SPEC CPU®2017 Integer Rate Result

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Hewlett Packard Enterprise

(Test Sponsor: HPE)

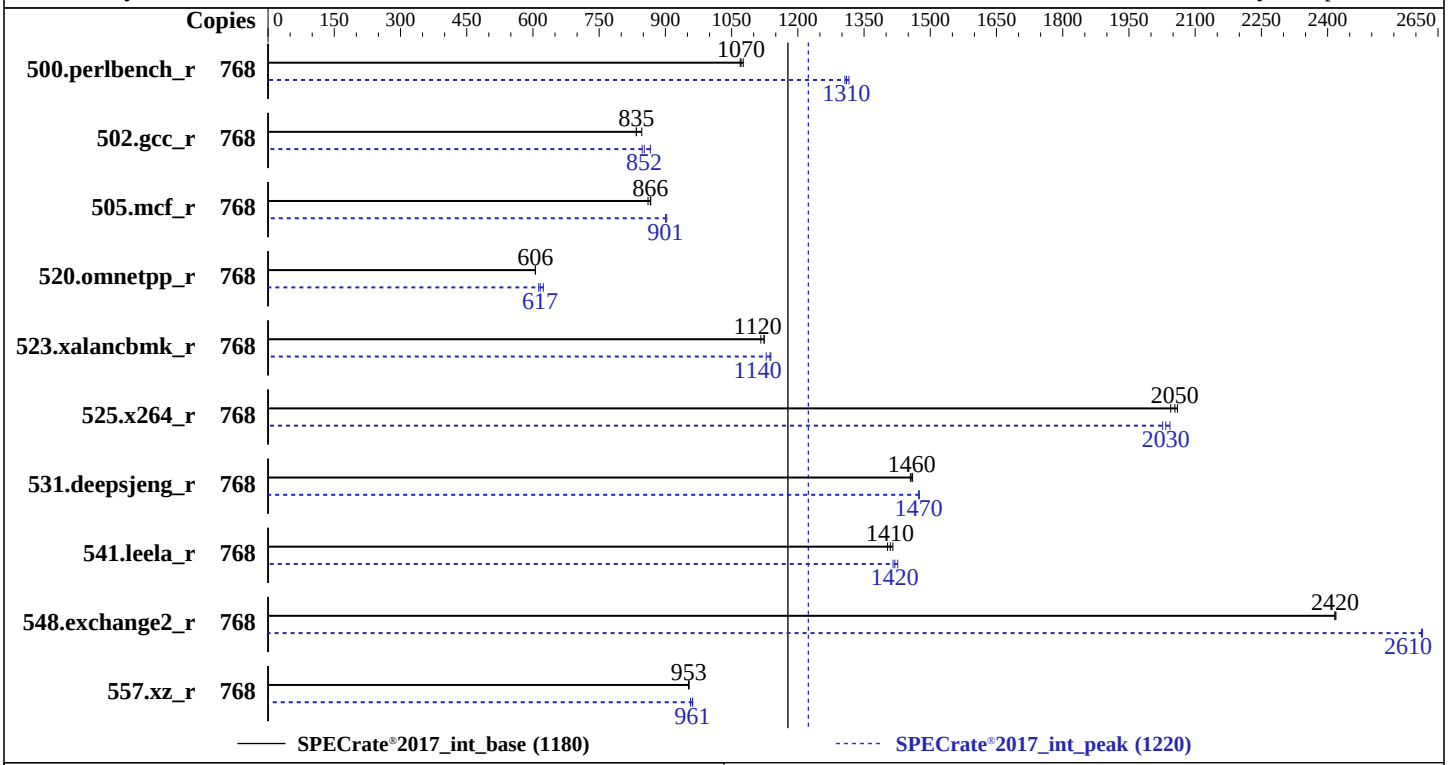
Integrity Superdome X
(384 core, 2.20 GHz, Intel Xeon E7-8890 v4)

SPECrate®2017_int_base = 1180

SPECrate®2017_int_peak = 1220

CPU2017 License: 3
Test Sponsor: HPE
Tested by: HPE

Test Date: Dec-2016
Hardware Availability: Jun-2016
Software Availability: Sep-2016



Hardware

CPU Name:	Intel Xeon E7-8890 v4
Max MHz:	3400
Nominal:	2200
Enabled:	384 cores, 16 chips, 2 threads/core
Orderable:	2 to 16 chips
Cache L1:	32 KB I + 32 KB D on chip per core
L2:	256 KB I+D on chip per core
L3:	60 MB I+D on chip per chip
Other:	None
Memory:	4 TB (128 x 32 GB 2Rx4 PC4-2400T-L, running at 1600)
Storage:	8 x C8S59A, 900 GB 10 K RPM SAS
Other:	None

