

# Лабораторная работа №1

## Операционные системы

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Мазурский А. Д.

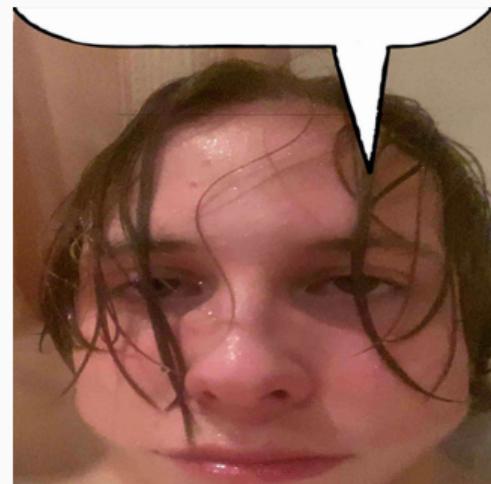
06 марта 2025

Российский университет дружбы народов, Москва, Россия

## Информация

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- Мазуркский Александр Дмитриевич
- Студент НКАбд-02-24
- я саша
- Российский университет дружбы народов
- 1132242468@pfur.ru



## Цель работы

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Целью данной работы является приобретение практических навыков установки операционной системы на виртуальную машину, настройки минимально необходимых для дальнейшей работы сервисов.

## Задание

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- Установка Linux на Qemu
- Установка необходимого ПО
- Первоначальная настройка ОС для дальнейшей работы

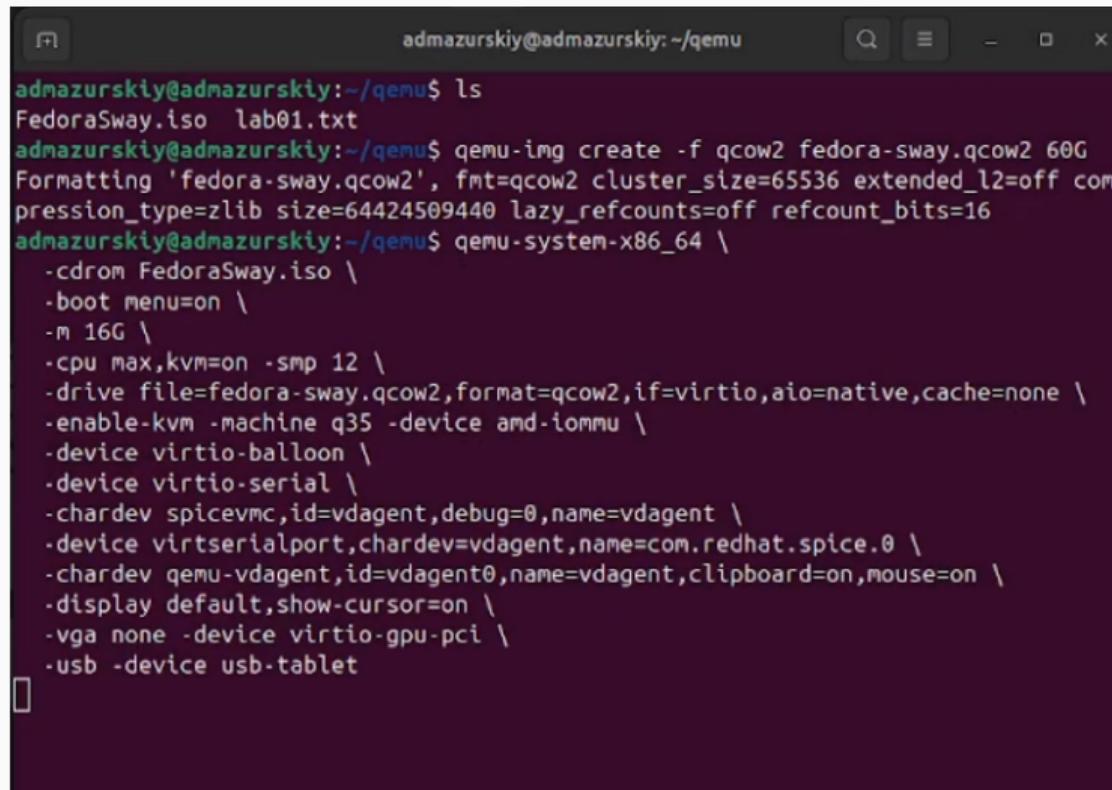
QEMU – свободная программа с открытым исходным кодом для эмуляции аппаратного обеспечения различных платформ.

