SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2024 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL20 Gen11
(3.20 GHz, Intel Xeon E-2488)

$SPECrate^{®}2017\_fp\_base = 114$
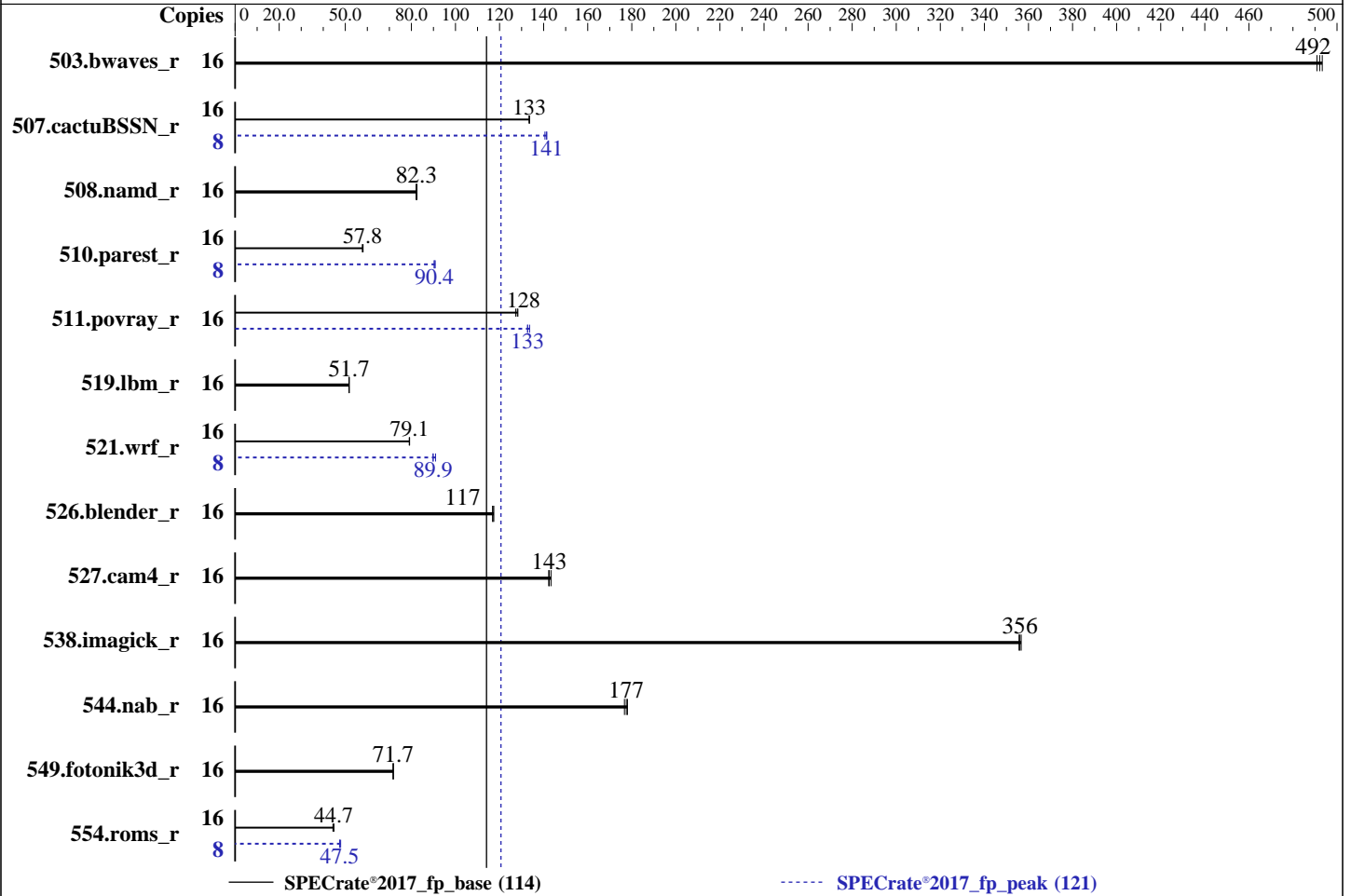
$SPECrate^{®}2017\_fp\_peak = 121$

