



Intel® Xeon® Processor E7-8800/4800 v4 Product Families

Performance Fact Sheet

World-Leading Performance Advancing Real-Time Analytics

June 5, 2016 - Several OEM companies have introduced new platforms based on the Intel Xeon processor E7-8800/4800 v4 product families and have achieved remarkable performance improvements scoring 27 new benchmark world records with improved economics from Cisco*, Dell*, Fujitsu*, Hewlett-Packard Enterprise (HPE)*, Huawei*, Lenovo* and SGI*.

Based on Intel internal analysis, using the new Intel Xeon processor E7-8890 v4 (60M Cache, 2.20 GHz) delivers more capabilities, larger memory capacity and microarchitecture enhancements for VM enter/exit latency reduction in a virtualized environment compared to prior generations.

- Up to double the queries per hour answered enabling smarter decisions for businesses analyzing their sales and customer data¹
 - up to 1.3x average performance across key industry-standard workloads²
- Up to 35% more virtual machines (VMs) and infrastructure applications throughput supported with same service-level agreement level to help IT grow line-of-business (LOB) heterogeneous needs³
- Ad-hoc cost per query has dropped from \$21 to just \$0.38 in just the past six-years – a 98% cost reduction, while queries per hour capability has increased by 19x⁴
- Use 1/3rd the servers for equivalent performance to lower operational expenses by replacing 4-5 year old installed platforms⁵, savings include lower:
 - Network and server maintenance costs by up to 92%
 - Utilities costs by up to 73%
 - Annual software licensing fees by up to 67%

Maximum Scalability to Meet the Most Demanding Needs

With industry-leading up to 3TB of memory per socket support¹⁵, the Intel Xeon processor E7-8800/4800 v4 product families are capable of holding multi-terabyte and petabyte-scale datasets that can be accessed in memory for fast time-to-insight and decision making. The processor also includes up to 60 MB last-level cache to support high-density, hardware-assisted virtualization with reduced latency. Further details show servers with Intel Xeon processor E7-8890 v4:

- Based on Intel internal analysis, compared to previous generation Intel Xeon processor E7-8890 v3 (45M Cache, 2.5 GHz, formerly codenamed “Haswell-EX”) using the same platform delivers up to:
 - 33% more benchmark users supported with SAP SD* 2-tier ERP workload⁶
 - 30% more On-Line Transaction Processing (OLTP) database transactions to support peak demands on supply chain⁷
 - 24% more query navigation steps using in-memory analytics with SAP HANA* through the new SAP Business Warehouse-Advanced Mixed Load (BW-AML) benchmark⁸

- Over the previous two generations Intel Xeon processor E7-4890 v2 (37.5M Cache, 2.8 GHz, formerly codenamed “Ivy Bridge-EX”) using the same platform demonstrates, based on Intel internal analysis, up to:
 - 4.6x faster ad-hoc queries for more insight into supporting business decisions⁹
 - 2.9x financial risk insights generational speedup with STAC-M3* theoretical profit and loss workload using 6TB of DDR4 memory¹⁰
 - Double the number of VMs for higher rack density¹¹
- Versus the broadest installed base of Intel Xeon processor E7 servers (formerly codenamed “Westmere-EX”) provides, based on Intel internal analysis, up to:
 - 3.7x more VMs for improving utilization while maintaining SLAs¹²
 - 2.9x more benchmark users supported with SAP SD* 2-tier ERP using SQL Server*¹³
 - 2.8x more OLTP database transactions to support peak demands on supply chain¹⁴

See <http://www.intel.com/E7v4Records> for the complete list of world records.

Configurations and Disclaimers

Software and workloads used in performance tests may have been optimized for performance only on Intel microprocessors.

Performance tests, such as SYSmark and MobileMark, are measured using specific computer systems, components, software, operations and functions. Any change to any of those factors may cause the results to vary. You should consult other information and performance tests to assist you in fully evaluating your contemplated purchases, including the performance of that product when combined with other products.

§ For more information go to <http://www.intel.com/performance/datacenter> and <http://www.intel.com/E7v4records>.

