

Процес виконання лабораторної роботи

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Обзор Терминал Пн, 17:32
lelly@lelly-super-pc: ~

Файл Правка Вид Поиск Терминал Справка
linux-hwe-5.4-headers-5.4.0-70 linux-hwe-5.4-headers-5.4.0-72
Для их удаления используйте «sudo apt autoremove».
Предлагаемые пакеты:
distcc
Следующие НОВЫЕ пакеты будут установлены:
ccache
Обновлено 0 пакетов, установлено 1 новых пакетов, для удаления отмечено 0 пакетов, и 296 пакетов не обновлено.
Необходимо скачать 110 kB архивов.
После данной операции объем занятого дискового пространства возрастёт на 326 kB.
Пол:1 http://ua.archive.ubuntu.com/ubuntu bionic/main amd64 ccache amd64 3.4.1-1 [110 kB]
Получено 110 kB за 0с (932 kB/s)
Выбор ранее не выбранного пакета ccache.
(Чтение базы данных ... на данный момент установлено 413713 файлов и каталогов.)
Подготовка к распаковке .../ccache_3.4.1-1_amd64.deb ...
Распаковывается ccache (3.4.1-1) ...
Настраивается пакет ccache (3.4.1-1) ...
Updating symlinks in /usr/lib/ccache ...
Обрабатываются триггеры для man-db (2.8.3-2ubuntu0.1) ...
lelly@lelly-super-pc:~$ ccache -M 5G
Set cache size limit to 5.0 GB
lelly@lelly-super-pc:~$ ccache -s
cache directory             /home/lelly/.ccache
primary config              /home/lelly/.ccache/ccache.conf
secondary config (readonly) /etc/ccache.conf
cache hit (direct)         0
cache hit (preprocessed)   0
cache miss                 0
cache hit rate             0.00 %
cleanups performed         0
files in cache             0
cache size                 0.0 kB
max cache size            5.0 GB
lelly@lelly-super-pc:~$ tree ~/.ccache
/home/lelly/.ccache
└── ccache.conf

0 directories, 1 file
lelly@lelly-super-pc:~$
```

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Обзор Терминал Пн, 17:33
lelly@lelly-super-pc: ~

Файл Правка Вид Поиск Терминал Справка
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Предлагаемые пакеты:
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Обновлено 0 пакетов, установлено 1 новых пакетов, для удаления отмечено 0 пакетов, и 296 пакетов не обновлено.
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Настраивается пакет ccache (3.4.1-1) ...
Updating symlinks in /usr/lib/ccache ...
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Set cache size limit to 5.0 GB
lelly@lelly-super-pc:~$ ccache -s
cache directory             /home/lelly/.ccache
primary config              /home/lelly/.ccache/ccache.conf
secondary config (readonly) /etc/ccache.conf
cache hit (direct)         0
cache hit (preprocessed)   0
cache miss                 0
cache hit rate             0.00 %
cleanups performed         0
files in cache             0
cache size                 0.0 kB
max cache size            5.0 GB
lelly@lelly-super-pc:~$ tree ~/.ccache
/home/lelly/.ccache
└── ccache.conf

0 directories, 1 file
lelly@lelly-super-pc:~$ export CROSS_COMPILE="ccache your-toolchain-prefix"
lelly@lelly-super-pc:~$
```

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Обзор Терминал Пн, 18:11
lelly@lelly-super-pc: ~/repos

Файл Правка Вид Поиск Терминал Справка
fatal: Не удалось прочитать из внешнего репозитория.

Удостоверьтесь, что у вас есть необходимые права доступа
и репозиторий существует.
lelly@lelly-super-pc:~/repos$ git clone git://git.kernel.org/pub/scm/linux/kernel/git/stable/linux-stable.git
Клонирование в «linux-stable»...
remote: Enumerating objects: 235, done.
remote: Counting objects: 100% (235/235), done.
remote: Compressing objects: 100% (102/102), done.
^Случение объектов: 1% (175251/10008476), 89.96 MiB | 2.27 MiB/s
lelly@lelly-super-pc:~/repos$ ls
lelly@lelly-super-pc:~/repos$ git clone git://git@source.denx.de:u-boot/u-boot.git
Клонирование в «u-boot»...
fatal: Unable to look up git@source.denx.de:u-boot (port 9418) (Неизвестное имя или служба)
lelly@lelly-super-pc:~/repos$ git clone git@source.denx.de:u-boot/u-boot.git
Клонирование в «u-boot»...
git@source.denx.de: Permission denied (publickey).
fatal: Не удалось прочитать из внешнего репозитория.

Удостоверьтесь, что у вас есть необходимые права доступа
и репозиторий существует.
lelly@lelly-super-pc:~/repos$ git clone https://source.denx.de/u-boot/u-boot.git
Клонирование в «u-boot»...
fatal: unable to access 'https://source.denx.de/u-boot/u-boot.git/': server certificate verification failed. CAfile: /etc/ssl/certs/ca-certifica
tes.crt CRLfile: none
lelly@lelly-super-pc:~/repos$ git config --global http.sslverify false
lelly@lelly-super-pc:~/repos$ git config --global http.sslverify false
lelly@lelly-super-pc:~/repos$ git clone https://source.denx.de/u-boot/u-boot.git
Клонирование в «u-boot»...
remote: Enumerating objects: 817205, done.
remote: Counting objects: 100% (1814/1814), done.
remote: Compressing objects: 100% (944/944), done.
remote: Total 817205 (delta 1110), reused 1376 (delta 863), pack-reused 815391
Получение объектов: 100% (817205/817205), 160.89 MiB | 1.15 MiB/s, готово.
Определение изменений: 100% (683135/683135), готово.
Распаковка файлов: 100% (17897/17897), готово.
lelly@lelly-super-pc:~/repos$
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Обзор Терминал Пн, 18:13
lelly@lelly-super-pc: ~/repos/u-boot

