POSEIDON: Safe, Fast and Scalable Persistent Memory Allocator

Wook-Hee Kim, Anthony Demeri, R. Madhava Krishnan, Jaeho Kim*, Mohannad Ismail, Changwoo Min
Virginia Tech, *Gyeongsang National University

12TH ANNUAL NON-VOLATILE MEMORIES WORKSHOP

**Background**

**Design Requirement of PM Allocator**
- Transactional allocation
- Crash consistency of heap metadata.
- Protection of heap metadata from program errors.
- Scalability

**Transaction allocation**

**Crash consistency of heap metadata.**

**Protection of heap metadata from program errors.**

**Scalability**

**The Case of PMDK**

**DRAM metadata**
- Per-thread Arena
  - Locks
  - Free list

**NVMM metadata and user data**
- Heap metadata
- User data

**NVMM metadata**
- Chunk for small size allocation
- Global AVL tree of free chunks

**Evaluation**

POSEIDON significantly outperforms other persistent memory allocators up to $4 \times$.

POSEIDON shows better performance in YCSB evaluation (read-world evaluation).

**Conclusion**

Poseidon guarantees safety using Intel MPK
Poseidon’s per-CPU sub-heap design show better scalability