SPEC® CPU2017 Integer Rate Result

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Lenovo Global Technology

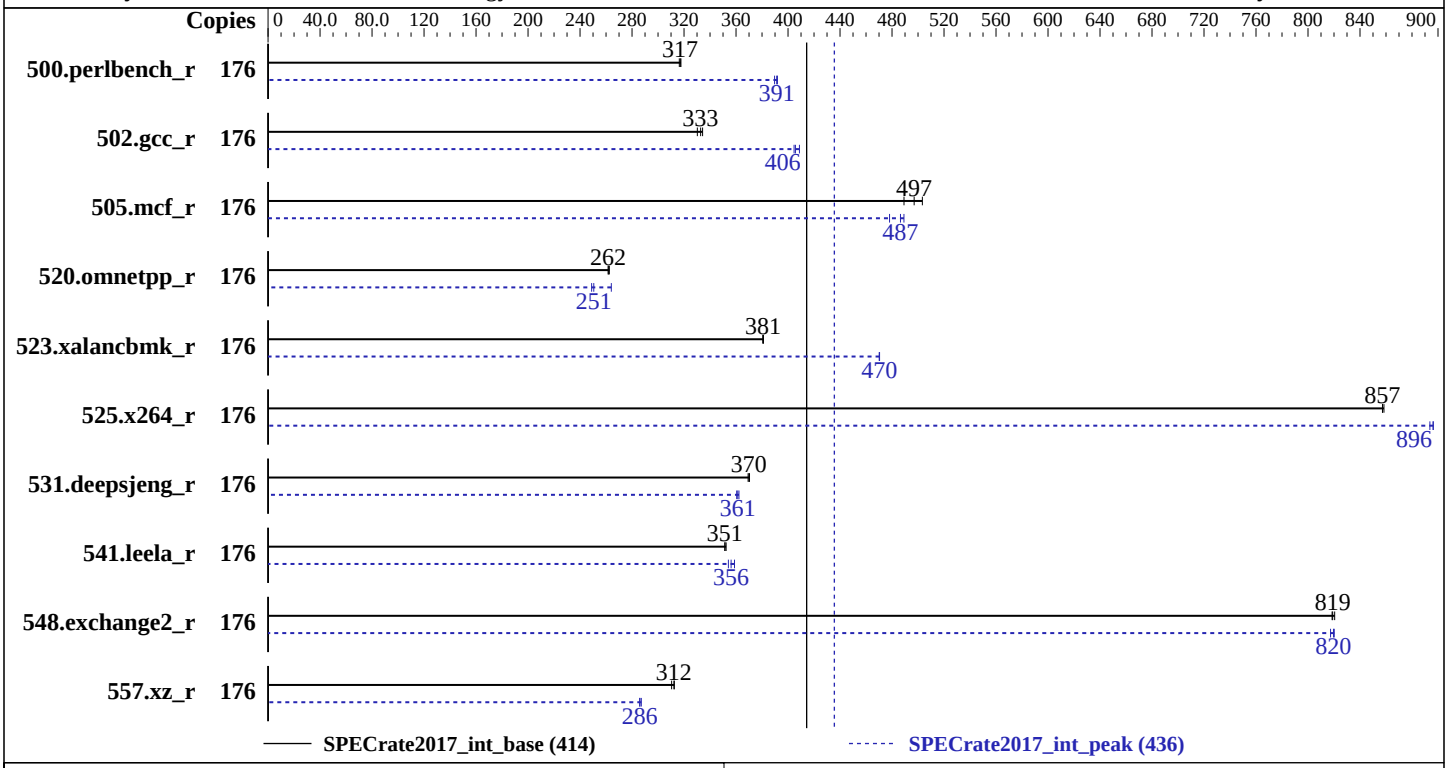
ThinkSystem SR850
(2.10 GHz, Intel Xeon Gold 6152)

SPECrate2017_int_base = 414

SPECrate2017_int_peak = 436

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology

Test Date: May-2018
Hardware Availability: Aug-2017
Software Availability: Feb-2018



Hardware

CPU Name:	Intel Xeon Gold 6152
Max MHz.:	3700
Nominal:	2100
Enabled:	88 cores, 4 chips, 2 threads/core
Orderable:	2,4 chips
Cache L1:	32 KB I + 32 KB D on chip per core
L2:	1 MB I+D on chip per core
L3:	30.25 MB I+D on chip per chip
Other:	None
Memory:	1536 GB (48 x 32 GB 2Rx4 PC4-2666V-R)
Storage:	1 x 800 GB SAS SSD
Other:	None

