

White Paper

FUJITSU Server PRIMERGY

Performance Report PRIMERGY TX2550 M5

This document contains a summary of the benchmarks executed for the FUJITSU Server PRIMERGY TX2550 M5.

The PRIMERGY TX2550 M5 performance data are compared with the data of other PRIMERGY models and discussed. In addition to the benchmark results, an explanation has been included for each benchmark and for the benchmark environment.

Version
1.0
2019/07/19



Performance



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Document history

Version 1.0 (2019/07/19)

New:

- Technical data
- SPECcpu2017
Measured with 2nd Generation Intel® Xeon® Processor Scalable Family
- OLTP-2
Calculated with 2nd Generation Intel® Xeon® Processor Scalable Family
- vServCon
Calculated with 2nd Generation Intel® Xeon® Processor Scalable Family

Technical data

PRIMERGY TX2550 M5



Decimal prefixes according to the SI standard are used for measurement units in this white paper (e.g. 1 GB = 10⁹ bytes). In contrast, these prefixes should be interpreted as binary prefixes (e.g. 1 GB = 2³⁰ bytes) for the capacities of caches and memory modules. Separate reference will be made to any further exceptions where applicable.

Model	PRIMERGY TX2550 M4	
	Tower	Rack
Model Version	PY TX2550 M5 Tower, 4x3.5" basic PY TX2550 M5 Tower, 8x3.5" PY TX2550 M5 Tower, 8x2.5" basic PY TX2550 M5 Tower, 8x2.5" PY TX2550 M5 Tower, 24x2.5" PY TX2550 M5 Tower, 16x2.5"	PY TX2550 M5 Rack, 8x3.5" PY TX2550 M5 Rack, 8x2.5" PY TX2550 M5 Rack, 24x2.5" PY TX2550 M5 Rack, 16x2.5"
Form factor	Tower or Rack server	
Chipset	Intel® C624	
Number of sockets	2	
Number of processors orderable	1 or 2	
Processor type	2nd Generation Intel® Xeon® Processor Scalable Family	
Number of memory slots	12 (6 per processor)	
Maximum memory configuration	768 GB	
Onboard HDD controller	Controller with RAID 0, RAID 1 or RAID 10 for up to 8 SATA HDDs	
PCI slots	PCI-Express 3.0 x8 x 5 PCI-Express 3.0 x16 x 3 PCI-32Bit x 1	
	Tower	Rack
Max. number of internal hard disks	PY TX2550 M5 Tower, 4x3.5" basic : 8 PY TX2550 M5 Tower, 8x3.5" : 12 PY TX2550 M5 Tower, 8x2.5" basic : 8 PY TX2550 M5 Tower, 8x2.5" : 24 PY TX2550 M5 Tower, 24x2.5" : 32 PY TX2550 M5 Tower, 16x2.5" : 16	PY TX2550 M5 Rack, 8x3.5" : 12 PY TX2550 M5 Rack, 8x2.5" : 24 PY TX2550 M5 Rack, 24x2.5" : 32 PY TX2550 M5 Rack, 16x2.5" : 16

Processors (since system release)								
Processor	Cores	Threads	Cache	UPI Speed	Rated Frequency	Max. Turbo Frequency	Max. Memory Frequency	TDP
			[MB]	[GT/s]	[Ghz]	[Ghz]	[MHz]	[Watt]
Xeon Gold 6262V	24	48	33.0	10.4	1.9	3.6	2933	130
Xeon Gold 6252	24	48	33.0	10.4	2.1	3.7	2933	150
Xeon Gold 6248	20	40	27.5	10.4	2.5	3.9	2933	150
Xeon Gold 6244	8	16	11.0	10.4	3.6	4.4	2933	150
Xeon Gold 6242	16	32	22.0	10.4	2.8	3.9	2933	150
Xeon Gold 6240Y	18	36	24.8	10.4	2.6	3.9	2933	150
	14	28						
	8	16						
Xeon Gold 6240	18	36	24.8	10.4	2.6	3.9	2933	140
Xeon Gold 6238	22	44	30.3	10.4	2.1	3.7	2933	140
Xeon Gold 6234	8	16	24.8	10.4	3.4	4.0	2933	130
Xeon Gold 6230	20	40	27.5	10.4	2.1	3.9	2933	125
Xeon Gold 6226	12	24	19.3	10.4	2.8	3.7	2933	125
Xeon Gold 6222V	20	40	27.5	10.4	1.8	3.6	2933	115
Xeon Gold 6212U	24	48	33.0	10.4	2.4	3.9	2933	165
Xeon Gold 6210U	20	40	27.5	10.4	2.5	3.9	2933	150
Xeon Gold 6209U	20	40	27.5	10.4	2.1	3.9	2933	125
Xeon Gold 5222	4	8	16.5	10.4	3.8	3.9	2666	105
Xeon Gold 5220S	18	36	24.8	10.4	2.2	3.9	2666	125
Xeon Gold 5220	18	36	24.8	10.4	2.2	3.9	2666	125
Xeon Gold 5218B	16	32	22.0	10.4	2.3	3.9	2666	125
Xeon Gold 5218	16	32	22.0	10.4	2.3	3.9	2666	125
Xeon Gold 5217	8	16	11.0	10.4	3.0	3.7	2666	115
Xeon Gold 5215	10	20	13.8	10.4	2.5	3.4	2666	85
Xeon Silver 4216	16	32	22.0	9.6	2.1	3.2	2400	100
Xeon Silver 4215	8	16	11.0	9.6	2.5	3.5	2400	85
Xeon Silver 4214Y	12	24	16.5	9.6	2.2	3.2	2400	85
	10	20						
	8	16						
Xeon Silver 4214	12	24	16.5	9.6	2.2	3.2	2400	85
Xeon Silver 4210	10	20	13.8	9.6	2.2	3.2	2400	85
Xeon Silver 4208	8	16	11.0	9.6	2.1	3.2	2400	85
Xeon Bronze 3204	6	6	8.3	9.6	1.9		2133	85

All the processors that can be ordered with the PRIMERGY TX2550 M5, apart from Xeon Bronze 3204, support Intel® Turbo Boost Technology 2.0. This technology allows you to operate the processor with higher frequencies than the nominal frequency. Listed in the processor table is "Max. Turbo Frequency" for the theoretical maximum frequency with only one active core per processor. The maximum frequency that can

actually be achieved depends on the number of active cores, the current consumption, electrical power consumption, and the temperature of the processor.

