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Energy Efficient Mobile DB for Wearable Devices



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Reconsider for energy consumption

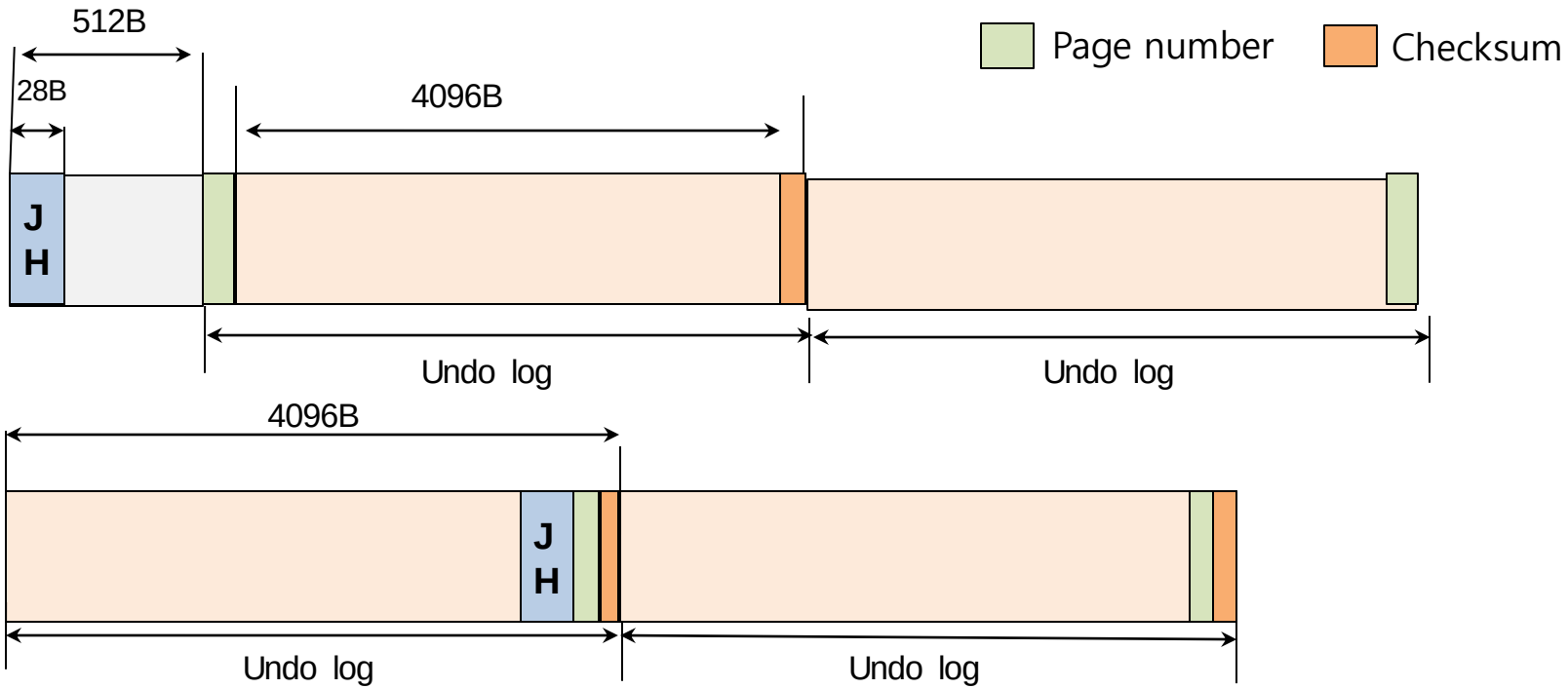
- Storage consumes pretty much energy.
- Most applications maintain their persistent data using SQLite
- SQLite constitute 70% of write IOs in the storage
- Reduce Power consumption by optimizing SQLite



Metadata Embedding

Metadata Embedding[1][2]

- Most applications use persist journal mode to store persistent data.
- Change data structure to reduce IO volume and fdatasync()
- Embedding Journal header in undo page (Do not use 512 bytes in the Journal header at all)
- For each file change counter renew, it updates the database header each time



