Міністерство освіти і науки України
Національний технічний університет України «КПІ» імені Ігоря Сікорського
Кафедра обчислювальної техніки ФІОТ

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

Тема:

Підготовка та налаштування плати BBB

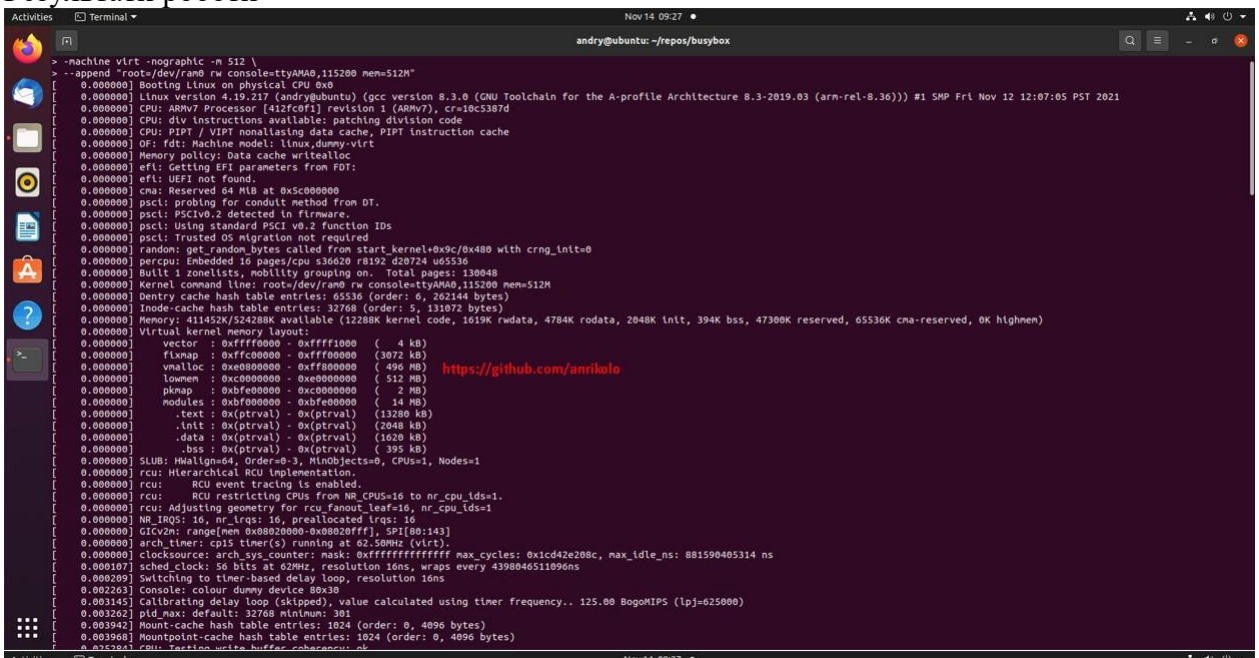
Виконав:
Студент 3 курсу кафедри ОТ ФІОТ,
Навчальної групи ІВ-93
Кочерга Андрій
Перевірив:
Нікольський С. С.

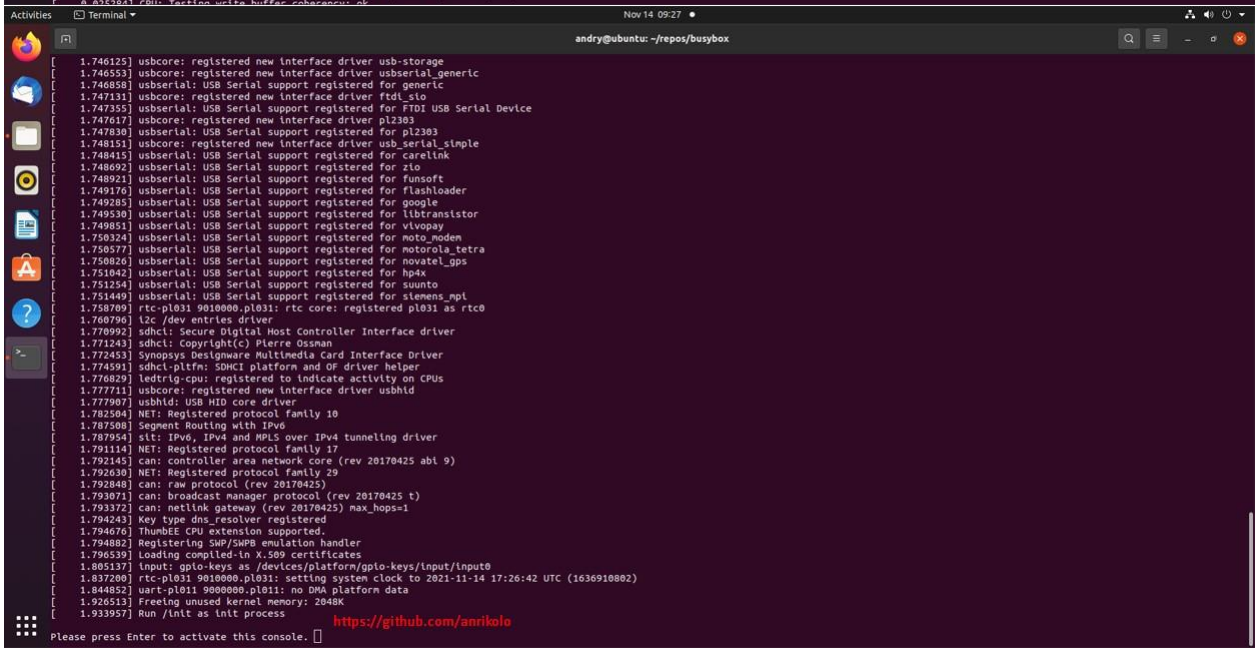
Київ 2021

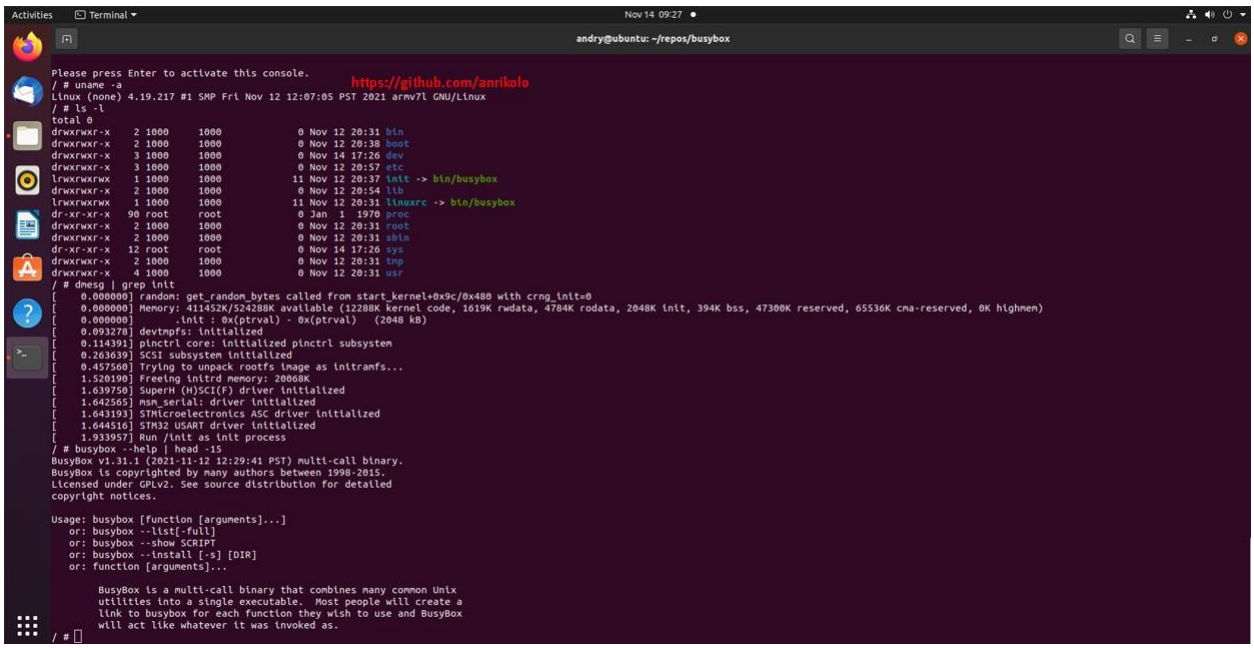
Мета:
Підготовка інструментів,Отримання та створення програмного забезпечення, Перепрошивка та завантаження для плати BBB