As a matter of principle, Intel does not guarantee that the maximum turbo frequency can be reached. This is related to manufacturing tolerances, which result in a variance regarding the performance of various examples of a processor model. The range of the variance covers the entire scope between the nominal frequency and the maximum turbo frequency.

The turbo functionality can be set via BIOS option. Fujitsu generally recommends leaving the "Turbo Mode" option set at the standard setting of "Enabled", as performance is substantially increased by the higher frequencies. However, since the higher frequencies depend on general conditions and are not always guaranteed, it can be advantageous to disable the "Turbo Mode" option for application scenarios with intensive use of AVX instructions and a high number of instructions per clock unit, as well as for those that require constant performance or lower electrical power consumption.

Suffix of Processor number shows additional feature of Xeon Processor.

The processors with M/L suffix support larger memory capacity of 2TB/socket(M-suffix) or 4.5TB/socket(L-suffix) whereas normal processors support 1TB/socket memory capacity.
 The processors with S suffix are specifically designed to offer consistent performance for search workloads.
 The processors with U suffix are only capable of single socket but the prices are lower than comparable normal processors with the same core count and frequency.
 The processors with V suffix are specifically designed to help maximize \$/VM
 The processors with Y suffix support Intel Speed Select Technology. It enables to provide 3 distinct configurations(number of active cores and frequencies) which customer can choose in BIOS option.
 Specifications of Xeon Gold 5218B and Xeon Gold 5218 including core count and frequencies are the same.
 The difference is minor electrical specifications only.

Suffix	Additional feature
M	Support up to 2TB/socket memory
L	Support up to 4.5TB/socket memory
S	Search Optimized
U	Single Socket
V	VM Density Optimized
Y	Speed Select

Memory modules (since system release)								
Memory module	Capacity [GB]	Ranks	Bit width of the memory chips	Frequency [MHz]	Load Reduced	Registered	NVDIMM	ECC
8 GB (1x8 GB) 1Rx8 DDR4-2933 R ECC	8	1	8	2933		✓		✓
16 GB (1x16 GB) 2Rx8 DDR4-2933 R ECC	16	2	8	2933		✓		✓
16 GB (1x16 GB) 1Rx4 DDR4-2933 R ECC	16	1	4	2933		✓		✓
32 GB (1x32 GB) 2Rx4 DDR4-2933 R ECC	32	2	4	2933		✓		✓
64 GB (1x64 GB) 2Rx4 DDR4-2933 R ECC	64	2	4	2933		✓		✓
64 GB (1x64 GB) 4Rx4 DDR4-2933 LR ECC	64	4	4	2933	✓	✓		✓
128GB (1x128GB) DCPMM-2666	128			2666			✓	✓
256GB (1x256GB) DCPMM-2666	256			2666			✓	✓

Power supplies (since system release)	Max. number
Modular PSU 450 W platinum hp	2
Modular PSU 800 W platinum hp	2
Modular PSU 800 W titanium hp	2
Modular PSU 1200 W platinum hp	2

Some components may not be available in all countries or sales regions.
 Detailed technical information is available in the data sheet PRIMERGY TX2550 M5.

SPECcpu2017

Benchmark description

SPECcpu2017 is a benchmark which measures the system efficiency with integer and floating-point operations. It consists of an integer test suite (SPECrate 2017 Integer, SPECspeed 2017 Integer) containing 10 applications and a floating-point test suite (SPECrate 2017 Floating Point, SPECspeed 2017 Floating Point) containing 14 applications. Both test suites are extremely computing-intensive and concentrate on the CPU and the memory. Other components, such as Disk I/O and network, are not measured by this benchmark.

SPECcpu2017 is not tied to a special operating system. The benchmark is available as source code and is compiled before the actual measurement. The used compiler version and their optimization settings also affect the measurement result.

SPECcpu2017 contains two different performance measurement methods: The first method (SPECspeed 2017 Integer or SPECspeed 2017 Floating Point) determines the time which is required to process a single task. The second method (SPECrate 2017 Integer or SPECrate 2017 Floating Point) determines the throughput, i.e. the number of tasks that can be handled in parallel. Both methods are also divided into two measurement runs, "base" and "peak", which differ in the use of compiler optimization. When publishing the results, the base values are always used and the peak values are optional.

Benchmark	Number of single benchmarks	Arithmetics	Type	Compiler optimization	Measurement result
SPECspeed2017_int_peak	10	integer	peak	aggressive	Speed
SPECspeed2017_int_base	10	integer	base	conservative	
SPECrate2017_int_peak	10	integer	peak	aggressive	Throughput
SPECrate2017_int_base	10	integer	base	conservative	
SPECspeed2017_fp_peak	10	floating point	peak	aggressive	Speed
SPECspeed2017_fp_base	10	floating point	base	conservative	
SPECrate2017_fp_peak	13	floating point	peak	aggressive	Throughput
SPECrate2017_fp_base	13	floating point	base	conservative	

The measurement results are the geometric average from normalized ratio values which have been determined for individual benchmarks. The geometric average - in contrast to the arithmetic average - means that there is a weighting in favor of the lower individual results. Normalized means that the measurement is how fast is the test system compared to a reference system. Value "1" was defined for the SPECspeed2017_int_base, SPECrate2017_int_base, SPECspeed2017_fp_base, and SPECrate2017_fp_base results of the reference system. For example, a SPECspeed2017_int_base value of 2 means that the measuring system has handled this benchmark twice as fast as the reference system. A SPECrate2017_fp_base value of 4 means that the measuring system has handled this benchmark some 4/[# base copies] times faster than the reference system. "# base copies" specifies how many parallel instances of the benchmark have been executed.

Not every SPECcpu2017 measurement is submitted by us for publication at SPEC. This is why the SPEC web pages do not have every result. As we archive the log files for all measurements, we can prove the correct implementation of the measurements at any time.

