



# SPEC CPU®2017 Integer Rate Result

Copyright 2017-2024 Standard Performance Evaluation Corporation

## Lenovo Global Technology

ThinkSystem SD550 V3  
(2.00 GHz, Intel Xeon Platinum 8581V)

SPECrate®2017\_int\_base = 461

SPECrate®2017\_int\_peak = Not Run

CPU2017 License: 9017

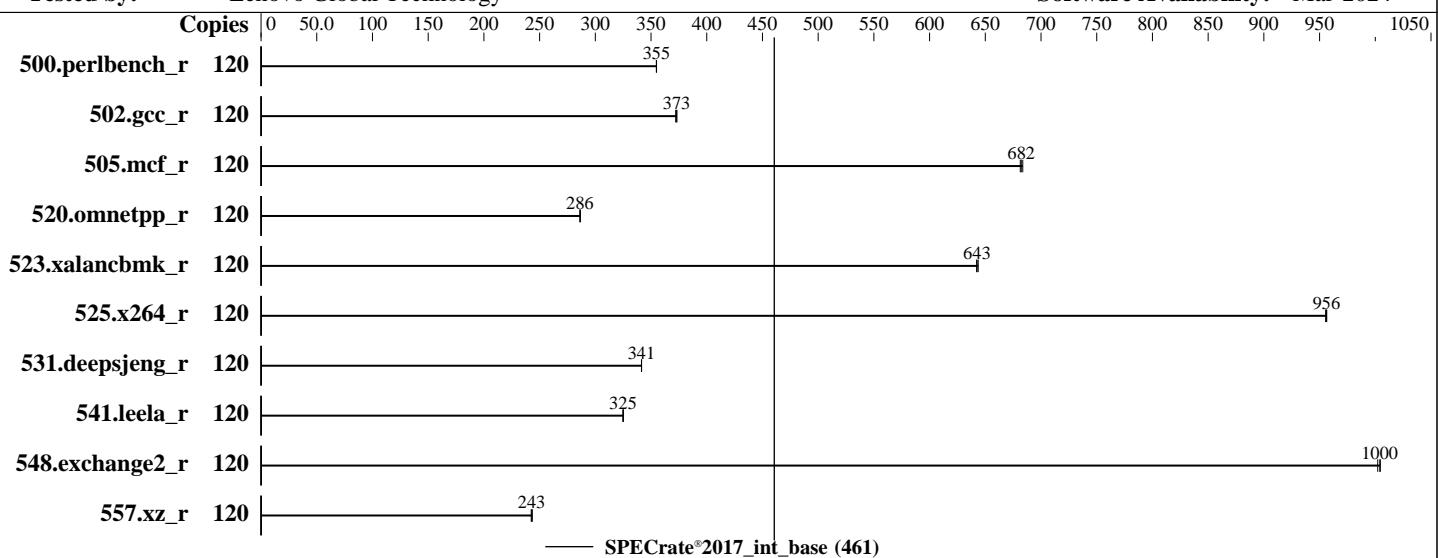
Test Sponsor: Lenovo Global Technology

Tested by: Lenovo Global Technology

Test Date: Apr-2024

Hardware Availability: Mar-2024

Software Availability: Mar-2024



### Hardware

CPU Name: Intel Xeon Platinum 8581V  
Max MHz: 3900  
Nominal: 2000  
Enabled: 60 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: 300 MB I+D on chip per chip  
Other: None  
Memory: 512 GB (8 x 64 GB 2Rx4 PC5-5600B-R, running at 4800)  
Storage: 1 x 480 GB SATA SSD  
Other: CPU Cooling: Air

### Software

OS: SUSE Linux Enterprise Server 15 SP5  
Compiler: Kernel 5.14.21-150500.53-default  
C/C++: Version 2024.0.2 of Intel oneAPI DPC++/C++ Compiler for Linux;  
Fortran: Version 2024.0.2 of Intel Fortran Compiler for Linux;  
Parallel: No  
Firmware: Lenovo BIOS Version FNE113F 2.20 released Jan-2024  
File System: xfs  
System State: Run level 3 (multi-user)  
Base Pointers: 64-bit  
Peak Pointers: Not Applicable  
Other: None  
Power Management: BIOS and OS set to prefer performance at the cost of additional power usage



