

Лабораторная работа №11

Управление загрузкой системы

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Цели и задачи

- Получить навыки работы с загрузчиком системы GRUB2.
1. Продемонстрируйте навыки по изменению параметров GRUB и записи изменений в файл конфигурации (см. раздел 11.4.1).
 2. Продемонстрируйте навыки устранения неполадок при работе с GRUB (см. раздел 11.4.2).
 3. Продемонстрируйте навыки работы с GRUB без использования root (см. раздел 11.4.3).

Материалы и методы

- Linux (дистрибутив Rocky 9.6)
- Linux Fedora Sway (Markdown)
- Oracle VirtualBox

Выполнение лабораторной работы

```
su -
```

```
nano /etc/default/grub
```

```
[aeakunaeva@aeakunaeva ~]$ su -  
Password:  
[root@aeakunaeva ~]# nano /etc/default/grub  
[root@aeakunaeva ~]# grub2-mkconfig > /boot/grub2/grub.cfg  
Generating grub configuration file ...  
Adding boot menu entry for UEFI Firmware Settings ...  
done
```

Параметр отображения меню загрузки в /etc/default/grub

GRUB_TIMEOUT=10

```
GNU nano 5.6.1 /etc/default/grub
GRUB_TIMEOUT=10
GRUB_DISTRIBUTOR="$(sed 's, release .*$,g' /etc/system-release)"
GRUB_DEFAULT=saved
GRUB_DISABLE_SUBMENU=true
GRUB_TERMINAL_OUTPUT="console"
GRUB_CMDLINE_LINUX="resume=/dev/mapper/rl-swap rd.lvm.lv=rl/root rd.lvm.lv=rl/s>
GRUB_DISABLE_RECOVERY="true"
GRUB_ENABLE_BLSCFG=true

[ Read 8 lines ]
^G Help      ^O Write Out ^W Where Is  ^K Cut       ^T Execute  ^C Location
^X Exit      ^R Read File ^\ Replace   ^U Paste     ^J Justify  ^_ Go To Line
```

Параметр запуска ядра системы GRUB2 в /etc/default/grub

```
GNU nano 5.6.1 /etc/default/grub
GRUB_TIMEOUT=10
GRUB_DISTRIBUTOR="$(sed 's, release .*$,,g' /etc/system-release)"
GRUB_DEFAULT=saved
GRUB_DISABLE_SUBMENU=true
GRUB_TERMINAL_OUTPUT="console"
v=rl/swap rhgb quiet
GRUB_DISABLE_RECOVERY="true"
GRUB_ENABLE_BLSCFG=true
```

Изменения сокрытия загрузочных сообщений GRUB2 в /etc/default/grub

```
grub2-mkconfig > /boot/grub2/grub.cfg
```

```
GNU nano 5.6.1 /etc/default/grub Modified
GRUB_TIMEOUT=10
GRUB_DISTRIBUTOR="$(sed 's, release .*$,,g' /etc/system-release)"
GRUB_DEFAULT=saved
GRUB_DISABLE_SUBMENU=true
GRUB_TERMINAL_OUTPUT="console"
v=r\l/swap"
GRUB_DISABLE_RECOVERY="true"
GRUB_ENABLE_BLSCFG=true

Save modified buffer?
Y Yes
N No ^C Cancel
```

