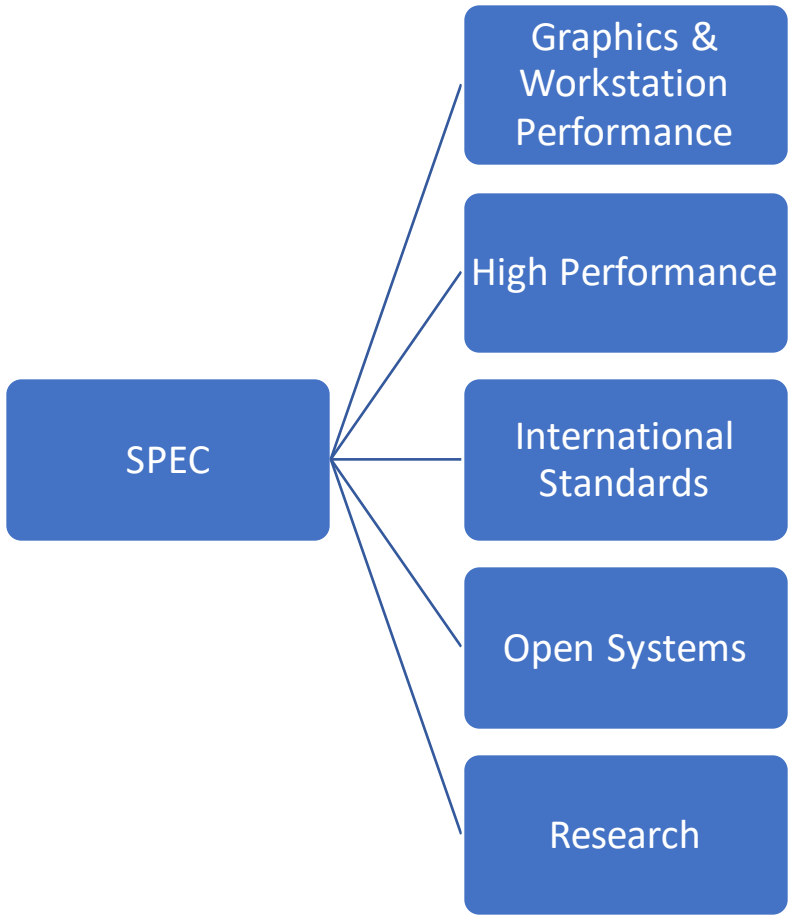
SPEC

Standard Performance Evaluation Corporation

Who is SPEC?