CPU2017 License: 3

Test Sponsor: HPE

Tested by: HPE

Test Date: Nov-2023

Hardware Availability: Dec-2023

Software Availability: Dec-2023

Benchmark	Copies	Result
503.bwaves_r	16	492
507.cactuBSSN_r	16	133
	8	141
508.namd_r	16	82.3
510.parest_r	16	57.8
	8	90.4
511.povray_r	16	128
		133
519.lbm_r	16	51.7
521.wrf_r	16	79.1
	8	89.9
526.blender_r	16	117
527.cam4_r	16	143
538.imagick_r	16	356
544.nab_r	16	177
549.fotonik3d_r	16	71.7
554.roms_r	16	44.7
	8	47.5

—— SPECrate®2017_fp_base (114)
- - - - SPECrate®2017_fp_peak (121)

Hardware

CPU Name: Intel Xeon E-2488

 Max MHz: 5600

 Nominal: 3200

Enabled: 8 cores, 1 chip, 2 threads/core

Orderable: 1 Chip

Cache L1: 32 KB I + 48 KB D on chip per core

 L2: 2 MB I+D on chip per core

 L3: 24 MB I+D on chip per chip

 Other: None

Memory: 64 GB (2 x 32 GB 2Rx8 PC5-5600B-E, running at 4400), orderable using HPE part# P64339-B21

Storage: 1 x 480 GB SATA SSD

Other: None

Software

OS: SUSE Linux Enterprise Server 15 SP4
Kernel 5.14.21-150400.22-default

Compiler: C/C++: Version 2023.2 of Intel oneAPI DPC++/C++ Compiler for Linux;
Fortran: Version 2023.2 of Intel Fortran Compiler for Linux;

Parallel: No

Firmware: HPE BIOS Version v1.40 10/18/2023 released Oct-2023

File System: xfs

System State: Run level 3 (multi-user)

Base Pointers: 64-bit

Peak Pointers: 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 Floating Point Rate Result

Copyright 2017-2024 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL20 Gen11
(3.20 GHz, Intel Xeon E-2488)

SPECrate®2017_fp_base = 114

SPECrate®2017_fp_peak = 121

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

Results Table

Benchmark	Base						Peak					
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
503.bwaves_r	16	325	493	**326**	**492**	327	491	16	325	493	**326**	**492**	327	491
507.cactuBSSN_r	16	152	133	**152**	**133**	152	134	8	72.0	141	71.6	141	**71.7**	**141**
508.namd_r	16	184	82.5	**185**	**82.3**	185	82.1	16	184	82.5	**185**	**82.3**	185	82.1
510.parest_r	16	724	57.8	721	58.1	**724**	**57.8**	8	232	90.3	**231**	**90.4**	230	90.8
511.povray_r	16	293	127	**292**	**128**	291	128	16	**281**	**133**	280	134	281	133
519.lbm_r	16	326	51.7	**326**	**51.7**	326	51.7	16	326	51.7	**326**	**51.7**	326	51.7
521.wrf_r	16	453	79.2	453	79.1	**453**	**79.1**	8	197	91.0	**199**	**89.9**	199	89.9
526.blender_r	16	**208**	**117**	209	117	208	117	16	**208**	**117**	209	117	208	117
527.cam4_r	16	**196**	**143**	197	142	195	143	16	**196**	**143**	197	142	195	143
538.imagick_r	16	**112**	**356**	112	356	112	357	16	**112**	**356**	112	356	112	357
544.nab_r	16	151	178	152	177	**152**	**177**	16	151	178	152	177	**152**	**177**
549.fotonik3d_r	16	869	71.7	**869**	**71.7**	869	71.8	16	869	71.7	**869**	**71.7**	869	71.8
554.roms_r	16	567	44.8	573	44.4	**569**	**44.7**	8	**268**	**47.5**	265	47.9	268	47.5
SPECrate®2017_fp_base =	**114**											
SPECrate®2017_fp_peak =	**121**											

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
   tuned-adm profile was set to Throughput-Performance using "tuned-adm profile throughput-performance"
```

Environment Variables Notes