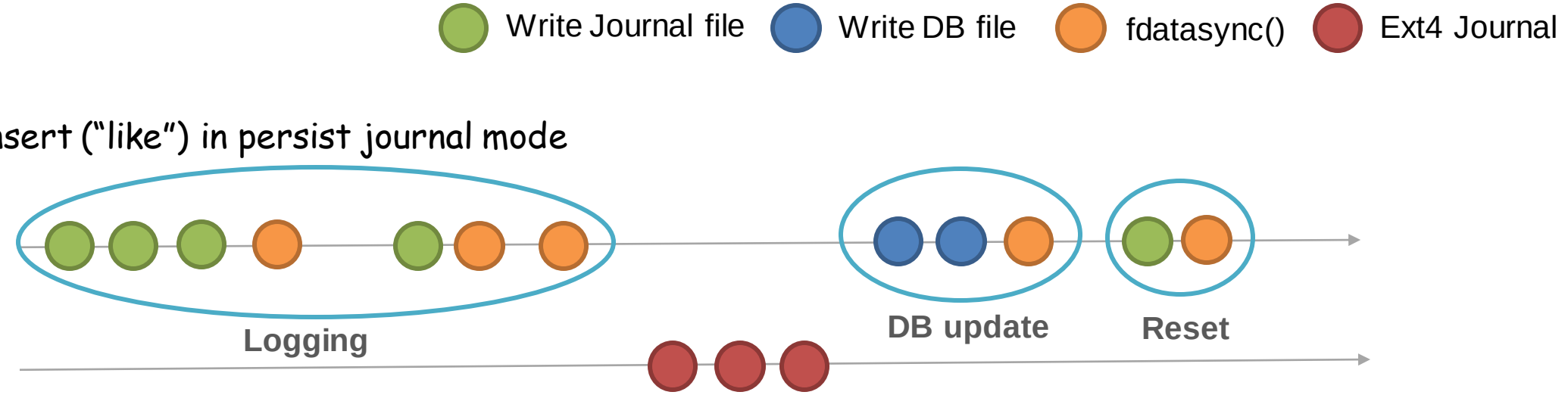
[1] Lee, Wongun, et al. "WALDIO: eliminating the filesystem journaling in resolving the journaling of journal anomaly." Usenix, 2015.
[2] Wook-Hee Kim, Beomseok Nam, Dongil Park and Youjip Won, “Resolving Journaling of Journal Anomaly in Android I/O: Multi-Version B-tree with Lazy Split”, In Proceedings of USENIX FAST 2014, Santa Clara, US, Feb. 2014

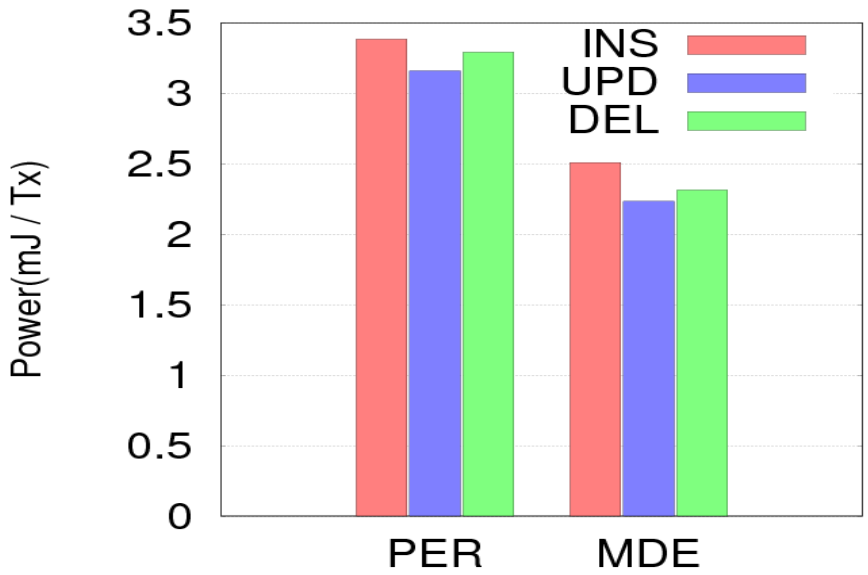
Metadata Embedding

facebook

SQLite

Ext4





There are three benefits of metadata embedding

- Cut down number of flush (from 5 to 3)
- Decrease dramatically IO volume (from 40KB to 12KB)
- Reduce power consumption per a transaction (about 24%)

Future work

What is Next…?

The next target is wearable devices

We are doing a research to save energy consumption for wearable device with small battery



Found several features

- Interestingly, a wearable device has an IO pattern similar to a smart phone.
- Wearable device occurs overhead IO traffic.
- When optimization is applied, we save much energy of battery



Thank You.