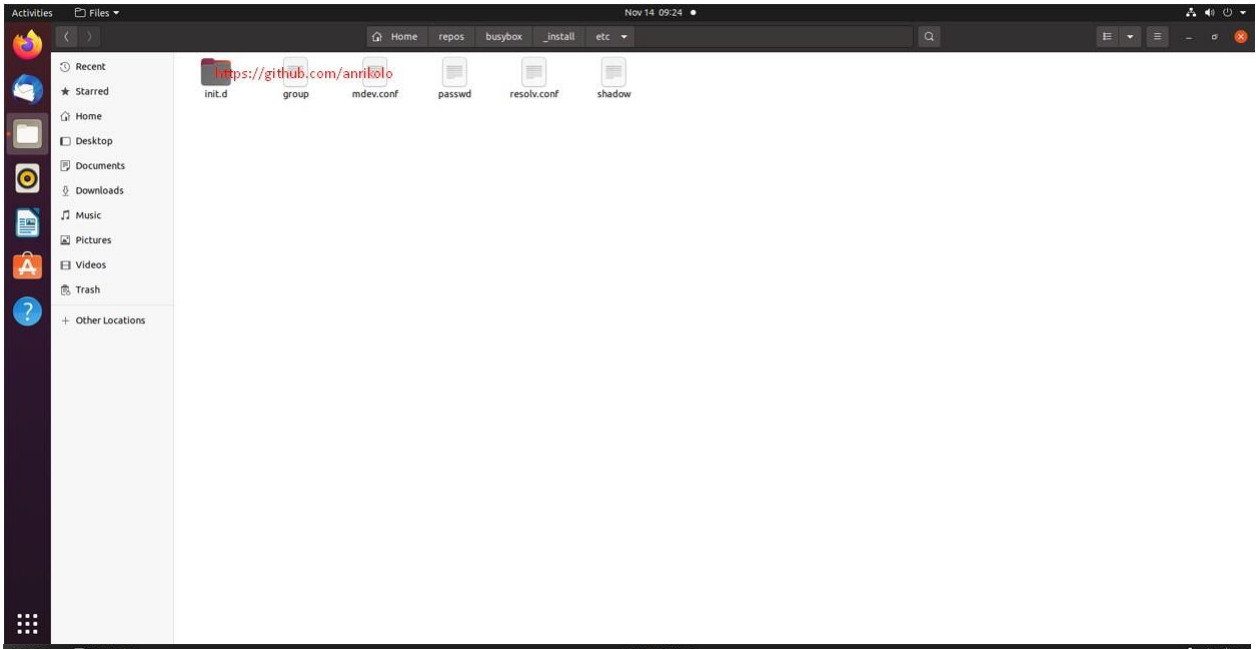
Завдання:
З файлу **BBB_-_Platform_Bring_Up** вам потрібно виконати пункти з першого і до 3.1 (QEMU Boot) включно, Підготовка інструментів,Отримання та створення програмного забезпечення, Перепрошивка та завантаження для плати BBB

Результати роботи






Activities
Terminal
Nov 14 09:27
andry@ubuntu: ~/repos/busybox
https://github.com/anrikolo
Please press Enter to activate this console.
/ # uname -a
Linux (none) 4.19.217 #1 SMP Fri Nov 12 12:07:05 PST 2021 armv7l GNU/Linux
/ # ls -l
total 0
drwxrwxr-x 2 1000 1000 0 Nov 12 20:31 bin
drwxrwxr-x 2 1000 1000 0 Nov 12 20:38 boot
drwxrwxr-x 3 1000 1000 0 Nov 14 17:26 dev
drwxrwxr-x 3 1000 1000 0 Nov 12 20:57 etc
lrwxrwxrwx 1 1000 1000 11 Nov 12 20:37 init -> bin/busybox
drwxrwxr-x 2 1000 1000 0 Nov 12 20:54 lib
lrwxrwxrwx 1 1000 1000 11 Nov 12 20:31 linuxrc -> bin/busybox
dr-xr-xr-x 90 root root 0 Jan 1 1970 proc
drwxrwxr-x 2 1000 1000 0 Nov 12 20:31 root
drwxrwxr-x 2 1000 1000 0 Nov 12 20:31 sbin
dr-xr-xr-x 12 root root 0 Nov 14 17:26 sys
drwxrwxr-x 2 1000 1000 0 Nov 12 20:31 tmp
drwxrwxr-x 4 1000 1000 0 Nov 12 20:31 usr
/ # dmesg | grep init
[0.000000] random: get_random_bytes called from start_kernel+0x9c/0x480 with crng_init=0
[0.000000] Memory: 411452K/524288K available (12288K kernel code, 1619K rwdata, 4784K rodata, 2048K init, 394K bss, 47300K reserved, 65536K cma-reserved, 0K highmem)
[0.000000] .init : 0x(ptrval) - 0x(ptrval) (2048 kB)
[0.093278] devtmpfs: initialized
[0.114391] pinctrl core: initialized pinctrl subsystem
[0.263639] SCSI subsystem initialized
[0.457560] Trying to unpack rootfs image as initramfs...
[1.520190] Freeing initrd memory: 20068K
[1.639750] SuperH (H)SCI(F) driver initialized
[1.642565] msm_serial: driver initialized
[1.643193] STMicroelectronics ASC driver initialized
[1.644516] STM32 USART driver initialized
[1.933957] Run /init as init process
/ # busybox --help | head -15
BusyBox v1.31.1 (2021-11-12 12:29:41 PST) 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.
/ #