Файл Правка Вид Поиск Терминал Справка
^Случение объектов: 1% (175251/10008476), 89.96 MiB | 2.27 MiB/s
lelly@lelly-super-pc:~/repos$ ls
lelly@lelly-super-pc:~/repos$ git clone git://git@source.denx.de:u-boot/u-boot.git
Клонирование в «u-boot»...
fatal: Unable to look up git@source.denx.de:u-boot (port 9418) (Неизвестное имя или служба)
lelly@lelly-super-pc:~/repos$ git clone git@source.denx.de:u-boot/u-boot.git
Клонирование в «u-boot»...
git@source.denx.de: Permission denied (publickey).
fatal: Не удалось прочитать из внешнего репозитория.

Удостоверьтесь, что у вас есть необходимые права доступа
и репозиторий существует.
lelly@lelly-super-pc:~/repos$ git clone https://source.denx.de/u-boot/u-boot.git
Клонирование в «u-boot»...
fatal: unable to access 'https://source.denx.de/u-boot/u-boot.git/': server certificate verification failed. CAfile: /etc/ssl/certs/ca-certifica
tes.crt CRLfile: none
lelly@lelly-super-pc:~/repos$ git config --global http.sslverify false
lelly@lelly-super-pc:~/repos$ git config --global http.sslverify false
lelly@lelly-super-pc:~/repos$ git clone https://source.denx.de/u-boot/u-boot.git
Клонирование в «u-boot»...
remote: Enumerating objects: 817205, done.
remote: Counting objects: 100% (1814/1814), done.
remote: Compressing objects: 100% (944/944), done.
remote: Total 817205 (delta 1110), reused 1376 (delta 863), pack-reused 815391
Получение объектов: 100% (817205/817205), 160.89 MiB | 1.15 MiB/s, готово.
Определение изменений: 100% (683135/683135), готово.
Распаковка файлов: 100% (17897/17897), готово.
lelly@lelly-super-pc:~/repos$ cd linux-stable
bash: cd: linux-stable: Нет такого файла или каталога
lelly@lelly-super-pc:~/repos$ cd u-boot
lelly@lelly-super-pc:~/repos/u-boot$ git tag | grep -v rc | tail -5
v2020.10
v2021.01
v2021.04
v2021.07
v2021.10
lelly@lelly-super-pc:~/repos/u-boot$
```

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Обзор Терминал Пн, 18:20
lelly@lelly-super-pc: ~/repos/u-boot

Файл Правка Вид Поиск Терминал Справка
CC      spl/lib/rand.o
CC      spl/lib/panic.o
lib/uuid.c: In function 'gen_rand_uuid':
lib/uuid.c:244:2: warning: converting a packed 'struct uuid' pointer (alignment 1) to a 'unsigned int' pointer (alignment 4) may result in an un
aligned pointer value [-Waddress-of-packed-member]
 244 | unsigned int *ptr = (unsigned int *)&uuid;
      | ^~~~~~
In file included from include/part.h:11,
                  from include/common.h:33,
                  from lib/uuid.c:6:
include/uuid.h:12:8: note: defined here
 12 | struct uuid {
      | ^~~~
CC      spl/lib/tiny-printf.o
CC      spl/lib/strto.o
LD      spl/drivers/usb/musb-new/built-in.o
LD      spl/drivers/built-in.o
LD      spl/lib/built-in.o
LD      spl/u-boot-spl
OBJCOPY spl/u-boot-spl-nodtb.bin
COPY    spl/u-boot-spl.bin
MKIMAGE MLO
MKIMAGE MLO.byteswap
===== WARNING =====
This board does not use CONFIG_WDT (DM watchdog support).
Please update the board to use CONFIG_WDT before the
v2019.10 release.
Failure to update by the deadline may result in board removal.
See doc/driver-model/MIGRATION.txt for more info.
=====
CFGCHK  u-boot.cfg
lelly@lelly-super-pc:~/repos/u-boot$ ls
api      config.mk  drivers  include  MAINTAINERS  post      test      u-boot.cfg.configs  u-boot.lds
arch     configs   dts      Kbuild   Makefile     README    tools     u-boot.dtb          u-boot.map
board    disk      env       Kconfig  MLO           scripts   u-boot    u-boot-dtb.bin      u-boot-nodtb.bin
cmd      doc       examples lib       MLO.byteswap spl        u-boot.bin  u-boot-dtb.img      u-boot.srec
common   Documenta fs        licenses net            System.map u-boot.cfg  u-boot.img          u-boot.sym
lelly@lelly-super-pc:~/repos/u-boot$
```

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Обзор Терминал Пн, 20:08
lelly@lelly-super-pc: ~/repos/linux-stable

