

Корневая файловая система

Создали файл init.c и собрали его под arm архитектуру arm-linux-gnueabi-hf-gcc -static init.c -o init

Заархивировали его с помощью команды echo init | cpio -o -H newc | gzip > initramfs.cpio.gz

Запускаем наше временную корневую файловую систему QEMU_AUDIO_DRV=none qemu-system-arm -M vexpress-a9 -kernel zImage -initrd initramfs.cpio.gz -dtb vexpress-v2p-ca9.dtb -append "console=ttyAMA0" -nographic

```
Oct 1 20:41
qwerty@qwerty-To-Be-Filled-By-O-E-Mc: ~/Desktop/linux/TMP1
[ 2.112761] usbcore: registered new interface driver usbhid
[ 2.112795] usbhid: USB HID core driver
[ 2.128780] NET: Registered PF_INET6 protocol family
[ 2.163840] Segment Routing with IPv6
[ 2.164103] In-situ OAM (IOAM) with IPv6
[ 2.164627] sit: IPv6, IPv4 and MPLS over IPv4 tunneling driver
[ 2.167639] NET: Registered PF_PACKET protocol family
[ 2.167688] can: controller area network core
[ 2.168279] NET: Registered PF_CAN protocol family
[ 2.168357] can: raw protocol
[ 2.168520] can: broadcast manager protocol
[ 2.168679] can: netlink gateway - max_hops=1
[ 2.170195] Key type dns_resolver registered
[ 2.170825] ThumbEE CPU extension supported.
[ 2.170957] Registering SWP/SWPB emulation handler
[ 2.210319] Timer migration: 1 hierarchy levels; 8 children per group; 1 crossnode level
[ 2.211120] Loading compiled-in X.509 certificates
[ 2.247736] 10009000.serial: ttyAMA0 at MMIO 0x10009000 (irq = 37, base_baud = 0) is a PL011 rev1
[ 2.249822] printk: legacy console [ttyAMA0] enabled
[ 2.310514] 1000a000.serial: ttyAMA1 at MMIO 0x1000a000 (irq = 38, base_baud = 0) is a PL011 rev1
[ 2.320267] 1000b000.serial: ttyAMA2 at MMIO 0x1000b000 (irq = 39, base_baud = 0) is a PL011 rev1
[ 2.322511] 1000c000.serial: ttyAMA3 at MMIO 0x1000c000 (irq = 40, base_baud = 0) is a PL011 rev1
[ 2.345597] clk: Disabling unused clocks
[ 2.346216] PM: genpd: Disabling unused power domains
[ 2.403498] Freeing unused kernel image (initramfs) memory: 2048K
[ 2.411917] Run /init as init process
HELLO!!!!
[ 2.637023] input: InEXPS/2 Generic Explorer Mouse as /devices/platform/bus@40000000/bus@40000000:motherboard-bus@40000000:iofpga07,00000000/10007000.kni/serio1/input/input1
[ 2.765324] input: AT Raw Set 2 keyboard as /devices/platform/bus@40000000/bus@40000000:motherboard-bus@40000000:iofpga07,00000000/10006000.kni/serio0/input/input2
[ 12.651620] amba 1000f000.wdt: deferred probe pending: (reason unknown)
[ 12.652961] amba 1000e000.memory-controller: deferred probe pending: (reason unknown)
[ 12.653227] amba 1000d000.memory-controller: deferred probe pending: (reason unknown)
[ 12.653589] amba 1000c000.watchdog: deferred probe pending: (reason unknown)
[ 17.493613] Kernel panic - not syncing: Attempted to kill init! exitcode=0x00000000
[ 17.494455] CPU: 0 PID: 1 Comm: init Not tainted 6.10.11 #1
[ 17.494745] Hardware name: ARM-Versatile Express
[ 17.495057] Call trace:
[ 17.495610] unwind_backtrace from show_stack+0x10/0x14
[ 17.496732] show_stack from dump_stack_lvl+0x54/0x68
[ 17.497018] dump_stack_lvl from panic+0x19c/0x364
[ 17.497355] panic from make_task_dead+0x0/0x164
[ 17.498205] ---[ end Kernel panic - not syncing: Attempted to kill init! exitcode=0x00000000 ]---
```

Далее мы должны скачать busybox и собирать его

ARCH=arm make qemu_arm_defconfig

ARCH=arm make menuconfig | ставим статическую сборку и заполняем префикс

ARCH=arm CROSS_COMPILE=arm-linux-gnueabi-hf- make -j 16

QEMU_AUDIO_DRV=none qemu-system-arm -M virt -bios u-boot.bin -nographic

получаем busybox файл, который нам потребуется для сборки корневой файловой системы

Собираем её QEMU_AUDIO_DRV=none qemu-system-arm -M vexpress-a9 -kernel zImage -initrd initramfs.cpio.gz -dtb vexpress-v2p-ca9.dtb -append "console=ttyAMA0 rdinit=/bin/ash" -nographic

