Goal

Build recoverable data structures as fast in online phase as possible.

Achieve better performance by relaxing ordering constraints and reducing the amount of persistent data.

Relax Ordering Constraints

(Non-buffered) durable linearizability requires operations to persist before return; Buffered durable linearizability (BDL) only requires operations not to persist in the opposite of their happens-before order and allows some progress loss in the wake of a crash. Operations can persist periodically in batches.

Periodic Persistence

Inspired by Dali [Nawab et al., DISC’17], Montage implements BDL: it breaks execution into epochs and issues fences only at epoch boundaries.

Reduce Persistent Data

Inspired by Pronto [Memaripour et al., ASPLOS’20], among others, Montage reduces the amount of persistent data by persisting only abstraction-related data. All transient indices can be rebuilt after a crash.

General Buffered Persistence

Montage is the first general buffered persistence system. It suits most abstractions including sets/maps, queues, and graphs.

Montage also works with nonblocking data structures with moderate API restrictions.

Great Performance

Montage shows great performance on multiple data structures:

Hash map (y log scale)

Memcached (linear scale)