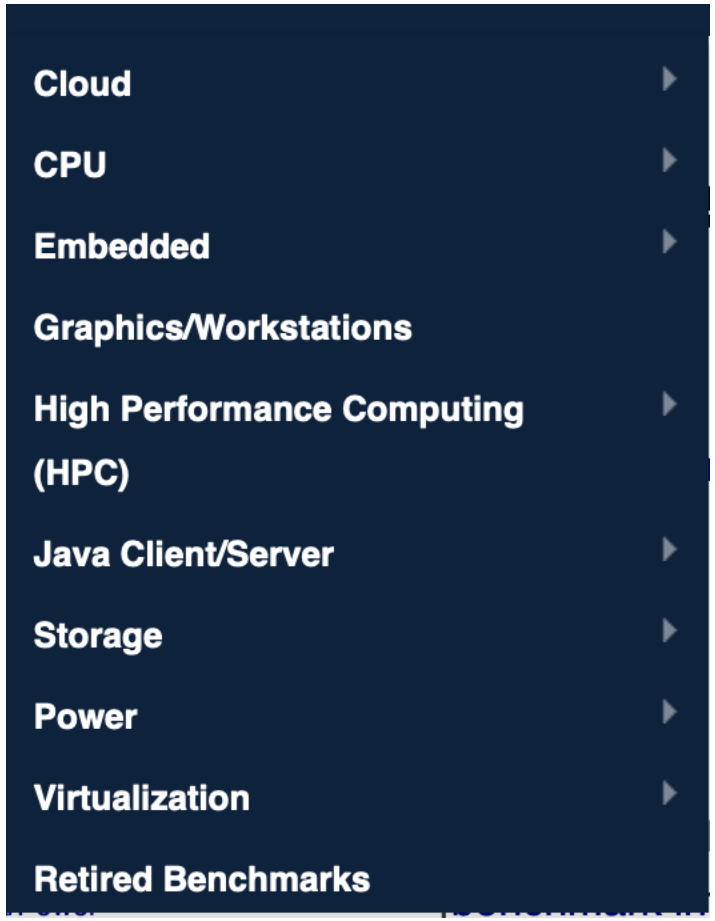
Members

- AMD
- Apple
- Cisco
- Dell
- Fujitsu
- HPE
- IBM
- Intel
- Lenovo
- Microsoft
- NVIDIA
- Supermicro
- Quanta
- nd more

