Welcome to the Storage Networking Industry Association (SNIA) Annual Members Symposium and Persistent Memory Summit
Welcome

Jim Pappas
SNIA Board of Directors
Director of Technology Initiatives, Data Center Group
Intel Corporation
jim@intel.com
SNIA-at-a-Glance

185 industry leading organizations

2,000 active contributing members

50,000 IT end users & storage pros worldwide

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Standards Development

20+ YEARS of Standards Development

- ISO & ANSI Standards
- Storage Standards
- Best Practices & Security
- Interoperability & Conformance Testing
Opening Remarks –
State of the Union in Persistent Memory
Thanks To Our Sponsors

Underwriters

Platinum

Demonstration

Tour demos throughout the day and at the evening Networking Reception
Latency Budgets

HDD | SATA SSD | NVMe Flash | Persistent Memory
---|---|---|---
100,000,000 | 10,000,000 | 1,000,000 | 18"
Retrospect 2016

Latency Budgets

Latency (nS)

HDD | SATA SSD | NVMe Flash | Persistent Memory

![Graph showing latency budgets for HDD, SATA SSD, NVMe Flash, and Persistent Memory.](image)
Retrospect 2016

Latency (nS)

Latency Budgets

HDD | SATA SSD | NVMe Flash | Persistent Memory

Karman | 18”
Retrospect 2017

Latency (nS)

<table>
<thead>
<tr>
<th>Storage</th>
<th>Memory</th>
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<tbody>
<tr>
<td>Architecture Disruption</td>
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</table>

Latency Budgets

- HDD
- SATA SSD
- NVMe Flash
- Persistent Memory

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Retrospect 2018

Latency Budgets

Storage Memory Architecture Disruption

Try SCE to AUX
2020 Assessment

We have cleared the tower!

The NASA Library / Alamy Stock Photo
Proof Points

1. Standards - SNIA, JEDEC, others
2. PM media – Several w/more arriving
3. OEMs/ODMs – Most!
4. Native OS support – Yes, mature
5. Hypervisors – Yes, and maturing
6. Hyperscale Cloud – Yes, and growing
7. Applications – Several… but still nascent

Under Development

- More applications
- PM development community
- New media
- New HW interfaces
PM Development Community

Goal: Create a “community” which provides PM knowledge and education to the software development ecosystem.

• Key programs to-date:
  • Persistent Memory Development Kit (PMDK)
  • Hackathons

• Hackathon progress report:
  • 8 Hackathons (4 US, 4 International)
  • 325 participants in 2019
  • NVDIMM Programming Challenge (ends April ’20)
New PM Interconnects

PM needs a better interconnect to flourish

• Issues:
  • PM comes at the expense of DRAM
  • Severe limitations on Form Factor & Power
• CXL is positioned to become the new interconnect for PM
  • Open industry standard w/native support for PM
  • Public support by nearly all CPU companies
<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>8:30 am – 9:00 am</td>
<td>Opening Remarks and the State of the Union – Persistent Memory</td>
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<tr>
<td>9:00 am – 9:30 am</td>
<td>Keynote: The Evolution of Cloud-scale Storage</td>
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<tr>
<td>9:30 am – 9:35 am</td>
<td>Symposium Attendees Leave for Sessions</td>
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<tr>
<td>9:35 am – 10:00 am</td>
<td>The Persistent Memory Programming Model</td>
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<tr>
<td>10:00 am – 10:25 am</td>
<td>PM in the Wild: VMware Experience and Future Expectations</td>
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<td>10:25 am – 10:45 am</td>
<td>Break and Demonstrations</td>
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<tr>
<td>10:45 am – 11:10 am</td>
<td>Persistent Memory Use Cases in Modern Software Architectures</td>
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<tr>
<td>11:10 am – 11:40 am</td>
<td>Memory at Storage Scale, Storage at Memory Speed</td>
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<td>11:40 am – 12:05 pm</td>
<td>Evolution of the Persistent Memory Development Kit</td>
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<tr>
<td>12:15 pm – 1:15 pm</td>
<td>Lunch, Networking, and Demonstrations</td>
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## Summit Afternoon Agenda

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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<tbody>
<tr>
<td>1:15 pm – 1:40 pm</td>
<td><strong>The Perfect Trifecta: NVMe, CXL, and Persistent Memory!</strong></td>
</tr>
<tr>
<td>1:40 pm – 2:05 pm</td>
<td>Persistent Memory: Media, Attachment, and Usage</td>
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<td>2:05 pm – 2:30 pm</td>
<td><strong>Providing Native Support for Byte-Addressable Persistent Memory in Golang</strong></td>
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<tr>
<td>2:30 pm – 3:00 pm</td>
<td>Oracle’s Unique Implementation of Persistent Memory for Accelerating Database Workloads</td>
</tr>
<tr>
<td>3:00 pm - 3:20 pm</td>
<td><em>Coffee, Networking, and Demo Tour Break on the Mezzanine</em></td>
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<tr>
<td>3:20 pm – 3:50 pm</td>
<td><strong>Using Persistent Memory with Pelikan</strong></td>
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<tr>
<td>3:50 pm – 4:15 pm</td>
<td>Introduction to PM Hackathons</td>
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<tr>
<td>4:15 pm – 4:45 pm</td>
<td><strong>Using Real World Workloads and Artificial Intelligence to Optimize NVMe SSD and PM Performance</strong></td>
</tr>
<tr>
<td>4:45 pm – 5:00 pm</td>
<td>Recap of Day and Closing Remarks</td>
</tr>
<tr>
<td>Until 6:30 pm</td>
<td><strong>Networking Reception and Demonstrations on the Mezzanine</strong></td>
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</table>
Enjoy and Socialize the Summit!

Live stream the Summit at www.snia.org

Ask a question on Twitter – use #sniapm

mentioning @SNIA
The Evolution of Cloud-scale Storage from iSCSI to RoCE to NVMexpress over Ethernet to NVMexpress over TCP/IP

Andy Bechtolsheim
Chief Development Officer and Co-Founder, Arista Networks