Activities
Files
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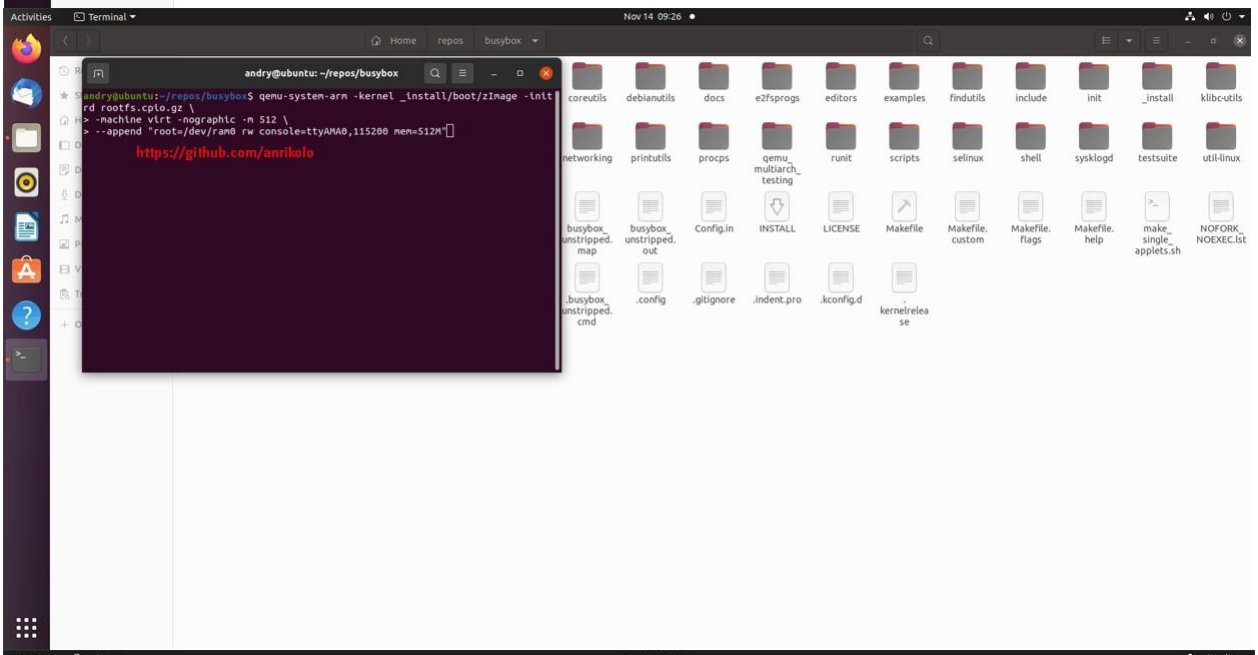
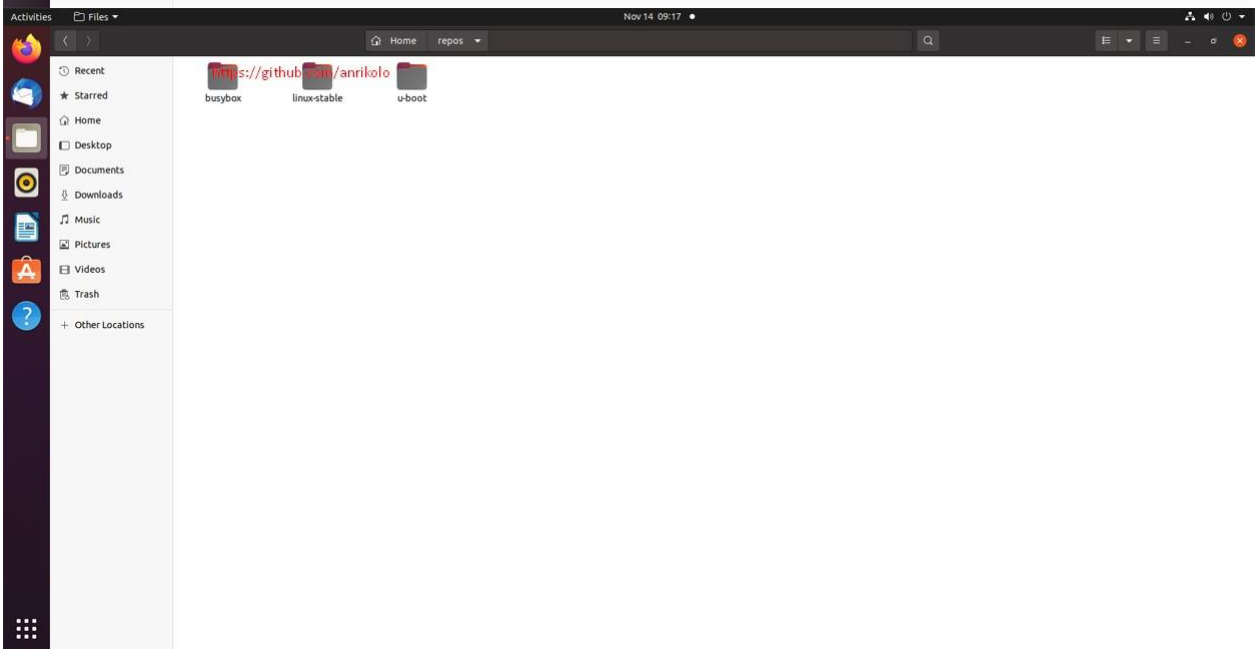
Pictures
Videos
Trash
Other Locations
https://github.com/anrikolo
init.d
group
mdev.conf
passwd
resolv.conf
shadow


Activities
Terminal
Nov 14 09:26
Home
repos
busybox
andry@ubuntu: ~/repos/busybox
andry@ubuntu:~/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"
https://github.com/anrikolo
coreutils
debianutils
docs
e2fsprogs
editors
examples
findutils
include
init
_install
klibc-utils
networking
printutils
procps
qemu_multiarch_testing
runit
scripts
selinux
shell
sysklogd
testsuite
util-linux
busybox_unstripped.map
busybox_unstripped.out
Config.in
INSTALL
LICENSE
Makefile
Makefile.custom
Makefile.flags
Makefile.help
make_single_applets.sh
NOFORK_NOEXEC.lst
.busybox_unstripped.cmd
.config
.gitignore
.indent.pro
.kconfig.d
.kernelrelease


Activities
Files
Nov 14 09:17
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Starred
Home
Desktop
Documents
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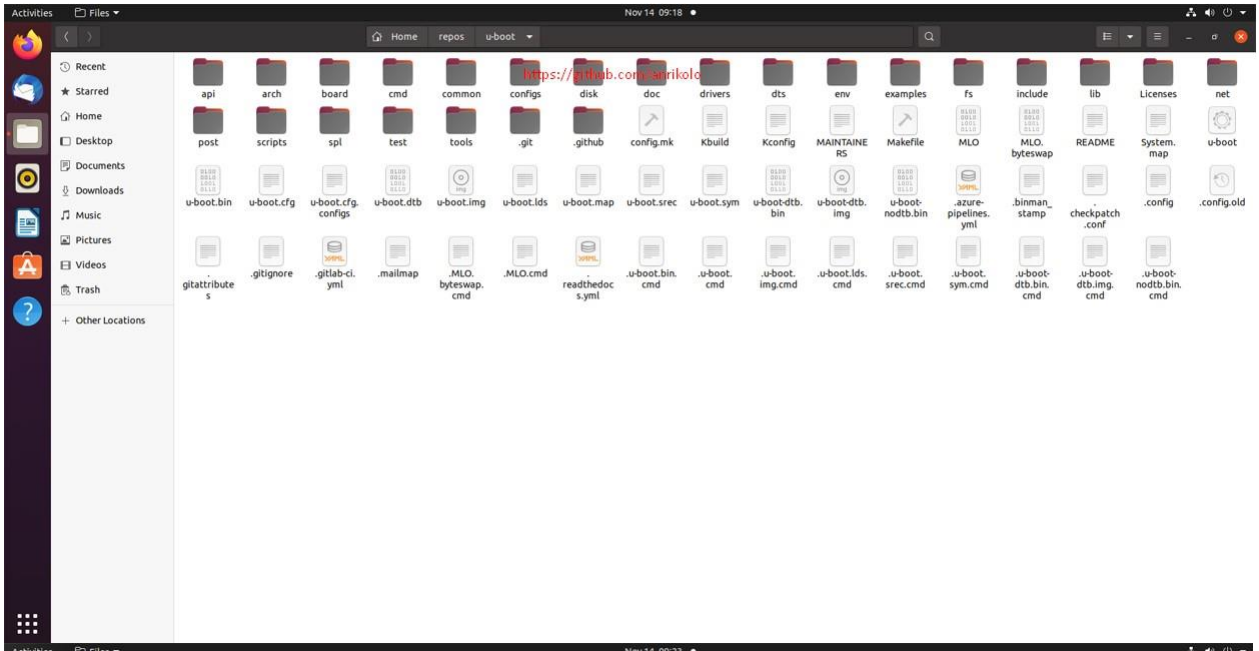
Pictures
Videos
Trash
Other Locations
https://github.com/anrikolo
busybox
linux-stable
u-boot