Включает в себя эмуляцию процессоров Intel x86 и устройств ввода-вывода. Может эмулировать 80386, 80486, Pentium, Pentium Pro, AMD64 и другие x86-совместимые процессоры; ARM, MIPS, RISC-V, PowerPC, SPARC, SPARC64 и частично m68k.

Работает на Syllable, FreeBSD, OpenBSD, FreeDOS, Linux, Windows 9x, Windows 2000, Mac OS X, QNX[8][9][10], Android и др.

# Выполнение лабораторной работы

Создаю виртуальный жесткий диск и запускаю скачанный образ операционной системы.

A screenshot of a terminal window titled "admazurskiy@admazurskiy: ~/qemu". The terminal displays a series of QEMU commands being run in a shell. The commands include creating a QCOW2 image from a ISO file, specifying memory, CPU type, drives, and various device configurations like VirtIO and SPICE. The terminal has a dark background with light-colored text.

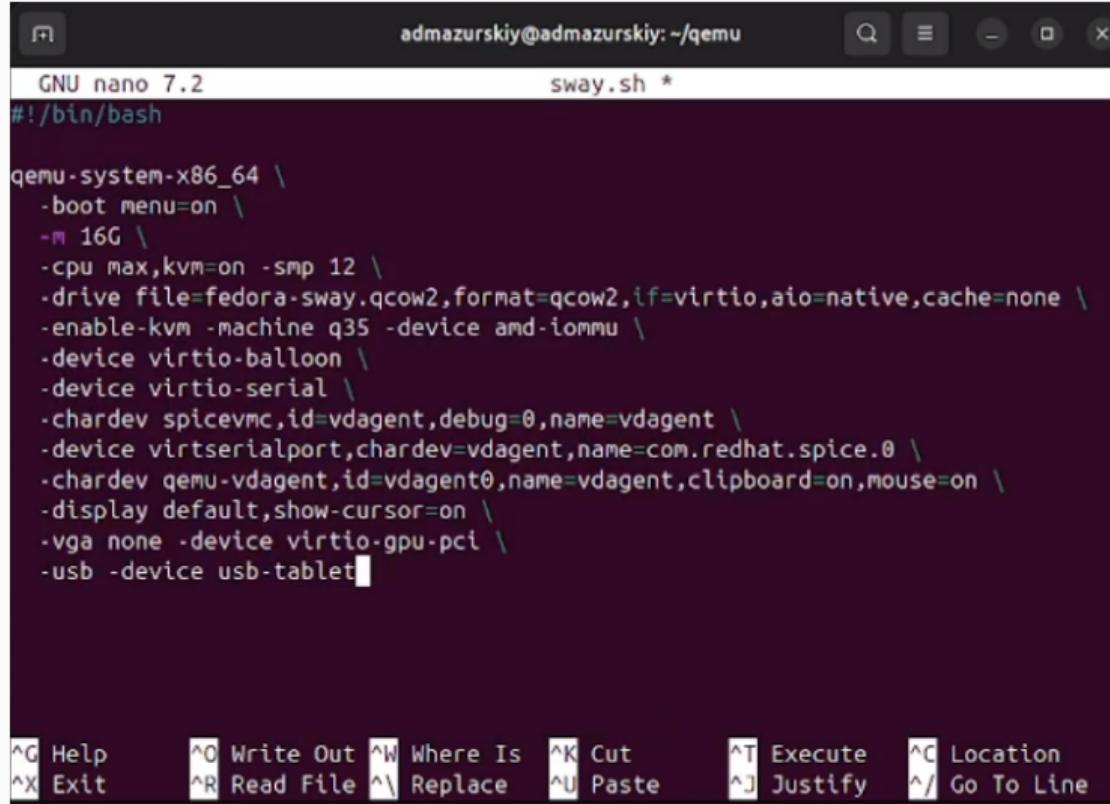
```
admazurskiy@admazurskiy:~/qemu$ ls
FedoraSway.iso  lab01.txt
admazurskiy@admazurskiy:~/qemu$ qemu-img create -f qcow2 fedora-sway.qcow2 60G
Formatting 'fedora-sway.qcow2', fmt=qcow2 cluster_size=65536 extended_l2=off compression_type=zlib size=64424509440 lazy_refcounts=off refcount_bits=16
admazurskiy@admazurskiy:~/qemu$ qemu-system-x86_64 \
    -cdrom FedoraSway.iso \
    -boot menu=on \
    -m 16G \
    -cpu max,kvm=on -smp 12 \
    -drive file=fedora-sway.qcow2,format=qcow2,if=virtio,aio=native,cache=none \
    -enable-kvm -machine q35 -device amd-iommu \
    -device virtio-balloon \
    -device virtio-serial \
    -chardev spicevmc,id=vdagent,debug=0,name=vdagent \
    -device virtserialport,chardev=vdagent,name=com.redhat.spice.0 \
    -chardev qemu-vdagent,id=vdagent0,name=vdagent,clipboard=on,mouse=on \
    -display default,show-cursor=on \
    -vga none -device virtio-gpu-pci \
    -usb -device usb-tablet
```

Через интерактивный установщик задаю базовые настройки для установки операционной системы.



