

Empowering Real-Time Decision Making for Large-Scale Datasets with SSD-like Economics

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Topics

The Need for Real-Time Data

In-Memory Applications

Extending Datasets from In-Memory to Flash Storage

Performance Testing and Analysis

Economics of In-Memory and Flash Storage Scaling for Real-time analytics

Building Next Gen Real-Time Applications

4,909 digital interactions
per user per day by 2025*



30% of the world's
data will be
real-time
by 2025*

Responding to Real-World Demands

Application Response Times

0.1 Sec



1 Sec



10 Sec



>10 Sec



User Behavior



Happy user



User flow of thought interrupted

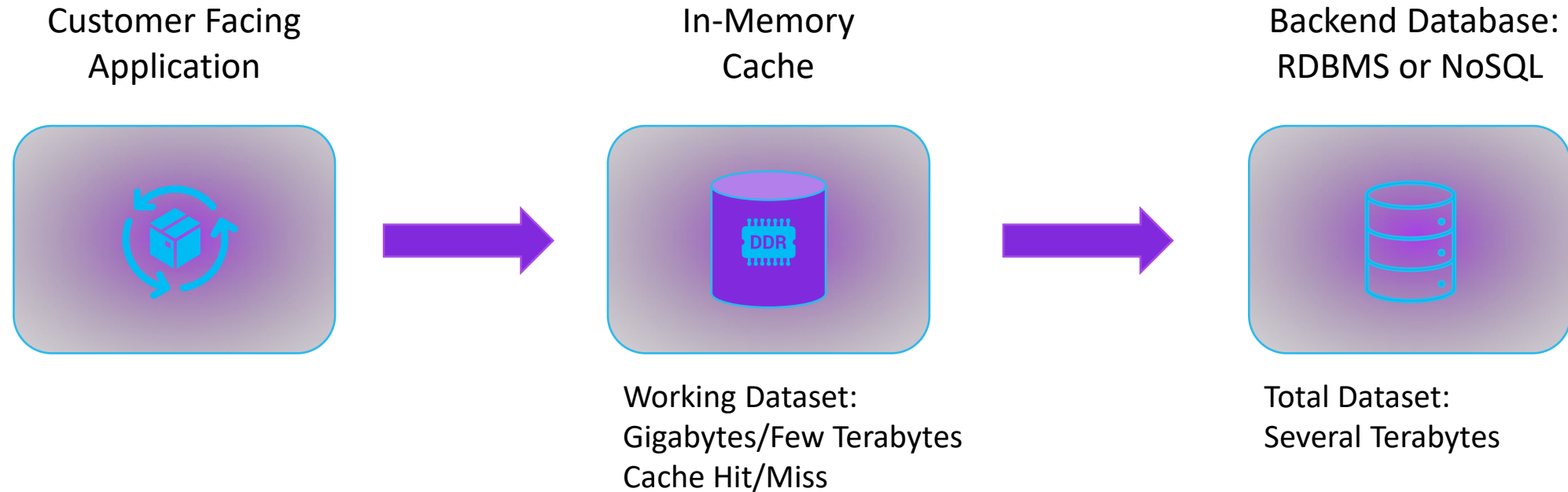


User Multi-tasking



User Goodbye

Application Caching for Responsiveness

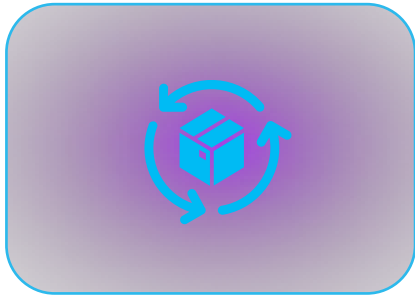


User Churn: Yearly Revenue loss due to latency

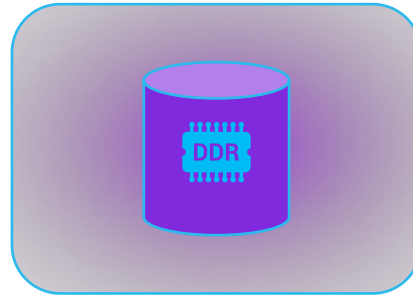
Customer Experience :Yearly SLA penalties cost due to latency and failed session states