Benchmark environment

System Under Test (SUT)	
Hardware	
Model	PRIMERGY TX2550 M5
Processor	2nd Generation Intel® Xeon® Scalable Processors Family
Memory	24 x 32 GB (1x32 GB) 2Rx4 PC4-2933Y-R
Software	
BIOS settings	Xeon Gold 6252: SPECrate2017_int: Patrol Scrub = Disabled DCU Ip Prefetcher = Disabled DCU Streamer Prefetcher = Disabled Fan Control = Full Stale AtoS = Enable WR CRC feature Control = Disabled SPECrate2017_fp Patrol Scrub = Disabled WR CRC feature Control = Disabled Fan Control = Full
Operating system	SUSE Linux Enterprise Server 15 4.12.14-25.28-default
Operating system settings	SPECrate2017_int: Stack size set to unlimited using "ulimit -s unlimited" SPECrate2017: Kernel Boot Parameter set with : nohz_full=1-95 SPECrate2017_fp: Stack size set to unlimited using "ulimit -s unlimited" SPECrate2017: Kernel Boot Parameter set with : nohz_full=1-95 echo 10000000 > /proc/sys/kernel/sched_min_granularity_ns
Compiler	SPECrate2017_int: C/C++: Version 19.0.1.144 of Intel C/C++ Compiler for Linux; Fortran: Version 19.0.1.144 of Intel Fortran Compiler for Linux SPECrate2017_fp: C/C++: Version 19.0.0.117 of Intel C/C++ Compiler for Linux; Fortran: Version 19.0.0.117 of Intel Fortran Compiler for Linux

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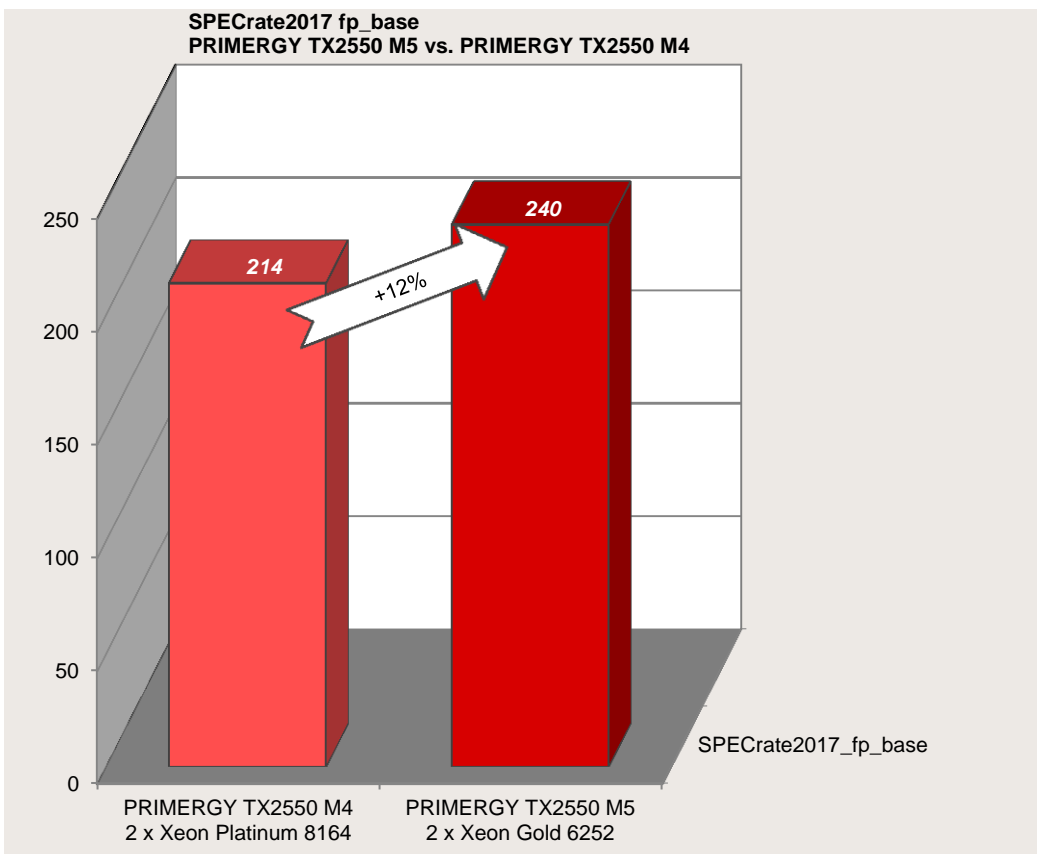
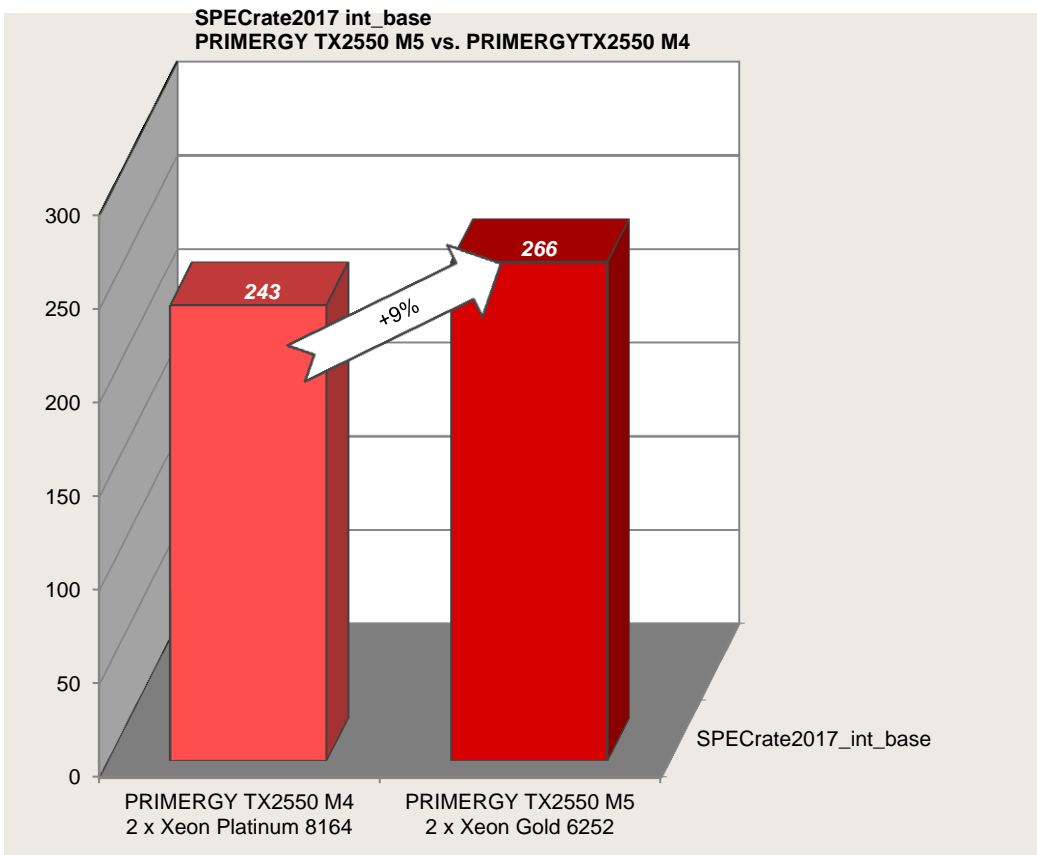
Benchmark results

