Dell Inc.  

PowerEdge T440 (Intel Xeon Bronze 3204, 1.90 GHz)

**SPEC CPU®2017 Integer Speed Result**

<table>
<thead>
<tr>
<th>Hardware</th>
<th>Software</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Name: Intel Xeon Bronze 3204</td>
<td>OS: Suse Linux Enterprise Server 15 SP1</td>
</tr>
<tr>
<td>Max MHz: 1900</td>
<td>kernel 4.12.14-195-default</td>
</tr>
<tr>
<td>Nominal: 1900</td>
<td>Compiler: C/C++: Version 19.0.4.227 of Intel C/C++</td>
</tr>
<tr>
<td>Enabled: 12 cores, 2 chips</td>
<td>Compiler Build 20190416 for Linux:</td>
</tr>
<tr>
<td>Orderable: 1.2 chip</td>
<td>Fortran: Version 19.0.4.227 of Intel Fortran</td>
</tr>
<tr>
<td>Cache L1: 32 KB I + 32 KB D on chip per core</td>
<td>Compiler Build 20190416 for Linux</td>
</tr>
<tr>
<td>L2: 1 MB I+D on chip per core</td>
<td>Parallel: Yes</td>
</tr>
<tr>
<td>L3: 8.25 MB I+D on chip per chip</td>
<td>Firmware: Version 2.5.4 released Jan-2020</td>
</tr>
<tr>
<td>Other: None</td>
<td>File System: xfs</td>
</tr>
<tr>
<td>Memory: 384 GB (12 x 32 GB 2Rx8 PC4-2666V-R)</td>
<td>System State: Run level 3 (multi-user)</td>
</tr>
<tr>
<td>Storage: 1 x 960 GB SATA SSD</td>
<td>Base Pointers: 64-bit</td>
</tr>
<tr>
<td>Other: None</td>
<td>Peak Pointers: 64-bit</td>
</tr>
<tr>
<td></td>
<td>Other: jemalloc memory allocator V5.0.1</td>
</tr>
<tr>
<td></td>
<td>Power Management: BIOS set to prefer performance at the cost of additional power usage</td>
</tr>
</tbody>
</table>

**Test Sponsor:** Dell Inc.  
**Test Date:** Feb-2020  
**Hardware Availability:** Dec-2019  
**Tested by:** Dell Inc.  
**Software Availability:** Jun-2019

**CPU2017 License:** 55  
**Test Date:** Feb-2020  
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### SPECspeed®2017

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<td>4.68</td>
<td>4.79</td>
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<tr>
<td>602.gcc_s</td>
<td>4.68</td>
<td>5.08</td>
</tr>
<tr>
<td>605.mcf_s</td>
<td>4.68</td>
<td>5.08</td>
</tr>
<tr>
<td>620.omnetpp_s</td>
<td>4.68</td>
<td>5.08</td>
</tr>
<tr>
<td>623.xalancbmk_s</td>
<td>4.68</td>
<td>5.08</td>
</tr>
<tr>
<td>625.x264_s</td>
<td>4.68</td>
<td>5.08</td>
</tr>
<tr>
<td>631.deepsjeng_s</td>
<td>4.68</td>
<td>5.08</td>
</tr>
<tr>
<td>641.leela_s</td>
<td>4.68</td>
<td>5.08</td>
</tr>
<tr>
<td>648.exchange2_s</td>
<td>4.68</td>
<td>5.08</td>
</tr>
<tr>
<td>657.xz_s</td>
<td>4.68</td>
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Results Table

