работы**

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## 5.4.1. Управление сервисами

```
root@edzhbitskaya:~  
[edzhbitskaya@edzhbitskaya ~]$ su -  
Password:  
[root@edzhbitskaya ~]# systemctl status vsftpd  
Unit vsftpd.service could not be found.  
[root@edzhbitskaya ~]# dnf -y install vsftpd  
Extra Packages for Enterprise Linux 9 - x86_64 20 kB/s | 40 kB 00:01  
Extra Packages for Enterprise Linux 9 - x86_64 1.4 MB/s | 23 MB 00:16  
packages for the GitHub CLI 2.4 kB/s | 3.0 kB 00:01  
packages for the GitHub CLI 1.4 kB/s | 2.7 kB 00:01  
Rocky Linux 9 - BaseOS 5.5 kB/s | 4.1 kB 00:00  
Rocky Linux 9 - BaseOS 605 kB/s | 2.3 MB 00:03  
Rocky Linux 9 - AppStream 5.3 kB/s | 4.5 kB 00:00  
Rocky Linux 9 - AppStream 1.0 MB/s | 8.0 MB 00:07  
Rocky Linux 9 - Extras 4.0 kB/s | 2.9 kB 00:00  
Dependencies resolved.  
=====
```

Package	Architecture	Version	Repository	Size
vsftpd	x86_64	3.0.5-5.el9	appstream	157

```
=====
```

Transaction Summary

=====

Install 1 Package

Total download size: 157 kB

Рис. 1: Статус и установка службы Very Secure FTP

```
19 20:38 en  
root@edzhbitskaya:~  
[root@edzhbitskaya ~]# systemctl start vsftpd  
[root@edzhbitskaya ~]# systemctl status vsftpd  
● vsftpd.service - Vsftpd ftp daemon  
   Loaded: loaded (/usr/lib/systemd/system/vsftpd.service; disabled; preset: enabled)  
   Active: active (running) since Thu 2024-09-19 20:37:43 MSK; 7s ago  
     Process: 4064 ExecStart=/usr/sbin/vsftpd /etc/vsftpd/vsftpd.conf (code=exited, status=0/SUCCESS)  
    Main PID: 4065 (vsftpd)  
       Tasks: 1 (limit: 12194)  
      Memory: 708.0K  
         CPU: 7ms  
    CGroup: /system.slice/vsftpd.service  
            └─4065 /usr/sbin/vsftpd /etc/vsftpd/vsftpd.conf  
  
Sep 19 20:37:43 edzhbitskaya systemd[1]: Starting Vsftpd ftp daemon...  
Sep 19 20:37:43 edzhbitskaya systemd[1]: Started Vsftpd ftp daemon.  
lines 1-13/13 (END)
```

Рис. 2: Запуск и статус службы Very Secure FTP

## 5.4.1

```
[root@edzhbitskaya ~]# systemctl enable vsftpd
Created symlink /etc/systemd/system/multi-user.target.wants/vsftpd.service → /usr/lib/systemd/system/vsftpd.service.
[root@edzhbitskaya ~]# systemctl status vsftpd
● vsftpd.service - Vsftpd ftp daemon
   Loaded: loaded (/usr/lib/systemd/system/vsftpd.service; enabled; preset: disabled)
   Active: active (running) since Thu 2024-09-19 20:37:43 MSK; 4min 59s ago
     Main PID: 4065 (vsftpd)
       Tasks: 1 (limit: 12194)
      Memory: 708.0K
         CPU: 7ms
        CGroup: /system.slice/vsftpd.service
                └─4065 /usr/sbin/vsftpd /etc/vsftpd/vsftpd.conf

Sep 19 20:37:43 edzhbitskaya systemd[1]: Starting Vsftpd ftp daemon...
Sep 19 20:37:43 edzhbitskaya systemd[1]: Started Vsftpd ftp daemon.
...skipping...
● vsftpd.service - Vsftpd ftp daemon
   Loaded: loaded (/usr/lib/systemd/system/vsftpd.service; enabled; preset: disabled)
   Active: active (running) since Thu 2024-09-19 20:37:43 MSK; 4min 59s ago
     Main PID: 4065 (vsftpd)
       Tasks: 1 (limit: 12194)
      Memory: 708.0K
         CPU: 7ms
        CGroup: /system.slice/vsftpd.service
                └─4065 /usr/sbin/vsftpd /etc/vsftpd/vsftpd.conf

Sep 19 20:37:43 edzhbitskaya systemd[1]: Starting Vsftpd ftp daemon...
Sep 19 20:37:43 edzhbitskaya systemd[1]: Started Vsftpd ftp daemon.
```

