SPEC CPU®2017 Integer Rate Result

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Hewlett Packard Enterprise

(Test Sponsor: HPE)
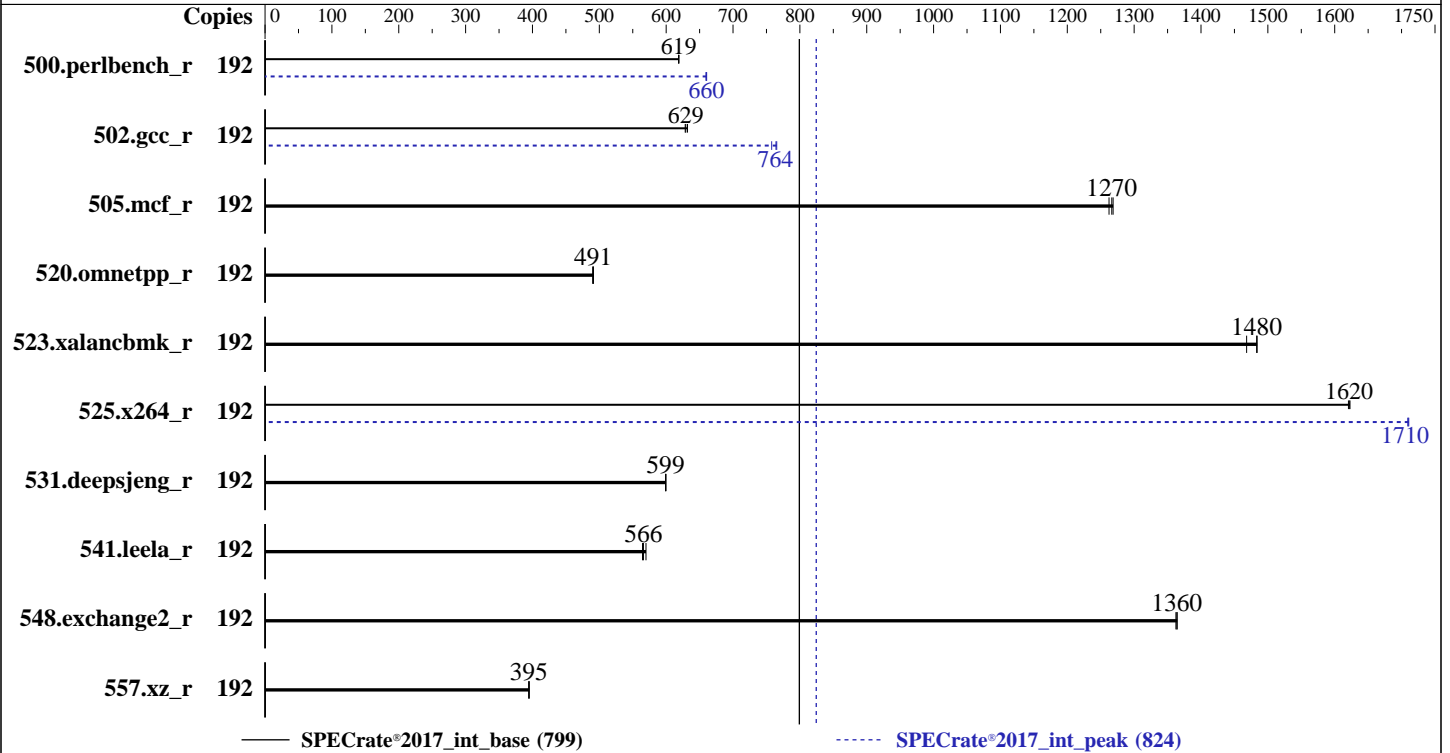
ProLiant ML350 Gen11
(2.40 GHz, Intel Xeon Platinum 8468V)

$SPECrate®2017\_int\_base = 799$

$SPECrate®2017\_int\_peak = 824$

CPU2017 License: 3

Test Sponsor: HPE

Tested by: HPE

Test Date: Mar-2023

Hardware Availability: Jan-2023

Software Availability: Nov-2022

SPECrate®2017_int_base (799) — SPECrate®2017_int_peak (824)

