



# SPEC CPU®2017 Integer Rate Result

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## Supermicro

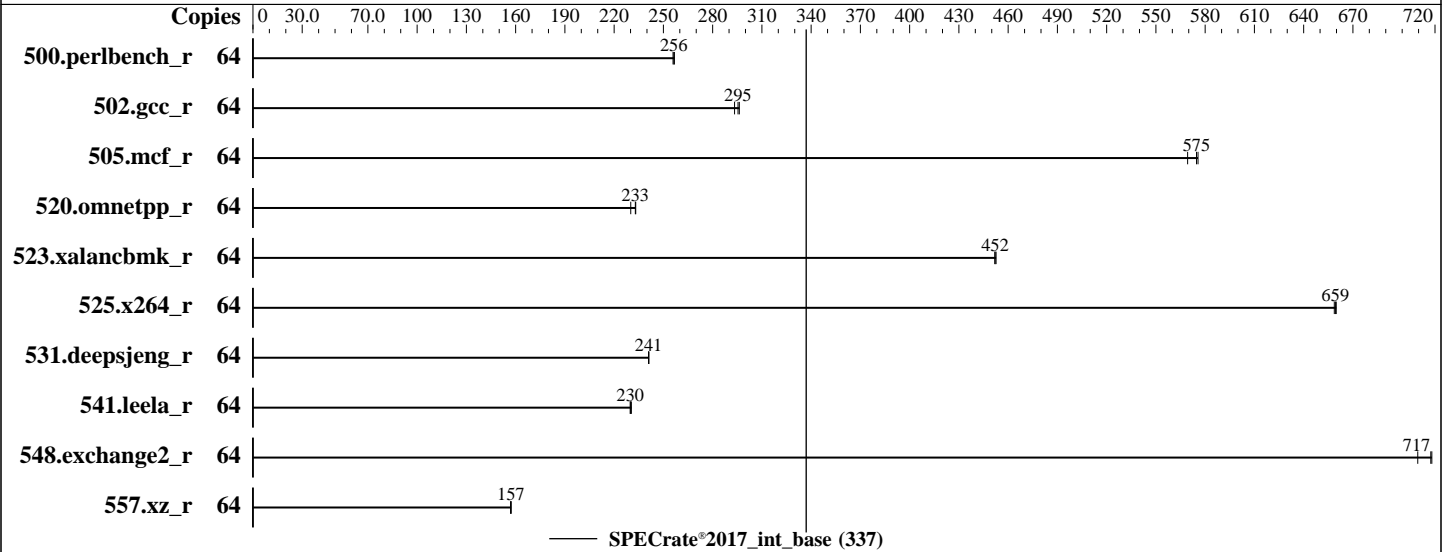
SuperServer SYS-621H-TN12R  
(X13DEM , Intel Xeon Gold 6526Y)

SPECrate®2017\_int\_base = 337

SPECrate®2017\_int\_peak = Not Run

CPU2017 License: 001176  
Test Sponsor: Supermicro  
Tested by: Supermicro

Test Date: Feb-2024  
Hardware Availability: Oct-2023  
Software Availability: Dec-2023



### Hardware

CPU Name: Intel Xeon Gold 6526Y  
Max MHz: 3900  
Nominal: 2800  
Enabled: 32 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: 37.5 MB I+D on chip per chip  
Other: None  
Memory: 1 TB (16 x 64 GB 2Rx4 PC5-5600B-R, running at 5200)  
Storage: 1 x 960 GB M.2 NVME SSD  
Other: None

### Software

OS: SUSE Linux Enterprise Server 15 SP5  
5.14.21-150500.53-default  
Compiler: C/C++: Version 2023.2.3 of Intel oneAPI DPC++/C++ Compiler for Linux;  
Fortran: Version 2023.2.3 of Intel Fortran Compiler for Linux;  
Parallel: No  
Firmware: Version 2.1 released Oct-2023  
File System: btrfs  
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.



