Sang Shuduo rust4linux homework

GitHub Repo: https://github.com/sangshuduo/r4l_stage3_homework/

Exercise1: Get source code and build kernel tree


```
CONFIG_RUST=y
CONFIG_RUSTC_VERSION_TEXT="rustc 1.62.0 (a8314ef7d 2022-06-27)"
CONFIG_HAVE_RUST=y
CONFIG_RANDOM_TRUST_CPU=y
CONFIG_RANDOM_TRUST_BOOTLOADER=y
CONFIG_HID_THRUSTMASTER=m
CONFIG_THRUSTMASTER_FF=y
# CONFIG_ANDROID_BINDER_IPC_RUST is not set
CONFIG_TRUSTED_KEYS=y
CONFIG_TRUSTED_KEYS_TPM=y
CONFIG_INTEGRITY_TRUSTED_KEYRING=y
CONFIG_IMA_TRUSTED_KEYRING=y
CONFIG_IMA_SECURE_AND_OR_TRUSTED_BOOT=y
CONFIG_SYSTEM_TRUSTED_KEYRING=y
CONFIG_SYSTEM_TRUSTED_KEYS=""
CONFIG_SECONDARY_TRUSTED_KEYRING=y
CONFIG_SAMPLES_RUST=y
# CONFIG_SAMPLE_RUST_MINIMAL is not set
CONFIG_SAMPLE_RUST_HELLOWORLD=m
# CONFIG_SAMPLE_RUST_PRINT is not set
# CONFIG_SAMPLE_RUST_MODULE_PARAMETERS is not set
# CONFIG_SAMPLE_RUST_SYNC is not set
# CONFIG_SAMPLE_RUST_CHRDEV is not set
# CONFIG_SAMPLE_RUST_MISCDEV is not set
# CONFIG_SAMPLE_RUST_STACK_PROBING is not set
# CONFIG_SAMPLE_RUST_SEMAPHORE is not set
# CONFIG_SAMPLE_RUST_SEMAPHORE_C is not set
# CONFIG_SAMPLE_RUST_RANDOM is not set
# CONFIG_SAMPLE_RUST_PLATFORM is not set
# CONFIG_SAMPLE_RUST_FS is not set
# CONFIG_SAMPLE_RUST_NETFILTER is not set
# CONFIG_SAMPLE_RUST_ECHO_SERVER is not set
# CONFIG_SAMPLE_RUST_HOSTPROGS is not set
# CONFIG_SAMPLE_RUST_SELFTESTS is not set
# CONFIG_RUST_DEBUG_ASSERTIONS is not set
CONFIG_RUST_OVERFLOW_CHECKS=y
# CONFIG_RUST_BUILD_ASSERT_ALLOW is not set
# CONFIG_RUST_BUILD_ASSERT_WARN is not set
CONFIG_RUST_BUILD_ASSERT_DENY=y
shuduo@shuduo-vaio ~/work/rust/rcore/stage3_homework/linux (master)95aa48f0f$ ll arch/x86/boot/bzImage
-rw-rw-r-- 1 shuduo shuduo 10004128  9月  2 13:43 arch/x86/boot/bzImage
shuduo@shuduo-vaio ~/work/rust/rcore/stage3_homework/linux (master)95aa48f0f$ ll vmlinux
-rwxrwxr-x 1 shuduo shuduo 526724496  9月  2 13:43 vmlinux*
shuduo@shuduo-vaio ~/work/rust/rcore/stage3_homework/linux (master)95aa48f0f$ []
```