Рис. 3: Добавление автозапуска

```
[root@edzhbitskaya ~]# systemctl disable vsftpd
Removed "/etc/systemd/system/multi-user.target.wants/vsftpd.service".
[root@edzhbitskaya ~]# systemctl status vsftpd
● vsftpd.service - Vsftpd ftp daemon
   Loaded: loaded (/usr/lib/systemd/system/vsftpd.service; disabled; preset: disabled)
   Active: active (running) since Thu 2024-09-19 20:37:43 MSK; 6min ago
     Main PID: 4065 (vsftpd)
       Tasks: 1 (limit: 12194)
      Memory: 708.0K
         CPU: 7ms
        CGroup: /system.slice/vsftpd.service
                └─4065 /usr/sbin/vsftpd /etc/vsftpd/vsftpd.conf

Sep 19 20:37:43 edzhbitskaya systemd[1]: Starting Vsftpd ftp daemon...
Sep 19 20:37:43 edzhbitskaya systemd[1]: Started Vsftpd ftp daemon.
lines 1-12/12 (END)
```

Рис. 4: Отключение автозапуска

Выведем на экран  
символические ссылки,  
ответственные за запуск  
различных сервисов. Снова  
добавим автозапуск и  
повторим вывод ссылок.

```

root@edzhbitskaya:~
[root@edzhbitskaya ~]# ls /etc/systemd/system/multi-user.target.wants
atd.service      irqbalance.service  rsyslog.service
auditd.service   kdump.service       smartd.service
avahi-daemon.service libstoragemgmt.service sshd.service
chronyd.service  mcelog.service      sssd.service
crond.service    mdmonitor.service   tuned.service
cups.path        ModemManager.service vboxadd.service
cups.service     NetworkManager.service vboxadd-service.service
firewalld.service remote-fs.target     vmttoolsd.service

[root@edzhbitskaya ~]# systemctl enable vsftpd
Created symlink /etc/systemd/system/multi-user.target.wants/vsftpd.service → /usr/lib/systemd/system/vsftpd.service.
[root@edzhbitskaya ~]# ls /etc/systemd/system/multi-user.target.wants
atd.service      kdump.service       sshd.service
auditd.service   libstoragemgmt.service sssd.service
avahi-daemon.service mcelog.service      tuned.service
chronyd.service  mdmonitor.service   vboxadd.service
crond.service    ModemManager.service vboxadd-service.service
cups.path        NetworkManager.service vmttoolsd.service
cups.service     remote-fs.target     vsftpd.service
firewalld.service rsyslog.service
irqbalance.service smartd.service
[root@edzhbitskaya ~]#

```

Рис. 5: Символические ссылки

```
[root@edzhibitskaya ~]# systemctl status vsftpd
* vsftpd.service - Vsftpd ftp daemon
   Loaded: loaded (/usr/lib/systemd/system/vsftpd.service; enabled; preset: on)
   Active: active (running) since Thu 2024-09-19 20:37:43 MSK; 10min ago
   Main PID: 4065 (vsftpd)
     Tasks: 1 (limit: 12194)
    Memory: 708.0K
       CPU: 7ms
    CGroup: /system.slice/vsftpd.service
           └─4065 /usr/sbin/vsftpd /etc/vsftpd/vsftpd.conf

Sep 19 20:37:43 edzhibitskaya systemd[1]: Starting Vsftpd ftp daemon...
Sep 19 20:37:43 edzhibitskaya systemd[1]: Started Vsftpd ftp daemon.
lines 1-12/12 (END)
```

Опять проверим статус.  
Увидим, что для файла юнита  
состояние изменено.

