## SPEC CPU®2017 Integer Rate Result

**Hewlett Packard Enterprise**  
(Test Sponsor: HPE)  
ProLiant DL380 Gen11  
(3.20 GHz, Intel Xeon Gold 6558Q)

<table>
<thead>
<tr>
<th>Test Date:</th>
<th>Feb-2024</th>
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<td>HPE</td>
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**SPECrate®2017_int_base = 729**  
**SPECrate®2017_int_peak = 754**

### Hardware

- **CPU Name:** Intel Xeon Gold 6558Q  
  - **Max MHz:** 4100  
  - **Nominal:** 3200  
  - **Enabled:** 64 cores, 2 chips, 2 threads/core  
  - **Orderable:** 1, 2 chip(s)  
  - **Cache L1:** 32 KB I + 48 KB D on chip per core  
  - **L2:** 2 MB I+D on chip per core  
  - **L3:** 60 MB I+D on chip per chip  
  - **Other:** None  
- **Memory:** 512 GB (16 x 32 GB 2Rx8 PC5-5600B-R, running at 5200)  
- **Storage:** 1 x 960 GB SATA SSD  
- **Other:** Cooling: DLC

### Software

- **OS:** SUSE Linux Enterprise Server 15 SP5  
  - **Kernel:** 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:** Compiler for Linux:  
  - **Parallel:** No  
- **Firmware:** HPE BIOS Version v2.12 12/13/2023 released Dec-2023  
- **File System:** xfs  
- **System State:** Run level 3 (multi-user)  
- **Base Pointers:** 64-bit  
- **Peak Pointers:** 32/64-bit  
- **Other:** jemalloc memory allocator V5.0.1  
- **Power Management:** BIOS and OS set to prefer performance at the cost of additional power usage

### Results

<table>
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<tr>
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<th>SPECrate®2017_int_base</th>
<th>SPECrate®2017_int_peak</th>
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- **SPECrate®2017_int_base (729)**
- **SPECrate®2017_int_peak (754)**
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CPU2017 License: 3
Test Sponsor: HPE
Tested by: HPE

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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"
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>

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
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.

(Continued on next page)
General Notes (Continued)

jemalloc, a general purpose malloc implementation
built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5

Platform Notes

The system ROM used for this result contains Intel microcode version 0x21000200 for the Intel Xeon Gold 6558Q processor.

BIOS Configuration:
- Workload Profile set to General Throughput Compute
- Memory Patrol Scrubbing set to Disabled
- Last Level Cache (LLC) Dead Line Allocation set to Disabled
- Intel UPI Link Enablement set to Single Link
- Sub-NUMA Clustering (SNC) set to Enable SNC2(2-clusters)
- Enhanced Processor Performance Profile set to Aggressive
- Thermal Configuration set to Maximum Cooling
- Workload Profile set to Custom
- DCU Stream Prefetcher set to Disabled
- Adjacent Sector Prefetch set to Disabled
- Intel UPI Link Power Management set to Enabled

Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
running on localhost Thu Feb 1 04:48:24 2024

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

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Software Availability: Dec-2023

Platform Notes (Continued)

2. w
   04:48:24 up 0 min, 0 users, load average: 0.62, 0.24, 0.09
   USER     TTY      FROM             LOGIN@   IDLE   JCPU   PCPU WHAT

   USER     TTY      FROM             LOGIN@   IDLE   JCPU   PCPU WHAT

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) 2062612
   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) 2062612
   virtual memory  (kbytes, -v) unlimited
   file locks       (-x) unlimited

5. sysinfo process ancestry
   /usr/lib/systemd/systemd --switched-root --system --deserialize 30
   ssrd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups
   sshd: root@notty
   bash -c cd $SPEC/ & & $SPEC/intrate.sh
   runcpu --nobuild --action validate --define default-platform-flags --define numcopies=128 --invert2023.2.3-lin-sapphirerapids-rate-20231121.cfg --define smt-on --define cores=64 --define physicalfirst --define invoke_with_interleave --define drop_caches --tune base,peak --o all intrate
   runcpu --nobuild --action validate --define default-platform-flags --define numcopies=128 --configfile ic2023.2.3-lin-sapphirerapids-rate-20231121.cfg --define smt-on --define cores=64 --define physicalfirst --define invoke_with_interleave --define drop_caches --tune base,peak --output_format all --nopower --runmode rate --tune base:peak --size refrate intrate --nopreev --notypeevent --logfile $SPEC/tmp/CP0U2017.001/templogs/preenv.intrate.001.0.log --lognum 001.0 --from_runcpu 2
   specperl $SPEC/bin/sysinfo
   $SPEC = /home/cpu2017

6. /proc/cpuinfo
   model name: INTEL(R) XEON(R) GOLD 6558Q
   vendor_id: GenuineIntel
   cpu family: 6
   model: 207
   stepping: 2
   microcode: 0x21000200
   bug: spectre_v1 spectre_v2 spec_store_bypass swapgs eibrp_pbrsb
   cpu cores: 32
   siblings: 64
   2 physical ids (chips)
   128 processors (hardware threads)
   physical id 0: core ids 0-31
   physical id 1: core ids 0-31