Exercise2: Let the e1000-NIC work

```
[   19.400693] r4l_e1000_demo: pending_irqs: 3
[   19.400868] r4l_e1000_demo: Rust for linux e1000 driver demo (napi poll)
[   19.565713] r4l_e1000_demo: Rust for linux e1000 driver demo (net device start_xmit) tdt=5, tdh=5, rdt=7, rdh=0
[   19.566181] r4l_e1000_demo: Rust for linux e1000 driver demo (handle_irq)
[   19.566670] r4l_e1000_demo: pending_irqs: 3
[   19.566953] r4l_e1000_demo: Rust for linux e1000 driver demo (napi poll)
~ # ip add[   23.137382] r4l_e1000_demo: Rust for linux e1000 driver demo (net device start_xmit) tdt=6, tdh=6, rdt=7, rdh=0
[   23.137835] r4l_e1000_demo: Rust for linux e1000 driver demo (handle_irq)
[   23.138056] r4l_e1000_demo: pending_irqs: 3
[   23.138432] r4l_e1000_demo: Rust for linux e1000 driver demo (napi poll)
r add broadcast[   30.561921] r4l_e1000_demo: Rust for linux e1000 driver demo (net device start_xmit) tdt=7, tdh=7, rdt=7, rdh=0
[   30.563182] r4l_e1000_demo: Rust for linux e1000 driver demo (handle_irq)
[   30.563903] r4l_e1000_demo: pending_irqs: 3
[   30.564502] r4l_e1000_demo: Rust for linux e1000 driver demo (napi poll)
 10.0.2.255 dev eth0
[   37.001129] r4l_e1000_demo: Rust for linux e1000 driver demo (net device get_stats64)
ip: RTNETLINK answers: Invalid argument
~ # ip addr add 10.0.2.[   45.921576] r4l_e1000_demo: Rust for linux e1000 driver demo (net device start_xmit) tdt=0, tdh=0, rdt=7, rdh=0
[   45.923081] r4l_e1000_demo: Rust for linux e1000 driver demo (handle_irq)
[   45.923712] r4l_e1000_demo: pending_irqs: 3
[   45.924410] r4l_e1000_demo: Rust for linux e1000 driver demo (napi poll)
15/255.255.255.0 dev eth0
[   56.216333] r4l_e1000_demo: Rust for linux e1000 driver demo (net device get_stats64)
~ # ip route add default via 10.0.2.1
~ # ping 10.0.2.2
PING 10.0.2.2 (10.0.2.2): 56 data bytes
[   75.170520] r4l_e1000_demo: Rust for linux e1000 driver demo (net device start_xmit) tdt=1, tdh=1, rdt=7, rdh=0
[   75.170909] r4l_e1000_demo: Rust for linux e1000 driver demo (handle_irq)
[   75.171047] r4l_e1000_demo: pending_irqs: 131
[   75.171279] r4l_e1000_demo: Rust for linux e1000 driver demo (napi poll)
[   75.174244] r4l_e1000_demo: Rust for linux e1000 driver demo (net device start_xmit) tdt=2, tdh=2, rdt=0, rdh=1
[   75.174502] r4l_e1000_demo: Rust for linux e1000 driver demo (handle_irq)
[   75.174609] r4l_e1000_demo: pending_irqs: 131
[   75.175407] r4l_e1000_demo: Rust for linux e1000 driver demo (napi poll)
64 bytes from 10.0.2.2: seq=0 ttl=255 time=10.892 ms
[   76.180196] r4l_e1000_demo: Rust for linux e1000 driver demo (net device start_xmit) tdt=3, tdh=3, rdt=1, rdh=2
[   76.181732] r4l_e1000_demo: Rust for linux e1000 driver demo (handle_irq)
[   76.182374] r4l_e1000_demo: pending_irqs: 131
[   76.182878] r4l_e1000_demo: Rust for linux e1000 driver demo (napi poll)
64 bytes from 10.0.2.2: seq=1 ttl=255 time=4.621 ms
^C
--- 10.0.2.2 ping statistics ---
2 packets transmitted, 2 packets received, 0% packet loss
round-trip min/avg/max = 4.621/7.756/10.892 ms
~ # [   76.897474] r4l_e1000_demo: Rust for linux e1000 driver demo (net device start_xmit) tdt=4, tdh=4, rdt=2, rdh=3
[   76.898675] r4l_e1000_demo: Rust for linux e1000 driver demo (handle_irq)
[   76.899297] r4l_e1000_demo: pending_irqs: 3
[   76.899935] r4l_e1000_demo: Rust for linux e1000 driver demo (napi poll)
[
```

Exercise3:Compile your own Rust Module

```
~ # insmod rust_helloworld.ko
[  125.229289] rust_helloworld: Hello World from Rust module
~ # [  138.338805] r4l_e1000_demo: Rust for linux e1000 driver demo (net device start_xmit) tdt=5, tdh=5, rdt=2, rdh=3
[  138.340964] r4l_e1000_demo: Rust for linux e1000 driver demo (handle_irq)
[  138.341619] r4l_e1000_demo: pending_irqs: 3
[  138.342181] r4l_e1000_demo: Rust for linux e1000 driver demo (napi poll)

~ # rmmod rust_helloworld.ko
~ # 
```

Exercise4: Write a simple stop function for Intel-e1000-NIC

```
~ # rmmod r4l_e1000_demo.ko
[  233.835204] r4l_e1000_demo: Rust for linux e1000 driver demo (exit)
[  233.835727] r4l_e1000_demo: Rust for linux e1000 driver demo (remove)
[  233.835888] r4l_e1000_demo: Rust for linux e1000 driver demo (device_remove)
[  233.837080] r4l_e1000_demo: Rust for linux e1000 driver demo (net device stop)
[  233.837391] r4l_e1000_demo: Rust for linux e1000 driver demo (net device get_stats64)
[  233.845627] r4l_e1000_demo: Rust for linux e1000 driver demo (net device get_stats64)
~ # 
```