Software

OS:	SUSE Linux Enterprise Server 12 (x86_64) SP1 Kernel 3.12.53-60.30-default
Compiler:	C/C++: Version 17.0.0.098 of Intel C/C++ Compiler for Linux; Fortran: Version 17.0.0.098 of Intel Fortran Compiler for Linux
Parallel:	No
Firmware:	HP Bundle: 008.004.084 SFW: 043.025.000 08/16/2016
File System:	xfs
System State:	Run level 5 (multi-user, w/GUI)
Base Pointers:	32/64-bit
Peak Pointers:	32/64-bit
Other:	Microquill SmartHeap V10.2
Power Management:	--

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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	768	1136	1080	1143	1070	**1141**	**1070**	768	936	1310	929	1320	**933**	**1310**
502.gcc_r	768	**1303**	**835**	1304	834	1285	847	768	1256	866	1283	847	**1276**	**852**
505.mcf_r	768	**1433**	**866**	1442	861	1432	867	768	1374	903	**1378**	**901**	1379	900
520.omnetpp_r	768	1663	606	**1664**	**606**	1664	605	768	1616	624	**1634**	**617**	1644	613
523.xalancbmk_r	768	722	1120	**722**	**1120**	727	1120	768	**713**	**1140**	719	1130	712	1140
525.x264_r	768	658	2040	**655**	**2050**	653	2060	768	664	2030	658	2040	**661**	**2030**
531.deepsjeng_r	768	603	1460	**604**	**1460**	605	1450	768	597	1470	**597**	**1470**	597	1470
541.leela_r	768	906	1400	**902**	**1410**	899	1420	768	898	1420	892	1430	**896**	**1420**
548.exchange2_r	768	833	2420	**833**	**2420**	832	2420	768	**770**	**2610**	769	2620	770	2610
557.xz_r	768	871	953	870	953	**870**	**953**	768	**863**	**961**	862	962	867	957

SPECrate®2017_int_base = 1180

SPECrate®2017_int_peak = 1220

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

Submit Notes

```
The config file option 'submit' was used.
```

Operating System Notes

```
Stack size set to unlimited using "ulimit -s unlimited"
intel_idle.max_cstate=3 appended in kernel command line
Power profile set with:
   cpupower -c all frequency-set -g performance
Setting the value of perf-bias:
  cpupower set -b 0
Tuned profile set with:
  tuned-adm profile throughput-performance
Transparent Huge Pages enabled by default
Filesystem page cache cleared with:
 echo 1 >       /proc/sys/vm/drop_caches
runcpu command invoked through numactl i.e.:
 numactl --interleave=all runcpu <etc>
```

General Notes

```
Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = "/spec/cpu2017-rc4/lib/ia32:/spec/cpu2017-rc4/lib/intel64:/spec/cpu2017-rc4/sh10.2"

 Binaries compiled on a system with 1x Intel Core i7-4790K CPU + 32GB RAM
 memory using Redhat Enterprise Linux 7.2
```

Platform Notes

```
Firmware settings:
 Memory RAS Configuration set to Maximum Performance
 Sysinfo program /spec/cpu2017-rc4/Docs/sysinfo
 Rev: r5007 of 2016-11-15 fc8dc82f217779bedfed4d694d580ba9
 running on hawk049os1 Mon Dec  5 16:35:17 2016

 This section contains SUT (System Under Test) info as seen by some common
 utilities.
 For more information on this section, see
 http://www.spec.org/cpu2017/Docs/config.html#sysinfo

 From /proc/cpuinfo
    model name : Intel(R) Xeon(R) CPU E7-8890 v4 @ 2.20GHz
       16 "physical id"s (chips)
       768 "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 : 24
       siblings  : 48
       physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
       27 28 29
       physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
       27 28 29
       physical 2: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
       27 28 29
       physical 3: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
       27 28 29
       physical 4: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
       27 28 29
       physical 5: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
       27 28 29
       physical 6: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
       27 28 29
       physical 7: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
       27 28 29
       physical 8: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
       27 28 29
       physical 9: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
       27 28 29
       physical 10: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
       27 28 29
       physical 11: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
       27 28 29
       physical 12: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
       27 28 29
       physical 13: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
```