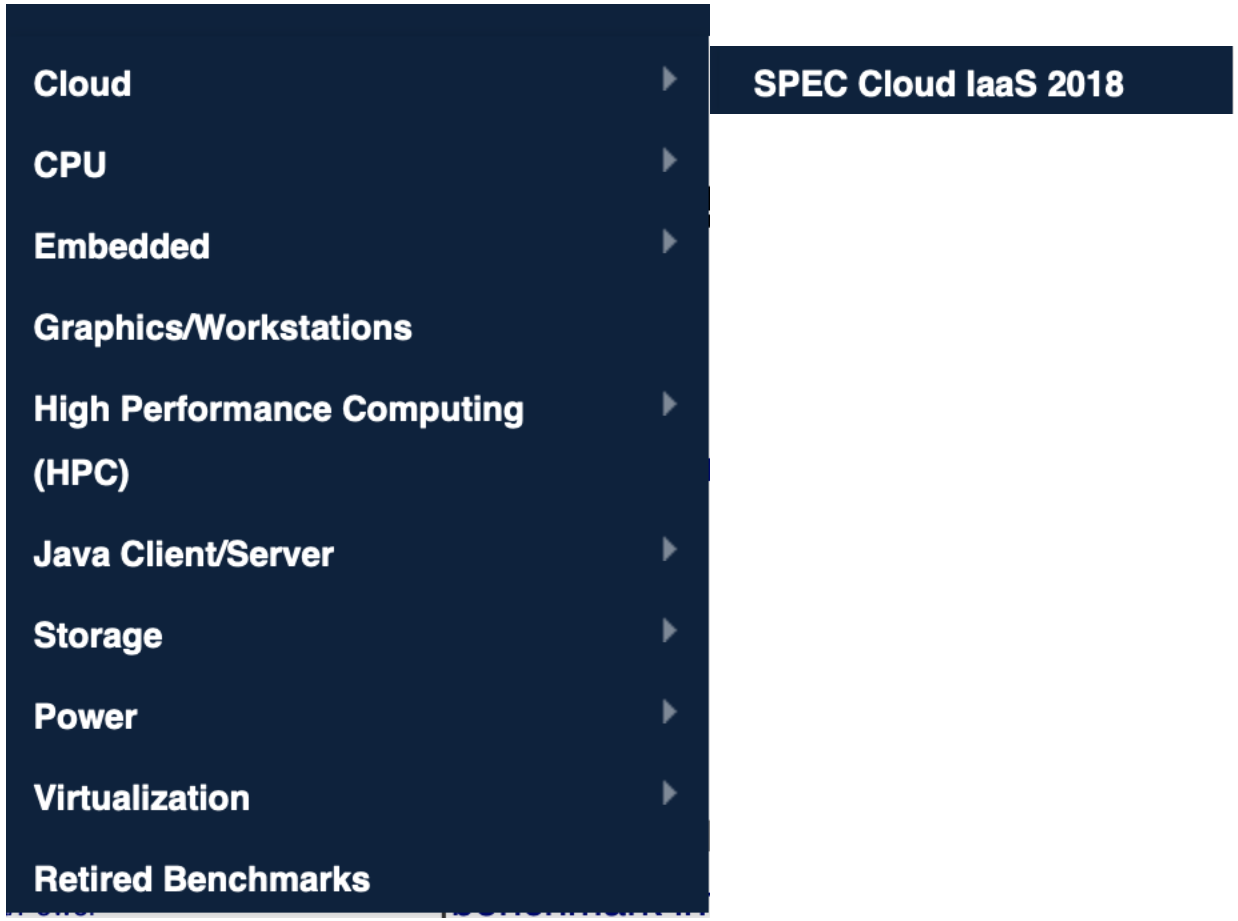
Associates

- ANL
- LBNL
- MIT
- Ohio State
- Purdue
- U Cal Berkeley
- More US institutions
- European institutions
- Asia/Pacific inst.

