SPEC CPU®2017 Integer Rate Result

NEC Corporation

Express5800/R120h-2E (Intel Xeon Bronze 3204)

SPECraten®2017_int_base = 22.4
SPECraten®2017_int_peak = 22.9

CPU2017 License: 9006
Test Sponsor: NEC Corporation
Tested by: NEC Corporation

Test Date: Oct-2022
Hardware Availability: Jul-2020
Software Availability: Dec-2020

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<td>523.xalancbmk_r</td>
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</tr>
<tr>
<td>557.xz_r</td>
<td>6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Hardware

CPU Name: Intel Xeon Bronze 3204
Max MHz: 1900
Nominal: 1900
Enabled: 6 cores, 1 chip
Orderable: 1.2 chips
Cache L1: 32 KB I + 32 KB D on chip per core
L2: 1 MB I+D on chip per core
L3: 8.25 MB I+D on chip per chip
Other: None
Memory: 192 GB (6 x 32 GB 2Rx4 PC4-2933Y-R, running at 2133)
Storage: 2 x 240 GB SATA SSD, RAID 1
Other: None

Software

OS: Red Hat Enterprise Linux release 8.1 (Ootpa)
Compiler: C/C++: Version 2021.1 of Intel oneAPI DPC++/C++
Compiler Build 20201113 for Linux;
Fortran: Version 2021.1 of Intel Fortran Compiler
Classic Build 20201112 for Linux;
C/C++: Version 2021.1 of Intel C/C++ Compiler
Classic Build 20201112 for Linux
Parallel: No
Firmware: NEC BIOS Version U31 v2.36 07/16/2020 released Dec-2020
File System: ext4
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 set to prefer performance at the cost of additional power usage.
Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>Seconds</th>
<th>Ratio</th>
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<td><strong>40.9</strong></td>
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<td>531.deepsjeng_r</td>
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<tr>
<td>541.leela_r</td>
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<td>43.5</td>
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<td>557.xz_r</td>
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<td>553</td>
<td>11.7</td>
<td><strong>552</strong></td>
<td><strong>11.7</strong></td>
</tr>
</tbody>
</table>

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

Submit Notes

The taskset mechanism was used to bind copies to processors. The config file option 'submit' was used to generate taskset 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"

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 1x Intel Core i9-7980XE CPU + 64GB RAM memory using Red Hat Enterprise Linux 8.1

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)
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.

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

Platform Notes

BIOS Settings:
Thermal Configuration: Maximum Cooling
Workload Profile: General Throughput Compute
Memory Patrol Scrubbing: Disabled
LLC Dead Line Allocation: Disabled
LLC Prefetch: Enabled
Enhanced Processor Performance: Enabled
Workload Profile: Custom
Advanced Memory Protection: Advanced ECC Support
Minimum Processor Idle Power Package C-Sate: No Package State
Sub-NUMA Clustering: Disabled

Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16aca64d
running on r120h-2e.localdomain Fri Oct  7 21:56:20 2022

SUT (System Under Test) info as seen by some common utilities.
For more information on this section, see
https://www.spec.org/cpu2017/Docs/config.html#sysinfo

From /proc/cpuinfo
    model name : Intel(R) Xeon(R) Bronze 3204 CPU @ 1.90GHz
    1 "physical id"s (chips)
    6 "processors"
cores, siblings (Caution: counting these is hw and system dependent. The following excerpts from /proc/cpuinfo might not be reliable. Use with caution.)
    cpu cores : 6
    siblings : 6
    physical 0: cores 0 1 2 3 4 5

From lscpu from util-linux 2.32.1:
    Architecture: x86_64
NEC Corporation

Express5800/R120h-2E (Intel Xeon Bronze 3204)

SPECrate®2017_int_base = 22.4
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Platform Notes (Continued)

CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 6
On-line CPU(s) list: 0-5
Thread(s) per core: 1
Core(s) per socket: 6
Socket(s): 1
NUMA node(s): 1
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Bronze 3204 CPU @ 1.90GHz
Stepping: 6
CPU MHz: 1898.021
BogoMIPS: 3800.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 8448K
NUMA node0 CPU(s): 0-5

