## SPEC® CPU2017 Integer Speed Result

**Dell Inc.**

**PowerEdge R740xd (Intel Xeon Gold 5120, 2.20GHz)**

<table>
<thead>
<tr>
<th>SPECspeed2017_int_base</th>
<th>SPECspeed2017_int_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.63</td>
<td>7.84</td>
</tr>
</tbody>
</table>

**CPU2017 License:** 55

**Test Sponsor:** Dell Inc.

**Tested by:** Dell Inc.

**Hardware**

- **CPU Name:** Intel Xeon Gold 5120
- **Max MHz.:** 3200
- **Nominal:** 2200
- **Enabled:** 28 cores, 2 chips
- **Orderable:** 1.2 chips
- **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:** 384 GB (24 x 16 GB 2Rx8 PC4-2666V-R, running at 2400)
- **Storage:** 480 GB SATA SSD
- **Other:** None

**Software**

- **OS:** SUSE Linux Enterprise Server 12 SP2 4.4.114-94.11-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:** Yes
- **Firmware:** Version 1.3.7 released Feb-2018
- **System State:** Run level 3 (multi-user)
- **Base Pointers:** 64-bit
- **Peak Pointers:** 32/64-bit
- **Other:** jemalloc memory allocator library V5.0.1

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### Tests Results

<table>
<thead>
<tr>
<th>Test</th>
<th>Threads</th>
<th>SPECspeed2017_int_base</th>
<th>SPECspeed2017_int_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>perlbench_s</td>
<td>28</td>
<td>5.38</td>
<td>6.47</td>
</tr>
<tr>
<td>gcc_s</td>
<td>28</td>
<td>8.19</td>
<td>8.39</td>
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<tr>
<td>mcf_s</td>
<td>28</td>
<td>9.73</td>
<td>9.94</td>
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<tr>
<td>omnetpp_s</td>
<td>28</td>
<td>5.27</td>
<td>5.4</td>
</tr>
<tr>
<td>xalancbmk_s</td>
<td>28</td>
<td>8.26</td>
<td>8.4</td>
</tr>
<tr>
<td>x264_s</td>
<td>28</td>
<td>9.88</td>
<td>9.86</td>
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<tr>
<td>deepsjeng_s</td>
<td>28</td>
<td>4.50</td>
<td>4.49</td>
</tr>
<tr>
<td>leela_s</td>
<td>28</td>
<td>3.73</td>
<td>3.72</td>
</tr>
<tr>
<td>exchange2_s</td>
<td>28</td>
<td>11.6</td>
<td>11.6</td>
</tr>
<tr>
<td>xz_s</td>
<td>28</td>
<td>18.5</td>
<td>18.9</td>
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</tbody>
</table>

---

**Notes:**

- **Test Date:** Mar-2018
- **Hardware Availability:** Sep-2017
- **Software Availability:** Feb-2018
**SPEC CPU2017 Integer Speed Result**

**Dell Inc.**

PowerEdge R740xd (Intel Xeon Gold 5120, 2.20GHz)