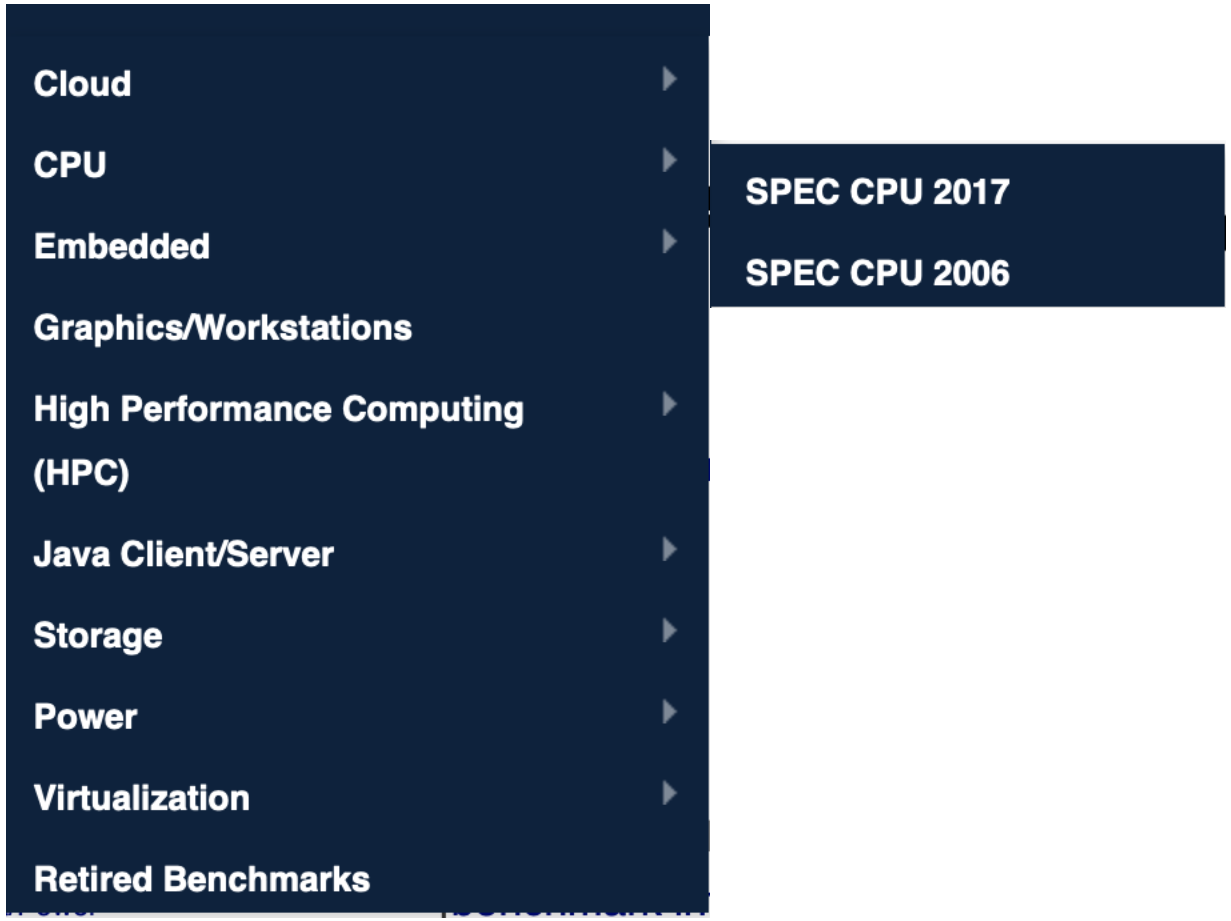
SPEC Benchmarks



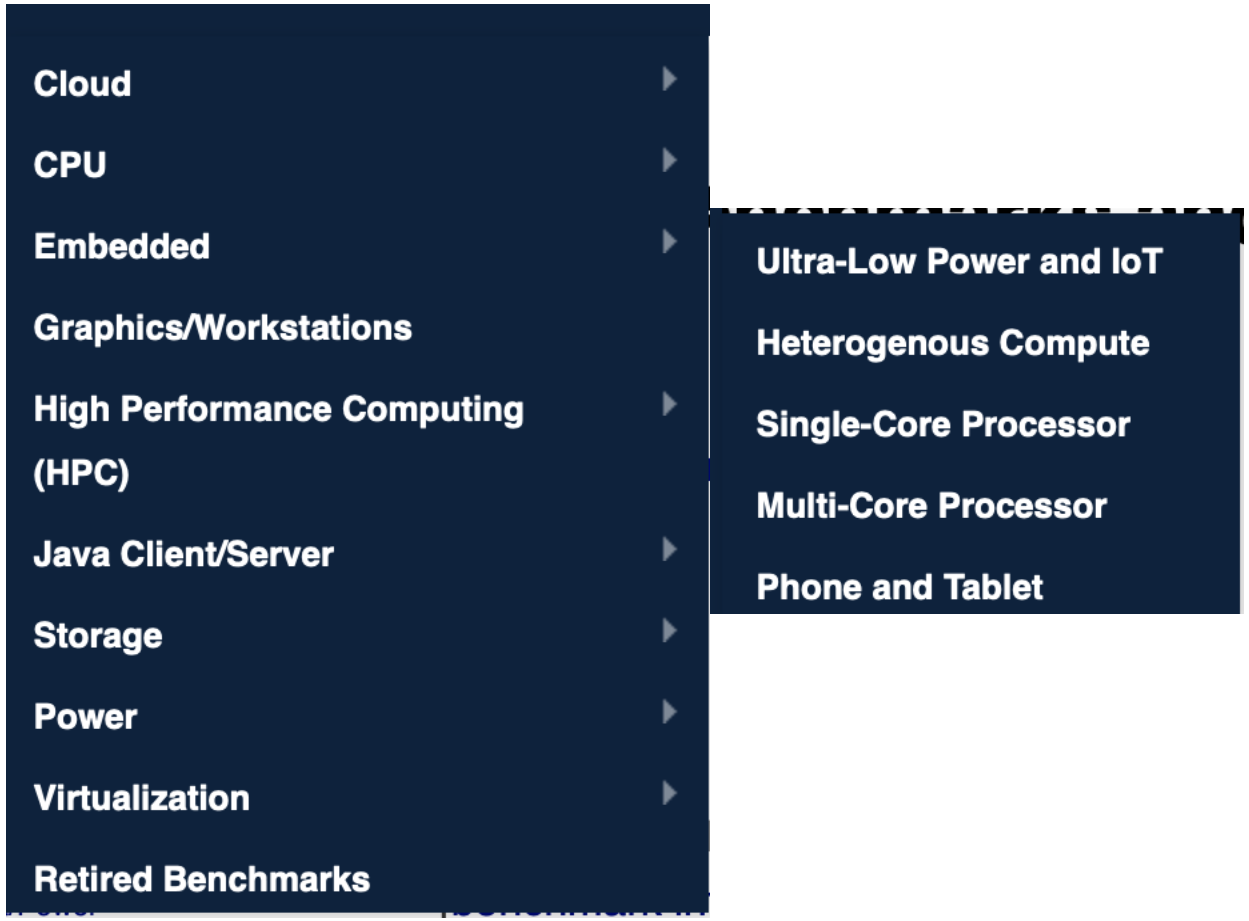
SPEC Benchmarks



SPEC Benchmarks

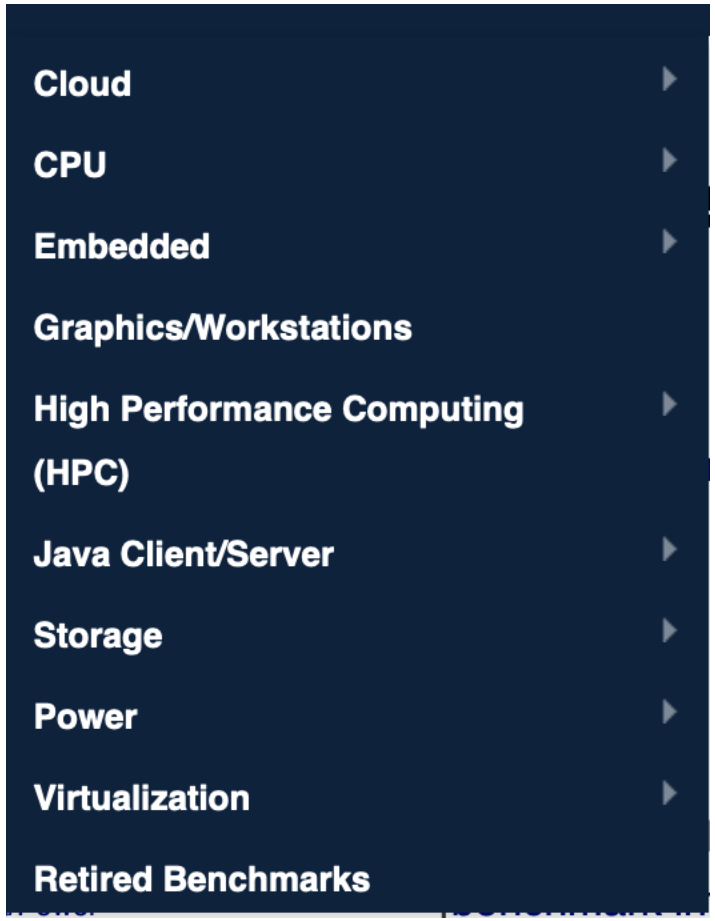


SPEC Benchmarks



SPEC Benchmarks

SPEC Benchmarks



Etc.

SPEC CPU 2017

Q6. What does SPEC CPU 2017 measure?

SPEC CPU 2017 focuses on compute intensive performance, which means these benchmarks emphasize the performance of:

- **Processor** - The CPU chip(s).
- **Memory** - The memory hierarchy, including caches and main memory.
- **Compilers** - C, C++, and Fortran compilers, including optimizers.

SPEC CPU 2017 intentionally depends on all three of the above - not just the processor.

SPEC CPU 2017 is not intended to stress other computer components such as networking, graphics, Java libraries, or the I/O system. Note that there are other SPEC benchmarks that focus on those areas.

SPEC CPU — Integer

SPECrate®2017 Integer	SPECspeed®2017 Integer	Language [1]	KLOC [2]	Application Area
500.perlbench_r	600.perlbench_s	C	362	Perl interpreter
502.gcc_r	602.gcc_s	C	1,304	GNU C compiler
505.mcf_r	605.mcf_s	C	3	Route planning
520.omnetpp_r	620.omnetpp_s	C++	134	Discrete Event simulation - computer network
523.xalancbmk_r	623.xalancbmk_s	C++	520	XML to HTML conversion via XSLT
525.x264_r	625.x264_s	C	96	Video compression
531.deepsjeng_r	631.deepsjeng_s	C++	10	Artificial Intelligence: alpha-beta tree search (Chess)
541.leela_r	641.leela_s	C++	21	Artificial Intelligence: Monte Carlo tree search (Go)
548.exchange2_r	648.exchange2_s	Fortran	1	Artificial Intelligence: recursive solution generator (Sudoku)
557.xz_r	657.xz_s	C	33	General data compression