Файл Правка Вид Поиск Терминал Справка
LD      spl/drivers/usb/musb-new/built-in.o
LD      spl/drivers/built-in.o
LD      spl/lib/built-in.o
LD      spl/u-boot-spl
OBJCOPY spl/u-boot-spl-nodtb.bin
COPY    spl/u-boot-spl.bin
MKIMAGE MLO
MKIMAGE MLO.byteswap
===== WARNING =====
This board does not use CONFIG_WDT (DM watchdog support).
Please update the board to use CONFIG_WDT before the
v2019.10 release.
Failure to update by the deadline may result in board removal.
See doc/driver-model/MIGRATION.txt for more info.
=====
CFGCHK  u-boot.cfg
lelly@lelly-super-pc:~/repos/u-boot$ ls
api      config.mk  drivers  include  MAINTAINERS  post      test      u-boot.cfg.configs  u-boot.lds
arch     configs   dts      Kbuild   Makefile     README    tools     u-boot.dtb          u-boot.map
board    disk      env       Kconfig  MLO           scripts   u-boot    u-boot-dtb.bin      u-boot-nodtb.bin
cmd      doc       examples lib       MLO.byteswap spl        u-boot.bin  u-boot-dtb.img      u-boot.srec
common   Documenta fs        licenses net            System.map u-boot.cfg  u-boot.img          u-boot.sym
lelly@lelly-super-pc:~/repos/u-boot$ cd ~/repos
lelly@lelly-super-pc:~/repos$ git clone git://git.kernel.org/pub/scm/linux/kernel/git/stable/linux-stable.git
Клонирование в «linux-stable»...
remote: Enumerating objects: 235, done.
remote: Counting objects: 100% (235/235), done.
remote: Compressing objects: 100% (102/102), done.
remote: Total 10008476 (delta 153), reused 171 (delta 133), pack-reused 10008241
Получение объектов: 100% (10008476/10008476), 3.76 GiB | 1.54 MiB/s, готово.
Определение изменений: 100% (8000763/8000763), готово.
Распаковка файлов: 100% (74302/74302), готово.
lelly@lelly-super-pc:~/repos$ cd linux-stable
lelly@lelly-super-pc:~/repos/linux-stable$ git checkout linux-4.19.y
Распаковка файлов: 100% (72584/72584), готово.
Ветка «linux-4.19.y» отслеживает внешнюю ветку «linux-4.19.y» из «origin».
Переключено на новую ветку «linux-4.19.y»
lelly@lelly-super-pc:~/repos/linux-stable$
```

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Обзор Терминал Пн, 21:27
lelly@lelly-super-pc: ~/repos/busybox

Файл Правка Вид Поиск Терминал Справка

./_install/usr/sbin/nanddump -> ../../bin/busybox
./_install/usr/sbin/nandwrite -> ../../bin/busybox
./_install/usr/sbin/nbd-client -> ../../bin/busybox
./_install/usr/sbin/nologin -> ../../bin/busybox
./_install/usr/sbin/ntpd -> ../../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/rtcwake -> ../../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/tftpd -> ../../bin/busybox
./_install/usr/sbin/ubiattach -> ../../bin/busybox
./_install/usr/sbin/ubidetach -> ../../bin/busybox
./_install/usr/sbin/ubinkvol -> ../../bin/busybox
./_install/usr/sbin/ubirename -> ../../bin/busybox
./_install/usr/sbin/ubirmvol -> ../../bin/busybox
./_install/usr/sbin/ubirsvol -> ../../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.
-----

lelly@lelly-super-pc:~/repos/busybox$ mkdir -p _install/{boot,dev,etc}/init.d,lib,proc,root,sys/kernel/debug,tmp
lelly@lelly-super-pc:~/repos/busybox$
```

```
Обзор Терминал Пн, 21:27
lelly@lelly-super-pc: ~/repos/busybox

Файл Правка Вид Поиск Терминал Справка

Final link with: m resolv
lelly@lelly-super-pc:~/repos/busybox$ make install
./_install/bin/arch -> busybox
./_install/bin/ash -> busybox
./_install/bin/base64 -> busybox
./_install/bin/cat -> busybox
./_install/bin/chattr -> busybox
./_install/bin/chgrp -> busybox
./_install/bin/chmod -> busybox
./_install/bin/chown -> busybox
./_install/bin/conspy -> busybox
./_install/bin/cp -> busybox
./_install/bin/cpio -> busybox
./_install/bin/cttyhack -> busybox
./_install/bin/date -> busybox
./_install/bin/dd -> busybox
./_install/bin/df -> busybox
./_install/bin/dmesg -> busybox
./_install/bin/dnsdomainname -> busybox
./_install/bin/dumpkmap -> busybox
./_install/bin/echo -> busybox
./_install/bin/ed -> busybox
./_install/bin/egrep -> busybox
./_install/bin/false -> busybox
./_install/bin/fatattr -> busybox
./_install/bin/fdflush -> busybox
./_install/bin/fgrep -> busybox
./_install/bin/fsync -> busybox
./_install/bin/getopt -> busybox
./_install/bin/grep -> busybox
./_install/bin/gunzip -> busybox
./_install/bin/gzip -> busybox
./_install/bin/hostname -> busybox
./_install/bin/hush -> busybox
./_install/bin/ionice -> busybox
./_install/bin/iostat -> busybox
./_install/bin/ipcalc -> busybox
./_install/bin/kbd mode -> busybox
```



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Обзор Терминал Пн, 21:28
lelly@lelly-super-pc: ~/repos/busybox

