



# Linux-C语言实现文件夹拷贝与性能测试

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## 实验过程

### 安装相关依赖并查看linux内核版本

```
解压缩后会消耗 384 kB 的额外空间。
获取:1 http://mirrors.tuna.tsinghua.edu.cn/ubuntu noble/main amd64 libelf-dev amd64 0.190-1.1build4 [68.5 kB]
已下载 68.5 kB, 耗时 1秒 (47.5 kB/s)
正在选中未选择的软件包 libelf-dev:amd64。
(正在读取数据库 ... 系统当前共安装有 175256 个文件和目录。)
准备解压 .../libelf-dev_0.190-1.1build4_amd64.deb ...
正在解压 libelf-dev:amd64 (0.190-1.1build4) ...
正在设置 libelf-dev:amd64 (0.190-1.1build4) ...
正在处理用于 man-db (2.12.0-4build2) 的触发器 ...
qh2212195@Rika:~$ sudo apt-get install libncurses-dev
正在读取软件包列表... 完成
正在分析软件包的依赖关系树... 完成
正在读取状态信息... 完成
建议安装:
  ncurses-doc
下列【新】软件包将被安装:
  libncurses-dev
升级了 0 个软件包, 新安装了 1 个软件包, 要卸载 0 个软件包, 有 9 个软件包未被升级。
需要下载 384 kB 的归档。
解压缩后会消耗 2,417 kB 的额外空间。
获取:1 http://cn.archive.ubuntu.com/ubuntu noble/main amd64 libncurses-dev amd64 6.4+20240113-1ubuntu2 [384 kB]
已下载 384 kB, 耗时 0秒 (870 kB/s)
正在选中未选择的软件包 libncurses-dev:amd64。
(正在读取数据库 ... 系统当前共安装有 175272 个文件和目录。)
准备解压 .../libncurses-dev_6.4+20240113-1ubuntu2_amd64.deb ...
正在解压 libncurses-dev:amd64 (6.4+20240113-1ubuntu2) ...
正在设置 libncurses-dev:amd64 (6.4+20240113-1ubuntu2) ...
正在处理用于 man-db (2.12.0-4build2) 的触发器 ...
qh2212195@Rika:~$ uname -r
6.8.0-45-generic
```

### 查看当前系统可用存储空间

```
qh2212195@Rika:~$ df -BG
文件系统      1G的块 已用 可用 已用% 挂载点
tmpfs          1G  1G  2  1% /run
/dev/sda2     59G  4G  43G  24% /
tmpfs          2G   0G  2G   0% /dev/shm
tmpfs          1G   1G  1G   1% /run/lock
tmpfs          1G   1G  1G   1% /run/user/1000
/dev/sr0       2G   1G  0G  100% /media/qh2212195/CDROM
```