Activities
Files
Nov 14 09:18
Home
repos
u-boot
Recent
Starred
Home
Desktop
Documents
Downloads
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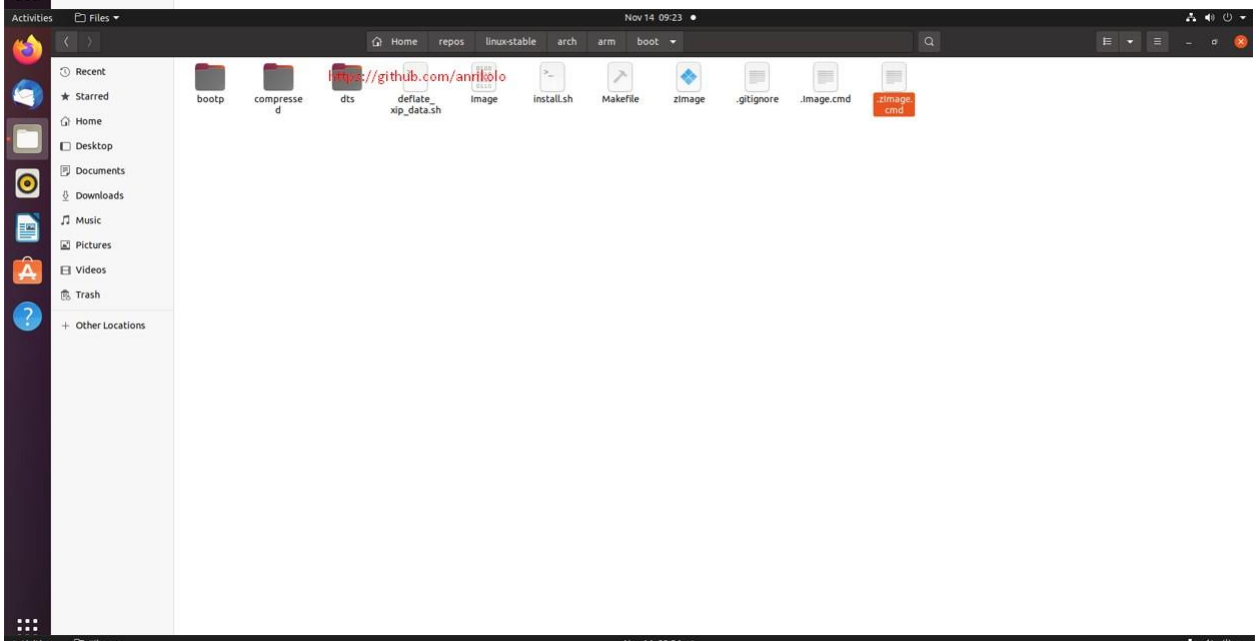
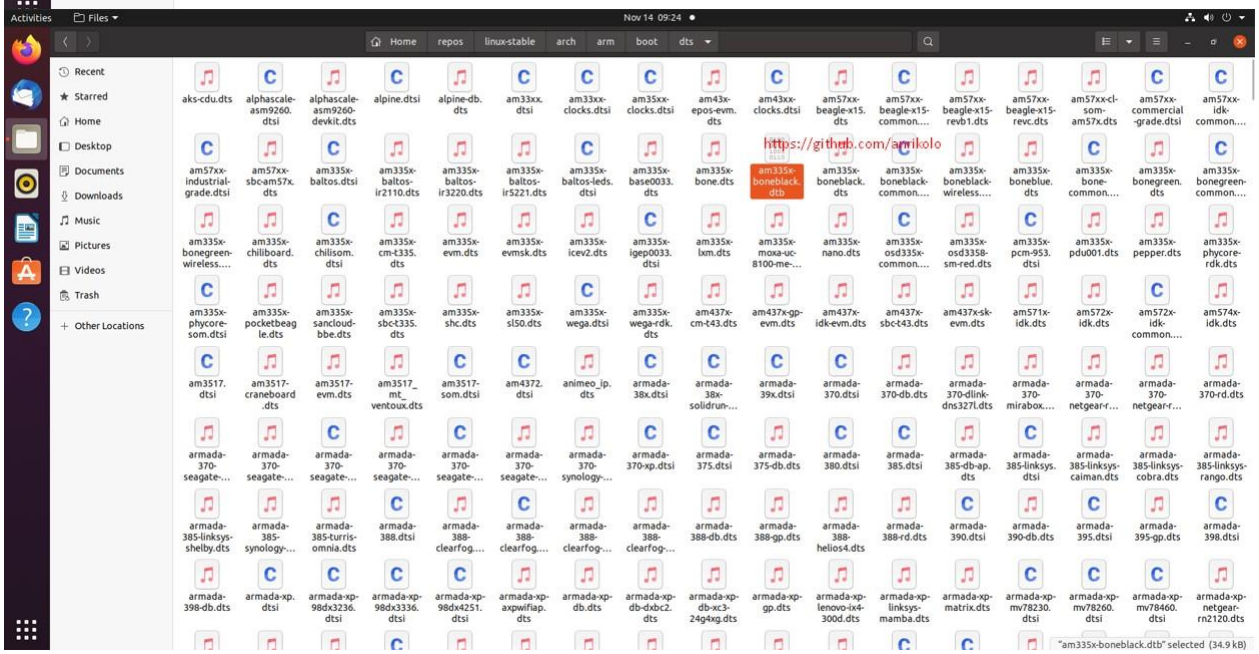
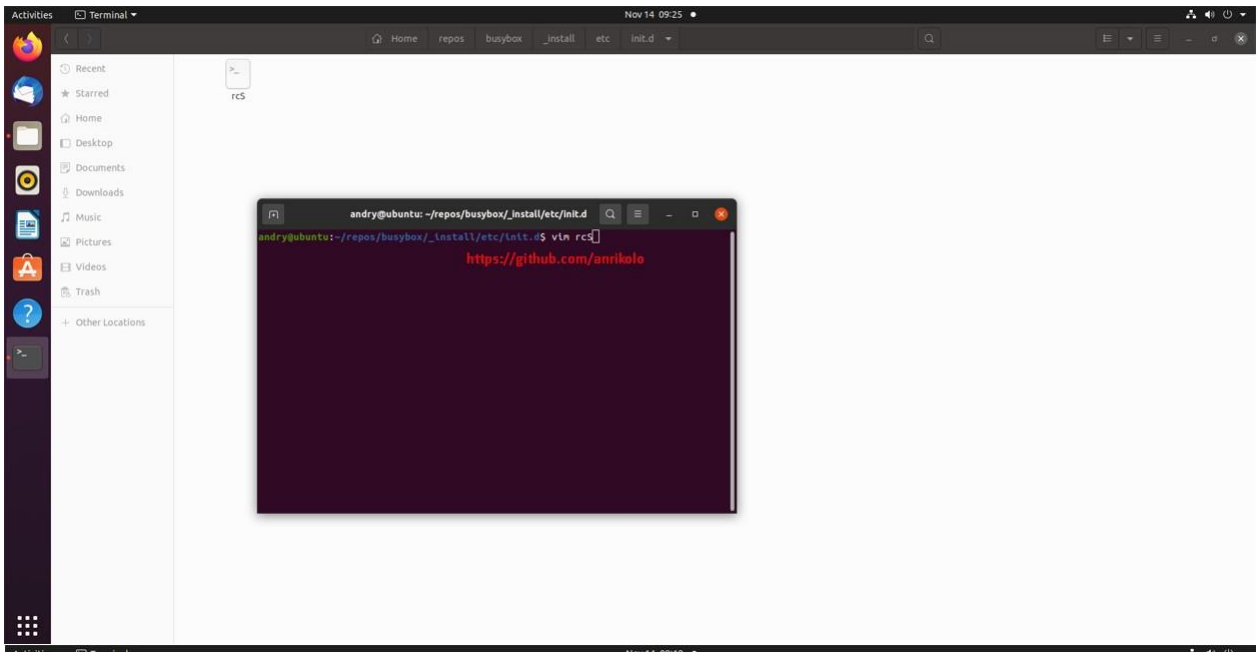
Videos
Trash
Other Locations
https://github.com/anrikolo
api
arch
board
cmd
common
configs
disk
doc
drivers
dts
env
examples
fs
include
lib
Licenses
net
post
scripts
spl
test
tools
.git
.github
config.mk
Kbuild
Kconfig
MAINTAINERS
Makefile
MLO
MLO.byteswap
README
System.map
u-boot
u-boot.bin
u-boot.cfg
u-boot.cfg.configs
u-boot.dtb
u-boot.img
u-boot.lds
u-boot.map
u-boot.srec
u-boot.sym
u-boot-dtb.bin
u-boot-dtb.img
u-boot-nodtb.bin
.azure-pipelines.yml
.binman_stamp
.checkpatch.conf
.config
.config.old
gitattributes
.gitignore
.gitlab-ci.yml
.mailmap
MLO.byteswap.cmd
.MLO.cmd
readthedocs.yml
.u-boot.bin.cmd
.u-boot.cmd
.u-boot.img.cmd
.u-boot.lds.cmd
.u-boot.srec.cmd
.u-boot.sym.cmd
.u-boot-dtb.bin.cmd
.u-boot-dtb.img.cmd
.u-boot-nodtb.bin.cmd


Activities
Files
Nov 14 09:23
Home
repos
linux-stable
arch
arm
boot
Recent
Starred
Home
Desktop
Documents
Downloads
Music
Pictures
Videos
Trash
Other Locations
https://github.com/anrikolo
bootp
compressed
dts
deflate_xip_data.sh
Image
install.sh
Makefile
zImage
.gitignore
.Image.cmd
.zImage.cmd


