Trade-off Throughput VS WAF

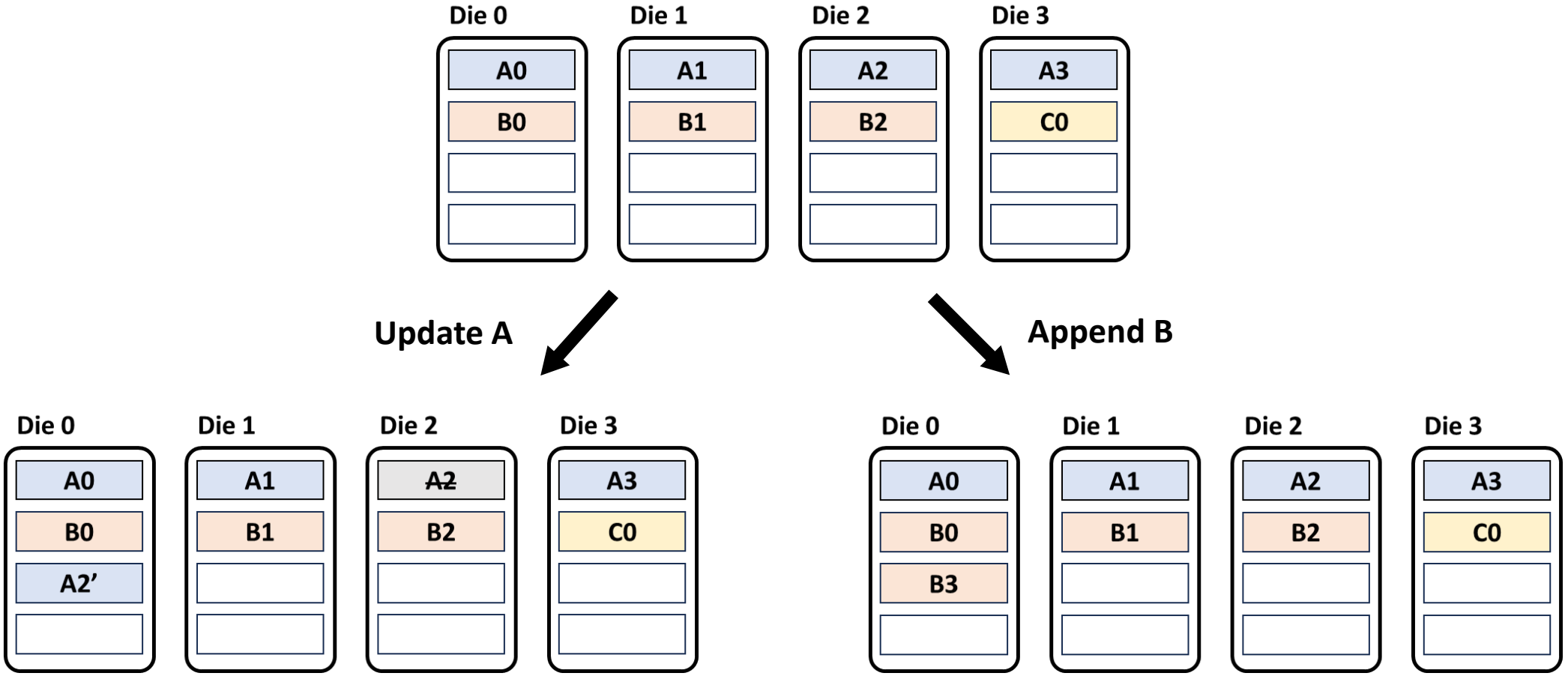
2024.08.23

Presentation by Boseung Kim, Juhyun Kim

bskim1102@dankook.ac.kr, jhk@kiost.ac.kr

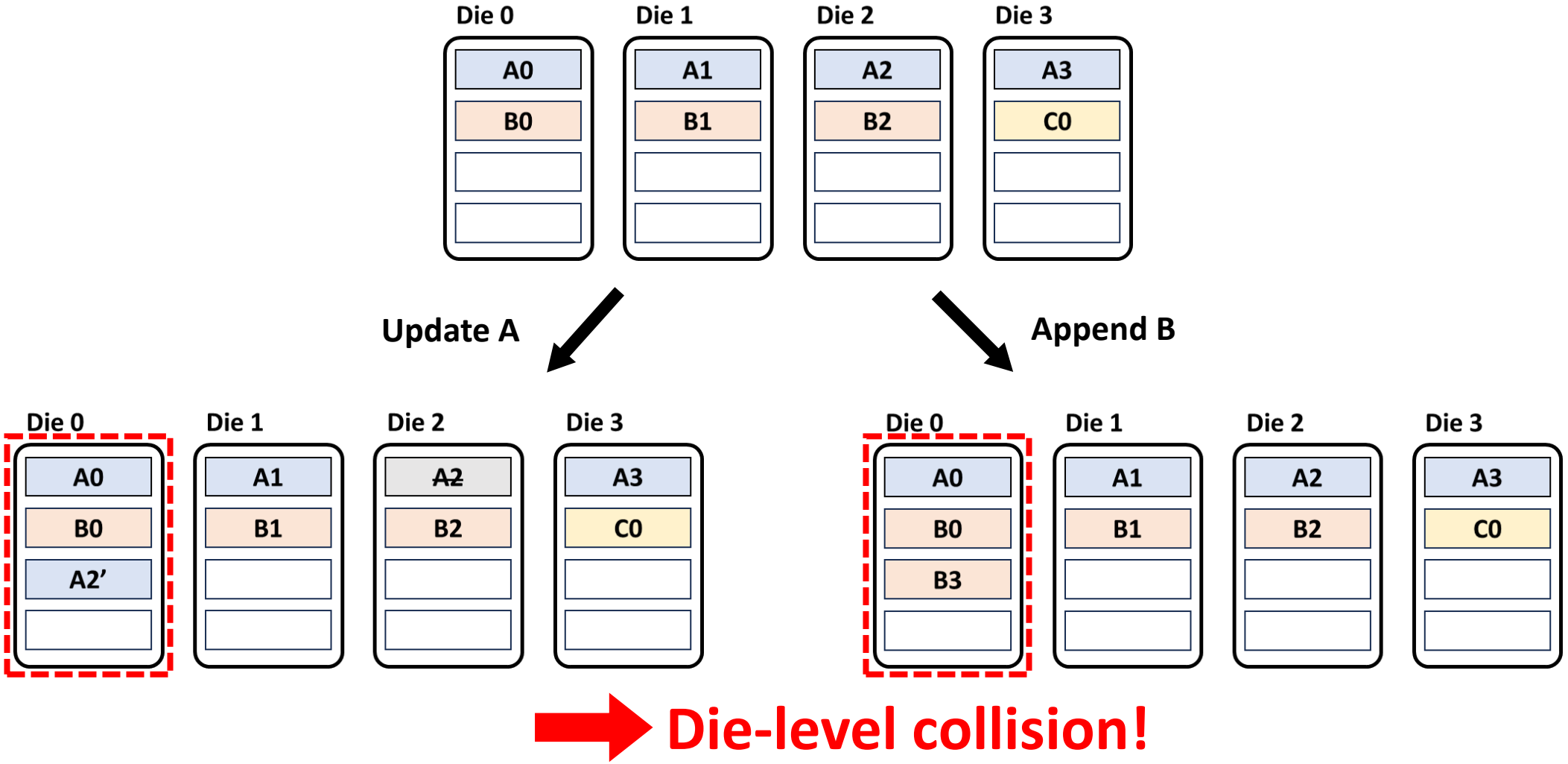
