Dell Inc.
PowerEdge MX740c (Intel Xeon Bronze 3104 CPU, 1.70GHz)

SPECrate2017_int_base = 33.1
SPECrate2017_int_peak = 34.5

### Hardware
- **CPU Name:** Intel Xeon Bronze 3104
- **Max MHz.:** 1700
- **Nominal:** 1700
- **Enabled:** 12 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:** 8.25 MB I+D on chip per chip
- **Memory:** 192 GB (12 x 16 GB 2Rx8 PC4-2666V-R, running at 2133)
- **Storage:** 960 GB SAS SSD
- **Other:** None

### Software
- **OS:** SUSE Linux Enterprise Server 12 SP3 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:** No
- **Firmware:** Version 0.4.1 released Apr-2018
- **File System:** xfs
- **System State:** Run level 3 (multi-user)
- **Base Pointers:** 64-bit
- **Peak Pointers:** 32/64-bit
- **Other:** jemalloc memory allocator library, version 5.0.1

<table>
<thead>
<tr>
<th>Copies</th>
<th>perlbench_r</th>
<th>gcc_r</th>
<th>mcf_r</th>
<th>omnetpp_r</th>
<th>xalancbmk_r</th>
<th>x264_r</th>
<th>deepsjeng_r</th>
<th>leela_r</th>
<th>exchange2_r</th>
<th>xz_r</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>27.7</td>
<td>31.8</td>
<td>35.6</td>
<td>38.4</td>
<td>38.8</td>
<td>59.8</td>
<td>59.8</td>
<td>65.3</td>
<td>65.2</td>
<td>21.8</td>
</tr>
</tbody>
</table>

**Table:**

<table>
<thead>
<tr>
<th>Copies</th>
<th>perlbench_r</th>
<th>gcc_r</th>
<th>mcf_r</th>
<th>omnetpp_r</th>
<th>xalancbmk_r</th>
<th>x264_r</th>
<th>deepsjeng_r</th>
<th>leela_r</th>
<th>exchange2_r</th>
<th>xz_r</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>32.7</td>
<td>31.8</td>
<td>38.4</td>
<td>38.4</td>
<td>59.8</td>
<td>59.8</td>
<td>65.3</td>
<td>65.2</td>
<td>21.8</td>
<td>21.8</td>
</tr>
</tbody>
</table>

**Notes:**
- **CPU2017 License:** 55
- **Test Sponsor:** Dell Inc.
- **Tested by:** Dell Inc.
- **Test Date:** May-2018
- **Hardware Availability:** Sep-2017
- **Software Availability:** Sep-2017

**System Details:**
- **OS:** SUSE Linux Enterprise Server 12 SP3 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:** No
- **Firmware:** Version 0.4.1 released Apr-2018
- **File System:** xfs
- **System State:** Run level 3 (multi-user)
- **Base Pointers:** 64-bit
- **Peak Pointers:** 32/64-bit
- **Other:** jemalloc memory allocator library, version 5.0.1
Dell Inc.

PowerEdge MX740c (Intel Xeon Bronze 3104 CPU, 1.70GHz)