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[ 2.327541] mmc1-pl18x 10005000.mmc1: Got WP GPIO
[ 2.331268] mmc1-pl18x 10005000.mmc1: mmc0: PL181 manf 41 rev0 at 0x10005000 irq 35,36 (pio)
[ 2.333962] sdhci: Secure Digital Host Controller Interface Driver
[ 2.333995] sdhci: Copyright(c) Pierre Ossman
[ 2.337002] Synopsys Designware Multimedia Card Interface Driver
[ 2.339677] sdhci-pltfm: SDHCI platform and OF driver helper
[ 2.396670] ledtrig-cpu: registered to indicate activity on CPUs
[ 2.403623] usbcore: registered new interface driver usbhid
[ 2.403673] usbhid: USB HID core driver
[ 2.416109] NET: Registered PF_INET6 protocol family
[ 2.424918] Segment Routing with IPv6
[ 2.425185] In-situ OAM (IOAM) with IPv6
[ 2.425698] sit: IPv6, IPv4 and MPLS over IPv4 tunneling driver
[ 2.428684] NET: Registered PF_PACKET protocol family
[ 2.428732] can: controller area network core
[ 2.429132] NET: Registered PF_CAN protocol family
[ 2.429180] can: raw protocol
[ 2.429353] can: broadcast manager protocol
[ 2.429520] can: netlink gateway - max_hops=1
[ 2.431053] Key type dns_resolver registered
[ 2.431680] ThumbEE CPU extension supported.
[ 2.431768] Registering SWP/SMPB emulation handler
[ 2.450989] Timer migration: 1 hierarchy levels; 8 children per group; 1 crossnode level
[ 2.451783] Loading compiled-in X.509 certificates
[ 2.476718] 10009000.serial: ttyAMA0 at MMIO 0x10009000 (irq = 37, base_baud = 0) is a PL011 rev1
[ 2.478410] printk: legacy console [ttyAMA0] enabled
[ 2.524772] 1000a000.serial: ttyAMA1 at MMIO 0x1000a000 (irq = 38, base_baud = 0) is a PL011 rev1
[ 2.527411] 1000b000.serial: ttyAMA2 at MMIO 0x1000b000 (irq = 39, base_baud = 0) is a PL011 rev1
[ 2.529616] 1000c000.serial: ttyAMA3 at MMIO 0x1000c000 (irq = 40, base_baud = 0) is a PL011 rev1
[ 2.534716] clk: Disabling unused clocks
[ 2.535352] PM: genpd: Disabling unused power domains
[ 2.592834] Freeing unused kernel image (initmem) memory: 2048K
[ 2.598933] Run /bin/ash as init process
/bin/ash: can't access tty: job control turned off
# [ 2.898503] lnux: InExpS/P2 Generic Explorer Mouse as /devices/platform/bus@40000000/bus@40000000:motherboard-bus@40000000:motherboard-bus@40000000:ioppga@7,0000000
0/10007000.kni/serio1/input/input1
[ 3.020055] input: AT Raw Set 2 keyboard as /devices/platform/bus@40000000/bus@40000000:motherboard-bus@40000000:motherboard-bus@40000000:ioppga@7,0000000/10006000.kni
/serio0/input/input2

- #
- # [ 12.656527] amba 1000f000.wdt: deferred probe pending: (reason unknown)
[ 12.657678] amba 100e0000.memory-controller: deferred probe pending: (reason unknown)
[ 12.658023] amba 100e1000.memory-controller: deferred probe pending: (reason unknown)
[ 12.658330] amba 100e5000.watchdog: deferred probe pending: (reason unknown)

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И в конечном итоге получили простую корневую файловую систему

```

28 0 0:00 [cpuhp/3]
29 0 0:00 [migration/3]
30 0 0:00 [ksfttirq/3]
31 0 0:00 [kworker/3:0]
32 0 0:00 [kworker/3:0H]
33 0 0:00 [kdevtmpfs]
34 0 0:00 [kworker/R-inet_]
35 0 0:01 [kworker/u16:1-e]
36 0 0:00 [oom_reaper]
37 0 0:00 [kworker/R-write]
38 0 0:00 [kcompactd0]
39 0 0:00 [kworker/R-kbloc]
40 0 0:00 [kworker/u16:2-e]
41 0 0:00 [kworker/R-ata_s]
42 0 0:00 [kworker/R-edac_]
43 0 0:00 [kworker/R-devfr]
44 0 0:00 [watchdogd]
45 0 0:00 [kworker/R-rpcio]
46 0 0:00 [kworker/0:1H]
47 0 0:00 [kworker/R-xprt1]
49 0 0:00 [kswapd0]
50 0 0:00 [kworker/R-nfsio]
53 0 0:00 [kworker/u16:6-e]
54 0 0:00 [kworker/u16:7-a]
59 0 0:00 [irq/35-mmc1-pl1]
65 0 0:00 [kworker/0:3-eve]
69 0 0:00 [kworker/R-ml_d]
70 0 0:00 [kworker/R-lpv6_]
83 0 0:00 ps

- # arp
- # route
Kernel IP routing table
- # ls
bin linuxrc sbin
dev proc sys
initramfs.cpio.gz root usr
- # who

- #
- #
- # whoami
whoami: unknown uid 0
- # QEMU: Terminated
qwerty@qwerty-To-Be-Filled-By-O-E-M:~/Desktop/linux/IMP1$

```