



МИНОБРНАУКИ РОССИИ

**Федеральное государственное бюджетное образовательное учреждение
высшего образования**

«МИРЭА – Российский технологический университет»

РТУ МИРЭА

Институт Информационных технологий

**Кафедра Математического обеспечения и стандартизации информационных
технологий**

Практическая работа №7

**По дисциплине: «Архитектура операционных систем мобильных
устройств»**

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Задание на выполнение практической работы №7

1. Загрузка и запуск образа Docker

```
alex@HOME-PC ~ > explorer.exe .
alex@HOME-PC ~ > ls
17_0                               fd_8.7.0_amd64.deb  kittenhouse          sdk
android-kernel-builder-docker     filename            logfile              soloby
ba-metrics                        filename.pub        my-image.tar         test.txt
chaos-example                     fleet              my-image.tar:Zone.Identifier  testproj
cifkaf.sql                       generatornogui      plustest            timeline.csv
ck                                go                 project              userver
conf3                             gol                pyproj              userver-test
conf4                             golangproj         pythontest          wrk
conf5                             gomainproj         pytproj5            yandex-taxi-testsuite
cron.log                         grock              random               ydb_certs
dbeaver-ce_latest_amd64.deb       hydra.restore      scrip                ydb_data
docker-gs-ping                   javabd             scripcron.log        zsh_history_fix

alex@HOME-PC ~ > docker load -i my-image.tar
508d7a929385: Loading layer [=====>] 5.632kB/5.632kB
37a66fe7ae7e: Loading layer [=====>] 2.048kB/2.048kB
022326001f89: Loading layer [=====>] 904MB/904MB
4b3bd23696e8: Loading layer [=====>] 77.04MB/77.04MB
59c91cba4ebd: Loading layer [=====>] 541.1MB/541.1MB
efb7d259c76d: Loading layer [=====>] 9.216kB/9.216kB
b4bf9f758073: Loading layer [=====>] 4.608kB/4.608kB
4f9559f832de: Loading layer [=====>] 8.753MB/8.753MB
5f70bf18a086: Loading layer [=====>] 1.024kB/1.024kB
21f970386418: Loading layer [=====>] 3.552GB/3.552GB
Loaded image: android-kernel-praktika:latest
alex@HOME-PC ~ > docker run -it android-kernel-praktika:latest /bin/bash
→ /kernel
```

3. Сборка ядра

```
alex@HOME-PC ~ > docker run -it android-kernel-praktika:latest /bin/bash
→ /kernel cd beryllium_derp
→ beryllium_derp git:(ten) × make clean
→ beryllium_derp git:(ten) × mkdir -p ./output
→ beryllium_derp git:(ten) × make mrproper O=./output
make[1]: Entering directory '/kernel/beryllium_derp/output'
CLEAN arch/arm64/kernel/vdso
CLEAN arch/arm64/kernel/vdso32
CLEAN arch/arm64/kernel
CLEAN drivers/net/wireguard
CLEAN drivers/video/logo
CLEAN firmware
CLEAN kernel
CLEAN lib
CLEAN net/wireless
CLEAN security/selinux
CLEAN usr
CLEAN arch/arm64/boot
CLEAN arch/arm64/boot/dts/qcom
CLEAN .tmp_versions
CLEAN scripts/basic
CLEAN scripts/dtc
CLEAN scripts/genksyms
CLEAN scripts/kconfig
CLEAN scripts/mod
CLEAN scripts/selinux/genheaders
CLEAN scripts/selinux/mdp
CLEAN scripts
CLEAN include/config include/generated arch/arm64/include/generated
CLEAN .config .version Module.symvers
make[1]: Leaving directory '/kernel/beryllium_derp/output'
→ beryllium_derp git:(ten) × make O=./output beryllium_defconfig
make[1]: Entering directory '/kernel/beryllium_derp/output'
HOSTCC scripts/basic/fixdep
GEN ./Makefile
HOSTCC scripts/kconfig/conf.o
SHIPPED scripts/kconfig/zconf.tab.c
SHIPPED scripts/kconfig/zconf.lex.c
SHIPPED scripts/kconfig/zconf.hash.c
HOSTCC scripts/kconfig/zconf.tab.o
HOSTLD scripts/kconfig/conf
#
# configuration written to .config
```

```

→ beryllium_derp git:(ten) × make 0=./output beryllium_defconfig
make[1]: Entering directory '/kernel/beryllium_derp/output'
HOSTCC scripts/basic/fixdep
GEN      ./Makefile
HOSTCC scripts/kconfig/conf.o
SHIPPED scripts/kconfig/zconf.tab.c
SHIPPED scripts/kconfig/zconf.lex.c
SHIPPED scripts/kconfig/zconf.hash.c
HOSTCC scripts/kconfig/zconf.tab.o
HOSTLD scripts/kconfig/conf
#
# configuration written to .config
#
make[1]: Leaving directory '/kernel/beryllium_derp/output'
→ beryllium_derp git:(ten) × PATH="/toolchain/clang/bin:/toolchain/gcc/bin:${PATH}"
→ beryllium_derp git:(ten) × make all 0=./output -j4 ARCH=arm64 CROSS_COMPILE=aarch64-linux-android- CROSS_COMPILE_ARM32=arm-linux-androideabi-
make[1]: Entering directory '/kernel/beryllium_derp/output'
GEN      ./Makefile
scripts/kconfig/conf --silentoldconfig Kconfig
CHK      include/config/kernel.release
GEN      ./Makefile
UPD      include/config/kernel.release
WRAP     arch/arm64/include/generated/asm/bugs.h
WRAP     arch/arm64/include/generated/asm/clkdev.h
WRAP     arch/arm64/include/generated/asm/cputime.h
WRAP     arch/arm64/include/generated/asm/delay.h
WRAP     arch/arm64/include/generated/asm/div64.h
WRAP     arch/arm64/include/generated/asm/dma.h
WRAP     arch/arm64/include/generated/asm/dma-contiguous.h
WRAP     arch/arm64/include/generated/asm/early_ioremap.h
WRAP     arch/arm64/include/generated/asm/emergency-restart.h
WRAP     arch/arm64/include/generated/asm/errno.h
WRAP     arch/arm64/include/generated/asm/hw_irq.h
WRAP     arch/arm64/include/generated/asm/ioctl.h
WRAP     arch/arm64/include/generated/asm/ipcbuf.h
WRAP     arch/arm64/include/generated/asm/ioctls.h
WRAP     arch/arm64/include/generated/asm/irq_regs.h
WRAP     arch/arm64/include/generated/asm/kdebug.h
WRAP     arch/arm64/include/generated/asm/kmap_types.h
WRAP     arch/arm64/include/generated/asm/kvm_para.h
WRAP     arch/arm64/include/generated/asm/local.h
WRAP     arch/arm64/include/generated/asm/local64.h
WRAP     arch/arm64/include/generated/asm/mcs_spinlock.h

