

**Міністерство освіти і науки України
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 Кафедра обчислювальної техніки ФІОТ**

**ЗВІТ
з лабораторної роботи №4
з навчальної дисципліни
«Архітектура комп'ютерів-2. Процесори»**

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```
rubertos@Maksym-box: ~/repos/busybox
# uname -a
Linux (none) 4.19.219 #1 SMP Wed Dec 8 03:13:09 EET 2021 armv7l GNU/Linux
# ls -l
total 0
drwxrwxr-x 2 1000 1000 https://github.com/Ruberto5/AK_Lab 0 Dec 8 02:42 bin
drwxrwxr-x 2 1000 1000 https://github.com/Ruberto5/AK_Lab 0 Dec 8 03:00 boot
drwxrwxr-x 3 1000 1000 https://github.com/Ruberto5/AK_Lab 0 Dec 8 16:06 dev
drwxrwxr-x 3 1000 1000 https://github.com/Ruberto5/AK_Lab 11 Dec 8 02:59 init -> bin/busybox
drwxrwxr-x 3 1000 1000 https://github.com/Ruberto5/AK_Lab 0 Dec 8 03:01 lib
drwxrwxr-x 1 1000 1000 https://github.com/Ruberto5/AK_Lab 11 Dec 8 02:42 linuxrc -> bin/busybox
dr-xr-xr-x 90 root root 0 Jan 1 1970 proc
drwxrwxr-x 2 1000 1000 https://github.com/Ruberto5/AK_Lab 0 Dec 8 02:42 root
drwxrwxr-x 2 1000 1000 https://github.com/Ruberto5/AK_Lab 0 Dec 8 02:42 sbin
dr-xr-xr-x 12 root root 0 Dec 8 16:06 sys
drwxrwxr-x 2 1000 1000 https://github.com/Ruberto5/AK_Lab 0 Dec 8 02:42 tmp
drwxrwxr-x 4 1000 1000 https://github.com/Ruberto5/AK_Lab 0 Dec 8 02:42 usr
# dmesg | grep init
[ 0.000000] random: get_random_bytes called from start_kernel+0x9c/0x480 with crng_init=0
[ 0.000000] Memory: 406432K/524288K available (12288K kernel code, 1619K rdata, 4784K rodata, 2048K init, 393K bss, 52320K reserved, 6553
6K cma-reserved, 0K highmem)
[ 0.000000] .init : 0x(ptrval) - 0x(ptrval) (2048 kB)
[ 0.238173] devtmpfs: initialized
[ 0.327847] pinctrl core: initialized pinctrl subsystem
[ 0.839000] SCSI subsystem initialized
[ 1.469012] Trying to unpack rootfs image as initramfs...
[ 9.647350] Freeling initrd memory: 25088K
[ 10.225964] SuperH (H)SCIF driver initialized
[ 10.242446] nsm_serial: driver initialized
[ 10.245694] STMicroelectronics ASC driver initialized
[ 10.248834] STM32 USART driver initialized
[ 11.857470] Run /init as init process
# busybox --help | head -15
BusyBox v1.31.1 (2021-12-08 04:39:13 EET) multi-call binary.
BusyBox is copyrighted by many authors between 1998-2015.
Licensed under GPLv2. See source distribution for detailed
copyright notices.
```

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```
rubertos@Maksym-box: ~/repos/busybox
rubertos@Maksym-box:~/repos/busybox$ qemu-system-arm -kernel _install/boot/zImage -initrd rootfs.cpio.gz \
> -machine virt -nographic -m 512 \
> --append "root=/dev/ram0 rw console=ttyAMA0,115200 mem=512M"
[ 0.000000] Booting Linux on physical CPU 0x0
[ 0.000000] Linux version 4.19.219 (rubertos@Maksym-box) (gcc version 8.3.0 (GNU Toolchain for the A-profile Architecture 8.3-2019.03 (arm
-rel-8.3))) #1 SMP Wed Dec 8 03:13:09 EET 2021
[ 0.000000] CPU: ARMv7 Processor [412fc0f1] revision 1 (ARMv7), cr=10c5387d
[ 0.000000] CPU: div instructions available: patching division code
[ 0.000000] CPU: PIPT / VIPT nonaliasing data cache, PIPT instruction cache
[ 0.000000] OF: fdt: Machine model: linux,dummy-virt
[ 0.000000] Memory policy: Data cache writealloc
[ 0.000000] efi: Getting EFI parameters from FDT:
[ 0.000000] efi: UEFI not found.
[ 0.000000] cma: Reserved 64 MB at 0x5c00000
[ 0.000000] psct: probing for conduit method from DT.
[ 0.000000] psct: PCIv0.2 detected in firmware.
[ 0.000000] psct: Using standard V0.2 function IDs
[ 0.000000] psct: Trusted OS migration not required
[ 0.000000] random: get_random_bytes called from start_kernel+0x9c/0x480 with crng_init=0
[ 0.000000] percpu: Embedded 16 pages/cpu s36620 r8192 d20724 u65536
[ 0.000000] Built 1 zonelists, mobility grouping on. Total pages: 130048
[ 0.000000] Kernel command line: root=/dev/ram0 rw console=ttyAMA0,115200 mem=512M
[ 0.000000] Dentry cache hash table entries: 65536 (order: 6, 262144 bytes)
[ 0.000000] Inode-cache hash table entries: 32768 (order: 5, 131072 bytes)
[ 0.000000] Memory: 406432K/524288K available (12288K kernel code, 1619K rdata, 4784K rodata, 2048K init, 393K bss, 52320K reserved, 6553
6K cma-reserved, 0K highmem)
[ 0.000000] Virtual kernel memory layout:
[ 0.000000]   vector : 0xffff0000 - 0xffff1000 ( 4 kB)
[ 0.000000]   fixmap : 0xffc00000 - 0xfff00000 (3072 kB)
[ 0.000000]   vmalloc : 0xe0800000 - 0xffff800000 ( 496 MB)
[ 0.000000]   lowmem : 0xc0000000 - 0xe0000000 ( 512 MB)
[ 0.000000]   pkmapping : 0xbfe00000 - 0xc0000000 ( 2 MB)
[ 0.000000]   modules : 0xbff00000 - 0xbfe00000 ( 14 MB)
[ 0.000000]   .text : 0x(ptrval) - 0x(ptrval) (13280 kB)
[ 0.000000]   .init : 0x(ptrval) - 0x(ptrval) (2048 kB)
[ 0.000000]   .data : 0x(ptrval) - 0x(ptrval) (1620 kB)
[ 0.000000]   .bss : 0x(ptrval) - 0x(ptrval) ( 394 kB)
[ 0.000000] SLUB: HWalign=64, Order=0-3, MinObjects=0, CPUs=1, Nodes=1
```



