



SPEC CPU®2017 Integer Rate Result

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Fujitsu

PRIMERGY RX2540 M7, Intel Xeon Max 9468, 2.10GHz

SPECrate®2017_int_base = 773

SPECrate®2017_int_peak = Not Run

CPU2017 License: 19

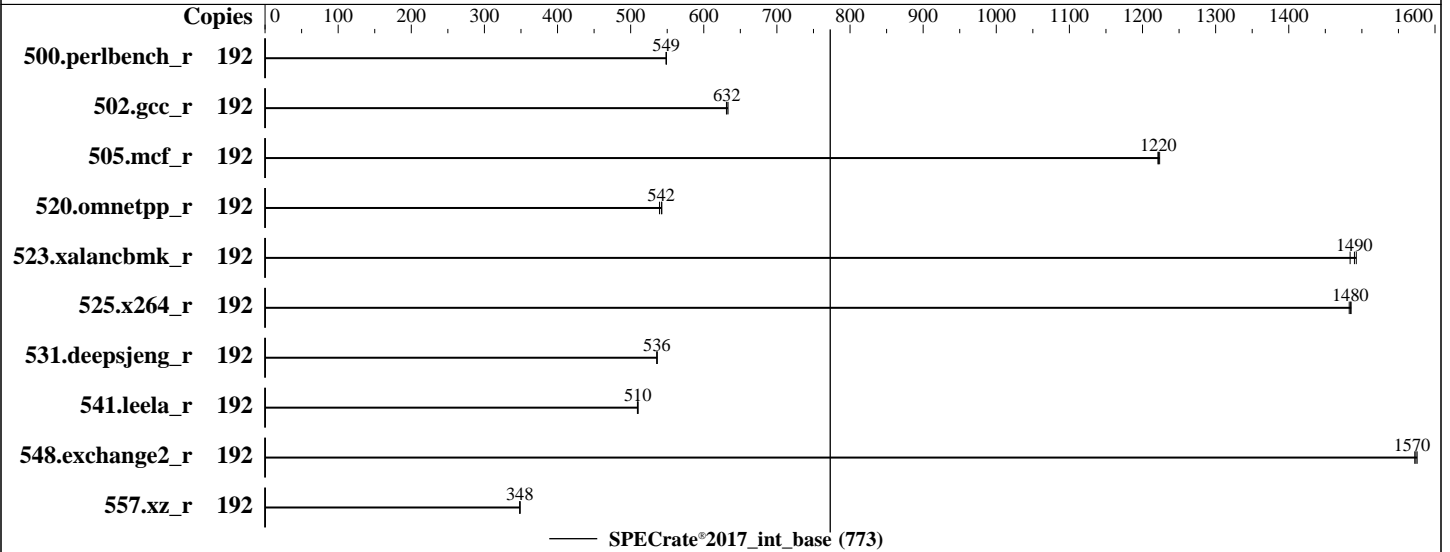
Test Sponsor: Fujitsu

Tested by: Fujitsu

Test Date: Jul-2023

Hardware Availability: Mar-2023

Software Availability: Dec-2022



Hardware

CPU Name: Intel Xeon Max 9468
 Max MHz: 3500
 Nominal: 2100
 Enabled: 96 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: 105 MB I+D on chip per chip
 Other: None
 Memory: 1152 GB (16 x 64 GB 2Rx4 PC5-4800B-R + 2 x 64 GB HBM)
 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 2023.0 of Intel oneAPI DPC++/C++ Compiler for Linux;
 Fortran: Version 2023.0 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 R1.1.0 for D3983-A1x Feb-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



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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	192	557	549	557	549	557	549							
502.gcc_r	192	431	631	429	633	430	632							
505.mcf_r	192	254	1220	254	1220	254	1220							
520.omnetpp_r	192	464	543	467	539	465	542							
523.xalancbmk_r	192	137	1480	136	1490	136	1490							
525.x264_r	192	226	1480	227	1480	226	1490							
531.deepsjeng_r	192	411	536	410	536	410	536							
541.leela_r	192	623	510	624	509	624	510							
548.exchange2_r	192	320	1570	320	1570	319	1580							
557.xz_r	192	595	349	595	348	595	348							

