Hewlett Packard Enterprise  
ProLiant DL380a Gen11  
(2.20 GHz, Intel Xeon Gold 6538Y+)

**CPU2017 License**: 3  
**Test Sponsor**: HPE  
**Test Date**: Feb-2024  
**Tested by**: HPE  
**Hardware Availability**: Feb-2024  
**Software Availability**: Dec-2023

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</table>

**Hardware**

- **CPU Name**: Intel Xeon Gold 6538Y+  
- **Max MHz**: 4000  
- **Nominal**: 2200  
- **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 1.6 TB NVMe SSD  
- **Other**: Cooling: Air

**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;  
- **Parallel**: No  
- **Firmware**: HPE BIOS Version v2.12 12/19/2023 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
SPEC CPU®2017 Integer Rate Result

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Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL380a Gen11
(2.20 GHz, Intel Xeon Gold 6538Y+)

SPECrate®2017_int_base = 625
SPECrate®2017_int_peak = 645

CPU2017 License: 3
Test Sponsor: HPE
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Test Date: Feb-2024
Hardware Availability: Feb-2024
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Results Table

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</table>

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>
tuned-adm profile was stopped using "systemctl stop tuned"

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)
General Notes (Continued)

is mitigated in the system as tested and documented.
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 6538Y+ processor.
BIOS Configuration:
Workload Profile set to General Throughput Compute
Memory Patrol Scrubbing set to Disabled
Intel UPI Link Enablement set to Single Link
Last Level Cache (LLC) Dead Line Allocation set to Disabled
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 Wed Feb 28 22:50:07 2024

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

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23. BIOS

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Platform Notes (Continued)

2. `w`

```
22:50:07 up 1 min, 0 users, load average: 0.30, 0.15, 0.06
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        (-l) 2062644
  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) 2062644
  virtual memory         (kbytes, -v) unlimited
  file locks             (-x) unlimited
```

5. `sysinfo` process ancestry

```
/usr/lib/systemd/systemd --switched-root --system --deserialize 29
sshd: /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 --c
```

6. `/proc/cpuinfo`

```
model name      : INTEL(R) XEON(R) GOLD 6538Y+
vendor_id       : GenuineIntel
cpu family      : 6
model           : 207
stepping        : 2
microcode       : 0x21000200
bugs            : spectre_v1 spectre_v2 spec_store_bypass swapgs eibr_pbrsb
cpu cores       : 32
siblings        : 64
  2 physical ids (chips)
  128 processors (hardware threads)
physical id 0: core ids 0-31
```

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<table>
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<th>Feb-2024</th>
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</tbody>
</table>

**Platform Notes (Continued)**

physical id 1: core ids 0-31  
physical id 0: apicids 0-63  
physical id 1: apicids 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 6538Y+
CPU family:                       6
Model:                             207
Thread(s) per core:                2
Core(s) per socket:                32
Socket(s):                        2
Stepping:                         2
BogoMIPS:                         4400.00

Flags:

fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat pse36
clflush dtst 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 tsc_trunc msr pae mce cx8 apicid movcnt tsck_deadline_timer aes xsave avx f16c rdrand
lahf_lm abm 3dnowprefetch pdiff_fault epb cat_13 cat_12 cdp_13
invpcid_single cdp_12 ssbd mba ibrs ibpb ibrs enhance tpr_shadow

