DAOS Project Update

One Year in the DAOS Foundation

PDSW @ SC24 – Michael Hennecke, Liang Zhen

THE **LINUX** FOUNDATION
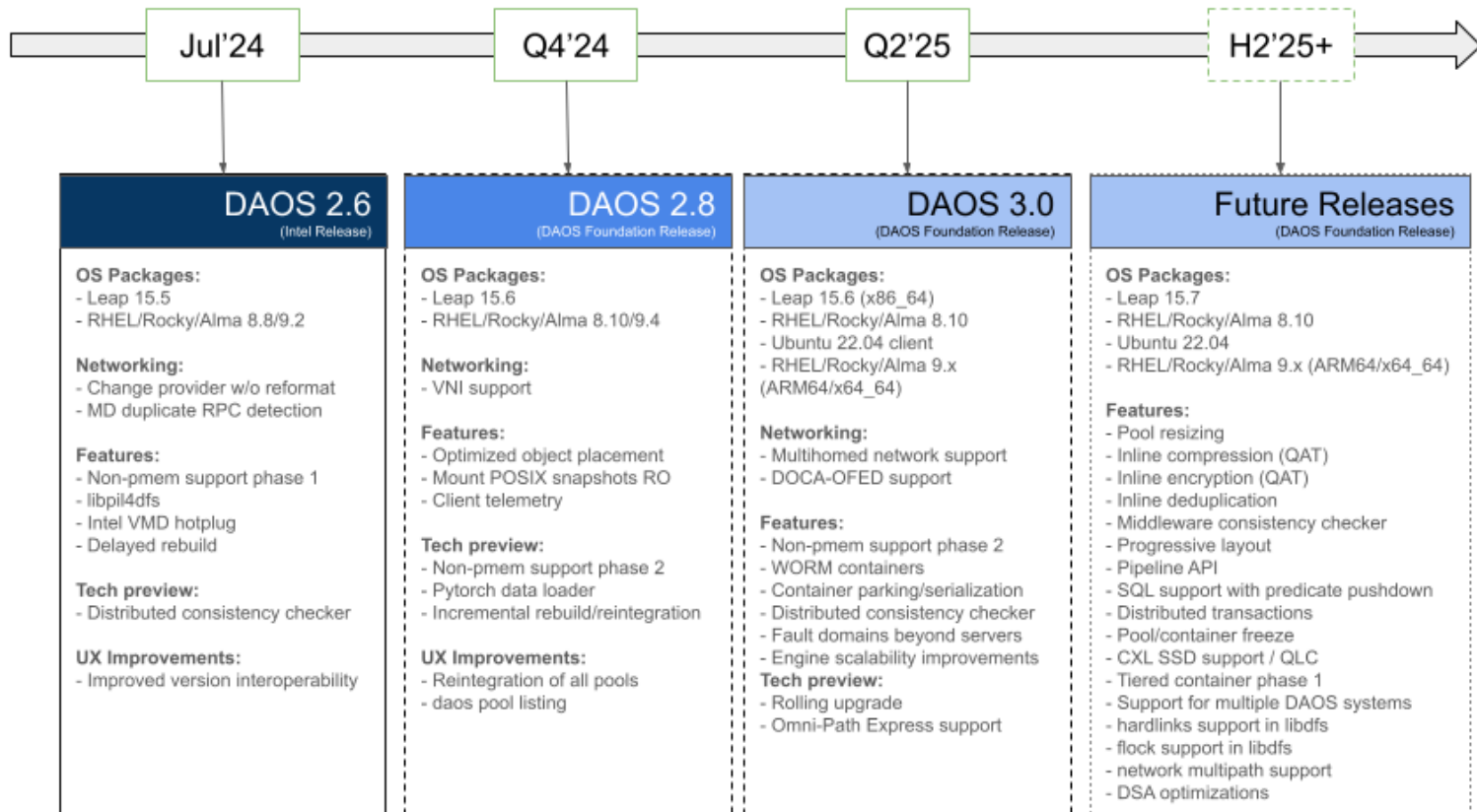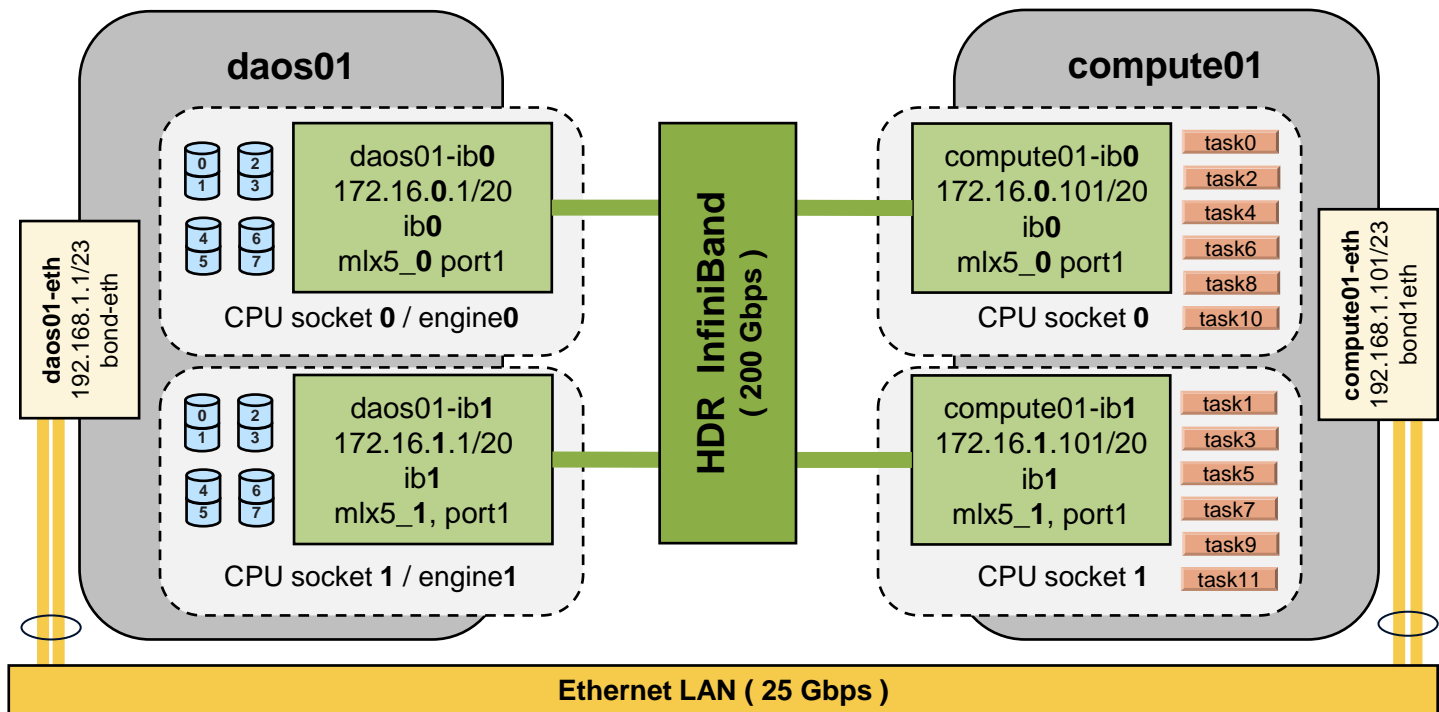
https://daos.io/

