# SPEC® CPU2017 Integer Rate Result

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

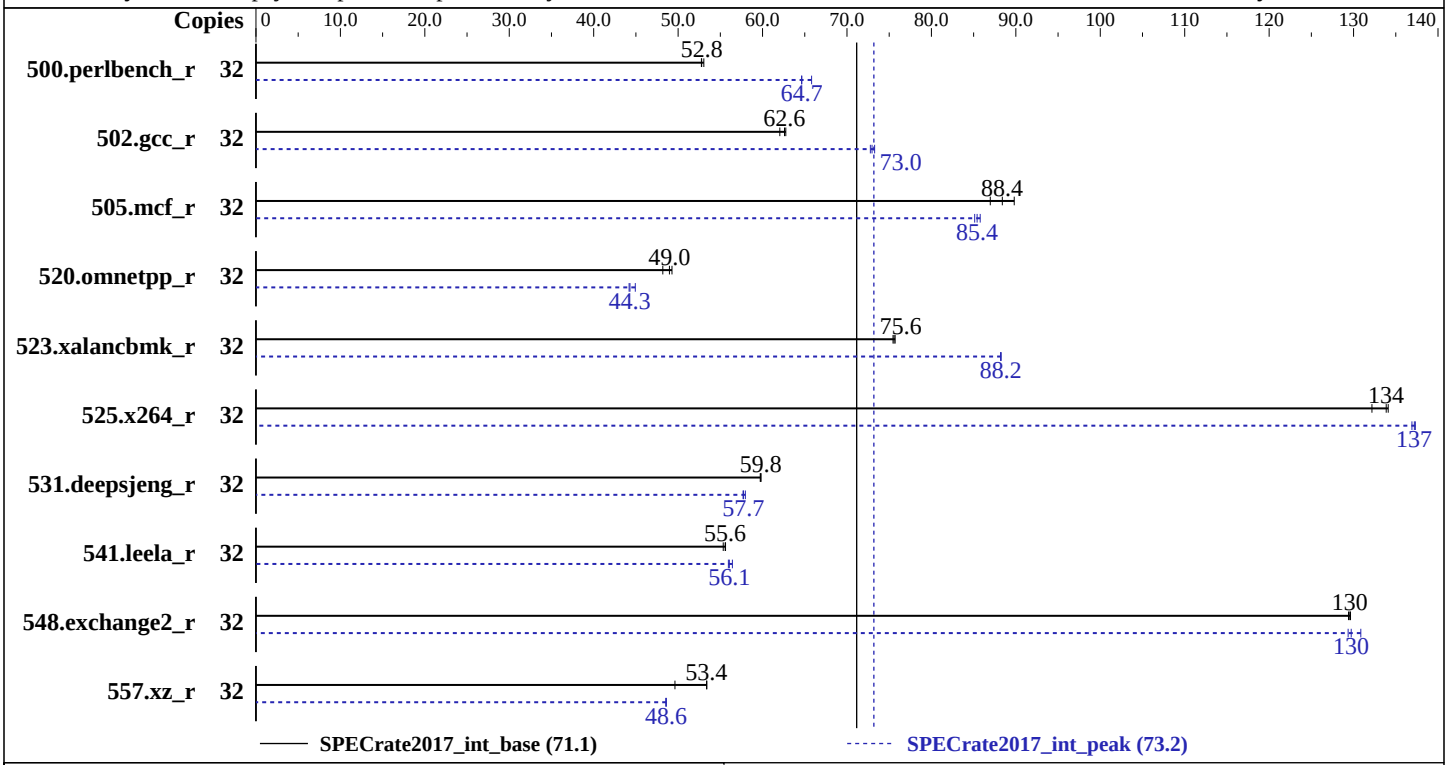
eterio 820 RA1 (Intel Xeon Silver 4109T, 2.00 GHz)

SPECrate2017_int_base = 71.1

SPECrate2017_int_peak = 73.2

**CPU2017 License:** 9081
**Test Sponsor:** Epsylon Sp. z o.o. Sp. Komandytowa
**Tested by:** Epsylon Sp. z o.o. Sp. Komandytowa

