

# CIS 722

## Project 2

Due: 5:00PM on 11/13/2014 (Thursday)

Implement a ram floppy device driver (major device number 2, minor device number 2) in floppy.c

### What to do

In the proj2 (zip) directory found in KSOL,

- There are a file "Makefile" and a directory "drivers"
- In "drivers", there are "Makefile" and two directories; "floppy" and "memory"
- You need to work on file "proj2/drivers/floppy/floppy.c"
  - Do not touch other files. Directory "memory" must be there to create all device drivers.
  - You must change relative file paths in include statements to absolute paths.
- To make the boot image, go to directory "proj2" and issue the following:
  - make clean // to clean up old executable and boot images
  - make fdboot // to create your bootable image in fd0
- First, test by writing a small message using printf() in main() in floppy.c to make sure that "make" picks up your floppy.c (I am not sure why printf() works in floppy.c (I have not looked at the source code of printf()), but it works)
- When allocating memory for the ram floppy, follow the geometry for the 360K floppy drive (# of sectors/track : 9, # of tracks/side : 40, the number of heads (NR\_HEADS) : 2, # of bytes/sector : 512)
  - Even though you can allocate 360K bytes in the BSS within the floppy process, you MUST use allocmem (see line 11886 on page 786) to allocate memory outside the driver process

In floppy.c, implement the following functions (starting their names with rf\_)

- struct device rf\_prepare(int device) : even though the ram floppy device has nothing to prepare, make sure to return non NIL\_DEV value
- int rf\_transfer (int proc\_nr, int opcode, off\_t position, iovec\_t \*iov, unsigned nr\_req)
- int rf\_do\_open(struct driver \*dp, message \*m\_ptr) : even though the ram floppy drive does not have anything to do in the open command, make sure to return OK
- void rf\_geometry(struct partition \*entry) : it should return struct partition's field values based on those of the 360K floppy disk drive

- In addition, I created `rf_init()` which is called from `main()` of `floppy.c`. It allocates memory and initializes the ram floppy's "struct device" values

The above functions should be called from the corresponding floppy's functions when the minor device number is 2 (do not use a magic number in your code. Define the constant).

Note that in `f_prepare()`, the minor device number is compared with 0 and `NR_DRIVES` (defined to be 2). I think this is the only place that the minor device number is compared with `NR_DRIVES`. Make sure not to return `NIL_DEV` when it is called with minor device number 2.

### How to test your implementation

Create device file `/dev/fd2` (this is already done in your hd image, but just for your information) by:

```
# mknod /dev/fd2 b 2 2
/* mknod file [b][c] major minor */
```

After booting your system ("shutdown", then "boot fd0"), try to access raw device `/dev/fd2` directly by

```
# cat some_file > /dev/fd2
# more /dev/fd2
```

This should display `some_file`'s contents followed by garbage values

If it works, make a file system by

```
# mkfs /dev/fd2
```

Now, you can mount `/dev/fd2` by

```
# mount /dev/fd2 /mnt
```

Try to create/remove files and directories in `/mnt`.

### How to submit your work

1. Replace `floppy.c` in `proj2/drivers/floppy` with your implementation
2. Issue "make clean" in `proj2` to clean up unnecessary files
3. Rename `proj2` to your `LastName_FirstName`
4. Make a zip file of the project directory
5. Submit your zip file in the Project 2 file dropbox

In addition to your floppy image file, submit a hard copy of the functions and variable/constant definitions that you have modified or added, and mark the exact lines you have modified with a colored marker

- For a function that you have added (such as `rf_prepare`), mark only the function name part (not the body)
- For a variable/constant definition you have added, include several lines before and after the definition and mark the line you have added.
- In your hard copy, write whether your program runs or not

Give your hard copy to me or put it in my mailbox