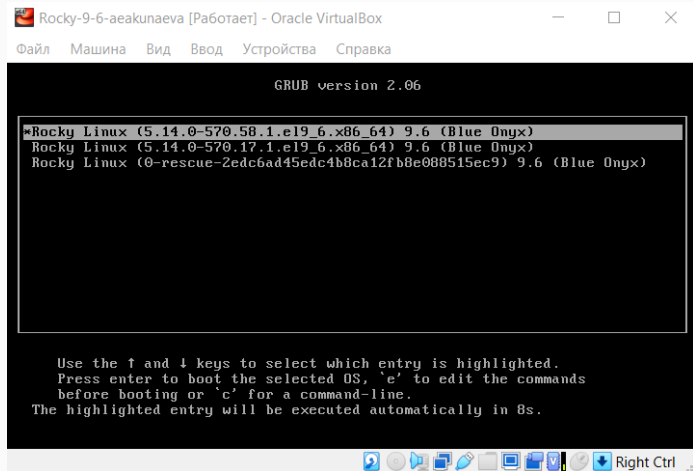
Меню загрузочных сообщений GRUB2

```
( OK ) Stopped target socket units.
( OK ) Stopped target System Initialization.
( OK ) Stopped target Local File Systems.
( OK ) Stopped target Preparation for Local File Systems.
( OK ) Stopped target Swaps.
( OK ) Stopped dracut initqueue hook.
      Starting Plymouth switch root service...
( OK ) Stopped Apply Kernel Variables.
( OK ) Stopped Load Kernel Modules.
( OK ) Stopped Create Volatile Files and Directories.
( OK ) Stopped Coldplug All udev Devices.
      Stopping Rule-based Manager for Device Events and Files...
( OK ) Finished Cleaning Up and Shutting Down Daemons.
( OK ) Stopped Rule-based Manager for Device Events and Files.
( OK ) Closed udev Control Socket.
( OK ) Closed udev Kernel Socket.
( OK ) Stopped dracut pre-udev hook.
( OK ) Stopped dracut cmdline hook.
      Starting Cleanup udev Database...
( OK ) Stopped Create Static Device Nodes in /dev.
( OK ) Stopped Create List of Static Device Nodes.
( OK ) Stopped Create System Users.
( OK ) Finished Cleanup udev Database.
( OK ) Reached target Switch Root.
( OK ) Finished Plymouth switch root service.
      Starting Switch Root...
( 4.936831) systemd-journald(247): Received SIGTERM from PID 1 (systemd).
( 6.231944) audit: type=1404 audit(1762567555.278:2): enforcing=0 audit=4294967295 ses=4294967295 enabled=1 old-enabled=1 lsm=selinux res=1
( 6.587380) SELinux: policy capability network_peer_controls=1
( 6.588495) SELinux: policy capability open_perms=1
( 6.589046) SELinux: policy capability extended_socket_class=1
( 6.589432) SELinux: policy capability always_check_network=0
( 6.589776) SELinux: policy capability cgroup_seclabel=1
( 6.518126) SELinux: policy capability mmp_nosuid_transition=1
( 6.518493) SELinux: policy capability genfs_seclabel_splinks=1
( 6.644826) audit: type=1403 audit(1762567555.688:3): audit=4294967295 ses=4294967295 lsm=selinux res=1
( 6.649959) systemd(1): Successfully loaded SELinux policy in 431.781ms.
( 6.818731) systemd(1): Relabeled /dev, /dev/shm, /run, /sys/fs/cgroup in 36.273ms.
( 6.853425) systemd(1): systemd 252-51.el9_6.3.rocky.8.1 running in system mode (+PAM +AUDIT +SELINUX +APPARMOR +IMA +SMACK +SECCOMP +GCRYPT +GNUTLS +OPENSSL +ACL +BLKID +CURL +ELFTOOLS +FIDO2 +IIO2 -IDN -IPTC +KMOD +LIBCRYPTSETUP +LIBFDISK +PCRE2 +PWQUALITY +PIKIT +QRENCODE +TIME +ZLIB +ZSTD -BPF +XZ +XZCOMPRESS -ZSTD -ZSTDINIT default-hierarchy=unified)
( 6.856888) systemd(1): Detected virtualization oracle.
( 6.856511) audit: type=1400 audit(1762567555.986:4): avc: denied (read) for pid=1 comm="systemd" name="usr" dev="devtmpfs" ino=06 scontext=system_u:sys_tem_r:init_t:s0 tcontext=system_u:object_r:cpu_device_t:s0 tclass=chr_file permissive=0
( 6.859683) systemd(1): Detected architecture x86_64.

Welcome to Rocky Linux 9.6 (Blue Oso)!

( 7.382878) systemd-rc-local-generator(612): /etc/rc.d/rc.local is not marked executable, skipping.
```

