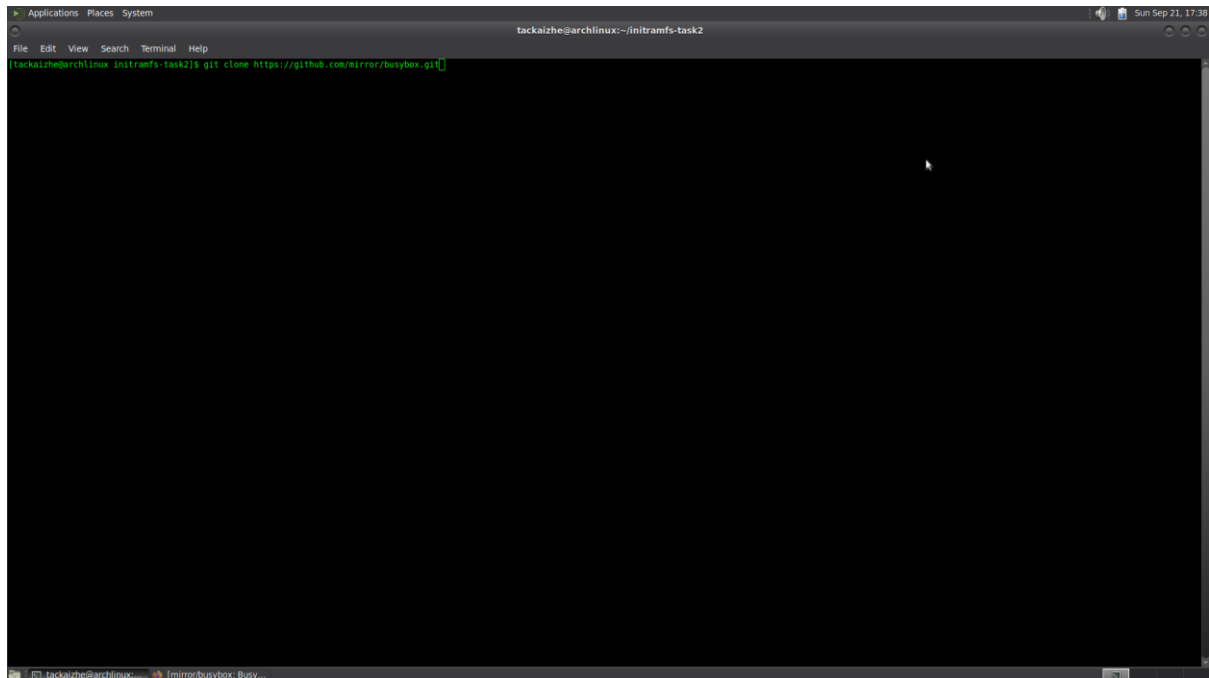


#18 Задание по корневой файловой системе

Часть 2

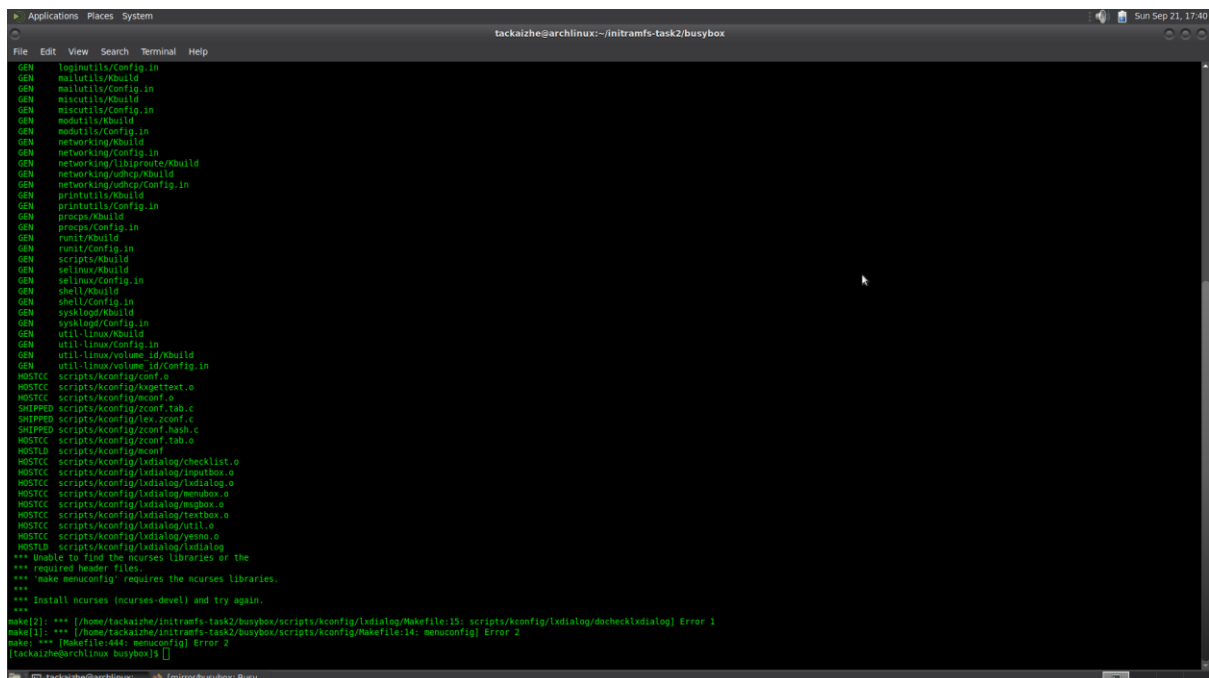
1. Получение Busybox



```
tackaizhe@archlinux:~/initramfs-task2$ git clone https://github.com/mirror/busybox.git
```

