



SPEC CPU®2017 Integer Rate Result

Copyright 2017-2024 Standard Performance Evaluation Corporation

Fujitsu

PRIMERGY RX2540 M7, Intel Xeon Platinum 8490H,
1.90GHz

SPECrate®2017_int_base =	915
SPECrate®2017_int_energy_base =	918
SPECrate®2017_int_peak =	Not Run
SPECrate®2017_int_energy_peak =	Not Run

CPU2017 License: 19

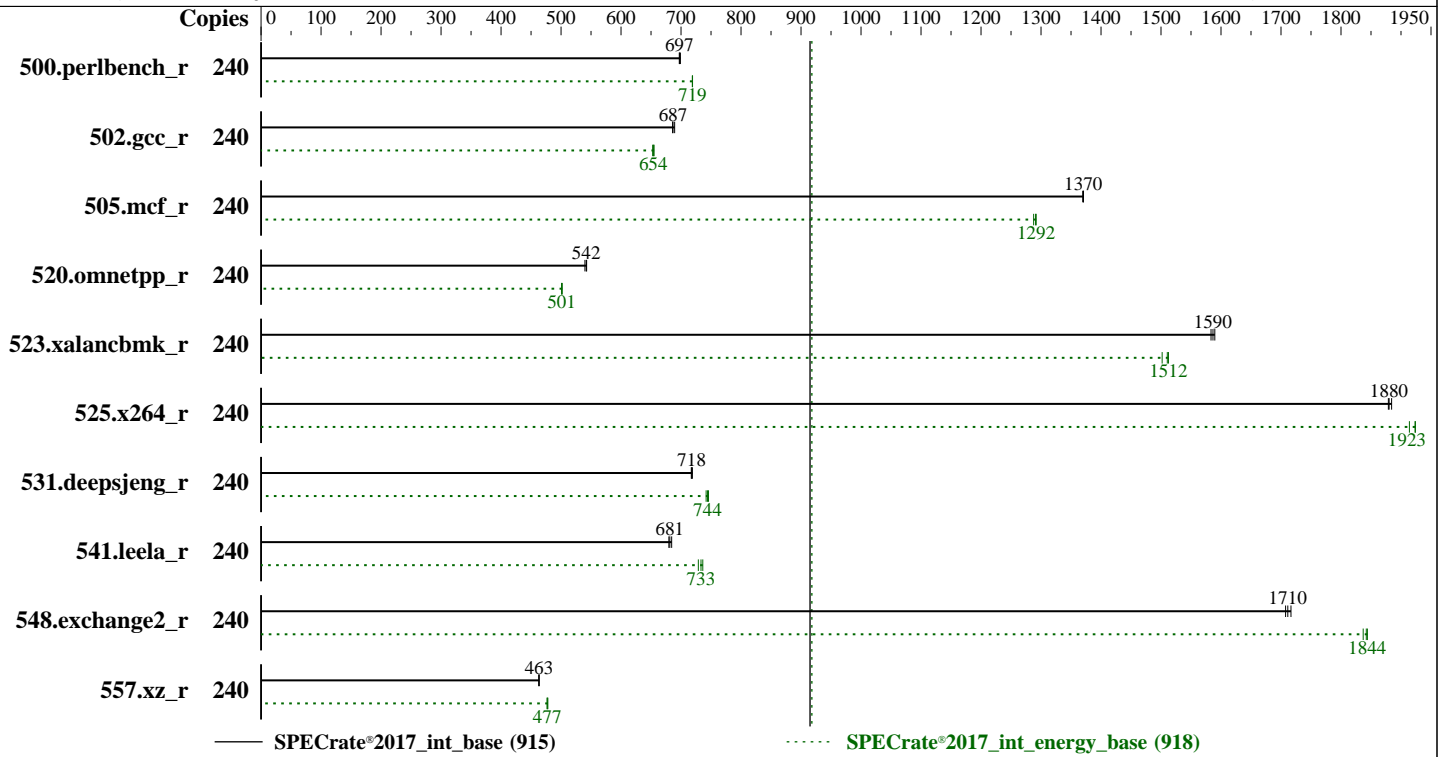
Test Sponsor: Fujitsu

Tested by: Fujitsu

Test Date: Jan-2023

Hardware Availability: Mar-2023

Software Availability: Jun-2022



Hardware

CPU Name: Intel Xeon Platinum 8490H
 Max MHz: 3500
 Nominal: 1900
 Enabled: 120 cores, 2 chips, 2 threads/core
 Orderable: 1,2 chips
 Cache L1: 32 KB I + 48 KB D on chip per core
 L2: 2 MB I+D on chip per core
 L3: 112.5 MB I+D on chip per chip
 Other: None
 Memory: 1 TB (16 x 64 GB 2Rx4 PC5-4800B-R)
 Storage: 1 x SATA SSD, 1.92TB
 Other: None

Software

OS: SUSE Linux Enterprise Server 15 SP4
 5.14.21-150400.22-default
 Compiler: C/C++: Version 2022.1 of Intel oneAPI DPC++/C++
 Compiler for Linux;
 Fortran: Version 2022.1 of Intel Fortran Compiler
 for Linux;
 Parallel: No
 Firmware: Fujitsu BIOS Version V1.0.0.0 R1.10.0 for
 D3983-A1x. Released Mar-2023
 tested as V1.0.0.0 R0.22.1 for D3983-A1x Jan-2023
 File System: xfs
 System State: Run level 3 (multi-user)
 Base Pointers: 64-bit
 Peak Pointers: Not Applicable
 Other: None
 Power Management: BIOS set to prefer performance at the cost of
 additional power usage

Power

Max. Power (W): 1225.7
