SPEC CPU®2017 Integer Rate Result

Hewlett Packard Enterprise

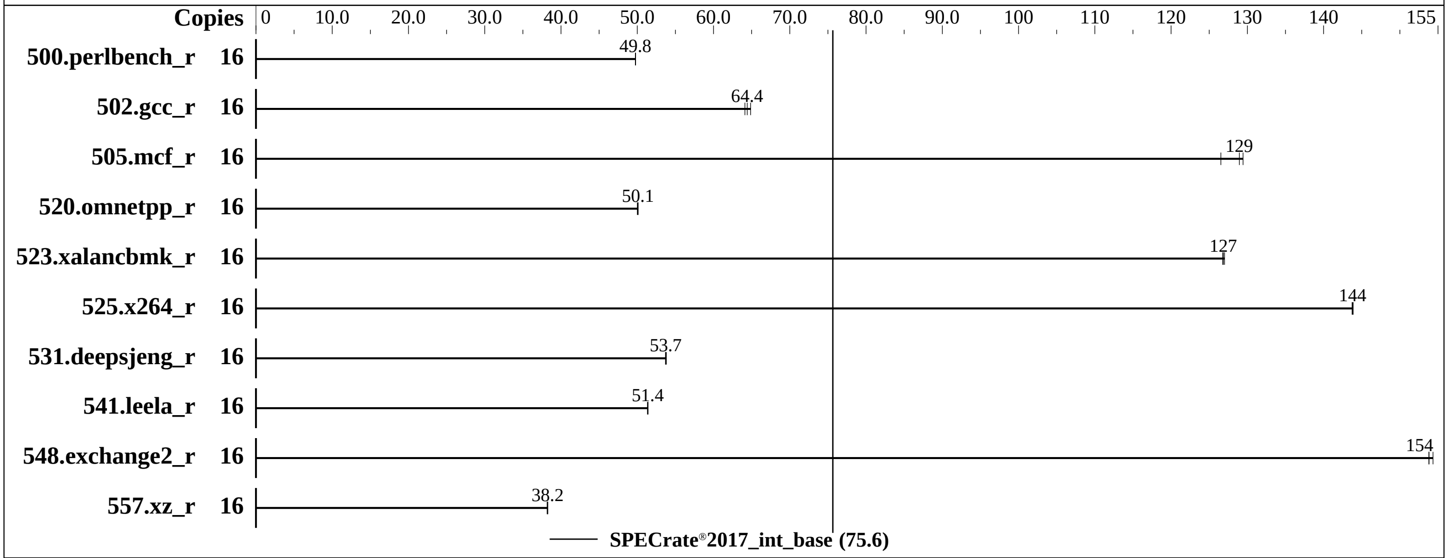
(Test Sponsor: HPE)

ProLiant DL360 Gen10 Plus
(3.20 GHz, Intel Xeon Gold 5315Y)

SPECrate®2017_int_base = 75.6

SPECrate®2017_int_peak = Not Run

CPU2017 License:	3	**Test Date:**	Nov-2022
Test Sponsor:	HPE	**Hardware Availability:**	Sep-2022
Tested by:	HPE	**Software Availability:**	May-2022



Hardware

CPU Name:	Intel Xeon Gold 5315Y
Max MHz:	3600
Nominal:	3200
Enabled:	8 cores, 2 chips, 2 threads/core
Orderable:	1, 2 chip(s)
Cache L1:	32 KB I + 48 KB D on chip per core
L2:	1.25 MB I+D on chip per core
L3:	12 MB I+D on chip per chip
Other:	None
Memory:	2 TB (32 x 64 GB 2Rx4 PC4-3200AA-R, running at 2933)
Storage:	2 x 960 GB SATA SSD, RAID 1
Other:	None