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## Results Table

Benchmark	Base								Peak							
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
500.perlbench_r	120	538	355	<b>538</b>	<b>355</b>	538	355									
502.gcc_r	120	<b>456</b>	<b>373</b>	455	373	457	372									
505.mcf_r	120	285	681	<b>284</b>	<b>682</b>	284	684									
520.omnetpp_r	120	550	286	<b>550</b>	<b>286</b>	550	286									
523.xalancbmk_r	120	<b>197</b>	<b>643</b>	197	644	197	642									
525.x264_r	120	<b>220</b>	<b>956</b>	220	955	220	956									
531.deepsjeng_r	120	<b>403</b>	<b>341</b>	403	342	403	341									
541.leela_r	120	<b>612</b>	<b>325</b>	612	325	611	325									
548.exchange2_r	120	<b>313</b>	<b>1000</b>	314	1000	313	1000									
557.xz_r	120	<b>534</b>	<b>243</b>	535	242	532	243									

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

## Submit Notes

The numactl mechanism was used to bind copies to processors. The config file option 'submit' was used to generate numactl commands to bind each copy to a specific processor. For details, please see the config file.

## Operating System Notes

Stack size set to unlimited using "ulimit -s unlimited"

## Environment Variables Notes

Environment variables set by runcpu before the start of the run:

```
LD_LIBRARY_PATH =
  "/home/cpu2017-1.1.9-ic2024.0.2/lib/intel64:/home/cpu2017-1.1.9-ic2024.0.2/lib/ia32:/home/cpu2017-1.1.9-ic2024.0.2/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

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>
```

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.

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## 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.

## Platform Notes

BIOS configuration:

Choose Operating Mode set to Maximum Performance and then set it to Custom Mode

C-States set to Legacy

SNC set to SNC2

LLC Prefetch set to Disabled

UPI Link Disable set to Minimum Number of Links Enabled

```
Sysinfo program /home/cpu2017-1.1.9-ic2024.0.2/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
running on localhost Sat Apr  6 03:37:14 2024
```

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 (249.16+suse.171.gdad0071f15)
  - 12. Failed units, from systemctl list-units --state=failed
  - 13. Services, from systemctl list-unit-files
  - 14. Linux kernel boot-time arguments, from /proc/cmdline
  - 15. cpupower frequency-info
  - 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 5.14.21-150500.53-default #1 SMP PREEMPT\_DYNAMIC Wed May 10 07:56:26 UTC 2023 (b630043)  
x86\_64 x86\_64 x86\_64 GNU/Linux

2. w  
03:37:14 up 6:07, 1 user, load average: 81.66, 110.68, 116.24  
USER TTY FROM LOGIN@ IDLE JCPU PCPU WHAT  
root tty1 - 21:33 3:34m 0.83s 0.01s sh  
Run502-compliant-ic2024.0.2-lin-sapphirerapids-rateint-base-smt-on-20231213.sh

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## Platform Notes (Continued)

### 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) 2062579
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) 2062579
virtual memory	(kbytes, -v) unlimited
file locks	(-x) unlimited

### 5. sysinfo process ancestry

```
/usr/lib/systemd/systemd --switched-root --system --deserialize 30
login -- root
-bash
/bin/bash ./run_SD550V3_EMR_new.sh
sh Run502-compliant-ic2024.0.2-lin-sapphirerapids-rateint-base-smt-on-20231213.sh
runcpu --nobuild --action validate --define default-platform-flags --define numcopies=120 -c
  ic2024.0.2-lin-sapphirerapids-rate-20231213.cfg --define smt-on --define cores=60 --define physicalfirst
  --define invoke_with_interleave --define drop_caches --tune base -o all intrate
runcpu --nobuild --action validate --define default-platform-flags --define numcopies=120 --configfile
  ic2024.0.2-lin-sapphirerapids-rate-20231213.cfg --define smt-on --define cores=60 --define physicalfirst
  --define invoke_with_interleave --define drop_caches --tune base --output_format all --nopower --runmode
  rate --tune base --size reframe intrate --nopreenv --note-preenv --logfile
  $SPEC/tmp/CPU2017.144/templogs/preenv.intrate.144.0.log --lognum 144.0 --from_runcpu 2
specperl $SPEC/bin/sysinfo
$SPEC = /home/cpu2017-1.1.9-ic2024.0.2
```

