Track-based solutions for IMR translation layer

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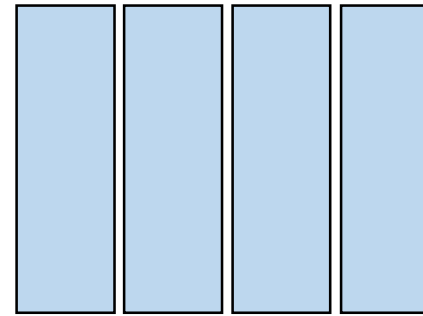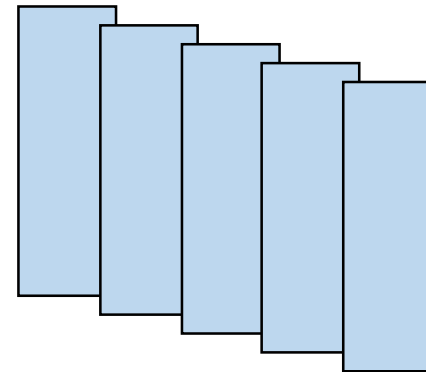
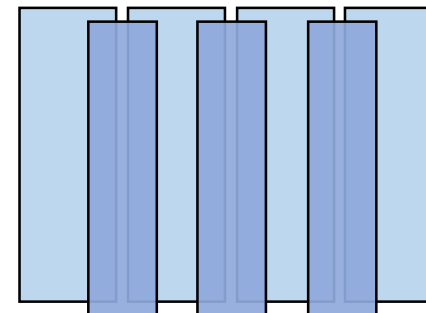# Interlaced Magnetic Recording (IMR)