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<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>
</tr>
</thead>
<tbody>
<tr>
<td>600.perlbench_s</td>
<td>12</td>
<td>570</td>
<td>3.11</td>
<td>571</td>
<td>3.11</td>
<td>571</td>
<td>3.11</td>
</tr>
<tr>
<td>602.gcc_s</td>
<td>12</td>
<td>783</td>
<td>3.50</td>
<td>800</td>
<td>4.98</td>
<td>801</td>
<td>4.97</td>
</tr>
<tr>
<td>605.mcf_s</td>
<td>12</td>
<td>735</td>
<td>6.42</td>
<td>734</td>
<td>6.43</td>
<td>734</td>
<td>6.43</td>
</tr>
<tr>
<td>620.omnetpp_s</td>
<td>12</td>
<td>467</td>
<td>3.50</td>
<td>464</td>
<td>3.52</td>
<td>464</td>
<td>3.52</td>
</tr>
<tr>
<td>623.xalancbmk_s</td>
<td>12</td>
<td>240</td>
<td>5.90</td>
<td>239</td>
<td>5.94</td>
<td>238</td>
<td>5.96</td>
</tr>
<tr>
<td>625.x264_s</td>
<td>12</td>
<td>298</td>
<td>5.93</td>
<td>297</td>
<td>5.93</td>
<td>297</td>
<td>5.94</td>
</tr>
<tr>
<td>631.deepsjeng_s</td>
<td>12</td>
<td>514</td>
<td>2.79</td>
<td>513</td>
<td>2.79</td>
<td>513</td>
<td>2.80</td>
</tr>
<tr>
<td>641.leela_s</td>
<td>12</td>
<td>771</td>
<td>2.21</td>
<td>771</td>
<td>2.21</td>
<td>771</td>
<td>2.21</td>
</tr>
<tr>
<td>648.exchange2_s</td>
<td>12</td>
<td>379</td>
<td>7.75</td>
<td>379</td>
<td>7.76</td>
<td>379</td>
<td>7.75</td>
</tr>
<tr>
<td>657.xz_s</td>
<td>12</td>
<td>719</td>
<td>8.60</td>
<td>720</td>
<td>8.59</td>
<td>719</td>
<td>8.60</td>
</tr>
</tbody>
</table>

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"

Environment Variables Notes

Environment variables set by runcpu before the start of the run:
- KMP_AFFINITY = "granularity=fine,scatter"
- LD_LIBRARY_PATH = "/home/cpu2017/lib/intel64:/home/cpu2017/je5.0.1-64"
- OMP_STACKSIZE = "192M"

General Notes

Binaries compiled on a system with 1x Intel Core i9-7900X CPU + 32GB RAM memory using Redhat Enterprise Linux 7.5

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

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.

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

**Dell Inc.**

PowerEdge T440 (Intel Xeon Bronze 3204, 1.90 GHz)

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### General Notes (Continued)

- 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>
  ```
- Jemalloc, a general purpose malloc implementation
- Built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5
- Sources available from jemalloc.net or https://github.com/jemalloc/jemalloc/releases

### Platform Notes

- BIOS settings:
  - Sub NUMA Cluster enabled
  - Virtualization Technology disabled
  - DCU Streamer Prefetcher 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
  - CPU Interconnect Bus Link Power Management enabled
  - PCI ASPM L1 Link Power Management enabled

- Sysinfo program: `/home/cpu2017/bin/sysinfo`
  - Rev: r6365 of 2019-08-21 295195f888a3d7edbble6e46a485a0011
  - Running on `linux-g3ob` Tue Mar 10 06:20:52 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

- From `/proc/cpuinfo`
  ```
  model name : Intel(R) Xeon(R) Bronze 3204 CPU @ 1.90GHz
  2 "physical id"s (chips)
  12 "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 : 6
  siblings : 6
  physical 0: cores 0 1 2 3 4 5
  physical 1: cores 0 1 2 3 4 5
  ```

- From `lscpu`:

(Continued on next page)
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**CPU2017 License:** 55  
**Test Sponsor:** Dell Inc.  
**Tested by:** Dell Inc.  
**Test Date:** Feb-2020  
**Hardware Availability:** Dec-2019  
**Software Availability:** Jun-2019

### 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):** 12
- **On-line CPU(s) list:** 0-11
- **Thread(s) per core:** 1
- **Core(s) per socket:** 6
- **Socket(s):** 2
- **NUMA node(s):** 2
- **Vendor ID:** GenuineIntel
- **CPU family:** 6
- **Model:** 85
- **Model name:** Intel(R) Xeon(R) Bronze 3204 CPU @ 1.90GHz
- **Stepping:** 7
- **CPU MHz:** 1900.000
- **BogoMIPS:** 3800.00
- **Virtualization:** VT-x
- **L1d cache:** 32K
- **L1i cache:** 32K
- **L2 cache:** 1024K
- **L3 cache:** 8448K
- **NUMA node0 CPU(s):** 0,2,4,6,8,10
- **NUMA node1 CPU(s):** 1,3,5,7,9,11
- **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 xtpr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abml amsx prefetch cpuid_fault epb cat_l3 cdp_l3 invpcid_single intel_ppn vmbios ibrs ibpb irbt enhanced tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invvpid rdmsk rdtscp cqm mxr rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl xsaveopt xsaves xsavec xgetbv1 xsavec qm_llc qm_occosp_llc qm_mbb_total qm_mbb_local dtherm arat pln pts pku ospke avx512_vnni md_clear flush_lld
- **arch_capabilities**

