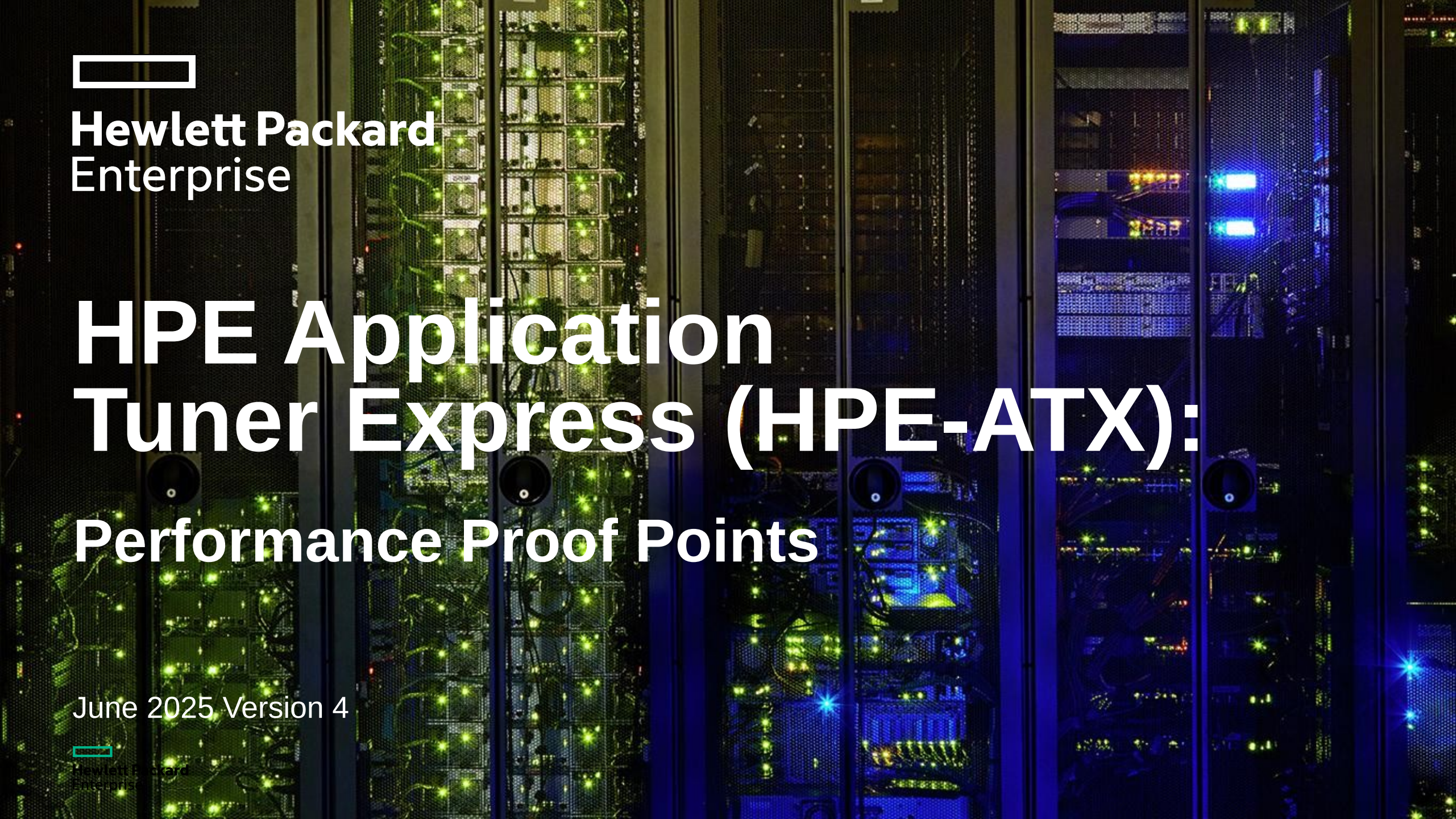

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HPE Application Tuner Express (HPE-ATX):

Performance Proof Points

June 2025 Version 4

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Houston, we have a problem!