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 arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid aperfmperf pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtpr pdcm pclid 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 cdp_l3 invpcid_single intel_ppin ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cmpx8bit rdtscp lm rdtscp cpuidibri aevxa0 aevxa1 avx2 f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb cat_l3 cdp_l3

/cacheinfo data cache size : 8448 KB

From numactl --hardware
WARNING: a numactl 'node' might or might not correspond to a physical chip.

node 0 cpus: 0 1 2 3 4 5
node 0 size: 193104 MB
node 0 free: 192005 MB
node distances:
node 0
  0: 10
**SPEC CPU®2017 Integer Rate Result**

**NEC Corporation**

Express5800/R120h-2E (Intel Xeon Bronze 3204)

<table>
<thead>
<tr>
<th>SPECrate®2017_int_base</th>
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**CPU2017 License:** 9006  
**Test Sponsor:** NEC Corporation  
**Test Date:** Oct-2022  
**Hardware Availability:** Jul-2020  
**Tested by:** NEC Corporation  
**Software Availability:** Dec-2020

**Platform Notes (Continued)**

From /proc/meminfo
- MemTotal: 197738536 kB
- HugePages_Total: 0
- Hugepagesize: 2048 kB

/sbin/tuned-adm active
- Current active profile: throughput-performance

From /etc/*release* /etc/*version*
- redhat-release: Red Hat Enterprise Linux release 8.1 (Ootpa)
- system-release: Red Hat Enterprise Linux release 8.1 (Ootpa)
- system-release-cpe: cpe:/o:redhat:enterprise_linux:8.1:ga
- uname -a:
  - Linux r120h-2e.localdomain 4.18.0-147.5.1.el8_1.x86_64 #1 SMP Tue Jan 14 15:50:19 UTC 2020 x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

- CVE-2018-12207 (iTLB Multihit): KVM: Mitigation: Split huge pages
- CVE-2018-3620 (L1 Terminal Fault): Not affected
- Microarchitectural Data Sampling: Not affected
- CVE-2017-5754 (Meltdown): Mitigation: Speculative Store Bypass disabled via prctl and seccomp
- CVE-2018-3639 (Speculative Store Bypass): Mitigation: usercopy/swaps barriers and __user pointer sanitization
- CVE-2017-5753 (Spectre variant 1): Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling
- CVE-2017-5715 (Spectre variant 2): Mitigation: Clear CPU buffers; SMT disabled
- CVE-2020-0543 (Special Register Buffer Data Sampling): No status reported
- SPEC is set to: /home/cpu2017

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

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NEC Corporation

Express5800/R120h-2E (Intel Xeon Bronze 3204)

SPECTate®2017_int_base = 22.4
SPECTate®2017_int_peak = 22.9

CPU2017 License: 9006
Test Sponsor: NEC Corporation
Tested by: NEC Corporation

Test Date: Oct-2022
Hardware Availability: Jul-2020
Software Availability: Dec-2020

Platform Notes (Continued)

Filesystem     Type  Size  Used Avail Use% Mounted on
/dev/sda3      ext4  211G   36G  165G  18% /

From /sys/devices/virtual/dmi/id
Vendor:         NEC
Product:        Express5800/R120h-2E
Product Family: Express5800
Serial:         7CE722P311

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:
10x UNKNOWN NOT AVAILABLE
6x UNKNOWN NOT AVAILABLE 32 GB 2 rank 2933, configured at 2133

BIOS:
BIOS Vendor:       NEC
BIOS Version:      U31
BIOS Date:         07/16/2020
BIOS Revision:     2.36
Firmware Revision: 2.31

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
C       | 500.perlbench_r(peak) 557.xz_r(peak)
------------------------------------------------------------------------------
Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R)
  64, Version 2021.1 Build 20201112_000000
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

==============================================================================
C       | 502.gcc_r(peak)
------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on IA-32, Version
  2021.1 Build 20201113
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

==============================================================================
C       | 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base, peak)
(Continued on next page)
## SPEC CPU®2017 Integer Rate Result