Software

OS:	SUSE Linux Enterprise Server 12 SP2 (x86_64) Kernel 4.4.114-92.64-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:	Lenovo BIOS Version TEE119R 1.22 released Feb-2018
File System:	btrfs
System State:	Run level 3 (multi-user)
Base Pointers:	64-bit
Peak Pointers:	32/64-bit
Other:	jemalloc: 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	176	886	316	882	318	**883**	**317**	176	715	392	**716**	**391**	719	390
502.gcc_r	176	**749**	**333**	755	330	746	334	176	610	409	**614**	**406**	616	405
505.mcf_r	176	**572**	**497**	565	503	581	489	176	581	489	595	478	**585**	**487**
520.omnetpp_r	176	882	262	880	263	**882**	**262**	176	874	264	928	249	**922**	**251**
523.xalancbmk_r	176	488	381	**488**	**381**	488	381	176	395	470	**395**	**470**	395	470
525.x264_r	176	**359**	**857**	359	858	359	857	176	**344**	**896**	344	896	345	894
531.deepsjeng_r	176	546	369	545	370	**545**	**370**	176	560	360	**558**	**361**	557	362
541.leela_r	176	829	351	827	352	**829**	**351**	176	823	354	**818**	**356**	812	359
548.exchange2_r	176	**563**	**819**	563	819	562	821	176	564	817	**563**	**820**	562	820
557.xz_r	176	**609**	**312**	608	313	612	310	176	665	286	**664**	**286**	662	287

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SPECrate2017_int_peak = 436

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 = "/home/cpu2017.1.0.2.ic18.0/lib/ia32:/home/cpu2017.1.0.2.ic18.0/lib/intel64"
LD_LIBRARY_PATH = "$LD_LIBRARY_PATH:/home/cpu2017.1.0.2.ic18.0/je5.0.1-32:/home/cpu2017.1.0.2.ic18.0/je5.0.1-64"
 Binaries compiled on a system with 1x Intel Core i7-4790 CPU + 32GB RAM
 memory using Redhat Enterprise Linux 7.4
 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: 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 from jemalloc.net or
```

(Continued on next page)

General Notes (Continued)

```
https://github.com/jemalloc/jemalloc/releases
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.
```

Platform Notes

```
BIOS configuration:
Choose Operating Mode set to Maximum Performance
SNC set to Enable
DCU Streamer Prefetcher set to Disable
MONITORMWAIT set to Enable
Execute Disable Bit set to Disable
DCA set to Enable
 Sysinfo program /home/cpu2017.1.0.2.ic18.0/bin/sysinfo
 Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f
 running on linux-nx6k Fri May 11 18:43:07 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) Gold 6152 CPU @ 2.10GHz
       4  "physical id"s (chips)
       176 "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 : 22
       siblings  : 44
       physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 16 17 18 19 20 21 24 25 26 27 28
       physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 16 17 18 19 20 21 24 25 26 27 28
       physical 2: cores 0 1 2 3 4 5 8 9 10 11 12 16 17 18 19 20 21 24 25 26 27 28
       physical 3: cores 0 1 2 3 4 5 8 9 10 11 12 16 17 18 19 20 21 24 25 26 27 28

 From lscpu:
      Architecture:          x86_64
      CPU op-mode(s):        32-bit, 64-bit
      Byte Order:            Little Endian
      CPU(s):                176
      On-line CPU(s) list:   0-175
      Thread(s) per core:    2
      Core(s) per socket:    22
```

(Continued on next page)

Platform Notes (Continued)

```
      Socket(s):             4
      NUMA node(s):          8
      Vendor ID:             GenuineIntel
      CPU family:            6
      Model:                 85
      Model name:            Intel(R) Xeon(R) Gold 6152 CPU @ 2.10GHz
      Stepping:              4
      CPU MHz:               2095.089
      BogoMIPS:              4190.17
      Virtualization:        VT-x
      L1d cache:             32K
      L1i cache:             32K
      L2 cache:              1024K
      L3 cache:              30976K
      NUMA node0 CPU(s):     0-2,6-8,11-13,17,18,88-90,94-96,99-101,105,106
      NUMA node1 CPU(s):     3-5,9,10,14-16,19-21,91-93,97,98,102-104,107-109
      NUMA node2 CPU(s):     22-24,28-30,33-35,39,40,110-112,116-118,121-123,127,128
      NUMA node3 CPU(s):     25-27,31,32,36-38,41-43,113-115,119,120,124-126,129-131
      NUMA node4 CPU(s):     44-46,50-52,55-57,61,62,132-134,138-140,143-145,149,150
      NUMA node5 CPU(s):     47-49,53,54,58-60,63-65,135-137,141,142,146-148,151-153
      NUMA node6 CPU(s):     66-68,72-74,77-79,83,84,154-156,160-162,165-167,171,172
      NUMA node7 CPU(s):     69-71,75,76,80-82,85-87,157-159,163,164,168-170,173-175
      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 3dnowprefetch ida arat epb invpcid_single pln pts
      dtherm intel_pt rsb_ctxsw spec_ctrl retpoline kaiser tpr_shadow vnmi flexpriority
      ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cqm mpx
      avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt
      xsavec xgetbv1 cqm_llc cqm_occup_llc