- Many existing applications today were designed for older 2- and 4-socket systems (20 to 40 cores) and are NUMA unaware.
- Scaling these applications to large current 16-socket / 240-core systems can show significant application performance issues.
- In larger systems with multiple cores and sockets memory latency can be a big problem if memory and cores are not kept together.
- It’s difficult to correctly design and code applications to have core and memory co-location in a NUMA system.

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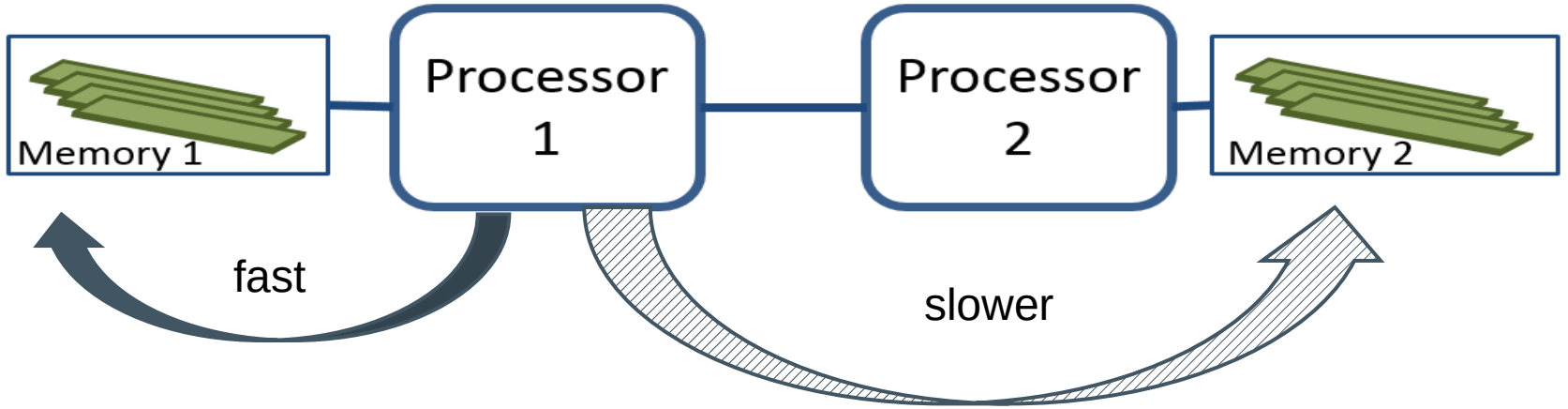
Non Uniform Memory Access (NUMA)

Quick recap

Modern computers have their memory controlled by processors



Accessing remote memory takes longer than accessing local memory

For 2-socket servers such as the HPE DL380:

- **50%** of the memory is **local memory**
- **50%** of the memory is **remote** with a **1.6x memory latency**

  (accessing remote memory takes 1.6 times longer)

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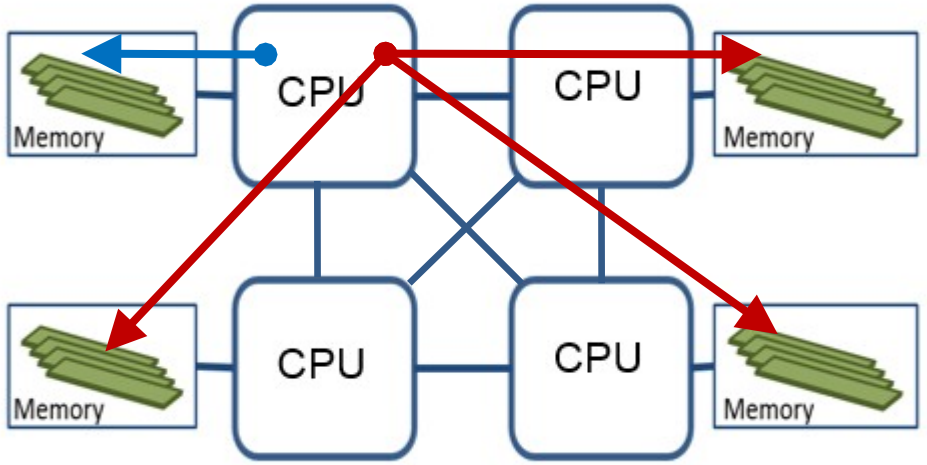
Non Uniform Memory Access (NUMA)