```
/platform/cpupower data
       cache size : 8448 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  
**node 0 size:** 192076 MB  
**node 0 free:** 191694 MB  
**node 1 cpus:** 1 3 5 7 9 11

(Continued on next page)
Platform Notes (Continued)

node 1 size: 193504 MB
node 1 free: 192995 MB
node distances:
  node  0  1
  0:  10  21
  1:  21  10

From /proc/meminfo
  MemTotal:       394835444 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"

uname -a:
  Linux linux-g3ob 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 Mar 10 06:14 last=5

SPEC is set to: /home/cpu2017
  Filesystem     Type  Size  Used Avail Use% Mounted on
  /dev/sda2      xfs   440G  46G  395G  11% /

From /sys/devices/virtual/dmi/id
  BIOS:    Dell Inc. 2.5.4 01/14/2020
  Vendor:  Dell Inc.
**SPEC CPU®2017 Integer Speed Result**

**Dell Inc.**

**PowerEdge T440 (Intel Xeon Bronze 3204, 1.90 GHz)**

**SPECspeed®2017_int_base = 4.68**

**SPECspeed®2017_int_peak = 4.79**

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---

**Platform Notes (Continued)**

- **Product:** PowerEdge T440
- **Product Family:** PowerEdge
- **Serial:** FBLH613

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:**
- 4x 00AD00B300AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933
- 8x 00AD063200AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933
- 4x Not Specified Not Specified

(End of data from sysinfo program)

---

**Compiler Version Notes**

---

**C**

- 600.perlbench_s(base, peak)
- 602.gcc_s(base, peak)
- 605.mcf_s(base, peak)
- 625.x264_s(base, peak)
- 657.xz_s(base, peak)

---

**Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,**

Version 19.0.4.227 Build 20190416

Copyright (C) 1985-2019 Intel Corporation.  All rights reserved.

---

**C++**

- 620.omnetpp_s(base, peak)
- 623.xalancbmk_s(base, peak)
- 631.deepsjeng_s(base, peak)
- 641.leela_s(base, peak)

---

**Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,**

Version 19.0.4.227 Build 20190416

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---

**Fortran**

- 648.exchange2_s(base, peak)

---

**Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64,**

Version 19.0.4.227 Build 20190416

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## Base Compiler Invocation

- **C benchmarks:**
  ```bash
ingcc -m64 -std=c11
  ```

- **C++ benchmarks:**
  ```bash
  icpc -m64
  ```

- **Fortran benchmarks:**
  ```bash
  ifort -m64
  ```

## Base 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: -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:**
  ```bash
  -Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div
  -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
  -L/usr/local/je5.0.1-64/lib -ljemalloc
  ```

- **C++ benchmarks:**
  ```bash
  -Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div
  -qopt-mem-layout-trans=4
  -L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64
  -lqkmalloc
  ```

- **Fortran benchmarks:**
  ```bash
  -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-mem-layout-trans=4
  -nostandard-realloc-lhs
  ```
Dell Inc.
PowerEdge T440 (Intel Xeon Bronze 3204, 1.90 GHz)  

| SPECspeed®2017_int_peak = 4.79 |
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Peak Compiler Invocation

C benchmarks:
icc -m64 -std=c11

C++ benchmarks:
icpc -m64

Fortran benchmarks:
ifort -m64

Peak Portability Flags

Same as Base Portability Flags

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=4 -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=4 -ipo -O3  
-no-prec-div -DSPEC_SUPPRESS_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=4  
-DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP  
-L/usr/local/je5.0.1-64/lib -ljemalloc

625.x264_s: -Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div  
-qopt-mem-layout-trans=4 -gopenmp -DSPEC_OPENMP  
-L/usr/local/je5.0.1-64/lib -ljemalloc

657.xz_s: -Wl,-z,muldefs -xCORE-AVX2 -qopt-mem-layout-trans=4 -ipo -O3  
-no-prec-div -DSPEC_SUPPRESS_OPENMP -qopenmp  
-DSPEC_OPENMP -L/usr/local/je5.0.1-64/lib -ljemalloc

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

### 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=4 -DSPEC_SUPPRESS_OPENMP -L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64 -lqkmalloc

- **623.xalancbmk_s**: `-Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-mem-layout-trans=4 -l/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64 -lqkmalloc

- **631.deepsjeng_s**: Same as 623.xalancbmk_s

- **641.leela_s**: Same as 623.xalancbmk_s

### Fortran benchmarks:

- **-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-mem-layout-trans=4 -nostandard-realloc-lhs**

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: