

Лабораторная работа 5

Управление системными службами через systemd

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Цель работы

Получить навыки управления системными службами операционной системы посредством `systemd`.

1. Управление службой vsftpd.
2. Разрешение конфликтов firewalld и iptables.
3. Работа с изолированными целями systemd.
4. Изменение целевого уровня по умолчанию.

Проверка статуса vsftpd до установки

```
Activities Terminal Sep 6 14:32 en
root@ndbaranov:~

[baranov@ndbaranov ~]$ su -
Password:
[root@ndbaranov ~]# systemctl status vsftpd
Unit vsftpd.service could not be found.
[root@ndbaranov ~]# dnf -y install vsftpd
Last metadata expiration check: 1:03:02 ago on Sat 06 Sep 2025 01:27:18 PM MSK.
Dependencies resolved.
=====
Package           Architecture      Version           Repository        Size
=====
Installing:
vsftpd            x86_64            3.0.5-6.el9      appstream         157 k
=====
Transaction Summary
=====
Install 1 Package

Total download size: 157 k
Installed size: 347 k
Downloading Packages:
vsftpd-3.0.5-6.el9.x86_64.rpm                28 kB/s | 157 kB    00:05
-----
Total                                         14 kB/s | 157 kB    00:11
Running transaction check
Transaction check succeeded.
Running transaction test
Transaction test succeeded.
Running transaction
  Preparing                :
  Installing               : vsftpd-3.0.5-6.el9.x86_64      1/1
  Running scriptlet        : vsftpd-3.0.5-6.el9.x86_64      1/1
  Verifying                : vsftpd-3.0.5-6.el9.x86_64      1/1

Installed:
vsftpd-3.0.5-6.el9.x86_64

Complete!
[root@ndbaranov ~]# systemctl status vsftpd
o vsftpd.service - Vsftpd ftp daemon
   Loaded: loaded (/usr/lib/systemd/system/vsftpd.service; disabled; preset: disabled)
   Active: inactive (dead)

[root@ndbaranov ~]# systemctl enable vsftpd
Created symlink /etc/systemd/system/multi-user.target.wants/vsftpd.service → /usr/lib/systemd/system/vsftpd.service.
[root@ndbaranov ~]# systemctl status vsftpd
o vsftpd.service - Vsftpd ftp daemon
   Loaded: loaded (/usr/lib/systemd/system/vsftpd.service; enabled; preset: disabled)
   Active: inactive (dead)

[root@ndbaranov ~]# systemctl disable vsftpd
Removed "/etc/systemd/system/multi-user.target.wants/vsftpd.service".
[root@ndbaranov ~]# systemctl status vsftpd
```

Установка и запуск vsftpd

```
Activities Terminal Sep 6 14:34 en
root@ndbaranov:~

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

[root@ndbaranov ~]# systemctl enable vsftpd
Created symlink /etc/systemd/system/multi-user.target.wants/vsftpd.service → /usr/lib/systemd/system/vsftpd.service.

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

[root@ndbaranov ~]# systemctl status vsftpd
0 vsftpd.service - Vsftpd ftp daemon
Loaded: loaded (/usr/lib/systemd/system/vsftpd.service; enabled; preset: disabled)
Active: inactive (dead)

[root@ndbaranov ~]# 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
└─selinux-autorelabel-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-boot-update.service
└─systemd-firstboot.service
└─systemd-hwdb-update.service
└─systemd-journal-catalog-update.service
└─systemd-journal-flush.service
└─systemd-journald.service
└─systemd-udev.service
```

Зависимости службы vsftpd

```
Activities Terminal Sep 6 14:35 en
root@ndbaranov:~

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
selinux-autorelabel-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-boot-update.service
systemd-firstboot.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
systemd-repart.service
systemd-sysctl.service
systemd-sysusers.service
systemd-tmpfiles-setup-dev.service
systemd-tmpfiles-setup.service
systemd-udev-trigger.service
systemd-udevd.service
systemd-update-done.service
systemd-update-utmp.service
cryptsetup.target

[root@ndbaranov ~]# systemctl list-dependencies vsftpd --reverse
vsftpd.service
└─multi-user.target
   └─graphical.target
[root@ndbaranov ~]#
```

Установка пакета iptables

```
Activities Terminal Sep 6 14:36 en
root@ndbaranov:~

[baranov@ndbaranov ~]$ su -
Password:
[root@ndbaranov ~]# dnf -y install iptables*
Last metadata expiration check: 1:08:53 ago on Sat 06 Sep 2025 01:27:18 PM MSK.
Package iptables-libs-1.8.10-11.el9_5.x86_64 is already installed.
Package iptables-nft-1.8.10-11.el9_5.x86_64 is already installed.
Dependencies resolved.

=====
Package Architecture Version Repository Size
=====
Installing:
iptables-devel x86_64 1.8.10-11.el9_5 appstream 16 k
iptables-nft-services noarch 1.8.10-11.el9_5 appstream 19 k
iptables-utils x86_64 1.8.10-11.el9_5 baseos 41 k
=====

Transaction Summary
=====
Install 3 Packages

Total download size: 76 k
Installed size: 142 k
Downloading Packages:
(1/3): iptables-utils-1.8.10-11.el9_5.x86_64.rpm 7.6 kB/s | 41 kB 00:05
(2/3): iptables-devel-1.8.10-11.el9_5.x86_64.rpm 2.9 kB/s | 16 kB 00:05
(3/3): iptables-nft-services-1.8.10-11.el9_5.noarch.rpm 3.4 kB/s | 19 kB 00:05
-----
Total 4.6 kB/s | 76 kB 00:16
Running transaction check
Transaction check succeeded.
Running transaction test
Transaction test succeeded.
Running transaction
Preparing : 1/1
Installing : iptables-nft-services-1.8.10-11.el9_5.noarch 1/3
Running scriptlet: iptables-nft-services-1.8.10-11.el9_5.noarch 1/3
Installing : iptables-devel-1.8.10-11.el9_5.x86_64 2/3
Installing : iptables-utils-1.8.10-11.el9_5.x86_64 3/3
Running scriptlet: iptables-utils-1.8.10-11.el9_5.x86_64 3/3
Verifying : iptables-utils-1.8.10-11.el9_5.x86_64 1/3
Verifying : iptables-devel-1.8.10-11.el9_5.x86_64 2/3
Verifying : iptables-nft-services-1.8.10-11.el9_5.noarch 3/3

Installed:
iptables-devel-1.8.10-11.el9_5.x86_64 iptables-nft-services-1.8.10-11.el9_5.noarch
iptables-utils-1.8.10-11.el9_5.x86_64

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


Конфликт firewalld и iptables