HPE DL580 Conceptual NUMA Topology



- **25%** of the memory is **local memory**
- **75%** of the memory is **remote** with a **1.6x memory latency**
  (accessing remote memory takes 1.6 times longer)

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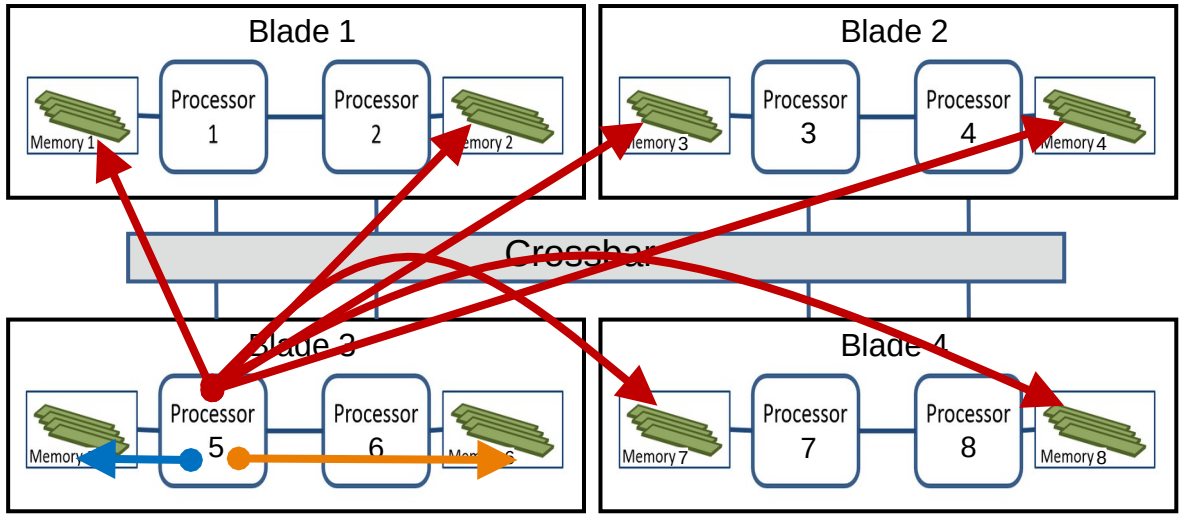
Non Uniform Memory Access (NUMA)

8-socket HPE Superdome X Conceptual NUMA Topology



- **Only 12.5%** of the memory is **local memory**
- **12.5%** of the memory is **remote on-blade** with a **1.6x memory latency**
- **75%** of the memory is **remote off-blade** with a **3.0x memory latency**
  (accessing remote off-blade memory takes 3.0 times longer)

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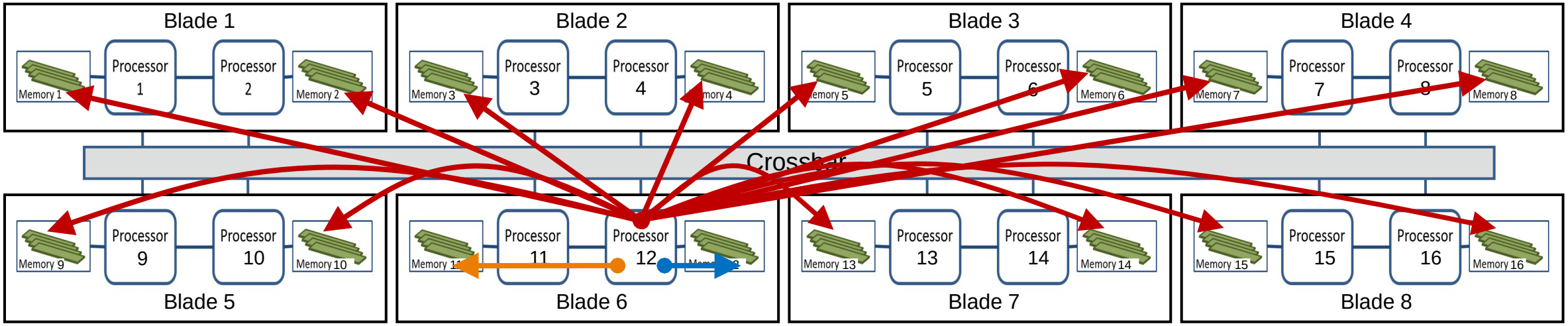
Non Uniform Memory Access (NUMA)

