Dell Inc.
PowerEdge R750 xa (Intel Xeon Gold 6338N, 2.20 GHz)  

**SPECspeed®2017_fp_base = 195**  
**SPECspeed®2017_fp_peak = 197**

---

### Hardware

- **CPU Name:** Intel Xeon Gold 6338N  
- **Max MHz:** 3500  
- **Nominal:** 2200  
- **Enabled:** 64 cores, 2 chips  
- **Orderable:** 1.2 chips  
- **Cache L1:** 32 KB I + 48 KB D on chip per core  
  - L2: 1.25 MB I+D on chip per core  
  - L3: 48 MB I+D on chip per chip  
- **Other:** None  
- **Memory:** 512 GB (16 x 32 GB 2Rx8 PC4-3200AA-R, running at 2666)  
- **Storage:** 1 x 480 GB M.2 SATA SSD  
- **Other:** None

### Software

- **OS:** Red Hat Enterprise Linux 8.3 (Ootpa)  
  - 4.18.0-240.15.1.el8_3.x86_64  
- **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;  
  - C/C++: Version 2021.1 of Intel C/C++ Compiler  
  - Classic Build 20201112 for Linux
- **Parallel:** Yes  
- **Firmware:** Version 1.1.2 released Apr-2021  
- **File System:** xfs  
- **System State:** Run level 5 (graphical multi-user)  
- **Base Pointers:** 64-bit  
- **Peak Pointers:** 64-bit  
- **Other:** None  
- **jemalloc memory allocator V5.0.1**  
- **Power Management:** BIOS and OS set to prefer performance at the cost of additional power usage.
Dell Inc.  
PowerEdge R750 xa (Intel Xeon Gold 6338N, 2.20 GHz)  

SPECspeed®2017_fp_base = 195  
SPECspeed®2017_fp_peak = 197

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

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<tbody>
<tr>
<td>603.bwaves_s</td>
<td>64</td>
<td>94.4</td>
<td>625</td>
<td>93.3</td>
<td>632</td>
<td>93.3</td>
<td>632</td>
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<tr>
<td>607.cactuBSSN_s</td>
<td>64</td>
<td>69.5</td>
<td>240</td>
<td>69.9</td>
<td>239</td>
<td>70.4</td>
<td>237</td>
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<tr>
<td>619.lbm_s</td>
<td>64</td>
<td>41.5</td>
<td>126</td>
<td>41.6</td>
<td>126</td>
<td>41.8</td>
<td>125</td>
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<td>621.wrf_s</td>
<td>64</td>
<td>67.2</td>
<td>197</td>
<td>67.4</td>
<td>196</td>
<td>67.9</td>
<td>195</td>
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<tr>
<td>627.cam4_s</td>
<td>64</td>
<td>61.9</td>
<td>143</td>
<td>61.8</td>
<td>143</td>
<td>62.1</td>
<td>143</td>
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<tr>
<td>628.pop2_s</td>
<td>64</td>
<td>143</td>
<td>83.2</td>
<td>145</td>
<td>82.1</td>
<td>143</td>
<td>83.0</td>
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<tr>
<td>638.imagick_s</td>
<td>64</td>
<td>76.0</td>
<td>190</td>
<td>76.1</td>
<td>189</td>
<td>76.2</td>
<td>189</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>64</td>
<td>47.5</td>
<td>368</td>
<td>47.6</td>
<td>367</td>
<td>47.5</td>
<td>368</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>64</td>
<td>89.0</td>
<td>102</td>
<td>89.2</td>
<td>102</td>
<td>87.9</td>
<td>104</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>64</td>
<td>63.9</td>
<td>246</td>
<td>64.0</td>
<td>246</td>
<td>64.2</td>
<td>245</td>
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<td></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.