**NEC Corporation**  
Express5800/R120h-2E (Intel Xeon Bronze 3204)

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**CPU2017 License:** 9006  
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**Tested by:** NEC Corporation  
**Test Date:** Oct-2022  
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### Compiler Version Notes (Continued)

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<tr>
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<td>525.x264_r(base, peak) 557.xz_r(base)</td>
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</tbody>
</table>

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Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,  
Version 2021.1 Build 20201113  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

---

C | 500.perlbench_r(peak) 557.xz_r(peak) |

---

Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R) 64,  
Version 2021.1 Build 20201112_000000  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

---

C | 502.gcc_r(peak) |

---

Intel(R) oneAPI DPC++/C++ Compiler for applications running on IA-32, Version 2021.1 Build 20201113  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

---

C | 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base, peak)  
525.x264_r(base, peak) 557.xz_r(base) |

---

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,  
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Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

---

C | 500.perlbench_r(peak) 557.xz_r(peak) |

---

Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R) 64,  
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Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

---

C | 502.gcc_r(peak) |

---

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(Continued on next page)
NEC Corporation
Express5800/R120h-2E (Intel Xeon Bronze 3204)

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Compiler Version Notes (Continued)

==============================================================================
| C     | 500.perlbanch_r(base) 502.gcc_r(base) 505.mcf_r(base, peak) |
|       | 525.x264_r(base, peak) 557.xz_r(base) |
==============================================================================
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
Version 2021.1 Build 20201113
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

==============================================================================
| C++   | 520.omnetpp_r(base, peak) 523.xalanchmk_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 2021.1 Build 20201113
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

==============================================================================
| Fortran | 548.exchange2_r(base, peak) |
==============================================================================
Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on
Intel(R) 64, Version 2021.1 Build 20201112_000000
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

Base Compiler Invocation

C benchmarks:
icx
C++ benchmarks:
icpx
Fortran benchmarks:
ifort

Base Portability Flags

500.perlbanch_r: -DSPEC_LP64 -DSPEC_LINUX_X64
502.gcc_r: -DSPEC_LP64
505.mcf_r: -DSPEC_LP64

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

NEC Corporation

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Base Portability Flags (Continued)

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
-ffast-math=sse -funroll-loops -qopt-mem-layout-trans=4
-mbranches-within-32B-boundaries
-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin
-lqkmalloc

C++ benchmarks:
-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math -flto
-ffast-math=sse -funroll-loops -qopt-mem-layout-trans=4
-mbranches-within-32B-boundaries
-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin
-lqkmalloc

Fortran benchmarks:
-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ipo -no-prec-div
-qopt-mem-layout-trans=4 -nostandard-realloc-lhs -align array32byte
-auto -mbranches-within-32B-boundaries
-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin
-lqkmalloc

Peak Compiler Invocation

C benchmarks (except as noted below):
icx

500.perlbench_r: icc

557.xz_r: icc

C++ benchmarks:
icpx

(Continued on next page)
Peak Compiler Invocation (Continued)

Fortran benchmarks:
ifort

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: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2)
-xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4 -fno-strict-overflow
-mbranches-within-32B-boundaries
-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin
-lqkmalloc

502.gcc_r: -m32
-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/ia32_lin
-std=gnu89 -Wl,-z,muldefs -fprofile-generate(pass 1)
-fprofile-use=default.profdata(pass 2) -xCORE-AVX512 -flto
-Ofast(pass 1) -O3 -ffast-math -qopt-mem-layout-trans=4
-mbranches-within-32B-boundaries
-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 -flto
-O3 -ffast-math -qopt-mem-layout-trans=4 -fno-alias
-mbranches-within-32B-boundaries
### NEC Corporation

**Express5800/R120h-2E (Intel Xeon Bronze 3204)**

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**CPU2017 License:** 9006  
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</table>

#### Peak Optimization Flags (Continued)

525.x264_r (continued):
- `-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin`  
- `-lqkmalloc`

557.xz_r:
- `-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div`
- `-qopt-mem-layout-trans=4 -mbranches-within-32B-boundaries`
- `-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin`
- `-lqkmalloc`

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:

You can also download the XML flags sources by saving the following links:

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