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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	64	398	256	<b><u>397</u></b>	<b><u>256</u></b>	397	257							
502.gcc_r	64	309	293	<b><u>307</u></b>	<b><u>295</u></b>	306	296							
505.mcf_r	64	182	569	<b><u>180</u></b>	<b><u>575</u></b>	180	576							
520.omnetpp_r	64	<b><u>361</u></b>	<b><u>233</u></b>	360	233	365	230							
523.xalancbmk_r	64	150	452	<b><u>149</u></b>	<b><u>452</u></b>	149	453							
525.x264_r	64	170	659	<b><u>170</u></b>	<b><u>659</u></b>	170	660							
531.deepsjeng_r	64	304	241	304	241	<b><u>304</u></b>	<b><u>241</u></b>							
541.leela_r	64	460	231	461	230	<b><u>461</u></b>	<b><u>230</u></b>							
548.exchange2_r	64	<b><u>234</u></b>	<b><u>717</u></b>	236	709	234	718							
557.xz_r	64	<b><u>440</u></b>	<b><u>157</u></b>	440	157	441	157							

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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"

## Environment Variables Notes

Environment variables set by runcpu before the start of the run:  
LD\_LIBRARY\_PATH = "/home/cpu2017/lib/intel64:/home/cpu2017/lib/ia32:/home/cpu2017/je5.0.1-32"  
MALLOC\_CONF = "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)

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### General Notes (Continued)

is mitigated in the system as tested and documented.

### Platform Notes

#### BIOS Settings:

Power Technology = Custom  
Power Performance Tuning = BIOS Controls EPB  
ENERGY\_PERF\_BIAS\_CFG mode = Extreme Performance  
KTI Prefetch = Enable  
SNC = Enable SNC2 (2-clusters)  
DCU Streamer Prefetcher = Disable  
LLC Dead Line Alloc = Disable  
Fan Mode: Full Speed

Sysinfo program /home/cpu2017/bin/sysinfo  
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197  
running on 184-15 Thu Feb 22 15:23:23 2024

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

#### Table of contents

1. uname -a
2. w
3. Username
4. ulimit -a
5. sysinfo process ancestry
6. /proc/cpuinfo
7. lscpu
8. numactl --hardware
9. /proc/meminfo
10. who -r
11. Systemd service manager version: systemd 249 (249.16+suse.171.gdad0071f15)
12. Services, from systemctl list-unit-files
13. Linux kernel boot-time arguments, from /proc/cmdline
14. cpupower frequency-info
15. sysctl
16. /sys/kernel/mm/transparent\_hugepage
17. /sys/kernel/mm/transparent\_hugepage/khugepaged
18. OS release
19. Disk information
20. /sys/devices/virtual/dmi/id
21. dmidecode
22. BIOS

```
1. uname -a
Linux 184-15 5.14.21-150500.53-default #1 SMP PREEMPT_DYNAMIC Wed May 10 07:56:26 UTC 2023 (b630043) x86_64
x86_64 x86_64 GNU/Linux
```

```
2. w
15:23:23 up 1 min, 3 users, load average: 0.46, 0.19, 0.07
USER      TTY      FROM          LOGIN@      IDLE        JCPU        PCPU        WHAT
root      tty1      -             15:23      10.00s     2.10s     0.03s     -bash
```

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### Platform Notes (Continued)

#### 3. Username

From environment variable \$USER: root

#### 4. ulimit -a

```

core file size          (blocks, -c) unlimited
data seg size          (kbytes, -d) unlimited
scheduling priority    (-e) 0
file size              (blocks, -f) unlimited
pending signals        (-i) 4125014
max locked memory      (kbytes, -l) 64
max memory size        (kbytes, -m) unlimited
open files             (-n) 1024
pipe size              (512 bytes, -p) 8
POSIX message queues   (bytes, -q) 819200
real-time priority     (-r) 0
stack size             (kbytes, -s) unlimited
cpu time               (seconds, -t) unlimited
max user processes     (-u) 4125014
virtual memory         (kbytes, -v) unlimited
file locks             (-x) unlimited

