Standard Performance Evaluation Corporation

Epsylon Sp. z o.o. Sp. Komandytowa
eterio 220 RA1 (Intel Xeon Silver 4208, 2.10 GHz)

SPECrate2017_int_base = 81.6
SPECrate2017_int_peak = 84.4

CPU2017 License: 9081
Test Sponsor: Epsylon Sp. z o.o. Sp. Komandytowa
Tested by: Epsylon Sp. z o.o. Sp. Komandytowa
Test Date: Jul-2019
Hardware Availability: Apr-2019
Software Availability: Nov-2018

Hardware
CPU Name: Intel Xeon Silver 4208
Max MHz.: 3200
Nominal: 2100
Enabled: 16 cores, 2 chips, 2 threads/core
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: 11 MB I+D on chip per chip
Other: None
Memory: 768 GB (24 x 32 GB 2Rx4 PC4-2666V-R, running at 2400)
Storage: 1 x 960 GB SSD SATA III
Other: None

Software
OS: Red Hat Enterprise Linux Server release 7.4 (Maipo)
Compiler: C/C++: Version 19.0.1.144 of Intel C/C++ Compiler Build 20181018 for Linux;
Fortran: Version 19.0.1.144 of Intel Fortran Compiler Build 20181018 for Linux
Parallel: No
Firmware: Version BIOS 02.01.0008 released Mar-2019
File System: ext4
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 32/64-bit
Other: jemalloc memory allocator V5.0.1
**SPEC CPU2017 Integer Rate Result**

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### Results Table

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<td>655</td>
</tr>
</tbody>
</table>

**SPECrate2017_int_base = 81.6**  
**SPECrate2017_int_peak = 84.4**

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:

```
LD_LIBRARY_PATH = "/cpu2017/lib/ia32:/cpu2017/lib/intel64:/cpu2017/je5.0.1-32:/cpu2017/je5.0.1-64"
```

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.

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
```

(Continued on next page)
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---

**General Notes (Continued)**

runcpu command invoked through numacl i.e.:
numactl --interleave=all runcpu <etc>

jemalloc:
jemalloc, a general purpose malloc implementation
built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5
sources available via jemalloc.net or https://github.com/jemalloc/jemalloc/releases

---

**Platform Notes**

BIOS Settings:
Intel(R) Hyper-Threading Tech = Enabled
CPU Power and Performance Policy = Performance
Intel(R) Turbo Boost Technology = Enabled
C1E = Disabled
Processor C6 = Disabled
IMC Interleaving = Auto
Sub_NUMA Cluster = Disabled
Set FAN Profile = Performance
Patrol Scrub = Disabled

Sysinfo program /cpu2017/bin/sysinfo
Rev: r5974 of 2018-05-19 9bced8f2999c33d61f64985e45859ea9
running on SUT Fri Jul 19 18:48:51 2019

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) Silver 4208 CPU @ 2.10GHz
  2 "physical id"s (chips)
  32 "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 : 8
siblings : 16
  physical 0: cores 0 1 2 3 4 5 6 7
  physical 1: cores 0 1 2 3 4 5 6 7

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

(Continued on next page)
SPEC CPU2017 Integer Rate Result

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Platform Notes (Continued)

On-line CPU(s) list: 0-31
Thread(s) per core: 2
Core(s) per socket: 8
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Silver 4208 CPU @ 2.10GHz
Stepping: 7
CPU MHz: 2499.984
CPU max MHz: 3200.0000
CPU min MHz: 800.0000
BogoMIPS: 4200.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 11264K
NUMA node0 CPU(s): 0-7,16-23
NUMA node1 CPU(s): 8-15,24-31
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 aperfmperf eagerfpu pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 fma cx16 xtpr pdcm pclid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch epb cat_l3 cdp_l3 invpcid_single intel_pt spec_ctrl ibpb_support tpr_shadow vmvi flexpriority ept vpid fsgsbase tsx_adjust bmi1 hle avx2 smep bmi2 ersed invpcid rtm cqm mpx rdtsa_a avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd avx512bw avx512vl xsaves opt xsaveopt xsaves xgetbv1 cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local dtherm ida arat pln pts hwp hwp_act_window hwp_epp hwp_pkg_req

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 1 2 3 4 5 6 7 16 17 18 19 20 21 22 23
node 0 size: 391875 MB
node 0 free: 368424 MB
node 1 cpus: 8 9 10 11 12 13 14 15 24 25 26 27 28 29 30 31
node 1 size: 393216 MB
node 1 free: 371831 MB
node distances:
node 0 1

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

From `/proc/meminfo`

<table>
<thead>
<tr>
<th>MemTotal:</th>
<th>791013240 kB</th>
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</thead>
<tbody>
<tr>
<td>HugePages_Total:</td>
<td>0</td>
</tr>
<tr>
<td>Hugepagesize:</td>
<td>2048 kB</td>
</tr>
</tbody>
</table>

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

```plaintext
os-release:
- NAME="Red Hat Enterprise Linux Server"
- VERSION="7.4 (Maipo)"
- ID="rhel"
- ID_LIKE="fedora"
- VARIANT="Server"
- VARIANT_ID="server"
- VERSION_ID="7.4"
- PRETTY_NAME="Red Hat Enterprise Linux"
```

```plaintext
redhat-release: Red Hat Enterprise Linux Server release 7.4 (Maipo)
```

```plaintext
system-release: Red Hat Enterprise Linux Server release 7.4 (Maipo)
```

```plaintext
system-release-cpe: cpe:/o:redhat:enterprise_linux:7.4:ga:server
```