- IMR technology
  - Offers higher capacity
  - Enabled by using HAMR
  - Half of the tracks overlap
    - Limitations on in-place updates
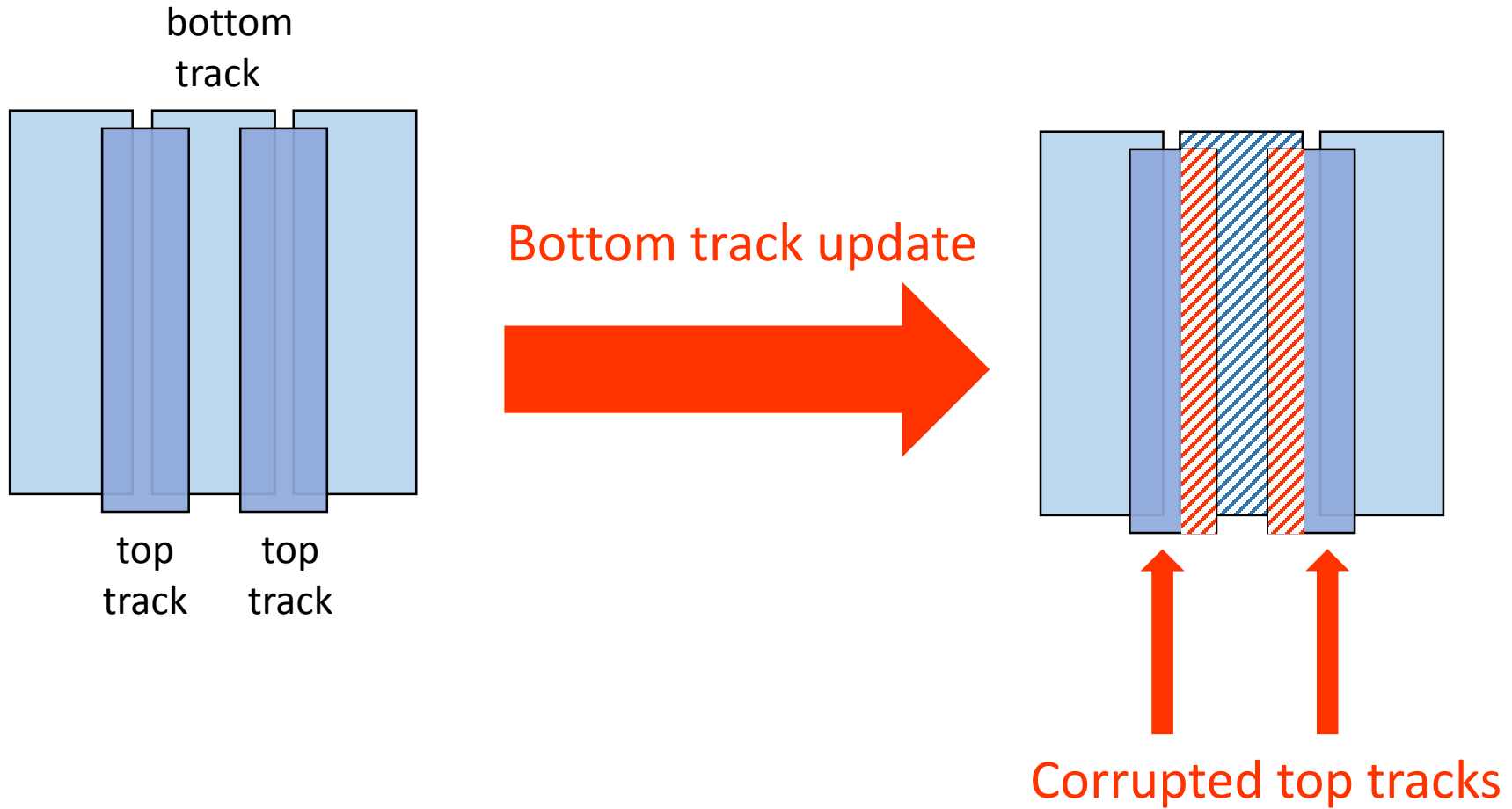
Conventional track layout
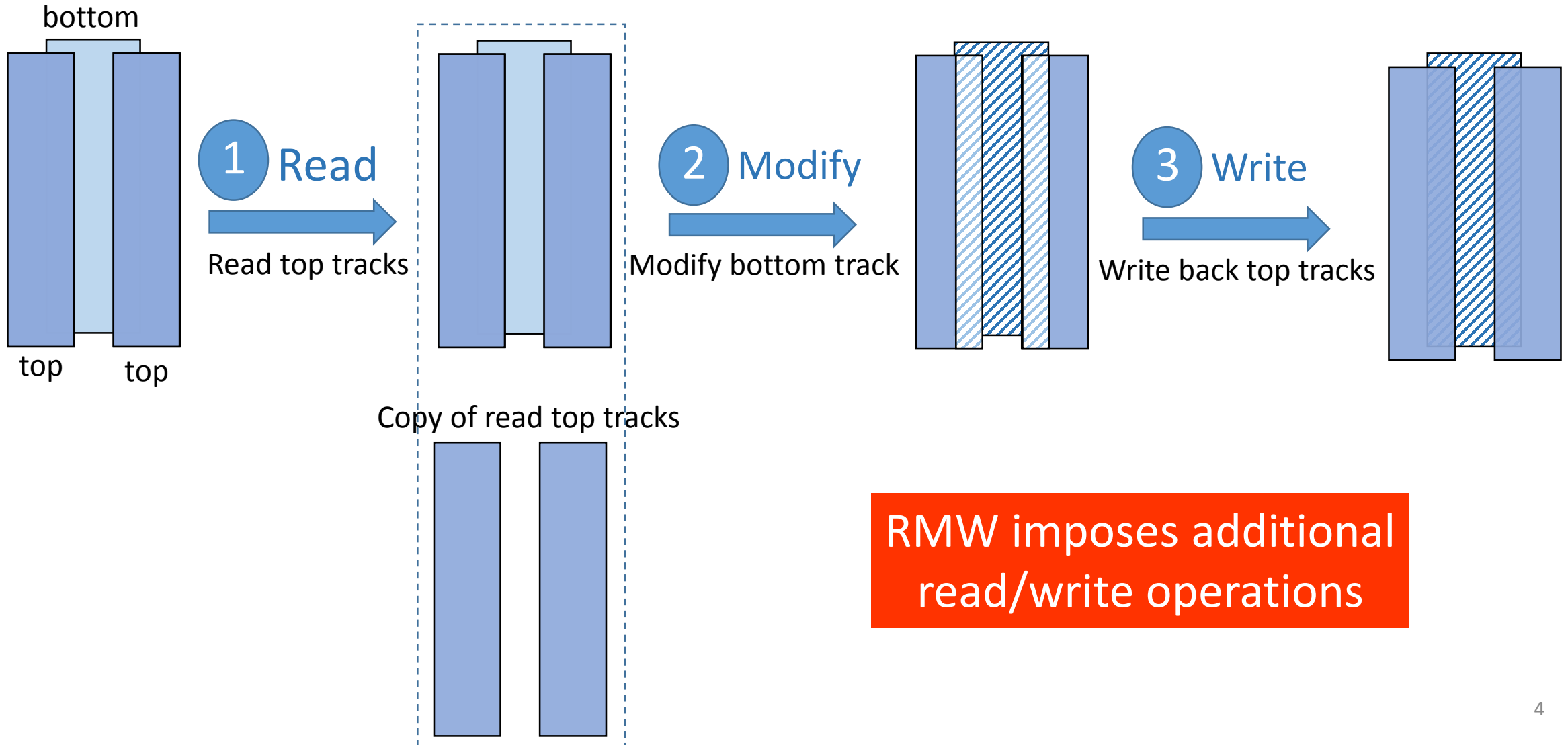
Shingled track layout