Рис. 6: Статус



## 5.4.1

```
>> Sep 10 20:37:43 edzhibitskaya systemd[1]: Starting Vsftpd ftp daemon...
Sep 10 20:37:43 edzhibitskaya systemd[1]: Started Vsftpd ftp daemon.
>> [root@edzhibitskaya ~]# systemctl list-dependencies vsftpd
vsftpd.service
├─system.slice
├─sysinit.target
├─dev-hugepages.mount
├─dev-mqueue.mount
├─dracut-shutdown.service
├─iscsi-onboot.service
├─iscsi-starter.service
├─kmod-static-nodes.service
├─ldconfig.service
├─lvm2-lvmpolld.socket
├─lvm2-monitor.service
├─multipathd.service
├─nis-domainname.service
├─plymouth-read-write.service
├─plymouth-start.service
├─proc-sys-fs-binfmt_misc.automount
├─solinux-autorelabel-mark.service
```

**Рис. 7:** Список зависимостей юнита

```
├─systemd-repart.service
├─systemd-sysctl.service
├─systemd-sysusers.service
[root@edzhibitskaya ~]# systemctl list-dependencies vsftpd --reverse
vsftpd.service
├─multi-user.target
├─graphical.target
[root@edzhibitskaya ~]#
```

**Рис. 8:** Список юнитов, которые зависят от данного юнита

## 5.4.2. Конфликты юнитов

```
Total download size: 153 k
Installed size: 314 k
» Downloading Packages:
(1/5): iptables-legacy-libs-1.8.10-2.2.el9.x86_ 88 kB/s | 37 kB    00:00
(2/5): iptables-legacy-devel-1.8.10-2.2.el9.x86 27 kB/s | 13 kB    00:00
(3/5): iptables-legacy-1.8.10-2.2.el9.x86_64.rp 94 kB/s | 49 kB    00:00
(4/5): iptables-services-1.8.10-2.2.el9.noarch. 102 kB/s | 15 kB    00:00
(5/5): iptables-utils-1.8.10-4.el9_4.x86_64.rpm 87 kB/s | 40 kB    00:00
-----
Total                                          58 kB/s | 153 kB    00:02
Running transaction check
Transaction check succeeded.
Running transaction test
Transaction test succeeded.
Running transaction
  Preparing      :                                1/1
  Installing     : iptables-legacy-libs-1.8.10-2.2.el9.x86_64 1/5
  Installing     : iptables-legacy-1.8.10-2.2.el9.x86_64 2/5
  Running scriptlet: iptables-legacy-1.8.10-2.2.el9.x86_64 2/5
  Installing     : iptables-services-1.8.10-2.2.el9.noarch 3/5
  Running scriptlet: iptables-services-1.8.10-2.2.el9.noarch 3/5
  Installing     : iptables-utils-1.8.10-4.el9_4.x86_64 4/5
  Installing     : iptables-legacy-devel-1.8.10-2.2.el9.x86_64 5/5
  Running scriptlet: iptables-legacy-devel-1.8.10-2.2.el9.x86_64 5/5
  Verifying      : iptables-legacy-1.8.10-2.2.el9.x86_64 1/5
  Verifying      : iptables-legacy-devel-1.8.10-2.2.el9.x86_64 2/5
  Verifying      : iptables-legacy-libs-1.8.10-2.2.el9.x86_64 3/5
  Verifying      : iptables-services-1.8.10-2.2.el9.noarch 4/5
  Verifying      : iptables-utils-1.8.10-4.el9_4.x86_64 5/5

Installed:
  iptables-legacy-1.8.10-2.2.el9.x86_64
  iptables-legacy-devel-1.8.10-2.2.el9.x86_64
  iptables-legacy-libs-1.8.10-2.2.el9.x86_64
  iptables-services-1.8.10-2.2.el9.noarch
  iptables-utils-1.8.10-4.el9_4.x86_64

Skipped:
  iptables-libs-1.8.10-4.el9_4.x86_64

Complete!
[root@edzhibitskaya ~]#
```

