



SPEC® CPU2017 Floating Point Rate Result

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Hewlett Packard Enterprise

(Test Sponsor: HPE)

Integrity Superdome X

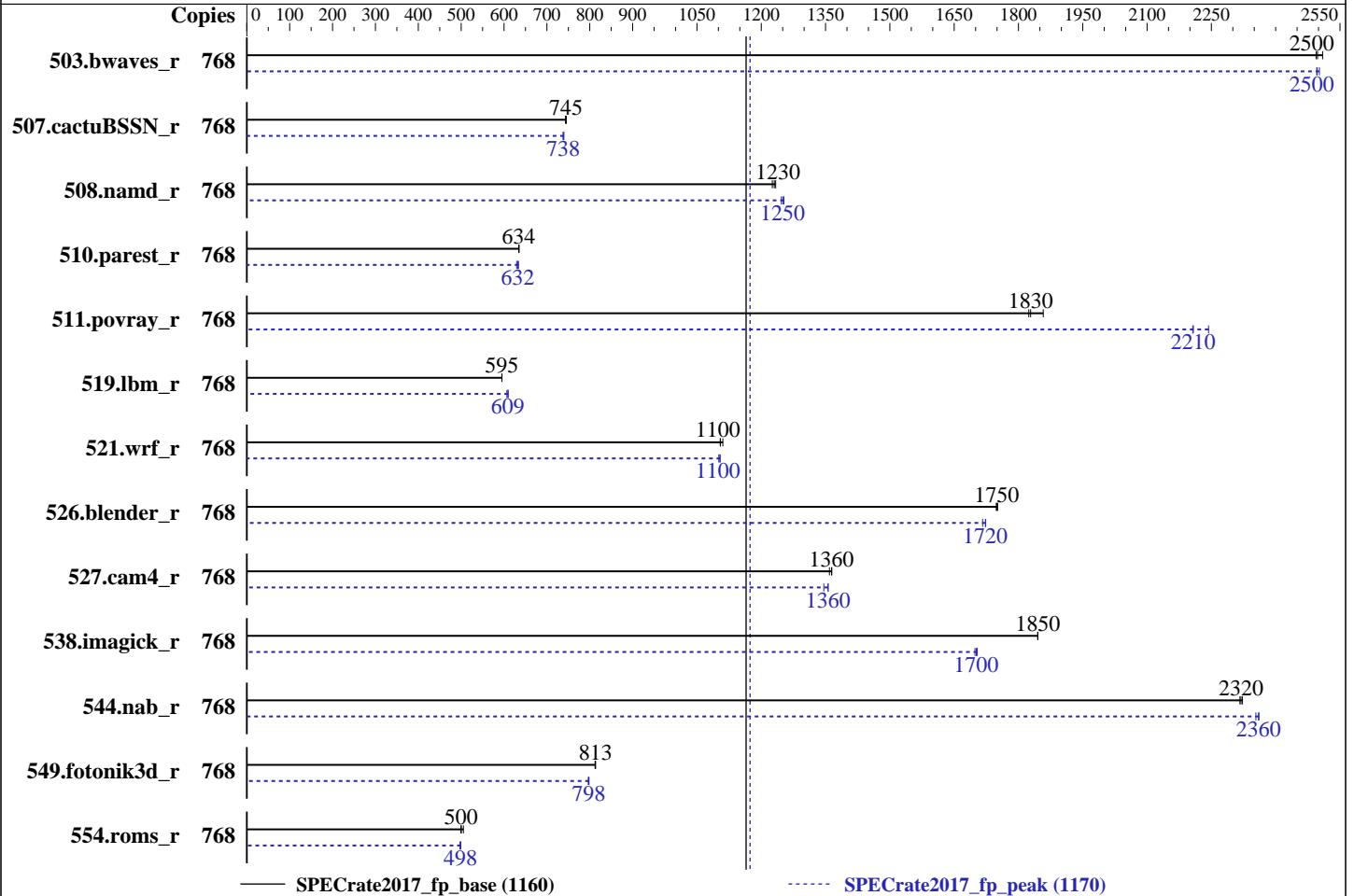
(384 core, 2.20 GHz, Intel Xeon E7-8890 v4)

SPECrate2017_fp_base = 1160

SPECrate2017_fp_peak = 1170

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 MHz)
 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: 64-bit
 Peak Pointers: 32/64-bit
 Other: Microquill SmartHeap V10.2