```
Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = "/home/cpu2017/lib/intel64:/home/cpu2017/je5.0.1-64"
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.
```

(Continued on next page)

SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2024 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL20 Gen11
(3.20 GHz, Intel Xeon E-2488)

$SPECrate®2017\_fp\_base = 114$

$SPECrate®2017\_fp\_peak = 121$

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

General Notes (Continued)

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 0x11f for
the Intel Xeon E-2488 processor.
BIOS Configuration:
 Workload Profile set to General Throughput Compute
 Thermal Configuration set to Maximum Cooling
 Enhanced Processor Performance Profile set to Enabled

 Sysinfo program /home/cpu2017/bin/sysinfo
 Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
 running on localhost Thu Nov 16 22:16:15 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. Services, from systemctl list-unit-files
 13. Linux kernel boot-time arguments, from /proc/cmdline
 14. cpupower frequency-info
 15. tuned-adm active
 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

 ----
 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
    22:16:15 up 19:03, 2 users, load average: 0.00, 0.00, 0.00
    USER   TTY   FROM   LOGIN@   IDLE   JCPU   PCPU WHAT
    root   tty1   -   03:13   19:02m 0.01s 0.01s -bash

(Continued on next page)

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

Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL20 Gen11
(3.20 GHz, Intel Xeon E-2488)

$SPECrate^{®}2017\_fp\_base = 114$

$SPECrate^{®}2017\_fp\_peak = 121$

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

Platform Notes (Continued)

```
   root     pts/0    172.16.0.100    03:14   7.00s  0.62s  0.00s -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) 256720
    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) 256720
    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@pts/0
   -bash
   -bash
   runcpu --nobuild --action validate --define default-platform-flags --define numcopies=16 -c
     ic2023.2-lin-core-avx2-rate-20230622.cfg --define smt-on --define cores=8 --define physicalfirst --define
     no-numa --tune base,peak -o all --define drop_caches fprate
   runcpu --nobuild --action validate --define default-platform-flags --define numcopies=16 --configfile
     ic2023.2-lin-core-avx2-rate-20230622.cfg --define smt-on --define cores=8 --define physicalfirst --define
     no-numa --tune base,peak --output_format all --define drop_caches --nopower --runmode rate --tune
     base:peak --size refrate fprate --nopreenv --note-preenv --logfile
     $SPEC/tmp/CPU2017.002/templogs/preenv.fprate.002.0.log --lognum 002.0 --from_runcpu 2
   specperl $SPEC/bin/sysinfo
  $SPEC = /home/cpu2017


  ------------------------------------------------------------
  6. /proc/cpuinfo
    model name        : Intel(R) Xeon(R) E E-2488
    vendor_id         : GenuineIntel
    cpu family        : 6
    model             : 183
    stepping          : 1
    microcode         : 0x11f
    bugs              : spectre_v1 spectre_v2 spec_store_bypass swapgs
    cpu cores         : 8
    siblings          : 16
    1 physical ids (chips)
    16 processors (hardware threads)
    physical id 0: core ids 0-7
    physical id 0: apicids 0-15
  Caution: /proc/cpuinfo data regarding chips, cores, and threads is not necessarily reliable, especially for
  virtualized systems.  Use the above data carefully.
```

(Continued on next page)

Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL20 Gen11
(3.20 GHz, Intel Xeon E-2488)

$SPECrate®2017\_fp\_base = 114$

$SPECrate®2017\_fp\_peak = 121$

CPU2017 License: 3

Test Sponsor: HPE

Tested by: HPE

Test Date: Nov-2023

Hardware Availability: Dec-2023

Software Availability: Dec-2023

Platform Notes (Continued)