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

Compiler Notes

SPEC has ruled that the compiler used for this result was performing a compilation that specifically improves the performance of the 523.xalancbmk_r / 623.xalancbmk_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"
Kernel Boot Parameter set with : nohz_full=1-191

Environment Variables Notes

Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH =
"/home/benchmark/speccpu-1.1.9/lib/intel64:/home/benchmark/speccpu-1.1.9/lib/ia32:/home/benchmark/spec-cpu-1.1.9/je5.0.1-32"
MALLOC_CONF = "retain:true"



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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

Platform Notes

BIOS configuration:
 DCU Streamer Prefetcher = Disabled
 SNC (Sub NUMA) = Enable SNC4
 Adjacent Cache Line Prefetch = Disabled
 Package C State Limit = C0
 Volatile Memory Mode = 2LM
 CPU Performance Boost = Aggressive
 FAN Control = Full

Sysinfo program /home/benchmark/speccpu-1.1.9/bin/sysinfo
 Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
 running on localhost Tue Jul 11 02:48:59 2023

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 (249.11+suse.124.g2bc0b2c447)`
12. Failed units, from `systemctl list-units --state=failed`
13. Services, from `systemctl list-unit-files`
14. Linux kernel boot-time arguments, from `/proc/cmdline`
15. `cpupower frequency-info`
16. `sysctl`
17. `/sys/kernel/mm/transparent_hugepage`
18. `/sys/kernel/mm/transparent_hugepage/khugepaged`
19. OS release
20. Disk information
21. `/sys/devices/virtual/dmi/id`
22. `dmidecode`
23. BIOS

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Platform Notes (Continued)

1. `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

2. `w`
02:48:59 up 5 min, 2 users, load average: 0.22, 3.05, 2.01
USER TTY FROM LOGIN@ IDLE JCPU PCPU WHAT
root tty1 - 02:44 10.00s 4.02s 0.52s
/home/benchmark/ptu_v4.0/UNIFIED_SERVER_PTAT_V4.0.0_20230110/ptat -mon -i 5000000 -filter 0x3f -y -ts -csv
-log
root pts/0 10.118.163.62 02:44 3.00s 0.26s 0.07s vim run_intrate_new.sh

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) 4125182
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) 4125182
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
-bash
runcpu --nobuild --action validate --define default-platform-flags --define numcopies=192 -c
ic2023.0-lin-sapphirerapids-rate-20221201.cfg --define smt-on --define cores=96 --define physicalfirst
--define invoke_with_interleave --define drop_caches --tune base -o all intrate
runcpu --nobuild --action validate --define default-platform-flags --define numcopies=192 --configfile
ic2023.0-lin-sapphirerapids-rate-20221201.cfg --define smt-on --define cores=96 --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/CPU2017.001/templogs/preenv.intrate.001.0.log --lognum 001.0 --from_runcpu 2
specperl \$SPEC/bin/sysinfo
\$SPEC = /home/benchmark/speccpu-1.1.9

6. `/proc/cpuinfo`
model name : Intel (R) Xeon (R) CPU Max 9468
vendor_id : GenuineIntel
cpu family : 6

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Platform Notes (Continued)

```
model          : 143
stepping       : 8
microcode      : 0x2c000120
bugs           : spectre_v1 spectre_v2 spec_store_bypass swappg
cpu cores      : 48
siblings       : 96
2 physical ids (chips)
192 processors (hardware threads)
physical id 0: core ids 0-47
physical id 1: core ids 0-47
physical id 0: apicids 0-95
physical id 1: apicids 128-223
```

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

7. lscpu

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):                 192
On-line CPU(s) list:   0-191
Vendor ID:              GenuineIntel
Model name:             Intel (R) Xeon (R) CPU Max 9468
CPU family:             6
Model:                  143
Thread(s) per core:    2
Core(s) per socket:    48
Socket(s):              2
Stepping:               8
CPU max MHz:            3500.0000
CPU min MHz:            800.0000
BogoMIPS:               4200.00
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 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
                        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_vpopcntdq la57 rdpid bus_lock_detect cldemote movdiri movdir64b
                        enqcmd fsrm md_clear serialize tsxldtrk pconfig arch_lbr avx512_fp16
                        amx_tile flush_l1d arch_capabilities