16-socket HPE Superdome X Conceptual NUMA Topology



- **Only 6.25%** of the memory is **local memory**
- **6.25%** of the memory is **remote on-blade** with a **1.6x memory latency**
- **87.5%** of the memory is **remote off-blade** with a **3.0x memory latency**
  (accessing remote off-blade memory takes 3.0 times longer)

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Keep Your Applications Organized

- As systems get larger the chance of accessing remote memory increases
- When applications are scheduled close to their memory performance increases significantly

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What is HPE-ATX?

- Utility that makes NUMA unaware applications more NUMA aware
  - **No application changes are needed!**
- Controls the distribution of an application's processes and threads in a NUMA environment
  - Several NUMA node and CPU Launch Policies are provided to obtain an optimal distribution
- HPE-ATX vs `numactl`:
  - `numactl` **constrains** an application to a set of NUMA nodes
  - HPE-ATX **distributes** an application around a set of nodes
- Benefit of HPE-ATX varies by platform and application
  - Higher socket count platforms benefit more than lower socket count platforms
  - NUMA-unaware applications benefit more than applications built with NUMA awareness

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Realize significant OLTP performance gains with HPE-ATX

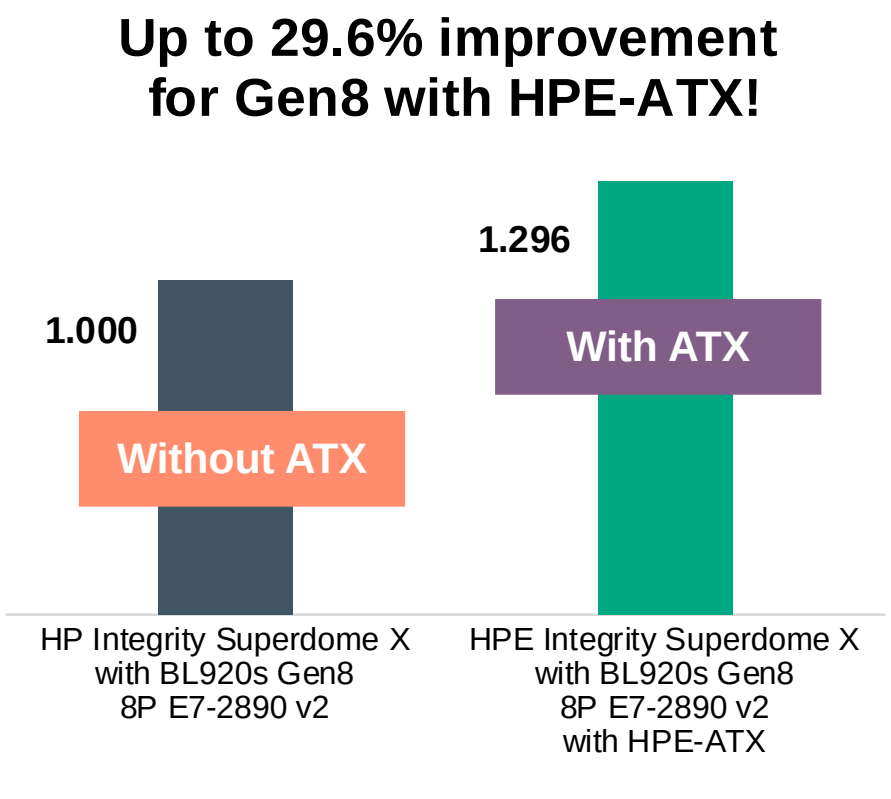
Up to 29.6% performance improvement on Superdome X Gen8

Key performance takeaways

- **Gen8 plus HPE-ATX software utility:**

  Up to 29.6% performance gain with HPE ATX software utility on Superdome X Gen8

- Outstanding results with the Red Hat Enterprise Linux 6.6 operating system



Read the performance brief at http://2025.

