SPEC® CPU2017 Integer Rate Result

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Hewlett Packard Enterprise
(Test Sponsor: HPE)
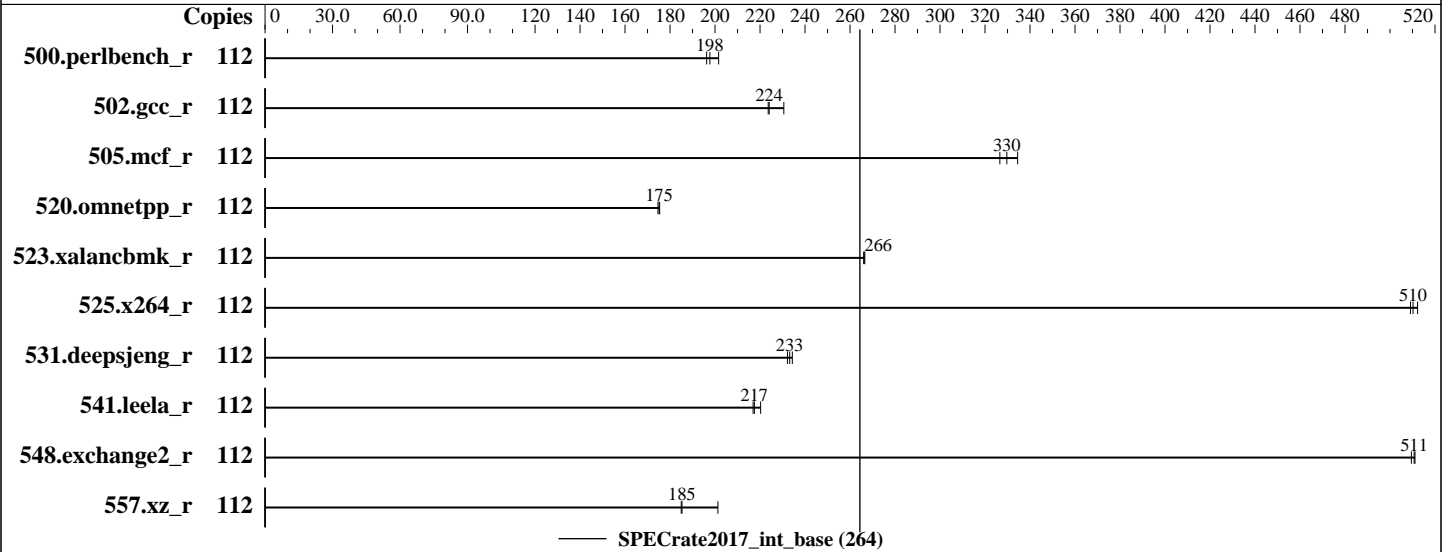
ProLiant DL580 Gen10
(2.20 GHz, Intel Xeon Gold 5120)

$SPECrate2017\_int\_base =$ 264

$SPECrate2017\_int\_peak =$ Not Run

CPU2017 License: 3	**Test Date:** Feb-2018
Test Sponsor: HPE	**Hardware Availability:** Nov-2017
Tested by: HPE	**Software Availability:** Sep-2017

Copies Scale: 0 30.0 60.0 90.0 120 140 160 180 200 220 240 260 280 300 320 340 360 380 400 420 440 460 480 520

- 500.perlbench_r **112** 198
- 502.gcc_r **112** 224
- 505.mcf_r **112** 330
- 520.omnetpp_r **112** 175
- 523.xalancbmk_r **112** 266
- 525.x264_r **112** 510
- 531.deepsjeng_r **112** 233
- 541.leela_r **112** 217
- 548.exchange2_r **112** 511
- 557.xz_r **112** 185

SPECrate2017_int_base (264)

Hardware

CPU Name: Intel Xeon Gold 5120
 Max MHz.: 3200
 Nominal: 2200
Enabled: 56 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: 19.25 MB I+D on chip per chip
 Other: None
Memory: 768 GB (48 x 16 GB 2Rx8 PC4-2666V-R, running at 2400)
Storage: 1 x 480 GB SATA SSD, RAID 0
Other: None