 Idle Power (W): 356.1
 Min. Temperature (C): 23.75

(Continued on next page)



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Power (Continued)

Elevation (m): 11
 Line Standard: 200 V / 50 Hz / 1 phase / 2 wires
 Provisioning: Line-powered

Power Settings

Management FW: Version 2.00u for D3933-A1x of Fujitsu BMC
 Firmware
 Memory Mode: Normal

Power-Relevant Hardware

Power Supply: 1 x 2200 W (non-redundant)
 Details: Standard power supply part of base unit
 S26113-E646-V50-1
 Backplane: 12 x 3.5inch HDD back plan
 Other Storage: Embedded SATA Controller
 Storage Model #: S26361-F5776-E192
 NICs Installed: 1 x Intel I210-T1 @ 1 Gb
 NICs Enabled (FW/OS): 1 / 1
 NICs Connected/Speed: 1 @ 1 Gb
 Other HW Model #: None

Power Analyzer

Power Analyzer: 10.118.163.191:8888
 Hardware Vendor: Hioki
 Model: Hioki PW3336:1-Channel
 Serial Number: 170213562
 Input Connection: USB via USB-Serial CH340
 Metrology Institute: NICT
 Calibration By: HIOKI E.E. CORPORATION
 Calibration Label: H06400088
 Calibration Date: 28-Jun-2022
 PTDaemon® Version: 1.9.2 (3976349f; 2020-12-08)
 Setup Description: Connected to PSU 1
 Current Ranges Used: 10A
 Voltage Range Used: 300V

Temperature Meter

Temperature Meter: 10.118.163.191:8889
 Hardware Vendor: Digi International Inc.
 Model: DigiWATCHPORT_H
 Serial Number: W 640 45112
 Input Connection: USB
 PTDaemon Version: 1.9.2 (3976349f; 2020-12-08)
 Setup Description: 5 mm in front of SUT main air intake

