



SPEC CPU®2017 Integer Speed Result

Copyright 2017-2023 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL325 Gen11

(3.10 GHz, AMD EPYC 9554P)

SPECspeed®2017_int_base =

SPECspeed®2017_int_peak =

CPU2017 License: 3

Test Sponsor: HPE

Tested by: HPE

Test Date: Dec-2022

Hardware Availability: Dec-2022

Software Availability: Nov-2022

SPEC has determined that this result does not comply with the SPEC CPU 2017 run and reporting rules. Specifically, the test sponsor notified SPEC that the results were measured on an unsupported configuration.

Threads

600.perlbench_s

602.gcc_s

605.mcf_s

620.omnetpp_s

623.xalanbmk_s

625.x264_s

631.deepsjeng_s

641.leela_s

648.exchange2_s

657.xz_s

Non-Compliant

Hardware

CPU Name: AMD EPYC 9554P

Nominal: 3100

Enabled: 64 cores, 1 chip

Orderable: 1 chip

Cache L1: 32 KB I + 32 KB D on chip per core

L2: 1 MB I+D on chip per core

L3: 256 MB I+D on chip per chip,

32 MB shared / 8 cores

Other: None

Memory: 768 GB (12 x 64 GB 2Rx4 PC5-4800B-R)

Storage: 1 x 480 GB SATA SSD

Other: None

Software

OS:

Red Hat Enterprise Linux 9.0 (Plow)

Kernel 5.14.0-70.13.1.el9_0.x86_64

Compiler:

C/C++/Fortran: Version 4.0.0 of AOCC

Parallel:

Yes

Firmware:

HPE BIOS Version v1.12 11/24/2022 released

Nov-2022

File System:

xfs

System State:

Run level 3 (multi-user)

Base Pointers:

64-bit

Peak Pointers:

64-bit

Other:

None

Power Management: BIOS and OS set to prefer performance at the cost of additional power usage



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Results Table

Benchmark	Base								Peak							
	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio		
600.perlbench_s	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	
602.gcc_s	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	
605.mcf_s	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	
620.omnetpp_s	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	
623.xalancbmk_s	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	
625.x264_s	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	
631.deepsjeng_s	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	
641.leela_s	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	
648.exchange2_s	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	
657.xz_s	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	

SPECspeed®2017_int_base =

SPECspeed®2017_int_peak =

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

Compiler Notes

The AMD64 AOCC Compiler Suite is available at <http://developer.amd.com/amd-aoacc/>

Submit Notes

The config file option 'submit' was used.
The option 'bind' was used to bind copies to the cores.
See the configuration file for details.

Operating System Notes

'ulimit -s unlimited' was used to set environment stack size limit
'ulimit -l 2097152' was used to set environment locked pages in memory limit

runcpu command invoked through numactl i.e.:
numactl --interleave=all runcpu <etc>

To limit dirty cache to 8% of memory, 'sysctl -w vm.dirty_ratio=8' run as root.
To limit swap usage to minimum necessary, 'sysctl -w vm.swappiness=1' run as root.
To free node-local memory and avoid remote memory usage,
'sysctl -w vm.zone_reclaim_mode=1' run as root.
To clear filesystem caches, 'sync; sysctl -w vm.drop_caches=3' run as root.

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Operating System Notes (Continued)

To disable address space layout randomization (ASLR) to reduce run-to-run variability, 'sysctl -w kernel.randomize_va_space=0' run as root.

To enable Transparent Hugepages (THP) for all allocations, 'echo always > /sys/kernel/mm/transparent_hugepage/enabled' and 'echo always > /sys/kernel/mm/transparent_hugepage/defrag' run as root.