Activities
Files
Nov 14 09:24
Home
repos
linux-stable
arch
arm
boot
dts
Recent
Starred
Home
Desktop
Documents
Downloads
Music
Pictures
Videos
Trash
Other Locations
https://github.com/anrikolo
aks-cdu.dts
alphascale-asm9260.dtsi
alphascale-asm9260-devkit.dts
alpine.dtsi
alpine-db.dts
am33xx.dtsi
am33xx-clocks.dtsi
am35xx-clocks.dtsi
am43x-epos-evm.dts
am43xx-clocks.dtsi
am57xx-beagle-x15.dts
am57xx-beagle-x15-common....
am57xx-beagle-x15-revb1.dts
am57xx-beagle-x15-revc.dts
am57xx-cl-som-am57x.dts
am57xx-commercial-grade.dtsi
am57xx-idk-common....
am57xx-industrial-grade.dtsi
am57xx-sbc-am57x.dts
am335x-baltos.dtsi
am335x-baltos-ir2110.dts
am335x-baltos-ir3220.dts
am335x-baltos-ir5221.dts
am335x-baltos-leds.dtsi
am335x-base0033.dts
am335x-bone.dts
am335x-boneblack.dtb
am335x-boneblack.dts
am335x-boneblack-common....
am335x-boneblack-wireless....
am335x-boneblue.dts
am335x-bone-common....
am335x-bonegreen.dts
am335x-bonegreen-common....
am335x-bonegreen-wireless....
am335x-chiliboard.dts
am335x-chilisom.dtsi
am335x-cm-t335.dts
am335x-evm.dts
am335x-evmsk.dts
am335x-icev2.dts
am335x-igep0033.dtsi
am335x-lxm.dts
am335x-moxa-uc-8100-me-...
am335x-nano.dts
am335x-osd335x-common....
am335x-osd3358-sm-red.dts
am335x-pcm-953.dtsi
am335x-pdu001.dts
am335x-pepper.dts
am335x-phycore-rdk.dts
am335x-phycore-som.dtsi
am335x-pocketbeagle.dts
am335x-sancloud-bbe.dts
am335x-sbc-t335.dts
am335x-shc.dts
am335x-sl50.dts
am335x-wega.dtsi
am335x-wega-rdk.dts
am437x-cm-t43.dts
am437x-gp-evm.dts
am437x-idk-evm.dts
am437x-sbc-t43.dts
am437x-sk-evm.dts
am571x-idk.dts
am572x-idk.dts
am572x-idk-common....
am574x-idk.dts
am3517.dtsi
am3517-craneboard.dts
am3517-evm.dts
am3517_mt_ventoux.dts
am3517-som.dtsi
am4372.dtsi
animeo_ip.dts
armada-38x.dtsi
armada-38x-solidrun-...
armada-39x.dtsi
armada-370.dtsi
armada-370-db.dts
armada-370-dlink-dns327l.dts
armada-370-mirabox....
armada-370-netgear-r...
armada-370-netgear-r...
armada-370-rd.dts
armada-370-seagate-...
armada-370-seagate-...
armada-370-seagate-...
armada-370-seagate-...
armada-370-seagate-...
armada-370-seagate-...
armada-370-synology-...
armada-370-xp.dtsi
armada-375.dtsi
armada-375-db.dts
armada-380.dtsi
armada-385.dtsi
armada-385-db-ap.dts
armada-385-linksys.dtsi
armada-385-linksys-caiman.dts
armada-385-linksys-cobra.dts
armada-385-linksys-rango.dts
armada-385-linksys-shelby.dts
armada-385-synology-...
armada-385-turris-omnia.dts
armada-388.dtsi
armada-388-clearfog....
armada-388-clearfog....
armada-388-clearfog-...
armada-388-clearfog-...
armada-388-db.dts
armada-388-gp.dts
armada-388-helios4.dts
armada-388-rd.dts
armada-390.dtsi
armada-390-db.dts
armada-395.dtsi
armada-395-gp.dts
armada-398.dtsi
armada-398-db.dts
armada-xp.dtsi
armada-xp-98dx3236.dtsi
armada-xp-98dx3336.dtsi
armada-xp-98dx4251.dtsi
armada-xp-axpwifiap.dts
armada-xp-db.dts
armada-xp-db-dxbc2.dts
armada-xp-db-xc3-24g4xg.dts
armada-xp-gp.dts
armada-xp-lenovo-ix4-300d.dts
armada-xp-linksys-mamba.dts
armada-xp-matrix.dts
armada-xp-mv78230.dtsi
armada-xp-mv78260.dtsi
armada-xp-mv78460.dtsi
armada-xp-netgear-rn2120.dts
"am335x-boneblack.dtb" selected (34.9 kB)


Activities
Terminal
Nov 14 09:25
Home
repos
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etc
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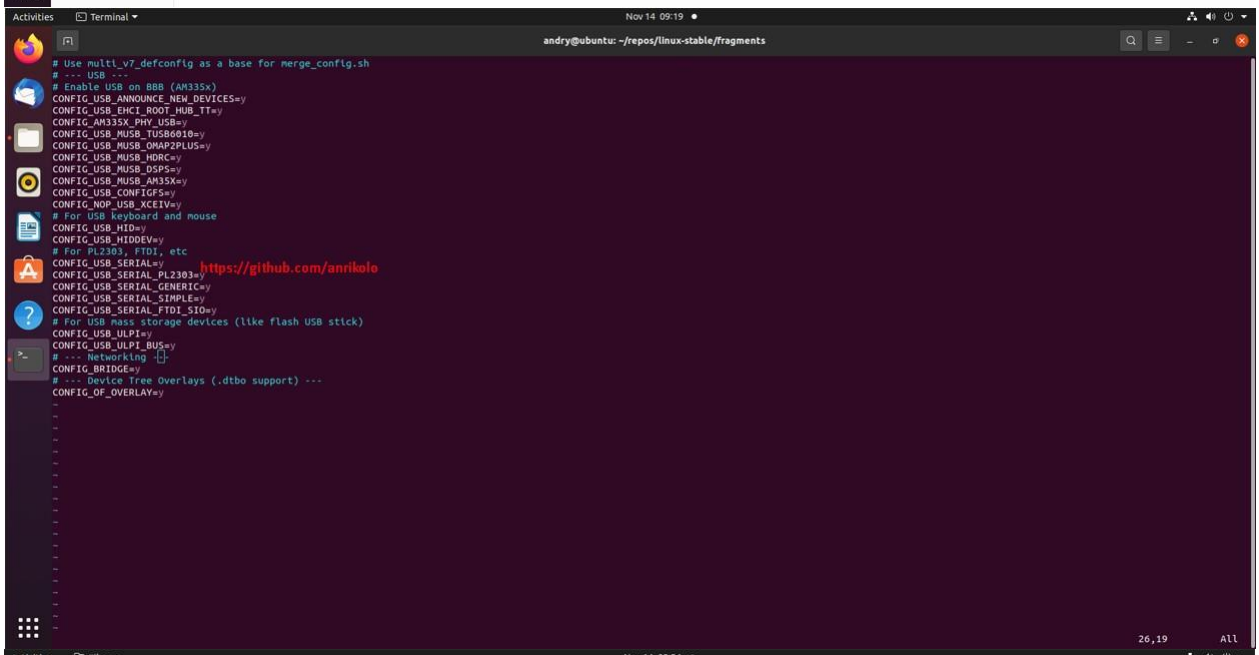
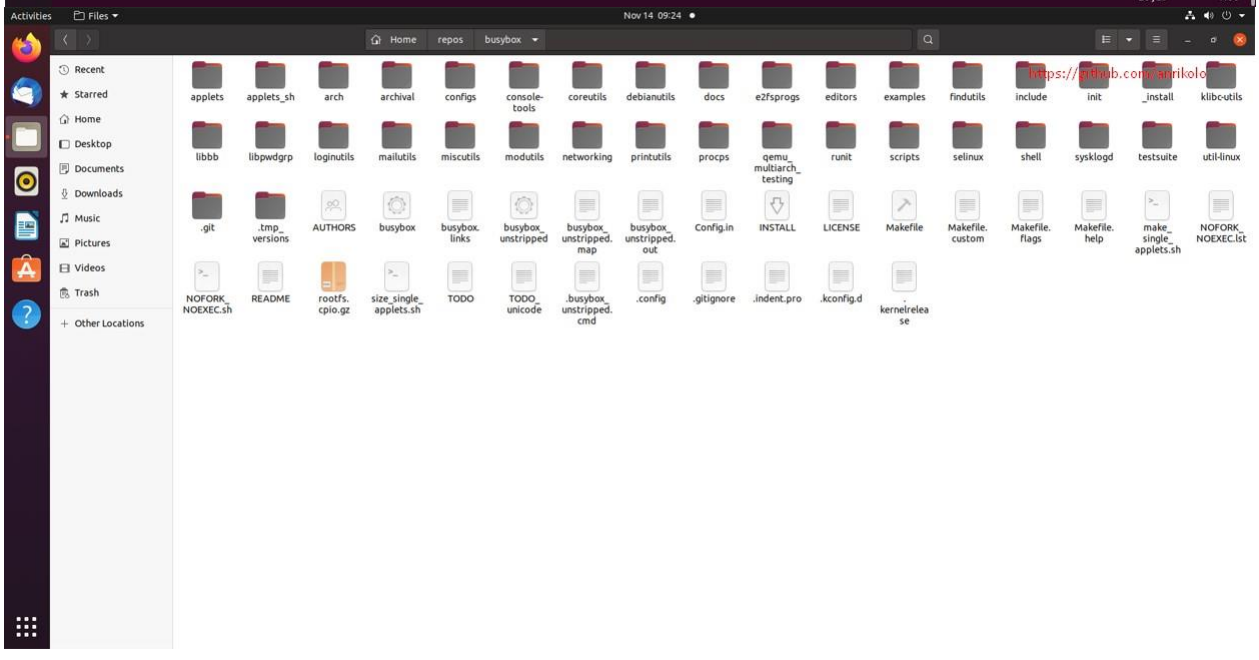
Other Locations
rcS
andry@ubuntu: ~/repos/busybox/_install/etc/init.d
andry@ubuntu:~/repos/busybox/_install/etc/init.d$ vim rcS
https://github.com/anrikolo


