SPECaccel®2023 Result

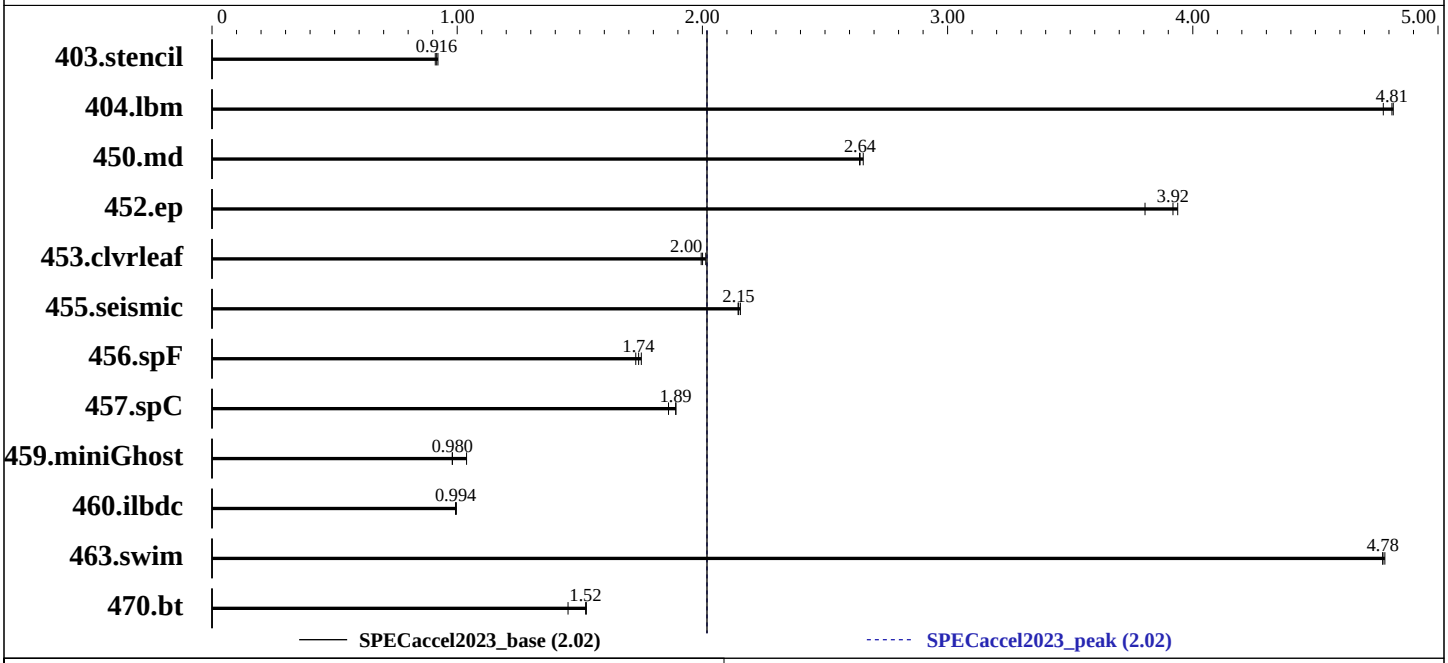
Dell Inc.
AMD EPYC 9965
PowerEdge R7725 (AMD EPYC 9965)

SPECaccel 2023_base = 2.02

SPECaccel 2023_peak = 2.02

accel2023 License: 6573
Test Sponsor: Dell Inc.
Tested by: Dell Inc.

Test Date: Sep-2024
Hardware Availability: Nov-2024
Software Availability: Feb-2024



Hardware

CPU Name:	AMD EPYC 9965
Max MHz.:	3700
Nominal:	2250
Enabled:	384 cores, 2 chips, 2 threads/core
Orderable:	1,2 chips
Cache L1:	32 KB I + 48 KB D on chip per core
L2:	1 MB I+D on chip per core
L3:	384 MB I+D on chip per chip, 32 MB shared / 16 cores
Other:	None
Memory:	1536 GB (24 x 64 GB 2Rx4 PC5-6400B-R, running at 6000 MHz)
Storage:	1 x 3.84 TB NVMe SSD
Other:	None
Base Threads Run:	768
Min. Peak Threads:	768
Max. Peak Threads:	768

Accelerator

Accel Model Name:	AMD EPYC 9965
Accel Vendor:	AMD
Accel Name:	AMD EPYC 9965
Type of Accel:	CPU
Accel Connection:	N/A
Does Accel Use ECC:	Yes
Accel Description:	2 x AMD EPYC 9965
Accel Driver:	N/A

