



SPEC CPU®2017 Integer Speed Result

Copyright 2017-2024 Standard Performance Evaluation Corporation

Lenovo Global Technology

ThinkSystem SR630 V4
(2.20 GHz, Intel Xeon 6731E)

SPECspeed®2017_int_base = 10.0

SPECspeed®2017_int_peak = Not Run

CPU2017 License: 9017

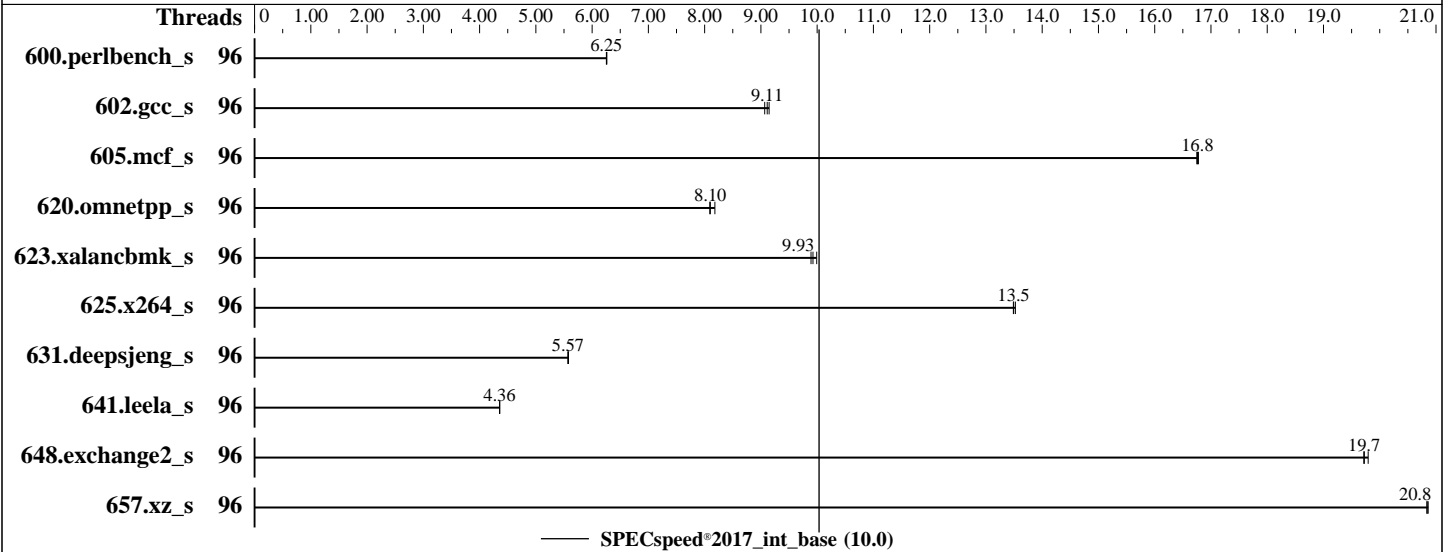
Test Sponsor: Lenovo Global Technology

Tested by: Lenovo Global Technology

Test Date: Oct-2024

Hardware Availability: Nov-2024

Software Availability: Apr-2024



Hardware

CPU Name: Intel Xeon 6731E
 Max MHz: 3100
 Nominal: 2200
 Enabled: 96 cores, 1 chip
 Orderable: 1 chip
 Cache L1: 64 KB I + 32 KB D on chip per core
 L2: 4 MB I+D on chip per core
 L3: 96 MB I+D on chip per chip
 Other: None
 Memory: 512 GB (8 x 64 GB 2Rx4 PC5-6400B-R, running at 5600)
 Storage: 1 x 3.84 TB NVME SSD
 Other: CPU Cooling: Air

Software

OS: Red Hat Enterprise Linux 9.4 (Plow)
 Kernel 5.14.0-427.13.1.el9_4.x86_64
 Compiler: C/C++: Version 2024.1 of Intel oneAPI DPC++/C++ Compiler for Linux;
 Fortran: Version 2024.1 of Intel Fortran Compiler for Linux;
 Parallel: Yes
 Firmware: Lenovo BIOS Version IHE107B 1.10 released Sep-2024
 File System: xfs
 System State: Run level 3 (multi-user)
 Base Pointers: 64-bit
 Peak Pointers: Not Applicable
 Other: jemalloc memory allocator V5.0.1
 Power Management: BIOS set to prefer performance at the cost of additional power usage