Software

OS: SUSE Linux Enterprise Server 12 (x86_64) SP3
 Kernel 4.4.73-5-default
Compiler: C/C++: Version 18.0.0.128 of Intel C/C++
 Compiler for Linux;
 Fortran: Version 18.0.0.128 of Intel Fortran
 Compiler for Linux
Parallel: No
Firmware: HPE BIOS Version U34 released Nov-2017 (tested as U34 11/14/2017)
File System: xfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: Not Applicable
Other: jemalloc memory allocator library V5.0.1

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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	112	**902**	**198**	884	202	909	196							
502.gcc_r	112	**708**	**224**	709	224	688	231							
505.mcf_r	112	541	334	**549**	**330**	554	327							
520.omnetpp_r	112	838	175	**839**	**175**	841	175							
523.xalancbmk_r	112	**444**	**266**	444	267	445	266							
525.x264_r	112	385	509	383	512	**384**	**510**							
531.deepsjeng_r	112	548	234	**550**	**233**	553	232							
541.leela_r	112	**853**	**217**	842	220	855	217							
548.exchange2_r	112	574	511	**575**	**511**	576	510							
557.xz_r	112	601	201	**653**	**185**	654	185							
SPECrate2017_int_base =		**264**												
SPECrate2017_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"
 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>
 irqbalance disabled with "service irqbalance stop"
 tuned profile set wtih "tuned-adm profile throughput-performance"
 VM Dirty ratio was set to 40 using "echo 40 > /proc/sys/vm/dirty_ratio"
 Numa balancing was disabled using "echo 0 > /proc/sys/kernel/numa_balancing"

General Notes

Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = "/home/cpu2017/lib/ia32:/home/cpu2017/lib/intel64:/home/cpu2017/je5.0.1-32:/home/cpu2017/je5.0.1-64"

 Binaries compiled on a system with 1x Intel Core i7-4790 CPU + 32GB RAM
 memory using Redhat Enterprise Linux 7.4

No: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown)

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General Notes (Continued)

```
is mitigated in the system as tested and documented.
No: 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.
No: 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.
jemalloc: configured and built at default for 32bit (i686) and 64bit (x86_64) targets;
built with RedHat Enterprise 7.4, and the system compiler gcc 4.8.5;
sources available from jemalloc.net or https://github.com/jemalloc/jemalloc/releases
```

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
  Stale A to S set to Enabled
  Workload Profile set to General Throughput Compute
   Minimum Processor Idle Power Core C-State set to C1E State
 Sysinfo program /home/cpu2017/bin/sysinfo
 Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f
 running on dl580-jk-sles12-sp3 Fri Feb  2 04:29:11 2018

 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 5120 CPU @ 2.20GHz
       4  "physical id"s (chips)
       112 "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 : 14
       siblings  : 28
       physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14
       physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14
       physical 2: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14
       physical 3: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14

 From lscpu:
      Architecture:          x86_64
      CPU op-mode(s):        32-bit, 64-bit
      Byte Order:            Little Endian
      CPU(s):                112
      On-line CPU(s) list:   0-111
```

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Platform Notes (Continued)

```
        Thread(s) per core:    2
        Core(s) per socket:    14
        Socket(s):             4
        NUMA node(s):          8
        Vendor ID:             GenuineIntel
        CPU family:            6
        Model:                 85
        Model name:            Intel(R) Xeon(R) Gold 5120 CPU @ 2.20GHz
        Stepping:              4
        CPU MHz:               2194.853
        BogoMIPS:              4389.70
        Virtualization:        VT-x
        L1d cache:             32K
        L1i cache:             32K
        L2 cache:              1024K
        L3 cache:              19712K
        NUMA node0 CPU(s):     0-6,56-62
        NUMA node1 CPU(s):     7-13,63-69
        NUMA node2 CPU(s):     14-20,70-76
        NUMA node3 CPU(s):     21-27,77-83
        NUMA node4 CPU(s):     28-34,84-90
        NUMA node5 CPU(s):     35-41,91-97
        NUMA node6 CPU(s):     42-48,98-104
        NUMA node7 CPU(s):     49-55,105-111
        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
    aperfmperf eagerfpu 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 ida arat epb pln pts dtherm intel_pt
    tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2
    erms invpcid rtm cqm mpx avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd
    avx512bw avx512vl xsaveopt xsavec xgetbv1 cqm_llc cqm_occup_llc pku ospke