Меню выбора версии ядра GRUB2



GRUB version 2.06

```
load_video
set gfxpayload=keep
insmod gzio
linux ($root)/vmlinuz-5.14.0-570.58.1.el9_6.x86_64 root=/dev/mapper/rl-root\
ro resume=/dev/mapper/rl-swap rd.lvm.lv=rl/root rd.lvm.lv=rl/swap rhgb qui\
et crashkernel=1G-4G:192M,4G-64G:256M,64G-:512M
initrd ($root)/initramfs-5.14.0-570.58.1.el9_6.x86_64.img $tuned_initrd
```

Minimum Emacs-like screen editing is supported. TAB lists completions. Press Ctrl-x or F10 to boot, Ctrl-c or F2 for a command-line or ESC to discard edits and return to the GRUB menu.

Изменение опций запуска ядра системы на режим rescue

systemd.unit=rescue.target

GRUB version 2.06

```
load_video
set gfxpayload=keep
insmod gzio
linux ($root)/vmlinuz-5.14.0-570.58.1.el9_6.x86_64 root=/dev/mapper/rl-root\
ro resume=/dev/mapper/rl-swap rd.lvm.lv=rl/root rd.lvm.lv=rl/swap crashker\
nel=1G-4G:192M,4G-64G:256M,64G-:512M systemd.unit=rescue.target
initrd ($root)/initramfs-5.14.0-570.58.1.el9_6.x86_64.img $tuned_initrd
```

Minimum Emacs-like screen editing is supported. TAB lists completions. Press Ctrl-x or F10 to boot, Ctrl-c or F2 for a command-line or ESC to discard edits and return to the GRUB menu.

Просмотр модулей и переменных в режиме восстановления GRUB2

systemctl list-units

systemctl show-environment

systemctl reboot

```
sys-devices-pc10000:00:0000:00:05:0-sound-card0-control00.device loaded active plugged /sys/devices/pc10000:00:0000:00:05:0-sound/c
sys-devices-pc10000:00:0000:00:0d:0-ata3-host1-target1:0:0:1:0:0:0-block-sda-sda1.device loaded active plugged UBDX_HARDDISK 1
sys-devices-pc10000:00:0000:00:0d:0-ata3-host1-target1:0:0:1:0:0:0-block-sda-sda2.device loaded active plugged UBDX_HARDDISK 2
sys-devices-platform-serial18250-tty-ttyS0.device loaded active plugged /sys/devices/platform/serial18250/tty/ttyS0
sys-devices-platform-serial18250-tty-ttyS1.device loaded active plugged /sys/devices/platform/serial18250/tty/ttyS1
sys-devices-platform-serial18250-tty-ttyS2.device loaded active plugged /sys/devices/platform/serial18250/tty/ttyS2
sys-devices-platform-serial18250-tty-ttyS3.device loaded active plugged /sys/devices/platform/serial18250/tty/ttyS3
sys-devices-virtual-block-dm0-dm0.device loaded active plugged /sys/devices/virtual/block/dm-0
sys-devices-virtual-block-dm1-dm1.device loaded active plugged /sys/devices/virtual/block/dm-1
sys-module-conf-igfs.device loaded active plugged /sys/module/conf-igfs
sys-module-fuse.device loaded active plugged /sys/module/fuse
sys-subsystem-net-devices-ens3.device loaded active plugged 82548EM Gigabit Ethernet Controller (PRO-100
boot.mount loaded active mounted Root Mount
dev-hugepages.mount loaded active mounted Huge Pages File System
dev-mqueue.mount loaded active mounted POSIX Message Queue File System
run-credentials-systemd\x2dsysctl.service.mount loaded active mounted /run/credentials/systemd-sysctl.service
run-credentials-system\x2dtmpfiles\x2dsetup.service.mount loaded active mounted /run/credentials/systemd-tmpfiles-setup.serv
sys-fs-fuse-connections.mount loaded active mounted FUSE Control File System
sys-kernel-config.mount loaded active mounted Kernel Configuration File System
sys-kernel-debug.mount loaded active mounted Kernel Debug File System
sys-kernel-tracing.mount loaded active mounted Kernel Trace File System
systemd-ask-password-plymouth.path loaded active waiting Forward Password Requests to Plymouth Direct
init.scope loaded active running System and Service Manager
alsa-state.service loaded active running Manage Sound Card State (restore and store)
dracut-shutdown.service loaded active exited Restore /run/initramfs on shutdown
kmod-static-nodes.service loaded active exited Create List of Static Device Nodes
lvm2-monitor.service loaded active exited Monitoring of LVM2 mirrors, snapshots etc. w
nfs-dm0.mount loaded active exited Read and set NFS domainname from /etc/system
plymouth-read-write.service loaded active exited Tell Plymouth To Write Out Runtime Data
plymouth-start.service loaded active exited Show Plymouth Boot Screen
rescue.service loaded active running Rescue Shell
systemd-boot-update.service loaded active exited Automatic Boot Loader Update
systemd-journald-flush.service loaded active exited Flush Journal to Persistent Storage
systemd-journald.service loaded active running Journal Service
systemd-modules-load.service loaded active exited Load Kernel Modules
systemd-network-generator.service loaded active exited Generate network units from Kernel command l
systemd-random-seed.service loaded active exited Load/Save OS Random Seed
systemd-resolconf.service loaded active exited Reconnect Root and Kernel File Systems
systemd-sysctl.service loaded active exited Apply Kernel Variables
systemd-tmpfiles-setup-dev.service loaded active exited Create Static Device Nodes in /dev
systemd-tmpfiles-setup.service loaded active exited Create Volatile Files and Directories
systemd-udev-settle.service loaded active exited Wait for udev To Complete Device Initializat
%
root@arakunaeve ~# systemctl show-environment
ANSI=US.UTF-8
PATH=/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin
root@arakunaeve ~# systemctl reboot
```