```
          -----------------------------------------------------------
          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, 48 bits virtual
            Byte Order:               Little Endian
            CPU(s):                   16
            On-line CPU(s) list:      0-15
            Vendor ID:                GenuineIntel
            Model name:               Intel(R) Xeon(R) E E-2488
            CPU family:               6
            Model:                    183
            Thread(s) per core:       2
            Core(s) per socket:       8
            Socket(s):                1
            Stepping:                 1
            BogoMIPS:                 6374.40
            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 sse4_1 sse4_2
                                      x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm
                                      abm 3dnowprefetch cpuid_fault epb invpcid_single ssbd ibrs ibpb stibp
                                      ibrs_enhanced tpr_shadow vnmi flexpriority ept vpid ept_ad fsgsbase
                                      tsc_adjust bmi1 avx2 smep bmi2 erms invpcid rdseed adx smap clflushopt
                                      clwb intel_pt sha_ni xsaveopt xsavec xgetbv1 xsaves avx_vnni dtherm ida
                                      arat pln pts umip pku ospke waitpkg gfni vaes vpclmulqdq tme rdpid movdiri
                                      movdir64b fsrm md_clear serialize pconfig arch_lbr flush_l1d
                                      arch_capabilities
            Virtualization:           VT-x
            L1d cache:                384 KiB (8 instances)
            L1i cache:                256 KiB (8 instances)
            L2 cache:                 16 MiB (8 instances)
            L3 cache:                 24 MiB (1 instance)
            NUMA node(s):             1
            NUMA node0 CPU(s):        0-15
            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     384K   12 Data            1    64     1              64
              L1i      32K     256K    8 Instruction     1    64     1              64
              L2        2M      16M   16 Unified         2  2048     1              64
              L3       24M      24M   12 Unified         3 32768     1              64

          -----------------------------------------------------------
          8. numactl --hardware
          NOTE: a numactl 'node' might or might not correspond to a physical chip.
```

(Continued on next page)

Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL20 Gen11
(3.20 GHz, Intel Xeon E-2488)

SPECrate®2017_fp_base = 114

SPECrate®2017_fp_peak = 121

CPU2017 License: 3

Test Sponsor: HPE

Tested by: HPE

Test Date: Nov-2023

Hardware Availability: Dec-2023

Software Availability: Dec-2023

Platform Notes (Continued)

```
   available: 1 nodes (0)
   node 0 cpus: 0-15
   node 0 size: 64202 MB
   node 0 free: 48528 MB
   node distances:
   node   0
     0:  10


   ------------------------------------------------------------
9. /proc/meminfo
   MemTotal:       65743616 kB


   ------------------------------------------------------------
10. who -r
   run-level 3 Nov 16 03:13


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


   ------------------------------------------------------------
12. Services, from systemctl list-unit-files
   STATE           UNIT FILES
   enabled         apparmor auditd cron getty@ haveged irqbalance issue-generator kbdsettings lvm2-monitor
                   postfix purge-kernels rollback sshd 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-switch-root hwloc-dump-hwdata issue-add-ssh-keys kexec-load lunmask
                   rpmconfigcheck serial-getty@ systemd-boot-check-no-failures systemd-network-generator
                   systemd-sysext systemd-time-wait-sync systemd-timesyncd tuned
   indirect        pcscd wickedd


   ------------------------------------------------------------
13. Linux kernel boot-time arguments, from /proc/cmdline
   BOOT_IMAGE=/boot/vmlinuz-5.14.21-150400.22-default
   root=UUID=0568eef9-b0ff-4cd5-adb9-1f8e14da628c
   splash=silent
   resume=/dev/disk/by-uuid/ffb9593d-577b-484e-83b9-b995375d44ca
   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
   Current active profile: throughput-performance


   ------------------------------------------------------------
16. sysctl
   kernel.numa_balancing           0
   kernel.randomize_va_space       2
```

(Continued on next page)

Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL20 Gen11
(3.20 GHz, Intel Xeon E-2488)

$SPECrate®2017\_fp\_base = 114$

$SPECrate®2017\_fp\_peak = 121$

CPU2017 License: 3

Test Sponsor: HPE

Tested by: HPE

Test Date: Nov-2023

Hardware Availability: Dec-2023

Software Availability: Dec-2023

Platform Notes (Continued)

```
   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                       10
   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/cpu2017
   Filesystem      Type  Size  Used Avail Use% Mounted on
   /dev/sdb3       xfs   344G   34G  310G  10% /home


   --------------------------------------------------------------
21. /sys/devices/virtual/dmi/id
     Vendor:         HPE
     Product:        ProLiant DL20 Gen11
     Product Family: ProLiant
     Serial:         DA2G93DK88