Файл Правка Вид Поиск Терминал Справка
Circular buffer support (FEATURE_IPC_SYSLOG) [Y/n/?] (NEW) y
Circular buffer size in Kbytes (minimum 4KB) (FEATURE_IPC_SYSLOG_BUFFER_SIZE) [16] (NEW) 16
Linux kernel printk buffer support (FEATURE_KMSG_SYSLOG) [Y/n/?] (NEW) y
lelly@lelly-super-pc:~/repos/busybox$ make -j4
  SPLIT include/autoconf.h -> include/config/*
    GEN include/bbconfigopts.h
    GEN include/common_bufsiz.h
    GEN include/embedded_scripts.h
  HOSTCC applets/usage
  HOSTCC applets/applet_tables
applets/usage.c: In function 'main':
applets/usage.c:52:3: warning: ignoring return value of 'write', declared with attribute warn_unused_result [-Wunused-result]
   write(STDOUT_FILENO, usage_array[i].usage, strlen(usage_array[i].usage) + 1);
   ^~~~~
    GEN include/usage_compressed.h
    GEN include/applet_tables.h include/NUM_APPLETS.h
    GEN include/applet_tables.h include/NUM_APPLETS.h
  HOSTCC applets/usage_pod
applets/usage_pod.c: In function 'main':
applets/usage_pod.c:74:3: warning: format not a string literal and no format arguments [-Wformat-security]
   printf(usage_array[i].aname);
   ^~~~~
    CC applets/applets.o
    LD applets/built-in.o
    DOC busybox.pod
    DOC BusyBox.txt
    DOC busybox.1
    DOC BusyBox.html
    LD archival/built-in.o
    CC archival/bbunzip.o
    LD console-tools/built-in.o
    CC console-tools/chvt.o
    LD archival/libarchive/built-in.o
    CC archival/libarchive/common.o
    LD coreutils/built-in.o
    CC coreutils/basename.o
    CC archival/libarchive/data_align.o
    CC console-tools/clear.o
    CC archival/bz2.o
```