Motivation

Traditional Mapping



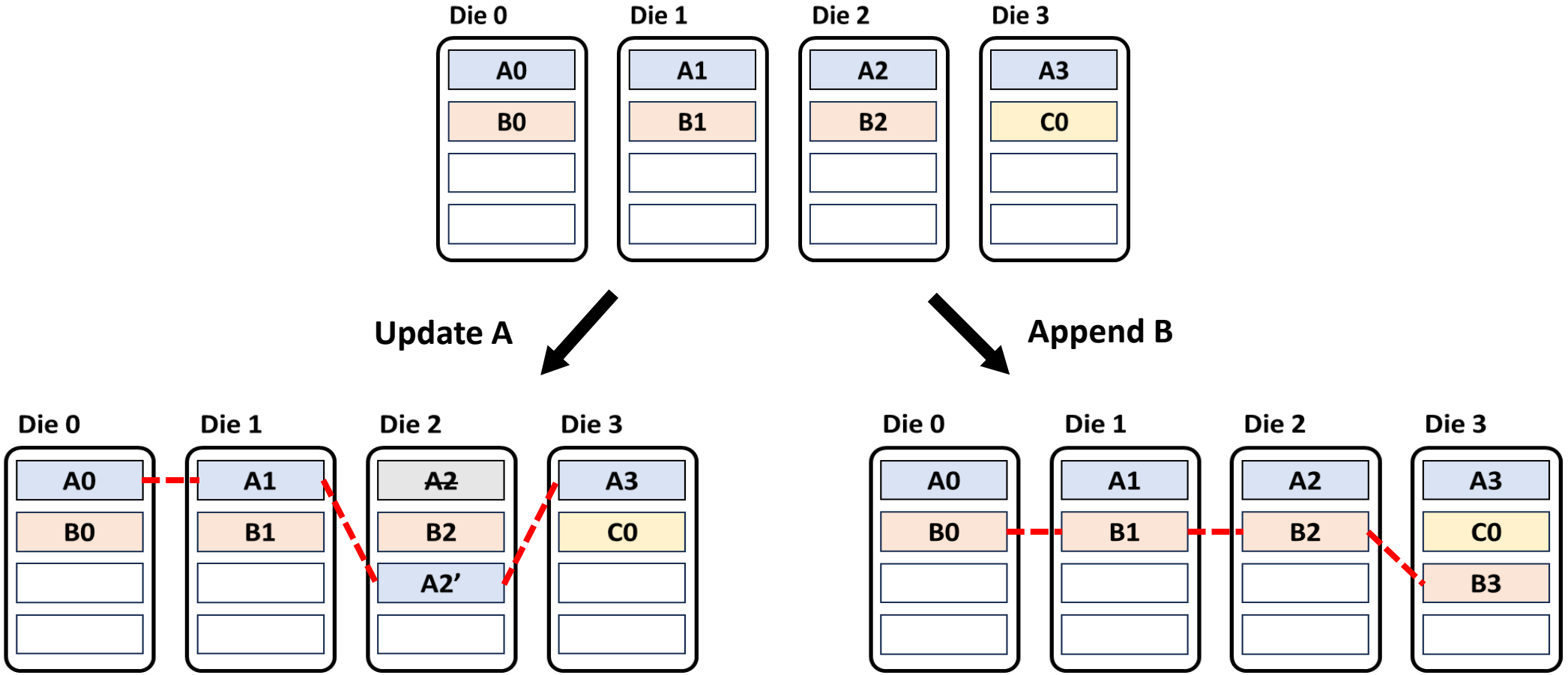
Motivation

Traditional Mapping



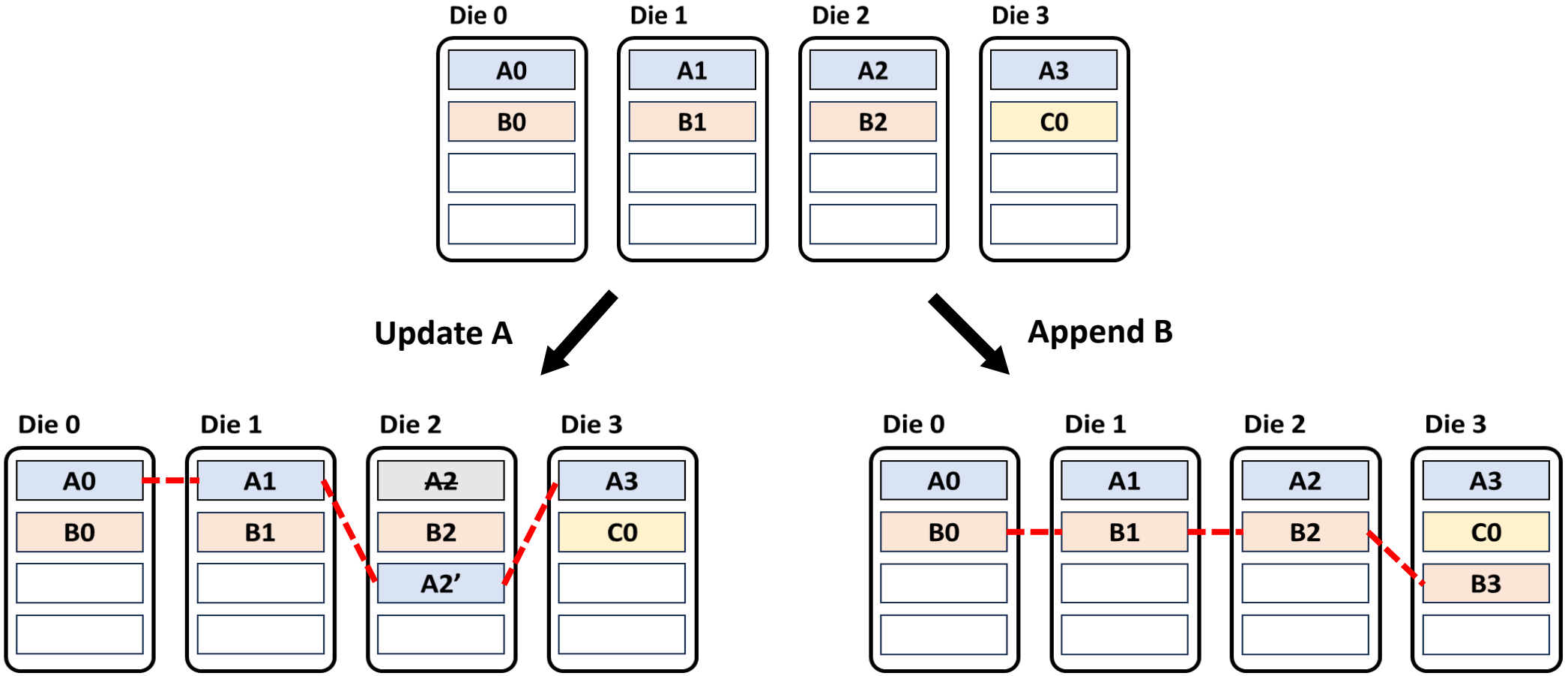
Motivation

Contiguous page-to-die allocation algorithm