The terminal window shows the command to clone the busybox repository from GitHub. The window title is "tackaizhe@archlinux:~/initramfs-task2". The status bar at the bottom shows "tackaizhe@archlinux" and "[mirror/busybox: Busy...]".

2. Получение ошибки при сборке menuconfig



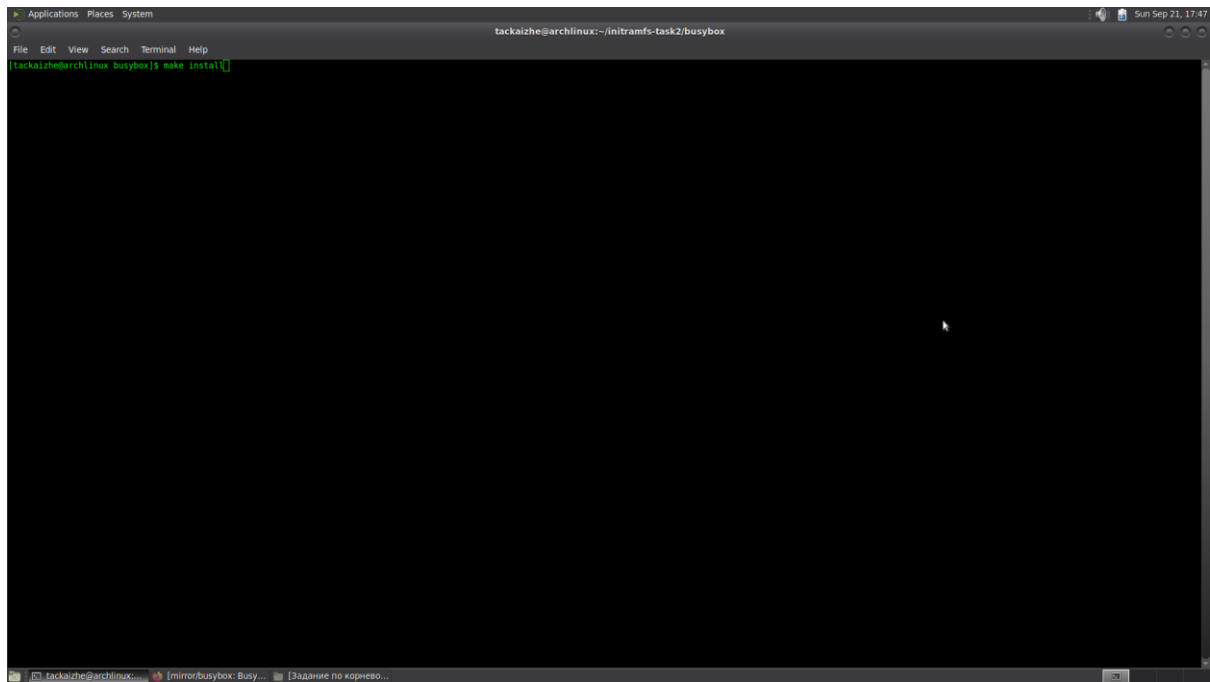
```
GEN loginutils/Config.in
GEN mailutils/Makefile
GEN mailutils/Config.in
GEN miscutils/Makefile
GEN miscutils/Config.in
GEN modutils/Makefile
GEN modutils/Config.in
GEN networking/Makefile
GEN networking/Config.in
GEN networking/liblprnter/Makefile
GEN networking/udhcp/Makefile
GEN networking/udhcp/Config.in
GEN printutils/Makefile
GEN printutils/Config.in
GEN procsps/Makefile
GEN procsps/Config.in
GEN runit/Makefile
GEN runit/Config.in
GEN scripts/Makefile
GEN selinux/Makefile
GEN selinux/Config.in
GEN shell/Makefile
GEN shell/Config.in
GEN syslogs/Makefile
GEN syslogs/Config.in
GEN util-linux/Makefile
GEN util-linux/Config.in
GEN util-linux/volume_id/Makefile
GEN util-linux/volume_id/Config.in
HOSTCC scripts/kconfig/conf.o
HOSTCC scripts/kconfig/kconfig.o
HOSTCC scripts/kconfig/mconf.o
SHIPPED scripts/kconfig/zconf.tab.c
SHIPPED scripts/kconfig/lex.zconf.c
SHIPPED scripts/kconfig/zconf.hash.c
HOSTCC scripts/kconfig/zconf.tab.o
HOSTLD scripts/kconfig/mconf
HOSTCC scripts/kconfig/ldialog/checklist.o
HOSTCC scripts/kconfig/ldialog/inputbox.o
HOSTCC scripts/kconfig/ldialog/ldialog.o
HOSTCC scripts/kconfig/ldialog/menubox.o
HOSTCC scripts/kconfig/ldialog/msgbox.o
HOSTCC scripts/kconfig/ldialog/textbox.o
HOSTCC scripts/kconfig/ldialog/util.o
HOSTCC scripts/kconfig/ldialog/yesno.o
HOSTLD scripts/kconfig/ldialog/ldialog
*** Unable to find the ncurses libraries or the
*** required header files.
*** make menuconfig requires the ncurses libraries.
*** Install ncurses (ncurses-devel) and try again.
***
make[2]: *** [/home/tackaizhe/initramfs-task2/busybox/scripts/kconfig/ldialog/Makefile:15: scripts/kconfig/ldialog/docheckldialog] Error 1
make[1]: *** [/home/tackaizhe/initramfs-task2/busybox/scripts/kconfig/Makefile:14: menuconfig] Error 2
make: *** [Makefile:44: menuconfig] Error 2
tackaizhe@archlinux:~/initramfs-task2$
```