Benchmark	Copies	Base	Peak
500.perlbench_r	192	619	660
502.gcc_r	192	629	764
505.mcf_r	192	1270	
520.omnetpp_r	192	491	
523.xalancbmk_r	192	1480	
525.x264_r	192	1620	1710
531.deepsjeng_r	192	599	
541.leela_r	192	566	
548.exchange2_r	192	1360	
557.xz_r	192	395	

Hardware

CPU Name: Intel Xeon Platinum 8468V

Max MHz: 3800

Nominal: 2400

Enabled: 96 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: 97.5 MB I+D on chip per chip

Other: None

Memory: 1 TB (16 x 64 GB 2Rx4 PC5-4800B-R)

Storage: 1 x 400 GB SATA SSD

Other: None

Software

OS: Red Hat Enterprise Linux release 9.0 (Plow)
Kernel 5.14.0-70.13.1.el9_0.x86_64

Compiler: C/C++: Version 2022.1 of Intel oneAPI DPC++/C++ Compiler for Linux;
Fortran: Version 2022.1 of Intel Fortran Compiler for Linux;

Parallel: No

Firmware: HPE BIOS Version v1.22 01/18/2023 released Jan-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

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Results Table

Benchmark	Copies	Base Seconds	Base Ratio	Base Seconds	Base Ratio	Base Seconds	Base Ratio	Copies	Peak Seconds	Peak Ratio	Peak Seconds	Peak Ratio	Peak Seconds	Peak Ratio
500.perlbench_r	192	494	619	**494**	**619**	494	619	192	**463**	**660**	463	661	463	659
502.gcc_r	192	430	632	433	628	**432**	**629**	192	**356**	**764**	359	758	355	765
505.mcf_r	192	**245**	**1270**	245	1270	246	1260	192	**245**	**1270**	245	1270	246	1260
520.omnetpp_r	192	513	491	**513**	**491**	514	490	192	513	491	**513**	**491**	514	490
523.xalancbmk_r	192	137	1480	138	1470	**137**	**1480**	192	137	1480	138	1470	**137**	**1480**
525.x264_r	192	207	1620	**207**	**1620**	207	1620	192	197	1710	**197**	**1710**	197	1710
531.deepsjeng_r	192	**367**	**599**	367	600	367	599	192	**367**	**599**	367	600	367	599
541.leela_r	192	**562**	**566**	563	565	558	570	192	**562**	**566**	563	565	558	570
548.exchange2_r	192	**369**	**1360**	369	1360	369	1360	192	**369**	**1360**	369	1360	369	1360
557.xz_r	192	525	395	**525**	**395**	526	394	192	525	395	**525**	**395**	526	394
SPECrate®2017_int_base =		**799**												
SPECrate®2017_int_peak =		**824**												

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"
  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>
  IRQ balance service was stopped using "systemctl stop irqbalance.service"
  tuned-adm profile was set to Accelerator-Performance using "tuned-adm profile accelerator-performance"
  perf-bias for all the CPUs is set using "cpupower set -b 0"
```

Standard Performance Evaluation Corporation (info@spec.org)   https://www.spec.org/

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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.
 jemalloc, a general purpose malloc implementation
 built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5
 sources available from jemalloc.net or https://github.com/jemalloc/jemalloc/releases
```

Platform Notes

```
The system ROM used for this result contains Intel microcode version 0x2b000161 for
the Intel Xeon Platinum 8468V 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
 Enhanced Processor Performance Profile set to Aggressive
 Thermal Configuration set to Maximum Cooling
 Workload Profile set to Custom
   Adjacent Sector Prefetch set to Disabled
   DCU Stream Prefetcher set to Disabled
   Intel UPI Link Power Management set to Enabled
   Minimum Processor Idle Power Package C-State set to Package C6 (non-retention) State

 Sysinfo program /home/cpu2017/bin/sysinfo
 Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
 running on localhost.localdomain Thu Mar  2 09:07:40 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 250 (250-6.el9_0)
 12. Services, from systemctl list-unit-files
 13. Linux kernel boot-time arguments, from /proc/cmdline
```