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Platform Notes (Continued)

```
      27 28 29
      physical 14: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
      27 28 29
      physical 15: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
      27 28 29
   cache size : 61440 KB

 The view from numactl --hardware follows.  WARNING: a numactl 'node' might or
 might not correspond to a physical chip.
   available: 16 nodes (0-15)
   node 0 cpus: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 384
   385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400 401 402 403
   404 405 406 407
   node 0 size: 258296 MB
   node 0 free: 257197 MB
   node 1 cpus: 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45
   46 47 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425
   426 427 428 429 430 431
   node 1 size: 258554 MB
   node 1 free: 257497 MB
   node 2 cpus: 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69
   70 71 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449
   450 451 452 453 454 455
   node 2 size: 258554 MB
   node 2 free: 257553 MB
   node 3 cpus: 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93
   94 95 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473
   474 475 476 477 478 479
   node 3 size: 258554 MB
   node 3 free: 257446 MB
   node 4 cpus: 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112
   113 114 115 116 117 118 119 480 481 482 483 484 485 486 487 488 489 490 491
   492 493 494 495 496 497 498 499 500 501 502 503
   node 4 size: 258554 MB
   node 4 free: 257517 MB
   node 5 cpus: 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135
   136 137 138 139 140 141 142 143 504 505 506 507 508 509 510 511 512 513 514
   515 516 517 518 519 520 521 522 523 524 525 526 527
   node 5 size: 258554 MB
   node 5 free: 257518 MB
   node 6 cpus: 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159
   160 161 162 163 164 165 166 167 528 529 530 531 532 533 534 535 536 537 538
   539 540 541 542 543 544 545 546 547 548 549 550 551
   node 6 size: 258554 MB
   node 6 free: 257471 MB
   node 7 cpus: 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183
   184 185 186 187 188 189 190 191 552 553 554 555 556 557 558 559 560 561 562
```

(Continued on next page)

Platform Notes (Continued)

```
563 564 565 566 567 568 569 570 571 572 573 574 575
node 7 size: 258554 MB
node 7 free: 257551 MB
node 8 cpus: 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207
208 209 210 211 212 213 214 215 576 577 578 579 580 581 582 583 584 585 586
587 588 589 590 591 592 593 594 595 596 597 598 599
node 8 size: 258554 MB
node 8 free: 257559 MB
node 9 cpus: 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231
232 233 234 235 236 237 238 239 600 601 602 603 604 605 606 607 608 609 610
611 612 613 614 615 616 617 618 619 620 621 622 623
node 9 size: 258554 MB
node 9 free: 257544 MB
node 10 cpus: 240 241 242 243 244 245 246 247 248 249 250 251 252 253 254 255
256 257 258 259 260 261 262 263 624 625 626 627 628 629 630 631 632 633 634
635 636 637 638 639 640 641 642 643 644 645 646 647
node 10 size: 258554 MB
node 10 free: 257560 MB
node 11 cpus: 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279
280 281 282 283 284 285 286 287 648 649 650 651 652 653 654 655 656 657 658
659 660 661 662 663 664 665 666 667 668 669 670 671
node 11 size: 258554 MB
node 11 free: 257539 MB
node 12 cpus: 288 289 290 291 292 293 294 295 296 297 298 299 300 301 302 303
304 305 306 307 308 309 310 311 672 673 674 675 676 677 678 679 680 681 682
683 684 685 686 687 688 689 690 691 692 693 694 695
node 12 size: 258554 MB
node 12 free: 257553 MB
node 13 cpus: 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327
328 329 330 331 332 333 334 335 696 697 698 699 700 701 702 703 704 705 706
707 708 709 710 711 712 713 714 715 716 717 718 719
node 13 size: 258554 MB
node 13 free: 257554 MB
node 14 cpus: 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350 351
352 353 354 355 356 357 358 359 720 721 722 723 724 725 726 727 728 729 730
731 732 733 734 735 736 737 738 739 740 741 742 743
node 14 size: 258554 MB
node 14 free: 257552 MB
node 15 cpus: 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375
376 377 378 379 380 381 382 383 744 745 746 747 748 749 750 751 752 753 754
755 756 757 758 759 760 761 762 763 764 765 766 767
node 15 size: 258549 MB
node 15 free: 257499 MB
node distances:
node   0   1   2   3   4   5   6   7   8   9  10  11  12  13  14  15
  0:  10  16  30  30  30  30  30  30  30  30  30  30  30  30  30  30
  1:  16  10  30  30  30  30  30  30  30  30  30  30  30  30  30  30
```