**Test Date:** Apr-2018
**Hardware Availability:** Sep-2017
**Software Availability:** Mar-2018




## Hardware

| | |
|---|---|
| CPU Name: | Intel Xeon Silver 4109T |
| Max MHz.: | 3000 |
| Nominal: | 2000 |
| 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: | 256 GB (16 x 16 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)<br>3.10.0-693.21.1.el7.x86_64 |
| Compiler: | C/C++: Version 18.0.0.128 of Intel C/C++ Compiler for Linux;<br>Fortran: Version 18.0.0.128 of Intel Fortran Compiler for Linux |
| Parallel: | No |
| Firmware: | Version BIOSR0013 released Mar-2018 |
| File System: | ext4 |
| 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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## Results Table

| Benchmark | Base | | | | | | | Peak | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Copies | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio | Copies | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio |
| 500.perlbench_r | 32 | 960 | 53.0 | **965** | **52.8** | 966 | 52.8 | 32 | 774 | 65.8 | 788 | 64.6 | **788** | **64.7** |
| 502.gcc_r | 32 | **724** | **62.6** | 722 | 62.8 | 730 | 62.0 | 32 | 618 | 73.3 | **621** | **73.0** | 623 | 72.8 |
| 505.mcf_r | 32 | **585** | **88.4** | 576 | 89.8 | 595 | 87.0 | 32 | 603 | 85.8 | 607 | 85.1 | **605** | **85.4** |
| 520.omnetpp_r | 32 | 852 | 49.3 | 871 | 48.2 | **857** | **49.0** | 32 | 934 | 44.9 | 950 | 44.2 | **948** | **44.3** |
| 523.xalancbmk_r | 32 | 448 | 75.5 | 446 | 75.7 | **447** | **75.6** | 32 | **383** | **88.2** | 383 | 88.2 | 383 | 88.3 |
| 525.x264_r | 32 | 424 | 132 | **419** | **134** | 418 | 134 | 32 | 409 | 137 | **408** | **137** | 408 | 137 |
| 531.deepsjeng_r | 32 | 614 | 59.7 | **613** | **59.8** | 613 | 59.8 | 32 | 636 | 57.7 | **635** | **57.7** | 633 | 58.0 |
| 541.leela_r | 32 | 958 | 55.3 | **954** | **55.6** | 953 | 55.6 | 32 | 947 | 56.0 | 939 | 56.4 | **945** | **56.1** |
| 548.exchange2_r | 32 | 647 | 130 | **647** | **130** | 648 | 129 | 32 | 648 | 129 | 641 | 131 | **646** | **130** |
| 557.xz_r | 32 | **648** | **53.4** | 647 | 53.4 | 696 | 49.6 | 32 | **712** | **48.6** | 712 | 48.6 | 711 | 48.6 |

**SPECrate2017_int_base = 71.1**

**SPECrate2017_int_peak = 73.2**

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 = "/cpu2017.1.0/lib/ia32:/cpu2017.1.0/lib/intel64:/cpu2017.1.0/je5.0.1-32:/cpu2017.1.0/je5.0.1-64"

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

 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)**

## General Notes (Continued)

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

jemalloc:
configured and built at default for 32bit (i686) and 64bit (x86_64) targets;
built with the RedHat Enterprise 7.4, 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 /cpu2017.1.0/bin/sysinfo
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f
running on SUT Fri Apr 13 13:13:34 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) Silver 4109T CPU @ 2.00GHz
      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
```

**(Continued on next page)**

## Platform Notes (Continued)

```
      CPU(s):                32
      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 4109T CPU @ 2.00GHz
      Stepping:              4
      CPU MHz:               2112.031
      CPU max MHz:           3000.0000
      CPU min MHz:           800.0000
      BogoMIPS:              4000.00
      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 art 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 pcid 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 vnmi flexpriority ept vpid fsgsbase
      tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cqm mpx rdt_a avx512f avx512dq
      rdseed adx smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt xsavec 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