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Platform Notes (Continued)

```
   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 localhost.localdomain 5.14.0-70.13.1.el9_0.x86_64 #1 SMP PREEMPT Thu Apr 14 12:42:38 EDT 2022 x86_64
     x86_64 x86_64 GNU/Linux

   ------------------------------------------------------------
   2. w
      09:07:40 up 1 min,  0 users,  load average: 0.17, 0.12, 0.05
     USER     TTY        LOGIN@   IDLE   JCPU   PCPU WHAT

   ------------------------------------------------------------
   3. Username
     From environment variable $USER:  root

   ------------------------------------------------------------
   4. ulimit -a
     real-time non-blocking time  (microseconds, -R) unlimited
     core file size              (blocks, -c) 0
     data seg size               (kbytes, -d) unlimited
     scheduling priority                 (-e) 0
     file size                   (blocks, -f) unlimited
     pending signals                     (-i) 4127068
     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) 4127068
     virtual memory              (kbytes, -v) unlimited
     file locks                          (-x) unlimited

   ------------------------------------------------------------
   5. sysinfo process ancestry
    /usr/lib/systemd/systemd --switched-root --system --deserialize 30
    sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups
    sshd: root [priv]
    sshd: root@notty
    bash -c cd $SPEC/ && $SPEC/intrate.sh
    runcpu --nobuild --action validate --define default-platform-flags --define numcopies=192 -c
      ic2022.1-lin-core-avx512-rate-20220316.cfg --define smt-on --define cores=96 --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=192 --configfile
      ic2022.1-lin-core-avx512-rate-20220316.cfg --define smt-on --define cores=96 --define physicalfirst
      --define invoke_with_interleave --define drop_caches --tune base,peak --output_format all --nopower
      --runmode rate --tune base:peak --size refrate intrate --nopreenv --note-preenv --logfile
      $SPEC/tmp/CPU2017.001/templogs/preenv.intrate.001.0.log --lognum 001.0 --from_runcpu 2
```

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Platform Notes (Continued)

```
  specperl $SPEC/bin/sysinfo
 $SPEC = /home/cpu2017


 --------------------------------------------------------------
 6. /proc/cpuinfo
    model name        : Intel(R) Xeon(R) Platinum 8468V
    vendor_id         : GenuineIntel
    cpu family        : 6
    model             : 143
    stepping          : 6
    microcode         : 0x2b000161
    bugs              : spectre_v1 spectre_v2 spec_store_bypass swapgs
    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 2.37.4:
   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):                192
   On-line CPU(s) list:   0-191
   Vendor ID:             GenuineIntel
   BIOS Vendor ID:        Intel(R) Corporation
   Model name:            Intel(R) Xeon(R) Platinum 8468V
   BIOS Model name:       Intel(R) Xeon(R) Platinum 8468V
   CPU family:            6
   Model:                 143
   Thread(s) per core:    2
   Core(s) per socket:    48
   Socket(s):             2
   Stepping:              6
   BogoMIPS:              4800.00
   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
                          vnmi flexpriority ept vpid ept_ad fsgsbase tsc_adjust bmi1 avx2 smep bmi2
                          erms invpcid 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
                          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
```

(Continued on next page)

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Platform Notes (Continued)

```
                             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:                  195 MiB (2 instances)
  NUMA node(s):              8
  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
  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     97.5M     195M   15 Unified       3 106496      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: 128731 MB
  node 0 free: 128130 MB
  node 1 cpus: 12-23,108-119
  node 1 size: 129018 MB
  node 1 free: 128460 MB
  node 2 cpus: 24-35,120-131
  node 2 size: 128982 MB
  node 2 free: 127861 MB
  node 3 cpus: 36-47,132-143
  node 3 size: 129018 MB
  node 3 free: 128509 MB
  node 4 cpus: 48-59,144-155
  node 4 size: 129018 MB
  node 4 free: 128575 MB
  node 5 cpus: 60-71,156-167
  node 5 size: 129018 MB
  node 5 free: 128612 MB
  node 6 cpus: 72-83,168-179
  node 6 size: 129018 MB
  node 6 free: 128601 MB
  node 7 cpus: 84-95,180-191
  node 7 size: 128998 MB
  node 7 free: 128588 MB
```