Interlaced track layout

IMR Limitation

bottom track

Bottom track update

top track   top track

Corrupted top tracks

3

IMR Read-modify-write: the simple solution

bottom

top   top

1 Read
Read top tracks

Copy of read top tracks

2 Modify
Modify bottom track

3 Write
Write back top tracks

RMW imposes additional read/write operations

Track-based solutions

- Track Flipping
  - Hot bottom tracks are swapped with neighboring cold tracks

- Track caching
  - Hot tracks are cached in a non-interlaced area

- Dynamic track mapping
  - Hot bottom tracks are swapped with cold top ones within a small number of tracks called zone

Track flipping

Data region

Non-interlaced cache region
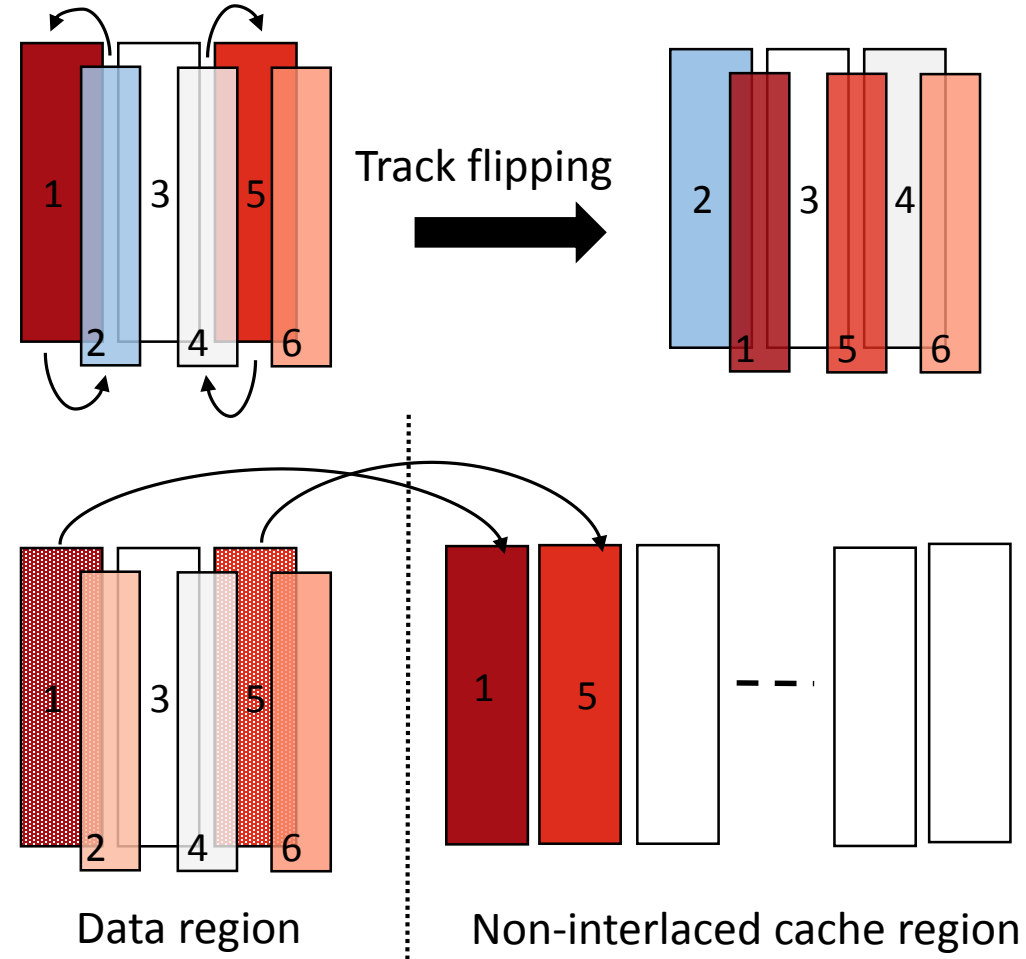
Track-based solutions performance
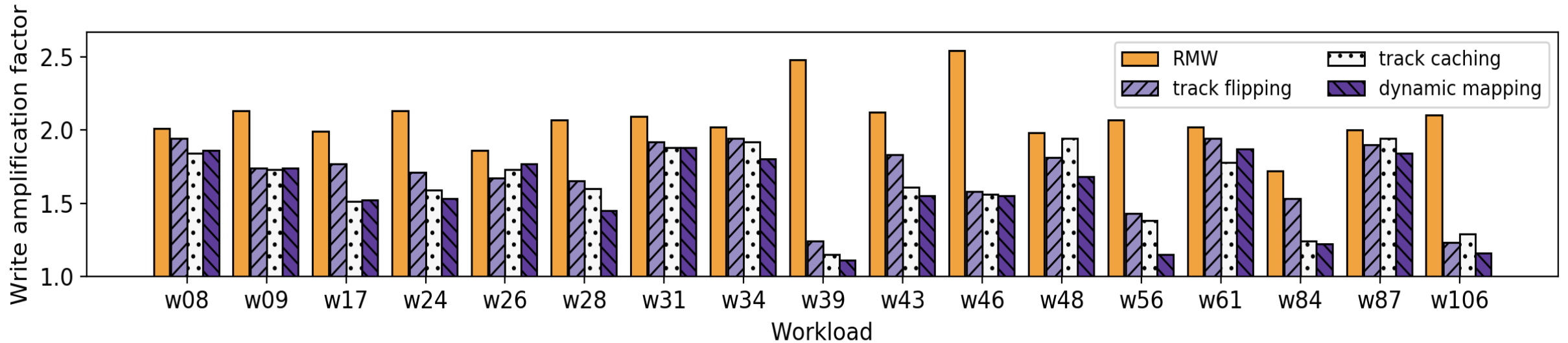
ATC 2019- Track 1: Solid-State & Hard Disk Drives
Time: 10:15, Friday July 12th