Software

OS:	Ubuntu 24.04 LTS 6.8.0-41-generic
Compiler:	Version 2024.0.2
Firmware:	0.2.4 released Sep-2024
File System:	ext4
System State:	Run level 5 (multi-user)
Other:	None
Base Parallel Model:	LOP

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Software (Continued)

Base Threads Run: 768
Peak Parallel Models: LOP
Max. Peak Threads: 768
Min. Peak Threads: 768

Results Table

Benchmark	Base							Peak						
	Model	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Model	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
403.stencil	LOP	**480**	**0.916**	483	0.911	478	0.921	LOP	**480**	**0.916**	483	0.911	478	0.921
404.lbm	LOP	94.4	4.82	**94.6**	**4.81**	95.2	4.78	LOP	94.4	4.82	**94.6**	**4.81**	95.2	4.78
450.md	LOP	**227**	**2.64**	226	2.66	227	2.64	LOP	**227**	**2.64**	226	2.66	227	2.64
452.ep	LOP	105	3.94	109	3.81	**106**	**3.92**	LOP	105	3.94	109	3.81	**106**	**3.92**
453.clvrleaf	LOP	**500**	**2.00**	497	2.01	501	1.99	LOP	**500**	**2.00**	497	2.01	501	1.99
455.seismic	LOP	364	2.15	**363**	**2.15**	362	2.16	LOP	364	2.15	**363**	**2.15**	362	2.16
456.spF	LOP	271	1.75	275	1.73	**273**	**1.74**	LOP	271	1.75	275	1.73	**273**	**1.74**
457.spC	LOP	290	1.86	285	1.89	**286**	**1.89**	LOP	290	1.86	285	1.89	**286**	**1.89**
459.miniGhost	LOP	**602**	**0.980**	602	0.980	568	1.04	LOP	**602**	**0.980**	602	0.980	568	1.04
460.ilbdc	LOP	559	0.994	**558**	**0.994**	557	0.996	LOP	559	0.994	**558**	**0.994**	557	0.996
463.swim	LOP	92.0	4.78	**92.1**	**4.78**	92.2	4.77	LOP	92.0	4.78	**92.1**	**4.78**	92.2	4.77
470.bt	LOP	**692**	**1.52**	691	1.53	727	1.45	LOP	**692**	**1.52**	691	1.53	727	1.45

SPEC accel2023_base = 2.02

SPEC accel2023_peak = 2.02

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

General Notes

```
Environment variables set by runaccel before the start of the run:
FORT_BUFFERED = "true"
KMP_AFFINITY = "compact,0,granularity=thread"
KMP_BLOCKTIME = "infinite"
KMP_HW_SUBSET = "2S,192C,2T"
KMP_LIBRARY = "turnaround"
KMP_STACKSIZE = "128M"
OMP_DYNAMIC = "FALSE"
OMP_WAIT_POLICY = "active"
NA
```

Platform Notes

```
Sysinfo program /root/accel/bin/sysinfo
Rev: r6622 of 2021-04-07 b1a7d5f8f71be5aff70a755cad7211a0
running on SLR7740-R7725 Mon Sep 16 17:42:53 2024

SUT (System Under Test) info as seen by some common utilities.
```

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Platform Notes (Continued)

```
For more information on this section, see
   https://www.spec.org/cpu2017/Docs/config.html#sysinfo

From /proc/cpuinfo
   model name : AMD EPYC 9965 192-Core Processor
      2  "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 : 192
      siblings  : 384
      physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 44 45 46 47 48 49 50 51 52
      53 54 55 56 57 58 59 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 92 93 94 95 96
      97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117
      118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138
      139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159
      160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180
      181 182 183 184 185 186 187 188 189 190 191
      physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 44 45 46 47 48 49 50 51 52
      53 54 55 56 57 58 59 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 92 93 94 95 96
      97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117
      118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138
      139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159
      160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180
      181 182 183 184 185 186 187 188 189 190 191

From lscpu from util-linux 2.39.3:
     Architecture:                         x86_64
     CPU op-mode(s):                       32-bit, 64-bit
     Address sizes:                        52 bits physical, 57 bits virtual
     Byte Order:                           Little Endian
     CPU(s):                               768
     On-line CPU(s) list:                  0-767
     Vendor ID:                            AuthenticAMD
     BIOS Vendor ID:                       AMD
     Model name:                           AMD EPYC 9965 192-Core Processor
     BIOS Model name:                      AMD EPYC 9965 192-Core Processor
       CPU @ 2.2GHz
     BIOS CPU family:                      107
     CPU family:                           26
     Model:                                17
     Thread(s) per core:                   2
     Core(s) per socket:                   192
     Socket(s):                            2
     Stepping:                             0
     Frequency boost:                      enabled
     CPU(s) scaling MHz:                   61%
```