(Continued on next page)
Platform Notes (Continued)

 physical id 0: apicid(s) 0-63
 physical id 1: apicid(s) 128-191
 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 2.37.4:

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):                          128
On-Line CPU(s) list:             0-127
Vendor ID:                       GenuineIntel
Model name:                      INTEL(R) XEON(R) GOLD 6558Q
CPU family:                      6
Model:                           207
Thread(s) per core:              2
Core(s) per socket:              32
Socket(s):                       2
Stepping:                        2
BogoMIPS:                        6400.00

Flags:                           fpu vme de pse mce cmov pat pse36
                                clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb
                                rdtscp lm constant-cst art arch_perfmon pebs bts rep_good nopl xtopology
                                nonstop_tsc cdtes64 monitor ds_cpl vmx sm xsaac xsmov pdcm pdcm dca sse4_1
                                ssse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand
                                lshf_lm abm 3dnowprefetch cpuid_fault epb cat_l3 cat_l2 cdp_l3
                                invpcid_single cdp_l2 ssbd mba ibrs ibpb ibrs_enhanced tpr_shadow
                                vmx flexpriority ept vpid ept_ad fsgsbase tsc_adjust bmi1 hlen avx2 smep
                                bmi2 ets evtx xmip pmovdiri pmovdvi pclmulqdq turbo_mic smap
                                arch_capabilities

Virtualization:                  VT-x
L1d cache:                       3 MiB (64 instances)
L1i cache:                       2 MiB (64 instances)
L2 cache:                        128 MiB (64 instances)
L3 cache:                        120 MiB (2 instances)
NUMA node(s):                    4
NUMA node0 CPU(s):               0-15,64-79
NUMA node1 CPU(s):               16-31,80-95
NUMA node2 CPU(s):               32-47,96-111
NUMA node3 CPU(s):               48-63,112-127
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/swappgs barriers and __user pointer sanitization
Vulnerability Spectre v2:        Mitigation; Enhanced IBRS, IBPB conditional, RSB filling, PBRSB-efIBRS SW

(Continued on next page)
**Platform Notes (Continued)**

```
sequence
Vulnerability Srbd:             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 3M 12 Data            1    64        1 128
L1i 32K 2M 8 Instruction     1    64        1 128
L2 2M 128M 16 Unified         2 2048        1 128
L3 60M 120M 15 Unified        3 65536        1 128
```

8. numactl --hardware
NOTE: a numactl 'node' might or might not correspond to a physical chip.
available: 4 nodes (0-3)
node 0 cpus: 0-15,64-79
node 0 size: 128709 MB
node 0 free: 128081 MB
node 1 cpus: 16-31,80-95
node 1 size: 129015 MB
node 1 free: 128100 MB
node 2 cpus: 32-47,96-111
node 2 size: 128981 MB
node 2 free: 128496 MB
node 3 cpus: 48-63,112-127
node 3 size: 128977 MB
node 3 free: 128492 MB

distances:
node   0   1   2   3
0:  10  10  10  10
1:  20  10  10  10
2:  30  30  30  30
3:  40  40  40  40

9. /proc/meminfo
MemTotal: 528060460 kB

10. who --r
run-level 3 Feb 1 04:47

11. Systemd service manager version: systemd 249 (249.16+suse.171.gdad0071f15)
Default Target Status
multi-user running

12. Services, from systemctl list-unit-files
STATE UNIT FILES
enabled ModemManager YaST2-Firstboot YaST2-Second-Stage apparmor appstream-sync-cache auditd
bluetooth cron display-manager getty@ irqbalance issue-generator kbdsettings klog
lvm2-monitor nscd postfix purge-kernels rollback rsyslog smartd sshd systemd-pstore wicked
wickedd-auto4 wickedd-dhcp4 wickedd-dhcp6 wickedd-nanny wpa_supplicant

systemd-remount-fs
enabled-runtime NetworkManager NetworkManager-dispatcher NetworkManager-wait-online accounts-daemon autofs
autostart-initscripts blk-availability bluetooth-mesh boot-sysctl ca-certificates
chrony-wait chronyd console-getty cups cups-browsed debug-shell dnsmasq ebtables
exchange-bmc-os-info firewalld gpm grub2-once havedeg havedeg-switch-root
hwloc-dump-hwdata ipmi ipmienv issue-add-ssh-keys kexec-load lunmask man-db-create
(Continued on next page)
Platform Notes (Continued)

multipathd nfs nfs-blkmap nmb openvpn@ ostree-remount rpcbind rpmconfigcheck rsyncd
rtkit-daemon serial-getty@ smbd generate_opts smb snmpd snmptrapd speech-dispatcherd
systemd-boot-check-no-failures systemd-network-generator systemd-sysext
systemd-time-wait-sync systemd-timesyncd udisks2 update-system-flatpaks upower vncserver@
wpa_supplicant@

indirect          pcscd saned@ wickedd

13. Linux kernel boot-time arguments, from /proc/cmdline
BOOT_IMAGE=/boot/vmlinuz-5.14.21-150500.53-default
root=UUID=da74e710-a3db-4f33-9e12-6a2e672dd5ee
splash=silent
resume=/dev/disk/by-uuid/ef943a7c-3213-42e5-81d6-d2759bb8ad29
mitigations=auto
quiet
security=apparmor