In terms of processors, the benchmark result depends primarily on the size of the processor cache, the support for Hyper-Threading, the number of processor cores, and the processor frequency. In the case of processors with Turbo mode, the number of cores, which are loaded by the benchmark, determines the maximum processor frequency that can be achieved. In the case of single-threaded benchmarks, which largely load one core only, the maximum processor frequency that can be achieved is higher than with multi-threaded benchmarks.

The result with "est." are the estimated values.

SPECrate2017				
Processor	Cores	Number of Processors	SPECrate2017 int_base	SPECrate2017 fp_base
Xeon Gold 6262V	24	2	212(est.)	165(est.)
Xeon Gold 6252	24	2	266	240
Xeon Gold 6248	20	2	246(est.)	224(est.)
Xeon Gold 6244	8	2	130(est.)	147(est.)
Xeon Gold 6242	16	2	212(est.)	203(est.)
Xeon Gold 6240Y	18	2	223(est.)	209(est.)
	14	2	tbd	tbd
	8	2	tbd	tbd
Xeon Gold 6240	18	2	221(est.)	208(est.)
Xeon Gold 6238	22	2	245(est.)	225(est.)
Xeon Gold 6234	8	2	115(est.)	127(est.)
Xeon Gold 6230	20	2	218(est.)	206(est.)
Xeon Gold 6226	12	2	162(est.)	170(est.)
Xeon Gold 6222V	20	2	222(est.)	212(est.)
Xeon Gold 6212U	24	1	142(est.)	125(est.)
Xeon Gold 6210U	20	1	123(est.)	113(est.)
Xeon Gold 6209U	20	1	112(est.)	107(est.)
Xeon Gold 5222	4	2	62.2(est.)	75.8(est.)
Xeon Gold 5220S	18	2	tbd	tbd
Xeon Gold 5220	18	2	195(est.)	189(est.)
Xeon Gold 5218B	16	2	179(est.)	177(est.)
Xeon Gold 5218	16	2	179(est.)	177(est.)
Xeon Gold 5217	8	2	105(est.)	115(est.)
Xeon Gold 5215	10	2	118(est.)	126(est.)
Xeon Silver 4216	16	2	172(est.)	167(est.)
Xeon Silver 4215	8	2	94.7(est.)	105(est.)
Xeon Silver 4214Y	12	2	131(est.)	137(est.)
	10	2	tbd	tbd
	8	2	tbd	tbd
Xeon Silver 4214	12	2	131(est.)	136(est.)
Xeon Silver 4210	10	2	107(est.)	117(est.)
Xeon Silver 4208	8	2	80.7(est.)	91.3(est.)
Xeon Bronze 3204	6	2	38.5(est)	53.8(est.)

The following two diagrams illustrate the throughput of the PRIMERGY TX2550 M5 in comparison to its predecessor PRIMERGY TX2550 M4, in their respective most performant configuration.



OLTP-2

Benchmark description

OLTP stands for Online Transaction Processing. The OLTP-2 benchmark is based on the typical application scenario of a database solution. In OLTP-2 database access is simulated and the number of transactions achieved per second (tps) determined as the unit of measurement for the system.

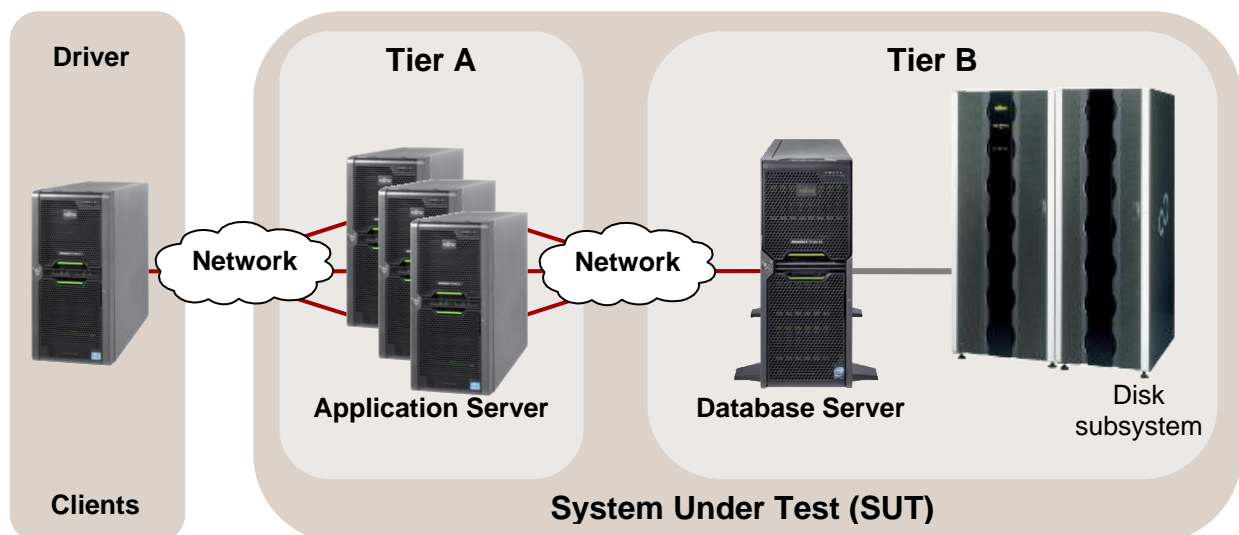
In contrast to benchmarks such as SPECint and TPC-E, which were standardized by independent bodies and for which adherence to the respective rules and regulations are monitored, OLTP-2 is an internal benchmark of Fujitsu. OLTP-2 is based on the well-known database benchmark TPC-E. OLTP-2 was designed in such a way that a wide range of configurations can be measured to present the scaling of a system with regard to the CPU and memory configuration.