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Results Table

Benchmark	Base							Peak						
	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
600.perlbench_s	96	<u>284</u>	<u>6.25</u>	283	6.26	284	6.25							
602.gcc_s	96	<u>437</u>	<u>9.11</u>	435	9.15	439	9.07							
605.mcf_s	96	<u>282</u>	<u>16.8</u>	281	16.8	282	16.7							
620.omnetpp_s	96	<u>201</u>	<u>8.10</u>	202	8.09	199	8.18							
623.xalancbmk_s	96	143	9.89	142	9.99	<u>143</u>	<u>9.93</u>							
625.x264_s	96	<u>131</u>	<u>13.5</u>	130	13.5	131	13.5							
631.deepsjeng_s	96	257	5.58	<u>257</u>	<u>5.57</u>	257	5.57							
641.leela_s	96	<u>392</u>	<u>4.36</u>	392	4.36	392	4.36							
648.exchange2_s	96	<u>149</u>	<u>19.7</u>	149	19.7	149	19.8							
657.xz_s	96	<u>297</u>	<u>20.8</u>	297	20.8	296	20.9							

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

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:
KMP_AFFINITY = "granularity=fine,scatter"
LD_LIBRARY_PATH = "/home/cpu2017-1.1.9-ic2024.1/lib/intel64:/home/cpu2017-1.1.9-ic2024.1/je5.0.1-64"
MALLOC_CONF = "retain:true"
OMP_STACKSIZE = "192M"

General Notes

Binaries compiled on a system with 2x Intel Xeon Platinum 8280M CPU + 384GB RAM memory using Redhat Enterprise Linux 8.0
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
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>



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Platform Notes

BIOS configuration:

Workload Profile set to General Computing - Max Performance

Page Policy set to Adaptive

Sysinfo program /home/cpu2017-1.1.9-ic2024.1/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
running on localhost.localdomain Sun Oct 27 22:46:41 2024

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

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1. uname -a
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10. who -r
11. Systemd service manager version: systemd 252 (252-32.e19_4)
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13. Linux kernel boot-time arguments, from /proc/cmdline
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18. OS release
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20. /sys/devices/virtual/dmi/id
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```
1. uname -a
Linux localhost.localdomain 5.14.0-427.13.1.el9_4.x86_64 #1 SMP PREEMPT_DYNAMIC Wed Apr 10 10:29:16 EDT
2024 x86_64 x86_64 x86_64 GNU/Linux
```

```
2. w
 22:46:41 up 4:37, 0 users, load average: 4.59, 6.11, 3.66
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) 2062126
max locked memory (kbytes, -l) unlimited
```

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Platform Notes (Continued)

```

max memory size      (kbytes, -m) unlimited
open files           (-n) 102400
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) 2062126
virtual memory       (kbytes, -v) unlimited
file locks           (-x) unlimited

```

```

-----
5. sysinfo process ancestry
/usr/lib/systemd/systemd --switched-root --system --deserialize 31
sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups
sshd: root [priv]
sshd: root@notty
/bin/bash ./02.remote_local_SPECCpu_1.01.sh
sh Run742-compliant-ic2024.1-lin-sierraforest-speedint-base-20240308.sh
runcpu --nobuild --action validate --define default-platform-flags -c
  ic2024.1-lin-sierraforest-speed-20240308.cfg --define cores=96 --tune base -o all --define
  intspeedaffinity --define smt-on --define drop_caches intspeed
runcpu --nobuild --action validate --define default-platform-flags --configfile
  ic2024.1-lin-sierraforest-speed-20240308.cfg --define cores=96 --tune base --output_format all --define
  intspeedaffinity --define smt-on --define drop_caches --nopower --runmode speed --tune base --size
  refspeed intspeed --nopreenv --note-preenv --logfile
  $SPEC/tmp/CPU2017.564/templogs/preenv.intspeed.564.0.log --lognum 564.0 --from_runcpu 2
specperl $SPEC/bin/sysinfo
$SPEC = /home/cpu2017-1.1.9-ic2024.1

```