Base Results Table

Benchmark	Copies	Seconds	Ratio	Energy (kJ)	Energy Ratio	Average Power	Maximum Power	Seconds	Ratio	Energy (kJ)	Energy Ratio	Average Power	Maximum Power	Seconds	Ratio	Energy (kJ)	Energy Ratio	Average Power	Maximum Power
500.perlbenc_r	240	547	699	576	719	1050	1140	548	697	577	719	1050	1150	548	697	576	719	1050	1140
502.gcc_r	240	495	686	565	653	1140	1200	493	689	563	655	1140	1200	495	687	564	654	1140	1200
505.mcf_r	240	283	1370	330	1290	1160	1190	283	1370	329	1290	1160	1190	283	1370	328	1290	1160	1190
520.omnetpp_r	240	581	542	680	501	1170	1180	583	540	681	501	1170	1180	580	543	679	502	1170	1180
523.xalancbmk_r	240	160	1580	183	1500	1140	1200	159	1590	182	1510	1140	1220	160	1590	181	1510	1140	1230
525.x264_r	240	224	1880	238	1910	1060	1170	224	1880	237	1920	1060	1170	223	1880	237	1920	1060	1170
531.deepsjeng_r	240	384	717	403	742	1050	1110	383	718	402	744	1050	1100	383	719	401	746	1050	1100
541.leela_r	240	585	680	590	729	1010	1050	583	681	586	733	1010	1050	581	684	584	736	1010	1050
548.exchange2_r	240	366	1720	370	1840	1010	1030	368	1710	371	1840	1010	1030	367	1710	370	1840	1010	1020
557.xz_r	240	559	463	591	477	1060	1130	560	463	591	477	1060	1150	559	464	589	478	1050	1140

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



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Compiler Notes

SPEC has ruled that the compiler used for this result was performing a compilation that specifically improves the performance of the 523.xalanbmk_r / 623.xalanbmk_s benchmarks using a priori knowledge of the SPEC code and dataset to perform a transformation that has narrow applicability.

In order to encourage optimizations that have wide applicability (see rule 1.4 https://www.spec.org/cpu2017/Docs/runrules.html#rule_1.4), SPEC will no longer publish results using this optimization.

This result is left in the SPEC results database for historical reference.

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"

Environment Variables Notes

Environment variables set by runcpu before the start of the run:

```
LD_LIBRARY_PATH =
"/home/Benchmark/speccpu-1.1.8/lib/intel64:/home/Benchmark/speccpu-1.1.8/lib/ia32:/home/Benchmark/spec
cpu-1.1.8/je5.0.1-32"
MALLOCONF = "retain:true"
```

General Notes

Binaries compiled on a system with 2x Intel Xeon Platinum 8280M CPU + 384GB RAM
memory using Red Hat Enterprise Linux 8.4
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>

NA: 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.



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Platform Notes

BIOS configuration:

DCU Streamer Prefetcher = Disabled
 Package C State limit = C0
 CPU Performance Boost = Aggressive
 SNC (Sub NUMA) = Enable SNC4
 Optimized Power Mode = Enable

Sysinfo program /home/Benchmark/speccpu-1.1.8/bin/sysinfo
 Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d
 running on localhost Sat Jan 14 01:45:42 2023

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) Platinum 8490H
   2 "physical id"s (chips)
   240 "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      : 60
siblings       : 120
physical 0:    cores 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
physical 1:    cores 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

```

From lscpu from util-linux 2.37.2:

```

Architecture:          x86_64
CPU op-mode(s):        32-bit, 64-bit
Address sizes:         46 bits physical, 57 bits virtual
Byte Order:            Little Endian
CPU(s):                240
On-line CPU(s) list:   0-239
Vendor ID:             GenuineIntel
Model name:            Intel(R) Xeon(R) Platinum 8490H
CPU family:            6
Model:                 143
Thread(s) per core:    2
Core(s) per socket:    60
Socket(s):             2
Stepping:              8
CPU max MHz:           3500.0000
CPU min MHz:           800.0000
BogoMIPS:              3800.00
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
pdpelgb rdtscp lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology
nonstop_tsc cpuid aperfmperf tsc_known_freq pni pclmulqdq dtes64 monitor ds_cpl vmx
smx est tm2 sse3 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 cpuid_fault
epb cat_l3 cat_l2 cdp_l3 invpcid_single intel_ppin cdp_l2 ssbd mba ibrs ibpb stibp
ibrs_enhanced tpr_shadow vnmi flexpriority ept vpid ept_ad fsgsbase tsc_adjust bmi1
hle avx2 smep bmi2 erms invpcid rtm cqm rdt_a avx512f avx512dq rdseed adx smap

```

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Platform Notes (Continued)