Environment Variables Notes

Environment variables set by runcpu before the start of the run:

```
GOMP_CPU_AFFINITY = "0-63"
LD_LIBRARY_PATH = "/home/cpu2017/int_speed_aocc00_genoa_B_lib/lib:"
LIBOMP_NUM_HIDDEN_HELPER_THREADS = "0"
MALLOC_CONF = "oversize_threshold:0,main:true"
OMP_DYNAMIC = "false"
OMP_SCHEDULE = "static"
OMP_STACKSIZE = "128M"
OMP_THREAD_LIMIT = "64"
```

Environment variables set by runcpu during the 605.mcf_s peak run:

```
GOMP_CPU_AFFINITY = "
```

Environment variables set by runcpu during the 623.xalancbmk_s peak run:

```
GOMP_CPU_AFFINITY = "0-63"
```

Environment variables set by runcpu during the 657.xz_s peak run:

```
GOMP_CPU_AFFINITY = "0-63"
LIBOMP_NUM_HIDDEN_HELPER_THREADS = "8"
```

General Notes

Binaries were compiled on a system with 2x AMD EPYC 9174F CPU + 1.5TiB Memory using RHEL 8.6

NA: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown) is mitigated in the system as tested and documented.

Yes: The test sponsor attests, as of date of publication, that CVE-2017-5753 (Spectre variant 1) is mitigated in the system as tested and documented.

Yes: The test sponsor attests, as of date of publication, that CVE-2017-5715 (Spectre variant 2) is mitigated in the system as tested and documented.

Platform Notes

BIOS Configuration

Workload Profile set to General Peak Frequency Compute

(Continued on next page)



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Platform Notes (Continued)

Determinism Control set to Manual

Performance Determinism set to Power Deterministic

AMD SMT Option set to Disabled

NUMA memory domains per socket set to Four memory domains per socket

Last-Level Cache (LLC) as NUMA Node set to Enabled

ACPI CST C2 Latency set to 18 microseconds

Memory PStates set to Disabled

Thermal Configuration set to Maximum Cooling

The system ROM used for this result contains microcode version 0x0A10110e for the AMD EPYC 9nn4X family of processors. The reference code/AGESA version used in this ROM is version GenoaPI 1.0.0.1-L

Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61e015b55891ef0116acafc64d
running on localhost.localdomain Dec 8 14:31:58 2022

SUT (System Under Test) info as seen by some common utilities.

For more information on this section, see

<https://www.spec.org/cpu2017/docs/config.html#sysinfo>

From /proc/cpuinfo

model name : AMD EPYC 9554P 64-Core Processor

1 "physical id" (chips)

64 "processors"

cores, siblings) counting these is hw and system dependent. The following excerpts from /proc/cpuinfo might not be reliable. Use with caution.)

cpu cores : 64

siblings : 64

physical id cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52

53 54 55 56 57 58 59 60 61 62 63

cat /etc/os-release

```
NAME="Ubuntu"
VERSION="22.04 LTS (Jammy Jellyfish)"
ID=ubuntu
ID_LIKE=debian
PRETTY_NAME="Ubuntu 22.04 LTS"
VERSION_ID="22.04"
HOME_URL="https://www.ubuntu.com/"
SUPPORT_URL="https://help.ubuntu.com/"
BUG_REPORT_URL="https://bugs.launchpad.net/ubuntu/"
PRIVACY_POLICY_URL="https://www.ubuntu.com/privacy-policy"
DEB_HOST_ARCH="amd64"
DEB_HOST_ARCH_BITS="64"
DEB_HOST_ARCH_CPE="cpe:2.3:ubuntu:ubuntu:22.04:amd64"
DEB_HOST_ARCH_CPU_OPTIONS=""
DEB_HOST_ARCH_FPU=""
DEB_HOST_ARCH_IDENTIFIER=""
DEB_HOST_ARCH_VARIANT=""
DEB_HOST_ARCH_VARIANT_CPU=""
DEB_HOST_ARCH_VARIANT_FPU=""
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
address sizes: 52 bits physical, 57 bits virtual
Byte Order: Little Endian
CPU(s): 64
On-line CPU(s) list: 0-63
Vendor ID: AuthenticAMD
BIOS Vendor ID: Advanced Micro Devices, Inc.
Model name: AMD EPYC 9554P 64-Core Processor
BIOS Model name: AMD EPYC 9554P 64-Core Processor
CPU family: 25
Model: 17
Thread(s) per core: 1
Core(s) per socket: 64
Socket(s): 1
Stepping: 1
BogoMIPS: 6190.61
```

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Platform Notes (Continued)