Рис. 9: Установка iptables

```
root@edzhibitskaya ~]# systemctl status firewalld
firewalld.service - firewalld - dynamic firewall daemon
Loaded: loaded (/usr/lib/systemd/system/firewalld.service; enabled; preset
Active: active (running) since Thu 2024-09-19 20:30:05 MSK; 23min ago
Docs: man:firewalld(1)
Main PID: 771 (firewalld)
Tasks: 2 (limit: 12194)
Memory: 9.0M
CPU: 1.150s
CGroup: /system.slice/firewalld.service
└─771 /usr/bin/python3 -s /usr/sbin/firewalld --nofork --nopid

ep 19 20:30:04 edzhibitskaya systemd[1]: Starting firewalld - dynamic firewall
ep 19 20:30:05 edzhibitskaya systemd[1]: Started firewalld - dynamic firewall
root@edzhibitskaya ~]# systemctl status iptables
iptables.service - IPv4 firewall with iptables
Loaded: loaded (/usr/lib/systemd/system/iptables.service; disabled; preset
Active: inactive (dead)
lines 1-3/3 (END)
```

Рис. 10: Статусы firewalld и iptables

Попробуем запустить их. Увидим, что сделать одновременно это невозможно - одна из служб деактивируется при запуске второй.

```
[root@edzhbitskaya ~]# systemctl start firewalld
[root@edzhbitskaya ~]# systemctl start iptables
[root@edzhbitskaya ~]# systemctl status iptables
• iptables.service - IPv4 firewall with iptables
  Loaded: loaded (/usr/lib/systemd/system/iptables.service; disabled; preset
  Active: active (exited) since Thu 2024-09-19 20:56:15 MSK; 1min 17s ago
  Process: 4758 ExecStart=/usr/libexec/iptables/iptables.init start (code=exi
  Main PID: 4758 (code=exited, status=0/SUCCESS)
  CPU: 39ms

Sep 19 20:56:15 edzhbitskaya systemd[1]: Starting IPv4 firewall with iptables.
Sep 19 20:56:15 edzhbitskaya iptables.init[4758]: iptables: Applying firewall
Sep 19 20:56:15 edzhbitskaya systemd[1]: Finished IPv4 firewall with iptables.
[root@edzhbitskaya ~]# systemctl status iptables
• iptables.service - IPv4 firewall with iptables
  Loaded: loaded (/usr/lib/systemd/system/iptables.service; disabled; preset
  Active: active (exited) since Thu 2024-09-19 20:56:15 MSK; 1min 34s ago
  Process: 4758 ExecStart=/usr/libexec/iptables/iptables.init start (code=exi
  Main PID: 4758 (code=exited, status=0/SUCCESS)
  CPU: 39ms

Sep 19 20:56:15 edzhbitskaya systemd[1]: Starting IPv4 firewall with iptables.
Sep 19 20:56:15 edzhbitskaya iptables.init[4758]: iptables: Applying firewall
Sep 19 20:56:15 edzhbitskaya systemd[1]: Finished IPv4 firewall with iptables.
lines 1-10/10 (END)
```

Рис. 11: Запуск конфликтующих служб

## 5.4.2

```
root@edzhbitskaya:~  
[root@edzhbitskaya ~]# cat /usr/lib/systemd/system/firewalld.service  
[Unit]  
Description=firewalld - dynamic firewall daemon  
Before=network-pre.target  
Wants=network-pre.target  
After=dbus.service  
After=polkit.service  
Conflicts=iptables.service ip6tables.service ebtables.service ipset.service nftables.service  
Documentation=man:firewalld(1)  
  
[Service]  
EnvironmentFile=-/etc/sysconfig/firewalld  
ExecStart=/usr/sbin/firewalld --nofork --nopid $FIREWALLD_ARGS  
ExecReload=/bin/kill -HUP $MAINPID  
# suppress to log debug and error output also to /var/log/messages  
StandardOutput=null  
StandardError=null  
Type=dbus  
BusName=org.fedoraproject.FirewallD1  
KillMode=mixed  
  
[Install]  
WantedBy=multi-user.target  
Alias=dbus-org.fedoraproject.FirewallD1.service  
[root@edzhbitskaya ~]#
```