  /proc/cpuinfo cache data
     cache size : 11264 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 1 2 3 4 5 6 7 16 17 18 19 20 21 22 23
    node 0 size: 129740 MB
    node 0 free: 126394 MB
    node 1 cpus: 8 9 10 11 12 13 14 15 24 25 26 27 28 29 30 31
    node 1 size: 131072 MB
    node 1 free: 127815 MB
    node distances:
```

**(Continued on next page)**

## Platform Notes (Continued)

```
  node   0   1
    0:  10  21
    1:  21  10

From /proc/meminfo
   MemTotal:       262574112 kB
   HugePages_Total:       0
   Hugepagesize:       2048 kB

From /etc/*release* /etc/*version*
   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"
   redhat-release: Red Hat Enterprise Linux Server release 7.4 (Maipo)
   system-release: Red Hat Enterprise Linux Server release 7.4 (Maipo)
   system-release-cpe: cpe:/o:redhat:enterprise_linux:7.4:ga:server

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
   x86_64 GNU/Linux

run-level 3 Apr 13 13:10

SPEC is set to: /cpu2017.1.0
   Filesystem     Type  Size  Used Avail Use% Mounted on
   /dev/sda1      ext4  825G   68G  716G   9% /

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.00.01.0013.030920180427 03/09/2018
  Memory:
   16x Samsung M393A2G40EB2-CTD 16 GB 2 rank 2666, configured at 2400

(End of data from sysinfo program)
```

## Compiler Version Notes

```
==============================================================================
 CC  500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base, peak)
     525.x264_r(base, peak) 557.xz_r(base, peak)
------------------------------------------------------------------------------
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------

==============================================================================
CC   500.perlbench_r(peak) 502.gcc_r(peak)
------------------------------------------------------------------------------
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------

==============================================================================
 CXXC 520.omnetpp_r(base) 523.xalancbmk_r(base) 531.deepsjeng_r(base)
      541.leela_r(base)
------------------------------------------------------------------------------
icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------

==============================================================================
CXXC 520.omnetpp_r(peak) 523.xalancbmk_r(peak) 531.deepsjeng_r(peak)
     541.leela_r(peak)
------------------------------------------------------------------------------
icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------

==============================================================================
 FC  548.exchange2_r(base, peak)
------------------------------------------------------------------------------
ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------
```

## Base Compiler Invocation

C benchmarks:
icc

C++ benchmarks:
icpc

**(Continued on next page)**

## Base Compiler Invocation (Continued)

Fortran benchmarks:
ifort

## 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=3 -L/usr/local/je5.0.1-64/lib -ljemalloc

C++ benchmarks:
-Wl,-z,muldefs -xCORE-AVX512 -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-AVX512 -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

**(Continued on next page)**

## Base Other Flags (Continued)

Fortran benchmarks:
-m64

## 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

## 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=3
-fno-strict-overflow -L/usr/local/je5.0.1-64/lib
-ljemalloc

502.gcc_r: -L/opt/intel/compilers_and_libraries_2018/linux/lib/ia32
-Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo
-xCORE-AVX512 -O3 -no-prec-div -qopt-mem-layout-trans=3
-L/usr/local/je5.0.1-32/lib -ljemalloc

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## Peak Optimization Flags (Continued)

505.mcf_r: `-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-mem-layout-trans=3 -L/usr/local/je5.0.1-64/lib -ljemalloc`

525.x264_r: `-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-mem-layout-trans=3 -fno-alias -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-AVX512 -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-AVX512 -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-AVX512 -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`

**(Continued on next page)**

## Peak Other Flags (Continued)

Fortran benchmarks:
-m64

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.2017-10-19.html
http://www.spec.org/cpu2017/flags/Epsylon-Platform-Flags-RevA-Feb-2018-For-Intel-Platform.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.2017-10-19.xml
http://www.spec.org/cpu2017/flags/Epsylon-Platform-Flags-RevA-Feb-2018-For-Intel-Platform.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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