Claim configurations as of 5 June 2016:

1. Up to 2.1x faster ad-hoc queries claim based on TPC-H @ 3000GB scale factor comparing HPE ProLiant* DL580 Gen9 with Intel Xeon processors E7-8890 v4 (4P, 96C, 192T), Actian* Vector 5.0 database scoring 2,140,307 QphH@3000GB, \$0.38/QphH@3000GB available 6/6/2016 (source: <http://www.tpc.org/3323>) vs. next best published result Intel Xeon processor E7-8890 v3 (4P, 72C/144T), 1,071,018 QphH@3000GB, \$0.60/QphH@3000GB available 6/1/2016 (source: <http://www.tpc.org/3322>)
2. Up to 1.3x average performance across key industry benchmarks (SPECjbb*2015 Multi-JVM Critical and Max jOPS, SPECint*_rate_base2006, SAP SD* 2-tier, SPECvirt_sc*2013, and TPC-E*) comparing best 4-socket OEM server publications on SPEC.org, SAP.com/benchmarks and TPC.org. See www.intel.com/E7v4Record for more information.
3. Up to 1.35x VMs claim based on SPECvirt_sc*2013 benchmark comparing 1-Node, 4 x Intel® Xeon® Processor E7-8890 v3 with 2 TB Total Memory on Red Hat Enterprise Linux 6.6 using Red Hat Enterprise Linux 6.6 (KVM). Data Source: http://www.spec.org/virt_sc2013/results/res2016q1/virt_sc2013-20160126-00041-perf.html, Benchmark: SPECvirt_sc* 2013, Score: 3118 @ 174 VMs to 1-Node, 4 x Intel® Xeon® Processor E7-8890 v4 on Hewlett Packard Enterprise ProLiant* DL580 Gen 9 with 2048 GB Total Memory on Red Hat Enterprise Linux* 7.2-kernel 3.10.0-327. Data Source: Request Number: 2222, Benchmark: SPECvirt_sc* 2013, Score: 4231 @ 237 VMs Higher is better
4. Up to 19x queries per hour at 98% lower cost per query claim comparing HPE ProLiant* DL580 Gen9 server with Intel Xeon processors E7-8890 v4 (4P, 96C, 192T), Actian* database scoring 2,140,307 QphH@3000GB, \$0.38/QphH@3000GB available 6/6/2016 (source: <http://www.tpc.org/3323>) vs. Xeon X7460 (16P, 96C, 96T), SQL Server* 2008 Datacenter Edition R2 database scoring 102,778QphH@3000GB, \$21.05/QphH@3000GB available 5/6/2010 (historical source: <http://www.tpc.org/3245>)
5. Up to 1/3rd fewer servers deployed with operational expenses reduction claim based on assumptions and estimates from the Server Refresh Savings Estimator (<http://estimator.intel.com/serverroi/>) comparing four-socket servers with 8x GbE ports per server, \$1399 software support cost per server per year, \$1000 software validation cost per server, \$0.10/kWh with 10% average utilization, 50% lower labor costs, \$2399 server maintenance per server per year, and \$15 network maintenance per server per year:
 - 100x Intel Xeon processor E7-4870 (30M Cache, 2.40 GHz, formerly codenamed “Westmere-EX”), estimated SPECint*_rate_base2006 score 1100 with Intel Compiler 12.1, estimated power 392W idle/692W active
 - to 33x E7-8890 v4 (60M Cache, 2.20 GHz, codenamed “Broadwell-EX”), estimated SPECint*_rate_base2006 score 3380 with Intel Compiler 14, estimated power 250W idle/1200W active
6. Up to 1.33x benchmark SD ERP users claim based on SAP* SD Standard Application Benchmark Results, Two-Tier Internet Configuration benchmark LINUX results comparing 1-Node, 4 x Intel® Xeon® Processor E7-8890 v3 with 1048576 Total Memory on Red Hat Enterprise Linux 6.7 using SAP enhancement package 5 for SAP ERP 6.0. Data Source: <http://download.sap.com/download.epd?context=40E2D9D5E00EEF7C8CF2455D066964A9E7704F91078B51E484F6EE755FAFFE86>, Benchmark: SAP* SD 2-Tier enhancement package 5 for SAP ERP 6.0, Score: 31000 benchmark users to 1-Node, 4 x Intel® Xeon® Processor E7-8890 v4 on Dell Inc. PowerEdge* R930 with 1024 GB Total Memory on Red Hat Enterprise Linux* 7.2-kernel 3.10.0-327 using SAP Enhancement Package 5 for SAP ERP 6.0, SAP NetWeaver 7.20 pl510. Data Source: The SAP certification number was not available at press time and can be found at the following Web page: www.sap.com/benchmark. Score: 41450 benchmark users Higher is better