14. cpupower frequency-info
analyzing CPU 0:
  Unable to determine current policy
  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.extrfrag_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+madvise [madvise] never
enabled        [always] madvise never
hpage_pmd_size  2097152
shmem_enabled  always within_size advise [never] deny force

17. /sys/kernel/mm/transparent_hugepage/khugepaged
defrag        1
max_ptes_none  511
max_ptes_shared 256
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**Platform Notes (Continued)**

```
max_pages_swap         64
pages_to_scan          4096
scan_sleep_milliseconds 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/sda3      xfs   350G  323G  28G  93% /home

20. /sys/devices/virtual/dmi/id
   Vendor: HPE
   Product: ProLiant DL380 Gen11
   Product Family: ProLiant
   Serial: CNX21000G7

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:
   16x Hynix HMCG88AGBRA193N 32 GB 2 rank 5600, configured at 5200

22. BIOS
   (This section combines info from /sys/devices and dmidecode.)
   BIOS Vendor: HPE
   BIOS Version: 2.12
   BIOS Date: 12/13/2023
   BIOS Revision: 2.12
   Firmware Revision: 1.54

**Compiler Version Notes**

```
C    | 502.gcc_r(peak)
---   |-------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on IA-32, Version 2023.2.3 Build x
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.

C    | 500.perlbench_r(base, peak) 502.gcc_r(base) 505.mcf_r(base, peak) 525.x264_r(base, peak) 557.xz_r(base, peak)
---   |-----------------------------------
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.
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<tr>
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<td>Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.2.3 Build x</td>
</tr>
<tr>
<td></td>
<td>Copyright (C) 1985-2023 Intel Corporation. All rights reserved.</td>
</tr>
</tbody>
</table>

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

(Continued on next page)
SPEC CPU®2017 Integer Rate Result
Copyright 2017-2024 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL380 Gen11
(3.20 GHz, Intel Xeon Gold 6558Q)

SPECrate®2017_int_base = 729
SPECrate®2017_int_peak = 754

CPU2017 License: 3
Test Sponsor: HPE
Tested by: HPE

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

Base Portability Flags (Continued)

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
-1/home/specdev/new_compilers/ic2023.2.3/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
-1/home/specdev/new_compilers/ic2023.2.3/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
-1/home/specdev/new_compilers/ic2023.2.3/compiler/lib/intel64_lin
-lqkmalloc

Peak Compiler Invocation

C benchmarks:
icx

C++ benchmarks:
icpx

Fortran benchmarks:
ifx

Peak Portability Flags

500.perlbench_r: -DSPEC_LP64 -DSPEC_LINUX_X64

(Continued on next page)
SPEC CPU®2017 Integer Rate Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL380 Gen11
(3.20 GHz, Intel Xeon Gold 6558Q)

SPECrate®2017_int_base = 729
SPECrate®2017_int_peak = 754

CPU2017 License: 3
Test Sponsor: HPE
Tested by: HPE

Peak Portability Flags (Continued)

502.gcc_r: -D_FILE_OFFSET_BITS=64
505.mcf_r: -DSPEC_LP64
520.ommnetpp_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

Peak Optimization Flags

C benchmarks:

500.perlbench_r: -w -std=c11 -m64 -Wl,-z,muldefs
-ffast-math
-flto
-Ofast
-flto -O -xCORE-AVX512 -ffast-math -mfpmath=sse
-funroll-loops -qopt-mem-layout-trans=4
-fno-strict-overflow
-L/home/specdev/new_compilers/ic2023.2.3/compiler/lib/intel64_lin
-lqkmalloc

502.gcc_r: -m32
-L/home/specdev/new_compilers/ic2023.2.3/compiler/lib/ia32_lin
-std=gnu89 -Wl,-z,muldefs -ffast-math
-flto
-Ofast -xCORE-AVX512 -ffast-math -mfpmath=sse
-funroll-loops -qopt-mem-layout-trans=4
-L/usr/local/jemalloc32-5.0.1.1/lib -ljemalloc

505.mcf_r: basepeak = yes

525.x264_r: -w -std=c11 -m64 -Wl,-z,muldefs -xsapphirerapids -Ofast
-ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -fno-alias
-L/home/specdev/new_compilers/ic2023.2.3/compiler/lib/intel64_lin
-lqkmalloc

557.xz_r: basepeak = yes

C++ benchmarks:

(Continued on next page)
## Peak Optimization Flags (Continued)

520.omnetpp_r: basepeak = yes

523.xalancbmk_r: basepeak = yes

531.deepsjeng_r: basepeak = yes

541.leela_r: basepeak = yes

Fortran benchmarks:

548.exchange2_r: basepeak = yes

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/HPE-Platform-Flags-Intel-EMR-rev1.0.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/HPE-Platform-Flags-Intel-EMR-rev1.0.xml

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

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