Flags: fpu vme de pse tsc mmx fxsr sse2 mtrr pae mce cx8 apic sep mtrr pge mca cmov pat pse36 clflush mmx fxsr sse2 nt syscall nx mmxext fxsr_opt pdpe1gb rdtscp lm constant_tsc rep_good nopl npt stop_tsc ncid extd_apicid aperfmperf rapl pni pclmulqdq monitor ssse3 fma4 amd64 smm sse4_1 sse4_2 x2apic movbe popcnt aes xsave avx f16c rdrand lahf_lm cmp_legacy svm extapic cr8_legacy abm sse4a misalignsse 3dnowprefetch osvw ibs skinit wdt tce topoext perfctr_core perfctr_nb bpext perfctr_llc mwaitx cpb cat_l3 cdp_l3 invpcid_single hw_pstate ssbd mba ibrs ibpb stibp vmmcall fsgsbase bmi1 avx2 smep bmi2 rtmx invpcid cqm rdt_a avx512f avx512dq rdseed adx smap avx512vbmi clflushopt clwb avx512cd sha_ni avx512bw avx512vl xsaveopt xsavec xgetbv1 xsaves tce_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local avx512_bf16 cqm_occup_llc irperf xsave_rptr rdpru wbnoinvd amd_ppin arat npt lbrv svm_lock nrip_save tss_scale vmcb_clean flushbyasid decodeassists pausefilter pfthreshold avic v_vmsave_oload vgif v_spec_ctrl avx512vbmi umip pku ospke avx512_vbmi2 gfni vaes vpccomuldq avx512_vnni avx512_bitalg avx512_vpopcntdq la57 rdpid overflow_recov succor_bca fsrm flush_l1d

Virtualization: AMD-V

L1d cache: (64 instances)
 L1i cache: 2 MiB (64 instances)
 L2 cache: 64 MiB (64 instances)
 L3 cache: 256 MiB (8 instances)
 NUMA node(s): 8
 NUMA node0 CPU(s): 0-7
 NUMA node1 CPU(s): 32-39
 NUMA node2 CPU(s): 16-23
 NUMA node3 CPU(s): 48-55
 NUMA node4 CPU(s): 24-31
 NUMA node5 CPU(s): 56-63
 NUMA node6 CPU(s): 8-15
 NUMA node7 CPU(s): 40-47

Vulnerability Itlb_multihit: Not affected
 Vulnerability L1d: Not affected
 Vulnerability Mds: Not affected
 Vulnerability Meltdown: Not affected
 Vulnerability Spec store bypass: Mitigation; Speculative Store Bypass disabled via prctl
 Vulnerability Spectre v1: Mitigation; usercopy/swaps barriers and __user pointer sanitization
 Vulnerability Spectre v2: Mitigation; Retpolines, IBPB conditional, IBRS_FW, STIBP disabled, RSB filling
 Vulnerability Srbds: Not affected
 Vulnerability Tsx async abort: Not affected

From lscpu --cache:

NAME	ONE-SIZE	ALL-SIZE	WAYS	TYPE	LEVEL	SETS	PHY-LINE	COHERENCY-SIZE
L1d	32K	2M	8	Data	1	64	1	64
L1i	32K	2M	8	Instruction	1	64	1	64
L2	1M	64M	8	Unified	2	2048	1	64
L3	32M	256M	16	Unified	3	32768	1	64

/proc/cpuinfo cache data
cache size : 1024 KB

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Platform Notes (Continued)

```

From numactl --hardware
WARNING: a numactl 'node' might or might not correspond to a physical chip.
available: 8 nodes (0-7)
node 0 cpus: 0 1 2 3 4 5 6 7
node 0 size: 96519 MB
node 0 free: 95929 MB
node 1 cpus: 32 33 34 35 36 37 38 39
node 1 size: 96766 MB
node 1 free: 96408 MB
node 2 cpus: 16 17 18 19 20 21 22 23
node 2 size: 96766 MB
node 2 free: 96525 MB
node 3 cpus: 48 49 50 51 52 53 54 55
node 3 size: 96766 MB
node 3 free: 96518 MB
node 4 cpus: 24 25 26 27 28 29 30
node 4 size: 96766 MB
node 4 free: 96572 MB
node 5 cpus: 56 57 58 59 60 61 62 63
node 5 size: 96729 MB
node 5 free: 96519 MB
node 6 cpus: 8 9 10 11 12 13 14 15
node 6 size: 96766 MB
node 6 free: 96575 MB
node 7 cpus: 40 41 42 43 44 45 46 47
node 7 size: 96717 MB
node 7 free: 96500 MB
node distances:
node 0 1 2 3 4 5 6 7
0: 1 11 12 12 12 12 12 12
1: 11 10 12 12 12 12 12 12
2: 12 11 10 11 12 12 12 12
3: 12 11 10 12 12 12 12 12
4: 12 12 12 12 10 11 12 12
5: 12 12 12 12 11 10 12 12
6: 12 12 12 12 12 12 10 11
7: 12 12 12 12 12 12 11 10