7. Up to 1.30x transactions per second E (tpsE) claim based on TPC-E* benchmark comparing 1-Node, 4P/72C/144T Intel® Xeon® Processor E7-8890 v3 with 4TB Total Memory on Microsoft Windows Server* 2012 Standard Edition using Microsoft SQL Server* 2014 Enterprise Edition. Data Source: http://www.tpc.org/tpce/results/tpce_result_detail.asp?id=115050101, Score: 6964 tpsE, \$245.98/tpsE, available 7/31/15 to 1-Node, 4P/96C/192T Intel® Xeon® Processor E7-8890 v4 on Lenovo Group Limited System x* 3850 x6 with 4096 GB Total Memory on Windows Server* 2012 R2 Standard using SQL Server* 2016 Enterprise Edition. Data Source: www.tpc.org/4078, Score: 9068 tpsE, \$139.85/tpsE, available 7/31/16.
8. Up to 24% more query navigation steps claim based on SAP BW-AML benchmark comparing 1-Node, 4 x Intel® Xeon® Processor E7-8890 v3 on Dell Inc. with 1536 GB Total Memory on SUSE Linux Enterprise Server* 11 using SAP HANA 1.0, SAP NetWeaver 7.50. Data Source: Request Number: 2232, Benchmark: SAP HANA (BW-AML) @ 2B, Score: 23690 Advanced Query Navigation Steps / hour @ 2B initial records to 1-Node, 4 x Intel® Xeon® Processor E7-8890 v4 on Dell Inc. with 1536 GB Total Memory on SUSE Linux Enterprise Server* 11 using SAP HANA 1.0, SAP NetWeaver 7.50. Data Source: Request Number: 2232, Benchmark: SAP HANA (BW-AML) @ 2B, Score: 29557 Advanced Query Navigation Steps / hour @ 2B initial records
9. Up to 4.6x QphH claim based on TPC-H* @ 3000GB benchmark comparing HPE ProLiant* DL580 Gen9 with Intel Xeon processors E7-8890 v4 (4P, 96C, 192T), Actian* Vector 5.0 database scoring 2,140,307 QphH@3000GB, \$0.38/QphH@3000GB available 6/6/2016 (source: <http://www.tpc.org/3323>) to 1-Node, 4 x Intel® Xeon® Processor E7-4890 v2 with 3 TB Total Memory on Microsoft Windows Server 2012 R2 Standard Edition using Microsoft SQL Server 2014 Enterprise Edition. Data Source: http://www.tpc.org/tpch/results/tpch_result_detail.asp?id=114041501, Score: 461837 QphH@3000GB, \$2.04/QphH, available 4/16/14
10. Up to 2.8x portfolio P&L generational speed-up claim based on STAC-M3* Shasta in-memory suite β1.10T.THEOPL.TIME benchmark comparing 4S Intel® Xeon® Processor E7-8890 v4 with 6TB SK Hynix* DDR4 memory, Intel SSD DC P3700, Kx Systems* db+ 3.3, Red Hat* Enterprise Linux 7.2 scoring 16 ms (Source: <https://www.stacresearch.com/KDB160425>) to 4S Intel® Xeon® Processor E7-4890 v2 with 6TB DDR3 memory, Intel SSD DC S3700, Kx systems* db+ 3.1, Red Hat* Enterprise Linux 6.3 ext4 scoring 46 ms (Source: <https://www.stacresearch.com/KDB140116>). Lower is better
11. Up to 2x VMs claim based on SPECvirt_sc*2013 benchmark comparing 1-Node, 4 x Intel® Xeon® Processor E7-4890 v2 with 1 TB Total Memory on FusionSphere V100R005 using Huawei Technologies Co., Ltd. FusionSphere V100R005. Data Source: http://www.spec.org/virt_sc2013/results/res2014q4/virt_sc2013-20140929-00018-perf.html, Score: 2086 @ 121 VMs to 1-Node, 4 x Intel® Xeon® Processor E7-8890 v4 on Hewlett Packard Enterprise ProLiant* DL580 Gen 9 with 2 TB Total Memory on Red Hat Enterprise Linux* 7.2-kernel 3.10.0-327. Data Source: www.spec.org/virt_sc2013/results, Benchmark: SPECvirt_sc* 2013, Score: 4231 @ 237 VMs Higher is better