Motivation

Contiguous page-to-die allocation algorithm



Ensure files' contiguous blocks always land on contiguous dies

Motivation

Contiguous page-to-die allocation algorithm

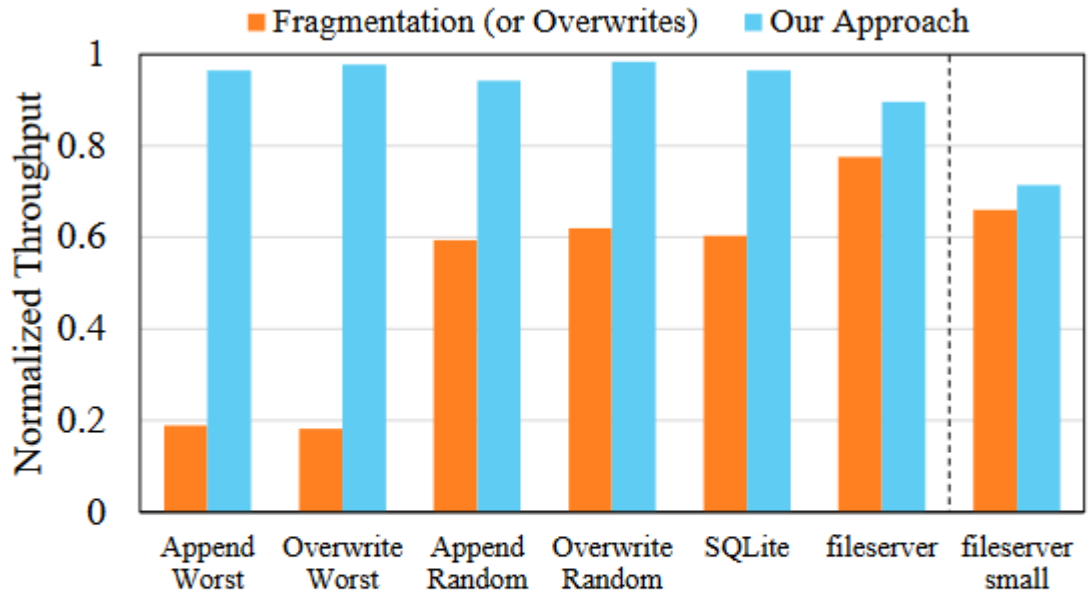


Figure 12: Normalized read throughput of applications executed with the implementation of our approach relative to that with ideal file block and flash page placement.

