SPEC CPU®2017 Integer Rate Result

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Huawei

(Test Sponsor: China Academy of Information and Communications Technology)

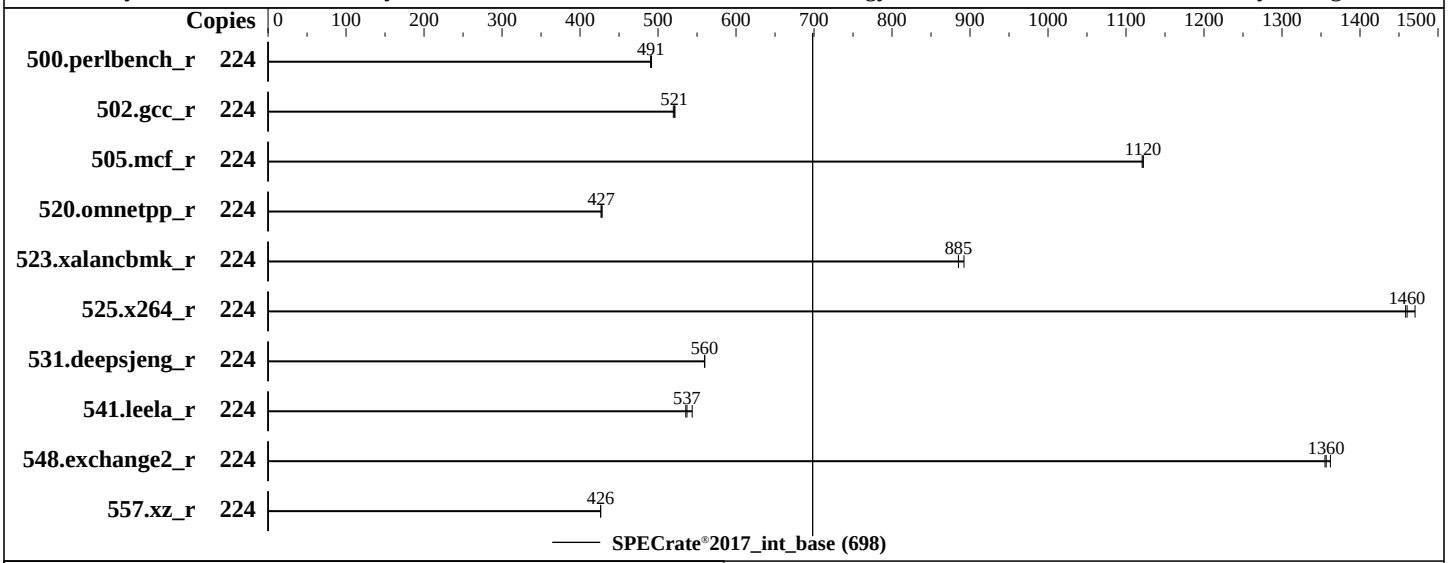
Huawei 2488H V6 (Intel Xeon Platinum 8376HL)

SPECrate®2017_int_base = 698

SPECrate®2017_int_peak = Not Run

CPU2017 License: 6177
Test Sponsor: China Academy of Information and Communications Technology
Tested by: China Academy of Information and Communications Technology

Test Date: Jan-2021
Hardware Availability: Nov-2020
Software Availability: Aug-2020



Hardware

CPU Name:	Intel Xeon Platinum 8376HL
Max MHz:	4300
Nominal:	2600
Enabled:	112 cores, 4 chips, 2 threads/core
Orderable:	2,4 chips
Cache L1:	32 KB I + 32 KB D on chip per core
L2:	1 MB I+D on chip per core
L3:	38.5 MB I+D on chip per chip
Other:	None
Memory:	1536 GB (48 x 32 GB 2Rx8 PC4-3200AA-R)
Storage:	1 x 3.84 TB SATA SSD
Other:	None