## 在 /usr/src 目录下建立软链接 linux

```
root@Rika:~# ln -s `pwd`/linux-6.10.10 /usr/src/linux
```

## 配置最新的linux内核

### 执行命令

```
cp /boot/config-`uname -r` .config
```

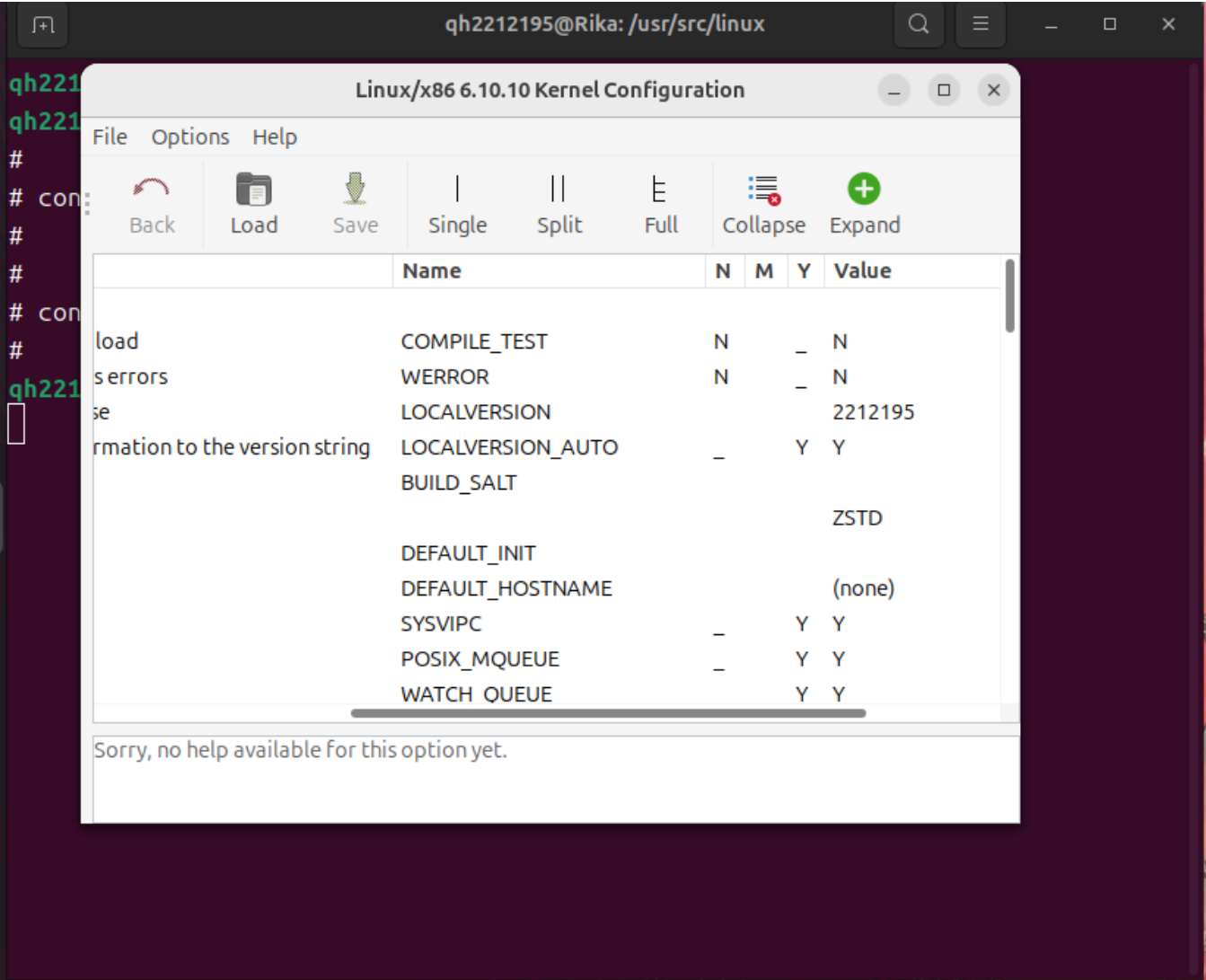
```
make oldconfig
```

### 执行结果展示（成功）

```
Enable BPF programs to override a kprobed function (BPF_KPROBE_OVERRIDE) [Y/n/?] y
Synthetic trace events (SYNTH_EVENTS) [Y/?] y
User trace events (USER_EVENTS) [Y/n/?] y
Histogram triggers (HIST_TRIGGERS) [Y/n/?] y
Trace event injection (TRACE_EVENT_INJECT) [Y/n/?] y
Add tracepoint that benchmarks tracepoints (TRACEPOINT_BENCHMARK) [N/y/?] n
Ring buffer benchmark stress tester (RING_BUFFER_BENCHMARK) [N/m/y/?] n
Show eval mappings for trace events (TRACE_EVAL_MAP_FILE) [N/y/?] n
Record functions that recurse in function tracing (FTRACE_RECORD_RECURSION) [N/y/?] n
Validate RCU is on during ftrace execution (FTRACE_VALIDATE_RCU_IS_WATCHING) [N/y/?] (NEW) N
Perform a startup test on ftrace (FTRACE_STARTUP_TEST) [N/y/?] n
Verify compile time sorting of ftrace functions (FTRACE_SORT_STARTUP_TEST) [N/y/?] n
Ring buffer startup self test (RING_BUFFER_STARTUP_TEST) [N/y/?] n
Verify ring buffer time stamp deltas (RING_BUFFER_VALIDATE_TIME_DELTAS) [N/y/?] n
Test module for mmiotrace (MMIOTRACE_TEST) [N/m/?] n
Test module to create a preempt / IRQ disable delay thread to test latency tracers (PREEMPTIRQ_DELAY_TEST) [N/m/?] n
Test module for in-kernel synthetic event generation (SYNTH_EVENT_GEN_TEST) [N/m/?] n
Test module for in-kernel kprobe event generation (KPROBE_EVENT_GEN_TEST) [N/m/?] n
Hist trigger debug support (HIST_TRIGGERS_DEBUG) [N/y/?] n
#
# configuration written to .config
#
qh2212195@Rika:/usr/src/linux$
```