SPEC CPU — FP

SPECrate®2017 Floating Point	SPECspeed®2017 Floating Point	Language [1]	KLOC [2]	Application Area
503.bwaves_r	603.bwaves_s	Fortran	1	Explosion modeling
507.cactuBSSN_r	607.cactuBSSN_s	C++, C, Fortran	257	Physics: relativity
508.namd_r		C++	8	Molecular dynamics
510.parest_r		C++	427	Biomedical imaging: optical tomography with finite elements
511.povray_r		C++, C	170	Ray tracing
519.lbm_r	619.lbm_s	C	1	Fluid dynamics
521.wrf_r	621.wrf_s	Fortran, C	991	Weather forecasting
526.blender_r		C++, C	1,577	3D rendering and animation
527.cam4_r	627.cam4_s	Fortran, C	407	Atmosphere modeling
	628.pop2_s	Fortran, C	338	Wide-scale ocean modeling (climate level)
538.imagick_r	638.imagick_s	C	259	Image manipulation
544.nab_r	644.nab_s	C	24	Molecular dynamics
549.fotonik3d_r	649.fotonik3d_s	Fortran	14	Computational Electromagnetics
554.roms_r	654.roms_s	Fortran	210	Regional ocean modeling

[1] For multi-language benchmarks, the first one listed determines library and link options (details)

[2] KLOC = line count (including comments/whitespace) for source files used in a build / 1000

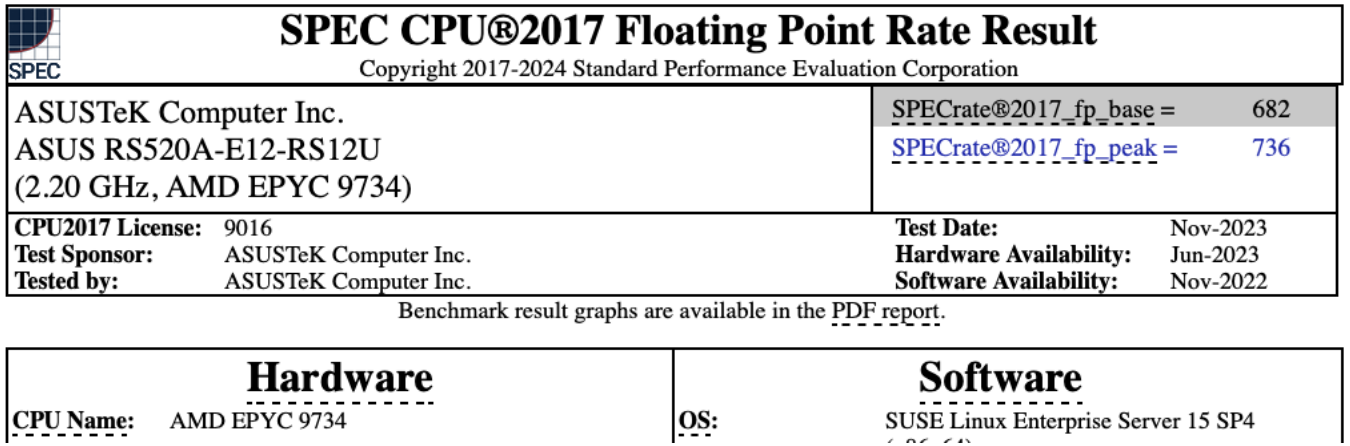
Library of Results

CPU2017 Floating Point Rates (77):

[Search in CPU2017 Floating Point Rates results]