Virtualization:        VT-x
L1d cache:             4.5 MiB (96 instances)
L1i cache:             3 MiB (96 instances)
L2 cache:              192 MiB (96 instances)
L3 cache:              210 MiB (2 instances)
NUMA node(s):         8
```

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Platform Notes (Continued)

```

NUMA node0 CPU(s):      0-11,96-107
NUMA node1 CPU(s):      12-23,108-119
NUMA node2 CPU(s):      24-35,120-131
NUMA node3 CPU(s):      36-47,132-143
NUMA node4 CPU(s):      48-59,144-155
NUMA node5 CPU(s):      60-71,156-167
NUMA node6 CPU(s):      72-83,168-179
NUMA node7 CPU(s):      84-95,180-191
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/swapgs 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	4.5M	12	Data	1	64	1	64
L1i	32K	3M	8	Instruction	1	64	1	64
L2	2M	192M	16	Unified	2	2048	1	64
L3	105M	210M	15	Unified	3	114688	1	64

8. numactl --hardware

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

```

available: 8 nodes (0-7)
node 0 cpus: 0-11,96-107
node 0 size: 128598 MB
node 0 free: 127712 MB
node 1 cpus: 12-23,108-119
node 1 size: 129017 MB
node 1 free: 128462 MB
node 2 cpus: 24-35,120-131
node 2 size: 129017 MB
node 2 free: 128624 MB
node 3 cpus: 36-47,132-143
node 3 size: 128983 MB
node 3 free: 128607 MB
node 4 cpus: 48-59,144-155
node 4 size: 129017 MB
node 4 free: 128611 MB
node 5 cpus: 60-71,156-167
node 5 size: 129017 MB
node 5 free: 128650 MB
node 6 cpus: 72-83,168-179
node 6 size: 129017 MB
node 6 free: 128630 MB
node 7 cpus: 84-95,180-191
node 7 size: 128648 MB
node 7 free: 128251 MB
node distances:
node  0  1  2  3  4  5  6  7
0:  10 17 17 17 26 26 26 26
1:  17 10 17 17 26 26 26 26
2:  17 17 10 17 26 26 26 26
3:  17 17 17 10 26 26 26 26
4:  26 26 26 26 10 17 17 17

```

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Platform Notes (Continued)

```
5: 26 26 26 26 17 10 17 17
6: 26 26 26 26 17 17 10 17
7: 26 26 26 26 17 17 17 10
```

```
-----
9. /proc/meminfo
MemTotal:      1056071552 kB
-----
```

```
10. who -r
run-level 3 Jul 11 02:43
-----
```

```
11. Systemd service manager version: systemd 249 (249.11+suse.124.g2bc0b2c447)
Default Target Status
multi-user      degraded
-----
```

```
12. Failed units, from systemctl list-units --state=failed
UNIT          LOAD    ACTIVE SUB    DESCRIPTION
* sep5.service loaded failed failed systemd script to load sep5 driver at boot time
-----
```

```
13. Services, from systemctl list-unit-files
STATE          UNIT FILES
enabled        YaST2-Firstboot YaST2-Second-Stage apparmor auditd bluetooth cron display-manager getty@
               haveged irqbalance iscsi issue-generator kbdsettings kdump kdump-early klog lvm2-monitor
               nscd postfix purge-kernels rollback rsyslog sep5 smartd sshd wicked wickedd-auto4
               wickedd-dhcp4 wickedd-dhcp6 wickedd-nanny
enabled-runtime systemd-remount-fs
disabled       accounts-daemon appstream-sync-cache 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 firewallld gpm grub2-once
               haveged-switch-root ipmi ipmievd iscsi-init iscsid iscsiuiio issue-add-ssh-keys kexec-load
               lunmask man-db-create multipathd nfs nfs-blkmap nmb ostree-remount rdisc rpcbind
               rpmconfigcheck rsyncd rtkit-daemon serial-getty@ smartd_generate_opts smb snmpd snmptrapd
               speech-dispatcherd systemd-boot-check-no-failures systemd-network-generator systemd-sysext
               systemd-time-wait-sync systemd-timesyncd udisks2 upower
indirect       wickedd
-----
```

```
14. Linux kernel boot-time arguments, from /proc/cmdline
BOOT_IMAGE=/boot/vmlinuz-5.14.21-150400.22-default
root=UUID=0e5beafe-73ba-4cb4-b738-5343b4292867
splash=silent
quiet
security=apparmor
crashkernel=322M,high
crashkernel=72M,low
nohz_full=1-191
mitigations=auto
-----
```

```
15. cpupower frequency-info
analyzing CPU 0:
  current policy: frequency should be within 800 MHz and 3.50 GHz.
                  The governor "powersave" may decide which speed to use
                  within this range.
boost state support:
  Supported: yes
-----
```