Рис. 2: Процесс установки ОС

После установки ОС закрываю виртуальную машину и создаю скрипт для упрощенного запуска машины в дальнейшем.



The screenshot shows a terminal window with a dark background and light-colored text. At the top, it says "GNU nano 7.2" and "admazurskiy@admazurskiy: ~/qemu". The main area contains a shell script named "sway.sh" with the following content:

```
#!/bin/bash

qemu-system-x86_64 \
    -boot menu=on \
    -m 16G \
    -cpu max,kvm=on -smp 12 \
    -drive file=fedora-sway.qcow2,format=qcow2,if=virtio,aio=native,cache=none \
    -enable-kvm -machine q35 -device amd-iommu \
    -device virtio-balloon \
    -device virtio-serial \
    -chardev spicevmc,id=vdagent,debug=0,name=vdagent \
    -device virtserialport,chardev=vdagent,name=com.redhat.spice.0 \
    -chardev qemu-vdagent,id=vdagent0,name=vdagent,clipboard=on,mouse=on \
    -display default,show-cursor=on \
    -vga none -device virtio-gpu-pci \
    -usb -device usb-tablet
```

At the bottom of the screen, there is a standard nano keybinding menu:

^G	Help	^O	Write Out	^W	Where Is	^K	Cut	^T	Execute	^C	Location
^X	Exit	^R	Read File	^Y	Replace	^U	Paste	^J	Justify	^/	Go To Line

## Скачиваю набор необходимых пакетов для работы с ОС.

```
[29/63] Installing perl-Socket-4:2.038-511.fc41.x86_64
[30/63] Installing perl>SelectSaver-0:1.02-514.fc41.noarch
[31/63] Installing perl-Symbol-0:1.09-514.fc41.noarch
[32/63] Installing perl-File-stat-0:1.14-514.fc41.noarch
[33/63] Installing perl-podlators-1:6.0.2-2.fc41.noarch
[34/63] Installing perl-Pod-Perldoc-0:3.28.01-512.fc41.noarch
[35/63] Installing perl-Fcntl-0:1.18-514.fc41.x86_64
[36/63] Installing perl-mro-0:1.29-514.fc41.x86_64
[37/63] Installing perl-overloading-0:0.02-514.fc41.noarch
[38/63] Installing perl-Text-ParseWords-0:3.31-511.fc41.noarch
[39/63] Installing perl-Io-0:1.55-514.fc41.x86_64
[40/63] Installing perl-base-0:2.27-514.fc41.noarch
[41/63] Installing perl-Pod-Usage-4:2.03-511.fc41.noarch
[42/63] Installing perl-constant-0:1.33-512.fc41.noarch
[43/63] Installing perl-parent-1:0.242-1.fc41.noarch
[44/63] Installing perl-File-Basename-0:2.86-514.fc41.noarch
[45/63] Installing perl-Errno-0:1.38-514.fc41.x86_64
[46/63] Installing perl-Scalar-List-Utils-5:1.68-1.fc41.x86_64
[47/63] Installing perl-vars-0:1.05-514.fc41.noarch
[48/63] Installing perl-overload-0:1.37-514.fc41.noarch
[49/63] Installing perl-MIME-Base64-0:3.16-511.fc41.x86_64
[50/63] Installing perl-Storable-1:3.32-511.fc41.x86_64
[51/63] Installing perl-Getopt-Std-0:1.14-514.fc41.noarch
[52/63] Installing perl-Getopt-Long-1:2.58-2.fc41.noarch
[53/63] Installing perl-Carp-0:1.54-511.fc41.noarch
[54/63] Installing perl-Exporter-0:5.78-511.fc41.noarch
[55/63] Installing perl-PathTools-0:3.91-512.fc41.x86_64
[56/63] Installing perl-DynaLoader-0:1.56-514.fc41.x86_64
[57/63] Installing perl-Encode-4:3.21-511.fc41.x86_64
[58/63] Installing perl-libs-4:5.40.1-514.fc41.x86_64
[59/63] Installing perl-interpreter-4:5.40.1-514.fc41.x86_64
[60/63] Installing gpm-libs-0:1.20.7-48.fc41.x86_64
[61/63] Installing mc-1:4.8.32-1.fc41.x86_64
[62/63] Installing perl-NDBM_File-0:1.17-514.fc41.x86_64
[63/63] Installing dnf5-plugin-automatic-0:5.2.10.0-2.fc41.x86_64
Complete!
[admazurskiy@admazurskiy ~]$
```