The terminal window shows the build process of busybox. It lists various components being generated (GEN) and compiled (HOSTCC, SHIPPED, HOSTLD). The process fails with the following error messages:

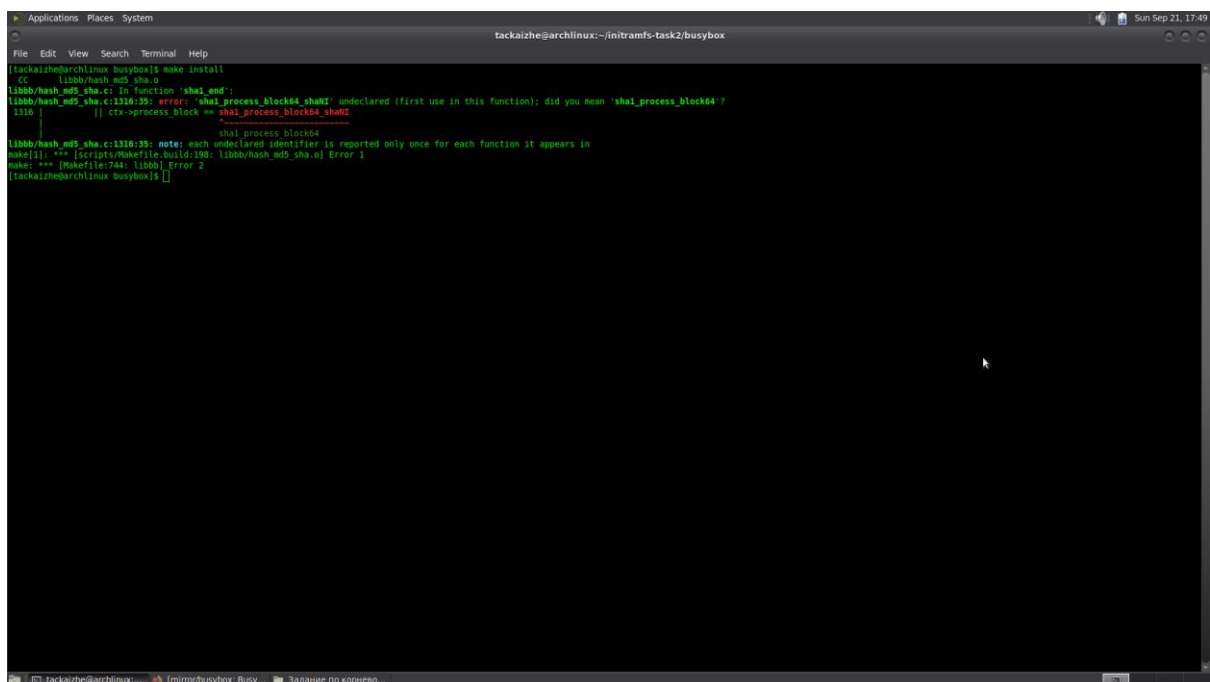
```
*** Unable to find the ncurses libraries or the
*** required header files.
*** make menuconfig requires the ncurses libraries.
*** Install ncurses (ncurses-devel) and try again.
***
make[2]: *** [/home/tackaizhe/initramfs-task2/busybox/scripts/kconfig/ldialog/Makefile:15: scripts/kconfig/ldialog/docheckldialog] Error 1
make[1]: *** [/home/tackaizhe/initramfs-task2/busybox/scripts/kconfig/Makefile:14: menuconfig] Error 2
make: *** [Makefile:44: menuconfig] Error 2
```

The window title is "tackaizhe@archlinux:~/initramfs-task2/busybox". The status bar at the bottom shows "tackaizhe@archlinux" and "[mirror/busybox: Busy...]".

