Operating Systems II

Fall 2017

Homework 3

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1 DESIGN

2 VERSION CONTROL LOG

3 WORK LOG

4 QUESTIONS

4.1 Main Point of the Assignment

The main point of this assignment was to understand how to present a chunk of memory as a block device, as well as to familiarize ourselves with the Linux Kernel's Crypto API and learn how to use this API to enable encryption and decryption of data on our block device.

4.2 Our Approach

4.3 Ensuring Correctness

To ensure that the block device and the encryption/decryption code are acting as expected, we've added *printk()* statements throughout the code. Once the qemu environment is booted, check the output of the *printk()* statements by typing *dmesg* in the command line or by viewing */var/log/messages*. The *printk()* statements we've included indicate whether the device is reading or writing data, whether the block device was successfully initiated, and whether or not an initialization failure occurred anywhere in the code.

4.4 What We Learned

4.5 How to Evaluate and Prove Correctness

Steps to Run with Patch

1) git clone "git://git.yoctoproject.org/linux-yocto-3.19" linux-yocto-3.19-patched
2) Apply Patch
    a) cp KernelAssn3.patch linux-yocto-3.19-patched/block
    b) cd linux-yocto-3.19-patched/block
    c) patch < kernelAssn3.patch
3) cd ..
4) cp /scratch/files/config-3.19.2-yocto-standard .
5) make menuconfig
6) Save and Exit
7) make -j4 all
8) cd ..
9) Use *screen* command to create two split-screens.
10) In both screens, make sure to source the environment variable.
    a) **SCREEN 1:** qemu-system-i386 -gdb tcp::5517 -S -nographic -kernel bzImage-qemux86.bin -drive file=core-image-lsb-sdk-qemux86.ext4,if=ide -enable-kvm -net none -usb -localtime –no-reboot –append "root=/dev/hda rw console=ttyS0 debug"

b) **SCREEN 2:** $GDB
c) **SCREEN 2:** target remote :5517
d) **SCREEN 2:** continue
e) **SCREEN 1:** log in as root
f) **SCREEN 1:**
g) **SCREEN 1:**
h) **SCREEN 1:**
i) **SCREEN 1:**

11) If no output from the *printk()* statements can be seen from the dmesg command, when reboot is entered you will see output.
12) reboot (this stops qemu)

Author	Date	Message
fischjer4	2017-10-31	First Commit for Encypted Block Device
blazerzero	2017-10-31	Added writeup files
fischjer4	2017-11-02	changed name. There was a typo
fischjer4	2017-11-02	Merge branch 'master' of https://github.com/fischjer4/Kernel
fischjer	2017-11-02	removed not needed files
fischjer	2017-11-02	Merge branch 'master' of https://github.com/fischjer4/Kernel
fischjer	2017-11-02	adding empty crypto-block-driver.c file
fischjer	2017-11-02	added cypto-block-device file
fischjer	2017-11-02	renamed file
fischjer	2017-11-02	added sbd skeleton to the block_device_crypto file
fischjer4	2017-11-05	added crypto handle init and printk statements to __init function
blazerzero	2017-11-05	Added #include <linux.crypto.h> to block_dev_crypto.c
fischjer4	2017-11-05	writing encrypted data to block is completed
fischjer4	2017-11-05	Merge branch 'master' of https://github.com/fischjer4/Kernel
fischjer4	2017-11-05	added decryption section
fischjer4	2017-11-05	added printk statements to print memory prior to enc/dec and after enc/dec
fischjer4	2017-11-05	added a print_mem function which prints the elements of the buffer and memory of the block device
blazerzero	2017-11-05	Included <linux/random.h> to initialize the key randomly. Also created new static const u8 variable for the key.
fischjer4	2017-11-05	added comments to code

fischjer4	2017-11-05	Merge branch ‘master’ of https://github.com/fischjer4/Kernel
fischjer4	2017-11-05	set key as module_param
fischjer4	2017-11-05	added printk statement for key so we know it was loaded properly
fischjer4	2017-11-06	added comments
fischjer	2017-11-06	added Makefile, Kconfig and added them along with the module C file to a neededFiles directory
fischjer4	2017-11-06	fixed syntax error in Kconfig file
fischjer	2017-11-06	fixed Kconfig line endings error
fischjer	2017-11-06	changed req->buffer to bio_data(req->bio) in sbd_transfer(). req->buffer is no longer a thing in this version of linux, and thus errors were produced with it
fischjer	2017-11-06	fixed print_mem to print hex, printing chars wouldn’t work obviosuly
fischjer	2017-11-06	fixed print –> printk syntax error
fischjer	2017-11-06	changed print_mem size to only 100 bytes. Printing all bytes CLUTTERED the screen
fischjer	2017-11-06	fixed printk error