```plaintext
uname -a:
- Linux SUT 3.10.0-693.21.1.el7.x86_64 #1 SMP Fri Feb 23 18:54:16 UTC 2018 x86_64 x86_64 GNU/Linux
```

**Kernel self-reported vulnerability status:**

- CVE-2017-5754 (Meltdown): Mitigation: PTI
- CVE-2017-5753 (Spectre variant 1): Mitigation: Load fences
- CVE-2017-5715 (Spectre variant 2): Mitigation: IBRS (kernel)

**run-level 3 Jul 17 20:35**

**SPEC is set to: /cpu2017**

```plaintext
Filesystem     Type  Size  Used Avail Use% Mounted on
/dev/sda1      ext4  825G  128G  656G 17% /
```

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 Intel Corporation SE5C620.86B.02.01.0008.031920191559 03/19/2019
- Memory:
  - 24x Samsung M393A4K40CB2-CTD 32 GB 2 rank 2666, configured at 2400

(End of data from sysinfo program)
Compiler Version Notes

==============================================================================
CC   502.gcc_r(peak)
Intel(R) C Intel(R) 64 Compiler for applications running on IA-32, Version
19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

==============================================================================
CC  500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base, peak)
   525.x264_r(base, peak) 557.xz_r(base, peak)

Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

==============================================================================
CC   500.perlbench_r(peak)
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

==============================================================================
CXXC 523.xalancbmk_r(peak)
Intel(R) C++ Intel(R) 64 Compiler for applications running on IA-32, Version
19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

==============================================================================
CXXC 520.omnetpp_r(base, peak) 523.xalancbmk_r(base) 531.deepsjeng_r(base,
   peak) 541.leela_r(base, peak)

Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

==============================================================================
FC  548.exchange2_r(base, peak)
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
64, Version 19.0.1.144 Build 20181018

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

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----------------------------------

Base Compiler Invocation

C benchmarks:
icc -m64 -std=c11

C++ benchmarks:
icpc -m64

Fortran benchmarks:
ifort -m64

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-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.1.144/linux/compiler/lib/intel64
-lqkmalloc

C++ benchmarks:
-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.1.144/linux/compiler/lib/intel64
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(Continued on next page)
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CPU2017 License: 9081
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Tested by: Epsylon Sp. z o.o. Sp. Komandytowa

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**Base Optimization Flags (Continued)**

Fortran benchmarks:
- `-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div`
- `-qopt-mem-layout-trans=4 -nostandard-realloc-lhs -align array32byte`
- `-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.1.144/linux/compiler/lib/intel64 -lqkmalloc`

---

**Peak Compiler Invocation**

C benchmarks (except as noted below):
- `icc -m64 -std=c11`


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

523.xalancbmk_r: `icpc -m32 -L/usr/local/IntelCompiler19/compilers_and_libraries_2019.1.144/linux/compiler/lib/ia32_lin`

Fortran benchmarks:
- `ifort -m64`

---

**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`

---

**Peak Optimization Flags**

C benchmarks:
- `500.perlbench_r: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo`
- `-xCORE-AVX512 -O3 -no-prec-div -qopt-mem-layout-trans=4`

(Continued on next page)
## Epsylon Sp. z o.o. Sp. Komandytowa

Epsylon Sp. z o.o. Sp. Komandytowa

### Epsylon Sp. z o.o. Sp. Komandytowa

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<td>Nov-2018</td>
</tr>
</tbody>
</table>

### Peak Optimization Flags (Continued)

#### Perlbench

500.perlbench_r (continued):
- `-fno-strict-overflow`
- `-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.1.144/linux/compiler/lib/intel64`
- `-lqkmalloc`

502.gcc_r: `-Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo`
- `-xCORE-AVX512` `-O3` `-no-prec-div`
- `-qopt-mem-layout-trans=4`
- `-L/usr/local/je5.0.1-32/lib` `-ljemalloc`

505.mcf_r: `-Wl,-z,muldefs -xCORE-AVX512` `-ipo` `-O3` `-no-prec-div`
- `-qopt-mem-layout-trans=4`
- `-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.1.144/linux/compiler/lib/intel64`
- `-lqkmalloc`

525.x264_r: `-Wl,-z,muldefs -xCORE-AVX512` `-ipo` `-O3` `-no-prec-div`
- `-qopt-mem-layout-trans=4` `-fno-alias`
- `-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.1.144/linux/compiler/lib/intel64`
- `-lqkmalloc`

557.xz_r: Same as 505.mcf_r

#### C++ benchmarks

520.omnetpp_r: `-Wl,-z,muldefs -xCORE-AVX512` `-ipo` `-O3` `-no-prec-div`
- `-qopt-mem-layout-trans=4`
- `-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.1.144/linux/compiler/lib/intel64`
- `-lqkmalloc`

523.xalancbmk_r: `-Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo`
- `-xCORE-AVX512` `-O3` `-no-prec-div`
- `-qopt-mem-layout-trans=4`
- `-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-AVX512` `-ipo` `-O3` `-no-prec-div`
- `-qopt-mem-layout-trans=4` `-nostandard-realloc-lhs` `-align array32byte`
- `-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.1.144/linux/compiler/lib/intel64`
- `-lqkmalloc`

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

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**Specifications**

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<td>Tested by:</td>
<td>Epsylon Sp. z o.o. Sp. Komandytowa</td>
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<td>Test Date:</td>
<td>Jul-2019</td>
</tr>
<tr>
<td>Hardware Availability:</td>
<td>Apr-2019</td>
</tr>
<tr>
<td>Software Availability:</td>
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You can also download the XML flags sources by saving the following links:

http://www.spec.org/cpu2017/flags/Intel-ic19.0u1-official-linux64.2019-08-06.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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