ASUSTeK Computer Inc.  
ASUS ESC8000 G4(Z11PG-D24) Server System  
(3.00 GHz, Intel Xeon Gold 6248R)

SPECrates\textsuperscript{\textregistered}2017\textunderscore int\textunderscore base = 367  
SPECrates\textsuperscript{\textregistered}2017\textunderscore int\textunderscore peak = 381

CPU\textsuperscript{2017} License: 9016  
Test Sponsor: ASUSTeK Computer Inc.  
Tested by: ASUSTeK Computer Inc.  
Test Date: Jun-2020  
Hardware Availability: Feb-2020  
Software Availability: Apr-2020

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<td>557.xz\textunderscore r</td>
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---

### Hardware

- **CPU Name:** Intel Xeon Gold 6248R
- **Max MHz:** 4000
- **Nominal:** 3000
- **Enabled:** 48 cores, 2 chips, 2 threads/core
- **Orderable:** 1, 2 chip(s)
- **Cache L1:** 32 KB I + 32 KB D on chip per core
- **L2:** 1 MB I+D on chip per core
- **L3:** 35.75 MB I+D on chip per chip
- **Other:** None
- **Memory:** 768 GB (24 x 32 GB 2Rx4 PC4-2933Y-R)
- **Storage:** 1 x 1 TB SATA SSD
- **Other:** None

### Software

- **OS:** SUSE Linux Enterprise Server 15 SP1
- **Kernel:** 4.12.14-195-default
- **Compiler:** C/C++: Version 19.1.1.217 of Intel C/C++ Compiler Build 20200306 for Linux; Fortran: Version 19.1.1.217 of Intel Fortran Compiler Build 20200306 for Linux
- **Parallel:** No
- **Firmware:** Version 6102 released Dec-2019
- **File System:** xfs
- **System State:** Run level 3 (multi-user)
- **Base Pointers:** 64-bit
- **Peak Pointers:** 32/64-bit
- **Other:** jemalloc: jemalloc memory allocator library V5.0.1
- **Power Management:** BIOS and OS set to prefer performance at the cost of additional power usage
SPEC CPU®2017 Integer Rate Result

ASUSTeK Computer Inc.
ASUS ESC8000 G4(Z11PG-D24) Server System
(3.00 GHz, Intel Xeon Gold 6248R)

SPECrate®2017_int_base = 367
SPECrate®2017_int_peak = 381

CPU2017 License: 9016
Test Sponsor: ASUSTeK Computer Inc.
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Results Table

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<td>217</td>
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</tr>
</tbody>
</table>

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"
OS set to performance mode via cpupower frequency-set -g performance

Environment Variables Notes

Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = "/191u1/lib/intel64:/191u1/lib/ia32:/191u1/je5.0.1-32"
MALLOC_CONF = "retain:true"
ASUSTeK Computer Inc.  
ASUS ESC8000 G4(Z11PG-D24) Server System  
(3.00 GHz, Intel Xeon Gold 6248R)  

SPECrate®2017_int_base = 367  
SPECrate®2017_int_peak = 381

General Notes

Binaries compiled on a system with 1x Intel Core i9-7980XE CPU + 64GB RAM  
memory using Redhat Enterprise Linux 8.0  
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.

The jemalloc library was  
configured and built at default for  
32bit (i686) and 64bit (x86_64) targets;  
built with the RedHat Enterprise 7.5,  
and the system compiler gcc 4.8.5;  
sources available from jemalloc.net or  

Platform Notes

BIOS Configuration:  
VT-d = Disabled  
Patrol Scrub = Disabled  
ENERGY_PERF_BIAS_CFG mode = performance  
SNC = Enabled  
IMC interleaving = 1-way  
Engine Boost = Level3(Max)  
Enforce POR = Disable  
Memory Frequency = 2933  
LLC dead line alloc = Disabled  
SR-IOV Support = Disabled  
CSM Support = Disabled