3. Коментируем Makefile. В нём происходит проверка наличия библиотеки ncurses посредством запуска скрипта. Почему он выдаёт ошибку загадка, так как библиотека есть в системе



6. Получаем ошибку при компиляции



7. Отключаем опцию SHA1

Возможно, компилятор, который поставляется моим linux просто неполный, так как далее будут ещё ошибки.


```
Applications Places System
tackaizhe@archlinux:~/initramfs-task2/busybox
File Edit View Search Terminal Help

/ install/usr/sbin/ether-wake -> ../bin/busybox
/ install/usr/sbin/fakeidentd -> ../bin/busybox
/ install/usr/sbin/fstest -> ../bin/busybox
/ install/usr/sbin/fdformat -> ../bin/busybox
/ install/usr/sbin/fdfreeze -> ../bin/busybox
/ install/usr/sbin/fstyp -> ../bin/busybox
/ install/usr/sbin/httpd -> ../bin/busybox
/ install/usr/sbin/l2cdetect -> ../bin/busybox
/ install/usr/sbin/l2cdump -> ../bin/busybox
/ install/usr/sbin/l2cget -> ../bin/busybox
/ install/usr/sbin/l2cset -> ../bin/busybox
/ install/usr/sbin/l2ctransfer -> ../bin/busybox
/ install/usr/sbin/lplugd -> ../bin/busybox
/ install/usr/sbin/inetd -> ../bin/busybox
/ install/usr/sbin/killall5 -> ../bin/busybox
/ install/usr/sbin/loadfont -> ../bin/busybox
/ install/usr/sbin/lpd -> ../bin/busybox
/ install/usr/sbin/mem -> ../bin/busybox
/ install/usr/sbin/memdump -> ../bin/busybox
/ install/usr/sbin/memwrite -> ../bin/busybox
/ install/usr/sbin/mem-client -> ../bin/busybox
/ install/usr/sbin/mlogin -> ../bin/busybox
/ install/usr/sbin/mtpd -> ../bin/busybox
/ install/usr/sbin/partprobe -> ../bin/busybox
/ install/usr/sbin/popmaildir -> ../bin/busybox
/ install/usr/sbin/powertop -> ../bin/busybox
/ install/usr/sbin/rdate -> ../bin/busybox
/ install/usr/sbin/rdev -> ../bin/busybox
/ install/usr/sbin/readahead -> ../bin/busybox
/ install/usr/sbin/readprofile -> ../bin/busybox
/ install/usr/sbin/remove-shell -> ../bin/busybox
/ install/usr/sbin/rpcwake -> ../bin/busybox
/ install/usr/sbin/seeding -> ../bin/busybox
/ install/usr/sbin/sendmail -> ../bin/busybox
/ install/usr/sbin/setfont -> ../bin/busybox
/ install/usr/sbin/setlogcons -> ../bin/busybox
/ install/usr/sbin/svlogd -> ../bin/busybox
/ install/usr/sbin/telnetd -> ../bin/busybox
/ install/usr/sbin/tftp -> ../bin/busybox
/ install/usr/sbin/ubiattach -> ../bin/busybox
/ install/usr/sbin/ubidetach -> ../bin/busybox
/ install/usr/sbin/ubiskool -> ../bin/busybox
/ install/usr/sbin/ubirename -> ../bin/busybox
/ install/usr/sbin/ubirmwrl -> ../bin/busybox
/ install/usr/sbin/ubirwvol -> ../bin/busybox
/ install/usr/sbin/ubiupdatevol -> ../bin/busybox
/ install/usr/sbin/udhcpd -> ../bin/busybox

You will probably need to make your busybox binary
setuid root to ensure all configured applets will
work properly.

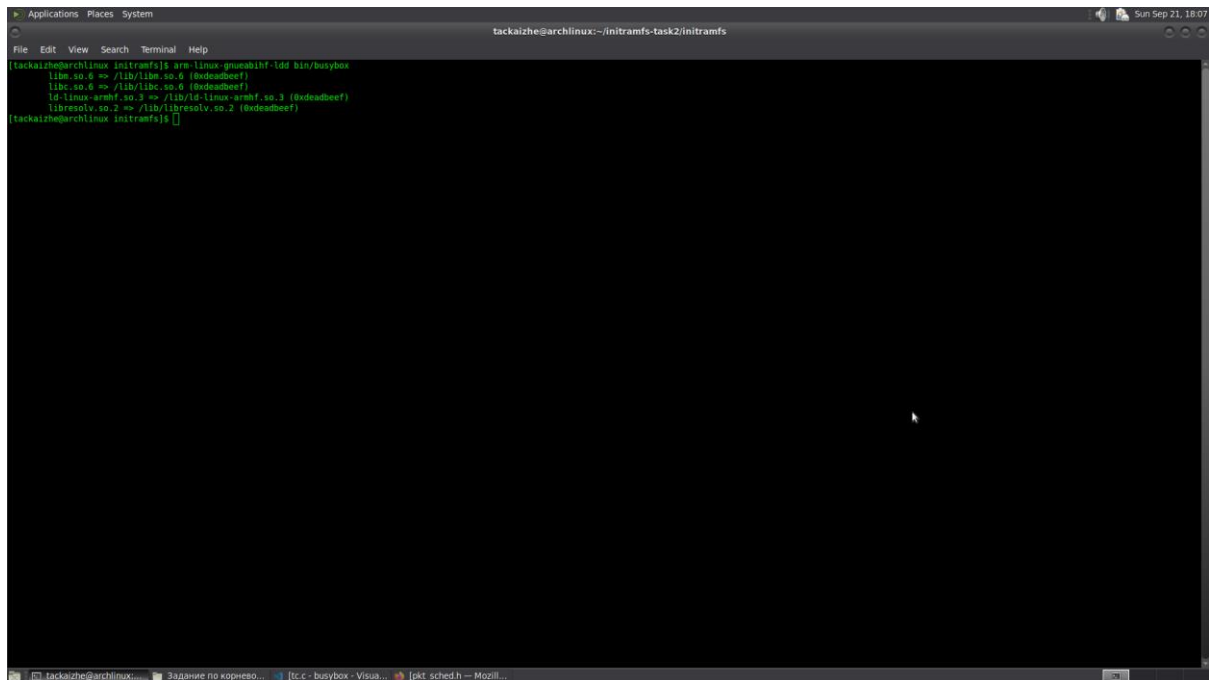
[tackaizhe@archlinux busybox]$
```