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Platform Notes (Continued)

```
  node distances:
  node   0   1   2   3   4   5   6   7
    0:  10  20  30  30  30  30  30  30
    1:  20  10  30  30  30  30  30  30
    2:  30  30  10  20  30  30  30  30
    3:  30  30  20  10  30  30  30  30
    4:  30  30  30  30  10  20  30  30
    5:  30  30  30  30  20  10  30  30
    6:  30  30  30  30  30  30  10  20
    7:  30  30  30  30  30  30  20  10


  ------------------------------------------------------------
  9. /proc/meminfo
    MemTotal:       1056570340 kB


  ------------------------------------------------------------
  10. who -r
    run-level 3 Mar 2 09:06


  ------------------------------------------------------------
  11. Systemd service manager version: systemd 250 (250-6.el9_0)
    Default Target  Status
    multi-user      running


  ------------------------------------------------------------
  12. Services, from systemctl list-unit-files
    STATE           UNIT FILES
    enabled         NetworkManager NetworkManager-dispatcher NetworkManager-wait-online auditd chronyd crond
                    dbus-broker firewalld getty@ irqbalance iscsi iscsi-onboot kdump libstoragemgmt
                    lvm2-monitor mdmonitor microcode multipathd nis-domainname rhsmcertd rpcbind rsyslog
                    selinux-autorelabel-mark sshd sssd systemd-network-generator udisks2 upower virtqemud
    enabled-runtime systemd-remount-fs
    disabled        blk-availability brltty canberra-system-bootup canberra-system-shutdown
                    canberra-system-shutdown-reboot chrony-wait console-getty cpupower debug-shell dnsmasq
                    gssproxy httpd httpd@ hwloc-dump-hwdata ipa-custodia iscsid iscsiuio kvm_stat
                    libvirt-guests libvirtd man-db-restart-cache-update ndctl-monitor nfs-blkmap nfs-server
                    nftables nmb numad pmcd pmfind pmie pmie_farm pmlogger pmlogger_farm pmproxy radiusd rdisc
                    rhsm rhsm-facts rpmdb-rebuild saslauthd serial-getty@ smb speech-dispatcherd sshd-keygen@
                    systemd-boot-check-no-failures systemd-nspawn@ systemd-pstore systemd-sysext virtnetworkd
                    virtproxyd virtsecretd virtstoraged
    indirect        sssd-autofs sssd-kcm sssd-nss sssd-pac sssd-pam sssd-ssh sssd-sudo virtlockd virtlogd

  ------------------------------------------------------------
  13. Linux kernel boot-time arguments, from /proc/cmdline
    BOOT_IMAGE=(hd0,gpt2)/vmlinuz-5.14.0-70.13.1.el9_0.x86_64
    root=/dev/mapper/rhel-root
    ro
    resume=/dev/mapper/rhel-swap
    rd.lvm.lv=rhel/root
    rd.lvm.lv=rhel/swap


  ------------------------------------------------------------
  14. cpupower frequency-info
    analyzing CPU 0:
      Unable to determine current policy
      boost state support:
        Supported: yes
        Active: yes


  ------------------------------------------------------------
```

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Platform Notes (Continued)

```
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+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
  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


  ---------------------------------------------------------------
18. OS release
  From /etc/*-release /etc/*-version
  os-release     Red Hat Enterprise Linux 9.0 (Plow)
  redhat-release Red Hat Enterprise Linux release 9.0 (Plow)
  system-release Red Hat Enterprise Linux release 9.0 (Plow)


  ---------------------------------------------------------------
19. Disk information
SPEC is set to: /home/cpu2017
  Filesystem            Type  Size  Used Avail Use% Mounted on
  /dev/mapper/rhel-home xfs   372G  153G  220G  42% /home


  ---------------------------------------------------------------
20. /sys/devices/virtual/dmi/id
    Vendor:        HPE
    Product:       ProLiant ML350 Gen11
    Product Family: ProLiant
    Serial:        CNX20800P7


  ---------------------------------------------------------------
21. dmidecode
```

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Platform Notes (Continued)

```
    Additional information from dmidecode 3.3 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 HMCG94MEBRA121N 64 GB 2 rank 4800


  ---------------------------------------------------------
  22. BIOS
  (This section combines info from /sys/devices and dmidecode.)
    BIOS Vendor:       HPE
    BIOS Version:      1.22
    BIOS Date:         01/18/2023
    BIOS Revision:     1.22
    Firmware Revision: 1.20
```

