SPEC CPU®2017 Integer Rate Result

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Hewlett Packard Enterprise

(Test Sponsor: HPE)

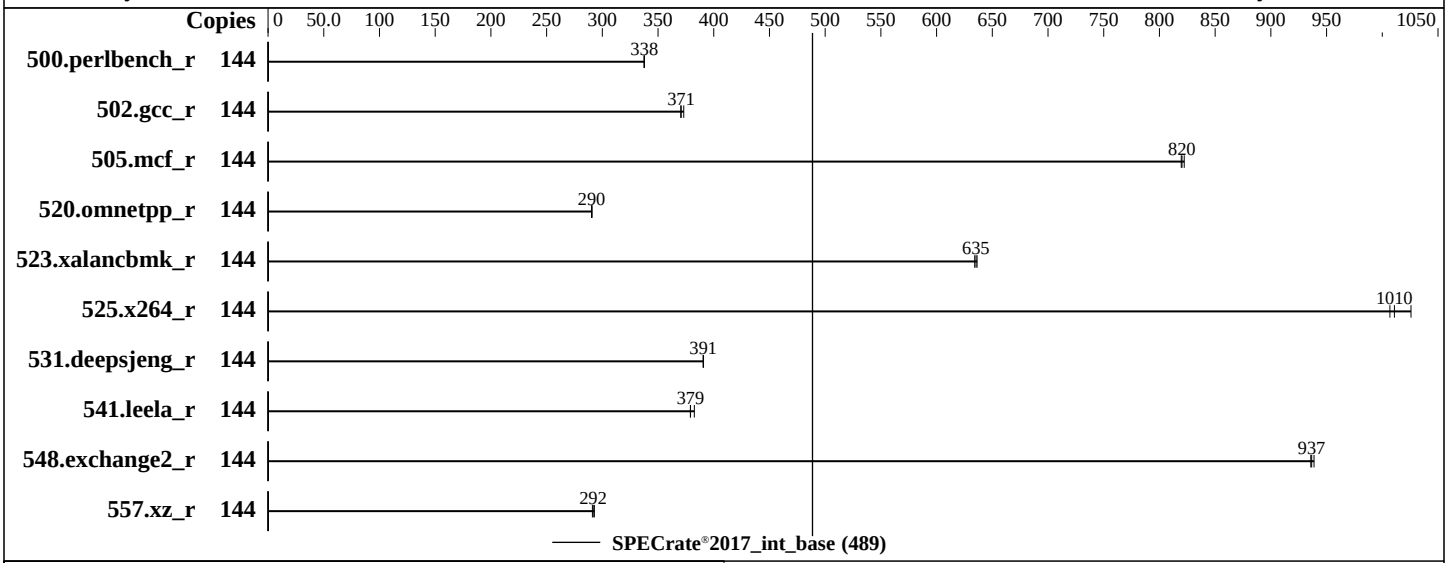
ProLiant DL560 Gen10
(2.60 GHz, Intel Xeon Gold 6240)

SPECrate®2017_int_base = 489

SPECrate®2017_int_peak = Not Run

CPU2017 License: 3
Test Sponsor: HPE
Tested by: HPE

Test Date: Jul-2021
Hardware Availability: May-2021
Software Availability: Dec-2020



Hardware

CPU Name:	Intel Xeon Gold 6240
Max MHz:	3900
Nominal:	2600
Enabled:	72 cores, 4 chips, 2 threads/core
Orderable:	1, 2, 4 chip(s)
Cache L1:	32 KB I + 32 KB D on chip per core
L2:	1 MB I+D on chip per core
L3:	24.75 MB I+D on chip per chip
Other:	None
Memory:	768 GB (24 x 32 GB 2Rx4 PC4-2933Y-R)
Storage:	1 x 800 GB SAS SSD
Other:	None

Software

OS:	SUSE Linux Enterprise Server 15 SP2 (x86_64) Kernel 5.3.18-22-default
Compiler:	C/C++: Version 2021.1 of Intel oneAPI DPC++/C++ Compiler Build 20201113 for Linux; Fortran: Version 2021.1 of Intel Fortran Compiler Classic Build 20201112 for Linux;
Parallel:	No
Firmware:	HPE BIOS Version U34 v2.50 05/24/2021 released May-2021
File System:	btrfs
System State:	Run level 3 (multi-user)
Base Pointers:	64-bit
Peak Pointers:	Not Applicable
Other:	None
Power Management:	BIOS 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	144	679	337	679	338	**679**	**338**							
502.gcc_r	144	551	370	547	373	**550**	**371**							
505.mcf_r	144	**284**	**820**	283	822	284	820							
520.omnetpp_r	144	650	291	**651**	**290**	651	290							
523.xalancbmk_r	144	239	636	240	634	**239**	**635**							
525.x264_r	144	250	1010	**249**	**1010**	246	1030							
531.deepsjeng_r	144	422	391	**422**	**391**	423	390							
541.leela_r	144	629	379	**629**	**379**	623	383							
548.exchange2_r	144	402	939	**403**	**937**	403	936							
557.xz_r	144	**533**	**292**	531	293	534	291							