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Platform Notes (Continued)

```
CPU max MHz:                          3700.1951
CPU min MHz:                          1500.0000
BogoMIPS:                             4493.99
Flags:                                fpu vme de pse tsc msr pae mce cx8 apic sep
mtrr pge mca cmov pat pse36 clflush mmx fxsr sse sse2 ht syscall nx mmxext fxsr_opt
pdpe1gb rdtscp lm constant_tsc rep_good amd_lbr_v2 nopl nonstop_tsc cpuid
extd_apicid aperfmperf rapl pni pclmulqdq monitor ssse3 fma cx16 pcid sse4_1 sse4_2
x2apic movbe popcnt aes xsave avx f16c rdrand lahf_lm cmp_legacy svm extapic
cr8_legacy abm sse4a misalignsse 3dnowprefetch osvw ibs skinit wdt tce topoext
perfctr_core perfctr_nb bpext perfctr_llc mwaitx cpb cat_l3 cdp_l3 hw_pstate ssbd
mba perfmon_v2 ibrs ibpb stibp ibrs_enhanced vmmcall fsgsbase tsc_adjust bmi1 avx2
smep bmi2 erms invpcid cqm rdt_a avx512f avx512dq rdseed adx smap avx512ifma
clflushopt clwb avx512cd sha_ni avx512bw avx512vl xsaveopt xsavec xgetbv1 xsaves
cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local user_shstk avx_vnni avx512_bf16
clzero irperf xsaveerptr rdpru wbnoinvd amd_ppin cppc arat npt lbrv svm_lock
nrip_save tsc_scale vmcb_clean flushbyasid decodeassists pausefilter pfthreshold
avic v_vmsave_vmload vgif x2avic v_spec_ctrl vnmi avx512vbmi umip pku ospke
avx512_vbmi2 gfni vaes vpclmulqdq avx512_vnni avx512_bitalg avx512_vpopcntdq la57
rdpid bus_lock_detect movdiri movdir64b overflow_recov succor smca fsrm
avx512_vp2intersect flush_l1d debug_swap
Virtualization:                       AMD-V
L1d cache:                            18 MiB (384 instances)
L1i cache:                            12 MiB (384 instances)
L2 cache:                             384 MiB (384 instances)
L3 cache:                             768 MiB (24 instances)
NUMA node(s):                         2
NUMA node0 CPU(s):                    0-191,384-575
NUMA node1 CPU(s):                    192-383,576-767
Vulnerability Gather data sampling:   Not affected
Vulnerability Itlb multihit:          Not affected
Vulnerability L1tf:                   Not affected
Vulnerability Mds:                    Not affected
Vulnerability Meltdown:               Not affected
Vulnerability Mmio stale data:        Not affected
Vulnerability Reg file data sampling: Not affected
Vulnerability Retbleed:               Not affected
Vulnerability Spec rstack overflow:   Not affected
Vulnerability Spec store bypass:      Mitigation; Speculative Store Bypass disabled
via prctl
Vulnerability Spectre v1:             Mitigation; usercopy/swapgs barriers and
__user pointer sanitization
Vulnerability Spectre v2:             Mitigation; Enhanced / Automatic IBRS; IBPB
conditional; STIBP always-on; RSB filling; PBRSB-eIBRS Not affected; BHI Not
affected
Vulnerability Srbds:                  Not affected
Vulnerability Tsx async abort:        Not affected
```

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Platform Notes (Continued)

```
From lscpu --cache:
     NAME ONE-SIZE ALL-SIZE WAYS TYPE        LEVEL  SETS PHY-LINE COHERENCY-SIZE
     L1d       48K      18M   12 Data            1    64        1             64
     L1i       32K      12M    8 Instruction     1    64        1             64
     L2         1M     384M   16 Unified         2  1024        1             64
     L3        32M     768M   16 Unified         3 32768        1             64

/proc/cpuinfo cache data
   cache size : 1024 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 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27
  28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56
  57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85
  86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110
  111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132
  133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154
  155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176
  177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 384 385 386 387 388 389 390
  391 392 393 394 395 396 397 398 399 400 401 402 403 404 405 406 407 408 409 410 411 412
  413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434
  435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450 451 452 453 454 455 456
  457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478
  479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500
  501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522
  523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544
  545 546 547 548 549 550 551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566
  567 568 569 570 571 572 573 574 575
  node 0 size: 773062 MB
  node 0 free: 768609 MB
  node 1 cpus: 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209
  210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231
  232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253
  254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275
  276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297
  298 299 300 301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319
  320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341
  342 343 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358 359 360 361 362 363
  364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 576 577
  578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599
  600 601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619 620 621
  622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643
  644 645 646 647 648 649 650 651 652 653 654 655 656 657 658 659 660 661 662 663 664 665
  666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 687
  688 689 690 691 692 693 694 695 696 697 698 699 700 701 702 703 704 705 706 707 708 709
```