12. Перемещаем в папку

```
Applications Places System
tackaizhe@archlinux:~/initramfs-task2
File Edit View Search Terminal Help

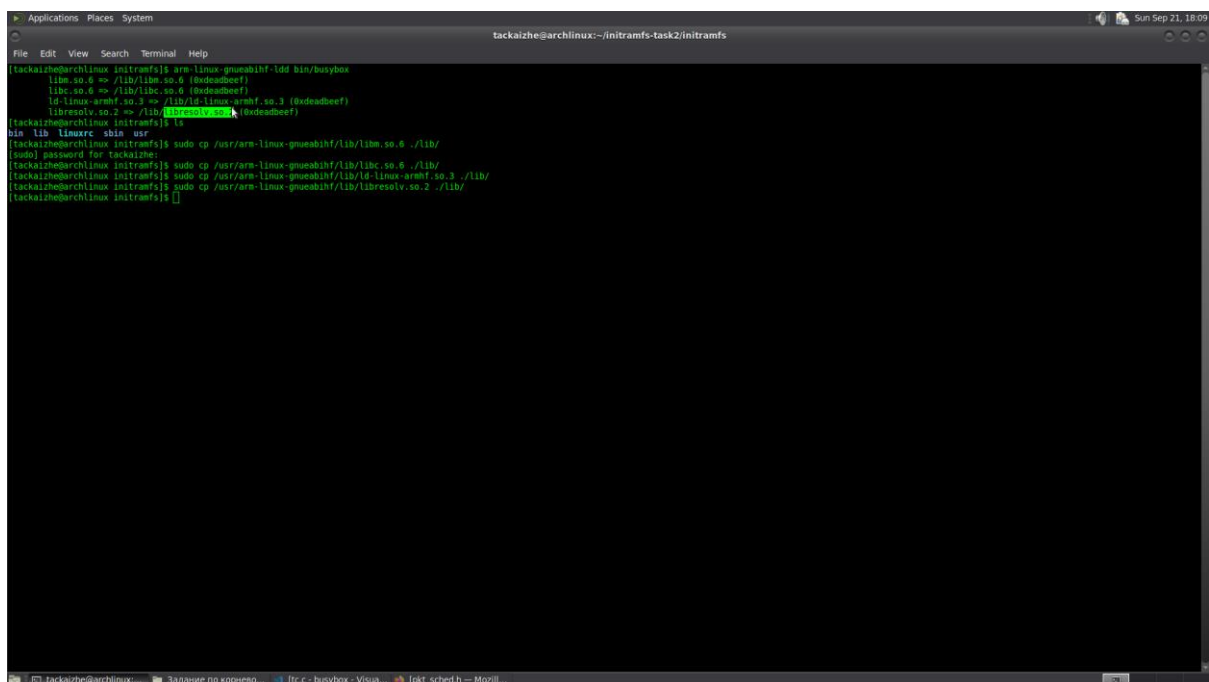
[tackaizhe@archlinux bin]$ cd ../..
[tackaizhe@archlinux busybox]$ ls
AUTHORS  Makefile.config  README
Config.in  Makefile.flags  T000
INSTALL  Makefile.help  T000 unicode
LICENSE  README  src  test  _install
Makefile  NOFORN  NOEXEC.sh  applets  busybox.links  configs
[tackaizhe@archlinux busybox]$ cd
[tackaizhe@archlinux initramfs-task2]$ ls
busybox  vxpress-v2p-ca9.dtb  zImage
[tackaizhe@archlinux initramfs-task2]$ mkdir initramfs
[tackaizhe@archlinux initramfs-task2]$ mv busybox_install/* ./initramfs/
```