Software

OS:	SUSE Linux Enterprise Server 15 SP2 (x86_64) Kernel 5.3.18-22-default
Compiler:	C/C++: Version 19.1.1.217 of Intel C/C++ Compiler for Linux; Fortran: Version 19.1.1.217 of Intel Fortran Compiler for Linux
Parallel:	No
Firmware:	Version 0.55 released Dec-2020
File System:	xfs
System State:	Run level 5 (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	224	727	491	**727**	**491**	725	492							
502.gcc_r	224	608	522	**609**	**521**	610	520							
505.mcf_r	224	323	1120	323	1120	**323**	**1120**							
520.omnetpp_r	224	686	428	688	427	**688**	**427**							
523.xalancbmk_r	224	**267**	**885**	265	892	267	885							
525.x264_r	224	267	1470	**269**	**1460**	269	1460							
531.deepsjeng_r	224	458	560	459	560	**459**	**560**							
541.leela_r	224	693	536	**691**	**537**	682	544							
548.exchange2_r	224	431	1360	433	1360	**433**	**1360**							
557.xz_r	224	567	426	568	426	**567**	**426**							

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

Compiler Notes

```
The inconsistent Compiler version information under Compiler Version section is due to a discrepancy in Intel Compiler.
The correct version of C/C++ compiler is: Version 19.1.1.217 Build 20200306 Compiler for Linux
The correct version of Fortran compiler is: Version 19.1.1.217 Build 20200306 Compiler for Linux
```

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"
```

Environment Variables Notes

```
Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH =
     "/opt/intel/compilers_and_libraries_2020.1.217/linux/compiler/lib/intel6
     4:/opt/intel/compilers_and_libraries_2020.1.217/linux/compiler/lib/ia32:
     /usr/local/jemalloc32-5.0.1"
MALLOC_CONF = "retain:true"
```

General Notes

```
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>
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:
Power Policy Set to Custom
SNC Set to Enabled
XPT Prefetch Set to Enabled

Sysinfo program /home/spec2017/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7edb1e6e46a485a0011
running on localhost Mon Jan  4 19:27:54 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) Platinum 8376HL CPU @ 2.60GHz
      4  "physical id"s (chips)
      224 "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 : 28
      siblings  : 56
      physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27
      28 29 30
      physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27
      28 29 30
      physical 2: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27
      28 29 30
      physical 3: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27
      28 29 30

From lscpu:
```

(Continued on next page)

Platform Notes (Continued)

```
      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):                224
      On-line CPU(s) list:   0-223
      Thread(s) per core:    2
      Core(s) per socket:    28
      Socket(s):             4
      NUMA node(s):          8
      Vendor ID:             GenuineIntel
      CPU family:            6
      Model:                 85
      Model name:            Intel(R) Xeon(R) Platinum 8376HL CPU @ 2.60GHz
      Stepping:              11
      CPU MHz:               2600.050
      CPU max MHz:           4300.0000
      CPU min MHz:           1000.0000
      BogoMIPS:              5200.00
      Virtualization:        VT-x
      L1d cache:             32K
      L1i cache:             32K
      L2 cache:              1024K
      L3 cache:              39424K
      NUMA node0 CPU(s):     0-3,7-9,14-17,21-23,112-115,119-121,126-129,133-135
      NUMA node1 CPU(s):     4-6,10-13,18-20,24-27,116-118,122-125,130-132,136-139
      NUMA node2 CPU(s):     28-31,35-37,42-45,49-51,140-143,147-149,154-157,161-163
      NUMA node3 CPU(s):     32-34,38-41,46-48,52-55,144-146,150-153,158-160,164-167
      NUMA node4 CPU(s):     56-59,63-65,70-73,77-79,168-171,175-177,182-185,189-191
      NUMA node5 CPU(s):     60-62,66-69,74-76,80-83,172-174,178-181,186-188,192-195
      NUMA node6 CPU(s):     84-87,91-93,98-101,105-107,196-199,203-205,210-213,217-219
      NUMA node7 CPU(s):     88-90,94-97,102-104,108-111,200-202,206-209,214-216,220-223
      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 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 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
     avx512_bf16 dtherm ida arat pln pts pku ospke avx512_vnni md_clear flush_l1d
     arch_capabilities