Software

OS:	Red Hat Enterprise Linux release 9.0 (Plow) Kernel 5.14.0-70.13.1.el9_0.x86_64
Compiler:	C/C++: Version 2022.1 of Intel oneAPI DPC++/C++ Compiler for Linux; Fortran: Version 2022.1 of Intel Fortran Compiler for Linux;
Parallel:	No
Firmware:	HPE BIOS Version U46 v1.64 08/11/2022 released Sep-2022
File System:	xfs
System State:	Run level 3 (multi-user)
Base Pointers:	64-bit
Peak Pointers:	Not Applicable
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						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
500.perlbench_r	16	512	49.8	512	49.8	**512**	**49.8**							
502.gcc_r	16	349	64.9	353	64.1	**352**	**64.4**							
505.mcf_r	16	200	129	204	127	**201**	**129**							
520.omnetpp_r	16	**419**	**50.1**	419	50.1	420	50.0							
523.xalancbmk_r	16	**133**	**127**	133	127	133	127							
525.x264_r	16	**195**	**144**	195	144	195	144							
531.deepsjeng_r	16	341	53.7	**341**	**53.7**	341	53.8							
541.leela_r	16	515	51.4	**516**	**51.4**	516	51.3							
548.exchange2_r	16	272	154	273	154	**273**	**154**							
557.xz_r	16	**452**	**38.2**	451	38.3	453	38.2							

SPECrate®2017_int_base = 75.6

SPECrate®2017_int_peak = Not Run

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

Compiler Notes

```
SPEC has ruled that the compiler used for this result was performing a compilation
that specifically improves the performance of the 523.xalancbmk_r / 623.xalancbmk_s
benchmarks using a priori knowledge of the SPEC code and dataset to perform a
transformation that has narrow applicability.

In order to encourage optimizations that have wide applicability (see rule 1.4
https://www.spec.org/cpu2017/Docs/runrules.html#rule_1.4), SPEC will no longer
publish results using this optimization.

This result is left in the SPEC results database for historical reference.
```

Submit Notes

```
The numactl mechanism was used to bind copies to processors. The config file option 'submit'
was used to generate numactl commands to bind each copy to a specific processor.
For details, please see the config file.
```

Operating System Notes

```
Stack size set to unlimited using "ulimit -s unlimited"
Transparent Huge Pages enabled by default
Prior to runcpu invocation
Filesystem page cache synced and cleared with:
sync; echo 3>       /proc/sys/vm/drop_caches
runcpu command invoked through numactl i.e.:
numactl --interleave=all runcpu <etc>
```

Environment Variables Notes

```
Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = "/home/cpu2017/lib/intel64:/home/cpu2017/lib/ia32:/home/cpu2017/je5.0.1-32"
MALLOC_CONF = "retain:true"
```

General Notes

```
 Binaries compiled on a system with 2x Intel Xeon Platinum 8280M CPU + 384GB RAM
 memory using Red Hat Enterprise Linux 8.4

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 Throughput Compute
 Intel Speed Select Technology - Performance Profile set to Config 2
 Dynamic Intel Speed Select Technology - Performance Profile set to Disabled
 Advanced Memory Protection set to Advanced ECC
 Memory Patrol Scrubbing set to Disabled
 Last Level Cache (LLC) Dead Line Allocation set to Disabled
 Intel UPI Link Enablement set to Single Link Operation
 Intel UPI Link Frequency set to Min UPI Speed
 Direct To UPI (D2K) set to Disabled
 Enhanced Processor Performance set to Enabled
 Enhanced Processor Performance Profile set to Aggressive
 XPT Remote Prefetcher set to Enabled
 Thermal Configuration set to Maximum Cooling
 Workload Profile set to Custom
   Energy Efficient Turbo set to Enabled
   Adjacent Sector Prefetch set to Disabled
   DCU Stream Prefetcher set to Disabled
   Intel UPI Link Power Management set to Enabled


 Sysinfo program /home/cpu2017/bin/sysinfo
 Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d
 running on dl360 Fri Nov 11 09:53:06 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 : Intel(R) Xeon(R) Gold 5315Y CPU @ 3.20GHz
       2  "physical id"s (chips)
       16 "processors"
    cores, siblings (Caution: counting these is hw and system dependent. The following
    excerpts from /proc/cpuinfo might not be reliable.  Use with caution.)
       cpu cores : 4
```