### 6. /proc/cpuinfo

model name	: INTEL(R) XEON(R) PLATINUM 8581V
vendor_id	: GenuineIntel
cpu family	: 6
model	: 207
stepping	: 2
microcode	: 0x21000200
bugs	: spectre_v1 spectre_v2 spec_store_bypass swapgs eibr_swrs
cpu cores	: 60
siblings	: 120
1 physical ids (chips)	
120 processors (hardware threads)	
physical id 0: core ids 0-59	
physical id 0: apicids 0-119	

Caution: /proc/cpuinfo data regarding chips, cores, and threads is not necessarily reliable, especially for virtualized systems. Use the above data carefully.

### 7. lscpu

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## Platform Notes (Continued)

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):               120
On-line CPU(s) list: 0-119
Vendor ID:            GenuineIntel
Model name:           INTEL(R) XEON(R) PLATINUM 8581V
CPU family:           6
Model:                207
Thread(s) per core:   2
Core(s) per socket:   60
Socket(s):            1
Stepping:              2
BogoMIPS:             4000.00
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 xtTopology
                      nonstop_tsc cpuid aperf fmperf tsc_known_freq pni pclmulqdq dtes64 monitor
                      ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtrp pdcm pcid dca sse4_1
                      sse4_2 x2apic movebe popcnt tsc_deadline_timer aes xsave avx f16c rdrand
                      lahf_lm abm 3dnowprefetch cpuid_fault epb cat_13 cat_12 cdp_13
                      invpcid_single cdp_12 ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow
                      vnmi flexpriority ept vpid ept_ad fsgsbase tsc_adjust bmi1 hle avx2 smep
                      bmi2 erms invpcid rtm 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 avx_vnni avx512_bf16 wbnoinvd dtherm ida arat pln pts hfi
                      avx512vbmi umip pku ospke waitpkg avx512_vbmi2 gfni vaes vpclmulqdq
                      avx512_vnni avx512_bitalg tme avx512_vpocntdq la57 rdpid bus_lock_detect
                      cldemote movdiri movdir64b enqcmd fsrm md_clear serialize tsxlptrk pconfig
                      arch_lbr avx512_fp16 amx_tile flush_lld arch_capabilities
Virtualization:        VT-x
L1d cache:             2.8 MiB (60 instances)
L1i cache:             1.9 MiB (60 instances)
L2 cache:              120 MiB (60 instances)
L3 cache:              300 MiB (1 instance)
NUMA node(s):          2
NUMA node0 CPU(s):    0-29,60-89
NUMA node1 CPU(s):    30-59,90-119
Vulnerability Itlb multihit: Not affected
Vulnerability Lltf:    Not affected
Vulnerability Mds:    Not affected
Vulnerability Meltdown: Not affected
Vulnerability Mmio stale data: Not affected
Vulnerability Retbleed: Not affected
Vulnerability Spec store bypass: Mitigation; Speculative Store Bypass disabled via prctl and seccomp
Vulnerability Spectre v1:  Mitigation; usercopy/swapgs barriers and __user pointer sanitization
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	2.8M	12	Data	1	64	1	64
L1i	32K	1.9M	8	Instruction	1	64	1	64
L2	2M	120M	16	Unified	2	2048	1	64

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## Platform Notes (Continued)

L3      300M      300M      20 Unified      3 245760      1      64

-----  
8. numactl --hardware

NOTE: a numactl 'node' might or might not correspond to a physical chip.  
available: 2 nodes (0-1)  
node 0 cpus: 0-29,60-89  
node 0 size: 257662 MB  
node 0 free: 256371 MB  
node 1 cpus: 30-59,90-119  
node 1 size: 258012 MB  
node 1 free: 256860 MB  
node distances:  
node 0 1  
0: 10 12  
1: 12 10

-----  
9. /proc/meminfo

MemTotal: 528051072 kB

-----  
10. who -r

run-level 3 Apr 5 21:30

-----  
11. Systemd service manager version: systemd 249 (249.16+suse.171.gdad0071f15)