**SPECspeed2017_int_base = 7.63**

**SPECspeed2017_int_peak = 7.84**

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<tr>
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<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
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<th>Ratio</th>
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<tbody>
<tr>
<td>600.perlbench_s</td>
<td>28</td>
<td>329</td>
<td>5.39</td>
<td>333</td>
<td>5.32</td>
<td>330</td>
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<td>602.gcc_s</td>
<td>28</td>
<td>485</td>
<td>8.22</td>
<td>486</td>
<td>8.19</td>
<td>490</td>
<td>8.13</td>
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<td>473</td>
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<tr>
<td>605.mcf_s</td>
<td>28</td>
<td>485</td>
<td>9.73</td>
<td>483</td>
<td>9.77</td>
<td>486</td>
<td>9.71</td>
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<tr>
<td>620.omnetpp_s</td>
<td>28</td>
<td>314</td>
<td>5.19</td>
<td>308</td>
<td>5.30</td>
<td>309</td>
<td>5.27</td>
<td>28</td>
<td>315</td>
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<tr>
<td>623.xalanchmk_s</td>
<td>28</td>
<td>170</td>
<td>8.31</td>
<td>172</td>
<td>8.26</td>
<td>173</td>
<td>8.20</td>
<td>28</td>
<td>159</td>
</tr>
<tr>
<td>625.x264_s</td>
<td>28</td>
<td>179</td>
<td>9.86</td>
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<td>9.89</td>
<td>178</td>
<td>9.88</td>
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<td>179</td>
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<tr>
<td>631.deepsjeng_s</td>
<td>28</td>
<td>318</td>
<td>4.50</td>
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<td>4.50</td>
<td>319</td>
<td>4.49</td>
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<td>319</td>
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<tr>
<td>641.leela_s</td>
<td>28</td>
<td>458</td>
<td>3.73</td>
<td>458</td>
<td>3.73</td>
<td>458</td>
<td>3.73</td>
<td>28</td>
<td>459</td>
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<tr>
<td>648.exchange2_s</td>
<td>28</td>
<td>255</td>
<td>11.5</td>
<td>253</td>
<td>11.6</td>
<td>253</td>
<td>11.6</td>
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<td>254</td>
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<td>657.xz_s</td>
<td>28</td>
<td>336</td>
<td>18.4</td>
<td>334</td>
<td>18.5</td>
<td>334</td>
<td>18.5</td>
<td>28</td>
<td>324</td>
</tr>
</tbody>
</table>

**Results Table**

- **SPECspeed2017_int_base = 7.63**
- **SPECspeed2017_int_peak = 7.84**

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

**Operating System Notes**

Stack size set to unlimited using "ulimit -s unlimited"

**General Notes**

Environment variables set by runcpu before the start of the run:
- `KMP_AFFINITY = "granularity=fine,scatter"
- `OMP_STACKSIZE = "192M"

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

Yes: 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.

jemalloc: configured and built at default for 32bit (i686) and 64bit (x86_64) targets;
jemalloc: built with the RedHat Enterprise 7.4, and the system compiler gcc 4.8.5;
jemalloc: sources available via jemalloc.net