```

4. Получение размеров файлов Image.gz и Image.gz-dtb

```

→ beryllium_derp git:(ten) × find / -name 'Image*'
/kernel/beryllium_derp/output/arch/arm64/boot/Image
/kernel/beryllium_derp/output/arch/arm64/boot/Image.gz
/kernel/beryllium_derp/output/arch/arm64/boot/Image.gz-dtb
→ beryllium_derp git:(ten) × cd /kernel/beryllium_derp/output/arch/arm64/boot
→ boot git:(ten) × ls -lh
total 72M
-rw-r--r-- 1 root root 40M Dec 6 11:26 Image
-rw-r--r-- 1 root root 15M Dec 6 11:26 Image.gz
-rw-r--r-- 1 root root 21M Dec 6 11:26 Image.gz-dtb
drwxr-xr-x 1 root root 4.0K Dec 6 11:21 dts
→ boot git:(ten) × stat Image
  File: Image
  Size: 41926664      Blocks: 73984      IO Block: 4096   regular file
Device: 100043h/1048643d Inode: 384987      Links: 1
Access: (0644/-rw-r--r--)  Uid: (  0/   root)   Gid: (  0/   root)
Access: 2023-12-06 11:26:36.950091132 +0000
Modify: 2023-12-06 11:26:35.330095127 +0000
Change: 2023-12-06 11:26:35.330095127 +0000
Birth: -
→ boot stat Image.gz
  File: Image.gz
  Size: 14870162      Blocks: 29048      IO Block: 4096   regular file
Device: 100043h/1048643d Inode: 379389      Links: 1
Access: (0644/-rw-r--r--)  Uid: (  0/   root)   Gid: (  0/   root)
Access: 2023-12-06 11:26:40.010022005 +0000
Modify: 2023-12-06 11:26:40.000022278 +0000
Change: 2023-12-06 11:26:40.000022278 +0000
Birth: -
→ boot git:(ten) × stat Image.gz-dtb
  File: Image.gz-dtb
  Size: 21955801      Blocks: 42888      IO Block: 4096   regular file
Device: 100043h/1048643d Inode: 361545      Links: 1
Access: (0644/-rw-r--r--)  Uid: (  0/   root)   Gid: (  0/   root)
Access: 2023-12-05 08:47:55.000000000 +0000
Modify: 2023-12-06 11:26:40.020021733 +0000
Change: 2023-12-06 11:26:40.020021733 +0000
Birth: -
→ boot git:(ten) ×

```