

F2FS

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Contents

- Serial Communication Tool
 - Windows
 - Putty
 - Linux
 - Minicom
- File System Write Policy Comparison
 - Ext4, F2FS
 - LBA Tracing on Jasmine
- Project Plan

Serial Communication on Linux

Serial Communication on Linux

- How to identify `/dev/ttyxxx`
 - `dmesg | grep "tty"`

```
root@ubuntu:~# dmesg | grep "tty"
[ 0.222543] printk: console [tty0] enabled
[ 6.048138] 00:02: ttyS0 at I/O 0x3f8 (irq = 4, base_baud = 115200) is a 1655
0A
[ 11.834006] fbcon: Remapping primary device, fb1, to tty 1-63
[ 13.775703] usb 1-11: pl2303 converter now attached to ttyUSB0
```

Serial Communication on Linux

- Minicom: Serial communication tool

- Install: `sudo apt-get install minicom -y`

- Setup: `sudo minicom -s`

- 1. Serial port setup

```
+-----+
| A - Serial Device      : /dev/ttyUSB0
| B - Lockfile Location  : /var/lock
| C - Callin Program    :
| D - Callout Program   :
| E - Bps/Par/Bits      : 115200 8N1
| F - Hardware Flow Control : Yes
| G - Software Flow Control : No
+-----+
Change which setting? |
+-----+
| Screen and keyboard
| Save setup as dfl
| Save setup as..
| Exit
| Exit from Minicom
+-----+
```

Press 'A' and modify

- 2. Screen and keyboard

```
+-----[Screen and keyboard]-----+
| A - Command key is      : ^A
| B - Backspace key sends : BS
| C - Status line is     : enabled
| D - Alarm sound        : Yes
| E - Foreground Color (menu): WHITE
| F - Background Color (menu): BLACK
| G - Foreground Color (term): WHITE
+--| H - Background Color (term): BLACK
| I - Foreground Color (stat): WHITE
| J - Background Color (stat): BLACK
| K - History Buffer Size  : 2000
| L - Macros file         : .macros
| M - Edit Macros
| N - Macros enabled      : Yes
| O - Character conversion :
| P - Add linefeed       : No
| Q - Local echo         : No
+--| R - Line Wrap          : Yes
| S - Hex Display        : No
| T - Add carriage return : Yes
| Change which setting? (Esc to exit)
+-----+
```

Press 'R'

Press 'T'

- 3. Save setup as dfl

- 4. Exit from Minicom

Serial Communication on Linux

- Minicom: Serial communication tool
 - Run: `sudo minicom`
 - Run with the output file saved: `sudo minicom -C output.txt`

```
Welcome to minicom 2.7

OPTIONS: I18n
Compiled on Nov 15 2018, 20:18:47.
Port /dev/ttyUSB0, 01:30:04

Press CTRL-A Z for help on special keys

Welcome to OpenSSD
do format
Total FTL DRAM metadata size: 946 KB
VBLKS_PER_BANK: 129
LBLKS_PER_BANK: 67
META_BLKS_PER_BANK: 5
format complete
end format
```

- Quit: Press `'Ctrl+A'` → Press `'X'`

File System Write Policy Comparison

FTL Testing: FIO

- Check the device.
 - `lsblk`
- Create a partition.
 - `fdisk /dev/sdh` (your device in /dev)
 - Run 'n' command and 'w' command
 - Type '+128M' at last sector and 'w' command
- Create a file system.
 - `mkfs -t ext4 /dev/sdh1` (your device partition in /dev)
- Mount the device.
 - `mount -t ext4 /dev/sdh1 /mnt`

FTL Testing: FIO

- Install the FIO.
 - *sudo apt-get install fio*
 - Verify the installation with the *fio* command.
- Write a FIO script.
 - *vim test.fio*
- Run the FIO.
 - *fio test.fio*

```
[global]
ioengine=libaio
directory=/mnt
rw=randwrite
bs=32k
filesize=32m
time_based=1
runtime=60
```

```
[job]
numjobs=1
fsync=10
```

F2FS File System Usage

- Install the F2FS file system tools.
 - `sudo apt-get install f2fs-tools`
- IPU(In-Place Update) disable
 - `echo 0 > /sys/fs/f2fs/sdh/l/ipu_policy` (your device in /dev)
- Check the F2FS file system status information.
 - `cat /sys/kernel/debug/f2fs/status`

```
Distribution of User Blocks: [ valid | invalid | free ]
[-----|-----]
IPU: 0 blocks
SSR: 40648 blocks in 80 segments
LFS: 147116 blocks in 286 segments
```