Even if the two benchmarks OLTP-2 and TPC-E simulate similar application scenarios using the same load profiles, the results cannot be compared or even treated as equal, as the two benchmarks use different methods to simulate user load. OLTP-2 values are typically similar to TPC-E values. A direct comparison, or even referring to the OLTP-2 result as TPC-E, is not permitted, especially because there is no price-performance calculation.

Further information can be found in the document [Benchmark Overview OLTP-2](#).

Benchmark environment

The typical measurement set-up is illustrated below:



All OLTP-2 results were Calculated based on the configuration of the next following pages of PRIMERGY RX2540 M5.

Database Server (Tier B)	
Hardware	
Model	PRIMERGY RX2540 M5
Processor	2nd Generation Intel® Xeon® Scalable Processors Family
Memory	1 processor: 12 x64 GB (1x64 GB) 2Rx4 DDR4-2933 ECC 2 processors: 24 x64 GB (1x64 GB) 2Rx4 DDR4-2933 ECC
Network interface	1 x Dual port onboard LAN 10 Gb/s
Disk subsystem	RX2540 M5: Onboard RAID controller PRAID EP420i 2 x 300 GB 10k rpm SAS Drive, RAID 1 (OS), 6 x 1.6 TB SSD, RAID 10 (LOG) 4 x 1.6 TB SSD, RAID 10 (temp) 5 x PRAID EP540e 5 x JX40 S2 : 9 x 1.6 TB SSD Drive each, RAID5 (data)
Software	
BIOS	Version R1.2.0
Operating system	Microsoft Windows Server 2016 Standard + KB4462928
Database	Microsoft SQL Server 2017 Enterprise + KB4341265

Application Server (Tier A)	
Hardware	
Model	1 x PRIMERGY RX2530 M4
Processor	2 x Xeon Platinum 8180
Memory	192 GB, 2666 MHz Registered ECC DDR4
Network interface	1 x Dual Port onboard LAN 10 Gb/s 1 x Dual Port LAN 1 Gb/s
Disk subsystem	2 x 300 GB 10k rpm SAS Drive
Software	
Operating system	Microsoft Windows Server 2016 Standard

Client	
Hardware	
Model	1 x PRIMERGY RX2530 M2
Processor	2 x Xeon E5-2667 v4
Memory	128 GB, 2400 MHz registered ECC DDR4
Network interface	1 x onboard Quad Port LAN 1 Gb/s
Disk subsystem	1 x 300 GB 10k rpm SAS Drive
Software	
Operating system	Microsoft Windows Server 2012 R2 Standard
Benchmark	OLTP-2 Software EGen version 1.14.0

Some components may not be available in all countries / sales regions.

Benchmark results

Database performance greatly depends on the configuration options with CPU, memory and on the connectivity of an adequate disk subsystem for the database. In the following scaling considerations for the processors we assume that both the memory and the disk subsystem has been adequately chosen and is not a bottleneck.

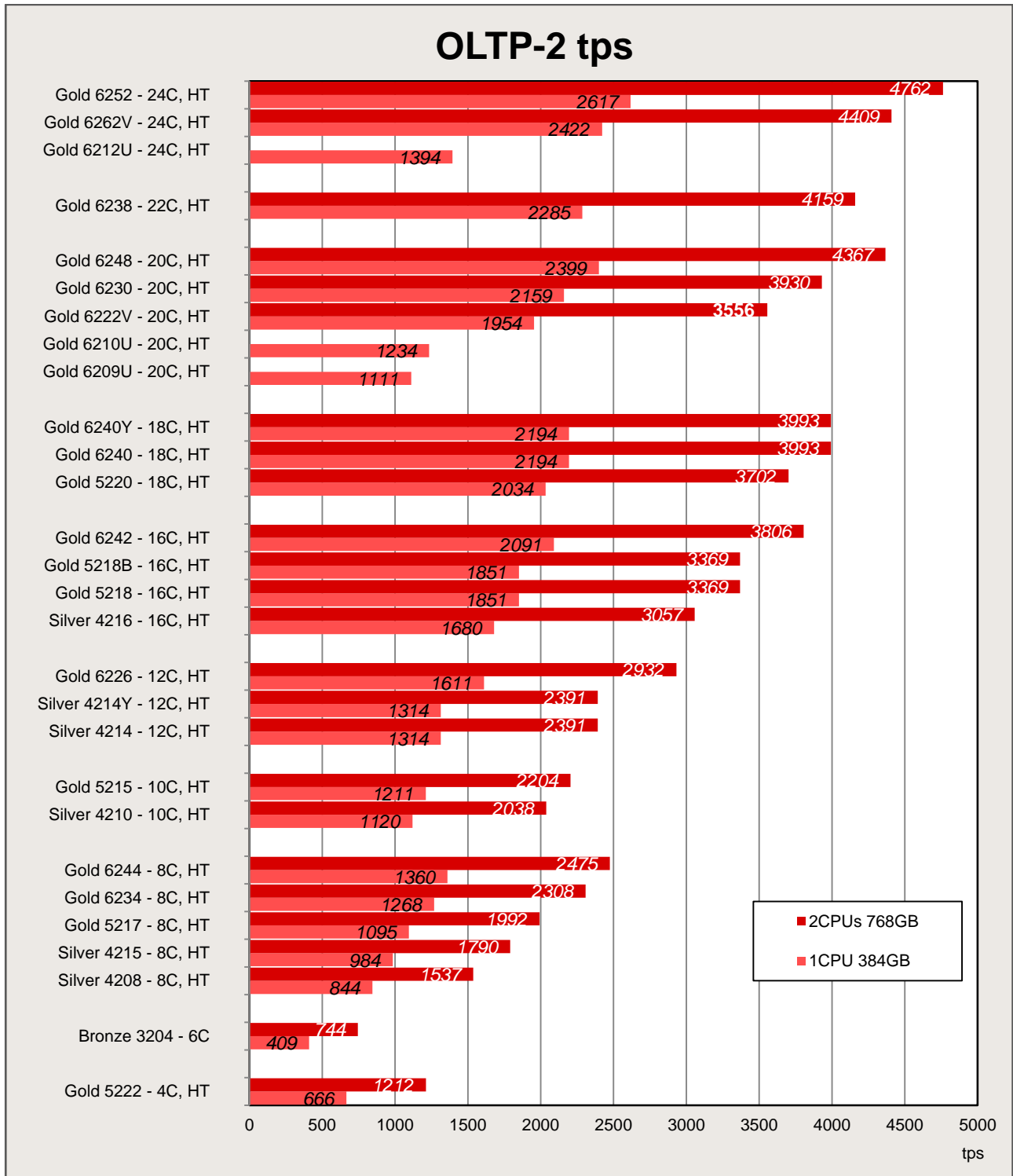
A guideline in the database environment for selecting main memory is that sufficient quantity is more important than the speed of the memory accesses. This why a configuration with a total memory of 1536 GB was considered for the measurements with two processors and a configuration with a total memory of 768 GB for the measurements with one processor. Both memory configurations have memory access of 2933 MHz.