13. Смотрим какие нужны библиотеки



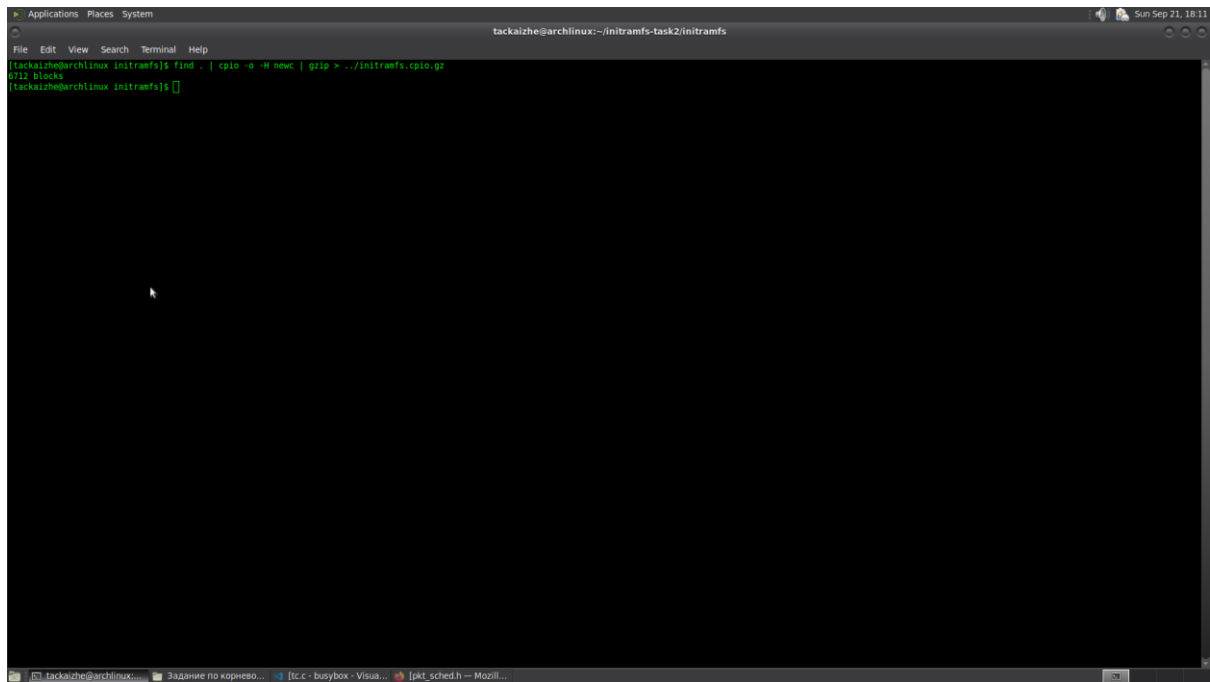
```
tackaizhe@archlinux:~/initramfs-task2/initramfs
File Edit View Search Terminal Help
[tackaizhe@archlinux initramfs]$ arm-linux-gnueabi-hf-ldd bin/busybox
libm.so.6 => /lib/libm.so.6 (0xdeadbeef)
libc.so.6 => /lib/libc.so.6 (0xdeadbeef)
ld-linux-armhf.so.3 => /lib/ld-linux-armhf.so.3 (0xdeadbeef)
libresolv.so.2 => /lib/libresolv.so.2 (0xdeadbeef)
[tackaizhe@archlinux initramfs]$
```

14. Получаем нужные библиотеки



```
tackaizhe@archlinux:~/initramfs-task2/initramfs
File Edit View Search Terminal Help
[tackaizhe@archlinux initramfs]$ arm-linux-gnueabi-hf-ldd bin/busybox
libm.so.6 => /lib/libm.so.6 (0xdeadbeef)
libc.so.6 => /lib/libc.so.6 (0xdeadbeef)
ld-linux-armhf.so.3 => /lib/ld-linux-armhf.so.3 (0xdeadbeef)
libresolv.so.2 => /lib/libresolv.so.2 (0xdeadbeef)
[tackaizhe@archlinux initramfs]$ ls
bin lib linuxrc/sbin usr
[tackaizhe@archlinux initramfs]$ sudo cp /usr/arm-linux-gnueabi-hf/lib/libm.so.6 ./lib/
[sudo] password for tackaizhe:
[tackaizhe@archlinux initramfs]$ sudo cp /usr/arm-linux-gnueabi-hf/lib/libc.so.6 ./lib/
[tackaizhe@archlinux initramfs]$ sudo cp /usr/arm-linux-gnueabi-hf/lib/ld-linux-armhf.so.3 ./lib/
[tackaizhe@archlinux initramfs]$ sudo cp /usr/arm-linux-gnueabi-hf/lib/libresolv.so.2 ./lib/
[tackaizhe@archlinux initramfs]$
```