Red Hat is a trademark of Red Hat, Inc. Linux is a registered trademark of Linus Torvalds. Intel and Xeon are trademarks of Intel Corporation in the U.S. and other countries. HP internal testing. Performance results with HPE-ATX (patent pending) on the Superdome X with Gen8 were achieved at 240 users with 1-to-1 mapping of users to logical CPUs. Configurations that are over-subscribed may show less performance gain. Results as of November 2, 2015.

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HPE Integrity MC990 X OLTP performance boost with HPE-ATX

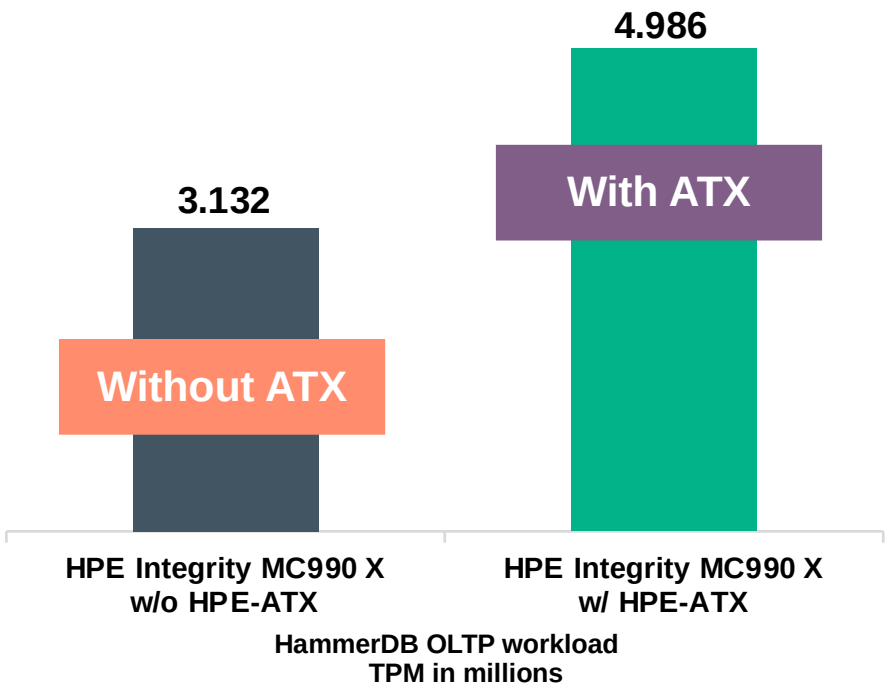
Significant database performance gains for the HPE Integrity MC990 X server

Key performance takeaways:

- **HPE-ATX software utility gains:**
  Up to 59% performance gain with the HPE-ATX software utility on HPE MC990 X servers for improved throughput
- **Database licensing costs:**
  Same database workload requires fewer cores

HPE Application Tuner Express (ATX) utility: A launch policy controller that facilitates more efficient use of application processes and threads for a NUMA environment

Up to 59% improvement on 8P with HPE-ATX!



Cut your per-core licensing costs by almost 40%!

8P HPE Integrity MC990 X

HPE Integrity MC990 X with 8 Intel® Xeon® E7-8890 v3 processors

Hewlett Packard Enterprise

Read the performance brief at hpe.com/servers/benchmarks.
Intel and Xeon are trademarks of Intel Corporation in the U.S. and other countries. HPE internal testing. Performance results with HPE-ATX (patent pending) on the MC990 X were achieved with 320 users and 1500 warehouses. Configurations that are over-subscribed may show less performance gain. Results as of September 25, 2016.