Caching for Business Intelligence

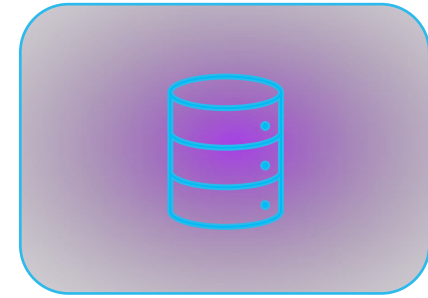
Business Intelligence
Application



In-Memory
Cache



Backend Database:
RDBMS or NoSQL



1 week of data
for business insights

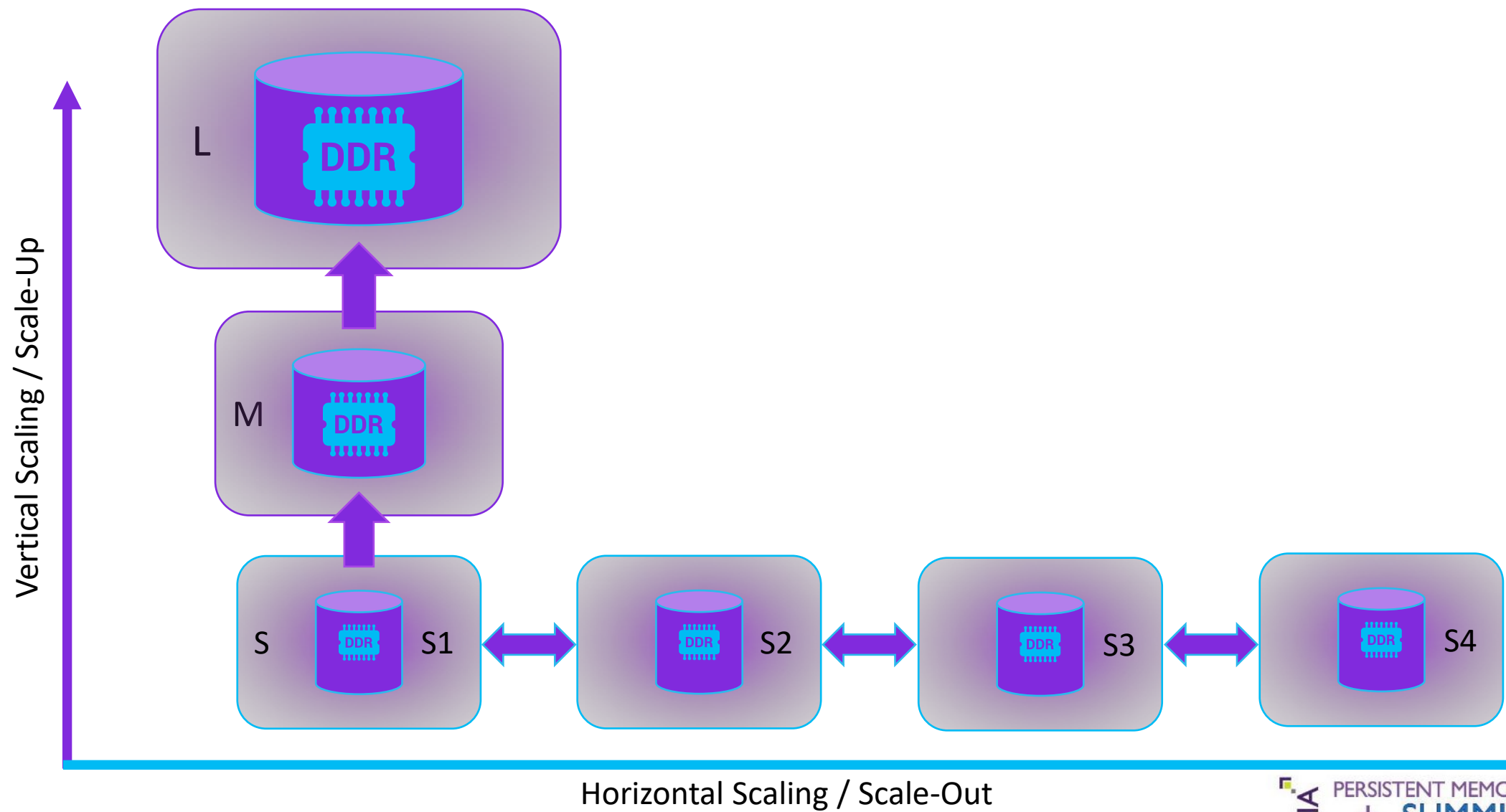


Multi-year business insights

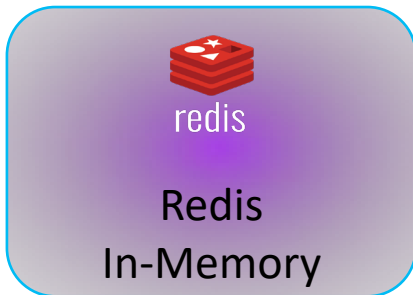
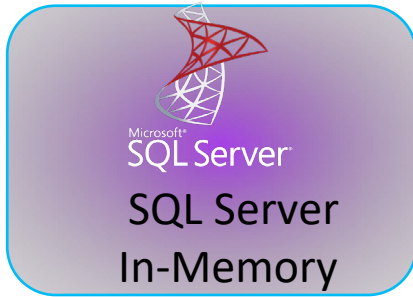


Yearly missed opportunity due to lack of business insights

Cache: Scaling Up or Out

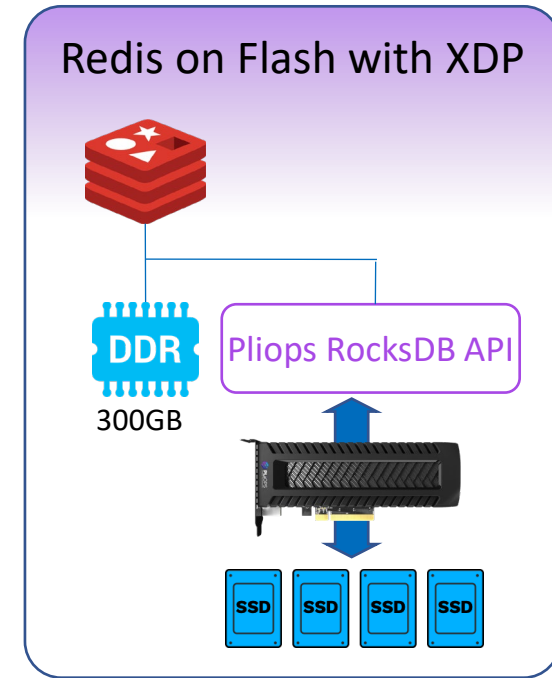
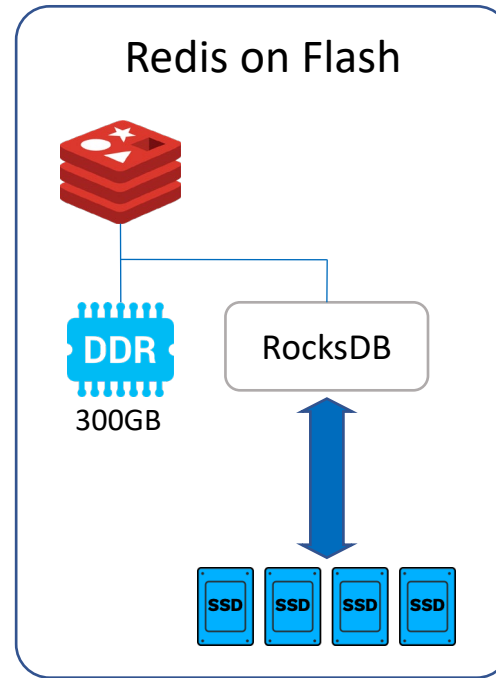
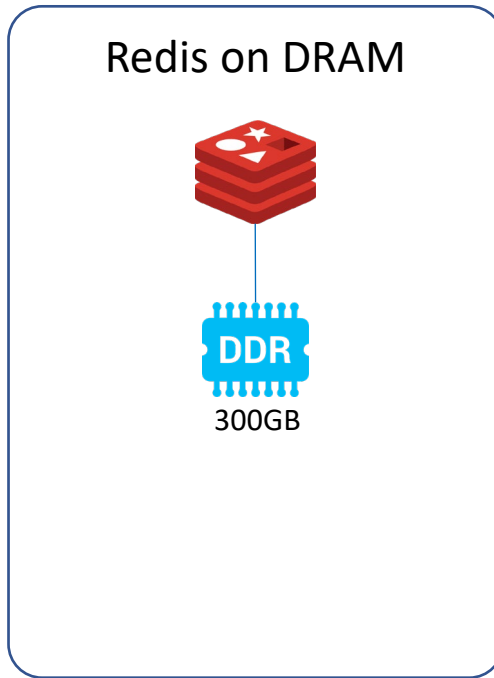