Test Sponsor	System Name	Base Copies	Processor			Results		Energy	
			Enabled Cores	Enabled Chips	Threads/ Core	Base	Peak	Base	Peak
ASUSTeK Computer Inc.	ASUS RS520A-E12-RS12U (2.20 GHz, AMD EPYC 9734) HTML | CSV | Text | PDF | PS | Config	112	112	1	2	682	736	--	--
ASUSTeK Computer Inc.	ASUS RS520A-E12-RS12U (2.20 GHz, AMD EPYC 9734) HTML | CSV | Text | PDF | PS | Config	112	112	1	1	686	687	--	--
ASUSTeK Computer Inc.	ASUS RS720A-E12-RS12 (2.20 GHz, AMD EPYC 9734) HTML | CSV | Text | PDF | PS | Config	224	224	2	2	1360	1470	--	--
ASUSTeK Computer Inc.	ASUS ESC4000-E11 (2.00 GHz, Intel Xeon Platinum 8480+) HTML | CSV | Text | PDF | PS | Config	224	112	2	2	1020	1080	--	--
ASUSTeK Computer Inc.	ASUS ESC4000-E11 (1.90 GHz, Intel Xeon Platinum 8490H) HTML | CSV | Text | PDF | PS | Config	240	120	2	2	1040	1100	--	--
ASUSTeK Computer Inc.	ASUS ESC4000-E11 (2.00 GHz, Intel Xeon Gold 6438N) HTML | CSV | Text | PDF | PS | Config	128	64	2	2	697	723	--	--
ASUSTeK Computer Inc.	ASUS ESC4000-E11 (2.00 GHz, Intel Xeon Platinum 8470) HTML | CSV | Text | PDF | PS | Config	208	104	2	2	987	1050	--	--
ASUSTeK Computer Inc.	ASUS ESC4000-E11 (3.60 GHz, Intel Xeon Gold 6444Y) HTML | CSV | Text | PDF | PS | Config	64	32	2	2	559	570	--	--
Dell Inc.	PowerEdge MX760c (Intel Xeon Platinum 8580) HTML | CSV | Text | PDF | PS | Config	240	120	2	2	1120	1160	--	--
Dell Inc.	PowerEdge R960 (Intel Xeon Gold 6416H) HTML | CSV | Text | PDF | PS | Config	144	72	4	2	907	929	--	--
Dell Inc.	PowerEdge C6620 (Intel Xeon Platinum 8558U) HTML | CSV | Text | PDF | PS | Config	96	48	1	2	488	506	--	--
Dell Inc.	PowerEdge MX760c (Intel Xeon Gold 6548Y+) HTML | CSV | Text | PDF | PS | Config	128	64	2	2	766	795	--	--
Dell Inc.	PowerEdge C6620 (Intel Xeon Gold 5512U) HTML | CSV | Text | PDF | PS | Config	56	28	1	2	328	338	--	--
Test Sponsor	**System Name**	**Base Copies**	**Processor**			**Results**		**Energy**	
			Enabled Cores	**Enabled Chips**	**Threads/ Core**	**Base**	**Peak**	**Base**	**Peak**
Dell Inc.	PowerEdge MX760c (Intel Xeon Gold 6534) HTML | CSV | Text | PDF | PS | Config	32	16	2	2	297	302	--	--
Dell Inc.	PowerEdge R960 (Intel Xeon Gold 6416H) HTML | CSV | Text | PDF | PS | Config	144	72	4	2	907	927	--	--
Dell Inc.	PowerEdge C6620 (Intel Xeon Platinum 8592+) HTML | CSV | Text | PDF | PS | Config	256	128	2	2	1120	1170	--	--
Dell Inc.	PowerEdge C6620 (Intel Xeon Platinum 8568Y+) HTML | CSV | Text | PDF | PS | Config	192	96	2	2	1070	1100	--	--
Dell Inc.	PowerEdge C6620 (Intel Xeon Platinum 8580) HTML | CSV | Text | PDF | PS | Config	240	120	2	2	1110	1160	--	--
Dell Inc.	PowerEdge C6620 (Intel Xeon Platinum 8562Y+) HTML | CSV | Text | PDF | PS | Config	128	64	2	2	811	845	--	--
Dell Inc.	PowerEdge C6620 (Intel Xeon Gold 6542Y) HTML | CSV | Text | PDF | PS | Config	96	48	2	2	679	701	--	--
Dell Inc.	PowerEdge C6620 (Intel Xeon Gold 6548Y+) HTML | CSV | Text | PDF | PS | Config	128	64	2	2	768	797	--	--
Dell Inc.	PowerEdge C6620 (Intel Xeon Gold 6534) HTML | CSV | Text | PDF | PS | Config	32	16	2	2	298	302	--	--
Dell Inc.	PowerEdge C6620 (Intel Xeon Gold 6526Y) HTML | CSV | Text | PDF | PS | Config	64	32	2	2	486	498	--	--
Dell Inc.	PowerEdge MX760c (Intel Xeon Silver 4514Y)	64	32	2	2	390	399		