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

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>500.perlbench_r</td>
<td>12</td>
<td>691</td>
<td>27.6</td>
<td>689</td>
<td>27.7</td>
<td>690</td>
<td>27.7</td>
</tr>
<tr>
<td>502.gcc_r</td>
<td>12</td>
<td>538</td>
<td>31.6</td>
<td>535</td>
<td>31.8</td>
<td>532</td>
<td>31.9</td>
</tr>
<tr>
<td>505.mcf_r</td>
<td>12</td>
<td>506</td>
<td>38.3</td>
<td>504</td>
<td>38.5</td>
<td>505</td>
<td>38.4</td>
</tr>
<tr>
<td>520.omnetpp_r</td>
<td>12</td>
<td>672</td>
<td>23.4</td>
<td>669</td>
<td>23.5</td>
<td>665</td>
<td>23.7</td>
</tr>
<tr>
<td>523.xalancbmk_r</td>
<td>12</td>
<td>359</td>
<td>35.3</td>
<td>356</td>
<td>35.6</td>
<td>355</td>
<td>35.7</td>
</tr>
<tr>
<td>525.x264_r</td>
<td>12</td>
<td>352</td>
<td>59.6</td>
<td>351</td>
<td>59.8</td>
<td>351</td>
<td>59.9</td>
</tr>
<tr>
<td>531.deepsjeng_r</td>
<td>12</td>
<td>479</td>
<td>28.7</td>
<td>479</td>
<td>28.7</td>
<td>479</td>
<td>28.7</td>
</tr>
<tr>
<td>541.leela_r</td>
<td>12</td>
<td>865</td>
<td>23.0</td>
<td>867</td>
<td>22.9</td>
<td>865</td>
<td>23.0</td>
</tr>
<tr>
<td>548.exchange2_r</td>
<td>12</td>
<td>483</td>
<td>65.0</td>
<td>481</td>
<td>65.3</td>
<td>481</td>
<td>65.4</td>
</tr>
<tr>
<td>557.xz_r</td>
<td>12</td>
<td>596</td>
<td>21.7</td>
<td>593</td>
<td>21.9</td>
<td>593</td>
<td>21.8</td>
</tr>
</tbody>
</table>

SPECrate2017_int_base = 33.1
SPECrate2017_int_peak = 34.5

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"

General Notes

Environment variables set by runcpu before the start of the run:

Binaries compiled on a system with 1x Intel Core i7-4790 CPU + 32GB RAM 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

(Continued on next page)
**SPEC CPU2017 Integer Rate Result**

**Dell Inc.**
PowerEdge MX740c (Intel Xeon Bronze 3104 CPU, 1.70GHz)

**SPECrate2017_int_base = 33.1**  
**SPECrate2017_int_peak = 34.5**

**General Notes (Continued)**

Filesystem page cache synced and cleared with:
```
sync; echo 3> /proc/sys/vm/drop_caches
runcpu command invoked through numaclt i.e.:
numaclt --interleave=all runcpu <etc>
```

**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
- CPU Interconnect Bus Link Power Management Disabled
- PCI ASPM L1 Link Power Management Disabled

Sysinfo program /root/cpu2017/bin/sysinfo
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bccc091c0f
running on linux-kuth Fri May 18 08:09:34 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

From /proc/cpuinfo
```
model name : Intel(R) Xeon(R) Bronze 3104 CPU @ 1.70GHz
  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:
```
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 12
On-line CPU(s) list: 0-11
Thread(s) per core: 1
Core(s) per socket: 6
```

(Continued on next page)
**SPEC CPU2017 Integer Rate Result**

**Dell Inc.**

PowerEdge MX740c (Intel Xeon Bronze 3104 CPU, 1.70GHz)

<table>
<thead>
<tr>
<th>SPECrate2017_int_base</th>
<th>33.1</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECrate2017_int_peak</td>
<td>34.5</td>
</tr>
</tbody>
</table>

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

**Test Date:** May-2018  
**Hardware Availability:** Sep-2017  
**Software Availability:** Sep-2017

**Platform Notes (Continued)**

```
Socket(s):             2  
NUMA node(s):          2  
Vendor ID:             GenuineIntel  
CPU family:            6  
Model:                 85  
Model name:            Intel(R) Xeon(R) Bronze 3104 CPU @ 1.70GHz  
Stepping:              4  
CPU MHz:               1695.994  
BogoMIPS:              3391.98  
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 art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc aperfmperf 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 3nowprefetch arat epb invpcid_single pln pts dtherm intel_pt rsb_cxsw spec_ctrl retpoline kaiser tpr_shadow vmx flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 ertm cqm mpx avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt xsaveset xgetbv1 cqm_llc cqm_occu_llc pku ospke