Запускаю скрипт для автоматического обновления пакетов через пакетный менеджер dnf.

```
[admazurskiy@admazurskiy ~]$ sudo systemctl enable --now dnf-automatic.timer
Created symlink '/etc/systemd/system/timers.target.wants/dnf5-automatic.timer' → '/usr/lib/systemd/system/dnf5-automatic.timer'.
[admazurskiy@admazurskiy ~]$
```

Рис. 5: Запуск скрипта

Отключаю защиту SELinux, так как на данном курсе мы не будем рассматривать работу с ней.

```
SELINUX=permissive
# SELINUXTYPE= can take one of these three values:
#       targeted - Targeted processes are protected,
#       minimum - Modification of targeted policy. Only selected processes are protected.
#       mls - Multi Level Security protection.
SELINUXTYPE=targeted
```

Рис. 6: Отключение защиты Linux

Настраиваю xkb, добавляю вторую раскладку клавиатуры с русским языком и задаю переключение на right ctrl.

```
# Note the quoting, the $() and the arguments quoting
# important to make the magic work. And if you want t
# the trick, it's all in the `wordexp(3)`.

#
include '$(/usr/libexec/sway/layered-include "/usr/sh

input * {
    xkb_layout us,ru
    xkb_options grp:rctrl_toggle
}

^G Help          ^O Write Out      ^F Where Is      ^K
^X Exit          ^R Read File      ^\ Replace       ^U
```

Рис. 7: Настройка xkb

Проверяю корректность заданного имени для hostname.

```
[admazurskiy@admazurskiy sway]$ hostnamectl
      Static hostname: admazurskiy
                  Icon name: computer-vm
                  Chassis: vm └─
        Machine ID: 89424dd19989457fb1fea71f615f20e1
          Boot ID: 00c29d6c1bb74349a594e9f7167606bb
  Virtualization: kvm
Operating System: Fedora Linux 41 (Sway)
      CPE OS Name: cpe:/o:fedoraproject:fedora:41
        OS Support End: Mon 2025-12-15
    OS Support Remaining: 9month 1w 4d
            Kernel: Linux 6.11.4-301.fc41.x86_64
      Architecture: x86-64
  Hardware Vendor: QEMU
Hardware Model: Standard PC _Q35 + ICH9, 2009_
Firmware Version: 1.16.3-debian-1.16.3-2
  Firmware Date: Tue 2014-04-01
  Firmware Age: 10y 11month 3d
[admazurskiy@admazurskiy sway]$
```

Устанавливаю pandoc, pandoc-crossref, texlive для работы над отчетами для лабораторных работ.

```
[admazurskiy@admazurskiy Downloads]$ tar -xvf pandoc-crossref-Linux-X64.tar.xz
pandoc-crossref
pandoc-crossref.1
[admazurskiy@admazurskiy Downloads]$ tar -xvf pandoc-3.6.2-linux-amd64.tar.gz
pandoc-3.6.2/
pandoc-3.6.2/bin/
pandoc-3.6.2/bin/pandoc-lua
pandoc-3.6.2/bin/pandoc
pandoc-3.6.2/bin/pandoc-server
pandoc-3.6.2/share/
pandoc-3.6.2/share/man/
pandoc-3.6.2/share/man/man1/
pandoc-3.6.2/share/man/man1/pandoc-server.1.gz
pandoc-3.6.2/share/man/man1/pandoc-lua.1.gz
pandoc-3.6.2/share/man/man1/pandoc.1.gz
[admazurskiy@admazurskiy Downloads]$ ls
pandoc-3.6.2 pandoc-3.6.2-linux-amd64.tar.gz pandoc-crossref pandoc-crossref.1 pandoc-crossref-Linux-X64.tar.xz
[admazurskiy@admazurskiy Downloads]$ sudo mv pandoc-crossref /usr/local/bin
[admazurskiy@admazurskiy Downloads]$ cd pandoc-3.6.2/
[admazurskiy@admazurskiy pandoc-3.6.2]$ ls
bin share
[admazurskiy@admazurskiy pandoc-3.6.2]$ cd bin
[admazurskiy@admazurskiy bin]$ ls
pandoc pandoc-lua pandoc-server
[admazurskiy@admazurskiy bin]$ sudo mv pandoc pandoc-lua pandoc-server /usr/local/bin
[admazurskiy@admazurskiy bin]$ ls /usr/local/bin
pandoc pandoc-crossref pandoc-lua pandoc-server
[admazurskiy@admazurskiy bin]$ sudo dnf install texlive-scheme-full■
```