Изменение опций запуска ядра системы на режим emergency

systemd.unit=emergency.target

GRUB version 2.06

```
load_video
set gfxpayload=keep
insmod gzio
linux ($root)/vmlinuz-5.14.0-570.58.1.el9_6.x86_64 root=/dev/mapper/rl-root\
ro resume=/dev/mapper/rl-swap rd.lvm.lv=rl/root rd.lvm.lv=rl/swap crashker\
nel=1G-4G:192M,4G-64G:256M,64G-:512M systemd.unit=emergency.target_
initrd ($root)/initramfs-5.14.0-570.58.1.el9_6.x86_64.img $tuned_initrd
```

Minimum Emacs-like screen editing is supported. TAB lists completions. Press Ctrl-x or F10 to boot, Ctrl-c or F2 for a command-line or ESC to discard edits and return to the GRUB menu.

Просмотр модулей в режиме мин. кол-ва системных единиц GRUB2

systemctl list-units

systemctl reboot

```
dev-disk-by\x22diskseg-1.device loaded activating tentative /dev/disk/by-diskseg/1
dev-disk-by\x22id-ata\x22UBOX_HARDDISK_U0668d85b2\x224c69c5db.device loaded activating tentative /dev/disk/by-id/ata-UBOX_H
dev-disk-by\x22id-ata\x22UBOX_HARDDISK_U0668d85b2\x224c69c5db\x222part1.device loaded activating tentative /dev/disk/by-id/ata-UBOX_H
dev-disk-by\x22id-ata\x22UBOX_HARDDISK_U0668d85b2\x224c69c5db\x222part2.device loaded activating tentative /dev/disk/by-id/ata-UBOX_H
dev-disk-by\x22partuuid-9d640253\x222d01.device loaded activating tentative /dev/disk/by-partuuid/9d64
dev-disk-by\x22partuuid-9d640253\x222d02.device loaded activating tentative /dev/disk/by-partuuid/9d64
dev-disk-by\x22path-pci\x220000:00:0d:00\x22ata\x22d1.0.device loaded activating tentative /dev/disk/by-path/pci-0000
dev-disk-by\x22path-pci\x220000:00:0d:00\x22ata\x22d1.0\x222part1.device loaded activating tentative /dev/disk/by-path/pci-0000
dev-disk-by\x22path-pci\x220000:00:0d:00\x22ata\x22d1.0\x222part2.device loaded activating tentative /dev/disk/by-path/pci-0000
dev-disk-by\x22path-pci\x220000:00:0d:00\x22ata\x22d1.device loaded activating tentative /dev/disk/by-path/pci-0000
dev-disk-by\x22path-pci\x220000:00:0d:00\x22ata\x22d1\x222part1.device loaded activating tentative /dev/disk/by-path/pci-0000
dev-disk-by\x22path-pci\x220000:00:0d:00\x22ata\x22d1\x222part2.device loaded activating tentative /dev/disk/by-path/pci-0000
dev-disk-by\x22dmuid-5ca0ef14\x22d49b5d\x22d4a90b\x222b7f7\x22d407ce94f232d.device loaded activating tentative /dev/disk/by-uuid/5ca0ef14
dev-sda1.device loaded activating tentative /dev/sda
dev-sda2.device loaded activating tentative /dev/sda2
dev-ttyS0.device loaded activating tentative /dev/ttyS0
dev-ttyS1.device loaded activating tentative /dev/ttyS1
dev-ttyS2.device loaded activating tentative /dev/ttyS2