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:
KMP_AFFINITY = "granularity=fine,compact"
LD_LIBRARY_PATH = 
"/home/cpu2017-1.1.5-ic2021.1/lib/intel64:/home/cpu2017-1.1.5-ic2021.1/j
e5.0.1-64"
MALLOC_CONF = "retain:true"
OMP_STACKSIZE = "192M"

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
jemalloc, a general purpose malloc implementation
built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5

NA: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown) is mitigated in the system as tested and documented.
General Notes (Continued)

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 Settings:
Logical Processor : Disabled
Virtualization Technology : Disabled

System Profile : Custom
CPU Power Management : Maximum Performance
C1E : Disabled
C States : Autonomous
Memory Patrol Scrub : Disabled
Energy Efficiency Policy : Performance
CPU Interconnect Bus Link
Power Management : Disabled

Sysinfo program /home/cpu2017-1.1.5-ic2021.1/bin/sysinfo
Rev: r6538 of 2020-09-24 e8664e66d2d7080afeaa89d4b38e2f1c
running on localhost.localdomain Thu Apr 22 13:53:39 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 6338N CPU @ 2.20GHz
  2 "physical id"s (chips)
  64 "processors"
cores, siblings (Caution: counting these is system dependent. The following excerpts from /proc/cpuinfo might not be reliable. Use with caution.)
cpu cores : 32
siblings : 32
physical 0: cores 0 1 2 3 4 5 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27
  28 29 30 31
physical 1: cores 0 1 2 3 4 5 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27
  28 29 30 31

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit

(Continued on next page)
**SPEC CPU®2017 Floating Point Speed Result**

**Dell Inc.**

PowerEdge R750 xa (Intel Xeon Gold 6338N, 2.20 GHz)

---

**SPECspeed®2017_fp_base = 195**

**SPECspeed®2017_fp_peak = 197**

---

**CPU2017 License:** 55  
**Test Sponsor:** Dell Inc.  
**Tested by:** Dell Inc.  
**Test Date:** Apr-2021  
**Hardware Availability:** May-2021  
**Software Availability:** Feb-2021

---

**Platform Notes (Continued)**

Byte Order: Little Endian  
CPU(s): 64  
On-line CPU(s) list: 0-63  
Thread(s) per core: 1  
Core(s) per socket: 32  
Socket(s): 2  
NUMA node(s): 2  
Vendor ID: GenuineIntel  
CPU family: 6  
Model: 106  
Model name: Intel(R) Xeon(R) Gold 6338N CPU @ 2.20GHz  
Stepping: 6  
CPU MHz: 801.030  
BogoMIPS: 4400.00  
Virtualization: VT-x  
L1d cache: 48K  
L1i cache: 32K  
L2 cache: 1280K  
L3 cache: 49152K  
NUMA node0 CPU(s): 0,2,4,6,8,10,12,14,16,18,20,22,24,26,28,30,32,34,36,38,40,42,44,46,48,50,52,54,56,58 ,60,62  
NUMA node1 CPU(s): 1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31,33,35,37,39,41,43,45,47,49,51,53,55,57,59 ,61,63  
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 pdelpgb rdtsdp   
   lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid   
   aperfmpinf pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16   
   xtrm pdc pcid dca ssse4 1 sse4 2 x2apic movbe popcnt pcpl_timer aes xsave   
   avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb cat l3 invpcid_single   
   intel_pinn ssbd mba ibrs ibpb stibp ibrs enhanced fsasbase tsc_adjust bmi1 hle avx2   
   srep bmivd emms invpcid cmq rdt_a avx512f avx512dq rdsenc axd smap avx512ifma   
   clflushopt clwb intel_pctl avx512cd sha ni avx512bw avx512vl xsaveopt xsaves xgetbvl   
   xsaves cgm llc cqm_occup llc cqm_mbb_total cqm_mbb_local split_lock Detect wbinvd   
   dtherm ida arat pni pts avx512vbmi umip pku ospke avx512_dbm2 gfini vaes vpcmulqdq   
   avx512_vnni avx512_bitalg tme avx512_vpopcntdq la57 rdpid md_clear pconfig flush_lld   
   arch_capabilities

`/proc/cpuinfo`
cache data  
cache size : 49152 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 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62

(Continued on next page)
## Platform Notes (Continued)

node 0 size: 245587 MB
node 0 free: 249476 MB
node 1 cpus: 1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47 49 51 53 55 57 59 61 63
node 1 size: 246498 MB
node 1 free: 255788 MB
node distances:
node 0 1
0: 10 20
1: 20 10

