**Free Atomic Consistency in Storage Class Memory with Software Based Write-Aside Persistence**

Ellis Giles  
Rice University

Peter Varman (Advisor)  
Rice University

Kshitij Doshi (Advisor)  
Intel Corporation

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### MOTIVATION

Emerging Storage Class Memory (SCM) promises to be a fast, byte-addressable, persistent memory near DRAM on the memory hierarchy. However, the high Density and low Endurance characteristics of the main non-volatile byte-addressable memory (PCM) need special facilities to be used in a dependable and efficient way.

**Hardware WrAP**

WrAP automatically and implicitly catches cache evictions to SCM during the write operation. It prevents SCM from updates, maintains consistency, and provides an atomic update to the cache on the way to the SCM, thus providing an atomic update to the cache on the way to the SCM.

**Software WrAP**

The sequential log area in SCM allows for write combining of log entries. There is no atomic guarantee in a transaction by the application.

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### RESULTS

Data intensive applications utilizing Storage Class Memories can achieve atomic consistency for free with Software Based Write-Aside Persistence.

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### CONCLUSIONS

- **SoftWRAP** can perform with close to same response time as Non-Atomic, gaining atomicity and consistency almost for free.
- **WRAP** lets cache hierarchy continue doing what it does best: reducing memory access latency.
- Performing lightweight value communication
- No disruptive changes to the cache hierarchy
- Avoids front end synchronous operations.
- Allows both Byte Addressability & Persistence of SCM devices
- **WRAP** has software only solution based on a DRAM Alias Table that shows significant performance gains.

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