SPECrate®2017_int_base = 489

SPECrate®2017_int_peak = Not Run

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

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
```

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 1x Intel Core i9-7940X CPU + 64GB RAM
memory using openSUSE Leap 15.2
```

(Continued on next page)

General Notes (Continued)

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

Submitted_by: "Bhatnagar, Prateek" <prateek.bhatnagar@hpe.com>
Submitted: Mon Aug  2 07:54:08 EDT 2021
Submission: cpu2017-20210802-28499.sub
```

Platform Notes

```
 BIOS Configuration:
 Thermal Configuration set to Maximum Cooling
 Memory Patrol Scrubbing set to Disabled
 LLC Prefetch set to Enabled
 LLC Dead Line Allocation set to Disabled
 Enhanced Processor Performance set to Enabled
 Workload Profile set to General Throughput Compute
 Workload Profile set to Custom
  Energy/Performance Bias set to Balanced Performance
  Advanced Memory Protection set to Advanced ECC

 Sysinfo program /home/cpu2017/bin/sysinfo
 Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d
 running on localhost Fri Jul 30 23:05:33 2021

 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 6240 CPU @ 2.60GHz
       4  "physical id"s (chips)
       144 "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 : 18
       siblings  : 36
       physical 0: cores 0 1 2 3 8 9 10 11 16 17 18 19 20 24 25 26 27
       physical 1: cores 0 1 2 3 8 9 10 11 16 17 18 19 20 24 25 26 27
       physical 2: cores 0 1 2 3 8 9 10 11 16 17 18 19 20 24 25 26 27
       physical 3: cores 0 1 2 3 8 9 10 11 16 17 18 19 20 24 25 26 27
```

(Continued on next page)

Platform Notes (Continued)

```
 From lscpu from util-linux 2.33.1:
      Architecture:        x86_64
      CPU op-mode(s):      32-bit, 64-bit
      Byte Order:          Little Endian
      Address sizes:       46 bits physical, 48 bits virtual
      CPU(s):              144
      On-line CPU(s) list: 0-143
      Thread(s) per core:  2
      Core(s) per socket:  18
      Socket(s):           4
      NUMA node(s):        8
      Vendor ID:           GenuineIntel
      CPU family:          6
      Model:               85
      Model name:          Intel(R) Xeon(R) Gold 6240 CPU @ 2.60GHz
      Stepping:            6
      CPU MHz:             3520.269
      BogoMIPS:            5200.00
      Virtualization:      VT-x
      L1d cache:           32K
      L1i cache:           32K
      L2 cache:            1024K
      L3 cache:            25344K
      NUMA node0 CPU(s):   0-8,72-80
      NUMA node1 CPU(s):   9-17,81-89
      NUMA node2 CPU(s):   18-26,90-98
      NUMA node3 CPU(s):   27-35,99-107
      NUMA node4 CPU(s):   36-44,108-116
      NUMA node5 CPU(s):   45-53,117-125
      NUMA node6 CPU(s):   54-62,126-134
      NUMA node7 CPU(s):   63-71,135-143
      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 cdp_l3
      invpcid_single intel_ppin ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vnmi
      flexpriority ept vpid ept_ad fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms
      invpcid rtm cqm mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt
      avx512cd avx512bw avx512vl xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc
      cqm_mbm_total cqm_mbm_local dtherm ida arat pln pts pku ospke avx512_vnni md_clear
      flush_l1d arch_capabilities