```

-----
6. /proc/cpuinfo
model name      : Intel(R) Xeon(R) 6731E
vendor_id      : GenuineIntel
cpu family     : 6
model          : 175
stepping       : 3
microcode      : 0x3000270
bugs           : spectre_v1 spectre_v2 spec_store_bypass swapgs
cpu cores      : 96
siblings       : 96
1 physical ids (chips)
96 processors (hardware threads)
physical id 0: core ids 0-95
physical id 0: apicids
0,2,4,6,8,10,12,14,16,18,20,22,24,26,28,30,32,34,36,38,40,42,44,46,48,50,52,54,56,58,60,62,64,66,68,70,72
,74,76,78,80,82,84,86,88,90,92,94,96,98,100,102,104,106,108,110,112,114,116,118,120,122,124,126,128,130,1
32,134,136,138,140,142,144,146,148,150,152,154,156,158,160,162,164,166,168,170,172,174,176,178,180,182,18
4,186,188,190
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:      52 bits physical, 48 bits virtual
Byte Order:         Little Endian

```

(Continued on next page)



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Platform Notes (Continued)

```

CPU(s): 96
On-line CPU(s) list: 0-95
Vendor ID: GenuineIntel
BIOS Vendor ID: Intel(R) Corporation
Model name: Intel(R) Xeon(R) 6731E
BIOS Model name: Intel(R) Xeon(R) 6731E
CPU family: 6
Model: 175
Thread(s) per core: 1
Core(s) per socket: 96
Socket(s): 1
Stepping: 3
BogoMIPS: 4400.00
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 cdp_l2 ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow
flexpriority ept vpid ept_ad fsgsbase tsc_adjust bmi1 avx2 smep bmi2
erms invpcid cqm rdt_a rdseed adx smap clflushopt clwb intel_pt sha_ni
xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total
cqm_mbm_local split_lock_detect avx_vnni lam wbnoinvd dtherm ida arat
pln pts vnmi umip pku ospke waitpkg gfni vaes vpclmulqdq tme rdpid
bus_lock_detect cldemote movdiri movdir64b enqcmd fsrm md_clear
serialize pconfig arch_lbr ibt flush_lld arch_capabilities

Virtualization: VT-x
L1d cache: 3 MiB (96 instances)
L1i cache: 6 MiB (96 instances)
L2 cache: 96 MiB (24 instances)
L3 cache: 96 MiB (1 instance)
NUMA node(s): 1
NUMA node0 CPU(s): 0-95
Vulnerability Gather data sampling: Not affected
Vulnerability Itlb multihit: Not affected
Vulnerability L1tf: Not affected
Vulnerability Mds: Not affected
Vulnerability Meltdown: Not affected
Vulnerability Mmio stale data: Not affected
Vulnerability Retbleed: Not affected
Vulnerability Spec rstack overflow: Not affected
Vulnerability Spec store bypass: Mitigation; Speculative Store Bypass disabled via prctl
Vulnerability Spectre v1: Mitigation; usercopy/swaps barriers and __user pointer sanitization
Vulnerability Spectre v2: Mitigation; Enhanced / Automatic IBRS, IBPB conditional, RSB filling,
PBRSE-eIBRS Not affected

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 32K 3M 8 Data 1 64 1 64
L1i 64K 6M 8 Instruction 1 128 1 64
L2 4M 96M 16 Unified 2 4096 1 64
L3 96M 96M 12 Unified 3 131072 1 64

```

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

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Platform Notes (Continued)

```
available: 1 nodes (0)
node 0 cpus: 0-95
node 0 size: 515570 MB
node 0 free: 513676 MB
node distances:
node 0
0: 10
```

```
-----
9. /proc/meminfo
MemTotal: 527944592 kB
```

```
-----
10. who -r
run-level 3 Oct 27 18:09
```

```
-----
11. Systemd service manager version: systemd 252 (252-32.el9_4)
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@ insights-client-boot irqbalance kdump low-memory-monitor
mdmonitor microcode nis-domainname nvme-fc-boot-connections rhsmcertd rsyslog rtkit-daemon
selinux-autorelabel-mark sshd sssd systemd-boot-update systemd-network-generator udisks2
upower
enabled-runtime systemd-remount-fs
disabled canberra-system-bootup canberra-system-shutdown canberra-system-shutdown-reboot
chrony-wait chronyd-restricted console-getty cpupower debug-shell dnf-system-upgrade
kvm_stat man-db-restart-cache-update nftables nvme-fc-autoconnect pesign rdisc rhcd rhsm
rhsm-facts rpmdm-rebuild selinux-check-proper-disable serial-getty@ sshd-keygen@
systemd-boot-check-no-failures systemd-pstore systemd-sysext
generated jexec
indirect sssd-autofs sssd-kcm sssd-nss sssd-pac sssd-pam sssd-ssh sssd-sudo systemd-sysupdate
systemd-sysupdate-reboot
```