```
avx512ifma clflushopt clwb intel_pt avx512cd sha_ni avx512bw avx512vl xsaveopt
xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local
split_lock_detect avx_vnni avx512_bf16 wbnoinvd dtherm ida arat pln pts hwp
hwp_act_window hwp_epp hwp_pkg_req avx512vbmi umip pku ospke waitpkg avx512_vbmi2
gfni vaes vpclmulqdq avx512_vnni avx512_bitalg tme avx512_vppopcndq la57 rdpid
bus_lock_detect cldemote movdiri movdir64b enqcmd fsrm md_clear serialize tsxldtrk
pconfig arch_lbr avx512_fp16 amx_tile flush_llid arch_capabilities
Virtualization: VT-x
L1d cache: 5.6 MiB (120 instances)
L1i cache: 3.8 MiB (120 instances)
L2 cache: 240 MiB (120 instances)
L3 cache: 225 MiB (2 instances)
NUMA node(s): 8
NUMA node0 CPU(s): 0-14,120-134
NUMA node1 CPU(s): 15-29,135-149
NUMA node2 CPU(s): 30-44,150-164
NUMA node3 CPU(s): 45-59,165-179
NUMA node4 CPU(s): 60-74,180-194
NUMA node5 CPU(s): 75-89,195-209
NUMA node6 CPU(s): 90-104,210-224
NUMA node7 CPU(s): 105-119,225-239
Vulnerability Itlb multihit: Not affected
Vulnerability L1tf: Not affected
Vulnerability Mds: Not affected
Vulnerability Meltdown: Not affected
Vulnerability Spec store bypass: Mitigation; Speculative Store Bypass disabled via
prctl and seccomp
Vulnerability Spectre v1: Mitigation; usercopy/swaps barriers and __user
pointer sanitization
Vulnerability Spectre v2: Mitigation; Enhanced IBRS, IBPB conditional, RSB
filling
Vulnerability Srbds: Not affected
Vulnerability Tsx async abort: Not affected
```

From lscpu --cache:

NAME	ONE-SIZE	ALL-SIZE	WAYS	TYPE	LEVEL	SETS	PHY-LINE	COHERENCY-SIZE
L1d	48K	5.6M	12	Data	1	64	1	64
L1i	32K	3.8M	8	Instruction	1	64	1	64
L2	2M	240M	16	Unified	2	2048	1	64
L3	112.5M	225M	15	Unified	3	122880	1	64

/proc/cpuinfo cache data
cache size : 115200 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 3 4 5 6 7 8 9 10 11 12 13 14 120 121 122 123 124 125 126 127 128 129
130 131 132 133 134
node 0 size: 128597 MB
node 0 free: 127448 MB
node 1 cpus: 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 135 136 137 138 139 140 141
142 143 144 145 146 147 148 149
node 1 size: 129016 MB
node 1 free: 128638 MB
node 2 cpus: 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 150 151 152 153 154 155 156
157 158 159 160 161 162 163 164
```

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Platform Notes (Continued)

```
node 2 size: 129016 MB
node 2 free: 128641 MB
node 3 cpus: 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 165 166 167 168 169 170 171
172 173 174 175 176 177 178 179
node 3 size: 129016 MB
node 3 free: 128661 MB
node 4 cpus: 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 180 181 182 183 184 185 186
187 188 189 190 191 192 193 194
node 4 size: 128981 MB
node 4 free: 128664 MB
node 5 cpus: 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 195 196 197 198 199 200 201
202 203 204 205 206 207 208 209
node 5 size: 129016 MB
node 5 free: 128700 MB
node 6 cpus: 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 210 211 212 213 214 215
216 217 218 219 220 221 222 223 224
node 6 size: 129016 MB
node 6 free: 128677 MB
node 7 cpus: 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 225 226 227
228 229 230 231 232 233 234 235 236 237 238 239
node 7 size: 128647 MB
node 7 free: 128228 MB
node distances:
node  0  1  2  3  4  5  6  7
0:  10  12  12  12  21  21  21  21
1:  12  10  12  12  21  21  21  21
2:  12  12  10  12  21  21  21  21
3:  12  12  12  10  21  21  21  21
4:  21  21  21  21  10  12  12  12
5:  21  21  21  21  12  10  12  12
6:  21  21  21  21  12  12  10  12
7:  21  21  21  21  12  12  12  10
```

From /proc/meminfo

```
MemTotal:      1056059680 kB
HugePages_Total:      0
Hugepagesize:      2048 kB
```