```

```

From /proc/meminfo
MemTotal: 792369040 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

```

```

/sbin/tuned-adm active
Current active profile: throughput-performance

```

```

From /etc/*release* /etc/*version*
os-release:
NAME="Red Hat Enterprise Linux"
VERSION="9.0 (Plow)"

```

(Continued on next page)



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Platform Notes (Continued)

```
ID="rhel"
ID_LIKE="fedora"
VERSION_ID="9.0"
PLATFORM_ID="platform:el9"
PRETTY_NAME="Red Hat Enterprise Linux 9.0 (Plow)"
ANSI_COLOR="0;31"
```

```
redhat-release: Red Hat Enterprise Linux release 9.0 (Plow)
system-release: Red Hat Enterprise Linux release 9.0 (Plow)
system-release-cpe: cpe:/o:redhat:enterprise_linux:::baseos
```

uname -a:

```
Linux localhost.localdomain 4.14.0-70.13.1.el9_0.x86_64 #1 SMP PREEMPT Thu Apr 14
12:42:38 EDT 2022 x86_64 x86_64 x86_64 GNU/Linux
```

Kernel self-reported vulnerability status:

```
CVE-2018-12207 (iTLB Multihit): Not affected
CVE-2018-3620 (L1 Terminal Fault): Not affected
Microarchitectural Data Sampling: Not affected
CVE-2017-5754 (Meltdown): Not affected
CVE-2018-3639 (Speculative Store Bypass): Mitigation: Speculative Store
Bypass disabled via prctl
CVE-2017-5753 (Spectre variant 1): Mitigation: usercopy/swpgs
barriers and __user pointer
sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: Retpolines, IBPB:
conditional, IBRS_FW, STIBP:
disabled, RSB filling
CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
CVE-2017-11135 (SAX Asynchronous Abort): Not affected
```

run-level 3 Dec 8 14:30

df -h /home/cpu2017

```
Filesystem Type Size Used Avail Use% Mounted on
/dev/mapper/rhel-home xfs 372G 17G 356G 5% /home
```

From /sys/devices/virtual/dmi/id

```
Vendor: HPE
Product: ProLiant DL325 Gen11
Product Family: ProLiant
Serial: DL325GEN11-002
```

Additional information from dmidecode 3.3 follows. WARNING: Use caution when you interpret this section. The 'dmidecode' program reads system data which is "intended to allow hardware to be accurately determined", but the intent may not be met, as there are frequent changes to hardware, firmware, and the "DMTF SMBIOS" standard.

Memory:

```
12x Hynix HMC94MEBRA121N 64 GB 2 rank 4800
```

BIOS:

(Continued on next page)



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Platform Notes (Continued)

BIOS Vendor: HPE
BIOS Version: 1.12
BIOS Date: 11/24/2022
BIOS Revision: 1.12
Firmware Revision: 1.10

(End of data from sysinfo program)

Compiler Version Notes

=====
C | 600.perlbench_s(base, peak) 602.gcc_s(base, peak) 605.mcf_s(base, peak) 625.x264_s(base, peak)
| 657.xz_s(base, peak)
=====

AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin
=====

=====
C++ | 620.omnetpp_s(base, peak) 623.xalancbmk_s(base, peak) 631.deepsjeng_s(base, peak)
| 641.leela_s(base, peak)
=====

AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin
=====

=====
| 640.change2_s(base, peak)
=====

AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin
=====

Base Compiler Invocation

C benchmarks:

clang

C++ benchmarks:

clang++

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Base Compiler Invocation (Continued)