(Continued on next page)

Platform Notes (Continued)

```
      siblings  : 8
      physical 0: cores 2 3 5 6
      physical 1: cores 0 3 4 7

 From lscpu from util-linux 2.37.4:
     Architecture:                    x86_64
     CPU op-mode(s):                  32-bit, 64-bit
     Address sizes:                   46 bits physical, 57 bits virtual
     Byte Order:                      Little Endian
     CPU(s):                          16
     On-line CPU(s) list:             0-15
     Vendor ID:                       GenuineIntel
     BIOS Vendor ID:                  Intel(R) Corporation
     Model name:                      Intel(R) Xeon(R) Gold 5315Y CPU @ 3.20GHz
     BIOS Model name:                 Intel(R) Xeon(R) Gold 5315Y CPU @ 3.20GHz
     CPU family:                      6
     Model:                           106
     Thread(s) per core:              2
     Core(s) per socket:              4
     Socket(s):                       2
     Stepping:                        6
     CPU max MHz:                     3600.0000
     CPU min MHz:                     800.0000
     BogoMIPS:                        6800.00
     Flags:                           fpu vme de pse tsc msr pae mce cx8 apic sep mtrr
     pge mca cmov pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx
     pdpe1gb rdtscp lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology
     nonstop_tsc cpuid aperfmperf pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2
     ssse3 sdbg fma cx16 xtpr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt
     tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault
     epb cat_l3 invpcid_single ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vnmi
     flexpriority ept vpid ept_ad fsgsbase tsc_adjust bmi1 avx2 smep bmi2 erms invpcid
     cqm rdt_a avx512f avx512dq rdseed adx smap avx512ifma clflushopt clwb intel_pt
     avx512cd sha_ni avx512bw avx512vl xsaveopt xsavec xgetbv1 xsaves cqm_llc
     cqm_occup_llc cqm_mbm_total cqm_mbm_local split_lock_detect wbnoinvd dtherm ida arat
     pln pts avx512vbmi umip pku ospke avx512_vbmi2 gfni vaes vpclmulqdq avx512_vnni
     avx512_bitalg tme avx512_vpopcntdq la57 rdpid fsrm md_clear pconfig flush_l1d
     arch_capabilities
     Virtualization:                  VT-x
     L1d cache:                       384 KiB (8 instances)
     L1i cache:                       256 KiB (8 instances)
     L2 cache:                        10 MiB (8 instances)
     L3 cache:                        24 MiB (2 instances)
     NUMA node(s):                    2
     NUMA node0 CPU(s):               0-3,8-11
     NUMA node1 CPU(s):               4-7,12-15
     Vulnerability Itlb multihit:     Not affected
     Vulnerability L1tf:              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/swapgs barriers and __user
     pointer sanitization
     Vulnerability Spectre v2:        Mitigation; Enhanced IBRS, IBPB conditional, RSB
     filling
     Vulnerability Srbds:             Not affected
     Vulnerability Tsx async abort:   Not affected

 From lscpu --cache:
```

(Continued on next page)

Platform Notes (Continued)

```
     NAME ONE-SIZE ALL-SIZE WAYS TYPE        LEVEL  SETS PHY-LINE COHERENCY-SIZE
     L1d       48K     384K   12 Data            1    64        1             64
     L1i       32K     256K    8 Instruction     1    64        1             64
     L2       1.3M      10M   20 Unified         2  1024        1             64
     L3        12M      24M   12 Unified         3 16384        1             64

/proc/cpuinfo cache data
   cache size : 12288 KB

From numactl --hardware
WARNING: a numactl 'node' might or might not correspond to a physical chip.
  available: 2 nodes (0-1)
  node 0 cpus: 0 1 2 3 8 9 10 11
  node 0 size: 1031514 MB
  node 0 free: 1030708 MB
  node 1 cpus: 4 5 6 7 12 13 14 15
  node 1 size: 1031666 MB
  node 1 free: 1030972 MB
  node distances:
  node   0   1
    0:  10  20
    1:  20  10

From /proc/meminfo
   MemTotal:       2112697428 kB
   HugePages_Total:       0
   Hugepagesize:       2048 kB

/sys/devices/system/cpu/cpu*/cpufreq/scaling_governor has
   performance

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

uname -a:
   Linux dl360 5.14.0-70.13.1.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/swapgs
                                                        barriers and __user pointer
                                                        sanitization
```