The result with "est." are the estimated values.

Processor	Cores	Threads	2CPU Score	1CPU Score
Xeon Gold 6262V	24	48	4,409(est.)	2,422(est.)
Xeon Gold 6252	24	48	4,762(est.)	2,617(est.)
Xeon Gold 6248	20	40	4,367(est.)	2,399(est.)
Xeon Gold 6244	8	16	2,475(est.)	1,360(est.)
Xeon Gold 6242	16	32	3,806(est.)	2,091(est.)
Xeon Gold 6240Y	18	36	3,993(est.)	2,194(est.)
	14	28	tbd	tbd
	8	16	tbd	tbd
Xeon Gold 6240	18	36	3,993(est.)	2,194(est.)
Xeon Gold 6238	22	44	4,159(est.)	2,285(est.)
Xeon Gold 6234	8	16	2,308(est.)	1,268(est.)
Xeon Gold 6230	20	40	3,930(est.)	2,159(est.)
Xeon Gold 6226	12	24	2,932(est.)	1,611(est.)
Xeon Gold 6222V	20	40	3,556(est.)	1,954(est.)
Xeon Gold 6212U	24	48	2,537(est.)	1,394(est.)
Xeon Gold 6210U	20	40	2,246(est.)	1,234(est.)
Xeon Gold 6209U	20	40	2,021(est.)	1,111(est.)
Xeon Gold 5222	4	8	1,212(est.)	666(est.)
Xeon Gold 5220S	18	36	tbd	tbd
Xeon Gold 5220	18	36	3,702(est.)	2,034(est.)
Xeon Gold 5218B	16	32	3,369(est.)	1,851(est.)
Xeon Gold 5218	16	32	3,369(est.)	1,851(est.)
Xeon Gold 5217	8	16	1,992(est.)	1,095(est.)
Xeon Gold 5215	10	20	2,204(est.)	1,211(est.)
Xeon Silver 4216	16	32	3,057(est.)	1,680(est.)
Xeon Silver 4215	8	16	1,790(est.)	984(est.)
Xeon Silver 4214Y	12	24	2,391(est.)	1,314(est.)
	10	20	tbd	tbd
	8	16	tbd	tbd
Xeon Silver 4214	12	24	2,391(est.)	1,314(est.)
Xeon Silver 4210	10	20	2,038(est.)	1,120(est.)

Xeon Silver 4208	8	16	1,537(est.)	844(est.)
Xeon Bronze 3204	6	6	744(est.)	409(est.)

The following diagram shows the OLTP-2 transaction rates that can be achieved with one and two processors of the 2nd Generation Intel® Xeon® Processor Scalable Family.



It is evident that a wide performance range is covered by the variety of released processors. If you compare the OLTP-2 value of the processor with the lowest performance (Xeon Bronze 3204) with the value of the processor with the highest performance (Xeon Platinum 8280), the result is an 8-fold increase in performance.

The features of the processors are summarized in the section “Technical data”.

The relatively large performance differences between the processors can be explained by their features. The values scale on the basis of the number of cores, the size of the L3 cache and the CPU clock frequency and as a result of the features of Hyper-Threading and turbo mode, which are available in most processor types. Furthermore, the data transfer rate between processors (“UPI Speed”) also determines the performance.

Within a group of processors with the same number of cores, scaling can be seen via the CPU clock frequency.

vServCon

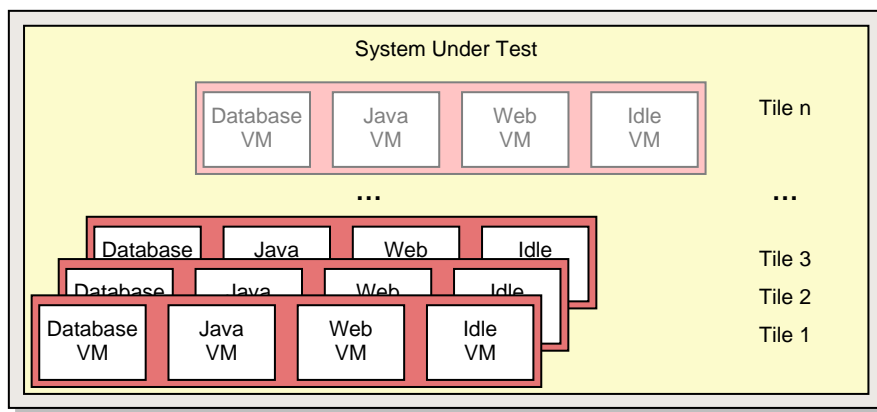
Benchmark description

vServCon is a benchmark used by Fujitsu to compare server configurations with hypervisor with regard to their suitability for server consolidation. This allows both the comparison of systems, processors and I/O technologies as well as the comparison of hypervisors, virtualization forms, and additional drivers for virtual machines.

vServCon is not a new benchmark in the true sense of the word. It is more a framework that combines already established benchmarks (or in modified form) as workloads in order to reproduce the load of a consolidated and virtualized server environment. Three proven benchmarks are used which cover the application scenarios database, application server, and web server.