  /proc/cpuinfo cache data
     cache size : 30976 KB

  From numactl --hardware  WARNING: a numactl 'node' might or might not correspond to a
  physical chip.
    available: 8 nodes (0-7)
    node 0 cpus: 0 1 2 6 7 8 11 12 13 17 18 88 89 90 94 95 96 99 100 101 105 106
    node 0 size: 193129 MB
    node 0 free: 192874 MB
    node 1 cpus: 3 4 5 9 10 14 15 16 19 20 21 91 92 93 97 98 102 103 104 107 108 109
    node 1 size: 193528 MB
    node 1 free: 193320 MB
    node 2 cpus: 22 23 24 28 29 30 33 34 35 39 40 110 111 112 116 117 118 121 122 123 127
    128
```

(Continued on next page)

Platform Notes (Continued)

```
   node 2 size: 193528 MB
   node 2 free: 193313 MB
   node 3 cpus: 25 26 27 31 32 36 37 38 41 42 43 113 114 115 119 120 124 125 126 129 130
   131
   node 3 size: 193528 MB
   node 3 free: 193159 MB
   node 4 cpus: 44 45 46 50 51 52 55 56 57 61 62 132 133 134 138 139 140 143 144 145 149
   150
   node 4 size: 193528 MB
   node 4 free: 193329 MB
   node 5 cpus: 47 48 49 53 54 58 59 60 63 64 65 135 136 137 141 142 146 147 148 151 152
   153
   node 5 size: 193528 MB
   node 5 free: 193357 MB
   node 6 cpus: 66 67 68 72 73 74 77 78 79 83 84 154 155 156 160 161 162 165 166 167 171
   172
   node 6 size: 193528 MB
   node 6 free: 193265 MB
   node 7 cpus: 69 70 71 75 76 80 81 82 85 86 87 157 158 159 163 164 168 169 170 173 174
   175
   node 7 size: 193525 MB
   node 7 free: 193341 MB
   node distances:
   node   0   1   2   3   4   5   6   7
     0:  10  11  21  21  21  21  31  31
     1:  11  10  21  21  21  21  31  31
     2:  21  21  10  11  31  31  21  21
     3:  21  21  11  10  31  31  21  21
     4:  21  21  31  31  10  11  21  21
     5:  21  21  31  31  11  10  21  21
     6:  31  31  21  21  21  21  10  11
     7:  31  31  21  21  21  21  11  10

  From /proc/meminfo
     MemTotal:       1584974096 kB
     HugePages_Total:       0
     Hugepagesize:       2048 kB

  From /etc/*release* /etc/*version*
     SuSE-release:
        SUSE Linux Enterprise Server 12 (x86_64)
        VERSION = 12
        PATCHLEVEL = 2
        # 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"
```

(Continued on next page)

Platform Notes (Continued)

```
       VERSION="12-SP2"
       VERSION_ID="12.2"
       PRETTY_NAME="SUSE Linux Enterprise Server 12 SP2"
       ID="sles"
       ANSI_COLOR="0;32"
       CPE_NAME="cpe:/o:suse:sles:12:sp2"

 uname -a:
    Linux linux-nx6k 4.4.114-92.64-default #1 SMP Thu Feb 1 19:18:19 UTC 2018 (c6ce5db)
    x86_64 x86_64 x86_64 GNU/Linux

 run-level 3 May 11 18:41

 SPEC is set to: /home/cpu2017.1.0.2.ic18.0
    Filesystem     Type   Size  Used Avail Use% Mounted on
    /dev/sda2      btrfs  744G  282G  462G  38% /home

 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 Lenovo -[TEE119R-1.22]- 02/06/2018
   Memory:
    48x Samsung M393A4K40BB2-CTD 32 GB 2 rank 2666

 (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)
```

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Compiler Version Notes (Continued)

```
      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

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

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Base Portability Flags (Continued)

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

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

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

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Peak Optimization Flags (Continued)

523.xalancbmk_r (continued):
-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

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.html
http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-SKL-C.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.xml
http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-SKL-C.xml

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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 2018-05-11 06:43:06-0400.
Report generated on 2018-10-31 17:56:41 by CPU2017 PS formatter v6067.
Originally published on 2018-06-12.