# 自定义最新版linux内核

嵌入学号



# 编译内核文件

## 编译结果展示（成功）

```
LD [M] net/nfc/nci/nci_uart.ko
LD [M] net/nfc/hci/hci.ko
LD [M] net/nfc/nfc_digital.ko
LD [M] net/psample/psample.ko
LD [M] net/ife/ife.ko
LD [M] net/openvswitch/openvswitch.ko
LD [M] net/openvswitch/vport-geneve.ko
LD [M] net/openvswitch/vport-vxlan.ko
LD [M] net/openvswitch/vport-gre.ko
LD [M] net/vmw_vsock/vsock.ko
LD [M] net/vmw_vsock/vsock_diag.ko
LD [M] net/vmw_vsock/vmw_vsock_vmci_transport.ko
LD [M] net/vmw_vsock/vmw_vsock_virtio_transport.ko
LD [M] net/vmw_vsock/vmw_vsock_virtio_transport_common.ko
LD [M] net/vmw_vsock/hv_vsock.ko
LD [M] net/vmw_vsock/vsock_loopback.ko
LD [M] net/nsh/nsh.ko
LD [M] net/qrtr/qrtr.ko
LD [M] net/hsr/hsr.ko
LD [M] net/qrtr/qrtr-smc.ko
LD [M] net/qrtr/qrtr-tun.ko
LD [M] net/qrtr/qrtr-mhi.ko
qh2212195@Rika:/usr/src/linux$ |
```

## 第二次验证

```
qh2212195@Rika:/usr/src/linux$ make
CALL scripts/checksyscalls.sh
DESCEND objtool
INSTALL libsubcmd_headers
CHK kernel/kheaders_data.tar.xz
Kernel: arch/x86/boot/bzImage is ready (#1)
qh2212195@Rika:/usr/src/linux$ |
```