In-Memory Database Application Types



MemTier Benchmark Testing with Redis

Extending In-Memory to Large Data Sets on Flash



MemTier
Benchmark

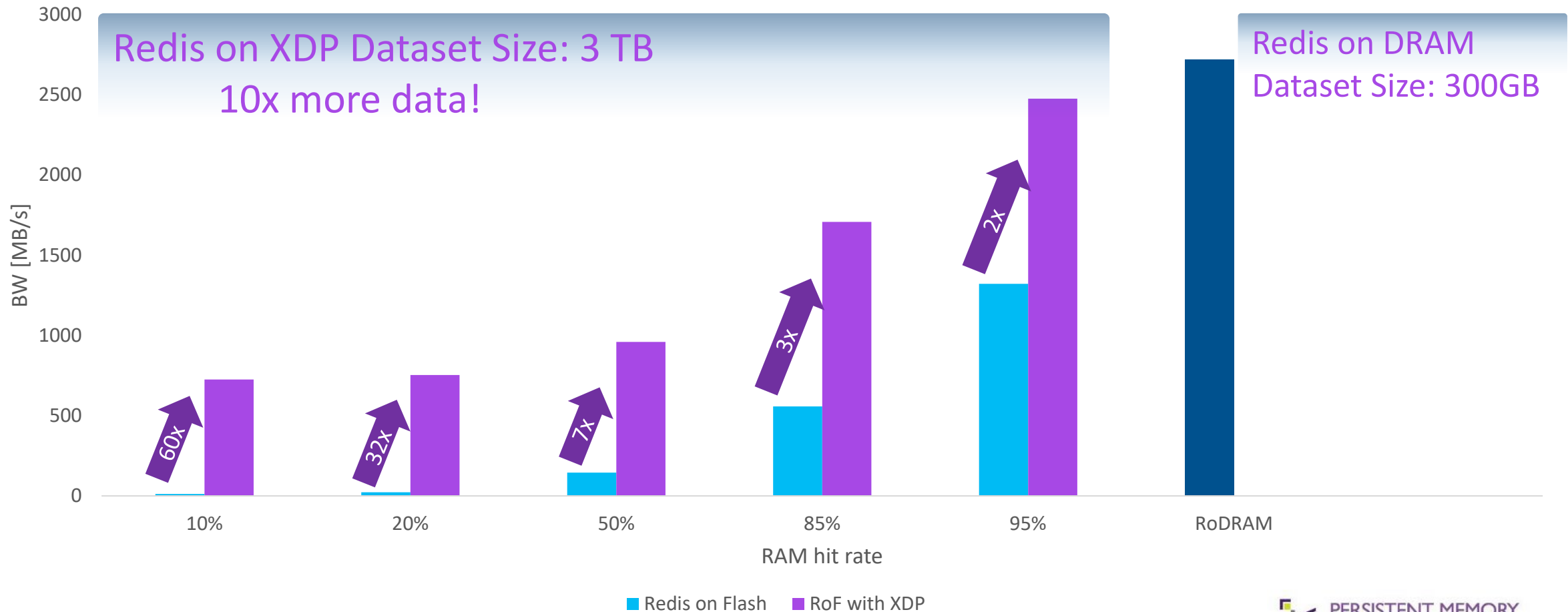
① Object Size: 4KB

② Latency Requirement: 1m Sec
(+/-5%)

③ Data Set Size:
300 GB to 3TB

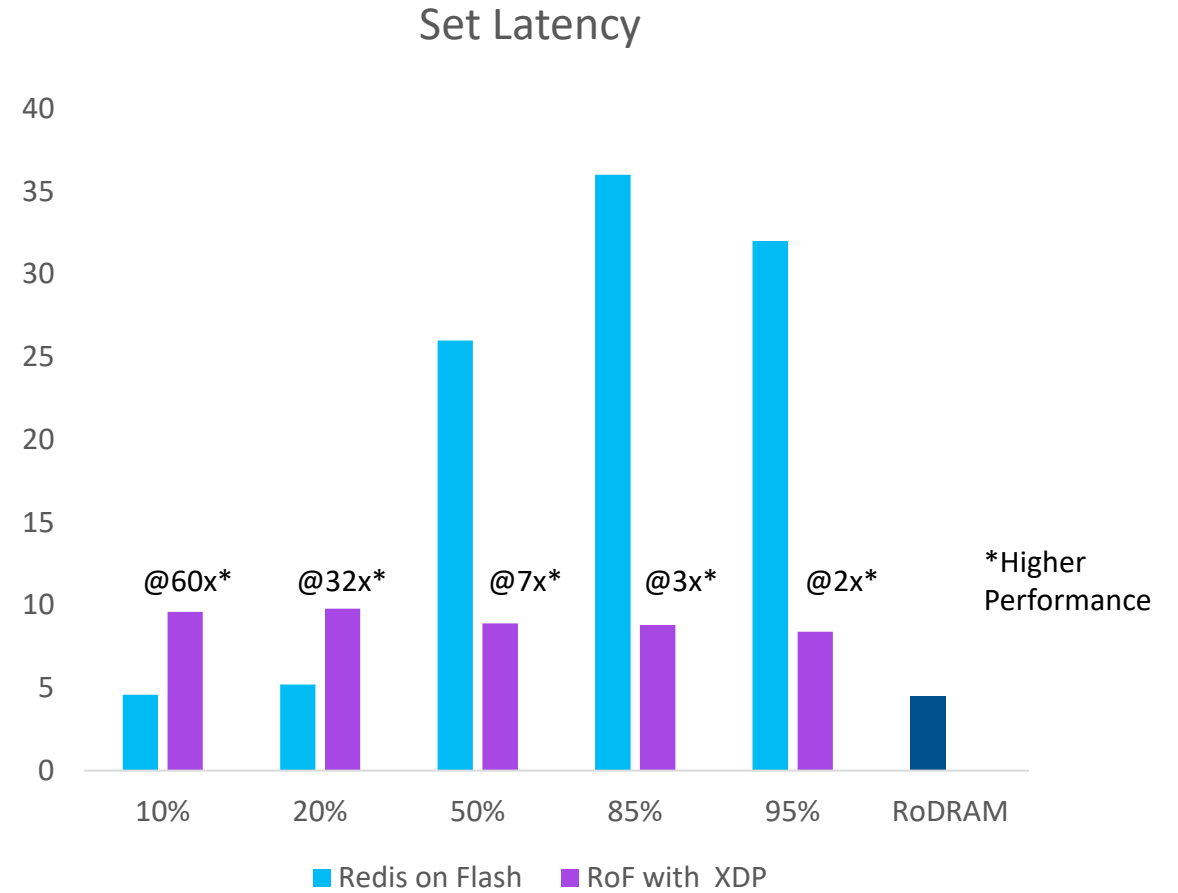
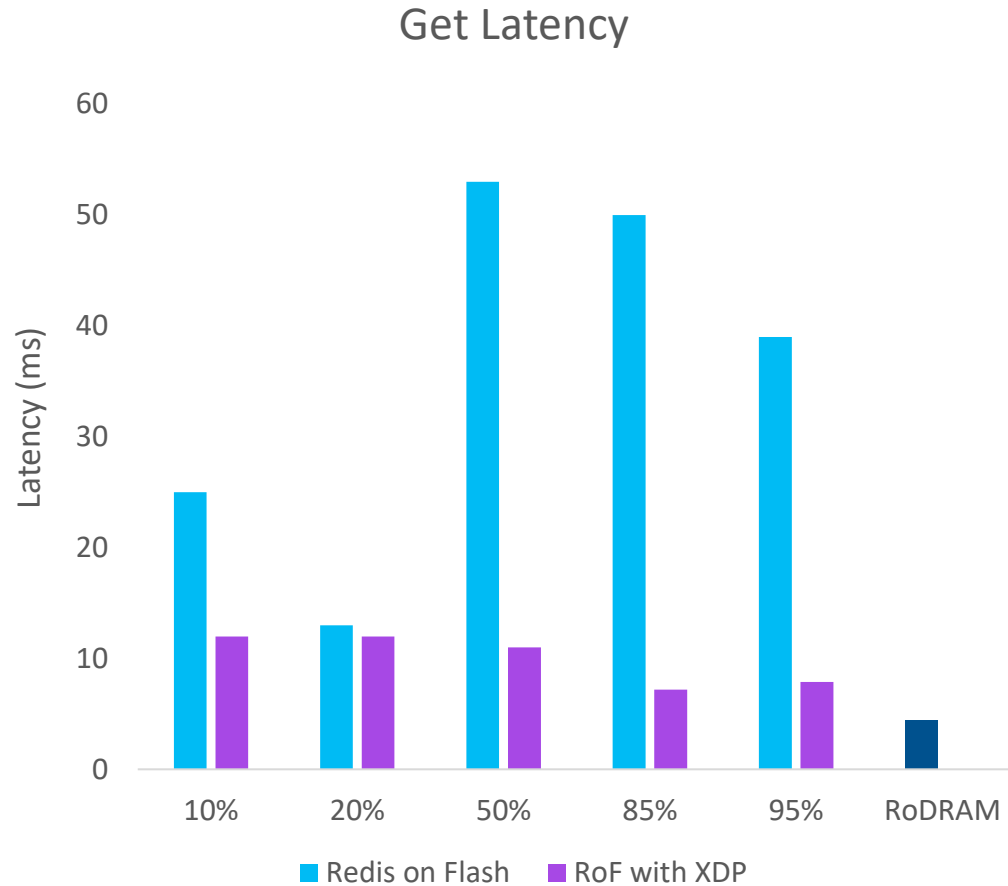
Redis on Flash : W/wo Pliops XDP