daos

The DAOS Foundation

- The DAOS Foundation was created in Nov 2023 to:
  - Maintain DAOS as an open source project independent of any one organization
  - Foster the developer and user communities around DAOS
  - Guide the direction of the overall project, including the software roadmap

- How to join: https://daos.io/?page_id=199
  - Join Linux Foundation, then join DAOS Foundation (3 membership levels, 5 fee levels)
  - Premier Membership → voting rights in Governing Board, Technical Steering Committee, …
  - Community contributions do *not* require membership, all contributors are welcome

- Join us at the DAOS User Group at SC24 (https://daos.io/dug24)
  - Monday 9am to 12am @ Omni Hotel, Pine Meeting Room at Atrium Level (follow HPE signs)

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Jul'24   **Q4'24**   **Q2'25**   **H2'25+**

DAOS 2.6
(Intel Release)

OS Packages:
- Leap 15.5
- RHEL/Rocky/Alma 8.8/9.2

Networking:
- Change provider w/o reformat
- MD duplicate RPC detection

Features:
- Non-pmem support phase 1
- libpil4dfs
- Intel VMD hotplug
- Delayed rebuild

Tech preview:
- Distributed consistency checker

UX Improvements:
- Improved version interoperability

DAOS 2.8
(DAOS Foundation Release)

OS Packages:
- Leap 15.6
- RHEL/Rocky/Alma 8.10/9.4

Networking:
- VNI support

Features:
- Optimized object placement
- Mount POSIX snapshots RO
- Client telemetry

Tech preview:
- Non-pmem support phase 2
- Pytorch data loader
- Incremental rebuild/reintegration

UX Improvements:
- Reintegration of all pools
- daos pool listing

DAOS 3.0
(DAOS Foundation Release)

OS Packages:
- Leap 15.6 (x86_64)
- RHEL/Rocky/Alma 8.10
- Ubuntu 22.04 client
- RHEL/Rocky/Alma 9.x (ARM64/x64_64)

Networking:
- Multihomed network support
- DOCA-OFED support

Features:
- Non-pmem support phase 2
- WORM containers
- Container parking/serialization
- Distributed consistency checker
- Fault domains beyond servers
- Engine scalability improvements

Tech preview:
- Rolling upgrade
- Omni-Path Express support

Future Releases
(DAOS Foundation Release)

OS Packages:
- Leap 15.7
- RHEL/Rocky/Alma 8.10
- Ubuntu 22.04
- RHEL/Rocky/Alma 9.x (ARM64/x64_64)

Features:
- Pool resizing
- Inline compression (QAT)
- Inline encryption (QAT)
- Inline deduplication
- Middleware consistency checker
- Progressive layout
- Pipeline API
- SQL support with predicate pushdown
- Distributed transactions
- Pool/container freeze
- CXL SSD support / QLC
- Tiered container phase 1
- Support for multiple DAOS systems
- hardlinks support in libdfs
- flock support in libdfs
- network multipath support
- DSA optimizations