Algorithm successfully suppressed the read performance degradation!

Motivation

Contiguous page-to-die allocation algorithm

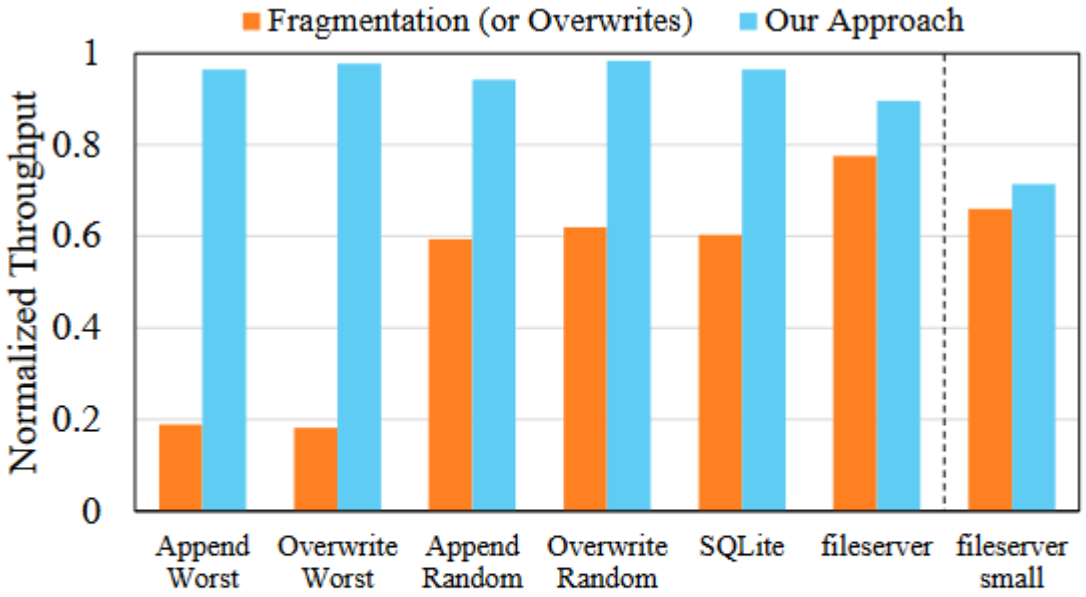


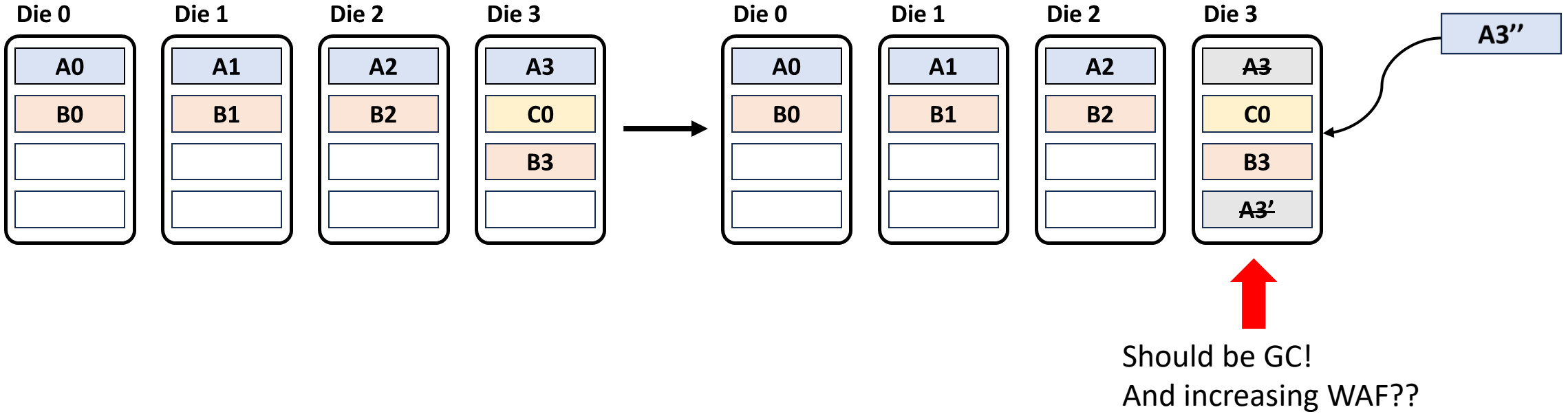
Figure 12: Normalized read throughput of applications executed with the implementation of our approach relative to that with ideal file block and flash page placement.

