



SPEC CPU®2017 Integer Rate Result

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Fujitsu

PRIMERGY RX2540 M7, Intel Xeon Max 9480,
1.90GHz

SPECrate®2017_int_base = 875

SPECrate®2017_int_peak = Not Run

CPU2017 License: 19

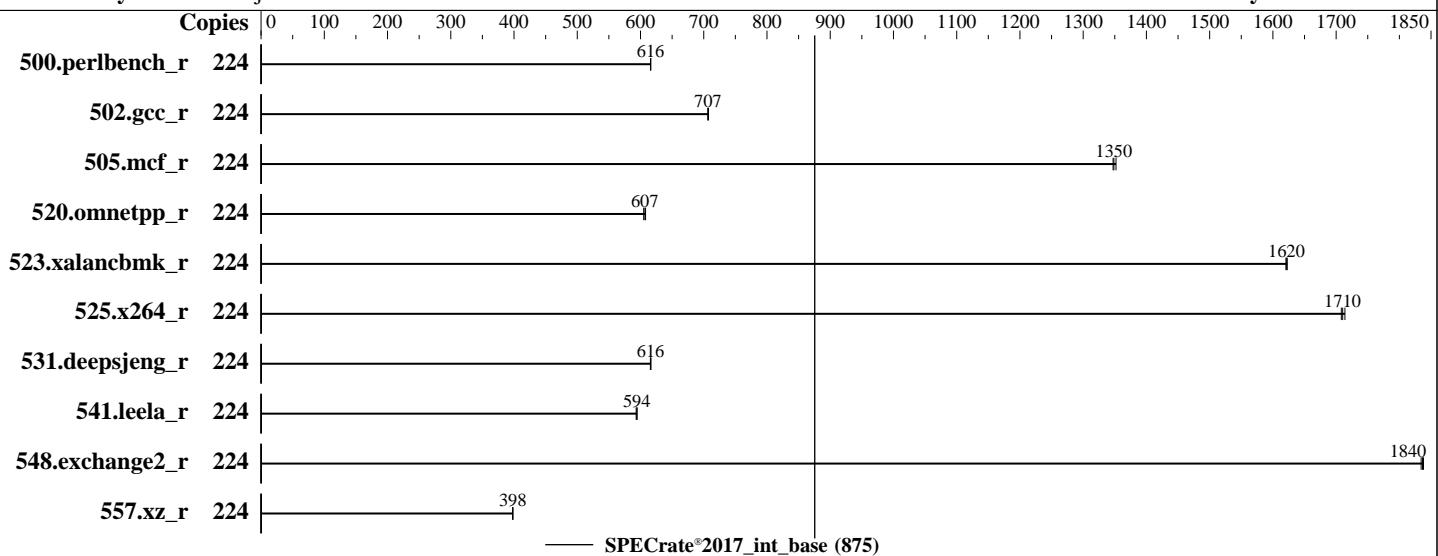
Test Date: Jul-2023

Test Sponsor: Fujitsu

Hardware Availability: Mar-2023

Tested by: Fujitsu

Software Availability: Dec-2022



Hardware

CPU Name: Intel Xeon Max 9480
Max MHz: 3500
Nominal: 1900
Enabled: 112 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: 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	Seconds	Ratio
500.perlbench_r	224	579	616	579	616	579	616									
502.gcc_r	224	448	708	449	707	449	707									
505.mcf_r	224	269	1350	268	1350	268	1350									
520.omnetpp_r	224	484	607	486	605	483	608									
523.xalancbmk_r	224	146	1620	146	1620	146	1620									
525.x264_r	224	230	1710	229	1710	229	1710									
531.deepsjeng_r	224	416	617	417	616	417	616									
541.leela_r	224	624	594	624	595	625	593									
548.exchange2_r	224	320	1830	320	1840	319	1840									
557.xz_r	224	608	398	608	398	608	398									

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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=1-223

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/jet5.0.1-32"
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 Fri Jul 14 19:24:40 2023

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

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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
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 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
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-

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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
19:24:40 up 18:43, 2 users, load average: 1.18, 74.63, 156.02
USER TTY FROM LOGIN@ IDLE JCPU PCPU WHAT
root tty1 - 00:41 14:50m 4.49s 0.36s
/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 00:42 14:31m 0.48s 0.48s -bash