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Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
503.bwaves_r	768	3088	2490	3069	2510	3084	2500	768	3086	2500	3085	2500	3078	2500
507.cactuBSSN_r	768	1305	745	1305	745	1308	743	768	1318	738	1314	740	1317	738
508.namd_r	768	591	1230	595	1230	593	1230	768	585	1250	584	1250	582	1250
510.parest_r	768	3163	635	3167	634	3168	634	768	3192	629	3180	632	3170	634
511.povray_r	768	965	1860	983	1820	981	1830	768	812	2210	813	2210	799	2240
519.lbm_r	768	1360	595	1360	595	1360	595	768	1328	610	1334	607	1329	609
521.wrf_r	768	1558	1100	1549	1110	1558	1100	768	1562	1100	1558	1100	1562	1100
526.blender_r	768	669	1750	668	1750	668	1750	768	679	1720	679	1720	681	1720
527.cam4_r	768	988	1360	985	1360	985	1360	768	991	1360	991	1360	998	1350
538.imagick_r	768	1035	1840	1035	1850	1035	1850	768	1122	1700	1125	1700	1121	1700
544.nab_r	768	557	2320	558	2320	557	2320	768	548	2360	549	2350	547	2360
549.fotonik3d_r	768	3680	813	3684	812	3680	813	768	3750	798	3751	798	3758	796
554.roms_r	768	2416	505	2443	500	2440	500	768	2445	499	2449	498	2453	497

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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"

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General Notes (Continued)

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 hawk049osl Tue Dec 6 09:59:45 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

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Platform Notes (Continued)

```

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
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: 233927 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: 238883 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: 238986 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: 238864 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: 238981 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: 238960 MB
node 6 cpus: 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159

```

(Continued on next page)



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Platform Notes (Continued)

```

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: 238925 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
563 564 565 566 567 568 569 570 571 572 573 574 575
node 7 size: 258554 MB
node 7 free: 239004 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: 238998 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: 238976 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: 239003 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: 238990 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: 238999 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: 239007 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: 238992 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

```

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Platform Notes (Continued)

node 15 size: 258549 MB
node 15 free: 238944 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
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	16	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:
```

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Platform Notes (Continued)

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

Filesystem	Type	Size	Used	Avail
Use% Mounted on				
/dev/mapper/3600c0ff0001e1834e672ee5701000000-part1	xfs	1.9T	723G	1.2T
38% /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

Base Compiler Invocation

C benchmarks:

icc -m64 -std=c11

C++ benchmarks:

icpc -m64

Fortran benchmarks:

ifort -m64

Benchmarks using both Fortran and C:

ifort -m64 icc -m64 -std=c11

Benchmarks using both C and C++:

icpc -m64 icc -m64 -std=c11

Benchmarks using Fortran, C, and C++:

icpc -m64 icc -m64 -std=c11 ifort -m64



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Base Portability Flags

503.bwaves_r: -DSPEC_LP64
507.cactuBSSN_r: -DSPEC_LP64
508.namd_r: -DSPEC_LP64
510.parest_r: -DSPEC_LP64
511.povray_r: -DSPEC_LP64
519.lbm_r: -DSPEC_LP64
521.wrf_r: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
526.blender_r: -DSPEC_LP64 -DSPEC_LINUX -funsigned-char
527.cam4_r: -DSPEC_LP64 -DSPEC_CASE_FLAG
538.imagick_r: -DSPEC_LP64
544.nab_r: -DSPEC_LP64
549.fotonik3d_r: -DSPEC_LP64
554.roms_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

Benchmarks using both Fortran and C:

-xCORE-AVX2 -ipo -O3 -no-prec-div -auto-p32 -qopt-prefetch
-qopt-mem-layout-trans=3 -nostandard-realloc-lhs

Benchmarks using both C and C++:

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

Benchmarks using Fortran, C, and C++:

-Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div -auto-p32
-qopt-prefetch -qopt-mem-layout-trans=3 -nostandard-realloc-lhs
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Peak Compiler Invocation

C benchmarks:

`icc -m64 -std=c11`

C++ benchmarks:

`icpc -m64`

Fortran benchmarks:

`ifort -m64`

Benchmarks using both Fortran and C:

`ifort -m64 icc -m64 -std=c11`

Benchmarks using both C and C++:

`icpc -m64 icc -m64 -std=c11`

Benchmarks using Fortran, C, and C++:

`icpc -m64 icc -m64 -std=c11 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/shl0.2 -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`

Benchmarks using both Fortran and C:

`-prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX2 -ipo -O3
-no-prec-div -auto-p32 -qopt-prefetch -qopt-mem-layout-trans=3
-nostandard-realloc-lhs`

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Peak Optimization Flags (Continued)

Benchmarks using both C and C++:

```
-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
```

Benchmarks using Fortran, C, and C++:

```
-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  
-nostandard-realloc-lhs -L/sh10.2 -lsmartheap64
```

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

Tested with SPEC CPU2017 v0.904.0 on 2016-12-06 11:59:44-0500.

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