

Linux for Embedded Systems – Laboratory ex. 1

The student: Patryk Walczak

Description of the assignment

1. Vex9 should automatically connect to the network, using DHCP to obtain the network parameters. Disconnection of the cable should shut down the network connection. Connection of the cable should reconnect the network.
2. The system hostname should be set to „firstname_lastname” of the student.
3. When the Internet connection is established, the system clock should be synchronized with an NTP server (preferably using the „NTP server pool”).
4. Add the Tcl interpreter with the script that after the start of the system displays the amount of free space in the root filesystem.

Procedure to recreate the design from the attached archive

I prepared:

- build.sh – script which downloads and prepares the configuration
- overlay – directory with the TCL script for 4 task
- runme – script which runs QEMU and starts buildroot

To reproduce my solution:

1. run build.sh script
2. run runme script

Description of the solution

Before all task, I had to download the newest buildroot from website <https://buildroot.org> to the build directory. Next step before the tasks was using the command „make qemu_arm_vexpress_defconfig” which prepared the default configuration for vexpress. Then I was changing configuration by a graphical interface which was started by „make menuconfig” command. Then I unpacked the „.tar.bz2” file and changed the working directory using the hints from „ex1_experiments.html” I speeded up the compilation by:

Toolchain → Toolchain type → External toolchain
Toolchain → Toolchain → Arm ARM 2019.12
Build options → Enable compiler cache → set as default

Also as it was recommended by teacher I changed options listed below:

Filesystem images → unchecked ext2/3/4 root filesystem
Filesystem images → checked initial RAM filesystem linked into Linux kernel
Filesystem images → Compression method → gzip

Then I saved the configuration and made the options by using command „make all”. That was the base configuration before making all the tasks.

1. For vexpress to connect and disconnect to the internet automatically when plugging in and out a network cable:

Target packages → Show packages that are also provided by busybox

Target packages → Networking applications → ifplugd

Then I tested the configuration with „set_link interface_name off/on” in QEMU monitor mode.

2. To set system hostname:

System configuration → System hostname → „Patryk_Walczak”

At the start of the buildroot system, the hostname is showing.

3. For clock synchronization:

Target packages → Networking applications → ntp → ntpd

4. For running a TCL script I had to :

Target packages → Interpreter languages and scripting → tcl

Target packages → Interpreter languages and scripting → unchecked delete
encodings

System configuration → Root filesystem overlay directory → set path to
„./overlay”

Later on, I had to use the command „make tcl-dirclean” before „make”, and add script.tcl to the ./overlay/etc/init.d/ directory with the rcS bash file in which I added option to run TCL script after the start.

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puts [exec df -h]
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The script is simple and uses the Linux command „df” which displays all information about filesystem usage, including free space.