Fortran benchmarks:

flang

Base Portability Flags

```

600.perlbench_s: -DSPEC_LINUX_64 -DSPEC_LP64
602.gcc_s: -DSPEC_LP64
605.mcf_s: -DSPEC_LP64
620.omnetpp_s: -DSPEC_LP64
623.xalancbmk_s: -DSPEC_LINUX_64 -DSPEC_LP64
625.x264_s: -DSPEC_LP64
631.deepsjeng_s: -DSPEC_LP64
641.leela_s: -DSPEC_LP64
648.exchange2_s: -DSPEC_LP64
657.xz_s: -DSPEC_LP64

```

Base Optimization Flags

C benchmarks:

```

-m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-allow-multiple-definition -O3 -march=znver4 -fveclib=AMDLIBM
-ffast-math -fopenmp -flto -fstruct-layout=7
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-fremap-arrays -fstrip-mining -mllvm -reduce-array-computations=3
-DSPEC_OPENMP -zopt -fopenmp=libomp -lomp -lamdlibm -lflang
-lamdalloc

```

C++ benchmarks:

```

-m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -march=znver4
-fveclib=AMDLIBM -ffast-math -fopenmp -flto
-mllvm -unroll-threshold=100 -finline-aggressive

```

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Peak Compiler Invocation (Continued)

Fortran benchmarks:
flang

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:

600.perlbench_s: basepeak = yes

602.gcc_s: basepeak = yes

605.mcf_s: -m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,allow-multiple-definition -Ofast -march=znver4
-fveclib=AMD64 -ffast-math -fopenmp -flto
-fstruct-layout=9 -mllvm -unroll-threshold=50
-fopenmp -fstrip-mining
-mllvm -unroll-threshold=1000
-mllvm -reduce-array-computations=3 -DSPEC_OPENMP -zopt
-fopenmp=libomp -lomp -lamdlibm -lamdalloc -lflang

625.x264_s: basepeak = yes

657.xz_s: Same as 605.mcf_s

C++ benchmarks:

620.omnetpp_s: basepeak = yes

623.xalancbmk_s: -m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3

(Continued on next page)



SPEC CPU®2017 Integer Speed Results

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ProLiant DL325 Gen11

(3.10 GHz, AMD EPYC 9554P)

SPECspeed®2017_int_base =

SPECspeed®2017_int_peak =

CPU2017 License: 3

Test Sponsor: HPE

Tested by: HPE

Test Date: Dec-2022

Hardware Availability: Dec-2022

Software Availability: Nov-2022

SPEC has determined that this result does not comply with the SPEC CPU 2017 rules and reporting rules. Specifically, the test sponsor notified SPEC that the results were measured on an unsupported configuration.

Peak Optimization Flags (Continued)

623.xalancbmk_s (continued):

```
-Wl,-mllvm -Wl,-do-block-reorder=aggressive -Ofast
-march=znver4 -fveclib=AMDLIBM -ffast-math -fopenmp
-flto -finline-aggressive -mllvm -unroll-threshold=100
-mllvm -reduce-array-computations=3 -DSPEC_OPENMP -zopt
-mllvm -do-block-reorder=aggressive
-fvirtual-function-elimination -fvisibility=hidden
-fopenmp=libomp -lomp -lamdlibm -lamdlibm_text -lflang
```

631.deepsjeng_s: basepeak = yes

641.leela_s: basepeak = yes

Fortran benchmarks:

648.exchange2_s: basepeak = yes

Peak Other Flags

C benchmarks:

```
-Wno-return-type -Wno-unused-command-line-argument
```

C++ benchmarks:

```
-Wno-unused-command-line-argument
```

Fortran benchmarks:

```
-Wno-unused-command-line-argument
```

The flags files that were used to format this result can be browsed at

<http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-AMD-Genoa-rev2.1.html>

<http://www.spec.org/cpu2017/flags/aocc400-flags.html>

You can also download the XML flags sources by saving the following links:

<http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-AMD-Genoa-rev2.1.xml>

<http://www.spec.org/cpu2017/flags/aocc400-flags.xml>



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