```
Обзор Терминал Пн, 21:28
lelly@lelly-super-pc: ~/repos/busybox

Файл Правка Вид Поиск Терминал Справка
Note: if build needs additional libraries, put them in CONFIG_EXTRA_LDLIBS.
Example: CONFIG_EXTRA_LDLIBS="pthread dl tirpc audit pam"
Makefile:718: recipe for target 'busybox_unstripped' failed
make: *** [busybox_unstripped] Error 1
lelly@lelly-super-pc:~/repos/busybox$ export PATH=/opt/gcc-arm-8.3-2019.03-x86_64-arm-linux-gnueabi/bin:$PATH
lelly@lelly-super-pc:~/repos/busybox$ export CROSS_COMPILE="ccache arm-linux-gnueabi-"
lelly@lelly-super-pc:~/repos/busybox$ export ARCH=arm
lelly@lelly-super-pc:~/repos/busybox$ make defconfig
scripts/kconfig/conf -d Config.in
*
* Busybox Configuration
*
* Settings
*
Enable compatibility for full-blown desktop systems (8kb) (DESKTOP) [Y/n/?] (NEW) y
Provide compatible behavior for rare corner cases (bigger code) (EXTRA_COMPAT) [N/y/?] (NEW) n
Building for Fedora distribution (FEDORA_COMPAT) [N/y/?] (NEW) n
Enable obsolete features removed before SUSv3 (INCLUDE_SUSV2) [Y/n/?] (NEW) y
Support --long-options (LONG_OPTS) [Y/?] (NEW) y
Show applet usage messages (SHOW_USAGE) [Y/n/?] (NEW) y
  Show verbose applet usage messages (FEATURE_VERBOSE_USAGE) [Y/n/?] (NEW) y
  Store applet usage messages in compressed form (FEATURE_COMPRESS_USAGE) [Y/n/?] (NEW) y
Support files > 2 GB (LFS) [Y/n/?] (NEW) y
Support PAM (Pluggable Authentication Modules) (PAM) [N/y/?] (NEW) n
Use the devpts filesystem for Unix98 PTYs (FEATURE_DEVPTS) [Y/n/?] (NEW) y
Support utmp file (FEATURE_UTMP) [Y/n/?] (NEW) y
  Support wtmp file (FEATURE_WTMP) [Y/n/?] (NEW) y
Support writing pidfiles (FEATURE_PIDFILE) [Y/n/?] (NEW) y
  Directory for pidfiles (PID_FILE_PATH) [/var/run] (NEW) /var/run
Include busybox applet (BUSYBOX) [Y/n/?] (NEW) y
  Support --show SCRIPT (FEATURE_SHOW_SCRIPT) [Y/n] (NEW) y
  Support --install [-s] to install applet links at runtime (FEATURE_INSTALLER) [Y/n/?] (NEW) y
Don't use /usr (INSTALL_NO_USR) [N/y/?] (NEW) n
Drop SUID state for most applets (FEATURE_SUID) [Y/n/?] (NEW) y
  Enable SUID configuration via /etc/busybox.conf (FEATURE_SUID_CONFIG) [Y/n/?] (NEW) y
  Suppress warning message if /etc/busybox.conf is not readable (FEATURE_SUID_CONFIG_QUIET) [Y/n/?] (NEW) y
exec prefers applets (FEATURE_PREFER_APPLETS) [N/y/?] (NEW) n
```

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Обзор Терминал Пн, 21:33
lelly@lelly-super-pc: ~/repos/busybox

Файл Правка Вид Поиск Терминал Справка

./_install/usr/sbin/readprofile -> ../../bin/busybox
./_install/usr/sbin/remove-shell -> ../../bin/busybox
./_install/usr/sbin/rtcwake -> ../../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/tftpd -> ../../bin/busybox
./_install/usr/sbin/ubiattach -> ../../bin/busybox
./_install/usr/sbin/ubidetach -> ../../bin/busybox
./_install/usr/sbin/ubimkvol -> ../../bin/busybox
./_install/usr/sbin/ubirename -> ../../bin/busybox
./_install/usr/sbin/ubirmvol -> ../../bin/busybox
./_install/usr/sbin/ubirsvol -> ../../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.
-----

lelly@lelly-super-pc:~/repos/busybox$ mkdir -p _install/{boot,dev,etc}/init.d,lib,proc,root,sys/kernel/debug,tmp}
lelly@lelly-super-pc:~/repos/busybox$ #!/bin/sh
lelly@lelly-super-pc:~/repos/busybox$ vim _install/etc/init.d/rcS
lelly@lelly-super-pc:~/repos/busybox$ chmod +x _install/etc/init.d/rcS
lelly@lelly-super-pc:~/repos/busybox$ ln -s bin/busybox _install/init
lelly@lelly-super-pc:~/repos/busybox$ cd _install/boot
lelly@lelly-super-pc:~/repos/busybox/_install/boot$ cp ~/repos/linux-stable/arch/arm/boot/zImage .
lelly@lelly-super-pc:~/repos/busybox/_install/boot$ cp ~/repos/linux-stable/arch/arm/boot/dts/am335x-boneblack.dtb .
lelly@lelly-super-pc:~/repos/busybox/_install/boot$ cp ~/repos/linux-stable/System.map .