Compiler Version Notes

```
==============================================================================================
C       | 502.gcc_r(peak)
----------------------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on IA-32, Version 2022.1.0 Build 20220316
Copyright (C) 1985-2022 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 2022.1.0 Build 20220316
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
----------------------------------------------------------------------------------------------


==============================================================================================
C       | 502.gcc_r(peak)
----------------------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on IA-32, Version 2022.1.0 Build 20220316
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----------------------------------------------------------------------------------------------


==============================================================================================
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 2022.1.0 Build 20220316
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----------------------------------------------------------------------------------------------


==============================================================================================
C++     | 520.omnetpp_r(base, peak) 523.xalancbmk_r(base, peak) 531.deepsjeng_r(base, peak)
        | 541.leela_r(base, peak)
----------------------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2022.1.0 Build 20220316
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----------------------------------------------------------------------------------------------


==============================================================================================
Fortran | 548.exchange2_r(base, peak)
```

(Continued on next page)

Standard Performance Evaluation Corporation (info@spec.org)   https://www.spec.org/

SPEC CPU®2017 Integer Rate Result

Copyright 2017-2024 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant ML350 Gen11
(2.40 GHz, Intel Xeon Platinum 8468V)

SPECrate®2017_int_base = 799

SPECrate®2017_int_peak = 824

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

Test Date: Mar-2023
Hardware Availability: Jan-2023
Software Availability: Nov-2022

Compiler Version Notes (Continued)

```
------------------------------------------------------------------------------
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2022.1.0 Build 20220316
Copyright (C) 1985-2022 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/usr/local/intel/compiler/2022.1.0/linux/compiler/lib/intel64_lin
-lqkmalloc`

C++ benchmarks:
`-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-L/usr/local/intel/compiler/2022.1.0/linux/compiler/lib/intel64_lin
-lqkmalloc`

(Continued on next page)

SPEC CPU®2017 Integer Rate Result

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CPU2017 License: 3		**Test Date:**	Mar-2023
Test Sponsor: HPE		**Hardware Availability:**	Jan-2023
Tested by: HPE		**Software Availability:**	Nov-2022

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/usr/local/intel/compiler/2022.1.0/linux/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`
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=c11 -m64 -Wl,-z,muldefs`
`-fprofile-generate`(pass 1)
`-fprofile-use=default.profdata`(pass 2) `-xCORE-AVX512`

(Continued on next page)

 https://www.spec.org/

Hewlett Packard Enterprise
(Test Sponsor: HPE)

SPECrate®2017_int_base = 799

ProLiant ML350 Gen11
(2.40 GHz, Intel Xeon Platinum 8468V)

SPECrate®2017_int_peak = 824

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

Test Date: Mar-2023
Hardware Availability: Jan-2023
Software Availability: Nov-2022

Peak Optimization Flags (Continued)

500.perlbench_r (continued):
```
-Ofast -ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -fno-strict-overflow
-L/usr/local/intel/compiler/2022.1.0/linux/compiler/lib/intel64_lin
-lqkmalloc
```

502.gcc_r: `-m32`
```
-L/usr/local/intel/compiler/2022.1.0/linux/compiler/lib/ia32_lin
-std=gnu89 -Wl,-z,muldefs -fprofile-generate(pass 1)
-fprofile-use=default.profdata(pass 2) -xCORE-AVX512
-Ofast -ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -L/usr/local/jemalloc32-5.0.1/lib
-ljemalloc
```

505.mcf_r: `basepeak = yes`

525.x264_r: `-w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast`
```
-ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -fno-alias
-L/usr/local/intel/compiler/2022.1.0/linux/compiler/lib/intel64_lin
-lqkmalloc
```

557.xz_r: `basepeak = yes`

C++ benchmarks:

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/HPE-Platform-Flags-Intel-SPR-rev1.1.html
http://www.spec.org/cpu2017/flags/Intel-ic2022-official-linux64_revA.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-SPR-rev1.1.xml
http://www.spec.org/cpu2017/flags/Intel-ic2022-official-linux64_revA.xml

SPEC CPU®2017 Integer Rate Result

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ProLiant ML350 Gen11
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CPU2017 License:	3	**Test Date:**	Mar-2023
Test Sponsor:	HPE	**Hardware Availability:**	Jan-2023
Tested by:	HPE	**Software Availability:**	Nov-2022

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

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