 /proc/cpuinfo cache data
    cache size : 25344 KB
```

(Continued on next page)

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 8 72 73 74 75 76 77 78 79 80
  node 0 size: 96356 MB
  node 0 free: 95117 MB
  node 1 cpus: 9 10 11 12 13 14 15 16 17 81 82 83 84 85 86 87 88 89
  node 1 size: 96763 MB
  node 1 free: 96326 MB
  node 2 cpus: 18 19 20 21 22 23 24 25 26 90 91 92 93 94 95 96 97 98
  node 2 size: 96763 MB
  node 2 free: 96616 MB
  node 3 cpus: 27 28 29 30 31 32 33 34 35 99 100 101 102 103 104 105 106 107
  node 3 size: 96763 MB
  node 3 free: 96616 MB
  node 4 cpus: 36 37 38 39 40 41 42 43 44 108 109 110 111 112 113 114 115 116
  node 4 size: 96763 MB
  node 4 free: 96618 MB
  node 5 cpus: 45 46 47 48 49 50 51 52 53 117 118 119 120 121 122 123 124 125
  node 5 size: 96763 MB
  node 5 free: 96618 MB
  node 6 cpus: 54 55 56 57 58 59 60 61 62 126 127 128 129 130 131 132 133 134
  node 6 size: 96729 MB
  node 6 free: 96581 MB
  node 7 cpus: 63 64 65 66 67 68 69 70 71 135 136 137 138 139 140 141 142 143
  node 7 size: 96762 MB
  node 7 free: 96613 MB
  node distances:
  node   0   1   2   3   4   5   6   7
    0:  10  21  31  31  31  31  31  31
    1:  21  10  31  31  31  31  31  31
    2:  31  31  10  21  31  31  31  31
    3:  31  31  21  10  31  31  31  31
    4:  31  31  31  31  10  21  31  31
    5:  31  31  31  31  21  10  31  31
    6:  31  31  31  31  31  31  10  21
    7:  31  31  31  31  31  31  21  10

From /proc/meminfo
   MemTotal:       792235348 kB
   HugePages_Total:       0
   Hugepagesize:       2048 kB

From /etc/*release* /etc/*version*
   os-release:
      NAME="SLES"
```

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Platform Notes (Continued)

```
       VERSION="15-SP2"
       VERSION_ID="15.2"
       PRETTY_NAME="SUSE Linux Enterprise Server 15 SP2"
       ID="sles"
       ID_LIKE="suse"
       ANSI_COLOR="0;32"
       CPE_NAME="cpe:/o:suse:sles:15:sp2"

 uname -a:
    Linux localhost 5.3.18-22-default #1 SMP Wed Jun 3 12:16:43 UTC 2020 (720aeba) x86_64
    x86_64 x86_64 GNU/Linux

 Kernel self-reported vulnerability status:

 CVE-2018-12207 (iTLB Multihit):                          KVM: Mitigation: Split huge pages
 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 and
                                                            seccomp
 CVE-2017-5753 (Spectre variant 1):                         Mitigation: usercopy/swapgs
                                                            barriers and __user pointer
                                                            sanitization
 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):                 Mitigation: Clear CPU buffers; SMT
                                                            vulnerable

 run-level 3 Jul 30 11:28

 SPEC is set to: /home/cpu2017
    Filesystem     Type   Size  Used Avail Use% Mounted on
    /dev/sda2      btrfs  371G   97G  273G  27% /home

 From /sys/devices/virtual/dmi/id
     Vendor:         HPE
     Product:        ProLiant DL560 Gen10
     Product Family: ProLiant
     Serial:         CN77110DRB

 Additional information from dmidecode 3.2 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:
```

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Platform Notes (Continued)

```
     24x UNKNOWN NOT AVAILABLE
     24x UNKNOWN NOT AVAILABLE 32 GB 2 rank 2933

 BIOS:
    BIOS Vendor:       HPE
    BIOS Version:      U34
    BIOS Date:         05/24/2021
    BIOS Revision:     2.50
    Firmware Revision: 2.42

 (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 2021.1 Build 20201113
Copyright (C) 1985-2020 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 2021.1 Build 20201113
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

==============================================================================
Fortran | 548.exchange2_r(base)
------------------------------------------------------------------------------
Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on
  Intel(R) 64, Version 2021.1 Build 20201112_000000
Copyright (C) 1985-2020 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------
```

Base Compiler Invocation

C benchmarks:
icx

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Base Compiler Invocation (Continued)

C++ benchmarks:
icpx

Fortran benchmarks:
ifort

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
-mbranches-within-32B-boundaries
-L/opt/intel/oneapi/compiler/2021.1.1/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
-mbranches-within-32B-boundaries
-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin
-lqkmalloc

Fortran benchmarks:
-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ipo -no-prec-div
-qopt-mem-layout-trans=4 -nostandard-realloc-lhs -align array32byte
-auto -mbranches-within-32B-boundaries
-L/opt/intel/oneapi/compiler/2021.1.1/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-V1.0-ICX-revE.html
http://www.spec.org/cpu2017/flags/Intel-ic2021-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-V1.0-ICX-revE.xml
http://www.spec.org/cpu2017/flags/Intel-ic2021-official-linux64_revA.xml

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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

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