lelly@lelly-super-pc:~/repos/busybox/_install/boot$ cp ~/repos/linux-stable/.config ./config
lelly@lelly-super-pc:~/repos/busybox/_install/boot$ cd -
/home/lelly/repos/busybox
lelly@lelly-super-pc:~/repos/busybox$
```

```
Обзор Терминал Пн, 21:36
lelly@lelly-super-pc: ~/repos/busybox

Файл Правка Вид Поиск Терминал Справка

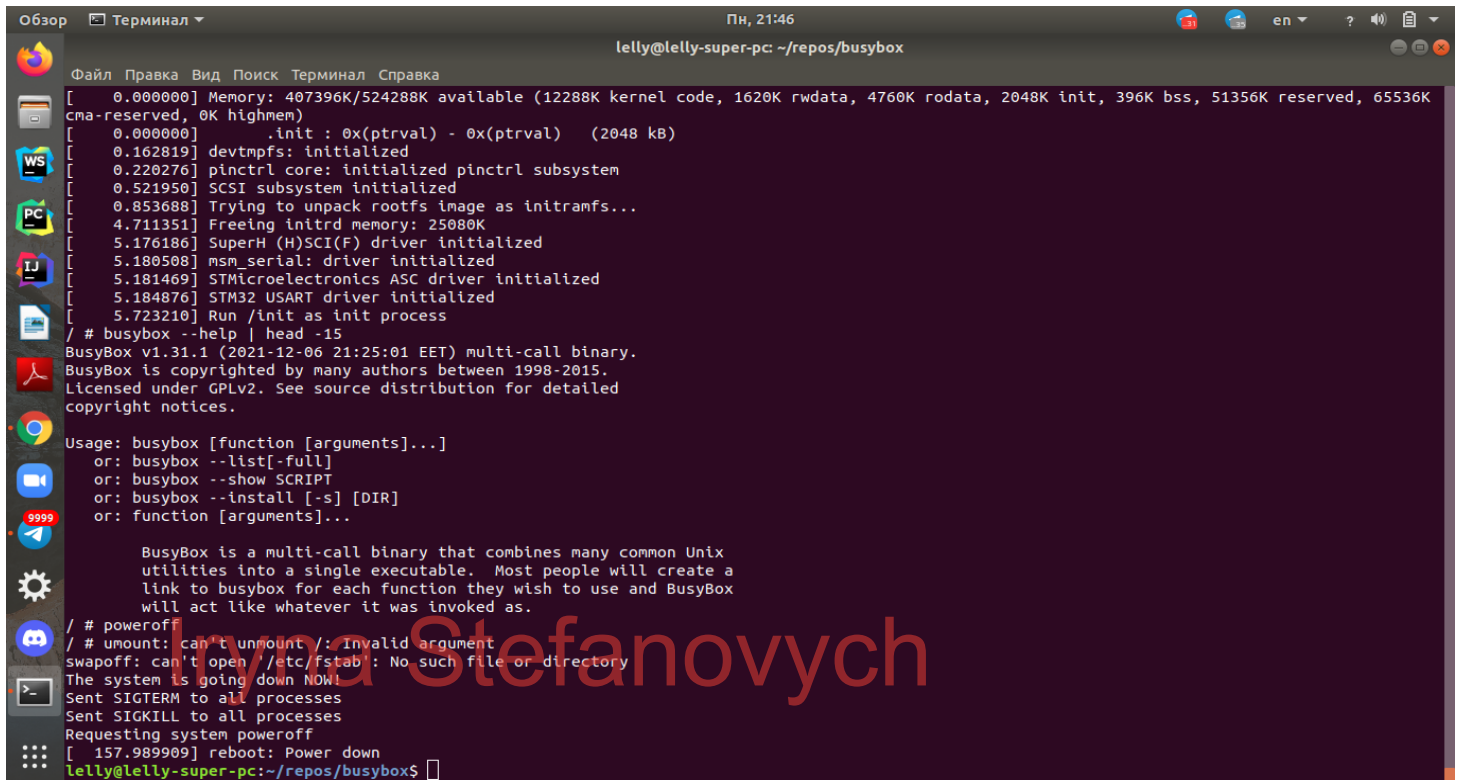
lelly@lelly-super-pc:~/repos/busybox$ mkdir -p _install/{boot,dev,etc}/init.d,lib,proc,root,sys/kernel/debug,tmp}
lelly@lelly-super-pc:~/repos/busybox$ #!/bin/sh
lelly@lelly-super-pc:~/repos/busybox$ vim _install/etc/init.d/rcS
lelly@lelly-super-pc:~/repos/busybox$ chmod +x _install/etc/init.d/rcS
lelly@lelly-super-pc:~/repos/busybox$ ln -s bin/busybox _install/init
lelly@lelly-super-pc:~/repos/busybox$ cd _install/boot
lelly@lelly-super-pc:~/repos/busybox/_install/boot$ cp ~/repos/linux-stable/arch/arm/boot/zImage .
lelly@lelly-super-pc:~/repos/busybox/_install/boot$ cp ~/repos/linux-stable/arch/arm/boot/dts/am335x-boneblack.dtb .
lelly@lelly-super-pc:~/repos/busybox/_install/boot$ cp ~/repos/linux-stable/System.map .
lelly@lelly-super-pc:~/repos/busybox/_install/boot$ cp ~/repos/linux-stable/.config ./config
lelly@lelly-super-pc:~/repos/busybox/_install/boot$ cd -
/home/lelly/repos/busybox
lelly@lelly-super-pc:~/repos/busybox$ cd ~/repos/linux-stable
lelly@lelly-super-pc:~/repos/linux-stable$ export INSTALL_MOD_PATH=~/repos/busybox/_install
lelly@lelly-super-pc:~/repos/linux-stable$ export ARCH=arm
lelly@lelly-super-pc:~/repos/linux-stable$ make modules_install
INSTALL arch/arm/crypto/aes-arm-bs.ko
INSTALL arch/arm/crypto/aes-arm-ce.ko
INSTALL arch/arm/crypto/aes-arm.ko
INSTALL arch/arm/crypto/chacha20-neon.ko
INSTALL arch/arm/crypto/crc32-arm-ce.ko
INSTALL arch/arm/crypto/ghash-arm-ce.ko
INSTALL arch/arm/crypto/sha1-arm-ce.ko
INSTALL arch/arm/crypto/sha1-arm-neon.ko
INSTALL arch/arm/crypto/sha1-arm.ko
INSTALL arch/arm/crypto/sha2-arm-ce.ko
INSTALL arch/arm/crypto/sha256-arm.ko
INSTALL arch/arm/crypto/sha512-arm.ko
INSTALL crypto/af_alg.ko
INSTALL crypto/algif_aead.ko
INSTALL crypto/algif_hash.ko
INSTALL crypto/algif_rng.ko
INSTALL crypto/algif_skcipher.ko
INSTALL crypto/arc4.ko
INSTALL crypto/authenc.ko
INSTALL crypto/authenc.esn.ko
INSTALL crypto/cbc.ko
INSTALL crypto/ccm.ko
```

```
Обзор Терминал Пн, 21:36
lelly@lelly-super-pc: ~/repos/busybox

Файл Правка Вид Поиск Терминал Справка
INSTALL sound/soc/rockchip/snd-soc-rockchip-pcm.ko
INSTALL sound/soc/rockchip/snd-soc-rockchip-rt5645.ko
INSTALL sound/soc/rockchip/snd-soc-rockchip-spdif.ko
INSTALL sound/soc/samsung/snd-soc-i2s.ko
INSTALL sound/soc/samsung/snd-soc-idma.ko
INSTALL sound/soc/samsung/snd-soc-odroid.ko
INSTALL sound/soc/samsung/snd-soc-pcm.ko
INSTALL sound/soc/samsung/snd-soc-s3c-dma.ko
INSTALL sound/soc/samsung/snd-soc-smdk-wm8994.ko
INSTALL sound/soc/samsung/snd-soc-smdk-wm8994pcm.ko
INSTALL sound/soc/samsung/snd-soc-snow.ko
INSTALL sound/soc/sh/rcar/snd-soc-rcar.ko
INSTALL sound/soc/sh/snd-soc-fsi.ko
INSTALL sound/soc/snd-soc-core.ko
INSTALL sound/soc/sti/snd-soc-sti.ko
INSTALL sound/soc/sunxi/sun4i-codec.ko
INSTALL sound/soc/tegra/snd-soc-tegra-alc5632.ko
INSTALL sound/soc/tegra/snd-soc-tegra-max98090.ko
INSTALL sound/soc/tegra/snd-soc-tegra-pcm.ko
INSTALL sound/soc/tegra/snd-soc-tegra-rt5640.ko
INSTALL sound/soc/tegra/snd-soc-tegra-trimslice.ko
INSTALL sound/soc/tegra/snd-soc-tegra-utils.ko
INSTALL sound/soc/tegra/snd-soc-tegra-wm8753.ko
INSTALL sound/soc/tegra/snd-soc-tegra-wm8903.ko
INSTALL sound/soc/tegra/snd-soc-tegra-wm9712.ko
INSTALL sound/soc/tegra/snd-soc-tegra20-ac97.ko
INSTALL sound/soc/tegra/snd-soc-tegra20-das.ko
INSTALL sound/soc/tegra/snd-soc-tegra20-i2s.ko
INSTALL sound/soc/tegra/snd-soc-tegra20-spdif.ko