Performance at Different Hit Ratios



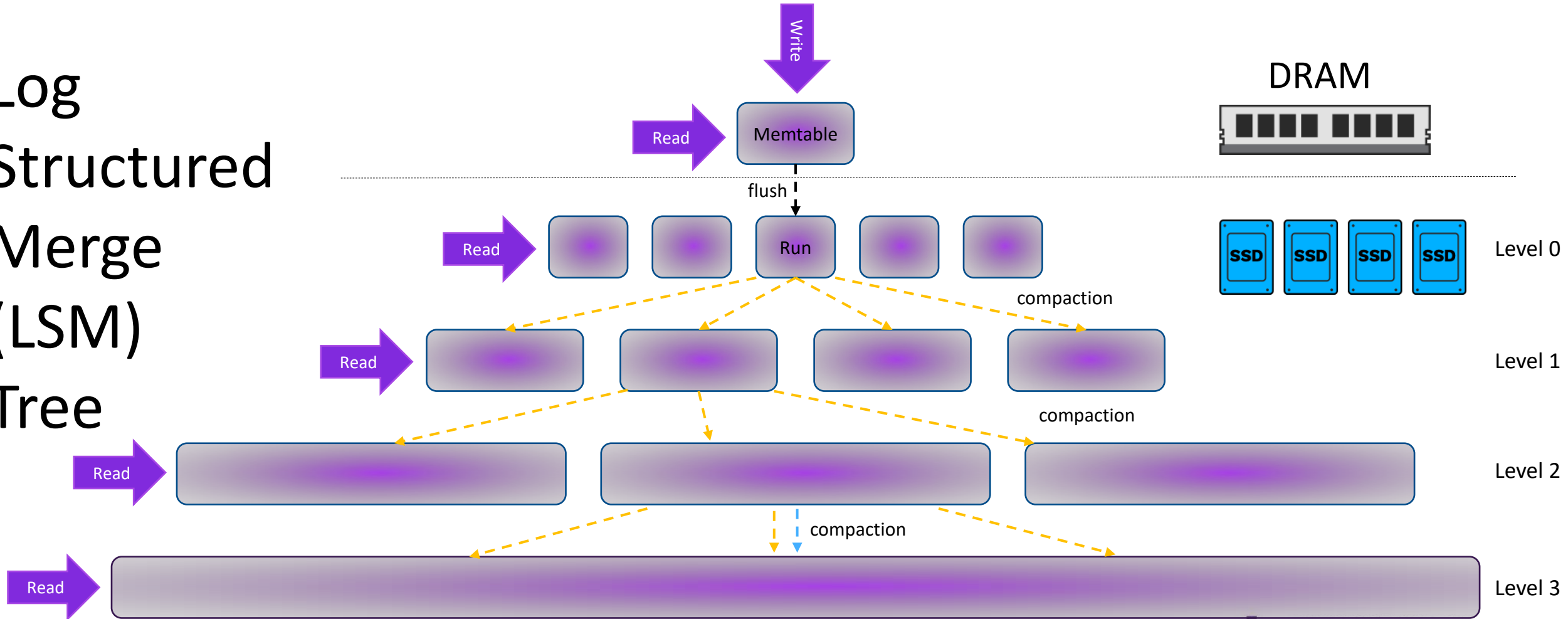
4 9's Latency : XDP Benefits over RocksDB