Application scenario	Benchmark	No. of logical CPU cores	Memory
Database	Sysbench (adapted)	2	1.5 GB
Java application server	SPECjbb (adapted, with 50% - 60% load)	2	2 GB
Web server	WebBench	1	1.5 GB

Each of the three application scenarios is allocated to a dedicated virtual machine (VM). A fourth machine, the so-called idle VM, is added to these. These four VMs make up a “tile”. Depending on the performance capability of the underlying server hardware, you may as part of a measurement also have to start several identical tiles in parallel in order to achieve a maximum performance score.



Each of the three vServCon application scenarios provides a specific benchmark result in the form of application-specific transaction rates for the respective VM. In order to derive a normalized score, the individual benchmark result for one tile is put in relation to the respective result of a reference system. The resulting relative performance value is then suitably weighted and finally added up for all VMs and tiles. The outcome is a score for this tile number.

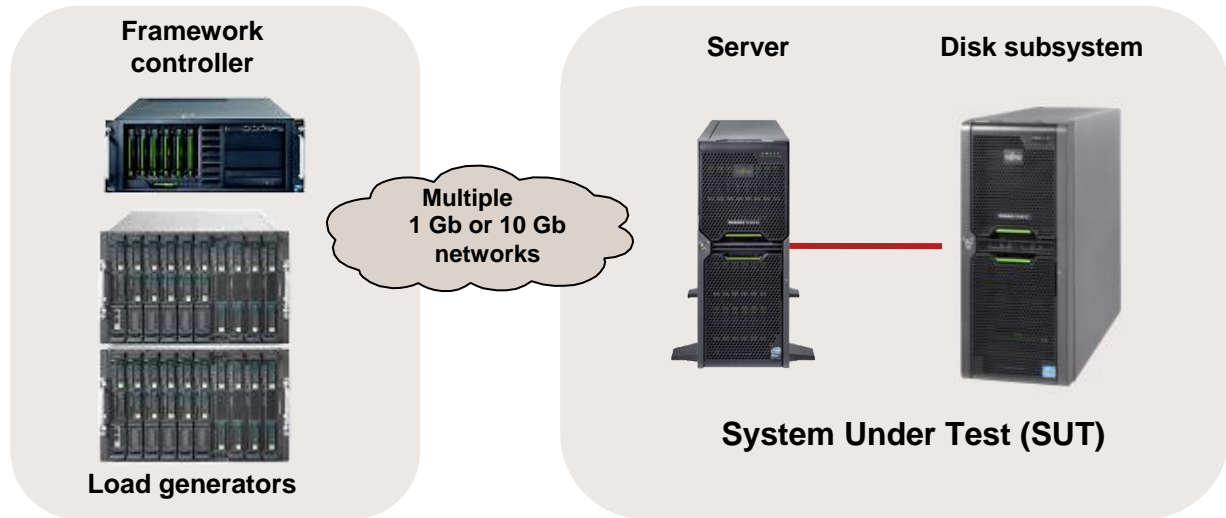
As a general rule, start with one tile, and this procedure is performed for an increasing number of tiles until no further significant increase in this vServCon score occurs. The final vServCon score is then the maximum of the vServCon scores for all tile numbers. This score thus reflects the maximum total throughput that can be achieved by running the mix defined in vServCon that consists of numerous VMs up to the possible full utilization of CPU resources. This is why the measurement environment for vServCon measurements is designed in such a way that only the CPU is the limiting factor and that no limitations occur as a result of other resources.

The progression of the vServCon scores for the tile numbers provides useful information about the scaling behavior of the “System under Test”.

A detailed description of vServCon is in the document: [Benchmark Overview vServCon](#).

Benchmark environment

The typical measurement set-up is illustrated below:



All vServCon results were Calculated based on the configuration of the next following pages of PRIMERGY RX2540 M5.

System Under Test (SUT)	
Hardware	
Processor	2nd Generation Intel® Xeon® Scalable Processors Family
Memory	24 x 32 GB (1x32 GB) 2Rx4 DDR4-2933 R ECC
Network interface	2 x Intel® Ethernet Controller X710 for 10GbE SFP+
Disk subsystem	1 x dual-channel FC controller Emulex LPe160021 LINUX/LIO based flash storage system
Software	
Operating system	VMware ESXi 6.7 EP06 Build 11675023

Load generator (incl. Framework controller)	
Hardware (Shared)	
Enclosure	5 x PRIMERGY RX2530 M2
Hardware	
Processor	2 x XeonE5-2683 v4
Memory	128 GB
Network interface	3 x 1 Gbit LAN
Software	
Operating system	VMware ESXi 6.0.0 U1b Build 3380124

Load generator VM (on various servers)	
Hardware	
Processor	1 x logical CPU
Memory	4048 MB
Network interface	2 x 1 Gbit/s LAN
Software	
Operating system	Microsoft Windows Server 2008 Standard Edition 32 bit

Some components may not be available in all countries or sales regions.

Benchmark results

The PRIMERGY dual-socket rack and tower systems dealt with here are based on processors of the 2nd Generation Intel® Xeon® Processor. The features of the processors are summarized in the section "Technical data".