```

#### 5. sysinfo process ancestry

```

/usr/lib/systemd/systemd --switched-root --system --deserialize 30
login -- root
-bash
-runcpu --nobuild --action validate --define default-platform-flags --define numcopies=64 -c
  ic2023.2.3-lin-core-avx512-rate-20231121.cfg --define smt-on --define cores=32 --define physicalfirst
  --define invoke_with_interleave --define drop_caches --tune base -o all intrate
-runcpu --nobuild --action validate --define default-platform-flags --define numcopies=64 --configfile
  ic2023.2.3-lin-core-avx512-rate-20231121.cfg --define smt-on --define cores=32 --define physicalfirst
  --define invoke_with_interleave --define drop_caches --tune base --output_format all --nopower --runmode
  rate --tune base --size refrate intrate --nopreenv --note-preenv --logfile
  $SPEC/tmp/CPU2017.002/temlogs/preenv.intrate.002.0.log --lognum 002.0 --from_runcpu 2
specperl $SPEC/bin/sysinfo
$SPEC = /home/cpu2017

```

#### 6. /proc/cpuinfo

```

model name      : INTEL(R) XEON(R) GOLD 6526Y
vendor_id      : GenuineIntel
cpu family     : 6
model          : 207
stepping      : 2
microcode     : 0x21000200
bugs           : spectre_v1 spectre_v2 spec_store_bypass swapgs eibrs_pbrsb
cpu cores     : 16
siblings      : 32
2 physical ids (chips)
64 processors (hardware threads)
physical id 0: core ids 0-15
physical id 1: core ids 0-15
physical id 0: apicids 0-31
physical id 1: apicids 128-159

```

Caution: /proc/cpuinfo data regarding chips, cores, and threads is not necessarily reliable, especially for virtualized systems. Use the above data carefully.

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## Platform Notes (Continued)

7. lscpu

From lscpu from util-linux 2.37.4:

```

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):                64
On-line CPU(s) list:   0-63
Vendor ID:             GenuineIntel
Model name:            INTEL(R) XEON(R) GOLD 6526Y
CPU family:            6
Model:                 207
Thread(s) per core:    2
Core(s) per socket:    16
Socket(s):             2
Stepping:              2
CPU max MHz:           3900.0000
CPU min MHz:           800.0000
BogoMIPS:              5600.00
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 pdpe1gb 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 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 cpuid_fault epb cat_l3 cat_l2 cdp_l3
                    invpcid_single cdp_l2 ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow
                    vmni flexpriority ept vpid ept_ad fsgsbase tsc_adjust bmi1 hle avx2 smep
                    bmi2 erms invpcid rtm cqm rdt_a avx512f avx512dq rdseed adx smap
                    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 avx_vnni avx512_bf16 wbnoinvd dtherm ida arat pln pts hwp
                    hwp_act_window hwp_epp hwp_pkg_req hfi avx512vbmi umip pku ospke waitpkg
                    avx512_vbmi2 gfni vaes vpclmulqdq avx512_vnni avx512_bitalg tme
                    avx512_vpopcntdq la57 rdpid bus_lock_detect cldemote movdiri movdir64b
                    enqcmd fsrm md_clear serialize tsxldtrk pconfig arch_lbr avx512_fp16
                    amx_tile flush_lld arch_capabilities

Virtualization:        VT-x
L1d cache:             1.5 MiB (32 instances)
L1i cache:             1 MiB (32 instances)
L2 cache:              64 MiB (32 instances)
L3 cache:              75 MiB (2 instances)
NUMA node(s):         4
NUMA node0 CPU(s):    0-7,32-39
NUMA node1 CPU(s):    8-15,40-47
NUMA node2 CPU(s):    16-23,48-55
NUMA node3 CPU(s):    24-31,56-63
Vulnerability Itlb multihit: Not affected
Vulnerability L1tf:    Not affected
Vulnerability Mds:     Not affected
Vulnerability Meltdown: Not affected
Vulnerability Mmio stale data: Not affected
Vulnerability Retbleed: Not affected
Vulnerability Spec store bypass: Mitigation; Speculative Store Bypass disabled via prctl and seccomp
Vulnerability Spectre v1: Mitigation; usercopy/swapgs barriers and __user pointer sanitization
Vulnerability Spectre v2: Mitigation; Enhanced IBRS, IBPB conditional, RSB filling, PBRSE-eIBRS SW
                    sequence
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	1.5M	12	Data	1	64	1	64
L1i	32K	1M	8	Instruction	1	64	1	64
L2	2M	64M	16	Unified	2	2048	1	64
L3	37.5M	75M	15	Unified	3	40960	1	64

8. numactl --hardware

NOTE: a numactl 'node' might or might not correspond to a physical chip.