**Рис. 12:** cat

/usr/lib/systemd/system/firewalld.service

```
[root@edzhbitskaya ~]# cat /usr/lib/systemd/system/iptables.service  
[Unit]  
Description=IPv4 firewall with iptables  
AssertPathExists=/etc/sysconfig/iptables  
Before=network-pre.target  
Wants=network-pre.target  
  
[Service]  
Type=oneshot  
RemainAfterExit=yes  
ExecStart=/usr/libexec/iptables/iptables.init start  
ExecReload=/usr/libexec/iptables/iptables.init reload  
ExecStop=/usr/libexec/iptables/iptables.init stop  
Environment=BOOTUP=serial  
Environment=CONSOLETYPE=serial  
  
[Install]  
WantedBy=multi-user.target  
[root@edzhbitskaya ~]#
```

**Рис. 13:** cat

/usr/lib/systemd/system/iptables.service

```
[root@edzhibitskaya ~]# systemctl stop iptables
[root@edzhibitskaya ~]# systemctl start firewalld
[root@edzhibitskaya ~]# systemctl mask iptables
Created symlink /etc/systemd/system/iptables.service → /dev/null.
[root@edzhibitskaya ~]# systemctl stop iptables
[root@edzhibitskaya ~]# systemctl start iptables
Failed to start iptables.service: Unit iptables.service is masked.
[root@edzhibitskaya ~]# systemctl enable iptables
Failed to enable unit: Unit file /etc/systemd/system/iptables.service is masked.
[root@edzhibitskaya ~]#
```

**Рис. 14:** Работа с iptables и firewalld

Выгрузим службу iptables, запустим firewalld, заблокируем запуск iptables (создана символическая ссылка на /dev/null для /etc/systemd/system/iptables.service) и попробуем запустить. Также попробуем добавить службу в автозапуск

## 5.4.3. Изолируемые цели

```
[root@edzhibitskaya ~]# systemctl --type=target
```

UNIT	LOAD	ACTIVE	SUB	DESCRIPTION
basic.target	loaded	active	active	Basic System
cryptsetup.target	loaded	active	active	Local Encrypted Volumes
getty.target	loaded	active	active	Login Prompts
graphical.target	loaded	active	active	Graphical Interface
integritysetup.target	loaded	active	active	Local Integrity Protected Volumes
local-fs-pre.target	loaded	active	active	Preparation for Local File Systems
local-fs.target	loaded	active	active	Local File Systems
multi-user.target	loaded	active	active	Multi-User System
network-online.target	loaded	active	active	Network is Online
network-pre.target	loaded	active	active	Preparation for Network
network.target	loaded	active	active	Network
nss-user-lookup.target	loaded	active	active	User and Group Name Lookups
paths.target	loaded	active	active	Path Units
remote-fs.target	loaded	active	active	Remote File Systems
slices.target	loaded	active	active	Slice Units
sockets.target	loaded	active	active	Socket Units
sound.target	loaded	active	active	Sound Card
sshd-keygen.target	loaded	active	active	sshd-keygen.target
swap.target	loaded	active	active	Swaps
sysinit.target	loaded	active	active	System Initialization
timers.target	loaded	active	active	Timer Units
veritysetup.target	loaded	active	active	Local Verity Protected Volumes

LOAD = Reflects whether the unit definition was properly loaded.  
ACTIVE = The high-level unit activation state, i.e. generalization of SUB.  
SUB = The low-level unit activation state, values depend on unit type.

