Assignment 1. compile kernel

1. 配置 rust 工具链

2. 在构建配置中选中 Rust support

配置完成后生成的 .config 文件

```
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
# end of Rust hacking
# end of Kernel hacking
❯ cat .config | grep rust
CONFIG_RUSTC_VERSION_TEXT="rustc 1.62.0 (a8314ef7d 2022-06-27)"
❯ cat .config | grep RUST
CONFIG_RUST_IS_AVAILABLE=y
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 is not set
# CONFIG_ANDROID_BINDER_IPC_RUST is not set
# CONFIG_TRUSTED_KEYS is not set
# CONFIG_IMA_SECURE_AND_OR_TRUSTED_BOOT is not set
CONFIG_SYSTEM_TRUSTED_KEYRING=y
CONFIG_SYSTEM_TRUSTED_KEYS=""
# CONFIG_SECONDARY_TRUSTED_KEYRING 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

  ~/project/cicv/cicv-r4l-3-Yang2096/linux on   master
❯ _
```

3. 开始编译

```
  CC       /home/y4ng/project/cicv/cicv-r4l-3-Yang2096/linux/tools/objtool/sigchain.o
  CC       /home/y4ng/project/cicv/cicv-r4l-3-Yang2096/linux/tools/objtool/subcmd-config.o
  CC       scripts/mod/empty.o
  HOSTCC   scripts/mod/mk_elfconfig
  CC       scripts/mod/devicetable-offsets.s
  UPD      scripts/mod/devicetable-offsets.h
  MKELF    scripts/mod/elfconfig.h
  HOSTCC   scripts/mod/modpost.o
  HOSTCC   scripts/mod/file2alias.o
  HOSTCC   scripts/mod/sumversion.o
  LD       /home/y4ng/project/cicv/cicv-r4l-3-Yang2096/linux/tools/objtool/libsubcmd-in.o
  LD       /home/y4ng/project/cicv/cicv-r4l-3-Yang2096/linux/tools/objtool/arch/x86/objtool-in.o
  AR       /home/y4ng/project/cicv/cicv-r4l-3-Yang2096/linux/tools/objtool/libsubcmd.a
  HOSTLD   scripts/mod/modpost
  CC       kernel/bounds.s
  CHKSHA1  include/linux/atomic/atomic-arch-fallback.h
  CHKSHA1  include/linux/atomic/atomic-instrumented.h
  CHKSHA1  include/linux/atomic/atomic-long.h
  UPD      include/generated/timeconst.h
  UPD      include/generated/bounds.h
  CC       arch/x86/kernel/asm-offsets.s
  LD       /home/y4ng/project/cicv/cicv-r4l-3-Yang2096/linux/tools/objtool/objtool-in.o
  LINK     /home/y4ng/project/cicv/cicv-r4l-3-Yang2096/linux/tools/objtool/objtool
  UPD      include/generated/asm-offsets.h
  CALL     scripts/checksyscalls.sh
  UPD      rust/target.json
  BINDGEN  rust/bindings/bindings_generated.rs
  BINDGEN  rust/bindings/bindings_helpers_generated.rs
  RUSTC L  rust/core.o
  _
```

4. 编译完成

```
drwxr-xr-x  14 y4ng y4ng 4.0K Mar 27 23:06 security
drwxr-xr-x  27 y4ng y4ng 4.0K Mar 27 23:06 sound
-rw-r--r--   1 y4ng y4ng 4.8M Mar 27 23:08 System.map
-rwxr-xr-x   1 y4ng y4ng  67M Mar 27 23:08 .tmp_vmlinux.kallsyms1
-rw-r--r--   1 y4ng y4ng 2.1M Mar 27 23:08 .tmp_vmlinux.kallsyms1.o
-rw-r--r--   1 y4ng y4ng  13M Mar 27 23:08 .tmp_vmlinux.kallsyms1.S
-rw-r--r--   1 y4ng y4ng 4.8M Mar 27 23:08 .tmp_vmlinux.kallsyms1.syms
-rwxr-xr-x   1 y4ng y4ng  69M Mar 27 23:08 .tmp_vmlinux.kallsyms2
-rw-r--r--   1 y4ng y4ng 2.1M Mar 27 23:08 .tmp_vmlinux.kallsyms2.o
-rw-r--r--   1 y4ng y4ng  13M Mar 27 23:08 .tmp_vmlinux.kallsyms2.S
-rw-r--r--   1 y4ng y4ng 4.8M Mar 27 23:08 .tmp_vmlinux.kallsyms2.syms
drwxr-xr-x  41 y4ng y4ng 4.0K Mar 27 00:03 tools
drwxr-xr-x   4 y4ng y4ng 4.0K Mar 27 23:06 usr
-rw-r--r--   1 y4ng y4ng    2 Mar 27 23:08 .version
drwxr-xr-x   4 y4ng y4ng 4.0K Mar 27 23:06 virt
-rwxr-xr-x   1 y4ng y4ng  69M Mar 27 23:08 vmlinux
-rw-r--r--   1 y4ng y4ng 1.4M Mar 27 23:08 vmlinux.a
-rw-r--r--   1 y4ng y4ng  234 Mar 27 23:08 .vmlinux.a.cmd
-rw-r--r--   1 y4ng y4ng  845 Mar 27 23:08 .vmlinux.cmd
-rw-r--r--   1 y4ng y4ng   35 Mar 27 23:08 .vmlinux.export.c
-rw-r--r--   1 y4ng y4ng  672 Mar 27 23:08 .vmlinux.export.o
-rw-r--r--   1 y4ng y4ng 4.3K Mar 27 23:08 ..vmlinux.export.o.cmd
-rw-r--r--   1 y4ng y4ng  64M Mar 27 23:08 vmlinux.o
-rw-r--r--   1 y4ng y4ng  143 Mar 27 23:08 .vmlinux.o.cmd
❯ file vmlinux
vmlinux: ELF 64-bit LSB executable, x86-64, version 1 (SYSV), statically linked, BuildID[sha1]=eb0992405d064991be01e4f4d
e654bd705a5e4fb, not stripped

~/project/cicv/cicv-r4l-3-Yang2096/linux on  master
❯ _
```

过程中遇到的问题

1. Linux 编译依赖的 rust 工具链是 1.63 版本，不支持使用 sparse 协议拉取 crate，安装 bindgen 时失败。之后修改成 git 协议即可。


```
[source.crates-io]
replace-with = 'rsproxy'
[source.rsproxy]
registry = "https://rsproxy.cn/crates.io-index"
[registries.rsproxy]
index = "https://rsproxy.cn/crates.io-index"
[net]
git-fetch-with-cli = true
~
```
"./config.toml" 8L, 207B   4,25   All