```
Activities Terminal Sep 6 14:38 en
root@ndbaranov:~

Installed:
iptables-devel-1.8.10-11.el9_5.x86_64      iptables-nft-services-1.8.10-11.el9_5.noarch
iptables-utils-1.8.10-11.el9_5.x86_64

Complete!
[root@ndbaranov ~]# systemctl status firewalld
● firewalld.service - firewalld - dynamic firewall daemon
   Loaded: loaded (/usr/lib/systemd/system/firewalld.service; enabled; preset: enabled)
   Active: active (running) since Sat 2025-09-06 12:59:01 MSK; 1h 37min ago
     Docs: man:firewalld(1)
   Main PID: 860 (firewalld)
    Tasks: 2 (limit: 22982)
   Memory: 42.8M
      CPU: 1.430s
   CGroup: /system.slice/firewalld.service
           └─860 /usr/bin/python3 -s /usr/sbin/firewalld --nofork --nopid

Sep 06 12:58:59 ndbaranov systemd[1]: Starting firewalld - dynamic firewall daemon...
Sep 06 12:59:01 ndbaranov systemd[1]: Started firewalld - dynamic firewall daemon.
[root@ndbaranov ~]# systemctl status iptables
○ iptables.service - IPv4 firewall with iptables
   Loaded: loaded (/usr/lib/systemd/system/iptables.service; disabled; preset: disabled)
   Active: inactive (dead)

[root@ndbaranov ~]# systemctl start firewalld
[root@ndbaranov ~]# systemctl start iptables
[root@ndbaranov ~]# 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
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@ndbaranov ~]#
```

Блокировка службы iptables

```
Activities Terminal Sep 6 14:42 en
root@ndbaranov:~

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@ndbaranov ~]# 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@ndbaranov ~]# systemctl stop iptables
[root@ndbaranov ~]# systemctl start firewalld
[root@ndbaranov ~]# systemctl mask iptables
Created symlink /etc/systemd/system/iptables.service → /dev/null.
[root@ndbaranov ~]# systemctl start iptables
Failed to start iptables.service: Unit iptables.service is masked.
[root@ndbaranov ~]# systemctl enable iptables
Failed to enable unit: Unit file /etc/systemd/system/iptables.service is masked.
[root@ndbaranov ~]# systemctl status iptables
o iptables.service
   Loaded: masked (Reason: Unit iptables.service is masked.)
   Active: inactive (dead) since Sat 2025-09-06 14:41:07 MSK; 1min 15s ago
   Duration: 3min 29.612s
   Main PID: 8108 (code=exited, status=0/SUCCESS)
   CPU: 164ms

Sep 06 14:37:36 ndbaranov systemd[1]: Starting IPv4 firewall with iptables...
Sep 06 14:37:36 ndbaranov iptables.init[8108]: iptables: Applying firewall rules: [ OK ]
Sep 06 14:37:36 ndbaranov systemd[1]: Finished IPv4 firewall with iptables.
Sep 06 14:41:06 ndbaranov systemd[1]: Stopping IPv4 firewall with iptables...
Sep 06 14:41:06 ndbaranov iptables.init[8137]: iptables: Setting chains to policy ACCEPT: raw mangle filter nat [ OK ]
Sep 06 14:41:07 ndbaranov iptables.init[8137]: iptables: Flushing firewall rules: [ OK ]
Sep 06 14:41:07 ndbaranov systemd[1]: iptables.service: Deactivated successfully.
Sep 06 14:41:07 ndbaranov systemd[1]: Stopped IPv4 firewall with iptables.
[root@ndbaranov ~]#
```

Поиск изолируемых целей

```
Activities Terminal Sep 6 14:43 en
root@ndbaranov:/usr/lib/systemd/system

[baranov@ndbaranov ~]$ su -
Password:
[root@ndbaranov ~]# cd /usr/lib/systemd/system
[root@ndbaranov 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@ndbaranov systemd]# systemctl isolate rescue.target
```

Изоляция rescue.target

```
Activities Terminal Sep 6 14:43 en
root@ndbaranov:/usr/lib/systemd/system

[baranov@ndbaranov ~]$ su -
Password:
[root@ndbaranov ~]# cd /usr/lib/systemd/system
[root@ndbaranov 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@ndbaranov systemd]# systemctl isolate rescue.target
```

Изменение целевого уровня по умолчанию

```
Activities Terminal Sep 6 14:51 en
root@ndbaranov:~
[baranov@ndbaranov ~]$ su -
Password:
[root@ndbaranov ~]# systemctl get-default
graphical.target
[root@ndbaranov ~]# 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@ndbaranov ~]# reboot
```

Получены навыки управления системными службами посредством systemd.