Serving 99.99% User Requests



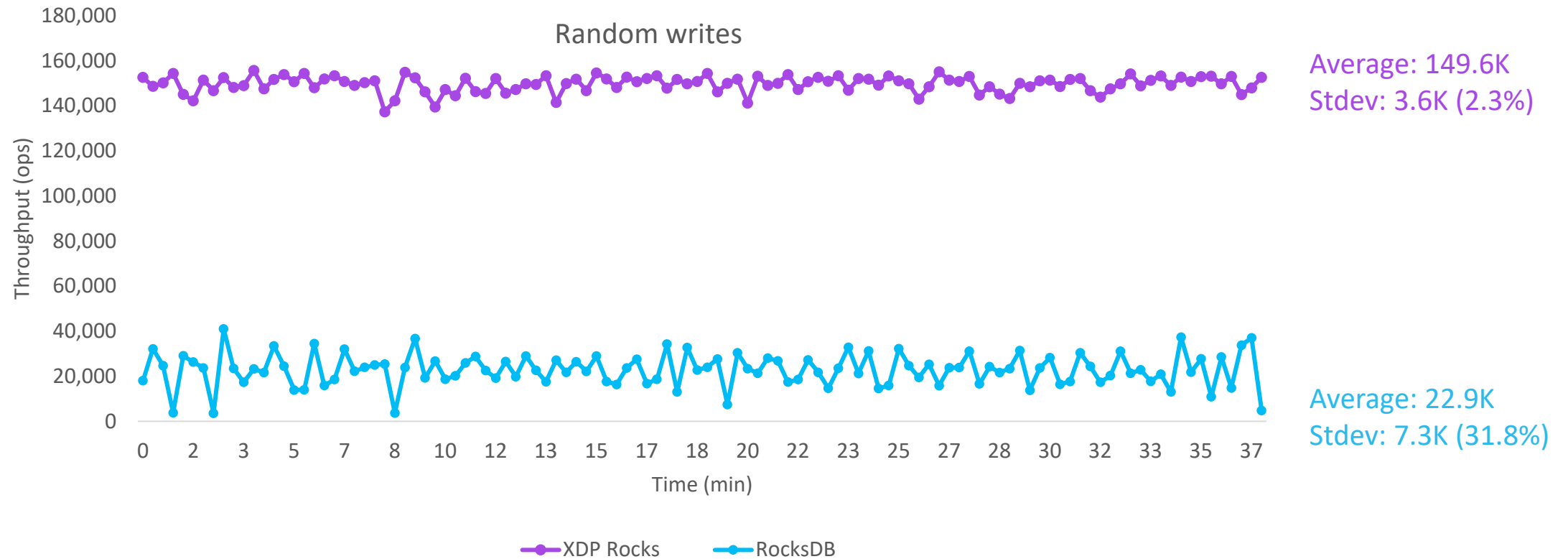
RocksDB Architecture Challenges

Log
Structured
Merge
(LSM)
Tree



The Rationale for XDP Performance Boost

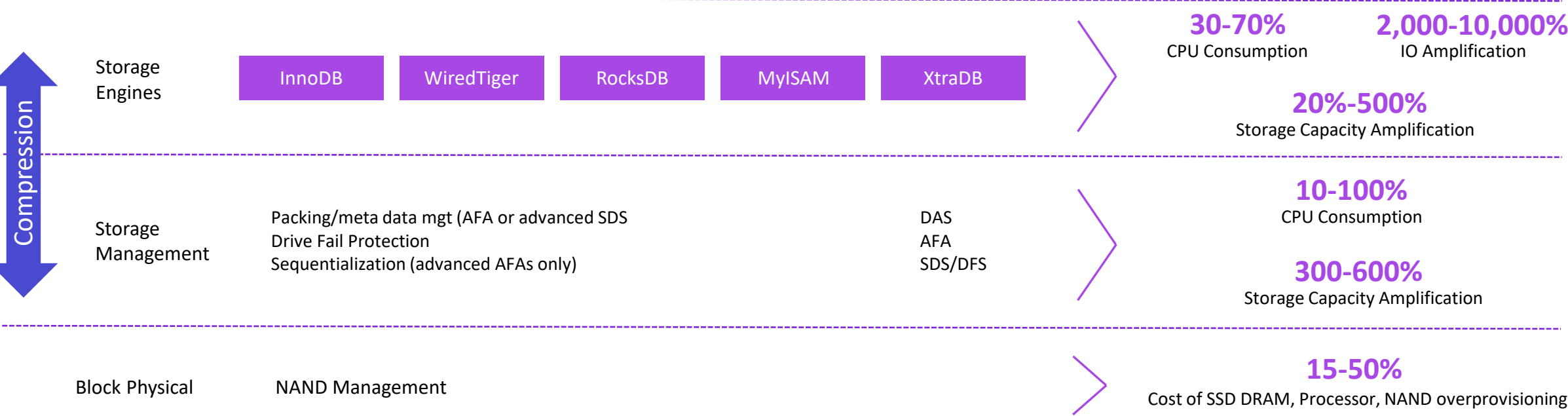
XDP Rocks Write Performance



Many Storage Engines Powering Several Applications



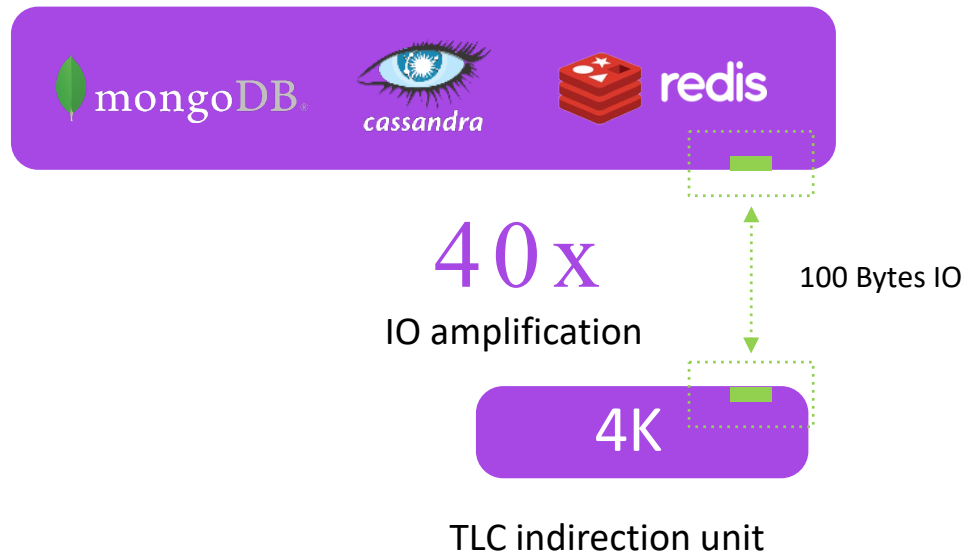
Compression



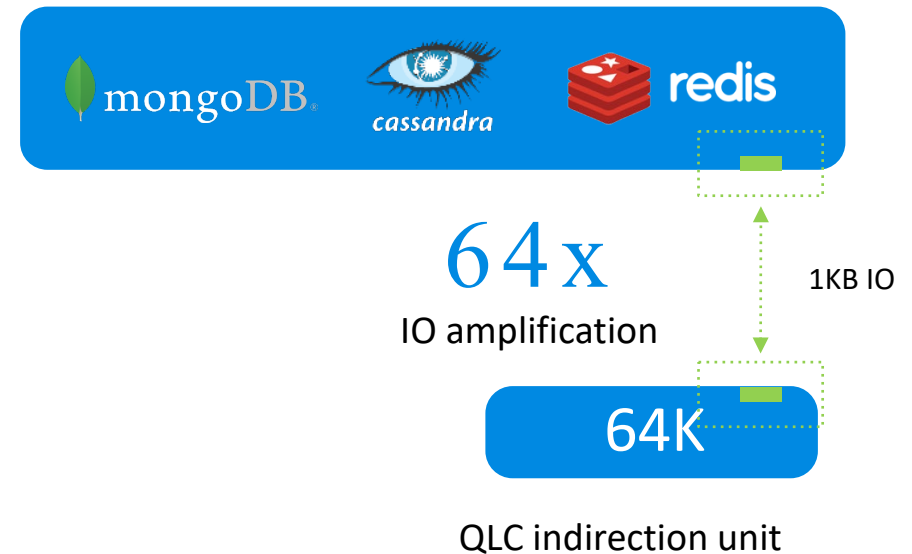
More Than Half of System Resources Typically Devoted to Storage Engine and Services!

Application IO Amplification Challenge

1

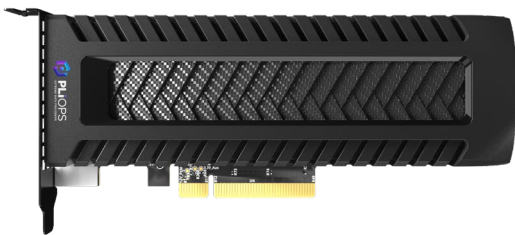
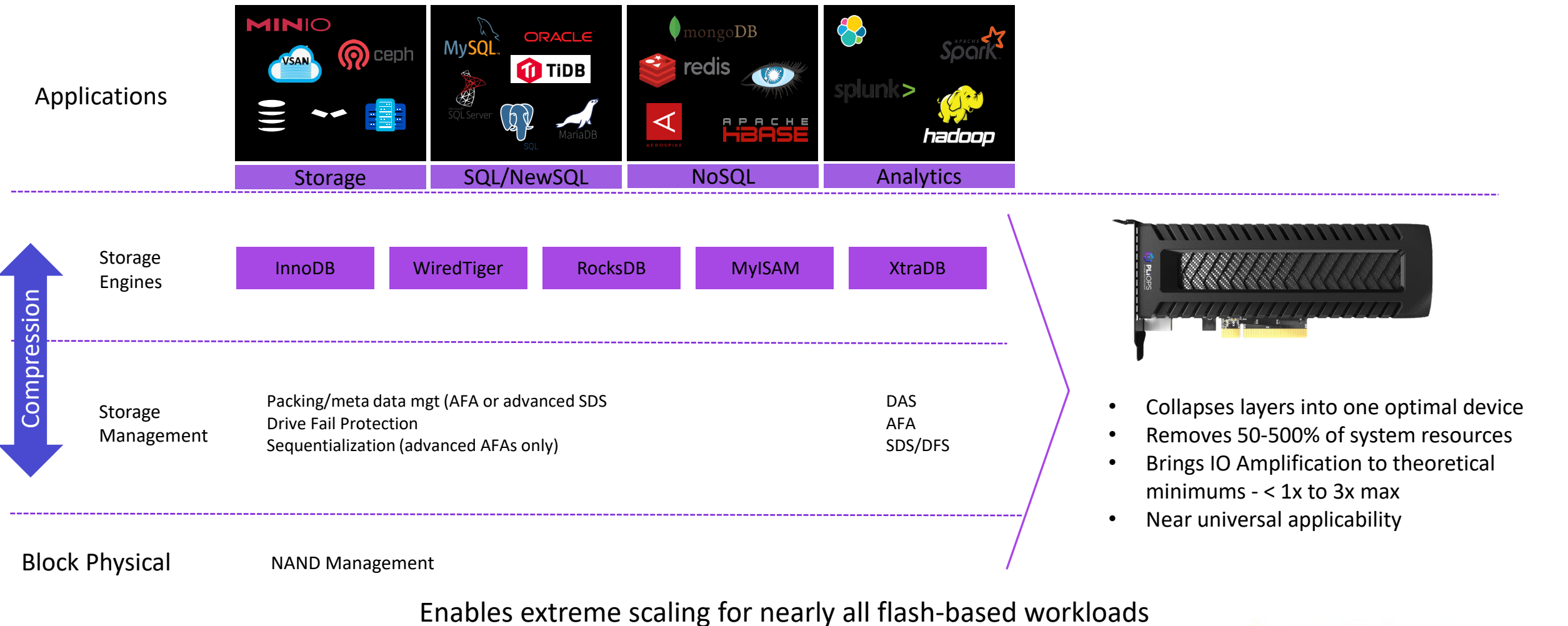