Sysinfo program /191u1/bin/sysinfo  
Rev: r6365 of 2019-08-21 295195f888a3d7edbble6e46a485a0011  
running on linux-628j Fri Jun 19 22:58:34 2020

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

(Continued on next page)
SPEC CPU®2017 Integer Rate Result

ASUSTeK Computer Inc.
ASUS ESC8000 G4(Z11PG-D24) Server System (3.00 GHz, Intel Xeon Gold 6248R)

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SPECRate®2017_int_peak = 381

CPU2017 License: 9016
Test Sponsor: ASUSTeK Computer Inc.
Tested by: ASUSTeK Computer Inc.

Test Date: Jun-2020
Hardware Availability: Feb-2020
Software Availability: Apr-2020

Platform Notes (Continued)

From /proc/cpuinfo

model name : Intel(R) Xeon(R) Gold 6248R CPU @ 3.00GHz
  2 "physical id"s (chips)
  96 "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 : 24
siblings : 48
physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 25 26 27 28 29
physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 25 26 27 28 29

From /libvirt:

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): 96
On-line CPU(s) list: 0-95
Thread(s) per core: 2
Core(s) per socket: 24
Socket(s): 2
NUMA node(s): 4
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Gold 6248R CPU @ 3.00GHz
Stepping: 7
CPU MHz: 3000.000
CPU max MHz: 4000.0000
CPU min MHz: 1200.0000
BogoMIPS: 6000.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 36608K
NUMA node0 CPU(s): 0-3,7-9,13-15,19,20,24-26,30-32,51,55-57,61-63,67,68
NUMA node1 CPU(s): 4-6,10-12,16-18,21-23,31-33,41-45,53-55,65-67,69-71
NUMA node2 CPU(s): 24-27,31-33,37-39,43,44,72-75,79-81,85-87,91,92
NUMA node3 CPU(s): 28-30,34-36,40-42,45-47,76-78,82-84,88-90,93-95
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 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
xtrunc pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave
avx f16c rdrand lahf_lm abm 3nowprefetch cpuid_fault epb cat13 cdcp13

(Continued on next page)
Platform Notes (Continued)

invpcid_single intel_puin ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vnmi
flexpriority ept vpid fsqbase tsc_adjust bmi1 hle avx2 smpem erms invpcid rtm
cqm mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd
avx512bw avx512vl xsaveopt xgetbv1 xsaves cqm_lcssqm_occup_llc cqm_mbm_total
cqm_mbm_local dtherm ida arat pln pts hwp hwp_act_window hwp_epp hwp_pkg_req pku
ospke avx512_vnni md_clear flush_lld arch_capabilities

/proc/cpuinfo cache data
  cache size : 36608 KB

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a
physical chip.
  available: 4 nodes (0-3)
  node 0 cpus: 0 1 2 3 7 8 9 13 14 15 19 20 48 49 50 51 55 56 57 61 62 63 67 68
  node 0 size: 192048 MB
  node 0 free: 191577 MB
  node 1 cpus: 4 5 6 10 11 12 16 17 18 21 22 23 52 53 54 58 59 60 64 65 66 69 70 71
  node 1 size: 193531 MB
  node 1 free: 193228 MB
  node 2 cpus: 24 25 26 27 31 32 33 37 38 39 43 44 72 73 74 75 79 80 81 85 86 87 91 92
  node 2 size: 193531 MB
  node 2 free: 193266 MB
  node 3 cpus: 28 29 30 34 35 36 40 41 42 45 46 47 76 77 78 82 83 84 88 89 90 93 94 95
  node 3 size: 193529 MB
  node 3 free: 193258 MB
  node distances:
    node 0: 10 11 21 21
    node 1: 11 10 21 21
    node 2: 21 21 10 11
    node 3: 21 21 11 10