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
```
Dell Inc. PowerEdge R740xd (Intel Xeon Gold 5120, 2.20GHz)

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<th>CPU2017 License</th>
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<tbody>
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<td>Test Sponsor</td>
<td>Dell Inc.</td>
</tr>
<tr>
<td>Tested by</td>
<td>Dell Inc.</td>
</tr>
</tbody>
</table>

**Platform Notes**

- BIOS settings:
  - Sub NUMA Cluster disabled
  - Virtualization Technology disabled
  - System Profile set to Custom
  - CPU Performance set to Maximum Performance
  - C States set to Autonomous
  - C1E disabled
  - Uncore Frequency set to Dynamic
  - Energy Efficiency Policy set to Performance
  - Memory Patrol Scrub disabled
  - Logical Processor disabled
  - CPU Interconnect Bus Link Power Management disabled
  - PCI ASPM L1 Link Power Management disabled

- Sysinfo program /home/cpu2017rev5/cpu2017/bin/sysinfo
  
- Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f
  
- running on linux-bgfp Thu Mar  1 12:54:29 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](https://www.spec.org/cpu2017/Docs/config.html#sysinfo)

- From /proc/cpuinfo
  
  - model name : Intel(R) Xeon(R) Gold 5120 CPU @ 2.20GHz
  
  - 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 : 14
    - 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

- From lscpu:
  
  - Architecture: x86_64
  - CPU op-mode(s): 32-bit, 64-bit
  - Byte Order: Little Endian
  - CPU(s): 28
  - On-line CPU(s) list: 0-27
  - Thread(s) per core: 1
  - Core(s) per socket: 14
  - Socket(s): 2
  - NUMA node(s): 2
  - Vendor ID: GenuineIntel
  - CPU family: 6
  - Model: 85
  - Model name: Intel(R) Xeon(R) Gold 5120 CPU @ 2.20GHz
  - Stepping: 4

(Continued on next page)
SPEC CPU2017 Integer Speed Result

Dell Inc.
PowerEdge R740xd (Intel Xeon Gold 5120, 2.20GHz)

CPU2017 License: 55
Test Sponsor: Dell Inc.
Tested by: Dell Inc.

SPECspeed2017_int_base = 7.63
SPECspeed2017_int_peak = 7.84

Test Date: Mar-2018
Hardware Availability: Sep-2017
Software Availability: Feb-2018

Platform Notes (Continued)

CPU MHz: 2194.854
BogoMIPS: 4389.70
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 19712K
NUMA node0 CPU(s): 0,2,4,6,8,10,12,14,16,18,20,22,24,26
NUMA node1 CPU(s): 1,3,5,7,9,11,13,15,17,19,21,23,25,27
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
aperfmpref 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 invpcid_single pln pts
dtherm intel_pt rsb_ctxsw spec_ctrl retpoline kaiser tpr_shadow vmvi flexpriority
ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cmp mpx
avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt
xsaveopt xsavevc xgetbv1 cmp_xlc cmp_occur_llc cmp_occur_xlc 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: 2 nodes (0-1)
  node 0 cpus: 0 2 4 6 8 10 12 14 16 18 20 22 24 26
  node 0 size: 191989 MB
  node 0 free: 191522 MB
  node 1 cpus: 1 3 5 7 9 11 13 15 17 19 21 23 25 27
  node 1 size: 193517 MB
  node 1 free: 192848 MB
  node distances:
    node 0: 10 21
    node 1: 21 10

From /proc/meminfo
  MemTotal: 394758448 kB
  HugePages_Total: 0
  Hugepagesize: 2048 kB

/usr/bin/lsb_release -d
  SUSE Linux Enterprise Server 12 SP2

From /etc/*release* /etc/*version*
  SuSE-release:

(Continued on next page)
Platform Notes (Continued)

SUSE Linux Enterprise Server 12 (x86_64)
VERSION = 12
PATCHLEVEL = 2
# 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-SP2"
 VERSION_ID="12.2"
 PRETTY_NAME="SUSE Linux Enterprise Server 12 SP2"
 ID="sles"
 ANSI_COLOR="0;32"
 CPE_NAME="cpe:/o:suse:sles:12:sp2"

uname -a:
 Linux linux-bgfp 4.4.114-94.11-default #1 SMP Thu Feb 1 19:28:26 UTC 2018 (4309ff9)
 x86_64 x86_64 x86_64 GNU/Linux

run-level 3 Mar 1 12:40

SPEC is set to: /home/cpu2017rev5/cpu2017
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda4 xfs 405G 53G 353G 14% /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 Dell Inc. 1.3.7 02/08/2018
Memory:
 22x 00AD00B300AD HMA82GR7AFR8N-VK 16 GB 2 rank 2666, configured at 2400
 2x 00CE063200CE M393A2K43BB1-CTD 16 GB 2 rank 2666, configured at 2400

(End of data from sysinfo program)
## Compiler Version Notes (Continued)

<table>
<thead>
<tr>
<th>Language</th>
<th>Benchmark</th>
<th>Notes</th>
</tr>
</thead>
</table>
| C        | 600.perlbench_s(peak) | `600.perlbench_s(peak)`
|          | 602.gcc_s(peak)       | `602.gcc_s(peak)`
|          | 605.mcf_s(peak)       | `605.mcf_s(peak)`
|          | 657.xz_s(peak)        | `657.xz_s(peak)`

**icc (ICC) 18.0.0 20170811**

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<table>
<thead>
<tr>
<th>Language</th>
<th>Benchmark</th>
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</table>
| C++      | 620.omnetpp_s(base) | `620.omnetpp_s(base)`
|          | 623.xalancbmk_s(base) | `623.xalancbmk_s(base)`