2



Impacts Network, Storage, SSD, CPU – Must Overprovision for
This Extra Data Transfer and Processing

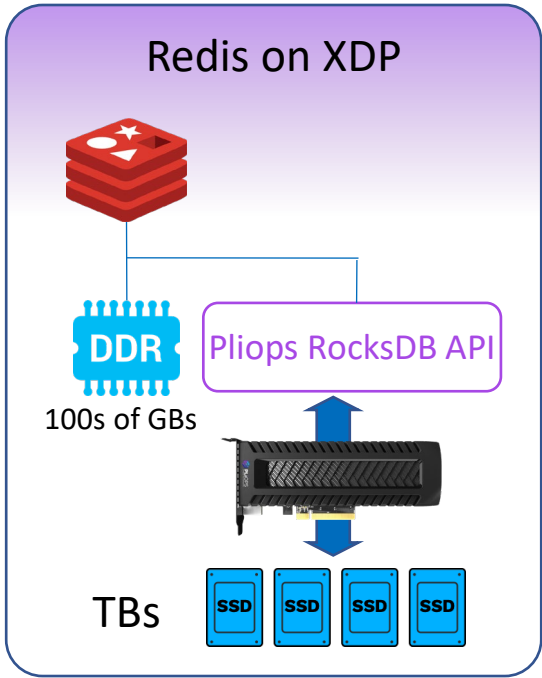
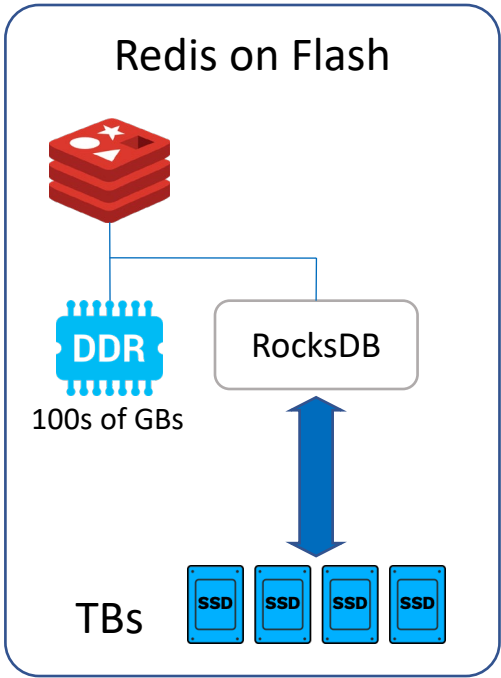
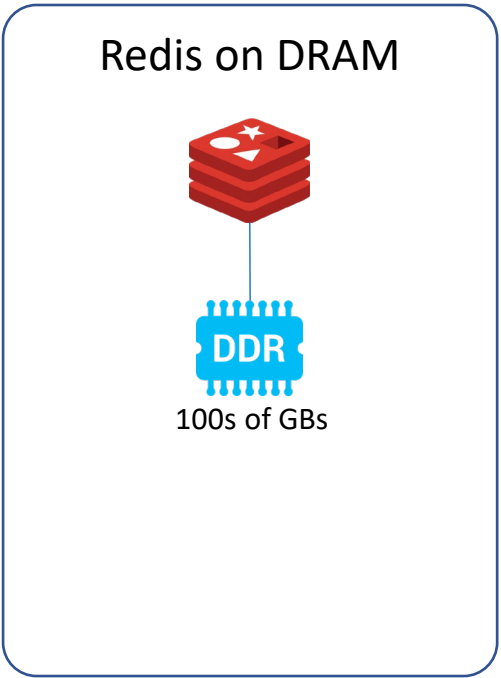
Pliops XDP Accelerates Core Storage Functions



- Collapses layers into one optimal device
- Removes 50-500% of system resources
- Brings IO Amplification to theoretical minimums - < 1x to 3x max
- Near universal applicability

Enables extreme scaling for nearly all flash-based workloads

In-Memory vs. Large Data Sets on Flash



Performance	<div>✓</div>	<div>X</div>	<div>✓</div>
Latency	<div>✓</div>	<div>X</div>	<div>✓</div>
Data Set Size	<div>X</div>	<div>✓</div>	<div>✓</div>
RA/WA/SA	<div>-</div>	<div>X</div>	<div>✓</div>

Cost-Effective Real-Time Decision Making for Large-Scale Datasets

Business Intelligence
Applications



Seamlessly Scaling In-Memory Cache
Unify Cache & backend Database



Multi-year business insights



Pliops TCO Benefits Approaches

Macro Level: Data Center

Objective: Cost Reduction



Footprint Reduction

- Data Center Consolidation
- Server Consolidation
- Overall TCO Reduction
- Overall, Power Savings

- High Capacity: Reduce \$/TB
- High Performance: Reduce \$/IOPS
- User Scalability/Multi-Tenancy: Reduce \$/Users