15. Создаём initrd

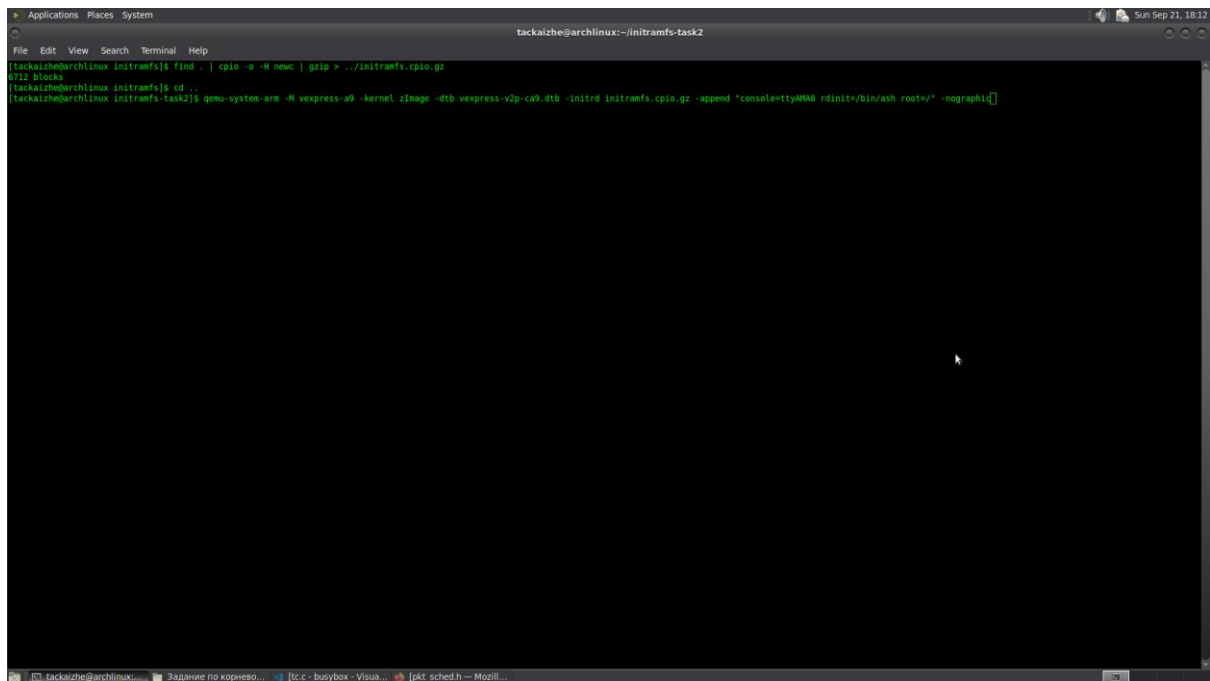


A terminal window titled 'tackaizhe@archlinux:~/initramfs-task2/initramfs' with a menu bar (File, Edit, View, Search, Terminal, Help). The terminal shows the following commands and output:

```
tackaizhe@archlinux initramfs$ find . | cpio -o -H newc | gzip > ../initramfs.cpio.gz
0712 blocks
tackaizhe@archlinux initramfs$
```

The window's taskbar at the bottom shows icons for 'tackaizhe@archlinux', 'Задание по корнессо...', 'lzc.c - busybox - Visua...', and 'lpt_sched.h - Mozill...'.

16. Запускаем QEMU



A terminal window titled 'tackaizhe@archlinux:~/initramfs-task2' with a menu bar (File, Edit, View, Search, Terminal, Help). The terminal shows the following commands and output:

```
tackaizhe@archlinux initramfs$ find . | cpio -o -H newc | gzip > ../initramfs.cpio.gz
0712 blocks
tackaizhe@archlinux initramfs$ cd ..
tackaizhe@archlinux initramfs-task2$ qemu-system-arm -M vxpress-a9 -kernel zImage -dtb vxpress-v2p-ca9.dtb -initrd initramfs.cpio.gz -append "console=ttyMMA0 rdinit=/bin/ash root=/" -nographic
```

The window's taskbar at the bottom shows icons for 'tackaizhe@archlinux', 'Задание по корнессо...', 'lzc.c - busybox - Visua...', and 'lpt_sched.h - Mozill...'.