Significant OLTP multi-tenant performance gains with HPE-ATX

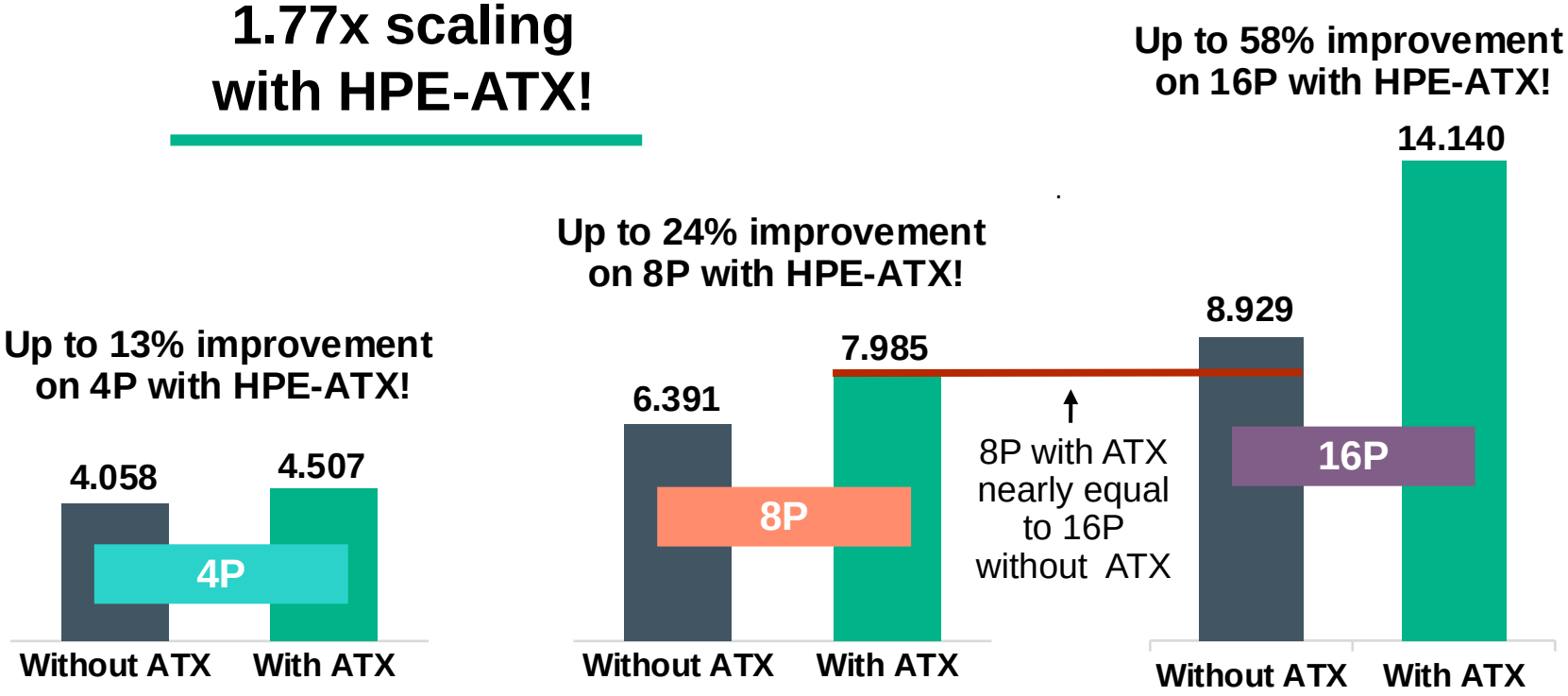
Database performance gains with HPE Integrity Superdome X Gen9

Key performance takeaways:

- **HPE-ATX software utility gains:**
  Up to 58% performance gain with the HPE-ATX software utility on HPE Superdome X with BL920s Gen9 blades
- **Database Licensing Costs:**
  8P performance with ATX is almost the same as 16P performance without ATX (see the red line)

Cut your per-core licensing costs almost in half!

1.77x scaling with HPE-ATX!