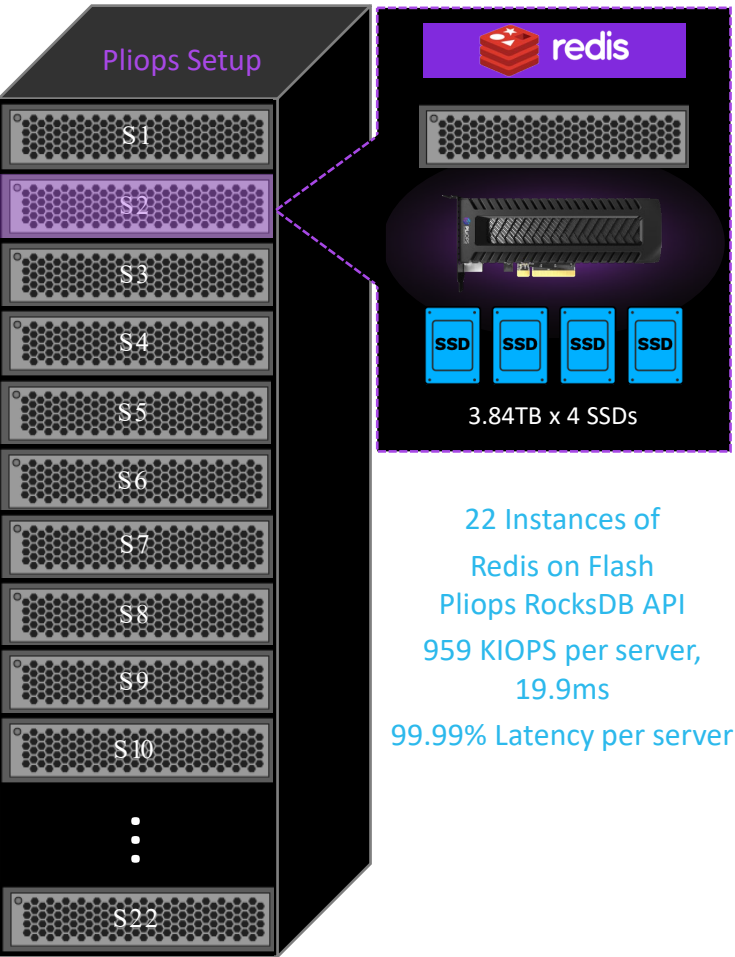
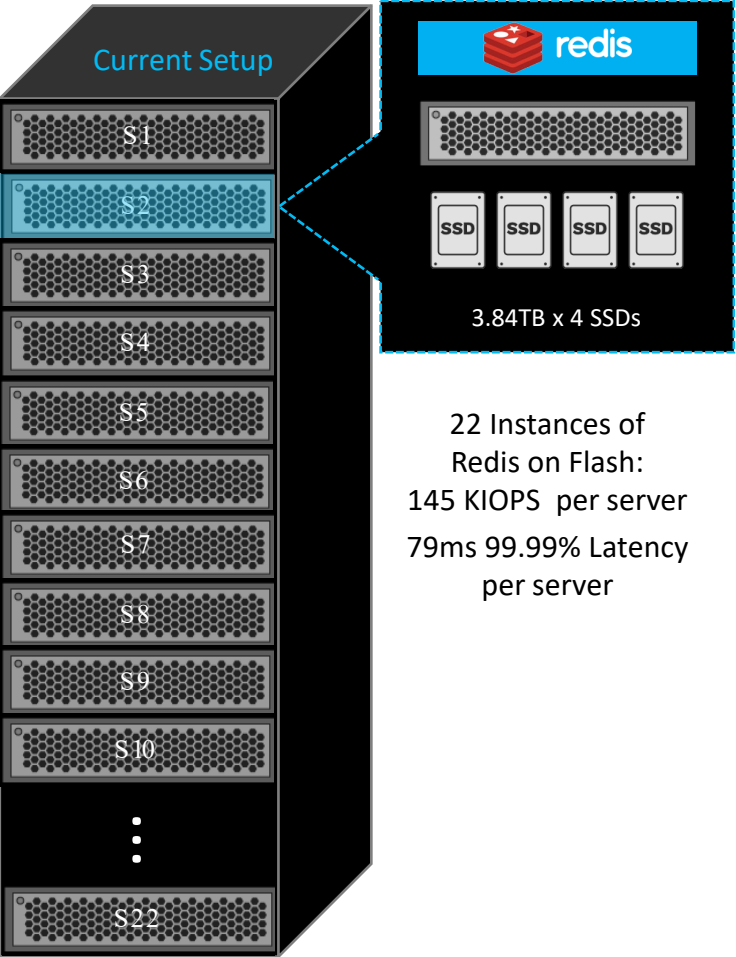
Do More with the Same Infrastructure



Objective: Get More Performance and Scale per Capacity at Lower Cost

Micro Level: Application Level

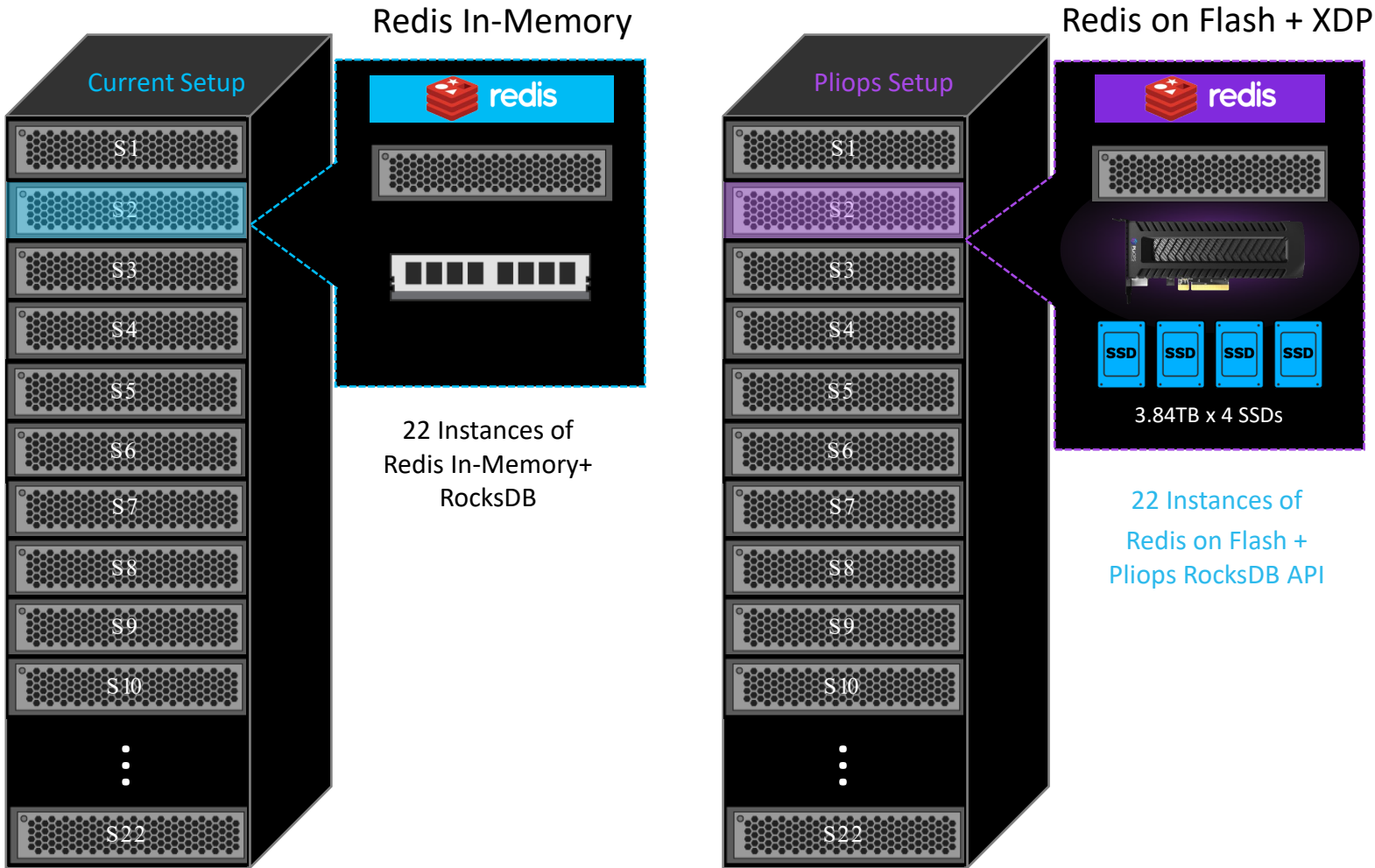
Redis on Flash TCO/Performance



Redis on Flash vs Redis with Pliops XDP Customer Benefits

7x ↑ Higher Performance	4x ↓ Lower 4 9's Latency
86% ↓ TCO/IOPS Reduction	3.6x ↑ Improved Endurance
 Improved Customer Experience/ Satisfaction	