From /proc/meminfo

| MemTotal:       | 527808492 kB |
| MemFree:        | 249476 MB    |

/sbin/tuned-adm active

| Current active profile: throughput-performance |

From /etc/*release* /etc/*version*

| NAME="Red Hat Enterprise Linux" |
| VERSION="8.3 (Ootpa)" |
| ID="rhel" |
| ID_LIKE="fedora" |
| VERSION_ID="8.3" |
| PLATFORM_ID="platform:el8" |
| PRETTY_NAME="Red Hat Enterprise Linux 8.3 (Ootpa)" |
| ANSI_COLOR="0;31" |

redhat-release: Red Hat Enterprise Linux release 8.3 (Ootpa)
system-release: Red Hat Enterprise Linux release 8.3 (Ootpa)
system-release-cpe: cpe:/o:redhat:enterprise_linux:8.3:ga

uname -a:

Linux localhost.localdomain 4.18.0-240.15.1.el8_3.x86_64 #1 SMP Wed Feb 3 03:12:15 EST 2021 x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

| CVE-2018-12207 (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 |

(Continued on next page)
### Platform Notes (Continued)

<table>
<thead>
<tr>
<th>Barriers and __user pointer sanitization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling</td>
</tr>
</tbody>
</table>

**CVE-2017-5715 (Spectre variant 2):** Not affected

**CVE-2020-0543 (Special Register Buffer Data Sampling):** Not affected

**CVE-2019-11135 (TSX Asynchronous Abort):** Not affected

**run-level 5 Apr 22 10:00**

**SPEC is set to:** /home/cpu2017-1.1.5-ic2021.1

<table>
<thead>
<tr>
<th>Filesystem</th>
<th>Type</th>
<th>Size</th>
<th>Used</th>
<th>Avail</th>
<th>Use%</th>
<th>Mounted on</th>
</tr>
</thead>
<tbody>
<tr>
<td>/dev/mapper/rhel-home</td>
<td>xfs</td>
<td>168G</td>
<td>15G</td>
<td>154G</td>
<td>9%</td>
<td>/home</td>
</tr>
</tbody>
</table>

**From /sys/devices/virtual/dmi/id**

- **Vendor:** Dell Inc.
- **Product:** PowerEdge R750 xa
- **Product Family:** PowerEdge
- **Serial:** 1234567

**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:**
- 16x 002C069D002C 18ASF4G72PDZ-3G2E1 32 GB 2 rank 3200, configured at 2666
- 16x Not Specified Not Specified

**BIOS:**
- **BIOS Vendor:** Dell Inc.
- **BIOS Version:** 1.1.2
- **BIOS Date:** 04/09/2021
- **BIOS Revision:** 1.1

(End of data from sysinfo program)

### Compiler Version Notes

```
C                                      619.lbm_s(base, peak) 638.imagick_s(base, peak)
                                      644.nab_s(base)
```

**Intel(R) C 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.

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

<table>
<thead>
<tr>
<th>C</th>
<th>644.nab_s(peak)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2021.1 Build 20201113</td>
<td></td>
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<tr>
<th>C</th>
<th>619.lbm_s(base, peak) 638.imagick_s(base, peak) 644.nab_s(base)</th>
</tr>
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<tr>
<td>Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000_000000</td>
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<tr>
<th>C++, C, Fortran</th>
<th>607.cactuBSSN_s(base, peak)</th>
</tr>
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<tbody>
<tr>
<td>Intel(R) C++ Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000_000000</td>
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<tr>
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<th>603.bwaves_s(base, peak) 649.fotonik3d_s(base, peak) 654.roms_s(base, peak)</th>
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SPEC CPU®2017 Floating Point Speed Result

Dell Inc.
PowerEdge R750 xa (Intel Xeon Gold 6338N, 2.20 GHz)

SPECspeed®2017_fp_base = 195
SPECspeed®2017_fp_peak = 197

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

Test Date: Apr-2021
Hardware Availability: May-2021
Software Availability: Feb-2021

Compiler Version Notes (Continued)