/proc/cpuinfo cache 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: 96299 MB  
node 0 free: 95777 MB  
node 1 cpus: 1 3 5 7 9 11  
node 1 size: 96750 MB  
node 1 free: 96251 MB  
node distances:
0: 10 21  
1: 21 10
```

From /proc/meminfo  
```
MemTotal: 197682508 kB  
HugePages_Total: 0
```

(Continued on next page)
**SPEC CPU2017 Integer Rate Result**

Dell Inc.

PowerEdge MX740c (Intel Xeon Bronze 3104 CPU, 1.70GHz)

<table>
<thead>
<tr>
<th>SPEC2017 int_base = 33.1</th>
<th>SPEC2017 int_peak = 34.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU2017 License: 55</td>
<td>Test Date:</td>
</tr>
<tr>
<td>Test Sponsor: Dell Inc.</td>
<td>Hardware Availability:</td>
</tr>
<tr>
<td>Tested by: Dell Inc.</td>
<td>Software Availability:</td>
</tr>
</tbody>
</table>

Platform Notes (Continued)

- Hugepagesize: 2048 kB

```bash
/usr/bin/lsb_release -d
SUSE Linux Enterprise Server 12 SP3
```

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

```bash
SuSE-release:
- SUSE Linux Enterprise Server 12 (x86_64)
- VERSION = 12
- PATCHLEVEL = 3
  # 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-SP3"
- VERSION_ID="12.3"
- PRETTY_NAME="SUSE Linux Enterprise Server 12 SP3"
- ID="sles"
- ANSI_COLOR="0;32"
- CPE_NAME="cpe:/o:suse:sles:12:sp3"

uname -a:
  Linux linux-kuth 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 May 18 08:08

SPEC is set to: /root/cpu2017

```
Filesystem  Type  Size  Used  Avail  Use%  Mounted on
/dev/sda2    xfs  890G  18G  873G  2%  /
```

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. 0.4.1 04/27/2018
- Memory:
  - 12x 00AD063200AD HMA82GR7AFR8N-VK 16 GB 2 rank 2666, configured at 2133
  - 12x Not Specified Not Specified

(End of data from sysinfo program)

**Compiler Version Notes**

```
CC  500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base, peak)
```

(Continued on next page)
Dell Inc.
PowerEdge MX740c (Intel Xeon Bronze 3104 CPU, 1.70GHz)

<table>
<thead>
<tr>
<th>SPECrate2017_int_base</th>
<th>33.1</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECrate2017_int_peak</td>
<td>34.5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CPU2017 License:</th>
<th>55</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Sponsor:</td>
<td>Dell Inc.</td>
</tr>
<tr>
<td>Tested by:</td>
<td>Dell Inc.</td>
</tr>
<tr>
<td>Test Date:</td>
<td>May-2018</td>
</tr>
<tr>
<td>Hardware Availability:</td>
<td>Sep-2017</td>
</tr>
<tr>
<td>Software Availability:</td>
<td>Sep-2017</td>
</tr>
</tbody>
</table>

**Compiler Version Notes (Continued)**

```
525.x264_r(base, peak) 557.xz_r(base, peak)
```

```plaintext
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
```

```plaintext
CC 500.perlbench_r(peak) 502.gcc_r(peak)
```

```plaintext
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
```

```plaintext
CXXC 520.omnetpp_r(base) 523.xalancbmk_r(base) 531.deepsjeng_r(base) 541.leela_r(base)
```

```plaintext
icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
```

```plaintext
CXXC 520.omnetpp_r(peak) 523.xalancbmk_r(peak) 531.deepsjeng_r(peak) 541.leela_r(peak)
```

```plaintext
icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
```

```plaintext
FC 548.exchange2_r(base, peak)
```

```plaintext
ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
```