Activities
Terminal
Nov 14 09:19
andry@ubuntu: ~/repos/linux-stable/fragments
# Use multi_v7_defconfig as a base for merge_config.sh
# --- USB ---
# Enable USB on BBB (AM335x)
CONFIG_USB_ANNOUNCE_NEW_DEVICES=y
CONFIG_USB_EHCI_ROOT_HUB_TT=y
CONFIG_AM335X_PHY_USB=y
CONFIG_USB_MUSB_TUSB6010=y
CONFIG_USB_MUSB_OMAP2PLUS=y
CONFIG_USB_MUSB_HDRC=y
CONFIG_USB_MUSB_DSPS=y
CONFIG_USB_MUSB_AM35X=y
CONFIG_USB_CONFIGFS=y
CONFIG_NOP_USB_XCEIV=y
# For USB keyboard and mouse
CONFIG_USB_HID=y
CONFIG_USB_HIDDEV=y
# For PL2303, FTDI, etc
CONFIG_USB_SERIAL=y
CONFIG_USB_SERIAL_PL2303=y
CONFIG_USB_SERIAL_GENERIC=y
CONFIG_USB_SERIAL_SIMPLE=y
CONFIG_USB_SERIAL_FTDI_SIO=y
# For USB mass storage devices (like flash USB stick)
CONFIG_USB_ULPI=y
CONFIG_USB_ULPI_BUS=y
# --- Networking ---
CONFIG_BRIDGE=y
# --- Device Tree Overlays (.dtbo support) ---
CONFIG_OF_OVERLAY=y
https://github.com/anrikolo
26,19
All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applets_sh
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coreutils
debianutils
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editors
examples
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klibc-utils
libbb
libpwdgrp
loginutils
mailutils
miscutils
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procps
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runit
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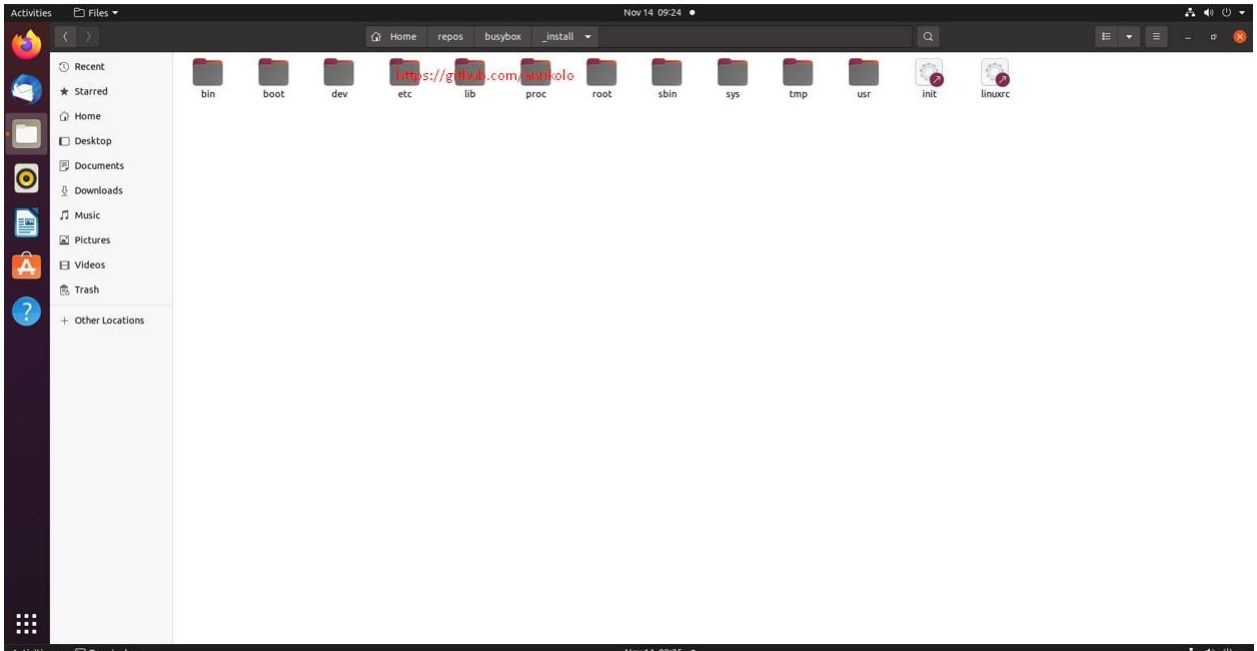
Makefile.custom
Makefile.flags
Makefile.help
make_single_applets.sh
NOFORK_NOEXEC.lst
NOFORK_NOEXEC.sh
README
rootfs.cpio.gz
size_single_applets.sh
TODO
TODO_unicode
.busybox_unstripped.cmd
.config
.gitignore
.indent.pro
.kconfig.d
kernelrelease
https://github.com/anrikolo