INSTALL sound/soc/tegra/snd-soc-tegra30-ahub.ko
INSTALL sound/soc/tegra/snd-soc-tegra30-i2s.ko
INSTALL sound/soundcore.ko
INSTALL sound/usb/snd-usb-audio.ko
INSTALL sound/usb/snd-usbmidi-lib.ko
DEPMOD 4.19.219
lelly@lelly-super-pc:~/repos/linux-stable$ cd -
/home/lelly/repos/busybox
lelly@lelly-super-pc:~/repos/busybox$
```

```
Обзор Терминал Пн, 21:36
lelly@lelly-super-pc: ~/repos/busybox

Файл Правка Вид Поиск Терминал Справка
INSTALL sound/soc/samsung/snd-soc-idma.ko
INSTALL sound/soc/samsung/snd-soc-odroid.ko
INSTALL sound/soc/samsung/snd-soc-pcm.ko
INSTALL sound/soc/samsung/snd-soc-s3c-dma.ko
INSTALL sound/soc/samsung/snd-soc-smdk-wm8994.ko
INSTALL sound/soc/samsung/snd-soc-smdk-wm8994pcm.ko
INSTALL sound/soc/samsung/snd-soc-snow.ko
INSTALL sound/soc/sh/rcar/snd-soc-rcar.ko
INSTALL sound/soc/sh/snd-soc-fsi.ko
INSTALL sound/soc/snd-soc-core.ko
INSTALL sound/soc/sti/snd-soc-sti.ko
INSTALL sound/soc/sunxi/sun4i-codec.ko
INSTALL sound/soc/tegra/snd-soc-tegra-alc5632.ko
INSTALL sound/soc/tegra/snd-soc-tegra-max98090.ko
INSTALL sound/soc/tegra/snd-soc-tegra-pcm.ko
INSTALL sound/soc/tegra/snd-soc-tegra-rt5640.ko
INSTALL sound/soc/tegra/snd-soc-tegra-trimslice.ko
INSTALL sound/soc/tegra/snd-soc-tegra-utils.ko
INSTALL sound/soc/tegra/snd-soc-tegra-wm8753.ko
INSTALL sound/soc/tegra/snd-soc-tegra-wm8903.ko
INSTALL sound/soc/tegra/snd-soc-tegra-wm9712.ko
INSTALL sound/soc/tegra/snd-soc-tegra20-ac97.ko
INSTALL sound/soc/tegra/snd-soc-tegra20-das.ko
INSTALL sound/soc/tegra/snd-soc-tegra20-i2s.ko
INSTALL sound/soc/tegra/snd-soc-tegra20-spdif.ko
INSTALL sound/soc/tegra/snd-soc-tegra30-ahub.ko
INSTALL sound/soc/tegra/snd-soc-tegra30-i2s.ko
INSTALL sound/soundcore.ko
INSTALL sound/usb/snd-usb-audio.ko
INSTALL sound/usb/snd-usbmidi-lib.ko
DEPMOD 4.19.219
lelly@lelly-super-pc:~/repos/linux-stable$ cd -
/home/lelly/repos/busybox
lelly@lelly-super-pc:~/repos/busybox$ ${CROSS_COMPILE}readelf -d _install/bin/busybox | grep NEEDED
0x00000001 (NEEDED) Shared library: [libm.so.6]
0x00000001 (NEEDED) Shared library: [libresolv.so.2]
0x00000001 (NEEDED) Shared library: [libc.so.6]
lelly@lelly-super-pc:~/repos/busybox$
```



```
Обзор Терминал Пн, 21:46
lelly@lelly-super-pc: ~/repos/busybox

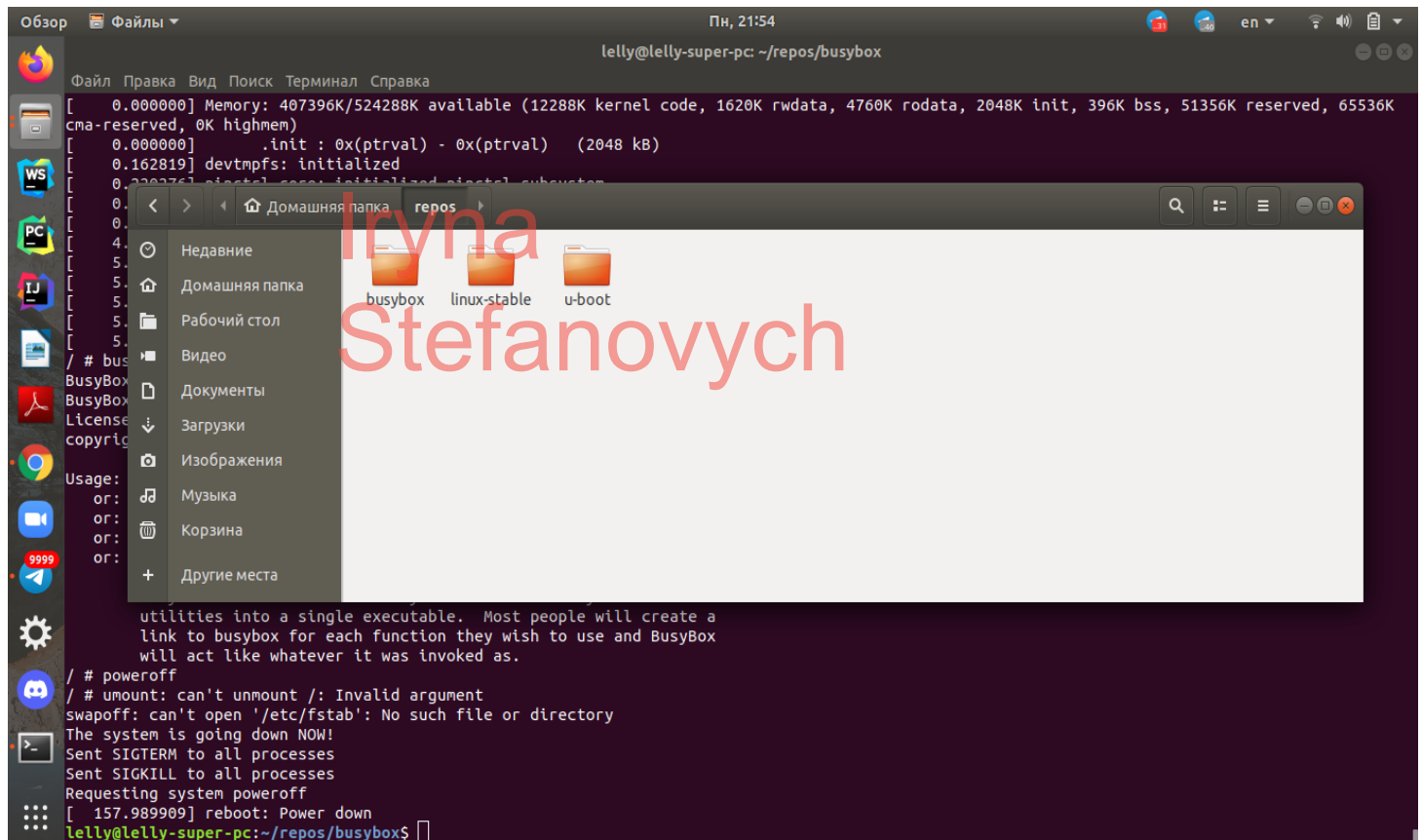
[ 0.000000] Memory: 407396K/524288K available (12288K kernel code, 1620K rwd...
[ 0.000000] .init : 0x(ptrval) - 0x(ptrval) (2048 kB)
[ 0.162819] devtmpfs: initialized
[ 0.220276] pinctrl core: initialized pinctrl subsystem
[ 0.521950] SCSI subsystem initialized
[ 0.853688] Trying to unpack rootfs image as initramfs...
[ 4.711351] Freeing initrd memory: 25080K
[ 5.176186] SuperH (H)SCI(F) driver initialized
[ 5.180508] msm_serial: driver initialized
[ 5.181469] STMicroelectronics ASC driver initialized
[ 5.184876] STM32 USART driver initialized
[ 5.723210] Run /init as init process
/ # busybox --help | head -15
BusyBox v1.31.1 (2021-12-06 21:25:01 EET) multi-call binary.
BusyBox is copyrighted by many authors between 1998-2015.
Licensed under GPLv2. See source distribution for detailed
copyright notices.

Usage: busybox [function [arguments]...]
or: busybox --list[-full]
or: busybox --show SCRIPT
or: busybox --install [-s] [DIR]
or: function [arguments]...

BusyBox is a multi-call binary that combines many common Unix
utilities into a single executable. Most people will create a
link to busybox for each function they wish to use and BusyBox
will act like whatever it was invoked as.

/ # poweroff
/ # umount: can't unmount /: Invalid argument
swapoff: can't open '/etc/fstab': No such file or directory
The system is going down NOW!
Sent SIGTERM to all processes
Sent SIGKILL to all processes
Requesting system poweroff
[ 157.989909] reboot: Power down
lelly@lelly-super-pc:~/repos/busybox$
```