Algorithm successfully suppressed the read performance degradation!

How about WAF? 🤔

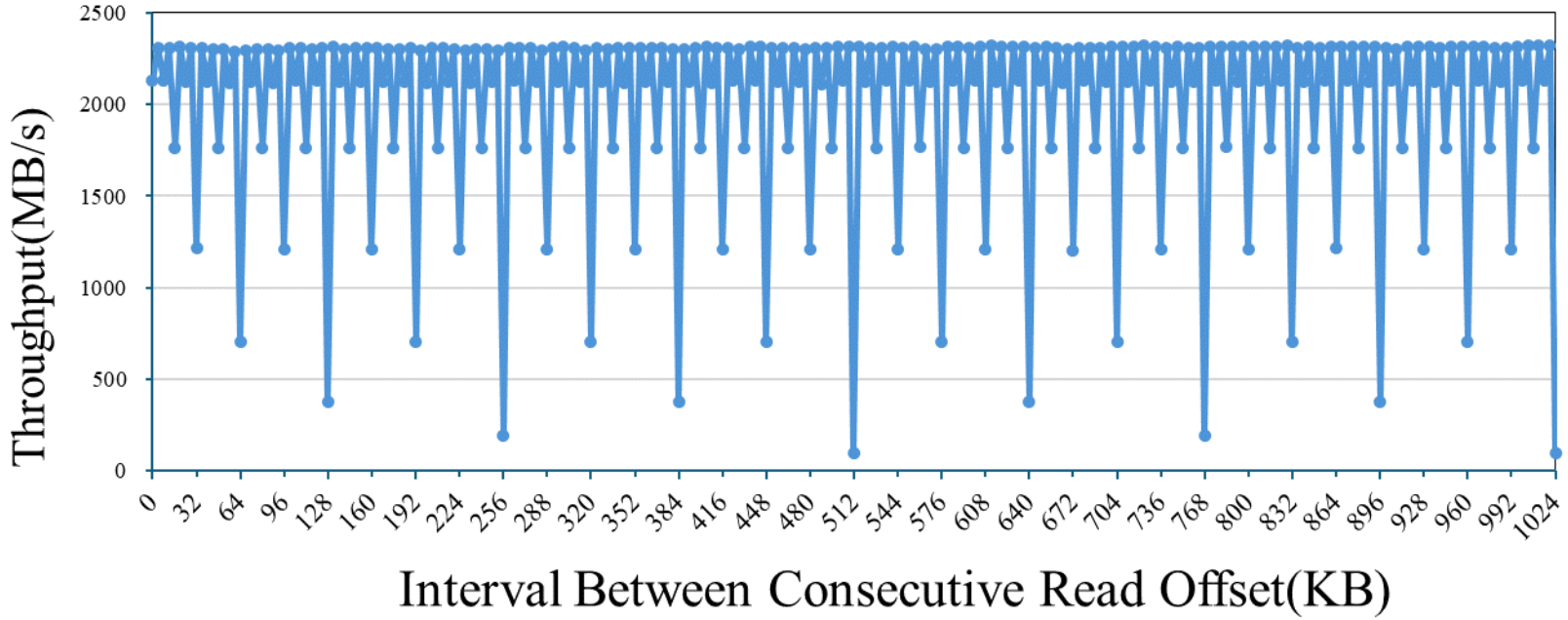
Motivation

Scenario: Update A3 x2



Validation

Throughput measurement for FEMU when varying the read interval



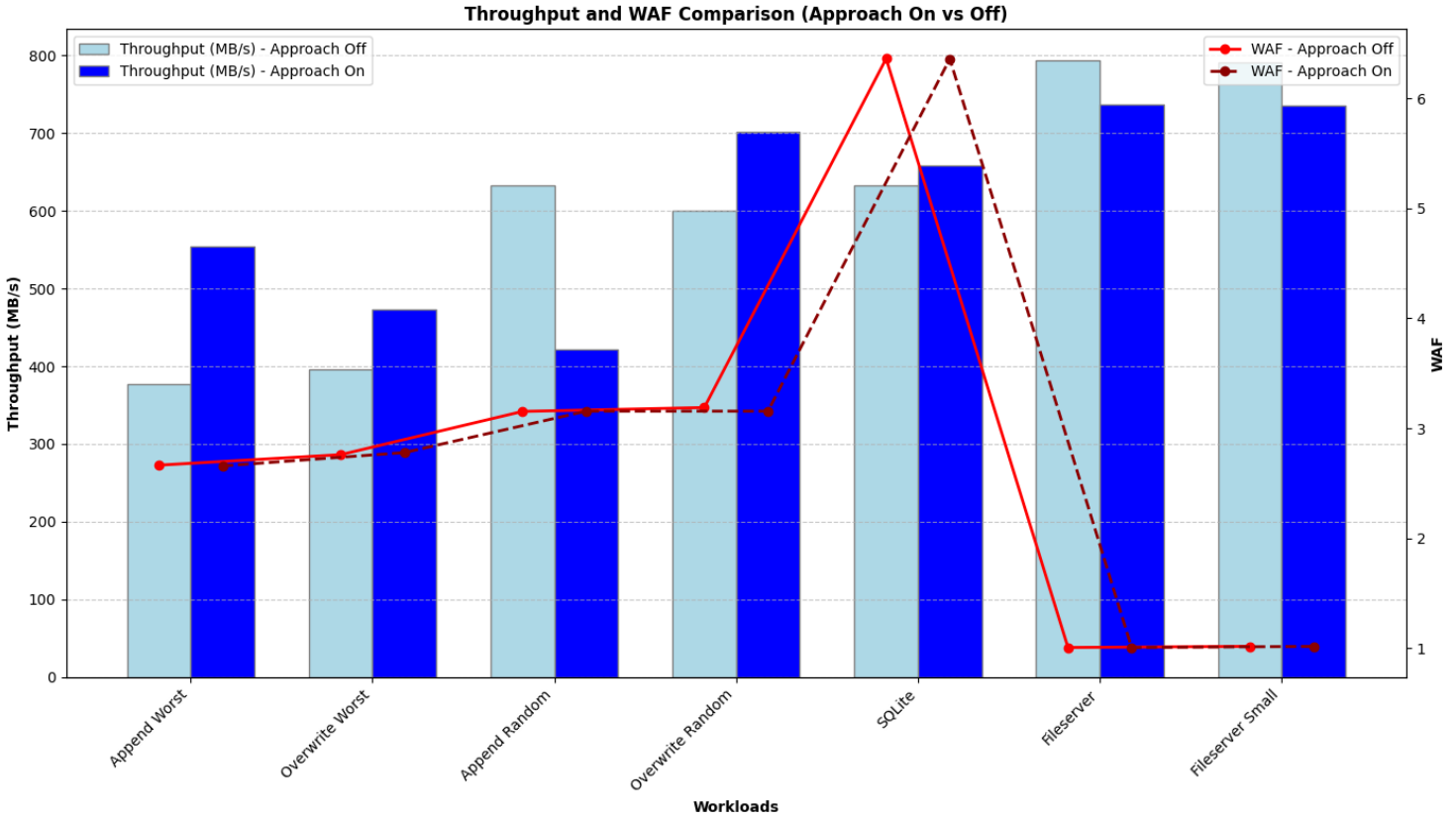
Die allocation granularity: 8KB

Stripe size: 512KB

Evaluation

Throughput and WAF measurement