```
-----
13. Linux kernel boot-time arguments, from /proc/cmdline
BOOT_IMAGE=(hd0,gpt2)/boot/vmlinuz-5.14.0-427.13.1.el9_4.x86_64
root=UUID=218263b5-b938-4bb9-acd2-fdd6e13af967
ro
resume=UUID=28b98cc0-6b11-4f02-b151-4d764447b0f5
```

```
-----
14. cpupower frequency-info
analyzing CPU 39:
Unable to determine current policy
boost state support:
Supported: yes
Active: yes
```

```
-----
15. sysctl
kernel.numa_balancing 0
kernel.randomize_va_space 2
vm.compaction_proactiveness 20
vm.dirty_background_bytes 0
```

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Platform Notes (Continued)

```

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+madvice [madvice] never
enabled         [always] madvice 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 9.4 (Plow)
redhat-release  Red Hat Enterprise Linux release 9.4 (Plow)
system-release  Red Hat Enterprise Linux release 9.4 (Plow)

```

```

-----
19. Disk information
SPEC is set to: /home/cpu2017-1.1.9-ic2024.1
Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/nvme0n1p4 xfs   3.5T  42G  3.4T   2% /home

```

```

-----
20. /sys/devices/virtual/dmi/id
Vendor:      Lenovo
Product:     ThinkSystem SR630 V4
Product Family: ThinkSystem
Serial:      0987654321

```

```

-----
21. dmidecode
Additional information from dmidecode 3.5 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:

```

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Platform Notes (Continued)

4x SK Hynix HMC94AHBRA275N 64 GB 2 rank 6400, configured at 5600
4x SK Hynix HMC94AHBRA281N 64 GB 2 rank 6400, configured at 5600

22. BIOS
(This section combines info from /sys/devices and dmidecode.)
BIOS Vendor:
BIOS Version: IHE107B-1.10
BIOS Date: 09/11/2024
BIOS Revision: 1.10
Firmware Revision: 1.0

Compiler Version Notes

=====
C | 600.perlbench_s(base) 602.gcc_s(base) 605.mcf_s(base) 625.x264_s(base) 657.xz_s(base)

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2024.1.0 Build 20240308
Copyright (C) 1985-2024 Intel Corporation. All rights reserved.

=====
C++ | 620.omnetpp_s(base) 623.xalancbmk_s(base) 631.deepsjeng_s(base) 641.leela_s(base)

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2024.1.0 Build 20240308
Copyright (C) 1985-2024 Intel Corporation. All rights reserved.

=====
Fortran | 648.exchange2_s(base)

Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2024.1.0 Build 20240308
Copyright (C) 1985-2024 Intel Corporation. All rights reserved.

Base Compiler Invocation

C benchmarks:
icx

C++ benchmarks:
icpx

Fortran benchmarks:
ifx



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Base Portability Flags

```
600.perlbench_s: -DSPEC_LP64 -DSPEC_LINUX_X64
602.gcc_s: -DSPEC_LP64
605.mcf_s: -DSPEC_LP64
620.omnetpp_s: -DSPEC_LP64
623.xalancbmk_s: -DSPEC_LP64 -DSPEC_LINUX
625.x264_s: -DSPEC_LP64
631.deepsjeng_s: -DSPEC_LP64
641.leela_s: -DSPEC_LP64
648.exchange2_s: -DSPEC_LP64
657.xz_s: -DSPEC_LP64
```

Base Optimization Flags

C benchmarks:

```
-w -std=c11 -m64 -Wl,-z,muldefs -xsierraforest -O3 -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -fiopenmp
-DSPEC_OPENMP -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

C++ benchmarks:

```
-w -std=c++14 -m64 -Wl,-z,muldefs -xsierraforest -O3 -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

Fortran benchmarks:

```
-w -m64 -Wl,-z,muldefs -xsierraforest -O3 -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-nostandard-realloc-lhs -align array32byte
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

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-Birchstream-B.html>

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

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-Birchstream-B.xml>

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

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

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