**Base Compiler Invocation**

C benchmarks:
```
icc
```

C++ benchmarks:
```
icpc
```

Fortran benchmarks:
```
ifort
```
## Dell Inc.
PowerEdge MX740c (Intel Xeon Bronze 3104 CPU, 1.70GHz)

<table>
<thead>
<tr>
<th>SPECrate2017_int_base = 33.1</th>
<th>SPECrate2017_int_peak = 34.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU2017 License: 55</td>
<td>Test Date: May-2018</td>
</tr>
<tr>
<td>Test Sponsor: Dell Inc.</td>
<td>Hardware Availability: Sep-2017</td>
</tr>
<tr>
<td>Tested by: Dell Inc.</td>
<td>Software Availability: Sep-2017</td>
</tr>
</tbody>
</table>

### 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:**
-Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=3 -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
Dell Inc.  
PowerEdge MX740c (Intel Xeon Bronze 3104 CPU, 1.70GHz)  

SPECrate2017_int_base = 33.1  
SPECrate2017_int_peak = 34.5

**Peak Compiler Invocation**

C benchmarks:  
- icc

C++ benchmarks:  
- icpc

Fortran benchmarks:  
- ifort

**Peak Portability Flags**

- 500.perlbench_r: -DSPEC_LP64 -DSPEC_LINUX_X64
- 502.gcc_r: -D_FILE_OFFSET_BITS=64
- 505.mcf_r: -DSPEC_LP64
- 520.omnetpp_r: -DSPEC_LP64
- 523.xalancbmk_r: -D_FILE_OFFSET_BITS=64 -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

(Continued on next page)
Dell Inc.
PowerEdge MX740c (Intel Xeon Bronze 3104 CPU, 1.70GHz)

SPECrate2017_int_base = 33.1
SPECrate2017_int_peak = 34.5

CPU2017 License: 55
Test Sponsor: Dell Inc.
Tested by: Dell Inc.
Test Date: May-2018
Hardware Availability: Sep-2017
Software Availability: Sep-2017

Peak Optimization Flags (Continued)

525.x264_r (continued):
-L/usr/local/je5.0.1-64/lib -ljemalloc

557.xz_r: Same as 505.mcf_r

C++ benchmarks:

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

523.xalancbmk_r: -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
-L/usr/local/je5.0.1-32/lib -ljemalloc

531.deepsjeng_r: Same as 520.omnetpp_r

541.leela_r: Same as 520.omnetpp_r

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 (except as noted below):
-m64 -std=c11

502.gcc_r: -m32 -std=c11

C++ benchmarks (except as noted below):
-m64

523.xalancbmk_r: -m32

Fortran benchmarks:
-m64

The flags files that were used to format this result can be browsed at
<table>
<thead>
<tr>
<th><strong>Test Sponsor:</strong></th>
<th>Dell Inc.</th>
<th><strong>Test Date:</strong></th>
<th>May-2018</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tested by:</strong></td>
<td>Dell Inc.</td>
<td><strong>Hardware Availability:</strong></td>
<td>Sep-2017</td>
</tr>
<tr>
<td><strong>CPU2017 License:</strong></td>
<td>55</td>
<td><strong>Software Availability:</strong></td>
<td>Sep-2017</td>
</tr>
</tbody>
</table>

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


**SPEC CPU2017 Integer Rate Result**

Dell Inc.
PowerEdge MX740c (Intel Xeon Bronze 3104 CPU, 1.70GHz)

<table>
<thead>
<tr>
<th><strong>SPECrate2017_int_base</strong></th>
<th>33.1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SPECrate2017_int_peak</strong></td>
<td>34.5</td>
</tr>
</tbody>
</table>

SPEC is a registered trademark of the Standard Performance Evaluation Corporation. All other brand and product names appearing in this result are trademarks or registered trademarks of their respective holders.

For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

Tested with SPEC CPU2017 v1.0.2 on 2018-05-17 20:09:33-0400.
Originally published on 2018-09-04.