Hammer DB OLTP multi-tenant workload

HPE Superdome X using BL920s Gen9 blades with Intel® Xeon® E7-8890 v3 processors

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HPE ProLiant DL580 OLTP performance boost with HPE-ATX

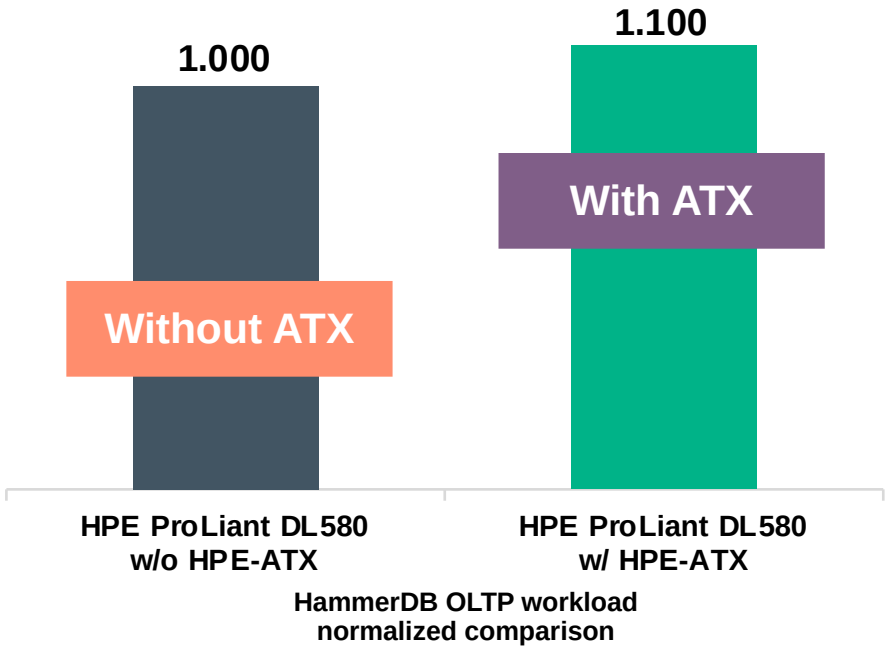
Significant database performance gains for the HPE ProLiant DL580 server

Key performance takeaways:

- **HPE-ATX software utility gains:**
  Up to 10% performance gain with the HPE-ATX software utility on HPE DL580 servers for improved throughput
- **Database licensing costs:**
  Same database workload requires fewer cores

HPE Application Tuner Express (ATX) utility: A launch policy controller that facilitates more efficient use of application processes and threads for a NUMA environment

Up to 10% improvement on 4P with HPE-ATX!



Cut your per-core database licensing costs!

4P HPE ProLiant DL580

HPE ProLiant DL580 with 4 Intel® Xeon® E7-8890 v3 processors

Hewlett Packard Enterprise

Read the performance brief at hpe.com/servers/benchmarks.
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Significant Apache® Spark™ Performance Gains with HPE-ATX

Up to 39% performance improvement on Superdome X

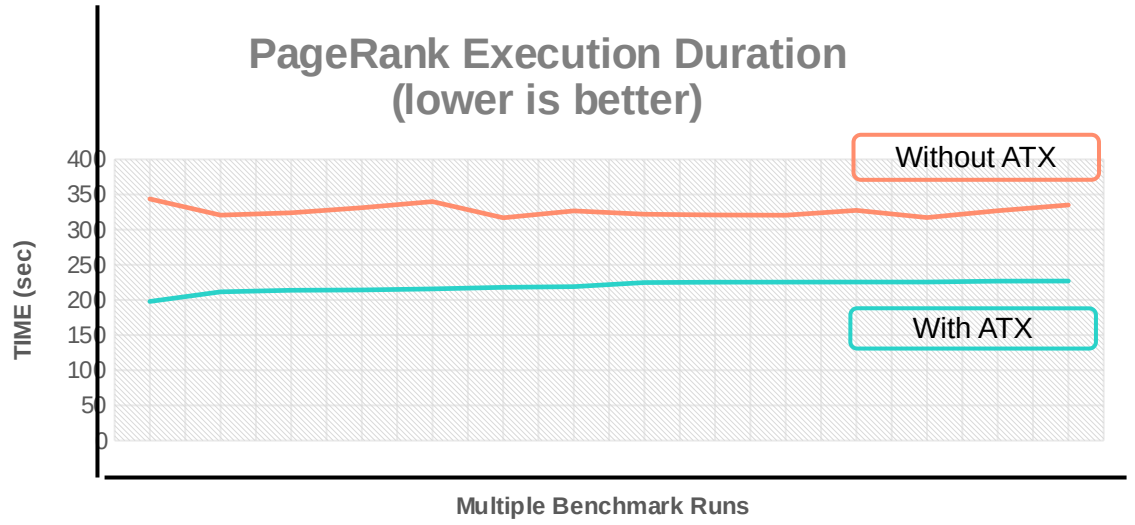
An 8-node machine-learning cluster of 2-socket servers running the **PageRank ML Benchmark** (OpenJDK 8, RHEL 7.3)