  /proc/cpuinfo cache data
    cache size : 19712 KB

 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 56 57 58 59 60 61 62
    node 0 size: 96350 MB
    node 0 free: 96135 MB
    node 1 cpus: 7 8 9 10 11 12 13 63 64 65 66 67 68 69
    node 1 size: 96765 MB
    node 1 free: 96587 MB
    node 2 cpus: 14 15 16 17 18 19 20 70 71 72 73 74 75 76
```

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Platform Notes (Continued)

```
   node 2 size: 96765 MB
   node 2 free: 96623 MB
   node 3 cpus: 21 22 23 24 25 26 27 77 78 79 80 81 82 83
   node 3 size: 96765 MB
   node 3 free: 96646 MB
   node 4 cpus: 28 29 30 31 32 33 34 84 85 86 87 88 89 90
   node 4 size: 96765 MB
   node 4 free: 96385 MB
   node 5 cpus: 35 36 37 38 39 40 41 91 92 93 94 95 96 97
   node 5 size: 96765 MB
   node 5 free: 96597 MB
   node 6 cpus: 42 43 44 45 46 47 48 98 99 100 101 102 103 104
   node 6 size: 96765 MB
   node 6 free: 96655 MB
   node 7 cpus: 49 50 51 52 53 54 55 105 106 107 108 109 110 111
   node 7 size: 96764 MB
   node 7 free: 96661 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:       792279652 kB
    HugePages_Total:        0
    Hugepagesize:        2048 kB

 From /etc/*release* /etc/*version*
    SuSE-release:
       SUSE Linux Enterprise Server 12 (x86_64)
       VERSION = 12
       PATCHLEVEL = 3
       # This file is deprecated and will be removed in a future service pack or release.
       # Please check /etc/os-release for details about this release.
    os-release:
       NAME="SLES"
       VERSION="12-SP3"
       VERSION_ID="12.3"
       PRETTY_NAME="SUSE Linux Enterprise Server 12 SP3"
       ID="sles"
       ANSI_COLOR="0;32"
```

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Platform Notes (Continued)

```
         CPE_NAME="cpe:/o:suse:sles:12:sp3"

uname -a:
    Linux dl580-jk-sles12-sp3 4.4.73-5-default #1 SMP Tue Jul 4 15:33:39 UTC 2017
    (b7ce4e4) x86_64 x86_64 x86_64 GNU/Linux

run-level 3 Feb 2 04:28

SPEC is set to: /home/cpu2017
    Filesystem      Type  Size  Used Avail Use% Mounted on
    /dev/sda4       xfs   405G   43G  362G  11% /home

Additional information from dmidecode 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.
  BIOS HPE U34 11/14/2017
  Memory:
   48x UNKNOWN NOT AVAILABLE 16 GB 2 rank 2666, configured at 2400

(End of data from sysinfo program)
```

Compiler Version Notes

```
==============================================================================
 CC   500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base) 525.x264_r(base)
      557.xz_r(base)
------------------------------------------------------------------------------
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------


==============================================================================
 CXXC 520.omnetpp_r(base) 523.xalancbmk_r(base) 531.deepsjeng_r(base)
      541.leela_r(base)
------------------------------------------------------------------------------
icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------


==============================================================================
 FC   548.exchange2_r(base)
------------------------------------------------------------------------------
ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------
```

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Base Compiler Invocation

C benchmarks:
`icc`

C++ benchmarks:
`icpc`

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:
`-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div`
`-qopt-mem-layout-trans=3 -L/usr/local/je5.0.1-64/lib -ljemalloc`

C++ benchmarks:
`-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div`
`-qopt-mem-layout-trans=3 -L/usr/local/je5.0.1-64/lib -ljemalloc`

Fortran benchmarks:
`-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div`
`-qopt-mem-layout-trans=3 -nostandard-realloc-lhs -align array32byte`
`-L/usr/local/je5.0.1-64/lib -ljemalloc`

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Base Other Flags

C benchmarks:
```
-m64 -std=c11
```

C++ benchmarks:
```
-m64
```

Fortran benchmarks:
```
-m64
```

The flags files that were used to format this result can be browsed at
```
http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.2017-10-19.html
http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.2-SKX-revH.html
```

You can also download the XML flags sources by saving the following links:
```
http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.2017-10-19.xml
http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.2-SKX-revH.xml
```

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

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