

Лабораторная работа №5

Управление системными службами systemd

Тукаев Тимур

10 декабря 2025

Российский университет дружбы народов, Москва, Россия

Цель работы

Основная цель

Получить навыки управления системными службами и целями
в операционной системе Linux с использованием systemd.

Управление сервисами

Проверка статуса и установка vsftpd

```
root@titukaev:/home/titukaev# systemctl status vsftpd
Unit vsftpd.service could not be found.

root@titukaev:/home/titukaev# dnf -y install vsftpd
Rocky Linux 8 - BaseOS                                14 kB/s | 4.3 kB   00:00
Rocky Linux 8 - AppStream                             16 kB/s | 4.3 kB   00:00
Rocky Linux 8 - Extras                               13 kB/s | 3.1 kB   00:00
Dependencies resolved.

-----  
Package          Architecture Version      Repository      Size
-----  
Installing:
vsftpd           x86_64       3.0.5-10.el10    appstream     170 k
```

Рис. 1: Статус и установка vsftpd

Служба отсутствовала в системе — затем была установлена через DNF.

Запуск и проверка работы службы

```
root@titukaev:/home/titukaev#
root@titukaev:/home/titukaev# systemctl start vsftpd
root@titukaev:/home/titukaev# systemctl status vsftpd
● vsftpd.service - Vsftpd ftp daemon
   Loaded: loaded (/usr/lib/systemd/system/vsftpd.service; disabled; preset: disabled)
   Active: active (running) since Wed 2025-12-10 10:06:10 MSK; 2s ago
     Invocation: 63118dd76c744a3b9f14f62cc2fb8434
      Process: 4544 ExecStart=/usr/sbin/vsftpd /etc/vsftpd/vsftpd.conf (code=exited, status=0/SUCCESS)
    Main PID: 4545 (vsftpd)
       Tasks: 1 (limit: 23136)
      Memory: 860K (peak: 1.2M)
        CPU: 3ms
       CGroup: /system.slice/vsftpd.service
                  └─4545 /usr/sbin/vsftpd /etc/vsftpd/vsftpd.conf

Dec 10 10:06:10 titukaev.localdomain systemd[1]: Starting vsftpd.service - Vsftpd ftp daemon...
Dec 10 10:06:10 titukaev.localdomain systemd[1]: Started vsftpd.service - Vsftpd ftp daemon.
root@titukaev:/home/titukaev#
```

Рис. 2: Статус после запуска

После запуска `vsftpd` стала активной, но не включённой в автозагрузку.

Управление автозапуском vsftpd

```
root@titukaev:/home/titukaev# systemctl enable vsftpd
Created symlink '/etc/systemd/system/multi-user.target.wants/vsftpd.service' → '/usr/lib/systemd/system/vsftpd.service'.
root@titukaev:/home/titukaev# systemctl status vsftpd
● vsftpd.service - Vsftpd ftp daemon
   Loaded: loaded (/usr/lib/systemd/system/vsftpd.service; enabled; preset: disabled)
     Active: active (running) since Wed 2025-12-10 10:06:10 MSK; 37s ago
       Invocation: 63118dd76c744a3b9f14f62cc2fb8434
     Main PID: 4545 (vsftpd)
        Tasks: 1 (limit: 23136)
      Memory: 860K (peak: 1.2M)
        CPU: 3ms
       CGroup: /system.slice/vsftpd.service
               └─4545 /usr/sbin/vsftpd /etc/vsftpd/vsftpd.conf

Dec 10 10:06:10 titukaev.localdomain systemd[1]: Starting vsftpd.service - Vsftpd ftp daemon...
Dec 10 10:06:10 titukaev.localdomain systemd[1]: Started vsftpd.service - Vsftpd ftp daemon.
root@titukaev:/home/titukaev# systemctl disable vsftpd
Removed '/etc/systemd/system/multi-user.target.wants/vsftpd.service'.
root@titukaev:/home/titukaev# systemctl status vsftpd
● vsftpd.service - Vsftpd ftp daemon
   Loaded: loaded (/usr/lib/systemd/system/vsftpd.service; disabled; preset: disabled)
     Active: active (running) since Wed 2025-12-10 10:06:10 MSK; 51s ago
       Invocation: 63118dd76c744a3b9f14f62cc2fb8434
     Main PID: 4545 (vsftpd)
        Tasks: 1 (limit: 23136)
      Memory: 860K (peak: 1.2M)
        CPU: 3ms
       CGroup: /system.slice/vsftpd.service
               └─4545 /usr/sbin/vsftpd /etc/vsftpd/vsftpd.conf

Dec 10 10:06:10 titukaev.localdomain systemd[1]: Starting vsftpd.service - Vsftpd ftp daemon...
Dec 10 10:06:10 titukaev.localdomain systemd[1]: Started vsftpd.service - Vsftpd ftp daemon.
root@titukaev:/home/titukaev# █
```