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DAOS Networking − All MPI tasks to all Targets

See the *DAOS Fabrics* paper in ISC24 IXPUG Workshop Proceedings

DAOS Architecture Evolution

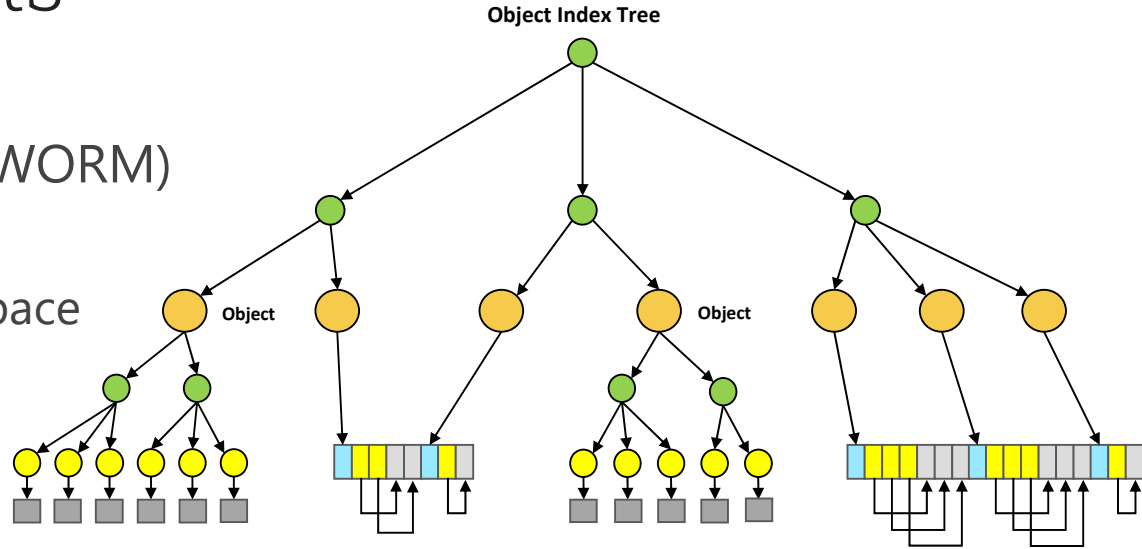## DAOS architecture without PMem

- No semantic changes to API
- Low latency I/O
  - Two (parallelized) SSD writes per I/O
  - Read metadata from DRAM, no change to data path
- Minimum impact on performance
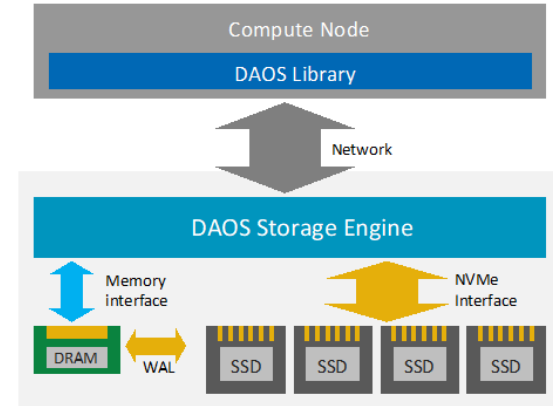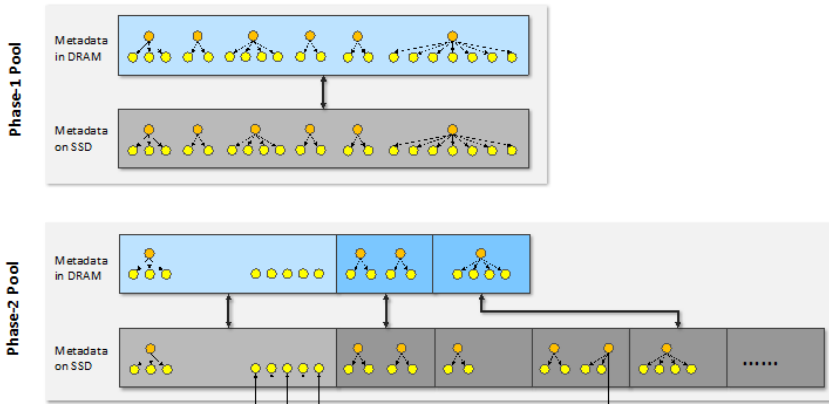
- Non-PMem Phase2 WIP
  - Metadata capacity is not limited by DRAM size
  - Dynamically load metadata bucket from SSD
  - Evict unused metadata bucket out from DRAM
  - Tech preview is in DAOS 2.8-tb1

WIP: WORM Objects

- Write Once Read Many (WORM)
- Flattened format:
  - Stored in contiguous space
  - Linear search
  - Less fragmentation: space efficiency
  - Less memory footprint: lower read latency
- Only flatten small (read-only) objects
  - Hierarchical format is kept for large KV

Object Index Tree

Object

Object

Questions?