  /proc/cpuinfo cache data
     cache size : 39424 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 7 8 9 14 15 16 17 21 22 23 112 113 114 115 119 120 121 126 127 128
  129 133 134 135
  node 0 size: 192068 MB
  node 0 free: 178024 MB
  node 1 cpus: 4 5 6 10 11 12 13 18 19 20 24 25 26 27 116 117 118 122 123 124 125 130 131
  132 136 137 138 139
  node 1 size: 193529 MB
  node 1 free: 173916 MB
  node 2 cpus: 28 29 30 31 35 36 37 42 43 44 45 49 50 51 140 141 142 143 147 148 149 154
  155 156 157 161 162 163
  node 2 size: 193529 MB
  node 2 free: 191063 MB
  node 3 cpus: 32 33 34 38 39 40 41 46 47 48 52 53 54 55 144 145 146 150 151 152 153 158
  159 160 164 165 166 167
  node 3 size: 193529 MB
  node 3 free: 192115 MB
  node 4 cpus: 56 57 58 59 63 64 65 70 71 72 73 77 78 79 168 169 170 171 175 176 177 182
  183 184 185 189 190 191
  node 4 size: 193529 MB
  node 4 free: 193182 MB
  node 5 cpus: 60 61 62 66 67 68 69 74 75 76 80 81 82 83 172 173 174 178 179 180 181 186
  187 188 192 193 194 195
  node 5 size: 193529 MB
  node 5 free: 180090 MB
  node 6 cpus: 84 85 86 87 91 92 93 98 99 100 101 105 106 107 196 197 198 199 203 204 205
  210 211 212 213 217 218 219
  node 6 size: 193529 MB
  node 6 free: 192708 MB
  node 7 cpus: 88 89 90 94 95 96 97 102 103 104 108 109 110 111 200 201 202 206 207 208
  209 214 215 216 220 221 222 223
  node 7 size: 193206 MB
  node 7 free: 192884 MB
  node distances:
  node   0   1   2   3   4   5   6   7
    0:  10  11  20  20  20  20  20  20
    1:  11  10  20  20  20  20  20  20
    2:  20  20  10  11  20  20  20  20
    3:  20  20  11  10  20  20  20  20
    4:  20  20  20  20  10  11  20  20
    5:  20  20  20  20  11  10  20  20
    6:  20  20  20  20  20  20  10  11
    7:  20  20  20  20  20  20  11  10
```

(Continued on next page)

Platform Notes (Continued)

```
From /proc/meminfo
   MemTotal:       1583565656 kB
   HugePages_Total:       0
   Hugepagesize:       2048 kB

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

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 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
srbds:                                   Not affected
tsx_async_abort:                         Not affected

run-level 5 Jan 4 12:12

SPEC is set to: /home/spec2017
   Filesystem     Type  Size  Used Avail Use% Mounted on
   /dev/sda3      xfs   2.2T   44G  2.1T   3% /home

From /sys/devices/virtual/dmi/id
    BIOS:    ByoSoft 0.55 12/16/2020
    Vendor:  Huawei
    Product: 2488H V6
    Product Family: Cedar Island
    Serial:  Huawei
```

(Continued on next page)

Platform Notes (Continued)

```
 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.
   Memory:
     48x Samsung M393A4G43AB3-CWE 32 GB 2 rank 3200

 (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) C Compiler for applications running on Intel(R) 64, Version 2021.1
  NextGen Build 20200304
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) C++ Compiler for applications running on Intel(R) 64, Version 2021.1
  NextGen Build 20200304
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

==============================================================================
Fortran | 548.exchange2_r(base)
------------------------------------------------------------------------------
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
  64, Version 19.1.1.217 Build 20200306
Copyright (C) 1985-2020 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------
```

Base Compiler Invocation

C benchmarks:
icc

C++ benchmarks:
icpc

(Continued on next page)

Base Compiler Invocation (Continued)

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:
-m64 -qnextgen -std=c11
-Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs
-xCORE-AVX512 -O3 -ffast-math -flto -mfpmath=sse -funroll-loops
-fuse-ld=gold -qopt-mem-layout-trans=4
-L/opt/intel/compilers_and_libraries_2020.1.217/linux/compiler/lib/intel64_lin
-lqkmalloc

C++ benchmarks:
-m64 -qnextgen -Wl,-plugin-opt=-x86-branches-within-32B-boundaries
-Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math -flto -mfpmath=sse
-funroll-loops -fuse-ld=gold -qopt-mem-layout-trans=4
-L/opt/intel/compilers_and_libraries_2020.1.217/linux/compiler/lib/intel64_lin
-lqkmalloc

Fortran benchmarks:
-m64 -Wl,-plugin-opt=-x86-branches-within-32B-boundaries -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/compilers_and_libraries_2020.1.217/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/Intel-ic19.1u1-official-linux64_revB.html
http://www.spec.org/cpu2017/flags/CAICT-Platform-Settings-V1.3.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/Intel-ic19.1u1-official-linux64_revB.xml
http://www.spec.org/cpu2017/flags/CAICT-Platform-Settings-V1.3.xml

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