Рис. 9: Установка ПО для выполнения отчетов



## Домашнее задание

Проверяю последовательность загрузки графического окружения командой dmesg | grep -i с указанием вывода желаемого нахождения

```
[ 0.001997] RAMDISK: [mem 0x34129000-0x3608cff]f
[ 0.002000] ACPI: Early table checksum verification disabled
[ 0.002002] ACPI: RSDP 0x00000000000F5260 000014 (v00 BOCHS )
[ 0.002004] ACPI: RSDT 0x000000007FFE27F1 00003C (v01 BOCHS BXPC 00000001 BXPC 00000001)
[ 0.002007] ACPI: FACP 0x000000007FFE2511 00004F (v03 BOCHS BXPC 00000001 BXPC 00000001)
[ 0.002010] ACPI: DSDT 0x000000007FFE0040 0024D1 (v01 BOCHS BXPC 00000001 BXPC 00000001)
[ 0.002012] ACPI: FACS 0x000000007FFE0000 000040
[ 0.002014] ACPI: APIC 0x000000007FFE2605 0000D0 (v03 BOCHS BXPC 00000001 BXPC 00000001)
[ 0.002015] ACPI: HPET 0x000000007FFE26D5 000038 (v01 BOCHS BXPC 00000001 BXPC 00000001)
[ 0.002017] ACPI: MCFG 0x000000007FFE270D 00003C (v01 BOCHS BXPC 00000001 BXPC 00000001)
[ 0.002018] ACPI: IVRS 0x000000007FFE2749 000080 (v01 BOCHS BXPC 00000001 BXPC 00000001)
[ 0.002020] ACPI: WAET 0x000000007FFE27C9 000028 (v01 BOCHS BXPC 00000001 BXPC 00000001)
[ 0.002021] ACPI: Reserving FACP table memory at [mem 0x7ffe2511-0x7ffe2604]
[ 0.002022] ACPI: Reserving DSDT table memory at [mem 0x7ffe0040-0x7ffe2510]
[ 0.002023] ACPI: Reserving FACS table memory at [mem 0x7ffe0000-0x7ffe003f]
[ 0.002023] ACPI: Reserving APIC table memory at [mem 0x7ffe2605-0x7ffe26d4]
[ 0.002024] ACPI: Reserving HPET table memory at [mem 0x7ffe26d5-0x7ffe270c]
[ 0.002024] ACPI: Reserving MCFG table memory at [mem 0x7ffe270d-0x7ffe2748]
[ 0.002025] ACPI: Reserving IVRS table memory at [mem 0x7ffe2749-0x7ffe27c8]
[ 0.002025] ACPI: Reserving WAET table memory at [mem 0x7ffe27c9-0x7ffe27f0]
[ 0.002279] No NUMA configuration found
[ 0.002280] Faking a node at [mem 0x0000000000000000-0x00000004ffffffffff]
[ 0.002288] NODE_DATA(0) allocated [mem 0x47ffd5000-0x47ffffffff]
[ 0.002554] Zone ranges:
[ 0.002555]   DMA      [mem 0x0000000000001000-0x0000000000ffff]
[ 0.002556]   DMA32    [mem 0x000000001000000-0x00000000ffffffff]
[ 0.002557]   Normal   [mem 0x00000010000000-0x00000047fffffff]
[ 0.002558]   Device   empty
[ 0.002559] Movable zone start for each node
[ 0.002560] Early memory node ranges
[ 0.002561]   node 0: [mem 0x0000000000001000-0x00000000009effff]
[ 0.002562]   node 0: [mem 0x000000000000100000-0x000000007ffd7fff]
[ 0.002563]   node 0: [mem 0x0000000010000000-0x000000047fffffff]
```

## Выводы

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В ходе выполнения лабораторной работы приобрел навыки установки виртуальной машины на Qemu, установил ряд пакетов и настроил ОС для дальнейшей работы на ней.