

**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 ВВВ

Виконав:

Студент 3 курсу кафедри
ОТ ФІОТ,
Навчальної групи ІВ-93
Гуцалюк О.Б.

Перевірив:

Нікольський С. С..

Київ 2021

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

```

langellus@langellus-Ubuntu: ~/repos/busybox
langellus@langellus-Ubuntu:~/repos/busybox$ qemu-system-arm -kernel _install/boot/zImage -initrd rootfs.cpio.gz \
-m 512 \
-append "root=/dev/ram0 rw console=ttyAMA0,115200 mem=512M"
0.000000 Booting Linux on physical CPU 0x0
0.000000 Linux version 3.10.0 (langellus@langellus-Ubuntu) (gcc version 8.3.0 (GNU Toolchain for the A-profile Architecture 8.3-2019.03 (arm-rel-8.36))) #1 SMP Thu Dec 9 07:20:31 EET 2021
0.000000 CPU: ARMv7 Processor [412fc0f1] revision 1 (ARMv7), cr=10c337d0
0.000000 CPU: div instructions available: patching division code
0.000000 CPU: PPI / VPI nonaliasing data cache, PIIPI instruction cache
0.000000 DFI: fdt: Machine model: linux,dumy-virt
0.000000 Memory policy: Data cache writealloc
0.000000 erl: getting EPI parameters from FDT:
0.000000 erl: EPI not found.
0.000000 cna: Reserved 64 MiB at 0xc5000000
0.000000 psci: probing for conduit method from DT.
0.000000 psci: PSCIv1.2 detected in firmware.
0.000000 psci: Using standard PSCI v0.2 function IDs
0.000000 psci: Trusted OS migration not required
0.000000 random: get_random_bytes called from start_kernel+0x9c/0x47c with crng_init=0
0.000000 percpu: Embedded 16 pages/cpu @36200 rb192 d20724 u65536
0.000000 Built 1 zonelists, mobility grouping on. Total pages: 130648
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: 4096392K/52288K available (12288K kernel code, 1035K rdata, 4784K rodata, 2048K init, 393K bss, 52316K reserved, 65536K cma-reserved, 0K highmem)
0.000000 Virtual kernel memory layout:
0.000000 vector: 0xffff0000 - 0xffff0000 ( 4 kB)
0.000000 fixmap: 0xffff0000 - 0xffff0000 (3072 kB)
0.000000 vmalloc: 0xe8000000 - 0xffff0000 ( 496 MB)
0.000000 lowmem: 0xc0000000 - 0xe8000000 ( 512 MB)
0.000000 pkmap: 0xc0000000 - 0xc0000000 ( 2 MB)
0.000000 modules: 0xb0000000 - 0xb0000000 ( 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, MinObjSize=0, CPUs=1, Nodes=1
0.000000 rcu: Hierarchical RCU implementation.
0.000000 rcu: RCU event tracing is enabled.
0.000000 rcu: RCU restricting CPUs from NR_CPUS=16 to nr_cpu_ids=1.
0.000000 rcu: Adjusting geometry for rcu_fanout_leaf=16, nr_cpu_ids=1
0.000000 NR_IRQS: 16, nr_irqs: 16, preallocated irqs: 16
0.000000 GICv2r: range from 0x00020000-0x000200ff, SPIs=143
0.000000 arch_timer: cp15 timer(s) running at 62.50MHz (virt).
0.000000 clocksource: arch_sys_counter: max_cycles: 0xffffffffff max_idle_nss: 881590465314 ns
0.000133 sched_clock: 56 bits at 62.5MHz, resolution 1ns, wraps every 439804651196ns
0.000276 Switching to timer-based delay loop, resolution 10ns
0.003153 Console: colour dummy device 80x30
0.004412 Calibrating delay loop (skipped), value calculated using timer frequency.. 125.00 BogoMIPS (lpj=625000)
0.004544 pid_max: default: 32768 minimum: 301
0.005470 Mount-cache hash table entries: 1024 (order: 6, 4096 bytes)
0.005612 Mountpoint-cache hash table entries: 1024 (order: 6, 4096 bytes)
0.010789 CPU: Testing write buffer coherency: ok
0.019530 CPU0: Spectre v2: firmware did not set auxiliary control register IBE bit, system vulnerable
0.027749 /cpus/cpus missing clock-frequency property
0.027887 CPU0: thread -1, cpu 0, socket 0, mpidr 80000000
0.033434 Section __init_idtable_max for 0x43200000 - 0x43200000
langellus@langellus-Ubuntu: ~/repos/busybox
2.467292 ohci-pci: OHCI PCI platform driver
2.467619 ohci-platform: OHCI generic platform driver
2.468024 SPEAR-ohci: OHCI SPEAR driver
2.468306 ohci-st: OHCI STMicroelectronics driver
2.468593 ohci-atmel: OHCI Atmel driver
2.470219 usbcore: registered new interface driver usb-storage
2.470970 usbcore: registered new interface driver usbserial_generic
2.474343 usbserial: USB Serial support registered for generic
2.471758 usbcore: registered new interface driver ftdi_sio
2.472626 usbserial: USB Serial support registered for FTDI USB Serial Device
2.472752 usbcore: registered new interface driver pl2303
2.472464 usbserial: USB Serial support registered for pl2303
2.472693 usbcore: registered new interface driver usbserial_simples
2.472909 usbserial: USB Serial support registered for cdc_acm
2.473096 usbserial: USB Serial support registered for zio
2.473284 usbserial: USB Serial support registered for fusb
2.473453 usbserial: USB Serial support registered for flashloader
2.473688 usbserial: USB Serial support registered for google
2.473886 usbserial: USB Serial support registered for libtransistor
2.474191 usbserial: USB Serial support registered for Vlogap
2.474310 usbserial: USB Serial support registered for moto_modem
2.474519 usbserial: USB Serial support registered for motorola_tetra
2.474741 usbserial: USB Serial support registered for novatel_gps
2.474949 usbserial: USB Serial support registered for hpsk
2.475146 usbserial: USB Serial support registered for sunto
2.475345 usbserial: USB Serial support registered for siemens_mpi
2.484009 rtc-pl031 9010000.pl031: rtc core: registered pl031 as rtc0
2.486587 l2c /dev entries driver
2.501837 sdhci: Secure Digital Host Controller Interface driver
2.501364 sdhci: Copyright(c) Pierre Ossman
2.503224 Synopsys Designware Multimedia Card Interface Driver
2.504783 sdhci-pltfm: SDHCI platform and OF driver helper
2.509763 ledtrig-cpu: registered to indicate activity on CPUs
2.509128 usbhid: registered new interface driver usbhid
2.509329 usbhid: USB HID core driver
2.518622 NET: Registered protocol family 10
2.522668 Segment Routing with IPv6
2.523294 sit: IPv6, IPv4 and MPLS over IPv4 tunneling driver
2.523503 NET: Registered protocol family 17
2.527246 can: controller area network core (rev 20170425 abt.9)
2.527758 NET: Registered protocol family 29
2.527956 can: raw protocol (rev 20170425)
2.528234 can: broadcast manager protocol (rev 20170425 t)
2.528482 can: netlink gateway (rev 20170425) max_hops=1
2.529976 key type dns_resolver registered
2.530483 ThumbEE CPU extension supported.
2.530683 Registering SWP/SWPB emulation handler
2.532543 Loading compiled-in X.509 certificates
2.542708 Input: gpio-keys as /devices/platform/gpio-keys/input/0000:00:00:00
2.548172 rtc-pl031 9010000.pl031: setting system clock to 2021-12-09 10:01:53 UTC (1639044113)
2.552707 rtc-pl031 9000000.pl031: no rtc platform data
2.668291 Freeing unused kernel memory: 2048K
2.675197 Run /init as init process