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

From /etc/*release* /etc/*version*

```
os-release:
NAME="SLES"
VERSION="15-SP4"
VERSION_ID="15.4"
PRETTY_NAME="SUSE Linux Enterprise Server 15 SP4"
ID="sles"
ID_LIKE="suse"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:15:sp4"
```

uname -a:

```
Linux localhost 5.14.21-150400.22-default #1 SMP PREEMPT_DYNAMIC Wed May 11 06:57:18
UTC 2022 (49db222/lp) x86_64 x86_64 x86_64 GNU/Linux
```

Kernel self-reported vulnerability status:

(Continued on next page)



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Platform Notes (Continued)

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
CVE-2018-3639 (Speculative Store Bypass):	Mitigation: Speculative Store Bypass disabled via prctl and seccomp
CVE-2017-5753 (Spectre variant 1):	Mitigation: usercopy/swappgs barriers and __user pointer sanitization
CVE-2017-5715 (Spectre variant 2):	Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling
CVE-2020-0543 (Special Register Buffer Data Sampling):	Not affected
CVE-2019-11135 (TSX Asynchronous Abort):	Not affected

run-level 3 Jan 14 01:26

```

SPEC is set to: /home/Benchmark/speccpu-1.1.8
Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/sda2        xfs   1.8T   76G  1.7T   5% /

```

```

From /sys/devices/virtual/dmi/id
Vendor:          FUJITSU
Product:         PRIMERGY RX2540 M7
Product Family: SERVER
Serial:          EWCExxxxxx

```

Additional information from dmidecode 3.2 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:
 10x Samsung M321R8GA0BB0-CQKDG 64 GB 2 rank 4800
  6x Samsung M321R8GA0BB0-CQKVG 64 GB 2 rank 4800

```

```

BIOS:
BIOS Vendor:      FUJITSU
BIOS Version:     V1.0.0.0 R0.22.1 for D3983-Alx
BIOS Date:        12/01/2022
BIOS Revision:    0.22
Firmware Revision: 2.0

```

(End of data from sysinfo program)

Compiler Version Notes

```

=====
C      | 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base) 525.x264_r(base) 557.xz_r(base)
=====

```

```

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2022.1.0 Build 20220316
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
=====

```

```

=====
C++   | 520.omnetpp_r(base) 523.xalancbmk_r(base) 531.deepsjeng_r(base) 541.leela_r(base)
=====

```

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Compiler Version Notes (Continued)

 Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2022.1.0 Build 20220316
 Copyright (C) 1985-2022 Intel Corporation. All rights reserved.

=====
 Fortran | 548.exchange2_r(base)

Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2022.1.0 Build 20220316
 Copyright (C) 1985-2022 Intel Corporation. All rights reserved.

Base Compiler Invocation

C benchmarks:

icx

C++ benchmarks:

icpx

Fortran benchmarks:

ifx

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:

-w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math
 -flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4

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Base Optimization Flags (Continued)

C benchmarks (continued):

```
-L/usr/local/intel/compiler/2022.1.0/linux/compiler/lib/intel64_lin
-lqkmalloc
```

C++ benchmarks:

```
-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-L/usr/local/intel/compiler/2022.1.0/linux/compiler/lib/intel64_lin
-lqkmalloc
```

Fortran benchmarks:

```
-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-nostandard-realloc-lhs -align array32byte -auto
-L/usr/local/intel/compiler/2022.1.0/linux/compiler/lib/intel64_lin
-lqkmalloc
```

The flags files that were used to format this result can be browsed at

<http://www.spec.org/cpu2017/flags/Fujitsu-Platform-Settings-V1.0-SPR-RevA.html>

http://www.spec.org/cpu2017/flags/Intel-ic2022-official-linux64_revA.html

You can also download the XML flags sources by saving the following links:

<http://www.spec.org/cpu2017/flags/Fujitsu-Platform-Settings-V1.0-SPR-RevA.xml>

http://www.spec.org/cpu2017/flags/Intel-ic2022-official-linux64_revA.xml

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Tested with SPEC CPU®2017 v1.1.8 on 2023-01-13 11:45:42-0500.

Report generated on 2024-01-29 17:20:33 by CPU2017 PDF formatter v6716.

Originally published on 2023-02-01.