(Continued on next page)

Platform Notes (Continued)

```
CVE-2017-5715 (Spectre variant 2):                      Mitigation: Enhanced IBRS, IBPB:
                                                        conditional, RSB filling
CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
CVE-2019-11135 (TSX Asynchronous Abort):                Not affected

run-level 3 Nov 11 09:44

SPEC is set to: /home/cpu2017
   Filesystem            Type  Size  Used Avail Use% Mounted on
   /dev/mapper/rhel-home xfs   819G   29G  790G   4% /home

From /sys/devices/virtual/dmi/id
    Vendor:         HPE
    Product:        ProLiant DL360 Gen10 Plus
    Product Family: ProLiant
    Serial:         CZ212308D7

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:
    32x Hynix HMAA8GR7AJR4N-XN 64 GB 2 rank 3200, configured at 2933

BIOS:
   BIOS Vendor:       HPE
   BIOS Version:      U46
   BIOS Date:         08/11/2022
   BIOS Revision:     1.64
   Firmware Revision: 2.72

(End of data from sysinfo program)
```

Compiler Version Notes

```
==============================================================================================================
C       | 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base) 525.x264_r(base) 557.xz_r(base)
--------------------------------------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2022.1.0 Build 20220316
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
--------------------------------------------------------------------------------------------------------------

==============================================================================================================
C++     | 520.omnetpp_r(base) 523.xalancbmk_r(base) 531.deepsjeng_r(base) 541.leela_r(base)
--------------------------------------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2022.1.0 Build 20220316
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
--------------------------------------------------------------------------------------------------------------

==============================================================================================================
Fortran | 548.exchange2_r(base)
--------------------------------------------------------------------------------------------------------------
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2022.1.0 Build 20220316
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
--------------------------------------------------------------------------------------------------------------
```

Base Compiler Invocation

C benchmarks:
`icx`

C++ benchmarks:
`icpx`

Fortran benchmarks:
`ifx`

Base Portability Flags

500.perlbench_r: `-DSPEC_LP64 -DSPEC_LINUX_X64`
502.gcc_r: `-DSPEC_LP64`
505.mcf_r: `-DSPEC_LP64`
520.omnetpp_r: `-DSPEC_LP64`
523.xalancbmk_r: `-DSPEC_LP64 -DSPEC_LINUX`
525.x264_r: `-DSPEC_LP64`
531.deepsjeng_r: `-DSPEC_LP64`
541.leela_r: `-DSPEC_LP64`
548.exchange2_r: `-DSPEC_LP64`
557.xz_r: `-DSPEC_LP64`

Base Optimization Flags

C benchmarks:
```
-w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-L/usr/local/intel/compiler/2022.1.0/linux/compiler/lib/intel64_lin
-lqkmalloc
```

C++ benchmarks:
```
-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-L/usr/local/intel/compiler/2022.1.0/linux/compiler/lib/intel64_lin
-lqkmalloc
```

Fortran benchmarks:
```
-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-nostandard-realloc-lhs -align array32byte -auto
-L/usr/local/intel/compiler/2022.1.0/linux/compiler/lib/intel64_lin
-lqkmalloc
```

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.1-ICX-revI.html
http://www.spec.org/cpu2017/flags/Intel-ic2022-official-linux64_revA.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.1-ICX-revI.xml
http://www.spec.org/cpu2017/flags/Intel-ic2022-official-linux64_revA.xml

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