```

```
langellus@langellus-Ubuntu: ~/repos/busybox

/ # ls -l
total 0
drwxrwxr-x 2 1000 1000 0 Dec 9 05:57 bin
drwxrwxr-x 2 1000 1000 0 Dec 9 06:01 boot
drwxrwxr-x 3 1000 1000 0 Dec 9 10:01 dev
drwxrwxr-x 3 1000 1000 0 Dec 9 06:06 etc
lrwxrwxrwx 1 1000 1000 11 Dec 9 05:59 init -> bin/busybox
drwxrwxr-x 3 1000 1000 0 Dec 9 06:04 lib
lrwxrwxrwx 1 1000 1000 11 Dec 9 05:57 linuxrc -> bin/busybox
dr-xr-xr-x 90 root root 0 Jan 1 1970 proc
drwxrwxr-x 2 1000 1000 0 Dec 9 05:57 root
drwxrwxr-x 2 1000 1000 0 Dec 9 05:57/sbin
dr-xr-xr-x 12 root root 0 Dec 9 10:01 sys
drwxrwxr-x 2 1000 1000 0 Dec 9 05:57 tmp
drwxrwxr-x 4 1000 1000 0 Dec 9 05:57 usr

/ # dmesg | grep init
[ 0.000000] random: get_random_bytes called from start_kernel+0x9c/0x47c with crng_init=0
[ 0.000000] Memory: 406436K/524288K available (12288K kernel code, 1619K rwdata, 4784K rodata, 2048K init, 393K bss, 52316K reserved, 65536K cma-reserved, 0K highmem)
[ 0.000000] .init : 0x(ptrval) - 0x(ptrval) (2048 kB)
[ 0.099199] devtmpfs: initialized
[ 0.127393] pinctrl core: initialized pinctrl subsystem
[ 0.268221] SCSI subsystem initialized
[ 0.441000] Trying to unpack rootfs image as initramfs...
[ 2.232094] Freeing initrd memory: 25084K
[ 2.373260] SuperH (H)SCI(F) driver initialized
[ 2.374518] msm_serial: driver initialized
[ 2.374047] STMicroelectronics ASC driver initialized
[ 2.376056] STM32 USART driver initialized
[ 2.675197] Run /init as init process
/ # busybox --help | head -15
BusyBox v1.31.1 (2021-12-09 07:56:12 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.

/ #
```

Структура середовища наведена у файлі repos_tree.txt

Висновки

В ході виконання ЛР було підготовано середовище для плати BBB, виконано завдання з файлу BBB - Platform Bring Up