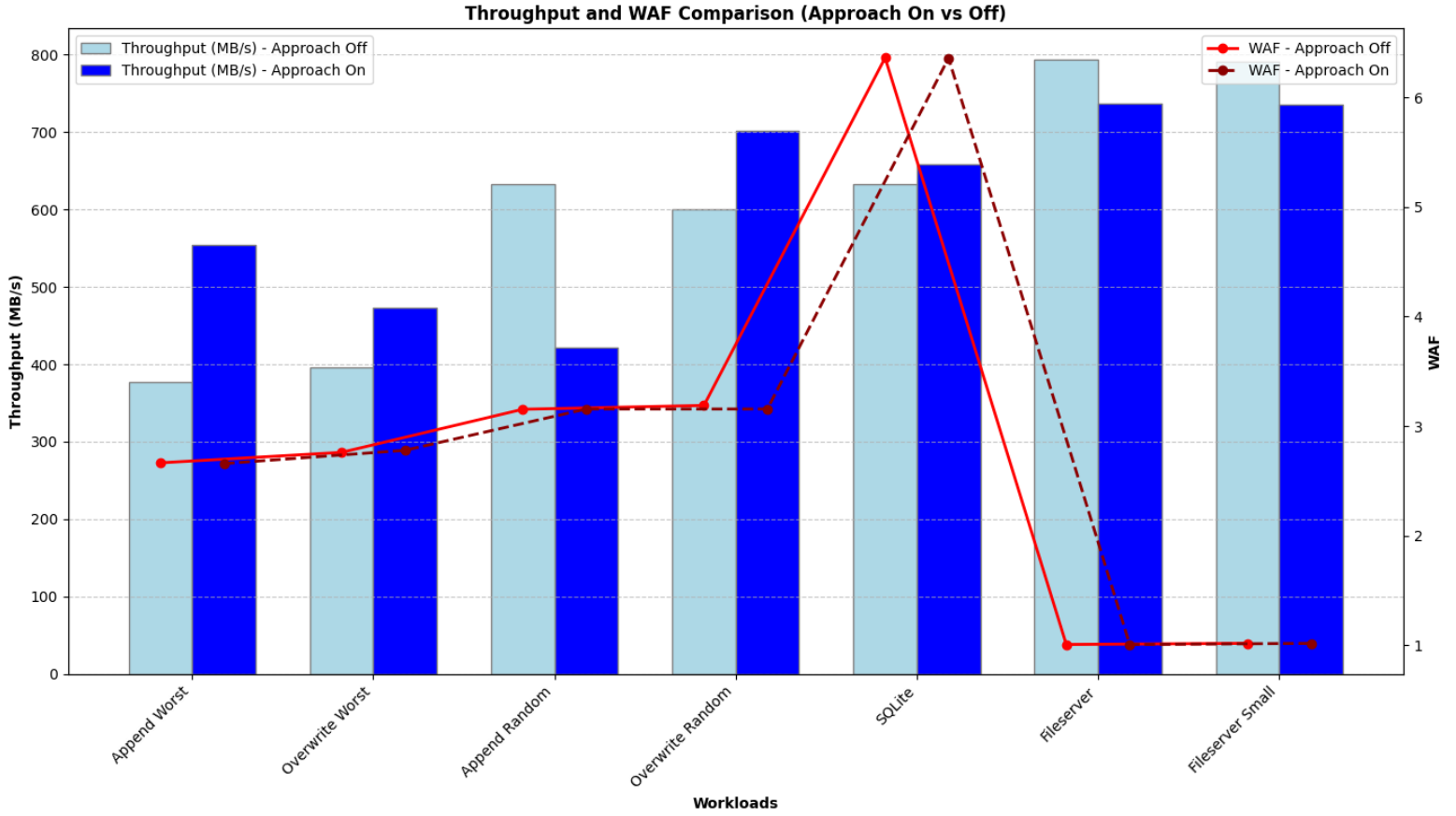
Worst case: All file blocks were allocated to a single die
Random case: The size of dummy file writes between target file writes varied randomly

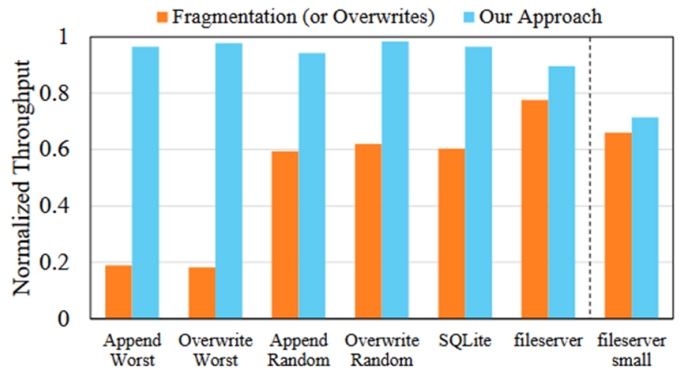


Evaluation

Throughput and WAF measurement

Regardless of applying approach, WAF is same… and throughput is quite different with paper's figure...





Conclusion

- Paper used a method of allocating consecutive dies to mitigate die-level collisions
- We were curious to see what would happen on the WAF side, so we ran an experiment
  - But we have some issues…
- We'll be re-experimenting with the issues
  - Dummyfile
  - NVMe device
  - …

Thank you!
Q & A ?

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