```

available: 4 nodes (0-3)
node 0 cpus: 0-7,32-39
node 0 size: 257610 MB
node 0 free: 256764 MB
node 1 cpus: 8-15,40-47
node 1 size: 258009 MB
node 1 free: 257324 MB
node 2 cpus: 16-23,48-55
node 2 size: 258043 MB
node 2 free: 256739 MB
node 3 cpus: 24-31,56-63
node 3 size: 257619 MB
node 3 free: 256824 MB
node distances:
node  0  1  2  3
  0:  10  12  21  21
  1:  12  10  21  21
  2:  21  21  10  12
  3:  21  21  12  10

```

9. /proc/meminfo

MemTotal: 1056034584 kB

10. who -r

run-level 3 Feb 22 15:22 last=5

11. Systemd service manager version: systemd 249 (249.16+suse.171.gdad0071f15)

```

Default Target Status
graphical        running

```

12. Services, from systemctl list-unit-files

```

STATE UNIT FILES
enabled YaST2-Firstboot YaST2-Second-Stage apparmor appstream-sync-cache auditd bluetooth cron
display-manager firewalld getty@ irqbalance issue-generator kbdsettings kdump kdump-early
klog lvm2-monitor nscd nvme-fc-boot-connections postfix purge-kernels rollback rsyslog
smartd sshd systemd-pstore wicked wickedd-auto4 wickedd-dhcp4 wickedd-dhcp6 wickedd-nanny

enabled-runtime systemd-remount-fs
disabled accounts-daemon autofs autoyast-initscripts blk-availability bluetooth-mesh boot-sysctl
ca-certificates chrony-wait chronyd console-getty cups cups-browsed debug-shell ebttables
exchange-bmc-os-info gpm grub2-once haveged haveged-switch-root ipmi ipmievd
issue-add-ssh-keys kexec-load lunmask man-db-create multipathd nfs nfs-blkmap nmb
nvme-autoconnect ostree-remount rpcbind rpmconfigcheck rsyncd rtkit-daemon serial-getty@
smartd-generate_opts smb snmpd snmptrapd speech-dispatcherd systemd-boot-check-no-failures
systemd-network-generator systemd-sysexit systemd-time-wait-sync systemd-timesyncd udisks2
update-system-flatpaks upower vncserver@

```

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### Platform Notes (Continued)

indirect            wickedd

-----  
13. Linux kernel boot-time arguments, from /proc/cmdline

```
BOOT_IMAGE=/boot/vmlinuz-5.14.21-150500.53-default
root=UUID=8e8c0749-cfeb-4341-986b-68d8b0a3fed1
splash=silent
mitigations=auto
quiet
security=apparmor
crashkernel=403M,high
crashkernel=72M,low
```

-----  
14. cpupower frequency-info

```
analyzing CPU 0:
  current policy: frequency should be within 800 MHz and 3.90 GHz.
                   The governor "powersave" may decide which speed to use
                   within this range.