Рис. 3: Enable/Disable vsftpd

Создание символических ссылок для автозагрузки

```
root@titukaev:/home/titukaev# 
root@titukaev:/home/titukaev# ls /etc/systemd/system/multi-user.target.wants/
atd.service          avahi-daemon.service  cups.path           httpd.service      libstorageagent.service  ModemManager.service   remote-fs.target    sshd.service    vboxadd.service
auditd.service       chronyd.service      cups.service       irqbalance.service  mcelog.service     NetworkManager.service  rsyslog.service   sshd.service    vboxadd-service.service
audit-rules.service  crond.service       firewalld.service  irqbalance.service  mdmonitor.service  mdsmonitor.service  remote-cryptsetup.target  smartd.service  tuned.service
avahi-daemon.service cups.service        firewalld.service  kdump.service     mdmonitor.service  mdsmonitor.service  remote-fs.target    smartd.service  vmtoolsd.service
root@titukaev:/home/titukaev# systemctl enable vsftpd
Created symlink '/etc/systemd/system/multi-user.target.wants/vsftpd.service' → '/usr/lib/systemd/system/vsftpd.service'.
root@titukaev:/home/titukaev# ls /etc/systemd/system/multi-user.target.wants/
atd.service          chronyd.service     firewalld.service  libstorageagent.service  NetworkManager.service  smartd.service    vboxadd.service
auditd.service       crond.service      httpd.service     mcelog.service     NetworkManager.service  sshd.service    vboxadd-service.service
audit-rules.service  cups.path         irqbalance.service  mdmonitor.service  remote-cryptsetup.target  sshd.service    vethoold.service
avahi-daemon.service cups.service      firewalld.service  kdump.service     mdmonitor.service  mdsmonitor.service  remote-fs.target    smartd.service  vsftpd.service
root@titukaev:/home/titukaev# systemctl status vsftpd
● vsftpd.service - Vsftpd ftp daemon
   Loaded: loaded (/usr/lib/systemd/system/vsftpd.service; enabled; preset: disabled)
   Active: active (running) since Wed 2025-12-10 10:06:10 MSK; 2min 35s ago
     Invocation: 63118dd76c744a3b9f14f62cc2fb8434
   Main PID: 4545 (vsftpd)
      Tasks: 1 (limit: 23136)
     Memory: 868K (peak: 1.32M)
        CPU: 3ms
       CGroup: /system.slice/vsftpd.service
               └─4545 /usr/sbin/vsftpd /etc/vsftpd/vsftpd.conf

Dec 10 10:06:10 titukaev.localdomain systemd[1]: Starting vsftpd.service - Vsftpd ftp daemon...
Dec 10 10:06:10 titukaev.localdomain systemd[1]: Started vsftpd.service - Vsftpd ftp daemon.
root@titukaev:/home/titukaev# 
```

Рис. 4: Создание ссылки vsftpd

После `systemctl enable vsftpd` появилась ссылка в `multi-user.target.wants`.

Зависимости юнита vsftpd

```
└─[systemd-detect-lts-mark.service
  └─sys-fs-fuse-connections.mount
  └─sys-kernel-config.mount
  └─sys-kernel-debug.mount
  └─sys-kernel-tracing.mount
  └─systemd-ask-password-console.path
  └─systemd-binfmt.service
  └─systemd-boot-random-seed.service
  └─systemd-confext.service
  └─systemd-firstboot.service
  └─systemd-hibernate-clear.service
  └─systemd-hwdb-update.service
  └─systemd-journal-catalog-update.service
  └─systemd-journal-flush.service
  └─systemd-journald.service
  └─systemd-machine-id-commit.service
  └─systemd-modules-load.service
  └─systemd-network-generator.service
  └─systemd-pcrmachine.service
  └─systemd-pcrphase-sysinit.service
  └─systemd-pcrphase.service
  └─systemd-pstore.service
  └─systemd-random-seed.service
root@titukaev:/home/titukaev# systemctl list-dependencies vsftpd --reverse
vsftpd.service
└─multi-user.target
  └─graphical.target
root@titukaev:/home/titukaev#
```

Рис. 5: Зависимости vsftpd

Конфликты юнитов

Статусы firewalld и iptables

```
Upgraded:
  iptables-libs-1.8.11-11.el10.x86_64
Installed:
  iptables-devel-1.8.11-11.el10.x86_64    iptables-nft-services-1.8.11-11.el10.noarch  iptables-utils-1.8.11-11.el10.x86_64  kernel-modules-extra-matched-6.12.0-124.16.1.el10_1.x86_64

Complete!
root@titukaev:/home/titukaev# systemctl status firewalld.service
● firewalld.service - firewalld - dynamic firewall daemon
   Loaded: loaded (/usr/lib/systemd/system/firewalld.service; enabled; preset: enabled)
   Active: active (running) since Wed 2025-12-10 10:02:47 MSK; 9min ago
     Invocation: a97d54bfef494f10e9ec456532d8e29b
      Docs: man:firewalld(1)
     Main PID: 1209 (firewalld)
       Tasks: 2 (limit: 23136)
      Memory: 500K (peak: 72M)
        CPU: 474ms
       CGroup: /system.slice/firewalld.service
               └─1209 /usr/bin/python3 -sP /usr/sbin/firewalld --nofork --nopl

Dec 10 10:02:44 titukaev.localdomain systemd[1]: Starting firewalld.service - firewalld - dynamic firewall daemon...
Dec 10 10:02:47 titukaev.localdomain systemd[1]: Started firewalld.service - firewalld - dynamic firewall daemon.
root@titukaev:/home/titukaev# systemctl status iptables.service
● iptables.service - IPv4 Firewall with iptables
   Loaded: loaded (/usr/lib/systemd/system/iptables.service; disabled; preset: disabled)
     Active: inactive (dead)
root@titukaev:/home/titukaev# systemctl start firewall
root@titukaev:/home/titukaev# systemctl start iptables
root@titukaev:/home/titukaev#
```

