The Big Memory Movement

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CEO, MemVerge
Big Memory Computing  =  Big Memory Hardware  +  Big Memory Software
Today’s Computer

Apps Run in DRAM

**DRAM**
- **Pros**
  - Fast
- **Cons**
  - Low Capacity
  - High Cost
  - Volatile

**Storage**
- **Pros**
  - High-Capacity
  - Low-Cost
  - Non-Volatile
- **Cons**
  - Slow

**Pros**
- Fast
**Cons**
- Low Capacity
- High Cost
- Volatile
Data Has Become Big & Fast
Our BIG MEMORY vision

All applications live in memory
Intel® optane™ persistent memory
Revolutionizing memory
The Rise of Big Memory Computing

Apps Run in DRAM and PMEM

**DRAM + PMEM**

**Pros**
- Fast
- High-Capacity
- High-Density
- Non-Volatile
Big Memory is Massive

$2.6B by 2023

IDC: Byte-Addressable Persistent Memory
Revenue ($M)

248% CAGR 2019-2023

$65M

$2,609M

$25B by 2030

Forbes: Emerging Memories
Shipments (PB)

DRAM
PME M

2019 2020 2021 2022 2023

IDC: Digital Transformation Driving New “Big Memory” Requirements

Emerging Memories Find Their Direction: Objective Analysis and Coughlin Associates
MemVerge Memory Machine™

Bigger Memory at Lower Cost without Performance Compromise
- Up to 9TB memory/2-way server
- 30-50% Memory Cost Savings
- DRAM-Performance

Persistence On-demand
- ZeroIO™ In-Memory Snapshot
- Fast Crash Recovery
- Thin-Clones

No Application Change!
Early Adopters

- Cloud Service Providers
- Movie Studios
- Financial Services
Example: Lower TCO Cloud MySQL Deployment

Sysbench QPS

<table>
<thead>
<tr>
<th>Configuration</th>
<th>Sysbench QPS</th>
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<tbody>
<tr>
<td>128GB DRAM</td>
<td>47,578</td>
</tr>
<tr>
<td>128GB PMEM</td>
<td>37,328</td>
</tr>
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<td>128GB PMEM +2GB DRAM</td>
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<td>128GB PMEM +8GB DRAM</td>
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<td>128GB PMEM +16GB DRAM</td>
<td>49,753</td>
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30-40% Lower Memory Cost
Example: Restore a 315GB Redis Database (300M Keys)

1,500X Faster
Example: MongoDB AI/ML and Big Data

Test results: 1000 libs (1 million records) case

TPS

Data access latency
The Future

Memory Machine™
(memory virtualization layer)

IMC Apps  Analytics  HPC  AI/ML

DRAM

intel OPTANE®
PERSISTENT MEMORY
Opening the door to Big Memory

A world of abundance, persistence and high availability
What happens in memory stays in memory...