From /proc/meminfo
  MemTotal: 791184272 kB
  HugePages_Total: 0
  Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
  os-release:
    NAME="SLES"
    VERSION="15-SP1"
    VERSION_ID="15.1"
    PRETTY_NAME="SUSE Linux Enterprise Server 15 SP1"
    ID="sles"
    ID_LIKE="suse"
    ANSI_COLOR="0;32"
    CPE_NAME="cpe:o:suse:sles:15:sp1"

(Continued on next page)
Platform Notes (Continued)

uname -a:
Linux linux-628j 4.12.14-195-default #1 SMP Tue May 7 10:55:11 UTC 2019 (8fba516)
x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:
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: __user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling

run-level 3 Jun 19 22:57

SPEC is set to: /191u1
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda4 xfs 932G 27G 905G 3% /

From /sys/devices/virtual/dmi/id
BIOS: American Megatrends Inc. 6102 12/19/2019
Vendor: ASUSTeK COMPUTER INC.
Product: Z11PG-D24 Series
Product Family: Server
Serial: System Serial Number

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:
24x Samsung M393A4K40CB2-CVF 32 GB 2 rank 2933

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
C | 502.gcc_r(peak)
==============================================================================

Intel(R) C Compiler for applications running on IA-32, Version 2021.1 NextGen
Build 20200304
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

(Continued on next page)
Compiler Version Notes (Continued)

==============================================================================
C  | 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base, peak)  
   | 525.x264_r(base, peak) 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  | 500.perlbench_r(peak) 557.xz_r(peak)
Intel(R) C Compiler for applications running on Intel(R) 64, 
   Version 19.1.1.217 Build 20200306
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
==============================================================================

C  | 502.gcc_r(peak)
Intel(R) C Compiler for applications running on IA-32, Version 2021.1 NextGen  
   Build 20200304
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
==============================================================================

C  | 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base, peak)  
   | 525.x264_r(base, peak) 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  | 500.perlbench_r(peak) 557.xz_r(peak)
Intel(R) C Compiler for applications running on Intel(R) 64, 
   Version 19.1.1.217 Build 20200306
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
==============================================================================

C  | 502.gcc_r(peak)
(Continued on next page)
ASUSTeK Computer Inc.
ASUS ESC8000 G4(Z11PG-D24) Server System (3.00 GHz, Intel Xeon Gold 6248R)

SPECrater®2017_int_base = 367
SPECrater®2017_int_peak = 381

CPU2017 License: 9016
Test Sponsor: ASUSTeK Computer Inc.
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Compiler Version Notes (Continued)

Intel(R) C Compiler for applications running on IA-32, Version 2021.1 NextGen Build 20200304
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---------

C       | 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base, peak)
       | 525.x264_r(base, peak) 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       | 500.perlbench_r(peak) 557.xz_r(peak)
---------

Intel(R) C 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.

---------

C++      | 520.omnetpp_r(base, peak) 523.xalancbmk_r(base, peak)
       | 531.deepsjeng_r(base, peak) 541.leela_r(base, peak)
---------

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, peak)
---------

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)
<table>
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<th>Base Compiler Invocation (Continued)</th>
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</table>

Fortran benchmarks:
ifort

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<th>Base Portability Flags</th>
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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

<table>
<thead>
<tr>
<th>Base Optimization Flags</th>
</tr>
</thead>
</table>

C benchmarks:
-m64 -m64 -qnextgen -std=c11  
-Wl, -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/usr/local/IntelCompiler19/compilers_and_libraries_2020.1.217/linux/compiler/lib/intel64_lin  
-lqkmalloc

C++ benchmarks:
-m64 -m64 -m64 -qnextgen -Wl,-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/usr/local/IntelCompiler19/compilers_and_libraries_2020.1.217/linux/compiler/lib/intel64_lin  
-lqkmalloc