dev-ttyS3.device loaded activating tentative /dev/ttyS3
sys-devices-pci0000:00:0000:00:03.0-net-emp8s3.device loaded activating tentative /sys/devices/pci0000:00:0000
sys-devices-pci0000:00:0000:00:0d.0-ata3-host1-target1:0:0:1:0:0:0-block-sda-sda1.device loaded activating tentative /sys/devices/pci0000:00:0000
sys-devices-pci0000:00:0000:00:0d.0-ata3-host1-target1:0:0:1:0:0:0-block-sda-sda2.device loaded activating tentative /sys/devices/pci0000:00:0000
sys-devices-pci0000:00:0000:00:0d.0-ata3-host1-target1:0:0:1:0:0:0-block-sda.device loaded activating tentative /sys/devices/pci0000:00:0000
sys-devices-platform-serial8250-tty-ttyS0.device loaded activating tentative /sys/devices/platform/seri
sys-devices-platform-serial8250-tty-ttyS1.device loaded activating tentative /sys/devices/platform/seri
sys-devices-platform-serial8250-tty-ttyS2.device loaded activating tentative /sys/devices/platform/seri
sys-devices-platform-serial8250-tty-ttyS3.device loaded activating tentative /sys/devices/platform/seri
sys-devices-virtual-block-dm\x22d0.device loaded active plugged /sys/devices/virtual/block
sys-devices-virtual-block-dm\x22d1.device loaded active plugged /sys/devices/virtual/block
sys-module-configfs.device loaded activating tentative /sys/module/configfs
sys-module-fuse.device loaded activating tentative /sys/module/fuse
sys-subsystem-net-devices-emp8s3.device loaded activating tentative /sys/subsystem/net/devices
-.mount loaded active mounted Root Mount
init.scope loaded active running System and Service Manager
emergency.service loaded active running Emergency Shell
plymouth-start.service loaded active exited Show Plymouth Boot Screen
systemd-journald.service loaded active running Journal Service
-.slice loaded active active Root Slice
system-system\x22hibernate\x22dresume.slice loaded active active Slice /system/systemd-hiber
system.slice loaded active active System Slice
systemd-journald-dev-log.socket loaded active running Journal Socket (/dev/log)
systemd-journald.socket loaded active running Journal Socket
emergency.target loaded active active Emergency Mode

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.
```

root@arekunaev ~# systemctl reboot

Добавлении опции rd.break в редакторе GRUB2

rd.break

GRUB version 2.06

```
load_video
set gfxpayload=keep
insmod gzio
linux ($root)/vmlinuz-5.14.0-570.58.1.el9_6.x86_64 root=/dev/mapper/rl-root\
ro resume=/dev/mapper/rl-swap rd.lvm.lv=rl/root rd.lvm.lv=rl/swap crashker\
nel=1G-4G:192M,4G-64G:256M,64G-:512M rd.break
initrd ($root)/initramfs-5.14.0-570.58.1.el9_6.x86_64.img $tuned_initrd
```