What Results Look Like



SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2024 Standard Performance Evaluation Corporation

ASUSTeK Computer Inc. ASUS RS520A-E12-RS12U (2.20 GHz, AMD EPYC 9734)		SPECrate®2017_fp_base =	682
		SPECrate®2017_fp_peak =	736
CPU2017 License:	9016	**Test Date:**	Nov-2023
Test Sponsor:	ASUSTeK Computer Inc.	**Hardware Availability:**	Jun-2023
Tested by:	ASUSTeK Computer Inc.	**Software Availability:**	Nov-2022

Benchmark result graphs are available in the PDF report.

Hardware		**Software**	
CPU Name:	AMD EPYC 9734	**OS:**	SUSE Linux Enterprise Server 15 SP4

How To Run

```
host:SPEC2017 user$ source shrc
host:SPEC2017 user$ runcpu --nobuild --define default-platform-flags
 --copies 96 -c <config_file.cfg> --define cores 96 --tune base --de
fine drop-caches intrate
```

How Long Does It Take

Q11: How long does it take to run? Does CPU 2017 take longer than CPU 2006?

Run time depends on the system, suite, compiler, tuning, and how many copies or threads are chosen. One example system is shown below; your times will differ.

Example run times - simple options chosen

Metric	Config Tested	Individual Benchmarks	Full Run (Reportable)
SPECrate 2017 Integer	1 copy	6 to 10 minutes	2.5 hours
SPECrate 2017 Floating Point	1 copy	5 to 36 minutes	4.8 hours
SPECspeed 2017 Integer	4 threads	6 to 15 minutes	3.1 hours
SPECspeed 2017 Floating Point	16 threads	6 to 75 minutes	4.7 hours

One arbitrary example using a year 2016 system. Your system will differ.
2 iterations chosen, base only, no peak. Does not include compile time.

Value Proposition

Q7.Should I use CPU 2017? Why or why not?

SPEC CPU 2017 provides a comparative measure of integer and/or floating point compute intensive performance. If this matches with the type of workloads you are interested in, SPEC CPU 2017 provides a good reference point.

Other advantages to using SPEC CPU 2017 include:

- Most of the benchmark programs are drawn from actual end-user applications, as opposed to being synthetic benchmarks.
- Multiple vendors use the suite and support it.
- SPEC CPU 2017 is highly portable.
- Results are available at https://www.spec.org/cpu2017/results
- The benchmarks are required to be run and reported according to a set of rules to ensure comparability and repeatability.

Limitations of SPEC CPU 2017: As described above, the ideal benchmark for vendor or product selection would be your own workload on your own application. Please bear in mind that no standardized benchmark can provide a perfect model of the realities of your particular system and user community.

How To Obtain: $1000 = ISO

Q8. What does SPEC provide?

SPEC CPU 2017 is distributed as an ISO image that contains:

- Source code for the benchmarks
- Data sets
- A tool set for compiling, running, validating and reporting on the benchmarks
- Pre-compiled tools for a variety of operating systems
- Source code for the SPEC CPU 2017 tools, for systems not covered by the pre-compiled tools
- Documentation
- Run and reporting rules

The documentation is also available at www.spec.org/cpu2017/Docs/index.html , including the Unix and Windows installation guides.