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) 4125150
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) 4125150
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=224 -c
ic2023.0-lin-sapphirerapids-rate-20221201.cfg --define smt-on --define cores=112 --define physicalfirst
--define invoke_with_interleave --define drop_caches --tune base -o all intrate
runcpu --nobuild --action validate --define default-platform-flags --define numcopies=224 --configfile
ic2023.0-lin-sapphirerapids-rate-20221201.cfg --define smt-on --define cores=112 --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 9480
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 swapgs
cpu cores      : 56
siblings        : 112
2 physical ids (chips)
224 processors (hardware threads)
physical id 0: core ids 0-55
physical id 1: core ids 0-55
physical id 0: apicids 0-111
physical id 1: apicids 128-239
```

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):                224
On-line CPU(s) list:  0-223
Vendor ID:             GenuineIntel
Model name:            Intel (R) Xeon (R) CPU Max 9480
CPU family:            6
Model:                 143
Thread(s) per core:   2
Core(s) per socket:   56
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 pdpe1gb rdtscp
                      lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtTopology
                      nonstop_tsc cpuid aperf/fmperf 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_13 cat_12 cdp_13
                      invpcid_single intel_ppin cdp_12 ssbd mba ibrs ibpb stibp ibrs_enhanced
                      tpr_shadow vnmi flexpriority ept vpid ept_ad fsgsbase tsc_adjust bmil hle
                      avx2 smep bmi2 erms invpcid rtm cmqm rdt_a avx512f avx512dq rdseed adx smap
                      avx512ifma clflushopt clwb intel_pt avx512cd sha_ni avx512bw avx512vl
                      xsaveopt xsavec xgetbv1 xsaves cqmq_llc cqmq_occup_llc cqmq_mbmm_total
                      cqmq_mbmm_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_vpocntdq la57 rdpid bus_lock_detect cldemote movdiri movdir64b
                      enqcmd fsrm md_clear serialize tsxlptrk pconfig arch_lbr avx512_fp16
                      amx_tile flush_lll arch_capabilities
Virtualization:        VT-x
L1d cache:             5.3 MiB (112 instances)
L1i cache:             3.5 MiB (112 instances)
L2 cache:              224 MiB (112 instances)
L3 cache:              225 MiB (2 instances)
NUMA node(s):          8
```

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Platform Notes (Continued)

NUMA node0 CPU(s):	0-13,112-125
NUMA node1 CPU(s):	14-27,126-139
NUMA node2 CPU(s):	28-41,140-153
NUMA node3 CPU(s):	42-55,154-167
NUMA node4 CPU(s):	56-69,168-181
NUMA node5 CPU(s):	70-83,182-195
NUMA node6 CPU(s):	84-97,196-209
NUMA node7 CPU(s):	98-111,210-223
Vulnerability Itlb multihit:	Not affected
Vulnerability Llftf:	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	5.3M	12	Data	1	64	1	64
L1i	32K	3.5M	8	Instruction	1	64	1	64
L2	2M	224M	16	Unified	2	2048	1	64
L3	112.5M	225M	15	Unified	3	122880	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: 0-13,112-125
node 0 size: 128597 MB
node 0 free: 127085 MB
node 1 cpus: 14-27,126-139
node 1 size: 129016 MB
node 1 free: 128073 MB
node 2 cpus: 28-41,140-153
node 2 size: 129016 MB
node 2 free: 128092 MB
node 3 cpus: 42-55,154-167
node 3 size: 129016 MB
node 3 free: 128096 MB
node 4 cpus: 56-69,168-181
node 4 size: 129016 MB
node 4 free: 128034 MB
node 5 cpus: 70-83,182-195
node 5 size: 128982 MB
node 5 free: 128058 MB
node 6 cpus: 84-97,196-209
node 6 size: 129016 MB
node 6 free: 128099 MB
node 7 cpus: 98-111,210-223
node 7 size: 128647 MB
node 7 free: 127709 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 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: 1056063476 kB
```

10. who -r

```
run-level 3 Jul 14 00:41
```

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 nsqd 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 firewalld gpm grub2-once haveged-switch-root ipmi ipmiev4d iscsi-init iscsiuio 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=1-223
```

```
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+madvise [madvise] never  
    enabled          [always] madvise 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 9480,
1.90GHz

SPECrate®2017_int_base = 875

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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