   --------------------------------------------------------------
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:
```

(Continued on next page)

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

Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL20 Gen11
(3.20 GHz, Intel Xeon E-2488)

SPECrate®2017_fp_base = 114

SPECrate®2017_fp_peak = 121

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

Platform Notes (Continued)

```
   2x Hynix HMCG88AGBEA084N 32 GB 2 rank 5600, configured at 4400


   ------------------------------------------------------------
   23. BIOS
   (This section combines info from /sys/devices and dmidecode.)
      BIOS Vendor:       HPE
      BIOS Version:      1.40
      BIOS Date:         10/18/2023
      BIOS Revision:     1.40
      Firmware Revision: 1.45
```

Compiler Version Notes

```
==============================================================================
C              | 519.lbm_r(base, peak) 538.imagick_r(base, peak) 544.nab_r(base, peak)
------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.2.0 Build 20230622
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------


==============================================================================
C++            | 508.namd_r(base, peak) 510.parest_r(base, peak)
------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.2.0 Build 20230622
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------


==============================================================================
C++, C         | 511.povray_r(base, peak) 526.blender_r(base, peak)
------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.2.0 Build 20230622
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.2.0 Build 20230622
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------


==============================================================================
C++, C, Fortran | 507.cactuBSSN_r(base, peak)
------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.2.0 Build 20230622
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.2.0 Build 20230622
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2023.2.0 Build 20230622
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------


==============================================================================
Fortran        | 503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak) 554.roms_r(base, peak)
------------------------------------------------------------------------------
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2023.2.0 Build 20230622
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------


==============================================================================
Fortran, C     | 521.wrf_r(base, peak) 527.cam4_r(base, peak)
------------------------------------------------------------------------------
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2023.2.0 Build 20230622
```

(Continued on next page)

SPEC CPU®2017 Floating Point Rate Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL20 Gen11
(3.20 GHz, Intel Xeon E-2488)

$SPECrate^{®}2017\_fp\_base = 114$

$SPECrate^{®}2017\_fp\_peak = 121$

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

Test Date: Nov-2023
Hardware Availability: Dec-2023
Software Availability: Dec-2023

Compiler Version Notes (Continued)

```
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.2.0 Build 20230622
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------------------
```

Base Compiler Invocation

C benchmarks:
`icx`

C++ benchmarks:
`icpx`

Fortran benchmarks:
`ifx`

Benchmarks using both Fortran and C:
`ifx icx`

Benchmarks using both C and C++:
`icpx icx`

Benchmarks using Fortran, C, and C++:
`icpx icx ifx`

Base Portability Flags

503.bwaves_r: `-DSPEC_LP64`
507.cactuBSSN_r: `-DSPEC_LP64`
508.namd_r: `-DSPEC_LP64`
510.parest_r: `-DSPEC_LP64`
511.povray_r: `-DSPEC_LP64`
519.lbm_r: `-DSPEC_LP64`
521.wrf_r: `-DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian`
526.blender_r: `-DSPEC_LP64 -DSPEC_LINUX -funsigned-char`
527.cam4_r: `-DSPEC_LP64 -DSPEC_CASE_FLAG`
538.imagick_r: `-DSPEC_LP64`
544.nab_r: `-DSPEC_LP64`
549.fotonik3d_r: `-DSPEC_LP64`
554.roms_r: `-DSPEC_LP64`

https://www.spec.org/

SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2024 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL20 Gen11
(3.20 GHz, Intel Xeon E-2488)

SPECrate®2017_fp_base = 114

SPECrate®2017_fp_peak = 121

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

Base Optimization Flags

C benchmarks:
```
-w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX2 -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-Wno-implicit-int -ljemalloc -L/usr/local/jemalloc64-5.0.1/lib
```

C++ benchmarks:
```
-w -std=c++14 -m64 -Wl,-z,muldefs -xCORE-AVX2 -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib
```

Fortran benchmarks:
```
-w -m64 -Wl,-z,muldefs -xCORE-AVX2 -Ofast -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-nostandard-realloc-lhs -align array32byte -auto -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib
```

Benchmarks using both Fortran and C:
```
-w -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX2 -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-Wno-implicit-int -nostandard-realloc-lhs -align array32byte -auto
-ljemalloc -L/usr/local/jemalloc64-5.0.1/lib
```

Benchmarks using both C and C++:
```
-w -std=c++14 -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX2 -Ofast
-ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -Wno-implicit-int -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib
```

Benchmarks using Fortran, C, and C++:
```
-w -std=c++14 -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX2 -Ofast
-ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -Wno-implicit-int -nostandard-realloc-lhs
-align array32byte -auto -ljemalloc -L/usr/local/jemalloc64-5.0.1/lib
```

Peak Compiler Invocation

C benchmarks:
```
icx
```

C++ benchmarks:
```
icpx
```

Fortran benchmarks:
```
ifx
```

(Continued on next page)

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

Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL20 Gen11
(3.20 GHz, Intel Xeon E-2488)

SPECrate®2017_fp_base = 114

SPECrate®2017_fp_peak = 121

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

Peak Compiler Invocation (Continued)

Benchmarks using both Fortran and C:
`ifx icx`

Benchmarks using both C and C++:
`icpx icx`

Benchmarks using Fortran, C, and C++:
`icpx icx ifx`

Peak Portability Flags