Рис. 6: Статусы служб

Сервисы конфликтуют — одновременный запуск невозможен.

Конфликты в файле firewalld.service

```
root@titukaev:/home/titukaev# 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 ebttables.service ipset.service
Documentation=man:firewalld(1)

[Service]
EnvironmentFile=-/etc/sysconfig	firewalld
ExecStart=/usr/sbin/firewalld --nofork --nopid $FIREWALLD_ARGS
ExecStartPost=/usr/bin/firewall-cmd --state
# don't fail ExecStartPost on RUNNING_BUT_FAILED
SuccessExitStatus=251
ExecReload=/bin/kill -HUP $MAINPID
StandardOutput=null
StandardError=null
Type=dbus
BusName=org.fedoraproject.FirewallD1
KillMode=mixed
DevicePolicy=closed
KeyringMode=private

```

Рис. 7: ЮНИТ firewalld

Конфигурация iptables.service

```
root@titukaev:/home/titukaev#
root@titukaev:/home/titukaev# 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=CONSOLETYP=serial

[Install]
WantedBy=multi-user.target
root@titukaev:/home/titukaev#
```

Рис. 8: Юнит iptables

Структура юнита и условия его загрузки.

Маскирование iptables

```
root@titukaev:/home/titukaev#  
root@titukaev:/home/titukaev# systemctl stop iptables.service  
root@titukaev:/home/titukaev# systemctl start firewalld.service  
root@titukaev:/home/titukaev# systemctl mask iptables.service  
Created symlink '/etc/systemd/system/iptables.service' → '/dev/null'.  
root@titukaev:/home/titukaev# systemctl start iptables  
Failed to start iptables.service: Unit iptables.service is masked.  
root@titukaev:/home/titukaev# systemctl enable iptables  
Failed to enable unit: Unit /etc/systemd/system/iptables.service is masked  
root@titukaev:/home/titukaev#
```

Рис. 9: Маскирование iptables

Сервис замаскирован — запуск невозможен.

Изолируемые цели

Поиск целей с AllowIsolate=yes

```
root@titukaev:/home/titukaev#
root@titukaev:/home/titukaev# cd /usr/lib/systemd/system
root@titukaev:/usr/lib/systemd/system# 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
soft-reboot.target:AllowIsolate=yes
system-update.target:AllowIsolate=yes
root@titukaev:/usr/lib/systemd/system# systemctl isolate rescue.target
```

Рис. 10: Поиск изолируемых целей

Переход в rescue.target

```
You are in rescue mode. After logging in, type "journalctl -xb" to view
system logs, "systemctl reboot" to reboot, or "exit"
to continue bootup.
Give root password for maintenance
(or press Control-D to continue):
root@titukaev:~# systemctl isolate reboot.target _
```

Рис. 11: Переход в rescue.target

Система переведена в режим восстановления.

Переключение в reboot.target

Система перезагружена через изоляцию цели reboot.

Цель по умолчанию

Проверка текущего режима загрузки

```
titukaev@titukaev:~$ su
Password:
root@titukaev:/home/titukaev#
root@titukaev:/home/titukaev# systemctl get-default
graphical.target
root@titukaev:/home/titukaev# 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@titukaev:/home/titukaev# █
```

Рис. 12: Проверка default target

Определён текущий default target.

Установка текстового режима загрузки

Система переведена на `multi-user.target`, выполнена перезагрузка.

Возврат к графическому режиму

```
Rocky Linux 8.0 (Red Quartz)
Kernel 6.12.0-55.39.1.el8_0.x86_64 on x86_64

Web console: https://titukaev.localdomain:9090/ or https://10.0.2.15:9090/

titukaev login: root
Password:
Last login: Wed Dec 10 10:19:43 on pts/0
root@titukaev:~# systemctl get-default
multi-user.target
root@titukaev:~# 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@titukaev:~# reboot _
```

Рис. 13: Переключение на graphical.target

Установлен graphical.target как режим по умолчанию.

Итоги работы

Вывод

Изучены механизмы управления службами и целями systemd,
включая автозагрузку, зависимости, конфликты сервисов,
изоляцию целей и изменение режима загрузки системы.