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Platform Notes (Continued)

Active: yes

```

-----
16. 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
-----
17. /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
-----
18. /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
scan_sleep_millisecs   10000
-----
19. OS release
From /etc/*-release /etc/*-version
os-release SUSE Linux Enterprise Server 15 SP4
-----
20. Disk information
SPEC is set to: /home/benchmark/speccpu-1.1.9
Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/sda2        xfs   1.8T  117G  1.7T   7% /
-----
21. /sys/devices/virtual/dmi/id
Vendor:          FUJITSU
Product:         PRIMERGY RX2540 M7
Product Family: SERVER
Serial:          EWCExxxxxx
-----

```

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Platform Notes (Continued)

22. dmidecode

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:

8x Intel 16 GB 1 rank 3200
2x Samsung M321R8GA0BB0-CQKDG 64 GB 2 rank 4800
8x Samsung M321R8GA0BB0-CQKEG 64 GB 2 rank 4800
6x Samsung M321R8GA0BB0-CQKVG 64 GB 2 rank 4800

23. BIOS

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

BIOS Vendor: FUJITSU
BIOS Version: V1.0.0.0 R1.1.0 for D3983-A1x
BIOS Date: 02/03/2023
BIOS Revision: 1.1
Firmware Revision: 2.0

Each Intel Xeon CPU Max processor is configured with 64 GB of High Bandwidth Memory (HBM) in-package. dmidecode is additionally reporting the capacity of the CPU in-package HBM stack as: '8x Intel 16 GB 1 rank 3200'

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 2023.0.0 Build 20221201
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)
=====

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201
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 2023.0.0 Build 20221201
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
=====

Base Compiler Invocation

C benchmarks:
icx

C++ benchmarks:
icpx

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Base Compiler Invocation (Continued)

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 -xsapphirerapids -O3 -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-L/usr/local/intel/compiler/2023.0.0/linux/compiler/lib/intel64_lin
-lqkmalloc
```

C++ benchmarks:

```
-w -std=c++14 -m64 -Wl,-z,muldefs -xsapphirerapids -O3 -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-L/usr/local/intel/compiler/2023.0.0/linux/compiler/lib/intel64_lin
-lqkmalloc
```

Fortran benchmarks:

```
-w -m64 -Wl,-z,muldefs -xsapphirerapids -O3 -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-nostandard-realloc-lhs -align array32byte -auto
-L/usr/local/intel/compiler/2023.0.0/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-RevC.html>

<http://www.spec.org/cpu2017/flags/Intel-ic2023-official-linux64.html>



SPEC CPU®2017 Integer Rate Result

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Fujitsu

PRIMERGY RX2540 M7, Intel Xeon Max 9468,
2.10GHz

SPECrate®2017_int_base = 773

SPECrate®2017_int_peak = Not Run

CPU2017 License: 19

Test Sponsor: Fujitsu

Tested by: Fujitsu

Test Date: Jul-2023

Hardware Availability: Mar-2023

Software Availability: Dec-2022

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-RevC.xml>

<http://www.spec.org/cpu2017/flags/Intel-ic2023-official-linux64.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 CPU®2017 v1.1.9 on 2023-07-10 13:48:57-0400.

Report generated on 2024-01-29 18:11:32 by CPU2017 PDF formatter v6716.

Originally published on 2023-10-10.