Fortran benchmarks:
-m64 -Wl, -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/usr/local/IntelCompiler19/compilers_and_libraries_2020.1.217/linux/compiler/lib/intel64_lin  
-lqkmalloc
## Peak Compiler Invocation

C benchmarks:
- icc

C++ benchmarks:
- icpc

Fortran benchmarks:
- ifort

## Peak Portability Flags

<table>
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<th>Benchmark</th>
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<td>perlbench_r</td>
<td>-DSPEC_LP64 -DSPEC_LINUX_X64</td>
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<tr>
<td>gcc_r</td>
<td>-D_FILE_OFFSET_BITS=64</td>
</tr>
<tr>
<td>mcf_r</td>
<td>-DSPEC_LP64</td>
</tr>
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<td>omnetpp_r</td>
<td>-DSPEC_LP64</td>
</tr>
<tr>
<td>smpbench_r</td>
<td>-DSPEC_LP64 -DSPEC_LINUX</td>
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<td>xalanchmk_r</td>
<td>-DSPEC_LP64 -DSPEC_LINUX</td>
</tr>
<tr>
<td>x264_r</td>
<td>-DSPEC_LP64</td>
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<tr>
<td>deepsjeng_r</td>
<td>-DSPEC_LP64 -DSPEC_LINUX</td>
</tr>
<tr>
<td>leela_r</td>
<td>-DSPEC_LP64</td>
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<td>exchange2_r</td>
<td>-DSPEC_LP64</td>
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<tr>
<td>xz_r</td>
<td>-DSPEC_LP64</td>
</tr>
</tbody>
</table>

(Continued on next page)

## Peak Optimization Flags

C benchmarks:

```bash
500.perlbench_r: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2)
-xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4 -fno-strict-overflow
-mbranches-within-32B-boundaries
-L/usr/local/IntelCompiler19/compilers_and_libraries_2020.1.217/linux/compiler/lib/intel64_lin
-1qmalloc

502.gcc_r: -m32
-L/usr/local/IntelCompiler19/compilers_and_libraries_2020.1.217/linux/compiler/lib/ia32_lin
-std=gnu89
-Wl,-plugin-opt=-x86-branches-within-32B-boundaries
-Wl,-z,muldefs -fprofile-generate(pass 1)
-fprofile-use=default.profdata(pass 2) -xCORE-AVX512 -flto
-Ofast(pass 1) -O3 -ffast-math -qnextgen -fuse-1d=gold
-qopt-mem-layout-trans=4 -L/usr/local/jemalloc32-5.0.1/lib
-1jemalloc
```

(Continued on next page)
### SPEC CPU®2017 Integer Rate Result

ASUSTeK Computer Inc.
ASUS ESC8000 G4(Z11PG-D24) Server System (3.00 GHz, Intel Xeon Gold 6248R)

<table>
<thead>
<tr>
<th>SPECrate®2017_int_base</th>
<th>367</th>
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<tbody>
<tr>
<td>SPECrate®2017_int_peak</td>
<td>381</td>
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**CPU2017 License:** 9016  
**Test Sponsor:** ASUSTeK Computer Inc.  
**Tested by:** ASUSTeK Computer Inc.

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<th>Test Date:</th>
<th>Jun-2020</th>
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<td>Hardware Availability:</td>
<td>Feb-2020</td>
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<td>Software Availability:</td>
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### Peak Optimization Flags (Continued)

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<th>Flags</th>
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<tr>
<td>505.mcf_r</td>
<td><code>basepeak = yes</code></td>
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**C++ benchmarks:**

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<td>520.omnetpp_r</td>
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<tr>
<td>523.xalancbmk_r</td>
<td><code>basepeak = yes</code></td>
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<td>531.deepsjeng_r</td>
<td><code>basepeak = yes</code></td>
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<td>541.leela_r</td>
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**Fortran benchmarks:**

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<tr>
<td>548.exchange2_r</td>
<td><code>basepeak = yes</code></td>
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</tbody>
</table>

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


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


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