# 安装最新版linux内核

## 执行命令1

```
sudo make modules_install
```

## 执行结果展示（成功）

```
INSTALL /lib/modules/6.10.102212195/kernel/net/vmw_vsock/vsock_loopback.ko
SIGN /lib/modules/6.10.102212195/kernel/net/vmw_vsock/vsock_loopback.ko
ZSTD /lib/modules/6.10.102212195/kernel/net/vmw_vsock/vsock_loopback.ko.zst
INSTALL /lib/modules/6.10.102212195/kernel/net/nsh/nsh.ko
SIGN /lib/modules/6.10.102212195/kernel/net/nsh/nsh.ko
ZSTD /lib/modules/6.10.102212195/kernel/net/nsh/nsh.ko.zst
INSTALL /lib/modules/6.10.102212195/kernel/net/hsr/hsr.ko
SIGN /lib/modules/6.10.102212195/kernel/net/hsr/hsr.ko
ZSTD /lib/modules/6.10.102212195/kernel/net/hsr/hsr.ko.zst
INSTALL /lib/modules/6.10.102212195/kernel/net/qrtr/qrtr.ko
SIGN /lib/modules/6.10.102212195/kernel/net/qrtr/qrtr.ko
ZSTD /lib/modules/6.10.102212195/kernel/net/qrtr/qrtr.ko.zst
INSTALL /lib/modules/6.10.102212195/kernel/net/qrtr/qrtr-smd.ko
SIGN /lib/modules/6.10.102212195/kernel/net/qrtr/qrtr-smd.ko
ZSTD /lib/modules/6.10.102212195/kernel/net/qrtr/qrtr-smd.ko.zst
INSTALL /lib/modules/6.10.102212195/kernel/net/qrtr/qrtr-tun.ko
SIGN /lib/modules/6.10.102212195/kernel/net/qrtr/qrtr-tun.ko
ZSTD /lib/modules/6.10.102212195/kernel/net/qrtr/qrtr-tun.ko.zst
INSTALL /lib/modules/6.10.102212195/kernel/net/qrtr/qrtr-mhi.ko
SIGN /lib/modules/6.10.102212195/kernel/net/qrtr/qrtr-mhi.ko
ZSTD /lib/modules/6.10.102212195/kernel/net/qrtr/qrtr-mhi.ko.zst
DEPMOD /lib/modules/6.10.102212195
qh2212195@Rika:/usr/src/linux$ |
```

## 执行命令2

```
sudo make install
```

## 执行结果展示（成功）

```
qh2212195@Rika:/usr/src/linux$ sudo make install
INSTALL /boot
run-parts: executing /etc/kernel/postinst.d/initramfs-tools 6.10.102212195 /boot/vmlinuz-6.10.102212195
update-initramfs: Generating /boot/initrd.img-6.10.102212195
run-parts: executing /etc/kernel/postinst.d/unattended-upgrades 6.10.102212195 /boot/vmlinuz-6.10.102212195
run-parts: executing /etc/kernel/postinst.d/update-notifier 6.10.102212195 /boot/vmlinuz-6.10.102212195
run-parts: executing /etc/kernel/postinst.d/xx-update-initrd-links 6.10.102212195 /boot/vmlinuz-6.10.102212195
I: /boot/initrd.img is now a symlink to initrd.img-6.10.102212195
run-parts: executing /etc/kernel/postinst.d/zz-update-grub 6.10.102212195 /boot/vmlinuz-6.10.102212195
Sourcing file `/etc/default/grub'
Generating grub configuration file ...
Found linux image: /boot/vmlinuz-6.10.102212195
Found initrd image: /boot/initrd.img-6.10.102212195
Found linux image: /boot/vmlinuz-6.8.0-45-generic
Found initrd image: /boot/initrd.img-6.8.0-45-generic
Found memtest86+x64 image: /boot/memtest86+x64.bin
Warning: os-prober will not be executed to detect other bootable partitions.
Systems on them will not be added to the GRUB boot configuration.
Check GRUB_DISABLE_OS_PROBER documentation entry.
Adding boot menu entry for UEFI Firmware Settings ...
done
```

## 查看最新版linux内核

```
qh2212195@Rika:~$ uname -a
Linux Rika 6.10.102212195 #1 SMP PREEMPT_DYNAMIC Thu Oct 17 20:20:39 CST 2024 x86_64 x86_64 x86_64 GNU/Linux
qh2212195@Rika:~$ uname -r
6.10.102212195
```

## 实验总结

在本次操作系统实验课上，我按照课件中的安装指引，利用wget命令下载了linux-6.10.10版本的Linux内核，并安装了相关依赖。随后将配置最新版的Linux内核文件信息并成功将其编译。最后，安装并执行了最新版的Linux内核。

本次实验让我学会了如何配置linux内核文件信息，并学会在本地linux系统上编译并安装运行linux内核文件。此外，通过本次实验，我掌握了wget，ln等命令，学会了在linux操作系统上下载文件，创建软链接等操作。

总的来说，这次的实验虽然过程曲折，在编译内核文件时遇到诸多未曾见过的问题，但最终在查阅资料和向同学寻求帮助之后，成功解决了遇到的问题。