Minimum Emacs-like screen editing is supported. TAB lists completions. Press Ctrl-x or F10 to boot, Ctrl-c or F2 for a command-line or ESC to discard edits and return to the GRUB menu.

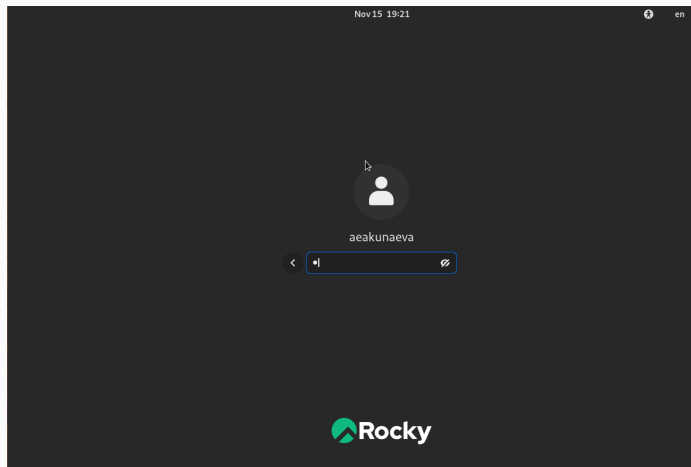
Сброс пароля root

```
mount -o remount,rw /sysroot
chroot /sysroot
passwd
chcon -t shadow_t /etc/shadow
reboot -f
```

```
( OK ) Finished Mountpoints Configured in the Real Root.
( OK ) Reached target Initrd File Systems.
( OK ) Reached target Initrd Default Target.
Starting dracut pre-pivot and cleanup hook...
  5.0212701 dracut-pre-pivot(560): Warning: Break before switch_root
Starting Dracut Emergency Shell...
Generating "/run/initramfs/rdsosreport.txt"

Entering emergency mode. Exit the shell to continue.
Type "journalctl" to view system logs.
You might want to save "/run/initramfs/rdsosreport.txt" to a USB stick or /boot
after mounting them and attach it to a bug report.

switch_root:/# mount -o remount,rw /sysroot
switch_root:/# chroot /sysroot
sh-5.1# passwd
sh: passwd: command not found
sh-5.1# passwd
Changing password for user root.
New password:
BAD PASSWORD: The password is a palindrome
Retype new password:
passwd: all authentication tokens updated successfully.
sh-5.1# load_policy -i
( 152.991436) audit: type=1404 audit(1763223542.970:2): enforcing=1 old_enforcing=0 auid=4294967295 ses=4294967295 enabled=1 old-enabled=1 lsm=sel
( 153.145290) SELinux: policy capability network_peer_controls=1
( 153.145839) SELinux: policy capability open_perms=1
( 153.146216) SELinux: policy capability extended_socket_class=1
( 153.146590) SELinux: policy capability always_check_network=0
( 153.146925) SELinux: policy capability cgroup_seclabel=1
( 153.147231) SELinux: policy capability mmp_posuid_transition=1
( 153.147567) SELinux: policy capability genfs_seclabel_symlinks=1
( 153.271622) audit: type=1403 audit(1763223543.259:3): auid=4294967295 ses=4294967295 lsm=selinux res=1
sh-5.1# chcon -t shadow_t /etc/shadow
sh-5.1# reboot -f
```



Выводы

Я получила навыки работы с загрузчиком системы GRUB2.