LBA Tracing

- Add code to print the LBA and sector counts to the firmware code. (`./sata/sata_main.c`)
 - Use `tab(\t)` for ease of excel processing

```
void Main(void)
{
    while (1)
    {
        if (eventq_get_count())
        {
            CMD_T cmd;

            eventq_get(&cmd);

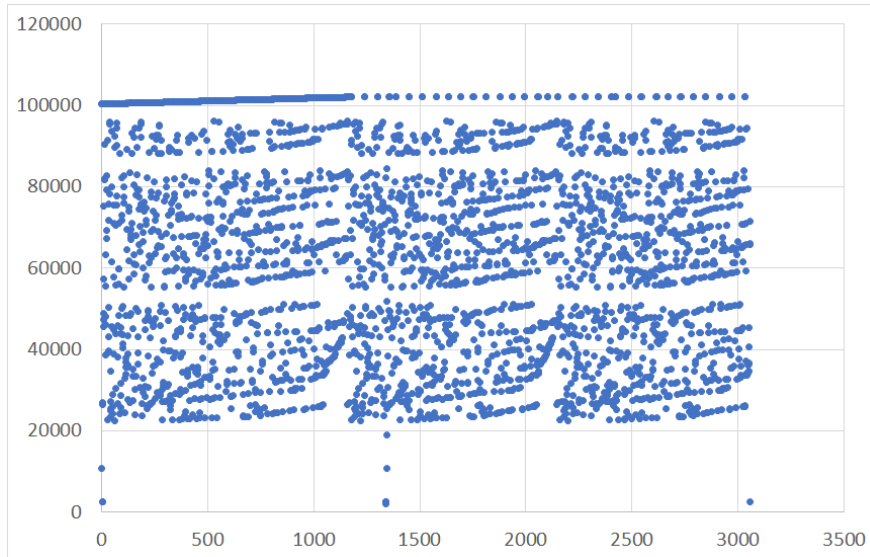
            if (cmd.cmd_type == READ)
            {
                uart_printf("ftl_read\tlba\t%d\tcount\t%d", cmd.lba, cmd.sector_count);
                ftl_read(cmd.lba, cmd.sector_count);
            }
            else
            {
                uart_printf("ftl_write\tlba\t%d\tcount\t%d", cmd.lba, cmd.sector_count);
                ftl_write(cmd.lba, cmd.sector_count);
            }
        }
    }
}
```

Write Policy Comparison

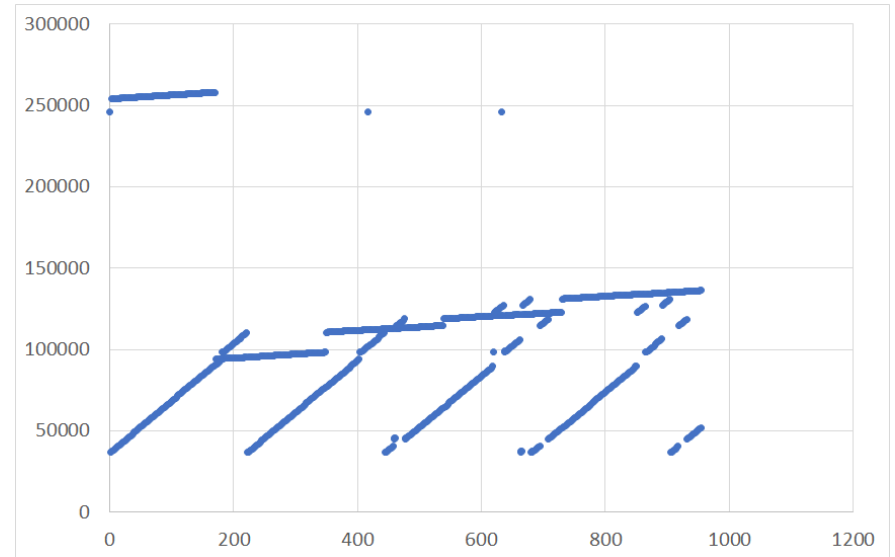
- Install the firmware with the code that prints LBA.
- After connecting the Jamine in Linux, turn on the serial monitor with minicom.
 - Save to file.
- Mount the file system to experiment with.
- IPU(In-Place Update) disable (**Only F2FS**)
- Experiment using the FIO benchmark.
 - Use the options listed above.
- Open the generated LBA Trace in Excel and draw a graph.

Write Policy Comparison

- Sample graph



< Ext4 >



< F2FS >

- Submit to the icampus
 - Excel file with data and graph

Project Plan

Project Plan

- Submit a project design, implementation and experiment plan for each group.
 - Include current progress.
 - About 1-2 pages in pdf

- Submit to the icampus
 - Due: 12/01(Sun.) 23:59:59