17. Запустился


```
Applications Places System
tackaizhe@archlinux:~/initramfs-task2

1.597495) usbcore: registered new interface driver pegasus
1.597557) usbcore: registered new interface driver xiala
1.597618) usbcore: registered new interface driver usb179.178a
1.597678) usbcore: registered new interface driver cdc_ether
1.597736) usbcore: registered new interface driver smc75xx
1.597796) usbcore: registered new interface driver smc83xx
1.597858) usbcore: registered new interface driver net1080
1.597916) usbcore: registered new interface driver cdc_subset
1.597976) usbcore: registered new interface driver lbmup
1.598045) usbcore: registered new interface driver cdc_ncm
1.731964) isp1760 4f000000.usb: isp1760 bus width: 32, dc: digital
1.732373) isp1760 4f000000.usb: NOP ISP1760 USB Host Controller
1.732485) isp1760 4f000000.usb: new USB bus registered, assigned bus number 1
1.732842) isp1760 4f000000.usb: Scratch test failed. 0x00000000
1.732877) isp1760 4f000000.usb: can't setup: 15
1.733011) isp1760 4f000000.usb: USB bus 1 deregistered
1.737493) usbcore: registered new interface driver usb-storage
1.750423) rtc-pl831 10017000.rtc: registered as rtc0
1.751027) rtc-pl831 10017000.rtc: setting system clock to 2025-09-21T18:13:17 UTC (1758478397)
1.753113) rtc_dev: rtc /dev entries driver
1.780311) mmc-pl18x 10005000.mmc: Got CD GPIO
1.780328) mmc-pl18x 10005000.mmc: Got WP GPIO
1.791006) sdhci: Secure Digital Host Controller Interface driver
1.791017) sdhci: Copyright(c) Pierre Ossman
1.792945) synopsys DesignWare Multimedia Card Interface Driver
1.794665) sdhci-pl18x: SDHCI platform and OF driver helper
1.800358) usbcore: registered new interface driver usbhid
1.800388) usbhid: USB HID core driver
1.804109) mmc-pl18x 10005000.mmc: mmc0: PL181 manf 41 rev0 at 0x10005000 irq 31,32 (pio)
1.827728) hw perfevents: enabled with armv7 cortex-a9 PMU driver, 7 (0000003f) counters available
1.830802) NET: Registered PF_INET6 protocol family
1.830718) Segment Routing with IPv6
1.830806) sit: IPv6, IPv4 and MPLS over IPv4 tunneling driver
1.837209) sit: IPv6, IPv4 and MPLS over IPv4 tunneling driver
1.839462) NET: Registered PF_PACKET protocol family
1.839518) can: controller area network core
1.839733) NET: Registered PF_CAN protocol family
1.839792) can: raw protocol
1.839808) can: broadcast manager protocol
1.839991) can: netlink gateway - max_hops=1
1.840005) key type dns_resolver registered
1.841323) Thumb2 CNV extension supported.
1.841373) Registering SMP/SMP emulation handler
1.873397) Input: AT Max Set 2 Keyboard as /devices/platform/bus40000000/busb40000000/motherboard-bus40000000/busb40000000/lofgag07.00000000/10000000.knl/serial/input/input0
1.887702) Loading compiled-in X.509 certificates
1.910377) 10009000.serial: ttyAMA0 at MMIO 0x10009000 (irq = 37, base baud = 0) is a PL011 rev1
1.910399) printk: console [ttyAMA0] enabled
1.961084) 10000000.serial: ttyAMA1 at MMIO 0x10000000 (irq = 38, base baud = 0) is a PL011 rev1
1.963229) 10000000.serial: ttyAMA2 at MMIO 0x10000000 (irq = 39, base baud = 0) is a PL011 rev1
1.963479) 10000000.serial: ttyAMA3 at MMIO 0x10000000 (irq = 40, base baud = 0) is a PL011 rev1
2.364915) Input: Ideapad 2 Generic Explorer Mouse as /devices/platform/bus40000000/busb40000000/motherboard-bus40000000/busb40000000/lofgag07.00000000/10007000.knl/serial/input/input2
2.170904) clk: Disabling unused clocks
2.212408) Freeing unused kernel image (initmem) memory: 2040K
2.215717) mm: /bin/ash as init process
/bin/ash: can't access tty: job control turned off
#
```

18. Работа

```
Applications Places System
tackaizhe@archlinux:~/initramfs-task2

# ls
bin      dev      lib      linuxrc  root     shin     usr
# cd bin
/bin # ls
arch      dumpknap  kill      netstat   setpriv
ash       echo      link      nice      setserial
base32    ed        linux32   pidof     sh
base64    egrep     linux64   ping      sleep
busybox   false     ln        plmp      stat
cat       fatattr   login     pipe_progress  stty
chattr    fdflush   ls        printenv  su
chgrp     fgrep     lsattr    ps        sync
chmod     fsync     lzop      pwd       tar
chown     getopt    mknlink   reformine  touch
compso    grep      mkdir     resume    true
cp         gunzip    mknode    rev        umount
cpio       gzip      mktemp    rm         uname
cttyhack  hostname more      rmdir      usleep
date       hush      mount     rpm        vi
df          ionice    mountpoint run-parts  watch
df          iostat   mountstat scriptreplay  zcat
dmesg      ipcalc    mt        sed
dmesdmain  tbd_node  mv        setarch
/bin #
```