Redis In-Memory – TCO/Caching Advantage



Redis on Flash vs Redis with Pliops XDP Customer Benefits

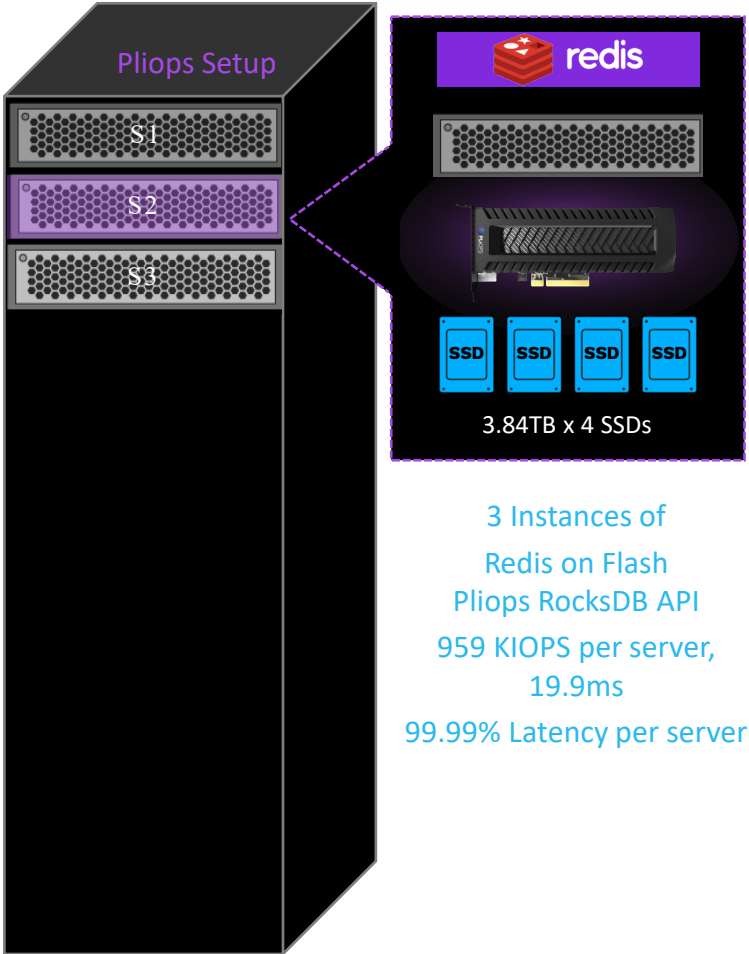
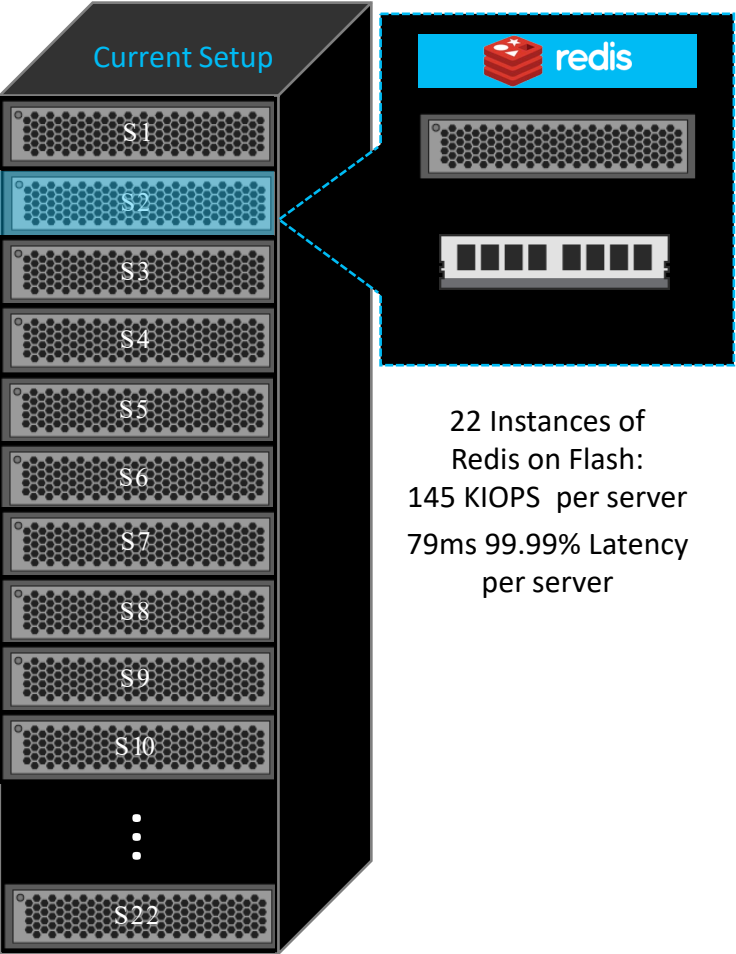
13x ↑
Higher Capacity

92% ↓
TCO savings/TB of Redis Caching



Extend Business Insights from few Weeks to Several Months

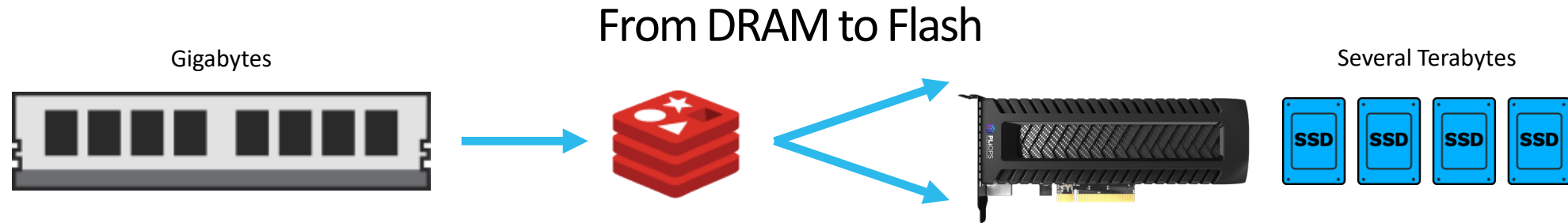
Redis In-Memory Consolidation TCO



Redis on Flash vs Redis with Pliops XDP Customer Benefits

7x ↑ Higher Performance	4x ↓ Lower 4 9's Latency
84% ↓ TCO Savings	3.6x ↑ Improved Endurance
Improved Customer Experience/ Satisfaction	

Conclusion



DRAM-like performance with SSD-like economics



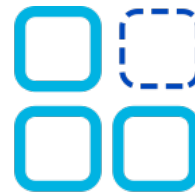
DRAM-like
IOPS

@ sub-millisecond latencies



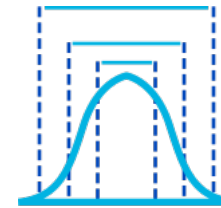
SSD-Like
economics

\$ per GB of data



Low variance
in performance

Fill SSDs more and better
SLA management



Resilient to
hit ratio

Not dependent on
caching or
workload tuning



Significantly
lower TCO

Lower cost and
power

Thank You

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