Результати виконання лабораторної роботи №4



```
Обзор Файлы Пн, 21:54
lelly@lelly-super-pc: ~/repos/busybox

[ 0.000000] Memory: 407396K/524288K available (12288K kernel code, 1620K rwd...
[ 0.000000] .init : 0x(ptrval) - 0x(ptrval) (2048 kB)
[ 0.162819] devtmpfs: initialized
[ 0.220276] pinctrl core: initialized pinctrl subsystem
[ 0.521950] SCSI subsystem initialized
[ 0.853688] Trying to unpack rootfs image as initramfs...
[ 4.711351] Freeing initrd memory: 25080K
[ 5.176186] SuperH (H)SCI(F) driver initialized
[ 5.180508] msm_serial: driver initialized
[ 5.181469] STMicroelectronics ASC driver initialized
[ 5.184876] STM32 USART driver initialized
[ 5.723210] Run /init as init process
/ # busybox --help | head -15
BusyBox v1.31.1 (2021-12-06 21:25:01 EET) multi-call binary.
BusyBox is copyrighted by many authors between 1998-2015.
Licensed under GPLv2. See source distribution for detailed
copyright notices.

Usage: busybox [function [arguments]...]
or: busybox --list[-full]
or: busybox --show SCRIPT
or: busybox --install [-s] [DIR]
or: function [arguments]...

BusyBox is a multi-call binary that combines many common Unix
utilities into a single executable. Most people will create a
link to busybox for each function they wish to use and BusyBox
will act like whatever it was invoked as.

/ # poweroff
/ # umount: can't unmount /: Invalid argument
swapoff: can't open '/etc/fstab': No such file or directory
The system is going down NOW!
Sent SIGTERM to all processes
Sent SIGKILL to all processes
Requesting system poweroff
[ 157.989909] reboot: Power down
lelly@lelly-super-pc:~/repos/busybox$
```