Default Target Status  
multi-user degraded

-----  
12. Failed units, from systemctl list-units --state=failed

UNIT LOAD ACTIVE SUB DESCRIPTION  
\* ntp\_sync.service loaded failed ntp\_sync.service

-----  
13. Services, from systemctl list-unit-files

STATE	UNIT FILES
enabled	YaST2-Firstboot YaST2-Second-Stage apparmor auditd cron getty@ irqbalance issue-generator kbdsettings klog lvm2-monitor nscd postfix purge-kernels rollback rsyslog smartd sshd systemd-pstore wicked wickedd-auto4 wickedd-dhcp4 wickedd-dhcp6 wickedd-nanny
enabled-runtime	systemd-remount-fs
disabled	autofs autoyast-initscripts blk-availability boot-sysctl ca-certificates chrony-wait chronyd console-getty cups cups-browsed debug-shell ebttables exchange-bmc-os-info firewalld gpm grub2-once haveged haveged-switch-root ipmi ipmievd issue-add-ssh-keys kexec-load lunmask man-db-create multipathd nfs nfs-blkmap rpcbind rpmconfigcheck rsyncd serial-getty@ smartd_generate_opts snmpd snmptrapd systemd-boot-check-no-failures systemd-network-generator systemd-sysext systemd-time-wait-sync systemd-timesyncd
generated	ntp_sync
indirect	wickedd

-----  
14. Linux kernel boot-time arguments, from /proc/cmdline

BOOT\_IMAGE=/boot/vmlinuz-5.14.21-150500.53-default  
root=UUID=1f1165ee-d57c-4884-9a69-769de0319f56  
splash=silent  
mitigations=auto  
quiet  
security=apparmor

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## Platform Notes (Continued)

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

```
16. 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
```

```
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 SP5
```

```
20. Disk information
SPEC is set to: /home/cpu2017-1.1.9-ic2024.0.2
Filesystem  Type  Size  Used Avail Use% Mounted on
/dev/sda3    xfs   446G   69G  377G  16%  /
```

```
21. /sys/devices/virtual/dmi/id
```

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## Platform Notes (Continued)

Vendor: Lenovo  
Product: ThinkSystem SD550 V3  
Product Family: ThinkSystem  
Serial: 1234567890

---

### 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:

5x Samsung M321R8GA0PB0-CWMKH 64 GB 2 rank 5600, configured at 4800  
3x Samsung M321R8GA0PB0-CWMXH 64 GB 2 rank 5600, configured at 4800

---

### 23. BIOS

(This section combines info from /sys/devices and dmidecode.)

BIOS Vendor: Lenovo  
BIOS Version: FNE113F-2.20  
BIOS Date: 01/02/2024  
BIOS Revision: 2.20  
Firmware Revision: 1.10

## Compiler Version Notes

---

C | 500.perlbench\_r(base) 502.gcc\_r(base) 505.mcf\_r(base) 525.x264\_r(base) 557.xz\_r(base)

---

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2024.0.2 Build 20231213  
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.

---

---

C++ | 520.omnetpp\_r(base) 523.xalancbmk\_r(base) 531.deepsjeng\_r(base) 541.leela\_r(base)

---

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2024.0.2 Build 20231213  
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.

---

---

Fortran | 548.exchange2\_r(base)

---

Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2024.0.2 Build 20231213  
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---

## Base Compiler Invocation

C benchmarks:

icx

C++ benchmarks:

icpx

(Continued on next page)



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## Base Compiler Invocation (Continued)

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 -xsapphirerapids -O3 -ffast-math  
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4  
-L/opt/intel/oneapi/compiler/2024.0/lib -lgkmalloc

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/opt/intel/oneapi/compiler/2024.0/lib -lgkmalloc

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/opt/intel/oneapi/compiler/2024.0/lib -lgkmalloc

The flags files that were used to format this result can be browsed at

<http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-Eaglestream-AA.html>  
<http://www.spec.org/cpu2017/flags/Intel-ic2024-official-linux64.html>



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

<http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-Eaglestream-AA.xml>

<http://www.spec.org/cpu2017/flags/Intel-ic2024-official-linux64.xml>

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