**22 loaded units listed.** Pass --all to see loaded but inactive units, too.  
To show all installed unit files use 'systemctl list-unit-files'.

```
[root@edzhibitskaya ~]# systemctl --type=target --all
```

UNIT
basic.target
blockdev@dev-disk-by\x2duuid-1d21a81d\x2d1079\x2d4692\x2d933a\x2df9b20806d
blockdev@dev-dm\x2d1.target
blockdev@dev-mapper-rl_10\x2droot.target
blockdev@dev-mapper-rl_10\x2dswap.target
blockdev@dev-sda1.target

Рис. 15: Списки целей

```
[root@edzhibitskaya ~]# cd /usr/lib/systemd/system
[root@edzhibitskaya systemd]# grep Isolate *.target
ctrl-alt-del.target:AllowIsolate=yes
default.target:AllowIsolate=yes
>> emergency.target:AllowIsolate=yes
exit.target:AllowIsolate=yes
graphical.target:AllowIsolate=yes
halt.target:AllowIsolate=yes
initrd-switch-root.target:AllowIsolate=yes
initrd.target:AllowIsolate=yes
kexec.target:AllowIsolate=yes
multi-user.target:AllowIsolate=yes
poweroff.target:AllowIsolate=yes
reboot.target:AllowIsolate=yes
rescue.target:AllowIsolate=yes
runlevel0.target:AllowIsolate=yes
runlevel1.target:AllowIsolate=yes
runlevel2.target:AllowIsolate=yes
runlevel3.target:AllowIsolate=yes
runlevel4.target:AllowIsolate=yes
runlevel5.target:AllowIsolate=yes
runlevel6.target:AllowIsolate=yes
system-update.target:AllowIsolate=yes
[root@edzhibitskaya systemd]#
```

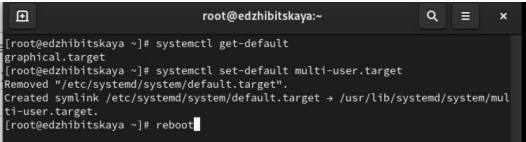
Рис. 16: Изолируемые цели

```
You are in rescue mode. After logging in, type "journalctl -xb" to view
system logs, "systemctl reboot" to reboot, "systemctl default" or "exit"
to boot into default mode.
Give root password for maintenance
(or press Control-D to continue):
[root@edzhibitskaya ~]# isolate reboot.target_
```

Рис. 17: Режим восстановления и перезапуск

## 5.4.4. Цель по умолчанию

Выведем установленную по умолчанию цель - `systemctl get-default`. Далее, для запуска по умолчанию текстового режима введем `systemctl set-default multi-user.target`



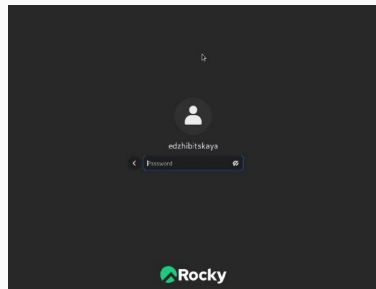
```
root@edzhbitskaya:~  
[root@edzhbitskaya ~]# systemctl get-default  
graphical.target  
[root@edzhbitskaya ~]# systemctl set-default multi-user.target  
Removed "/etc/systemd/system/default.target".  
Created symlink /etc/systemd/system/default.target → /usr/lib/systemd/system/multi-user.target.  
[root@edzhbitskaya ~]# reboot
```

Рис. 18: Цель по умолчанию



```
edzhbitskaya login: edzhbitskaya
Password:
Last login: Thu Sep 19 21:17:33 on tty2
edzhbitskaya@edzhbitskaya: ~$ su -
Password:
[root@edzhbitskaya]# systemctl set-default graphical.target
Removed '/etc/systemd/system/default.target'.
Created symlink /etc/systemd/system/default.target → /usr/lib/systemd/system/graphical.target.
[root@edzhbitskaya]# reboot
```

**Рис. 19:** Возвращение  
графического режима



**Рис. 20:** Проверка

## Вывод

---

- В ходе работы было произведено знакомство с системными службами операционной системы. Были получены навыки управления системными службами посредством systemd.