|          | 631.deepsjeng_s(base) | `631.deepsjeng_s(base)`
|          | 641.leela_s(base)    | `641.leela_s(base)`

**icpc (ICC) 18.0.0 20170811**

**Copyright (C) 1985-2017 Intel Corporation. All rights reserved.**

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<table>
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|          | 623.xalancbmk_s(peak) | `623.xalancbmk_s(peak)`
|          | 631.deepsjeng_s(peak) | `631.deepsjeng_s(peak)`
|          | 641.leela_s(peak)    | `641.leela_s(peak)`

**icpc (ICC) 18.0.0 20170811**

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<table>
<thead>
<tr>
<th>Language</th>
<th>Benchmark</th>
<th>Notes</th>
</tr>
</thead>
</table>
| Fortran  | 648.exchange2_s(base, peak) | `648.exchange2_s(base, peak)`

**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

- `600.perlbench_s: -DSPEC_LP64 -DSPEC_LINUX_X64`
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<th>Value</th>
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**CPU2017 License:** 55  
**Test Sponsor:** Dell Inc.  
**Tested by:** Dell Inc.  
**Test Date:** Mar-2018  
**Hardware Availability:** Sep-2017  
**Software Availability:** Feb-2018

### Base Portability Flags (Continued)

- 602.gcc_s: -DSPEC_LP64  
- 605.mcf_s: -DSPEC_LP64  
- 620.omnetpp_s: -DSPEC_LP64  
- 623.xalancbmk_s: -DSPEC_LP64 -DSPEC_LINUX  
- 625.x264_s: -DSPEC_LP64  
- 631.deepsjeng_s: -DSPEC_LP64  
- 641.leela_s: -DSPEC_LP64  
- 648.exchange2_s: -DSPEC_LP64  
- 657.xz_s: -DSPEC_LP64

### Base Optimization Flags

**C benchmarks:**

- Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div  
- qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP  
- L/usr/local/je5.0.1-64/lib -ljemalloc  

**C++ benchmarks:**

- Wl,-z,muldefs -xCORE-AVX2 -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-AVX2 -ipo -O3 -no-prec-div  
- qopt-mem-layout-trans=3 -nostandard-realloc-lhs -align array32byte  
- L/usr/local/je5.0.1-64/lib -ljemalloc

### Base Other Flags

**C benchmarks:**

- m64 -std=c11

**C++ benchmarks:**

- m64

**Fortran benchmarks:**

- m64
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## Peak Compiler Invocation

- **C benchmarks:**
  - icc

- **C++ benchmarks:**
  - icpc

- **Fortran benchmarks:**
  - ifort

## Peak Portability Flags

- 600.perlbench_s: -DSPEC_LP64 -DSPEC_LINUX_X64
- 602.gcc_s: -DSPEC_LP64
- 605.mcf_s: -DSPEC_LP64
- 620.omnetpp_s: -DSPEC_LP64
- 623.xalancbmk_s: -D_FILE_OFFSET_BITS=64 -DSPEC_LINUX
- 625.x264_s: -DSPEC_LP64
- 631.deepsjeng_s: -DSPEC_LP64
- 641.leela_s: -DSPEC_LP64
- 648.exchange2_s: -DSPEC_LP64
- 657.xz_s: -DSPEC_LP64

## Peak Optimization Flags

- **C benchmarks:**
  - 600.perlbench_s: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -O2 -xCORE-AVX2 -qopt-mem-layout-trans=3 -ipo -O3 -no-prec-div -DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP -fno-strict-overflow -L/usr/local/je5.0.1-64/lib -ljemalloc
  
  - 602.gcc_s: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -O2 -xCORE-AVX2 -qopt-mem-layout-trans=3 -ipo -O3 -no-prec-div -DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP -L/usr/local/je5.0.1-64/lib -ljemalloc
  
  - 605.mcf_s: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -O3 -no-prec-div -qopt-mem-layout-trans=3 -DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP -L/usr/local/je5.0.1-64/lib -ljemalloc

(Continued on next page)
### Peak Optimization Flags (Continued)

625.x264_s: 
- Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div  
- qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP  
- L/usr/local/je5.0.1-64/lib -ljemalloc

657.xz_s: Same as 602.gcc_s

C++ benchmarks:

620.omnetpp_s: 
- Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo  
- xCORE-AVX2 -O3 -no-prec-div -qopt-mem-layout-trans=3  
- DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP  
- L/usr/local/je5.0.1-64/lib -ljemalloc

623.xalancbmk_s: 
- L/opt/intel/compilers_and_libraries_2018/linux/lib/ia32  
- Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo  
- xCORE-AVX2 -O3 -no-prec-div -qopt-mem-layout-trans=3  
- DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP  
- L/usr/local/je5.0.1-32/lib -ljemalloc

631.deepsjeng_s: Same as 620.omnetpp_s

641.leela_s: Same as 620.omnetpp_s

Fortran benchmarks:

- Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div  
- qopt-mem-layout-trans=3 -nostandard-realloc-lhs -align array32byte  
- L/usr/local/je5.0.1-64/lib -ljemalloc

### Peak Other Flags

C benchmarks:

- m64 -std=c11

C++ benchmarks (except as noted below):

- m64

623.xalancbmk_s: -m32

Fortran benchmarks:

- m64
<table>
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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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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.