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Platform Notes (Continued)

```
  710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727 728 729 730 731
  732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750 751 752 753
  754 755 756 757 758 759 760 761 762 763 764 765 766 767
  node 1 size: 773891 MB
  node 1 free: 771417 MB
  node distances:
  node   0   1
    0:  10  32
    1:  32  10

From /proc/meminfo
   MemTotal:       1584080640 kB
   HugePages_Total:       0
   Hugepagesize:       2048 kB

/sys/devices/system/cpu/cpu*/cpufreq/scaling_governor has
   performance

/usr/bin/lsb_release -d
   Ubuntu 24.04 LTS

From /etc/*release* /etc/*version*
   debian_version: trixie/sid
   os-release:
      PRETTY_NAME="Ubuntu 24.04 LTS"
      NAME="Ubuntu"
      VERSION_ID="24.04"
      VERSION="24.04 LTS (Noble Numbat)"
      VERSION_CODENAME=noble
      ID=ubuntu
      ID_LIKE=debian
      HOME_URL="https://www.ubuntu.com/"

uname -a:
   Linux SLR7740-R7725 6.8.0-41-generic #41-Ubuntu SMP PREEMPT_DYNAMIC Fri Aug  2
   20:41:06 UTC 2024 x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

gather_data_sampling:                                Not affected
CVE-2018-12207 (iTLB Multihit):                      Not affected
CVE-2018-3620 (L1 Terminal Fault):                   Not affected
Microarchitectural Data Sampling:                    Not affected
CVE-2017-5754 (Meltdown):                            Not affected
mmio_stale_data:                                     Not affected
reg_file_data_sampling:                              Not affected
retbleed:                                            Not affected
```

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Platform Notes (Continued)

```
 spec_rstack_overflow:                                  Not affected
 CVE-2018-3639 (Speculative Store Bypass):              Mitigation: Speculative Store
                                                        Bypass disabled via prctl
 CVE-2017-5753 (Spectre variant 1):                     Mitigation: usercopy/swapgs
                                                        barriers and __user pointer
                                                        sanitization
 CVE-2017-5715 (Spectre variant 2):                    Mitigation: Enhanced / Automatic
                                                        IBRS; IBPB: conditional; STIBP:
                                                        always-on; RSB filling;
                                                        PBRSB-eIBRS: Not affected; BHI:
                                                        Not affected
 CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
 CVE-2019-11135 (TSX Asynchronous Abort):               Not affected

 run-level 5 Sep 16 17:27

 SPEC is set to: /root/accel
    Filesystem     Type  Size  Used Avail Use% Mounted on
    /dev/nvme0n1p2 ext4  2.9T   25G  2.7T   1% /

 From /sys/devices/virtual/dmi/id
     Vendor:         Dell Inc.
     Product:        PowerEdge R7725
     Product Family: PowerEdge
     Serial:         SLR7740

 Additional information from dmidecode 3.5 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.
   Memory:
     20x 80AD000080AD HMCG94AHBRA277N 64 GB 2 rank 6400, configured at 6000
     4x 80AD000080AD HMCG94AHBRA480N 64 GB 2 rank 6400, configured at 6000

 BIOS:
    BIOS Vendor:       Dell Inc.
    BIOS Version:      0.2.5 [X-REV]
    BIOS Date:         09/12/2024
    BIOS Revision:     0.2

 (End of data from sysinfo program)
```

Compiler Version Notes

```
==============================================================================
C          | 403.stencil(base) 404.lbm(base) 452.ep(base) 457.spC(base)
```

(Continued on next page)

Compiler Version Notes (Continued)

```
          | 470.bt(base)
------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler 2024.2.1 (2024.2.1.20240711)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/intel/oneapi/compiler/2024.2/bin/compiler
Configuration file: /opt/intel/oneapi/compiler/2024.2/bin/compiler/../icx.cfg
------------------------------------------------------------------------------

==============================================================================
Fortran    | 450.md(base) 455.seismic(base) 456.spF(base) 460.ilbdc(base)
           | 463.swim(base)
------------------------------------------------------------------------------
ifx (IFX) 2024.2.1 20240711
Copyright (C) 1985-2024 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

==============================================================================
Fortran, C | 453.clvrleaf(base) 459.miniGhost(base)
------------------------------------------------------------------------------
ifx (IFX) 2024.2.1 20240711
Copyright (C) 1985-2024 Intel Corporation. All rights reserved.
Intel(R) oneAPI DPC++/C++ Compiler 2024.2.1 (2024.2.1.20240711)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/intel/oneapi/compiler/2024.2/bin/compiler
Configuration file: /opt/intel/oneapi/compiler/2024.2/bin/compiler/../icx.cfg
------------------------------------------------------------------------------
```