Activities
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Nov 14 09:24
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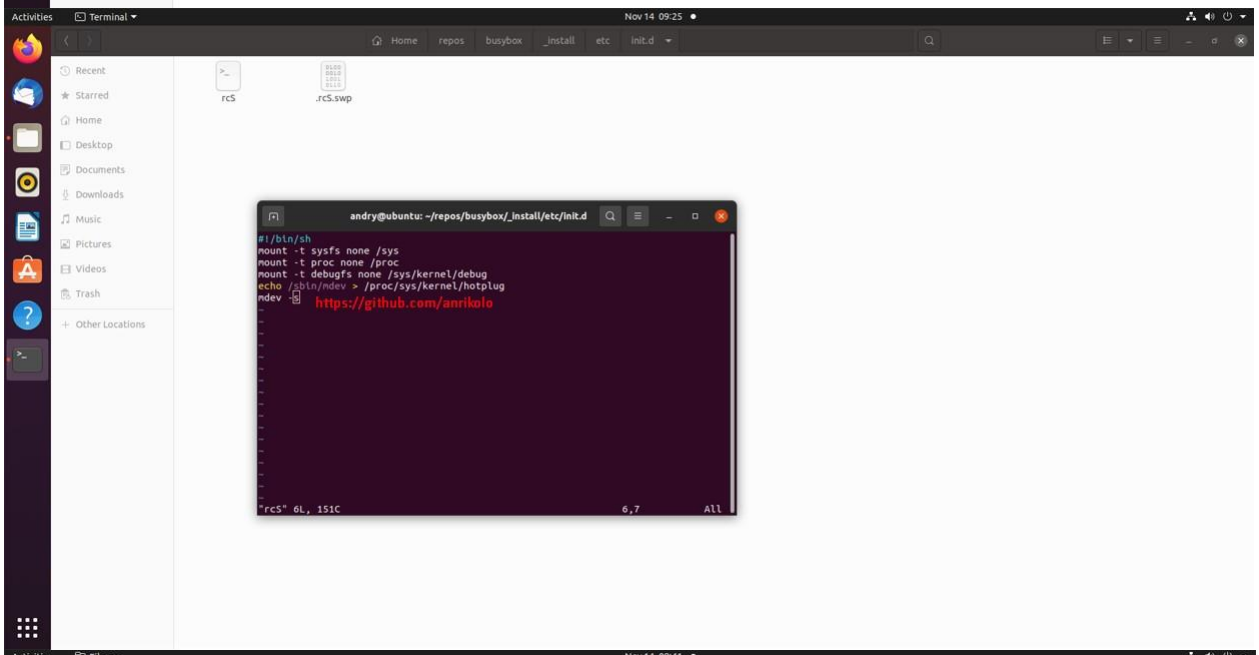
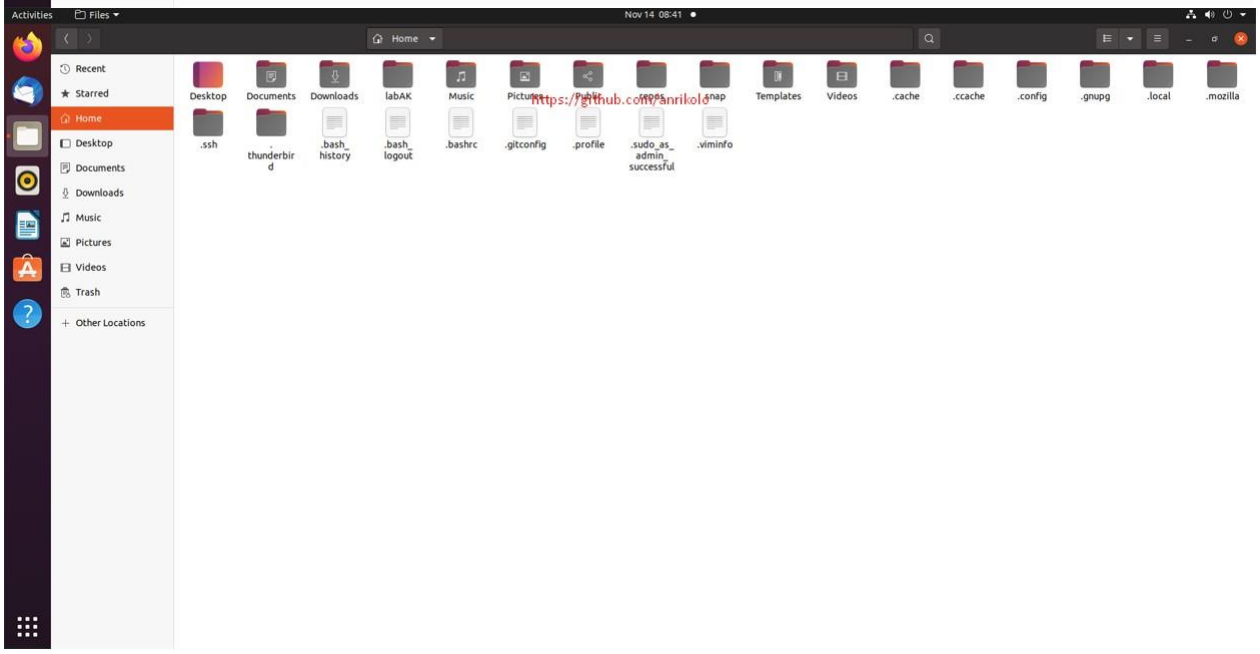
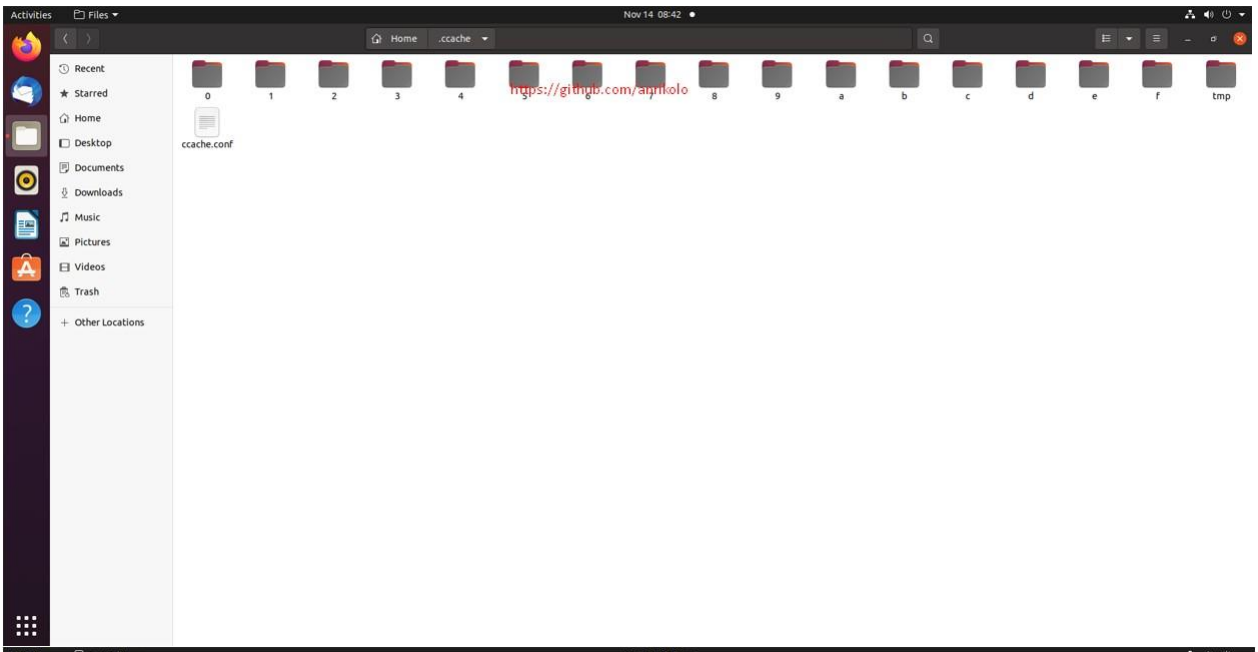
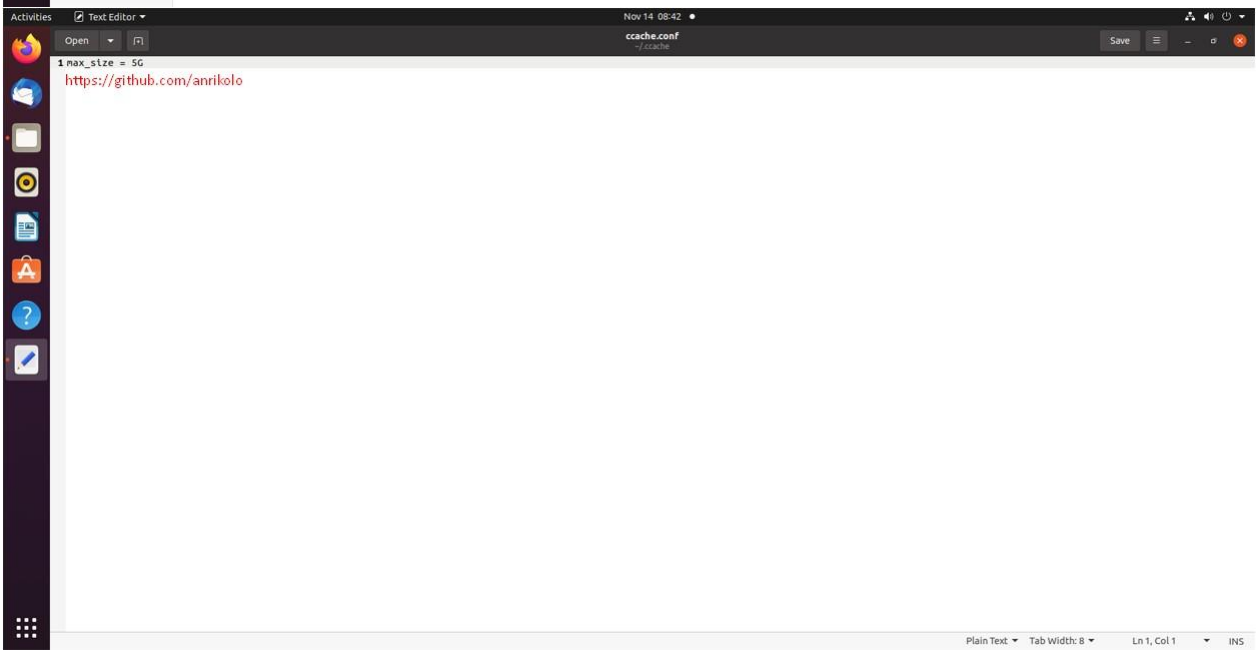
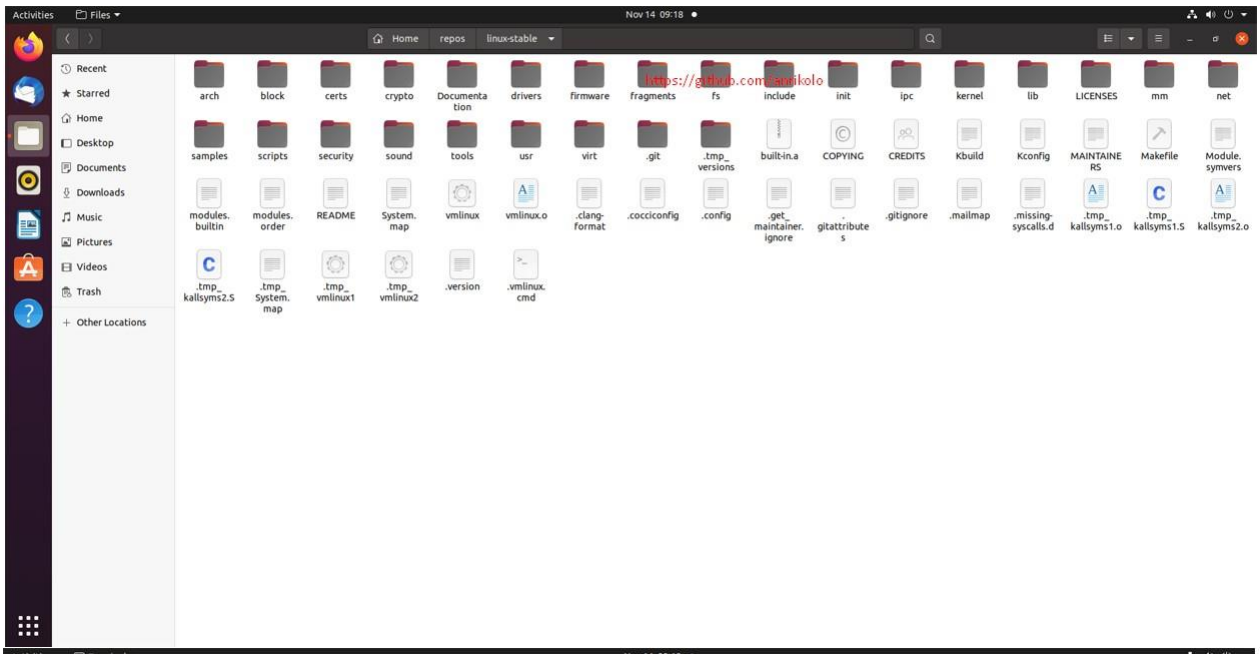
Other Locations
bin
boot
dev
etc
lib
proc
root
sbin
sys
tmp
usr
init
linuxrc
https://github.com/anrikolo