Key performance takeaways

- **Gen8 plus HPE-ATX:**

  Up to **39%** performance gain with HPE ATX software utility on Superdome X using eight BL920s Gen8 blades with Intel® Xeon® E7-8893 v2 processors.

Up to 39% improvement with HPE-ATX!



HPE Integrity Superdome X with Intel® Xeon® E7-8893 v2 processors

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HPE-ATX Performance Demo Videos

HPE Solution Demonstration Portal (https://hpedemoportal.ext.hpe.com/)

https://hpedemoportal.ext.hpe.com/search/HPE-ATX

Demo: HPE Automatic Tuner Express (HPE-ATX) (8P Superdome X)

Demo: HPE Integrity MC990 X OLTP perf improvement with HPE-ATX (8P MC990 X)

Demo: Database consolidation perf enhancement with HPE-ATX (16P Superdome X)

To view in full screen mode click on  when playing or login to download the demo video

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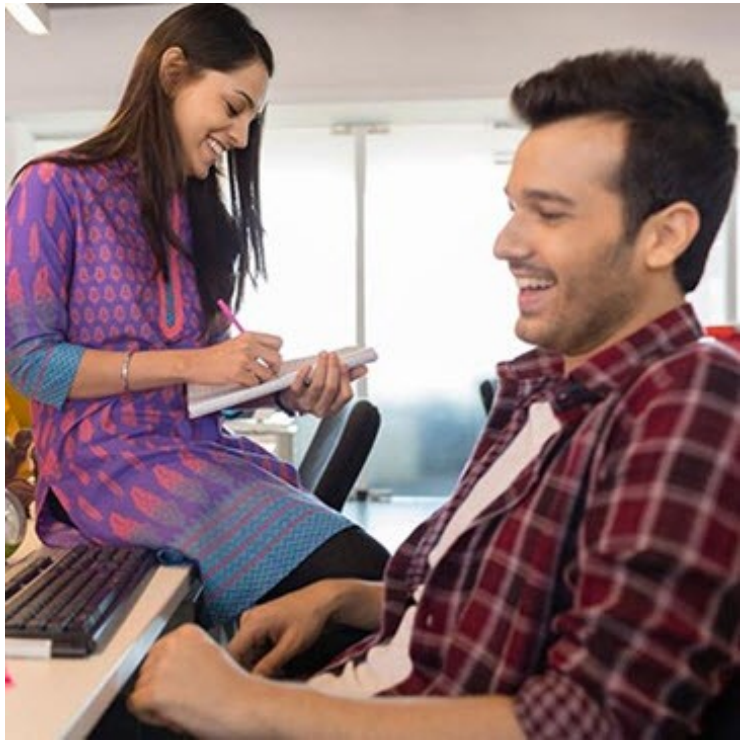
For additional information

Publicly Available Resources

- **HPE-ATX product page:**
  - http://downloads.linux.hpe.com/SDR/project/hpe-atx
- **HPE-ATX download:**
  - **HPE My License Depot**
    - My HPE Software Center -> HPE-ATX
  - **HPE Software Delivery Repository**
    - http://downloads.linux.hpe.com/SDR/project/hpe-atx/repo.html
- **Documentation: Installing HPE-ATX**
  - http://downloads.linux.hpe.com//SDR/project/hpe-atx/Installing_HPE-ATX.pdf
- **Documentation: Launching applications with HPE-ATX**
  - http://downloads.linux.hpe.com//SDR/project/hpe-atx/Using_HPE-ATX.pdf
  - http://downloads.linux.hpe.com//SDR/project/hpe-atx/HPE-ATX_proof_points.pdf
- **Demo Videos on the HPE Solution Demonstration Portal**
  - https://hpedemoportal.ext.hpe.com/search/HPE-ATX



Thank you