Vulnerability Itlb multihit: Not affected
Vulnerability Lttf: Not affected
Vulnerability Mds: Not affected
Vulnerability Meltdown: Not affected
Vulnerability Mpio 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/swapsgs barriers and __user pointer sanitization
```

(Continued on next page)
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Platform Notes (Continued)

Vulnerability Spectre v2: Mitigation; Enhanced IBRS, IBPB conditional, RSB filling, PBRSB-eIBRS SW sequence
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  3M  12 Data  1  64     1  64
L1i  32K  2M   8 Instruction 1  64     1  64
L2   2M  128M  16 Unified  2 2048    1  64
L3   60M  120M  15 Unified  3 65536   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: 0-15,64-79
node 0 size: 128709 MB
node 0 free: 128141 MB
node 1 cpus: 16-31,80-95
node 1 size: 129015 MB
node 1 free: 128507 MB
node 2 cpus: 32-47,96-111
node 2 size: 128981 MB
node 2 free: 128358 MB
node 3 cpus: 48-63,112-127
node 3 size: 128977 MB
node 3 free: 128165 MB
node distances:
  node   0   1   2   3
  0:  10  20  30  30
  1:  20  10  30  30
  2:  30  30  10  20
  3:  30  30  20  10

9. /proc/meminfo
MemTotal: 528060472 kB

10. who -r
run-level 3 Feb 28 22:49

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 apparmor auditd cron getty@ irqbalance issue-generator kbdsettings lvm2-monitor
nvme-fc-boot-connections postfix purget-kernels rollback sshd systemd-pstore wicked
wickedd-auto4 wickedd-dhcp4 wickedd-dhcp6 wickedd-nanny
enabled-runtime systemd-remount-fs
disabled blk-availability boot-sysctl ca-certificates chrony-wait chronyd console-getty debug-shell
grub2-once haveged haveged-switch-root issue-add-ssh-keys kexec-load nvmf-autoconnect
rpmconfigcheck serial-getty@ systemd-boot-check-no-failures systemd-network-generator
systemd-sysext systemd-time-wait-sync systemd-timesyncd tuned
indirect wickedd

(Continued on next page)
Platform Notes (Continued)

13. Linux kernel boot-time arguments, from /proc/cmdline
   BOOT_IMAGE=/boot/vmlinuz-5.14.21-150500.53-default
   root=UUID=8cfeaf2f-51cb-41d3-956f-66e764c9dda6
   splash=silent
   resume=/dev/disk/by-uuid/f2fbd83d-34e7-4b60-be82-95ecb061302c
   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. tuned-adm active
   It seems that tuned daemon is not running, preset profile is not activated.
   Preset profile: latency-performance

16. sysctl
   kernel.numa_balancing               1
   kernel.randomize_va_space           2
   vm.compaction_proactiveness         20
   vm.dirty_background_bytes          10
   vm.dirty_background_ratio          10
   vm.dirty_bytes                      0
   vm.dirty_expire_centisecs          3000
   vm.dirty_ratio                     20
   vm.dirty_writeback_centisecs      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+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/klugepaged
   alloc_sleep_millisecs    60000
   defrag                   1
   max_ptes_none            511
   max_ptes_shared          256
   max_ptes_swap            64
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Platform Notes (Continued)

19. OS release
From /etc/*-release /etc/*-version
os-release SUSE Linux Enterprise Server 15 SP5

20. Disk information
SPEC is set to: /home/cpu2017
Filesystem     Type  Size  Used Avail Use% Mounted on
/dev/nvme0n1p3 xfs   946G  299G  648G  32% /home

21. /sys/devices/virtual/dmi/id
Vendor:         HPE
Product:        ProLiant DL380a Gen11
Product Family: ProLiant
Serial:         CNX22602MZ

22. 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

23. BIOS
(This section combines info from /sys/devices and dmidecode.)
BIOS Vendor:       HPE
BIOS Version:      2.12
BIOS Date:         12/19/2023
BIOS Revision:     2.12
Firmware Revision: 1.56

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)

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       | 502.gcc_r(peak)

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**Compiler Version Notes (Continued)**

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<tr>
<td>Fortran</td>
<td>548.exchange2_r(base, peak)</td>
</tr>
</tbody>
</table>

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

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

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Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL380a Gen11
(2.20 GHz, Intel Xeon Gold 6538Y+)

SPECrate®2017_int_base = 625
SPECrate®2017_int_peak = 645

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
-L/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
-L/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
-L/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 DL380a Gen11
(2.20 GHz, Intel Xeon Gold 6538Y+)

SPECrate®2017_int_base = 625
SPECrate®2017_int_peak = 645

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.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

Peak Optimization Flags

C benchmarks:

500.perlbench_r: -w -std=gnu89 -Wl,-z,muldefs -fprofile-use=default.profdata(pass 2) -xCORE-AVX2(pass 1)
-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 -L/home/specdev/new_compilers/ic2023.2.3/compiler/lib/ia32_lin

505.mcf_r: -m32
-L/home/specdev/new_compilers/ic2023.2.3/compiler/lib/ia32_lin
-std=gnu89 -Wl,-z,muldefs -fprofile-use=default.profdata(pass 2) -xCORE-AVX2(pass 1)
-ffast-math -mfpmath=sse
-funroll-loops -qopt-mem-layout-trans=4
-L/usr/local/jemalloc32-5.0.1/lib -Ljemalloc

525.x264_r: -w -std=c11 -m64 -Wl,-z,muldefs -xsapphirerapids -0fast -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 -Ljemalloc

C++ benchmarks:

557.xz_r: basepeak = yes

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SPEC CPU®2017 Integer Rate Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL380a Gen11
(2.20 GHz, Intel Xeon Gold 6538Y+)

SPECraten®2017_int_base = 625
SPECraten®2017_int_peak = 645

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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