Base Compiler Invocation

C benchmarks:
`mpicc`

Fortran benchmarks:
`mpifort`

Benchmarks using both Fortran and C:
`mpifort mpicc`

Base Portability Flags

450.md: `-80`

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Base Portability Flags (Continued)

457.spC: `-Wl,--no-relax`(mpicc)(*) `-shared-intel -Wl,--no-relax`(mpicc)
459.miniGhost: `-nofor-main`

(*) Indicates a portability flag that was found in a non-portability variable.

Base Optimization Flags

C benchmarks:

403.stencil: `-qopenmp -Ofast -O3 -march=skylake-avx512 -mtune=skylake-avx512 -mprefer-vector-width=512 -qopt-multiple-gather-scatter-by-shuffles -flto -ffast-math -qopt-dynamic-align -fvec-peel-loops -qopt-streaming-stores always -Xclang -fopenmp-declare-target-scalar-defaultmap-firstprivate -fimf-precision=low`

404.lbm: `Same as 403.stencil`

452.ep: `Same as 403.stencil`

457.spC: `-qopenmp -Ofast -O3 -march=skylake-avx512 -mtune=skylake-avx512 -mprefer-vector-width=512 -qopt-multiple-gather-scatter-by-shuffles -flto -ffast-math -qopt-dynamic-align -fvec-peel-loops -qopt-streaming-stores always -Xclang -fopenmp-declare-target-scalar-defaultmap-firstprivate -fimf-precision=low -mcmodel=medium`(*)

470.bt: `Same as 403.stencil`

Fortran benchmarks:
`-qopenmp -Ofast -O3 -march=skylake-avx512 -mtune=skylake-avx512 -mprefer-vector-width=512 -qopt-multiple-gather-scatter-by-shuffles -flto -ffast-math -qopt-dynamic-align -fvec-peel-loops -qopt-streaming-stores always -nostandard-realloc-lhs -align array32byte -auto -fimf-accuracy-bits-sqrt=14 -fimf-precision=low`

Benchmarks using both Fortran and C:
`-qopenmp -Ofast -O3 -march=skylake-avx512 -mtune=skylake-avx512 -mprefer-vector-width=512 -qopt-multiple-gather-scatter-by-shuffles -flto -ffast-math -qopt-dynamic-align -fvec-peel-loops -qopt-streaming-stores always -Xclang`

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Base Optimization Flags (Continued)

Benchmarks using both Fortran and C (continued):
`-fopenmp-declare-target-scalar-defaultmap-firstprivate`
`-fimf-precision=low -nostandard-realloc-lhs -align array32byte -auto`
`-fimf-accuracy-bits-sqrt=14`

(*) Indicates an optimization flag that was found in a portability variable.

Peak Optimization Flags

C benchmarks:

403.stencil: `basepeak = yes`

404.lbm: `basepeak = yes`

452.ep: `basepeak = yes`

457.spC: `basepeak = yes`

470.bt: `basepeak = yes`

Fortran benchmarks:

450.md: `basepeak = yes`

455.seismic: `basepeak = yes`

456.spF: `basepeak = yes`

460.ilbdc: `basepeak = yes`

463.swim: `basepeak = yes`

Benchmarks using both Fortran and C:

453.clvrleaf: `basepeak = yes`

459.miniGhost: `basepeak = yes`

The flags files that were used to format this result can be browsed at
`http://www.spec.org/accel2023/flags/Dell-Platform-Flags-PowerEdge-AMD-EPYC-v1.3.html`
`http://www.spec.org/accel2023/flags/Intel_compiler_flags_accel.2024.2024-10-10.html`

You can also download the XML flags sources by saving the following links:
http://www.spec.org/accel2023/flags/Dell-Platform-Flags-PowerEdge-AMD-EPYC-v1.3.xml
http://www.spec.org/accel2023/flags/Intel_compiler_flags_accel.2024.2024-10-10.xml

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

Tested with SPECaccel2023 v2.0.17 on 2024-09-16 13:42:53-0400.
Report generated on 2024-10-10 16:57:30 by accel2023 PDF formatter v112.
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