Log-block FTL

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Schedule

• Project4: Log-block FTL
  – 11/22 ~ 12/2(Sun., 23:59:59 PM)
  – -10% for delayed submission (per day)

• Project5: Power-off Recovery
  – Submission: 11/29 ~ 12/13(Thu., 11:59:59 AM)
  – Presentation: 12/13(TBD)

• Implement multi-stream on jasmine board will be done as “lab” on 11/24 (Sat., make-up class)
Block Mapping FTL

Page mapping

Block mapping

Logical sector number

Page-level mapping table

Physical block number

Flash block

Logical sector number

Block-level mapping table

Physical block number

Logical block number

Logical page number

Flash block
Page Mapping vs. Block Mapping

- Exploits both mapping schemes
  - Page mapping
    - Update block or log block
  - Block mapping
    - Data blocks

<table>
<thead>
<tr>
<th>Pros</th>
<th>Page Mapping</th>
<th>Block Mapping</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Efficient handling of small writes</td>
<td>Small management overhead for translation information</td>
</tr>
<tr>
<td>Cons</td>
<td>Large management overhead for translation information</td>
<td>Inefficient handling of small writes</td>
</tr>
</tbody>
</table>

ICE3028: Embedded Systems Design (Fall 2018), Fall 2018, Jinkyu Jeong (jinkyu@skku.edu)
What should we implement? BAST

• Data block
  – Block level mapping
• Log block
  – Page level mapping
  – Temporary block associated with the data block
• Merge
  – Partial, Switch, Full
Log Block FTL on NAND simulator
Design log-block FTL on NAND simulator

Make # of log block flexible
- e.g) #define NUM_LOGBLOCK (3) // in ftl.h

Make three merge functions explicitly
- switch_merge(), partial_merge(), full_merge()
  - Those three functions should be exist and called in FTL
  - No restriction at return type and arguments

With a well-designed code, draw a graph
- Relation between WAF and NUM_LOGBLOCK
Log Block FTL on Jasmine board
Descriptoin

• Design log block FTL on OpenSSD Jasmine board

• Make # of log block: 3 ~ 8
  – e.g) #define NUM_LOGBLOCK (3) // in ftl.h

• Modify only ftl.c and ftl.h
  – Above two files are the only source files submitted
  – Any source code in OpenSSD ftl is available
    • Greedy, Dummy, Tutorial, etc.

• You may use spare area (include/jasmine.h)
  – VBLKS_PER_BANK ~ SPARE_VBLKS_PER_BANK - 1
Comments

• Read
  – Find out which block has the up-to-date data
    • Data block vs. Log block

• Write
  – Similar process as page-mapping FTL for page-level logging
  – Misc. metadata to help allocating new block
    • Free block list
    • Block bitmap

• GC
  – When GC happens?
    • No avail page in a log block
    • No avail log block
  – You have to keep track of valid pages of each log block
Submission

• As personal,
  – Compress your folder as YourStudentID-4.tar.gz
    • With code and graph(# of log block vs. WAF)
    • Please send mail with uniformized title
      – [ICE3028]YourStudentID-4

• As team,
  – Compress your folder as YourGroupID-4.tar.gz
    • With code(ftl.c, and ftl.h) and report
    • Please send mail with uniformized title
      – [ICE3028]YourGroupID-4

• Send email to minwoo.ahn@csl.skku.edu

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• Due date: 12/2(Sun.), 23:59:59 PM
  – -10% per day for delayed submission
Any Questions?