```
Same as Base Portability Flags
```

Peak Optimization Flags

C benchmarks:

519.lbm_r: `basepeak = yes`

538.imagick_r: `basepeak = yes`

544.nab_r: `basepeak = yes`

C++ benchmarks:

508.namd_r: `basepeak = yes`

510.parest_r: `-w -std=c++14 -m64 -Wl,-z,muldefs -xCORE-AVX2 -Ofast -ffast-math -flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -ljemalloc -L/usr/local/jemalloc64-5.0.1/lib`

Fortran benchmarks:

503.bwaves_r: `basepeak = yes`

549.fotonik3d_r: `basepeak = yes`

554.roms_r: `-w -m64 -Wl,-z,muldefs -xCORE-AVX2 -Ofast -ffast-math -flto -mfpmath=sse -funroll-loops`

(Continued on next page)

Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL20 Gen11
(3.20 GHz, Intel Xeon E-2488)

SPECrate®2017_fp_base = 114

SPECrate®2017_fp_peak = 121

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

Peak Optimization Flags (Continued)

554.roms_r (continued):
```
-qopt-mem-layout-trans=4 -nostandard-realloc-lhs
-align array32byte -auto -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib
```

Benchmarks using both Fortran and C:

521.wrf_r: `-w -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX2 -Ofast`
```
-ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -Wno-implicit-int
-nostandard-realloc-lhs -align array32byte -auto
-ljemalloc -L/usr/local/jemalloc64-5.0.1/lib
```

527.cam4_r: `basepeak = yes`

Benchmarks using both C and C++:

511.povray_r: `-w -std=c++14 -m64 -std=c11 -Wl,-z,muldefs`
`-fprofile-generate`(pass 1)
`-fprofile-use=default.profdata`(pass 2) `-xCORE-AVX2 -flto`
```
-Ofast -ffast-math -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -Wno-implicit-int -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib
```

526.blender_r: `basepeak = yes`

Benchmarks using Fortran, C, and C++:
```
-w -std=c++14 -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX2 -Ofast
-ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -Wno-implicit-int -nostandard-realloc-lhs
-align array32byte -auto -ljemalloc -L/usr/local/jemalloc64-5.0.1/lib
```

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-RPL-rev2.0.html
http://www.spec.org/cpu2017/flags/Intel-ic2023p2-official-linux64.html

---

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-RPL-rev2.0.xml
http://www.spec.org/cpu2017/flags/Intel-ic2023p2-official-linux64.xml

SPEC CPU®2017 Floating Point Rate Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL20 Gen11
(3.20 GHz, Intel Xeon E-2488)

SPECrate®2017_fp_base = 114

SPECrate®2017_fp_peak = 121

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

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 2023-11-16 11:46:15-0500.
Report generated on 2024-02-16 12:26:50 by CPU2017 PDF formatter v6716.
Originally published on 2023-12-20.