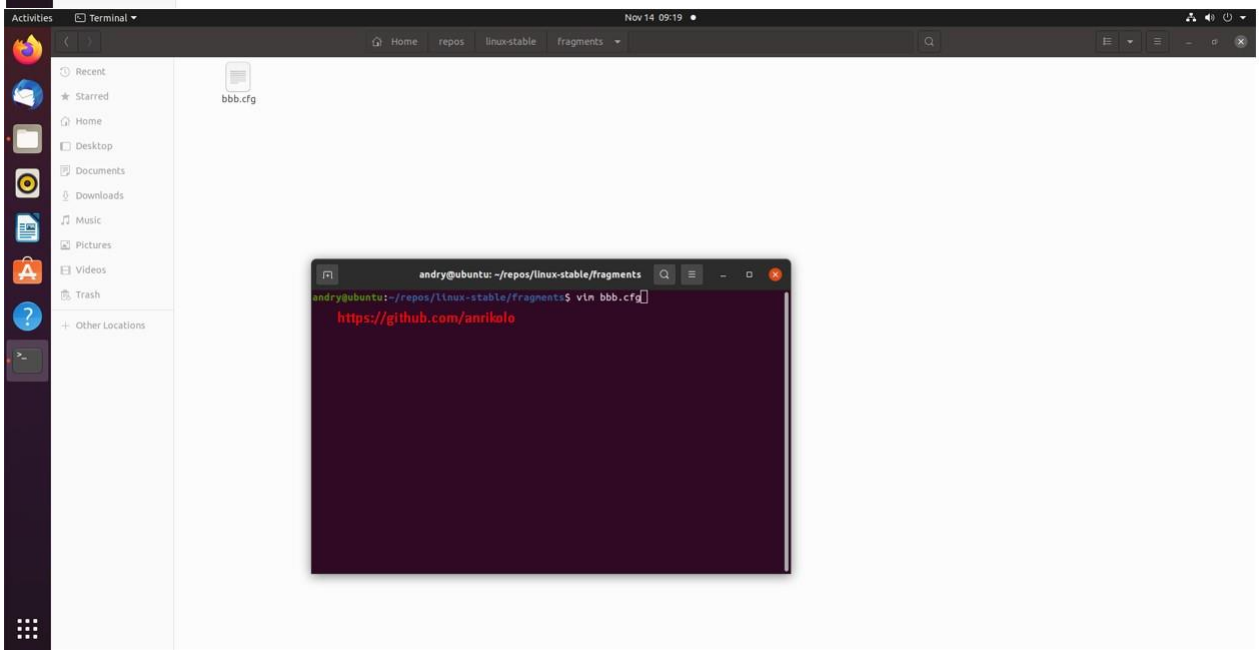

Activities
Terminal
Nov 14 09:25
Home
repos
busybox
_install
etc
init.d
rcS
.rcS.swp
andry@ubuntu: ~/repos/busybox/_install/etc/init.d
#!/bin/sh
mount -t sysfs none /sys
mount -t proc none /proc
mount -t debugfs none /sys/kernel/debug
echo /sbin/mdev > /proc/sys/kernel/hotplug
mdev -s
https://github.com/anrikolo
"rcS" 6L, 151C
6,7
All


Activities
Files
Nov 14 08:41
Home
Recent
Starred
Home
Desktop
Documents
Downloads
Music
Pictures
Videos
Trash
Other Locations
Desktop
Documents
Downloads
labAK
Music
Pictures
Public
repos
snap
Templates
Videos
.cache
.ccache
.config
.gnupg
.local
.mozilla
.ssh
.thunderbird
.bash_history
.bash_logout
.bashrc
.gitconfig
.profile
.sudo_as_admin_successful
.viminfo
https://github.com/anrikolo


Activities
Files
Nov 14 08:42
Home
.ccache
Recent
Starred
Home
Desktop
Documents
Downloads
Music
Pictures
Videos
Trash
Other Locations
0
1
2
3
4
5
6
7
8
9
a
b
c
d
e
f
tmp
ccache.conf
https://github.com/anrikolo


Activities
Text Editor
Nov 14 08:42
Open
ccache.conf
~/.ccache
Save
1 max_size = 5G
https://github.com/anrikolo
Plain Text
Tab Width: 8
Ln 1, Col 1
INS





Висновки

Підготували середовище для плати BBB. Виконали завдання з файлу **BBB_-_Platform_Bring_Up** з першого і до 3.1