12. Up to 3.7x VMs claim based on internal virtualized consolidation workload (similar to SPECvirt_sc*2013) benchmark comparing 1-Node, 4 x Intel® Xeon® Processor E7-8890 v4 on Brickland (Patsburg) with 1024 GB Total Memory on VMware ESXi* 6.0 Update 1. Data Source: Request Number: 2150, Score: 2114 @ 121 VMs Higher is better to 1-Node, 4 x Intel® Xeon® Processor E7-4870 on Emerald Ridge with 512 GB Total Memory on VMware ESXi* 5.5 GA using RHEL6.2-64-bit for all VMs. Data Source: Request Number: 131, Score: 573 @ 32 VMs Higher is better NOTE: the IT application virtualized consolidation workload is derived from the SPECvirt_sc*2103 benchmark and as such is not comparable to published SPEC Benchmark results
13. Up to 2.9x benchmark SD users claim based on SAP* SD Standard Application Benchmark Results, Two-Tier Internet Configuration benchmark comparing 1-Node, 4 x Intel® Xeon® Processor E7-4870 with 524288 Total Memory on Windows Server 2008 R2 Enterprise Edition using SAP enhancement package 4 for SAP ERP 6.0. Data Source: <http://download.sap.com/download.epd?context=40E2D9D5E00EEF7C2E1EC28E273D05AA5BABF57108CE9C65D0BF4DBFB4628AB>, Score: 14000 benchmark users to 1-Node, 4 x Intel® Xeon® Processor E7-8890 v4 on Dell Inc. PowerEdge* R930 with 1024 GB Total Memory on Red Hat Enterprise Linux* 7.2-kernel 3.10.0-327 using SAP Enhancement Package 5 for SAP ERP 6.0, SAP NetWeaver 7.20 pl510. Data Source: The SAP certification number was not available at press time and can be found at the following Web page: www.sap.com/benchmark, Benchmark: SAP* SD 2-Tier enhancement package 5 for SAP ERP 6.0, Score: 41450 benchmark users Higher is better.
14. Up to 2.8x transactions per second E (tpsE) claim based on TPC-E* benchmark comparing 1-Node, 4 x Intel® Xeon® Processor E7-4870 with 2TB Total Memory on Microsoft Windows Server 2012 Standard Edition using Microsoft SQL Server 2012 Enterprise Edition. Data Source: http://www.tpc.org/tpce/results/tpce_result_detail.asp?id=112112801, Score: 3218 tpsE, \$225.30/tpsE, available 11/28/12 (historical) to 1-Node, 4P/96C/192T Intel® Xeon® Processor E7-8890 v4 on Lenovo Group Limited System x* 3850 x6 with 4096 GB Total Memory on Windows Server* 2012 R2 Standard using SQL Server* 2016 Enterprise Edition. Data Source: www.tpc.org/4078, Score: 9068 tpsE, \$139.85/tpsE, available 7/31/16
15. Intel Xeon processor E7 v4 family supports 128 GB 3DS LRDIMMs for 3TB per socket (24TB in 8-sockets) – see ark.intel.com. IBM POWER8* platforms support up to 2TB of memory per socket: http://www-01.ibm.com/common/ssi/cgi-bin/ssialias?infotype=PM&subtype=RG&appname=STGE_PO_PO_USEN&htmlfid=POO03017USEN&attachment=POO03017USEN.PDF. Oracle SPARC M7*-based platforms support up to 0.5TB of memory per socket: <https://www.oracle.com/servers/sparc/m7-16/comparisons.html>.

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