==============================================================================
Fortran, C   | 621.wrf_s(base, peak) 627.cam4_s(base, peak)
            | 628.pop2_s(base, peak)
==============================================================================
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.
Intel(R) C 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:
icc

Fortran benchmarks:
ifort

Benchmarks using both Fortran and C:
ifort icc

Benchmarks using Fortran, C, and C++:
icpc icc ifort

Base Portability Flags

603.bwaves_s: -DSPEC_LP64
607.cactuBSSN_s: -DSPEC_LP64
619.lbm_s: -DSPEC_LP64
621.wrf_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
627.cam4_s: -DSPEC_LP64 -DSPEC_CASE_FLAG
628.pop2_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
-assume byterecl
638.imagick_s: -DSPEC_LP64
644.nab_s: -DSPEC_LP64
649.fotonik3d_s: -DSPEC_LP64
654.roms_s: -DSPEC_LP64
**Dell Inc.**  
PowerEdge R750 xa (Intel Xeon Gold 6338N, 2.20 GHz)

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**Test Date:** Apr-2021  
**Hardware Availability:** May-2021  
**Software Availability:** Feb-2021

### Base Optimization Flags

**C benchmarks:**
- `-m64 -std=c11 -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch`
- `-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OpenMP`
- `-mbranches-within-32B-boundaries`

**Fortran benchmarks:**
- `-m64 -Wl,-z,muldefs -DSPEC_OpenMP -xCORE-AVX512 -ipo -O3`
- `-no-prec-div -qopt-prefetch -ffinite-math-only`
- `-qopt-mem-layout-trans=4 -qopenmp -nostandard-realloc-lhs`
- `-mbranches-within-32B-boundaries -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

**Benchmarks using both Fortran and C:**
- `-m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div`
- `-qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp`
- `-DSPEC_OpenMP -mbranches-within-32B-boundaries -nostandard-realloc-lhs`
- `-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

**Benchmarks using Fortran, C, and C++:**
- `-m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div`
- `-qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp`
- `-DSPEC_OpenMP -mbranches-within-32B-boundaries -nostandard-realloc-lhs`
- `-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

### Peak Compiler Invocation

**C benchmarks (except as noted below):**
- `icc`
  - `644.nab_s: icx`

**Fortran benchmarks:**
- `ifort`

**Benchmarks using both Fortran and C:**
- `ifort icc`

**Benchmarks using Fortran, C, and C++:**
- `icpc icc ifort`
Dell Inc.  
PowerEdge R750 xa (Intel Xeon Gold 6338N, 2.20 GHz)  

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</tr>
<tr>
<td><strong>Tested by:</strong> Dell Inc.</td>
<td><strong>Software Availability:</strong> Feb-2021</td>
</tr>
</tbody>
</table>

### Peak Portability Flags

Same as Base Portability Flags

### Peak Optimization Flags

**C benchmarks:**

- `619.lbm_s`: basepeak = yes
- `638.imagick_s`: basepeak = yes


**Fortran benchmarks:**

- `603.bwaves_s`: -m64 -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -DSPEC_SUPPRESS_OPENMP -DSPEC_OPENMP -ipo -xCORE-AVX512 -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -nostandard-realloc-lhs -mbranches-within-32B-boundaries -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

- `649.fotonik3d_s`: Same as 603.bwaves_s

- `654.roms_s`: basepeak = yes

**Benchmarks using both Fortran and C:**

- `621.wrf_s`: -m64 -std=c11 -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX512 -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP -mbranches-within-32B-boundaries -nostandard-realloc-lhs -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

- `627.cam4_s`: basepeak = yes

- `628.pop2_s`: basepeak = yes

(Continued on next page)
SPEC CPU®2017 Floating Point Speed Result

Dell Inc.
PowerEdge R750 xa (Intel Xeon Gold 6338N, 2.20 GHz)

| SPECspeed®2017_fp_base | 195 |
| SPECspeed®2017_fp_peak | 197 |

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

Test Date: Apr-2021
Hardware Availability: May-2021
Software Availability: Feb-2021

Peak Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++:

607.cactuBSSN_s: basepeak = yes

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

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[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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