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Platform Notes (Continued)

```
     2:  30  30  10  16  30  30  30  30  30  30  30  30  30  30  30  30
     3:  30  30  16  10  30  30  30  30  30  30  30  30  30  30  30  30
     4:  30  30  30  30  10  16  30  30  30  30  30  30  30  30  30  30
     5:  30  30  30  30  16  10  30  30  30  30  30  30  30  30  30  30
     6:  30  30  30  30  30  30  10  16  30  30  30  30  30  30  30  30
     7:  30  30  30  30  30  30  16  10  30  30  30  30  30  30  30  30
     8:  30  30  30  30  30  30  30  30  10  16  30  30  30  30  30  30
     9:  30  30  30  30  30  30  30  30  16  10  30  30  30  30  30  30
    10:  30  30  30  30  30  30  30  30  30  30  10  16  30  30  30  30
    11:  30  30  30  30  30  30  30  30  30  30  16  10  30  30  30  30
    12:  30  30  30  30  30  30  30  30  30  30  30  30  10  16  30  30
    13:  30  30  30  30  30  30  30  30  30  30  30  30  16  10  30  30
    14:  30  30  30  30  30  30  30  30  30  30  30  30  30  30  10  16
    15:  30  30  30  30  30  30  30  30  30  30  30  30  30  30  16  10

  From /proc/meminfo
     MemTotal:       4235891396 kB
     HugePages_Total:       0
     Hugepagesize:       2048 kB

  /usr/bin/lsb_release -d
     SUSE Linux Enterprise Server 12 SP1

  From /etc/*release* /etc/*version*
     SuSE-release:
        SUSE Linux Enterprise Server 12 (x86_64)
        VERSION = 12
        PATCHLEVEL = 1
        # 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-SP1"
        VERSION_ID="12.1"
        PRETTY_NAME="SUSE Linux Enterprise Server 12 SP1"
        ID="sles"
        ANSI_COLOR="0;32"
        CPE_NAME="cpe:/o:suse:sles:12:sp1"

  uname -a:
     Linux hawk049os1 3.12.53-60.30-default #1 SMP Wed Feb 10 14:41:46 UTC 2016
     (e57129f) x86_64 x86_64 x86_64 GNU/Linux

  run-level 5 Dec 5 15:39

  SPEC is set to: /spec/cpu2017-rc4
```

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Platform Notes (Continued)

```
    Filesystem                                              Type  Size  Used Avail
    Use% Mounted on
    /dev/mapper/3600c0ff0001e1834e672ee5701000000-part1 xfs   1.9T  449G  1.5T
    24% /spec

 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 HP Bundle: 008.004.084 SFW: 043.025.000 08/16/2016
   Memory:
    128x HP HMA84GL7MFR4N-UH 32 GB 2 rank 1067 MHz, configured at 1600 MHz
    256x not defined not defined

 (End of data from sysinfo program)
 Regarding the sysinfo display about the memory installed, the correct amount of
 memory is 4 TB and the dmidecode description should have one line reading as:
 128x HP HMA84GL7MFR4N-UH 32 GB 2 rank 1067 MHz, configured at 1600 MHz
```

Compiler Version Notes

```
==============================================================================
C       | 500.perlbench_r(base, peak) 502.gcc_r(base, peak) 505.mcf_r(base,
        | peak) 525.x264_r(base, peak) 557.xz_r(base, peak)
------------------------------------------------------------------------------
icc (ICC) 17.0.0 20160721
Copyright (C) 1985-2016 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------

==============================================================================
C++     | 520.omnetpp_r(base, peak) 523.xalancbmk_r(base, peak)
        | 531.deepsjeng_r(base, peak) 541.leela_r(base, peak)
------------------------------------------------------------------------------
icpc (ICC) 17.0.0 20160721
Copyright (C) 1985-2016 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------

==============================================================================
Fortran | 548.exchange2_r(base, peak)
------------------------------------------------------------------------------
ifort (IFORT) 17.0.0 20160721
Copyright (C) 1985-2016 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------
```

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:
`-xCORE-AVX2 -ipo -O3 -no-prec-div -auto-p32 -qopt-prefetch -qopt-mem-layout-trans=3`

C++ benchmarks:
`-Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div -auto-p32 -qopt-prefetch -qopt-mem-layout-trans=3 -L/sh10.2 -lsmartheap64`

Fortran benchmarks:
`-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -qopt-mem-layout-trans=3 -nostandard-realloc-lhs`

Peak Compiler Invocation

C benchmarks:
`icc -m64 -std=c11`

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Peak Compiler Invocation (Continued)

C++ benchmarks:
icpc -m64

Fortran benchmarks:
ifort -m64

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:
-prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX2 -ipo -O3
-no-prec-div -auto-p32 -qopt-prefetch -qopt-mem-layout-trans=3

C++ benchmarks:
-Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX2 -ipo
-O3 -no-prec-div -auto-p32 -qopt-prefetch -qopt-mem-layout-trans=3
-L/sh10.2 -lsmartheap64

Fortran benchmarks:
-prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX2 -ipo -O3
-no-prec-div -qopt-prefetch -qopt-mem-layout-trans=3
-nostandard-realloc-lhs

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2017/flags/Intel-ic17.0-official-linux64-revD.html
http://www.spec.org/cpu2017/flags/HP-Platform-Flags-Intel-V1.2-Integrity-revC.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/Intel-ic17.0-official-linux64-revD.xml
http://www.spec.org/cpu2017/flags/HP-Platform-Flags-Intel-V1.2-Integrity-revC.xml

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Tested with SPEC CPU®2017 v0.904.0 on 2016-12-05 18:35:16-0500.
Report generated on 2020-02-06 17:16:42 by CPU2017 PS formatter v6255.
Originally published on 2017-06-19.