Lab 3 Booting the Kernel

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ОТКРЫТАЯ МОБИЛЬНАЯ ПЛАТФОРМА

Compiling and running u-boot

What is u-boot?

- Das U-boot (Universal Bootloader) is open source primary (1st stage) bootloader commonly used on embedded devices
- Source code can be found here:
- https://github.com/u-boot/u-boot.git

- It support many architectures;
- It support booting Linux Kernel or 2nd stage bootloaders (like GRUB)
- It has support for many storage devices, basic IO, networking, file transfer and etc.

Step-by-step guide part 1 ☺

- 1. Install qemu, qemu-system-arm, cross toolchain
- 2. qemu supports many development boards and special configurable virtual machine `virt`
- 3. Clone U-boot repo and checkout latest stable version

```
git clone https://github.com/u-boot/u-boot/
git checkout v2022.01
```

- 4. Compile u-boot for vexpress dev board (you can make optional configurations too)

```
export ARCH = arm
export CROSS_COMPILE = arm-linux-gnueabihf-
make vexpress_ca9x4_defconfig
make
```

- 5. Check if your u-boot image works

```
qemu-system-arm -M vexpress-a9 -kernel u-boot -m 512M
```

Step-by-step guide part 2 ☺

- 6. Compile Linux Kernel for vexpress board

```
export ARCH = arm
export CROSS_COMPILE = arm-linux-gnueabihf-
make vexpress_defconfig
make zImage
make modules
make dtbs
```

- 7. Check if your kernel works in qemu

```
sudo qemu-system-arm -M vexpress-a9 -m 512M -kernel arm/boot/zImage -append "console = ttyAMA0“ -dtb
arch/arm/boot/dts/vexpress-v2p-ca9.dtb
```

TASK

- Setup development environment: install VM, qemu, git, download kernel source code.
- Build bootloader for ARM arch (U-boot, coreboot, etc.) – use vexpress-a9 as qemu target.
- Prepare initrd/initramfs (busybox, u-root, etc.)
- Prepare root filesystem (busybox, u-root, etc.)
- Build latest stable kernel for qemu-arm. (use vexpress-a9 as qemu target)
- Boot into rootfs using booting flow: bootloader -> initramfs -> rootfs (important!)
- Create report. (boot flow must be clearly demonstrated)

- Graded output: report including screenshots. (in PDF)

Acceptance criteria

- **A (20 points) –** boot flow correctly shown. Student can describe usage of initramfs.
- **B (15-19 points)** – minor issues but boot flow correctly shown.
- **C (10-14 points)** – one of boot stage is missing (usually initramfs).

Thanks for your attention!

About US

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- Founded in 2016
- Offices in Moscow, Innopolis and St.Petersburg
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Main products:

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