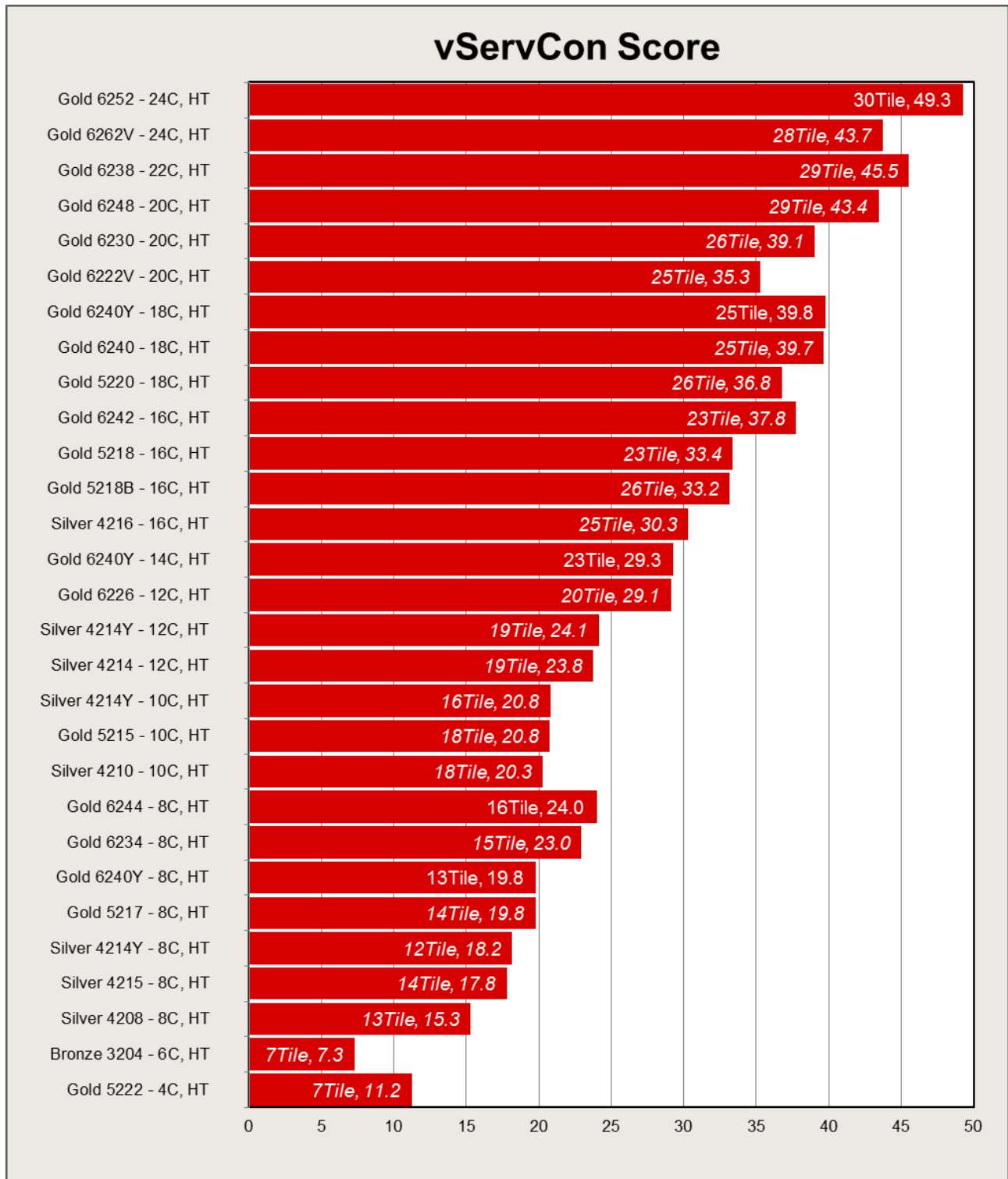
The available processors of these systems with their results can be seen in the following table.

The result with "est." are the estimated values.

Processor	Cores	Threads	Number of Processors	#Tiles	Score
Xeon Gold 6262V	24	48	2	28(est.)	43.7(est.)
Xeon Gold 6252	24	48	2	30	49.3
Xeon Gold 6248	20	40	2	29(est.)	43.4(est.)
Xeon Gold 6244	8	16	2	16	24.0
Xeon Gold 6242	16	32	2	23(est.)	37.8(est.)
Xeon Gold 6240Y	18	36	2	25(est.)	39.8(est.)
	14	28	2	tbd	tbd
	8	16	2	tbd	tbd
Xeon Gold 6240	18	36	2	25(est.)	39.7(est.)
Xeon Gold 6238	22	44	2	29(est.)	45.5(est.)
Xeon Gold 6234	8	16	2	15(est.)	23.0(est.)
Xeon Gold 6230	20	40	2	26(est.)	39.1(est.)
Xeon Gold 6226	12	24	2	20(est.)	29.1(est.)
Xeon Gold 6222V	20	40	2	25(est.)	35.3(est.)
Xeon Gold 6212U	24	48	1	tbd	tbd
Xeon Gold 6210U	20	40	1	tbd	tbd
Xeon Gold 6209U	20	40	1	tbd	tbd
Xeon Gold 5222	4	8	2	7(est.)	11.2(est.)
Xeon Gold 5220S	18	36	2	tbd	tbd
Xeon Gold 5220	18	36	2	26(est.)	36.8(est.)
Xeon Gold 5218B	16	32	2	tbd	tbd
Xeon Gold 5218	16	32	2	23(est.)	33.4(est.)
Xeon Gold 5217	8	16	2	14(est.)	19.8(est.)

Xeon Gold 5215	10	20	2	18(est.)	20.8(est.)
Xeon Silver 4216	16	32	2	25(est.)	30.3(est.)
Xeon Silver 4215	8	16	2	14(est.)	17.8(est.)
Xeon Silver 4214Y	12	24	2	19(est.)	24.1(est.)
	10	20	2	tbd	tbd
	8	16	2	tbd	tbd
Xeon Silver 4214	12	24	2	19(est.)	23.8(est.)
Xeon Silver 4210	10	20	2	18(est.)	20.3(est.)
Xeon Silver 4208	8	16	2	13(est.)	15.3(est.)
Xeon Bronze 3204	6	6	2	7(est.)	7.3(est.)

The following diagram compares the virtualization performance values that can be achieved with the processors reviewed here.



The relatively large performance differences between the processors can be explained by their features. The values scale on the basis of the number of cores, the size of the L3 cache and the CPU clock frequency and as a result of the features of Hyper-Threading and turbo mode, which are available in most processor types. Furthermore, the data transfer rate between processors (“UPI Speed”) also determines performance.

Within a group of processors with the same number of cores scaling can be seen via the CPU clock frequency.

A low performance can be seen in the Xeon Bronze 3204 processor, as they have to manage without Hyper-Threading (HT) and turbo mode (TM). In principle, these weakest processors are only to a limited extent suitable for the virtualization environment.

As a matter of principle, the memory access speed also influences performance. A guideline in the virtualization environment for selecting main memory is that sufficient quantity is more important than the speed of the memory accesses. The vServCon scaling measurements presented here were all performed with a memory access speed – depending on the processor type – of at most 2933 MHz.


Literature


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<http://primergy.com/>

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