  boost state support:
    Supported: yes
    Active: yes
```

-----  
15. sysctl

```
kernel.numa_balancing            1
kernel.randomize_va_space        2
vm.compaction_proactiveness      20
vm.dirty_background_bytes        0
vm.dirty_background_ratio        10
vm.dirty_bytes                    0
vm.dirty_expire_centisecs        3000
vm.dirty_ratio                    20
vm.dirty_writeback_centisecs     500
vm.dirtytime_expire_seconds      43200
vm.extfrag_threshold             500
vm.min_unmapped_ratio            1
vm.nr_hugepages                   0
vm.nr_hugepages_mempolicy        0
vm.nr_overcommit_hugepages       0
vm.swappiness                    60
vm.watermark_boost_factor        15000
vm.watermark_scale_factor        10
vm.zone_reclaim_mode             0
```

-----  
16. /sys/kernel/mm/transparent\_hugepage

```
defrag            always defer defer+madvice [madvice] never
enabled           [always] madvice never
hpage_pmd_size   2097152
shmem_enabled    always within_size advise [never] deny force
```

-----  
17. /sys/kernel/mm/transparent\_hugepage/khugepaged

```
alloc_sleep_millisecs    60000
defrag                   1
max_ptes_none            511
max_ptes_shared         256
max_ptes_swap            64
pages_to_scan            4096
```

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### Platform Notes (Continued)

scan\_sleep\_millisecs 10000

-----  
18. OS release

From /etc/\*-release /etc/\*-version  
os-release SUSE Linux Enterprise Server 15 SP5

-----  
19. Disk information

SPEC is set to: /home/cpu2017  
Filesystem Type Size Used Avail Use% Mounted on  
/dev/nvme0n1p5 btrfs 563G 23G 540G 4% /home

-----  
20. /sys/devices/virtual/dmi/id

Vendor: Supermicro  
Product: Super Server  
Product Family: Family  
Serial: 0123456789

-----  
21. dmidecode

Additional information from dmidecode 3.4 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:

15x Samsung M321R8GA0PB0-CWMMKH 64 GB 2 rank 5600, configured at 5200  
1x Samsung M321R8GA0PB0-CWMMXH 64 GB 2 rank 5600, configured at 5200

-----  
22. BIOS

(This section combines info from /sys/devices and dmidecode.)

BIOS Vendor: American Megatrends International, LLC.  
BIOS Version: 2.1  
BIOS Date: 12/07/2023  
BIOS Revision: 5.32

### 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 2023.2.3 Build x  
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.

=====  
C++ | 520.omnetpp\_r(base) 523.xalancbmk\_r(base) 531.deepsjeng\_r(base) 541.leela\_r(base)

-----  
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.2.3 Build x  
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.

=====  
Fortran | 548.exchange2\_r(base)

-----  
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2023.2.3 Build x

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## Compiler Version Notes (Continued)

Copyright (C) 1985-2023 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  
-L/home/specdev/new\_compilers/ic2023.2.3/compiler/lib/intel64\_lin  
-lqkmallo

C++ benchmarks:

-w -std=c++14 -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math  
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4  
-L/home/specdev/new\_compilers/ic2023.2.3/compiler/lib/intel64\_lin  
-lqkmallo

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**Test Sponsor:** Supermicro  
**Tested by:** Supermicro

**Test Date:** Feb-2024  
**Hardware Availability:** Oct-2023  
**Software Availability:** Dec-2023

## Base Optimization Flags (Continued)

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/home/specdev/new_compilers/ic2023.2.3/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/Intel-ic2023p2-official-linux64.html>  
<http://www.spec.org/cpu2017/flags/Supermicro-Platform-Settings-V1.2-SPR-revG.html>

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

<http://www.spec.org/cpu2017/flags/Intel-ic2023p2-official-linux64.xml>  
<http://www.spec.org/cpu2017/flags/Supermicro-Platform-Settings-V1.2-SPR-revG.xml>

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For questions about this result, please contact the tester. For other inquiries, please contact [info@spec.org](mailto:info@spec.org).

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