# SPEC® OMPG2012 Result

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## Intel

Intel Server System M70KLP  (Intel Xeon Platinum 8360Y, 2.40 GHz)

$SPECompG\_peak2012 =$ 42.1
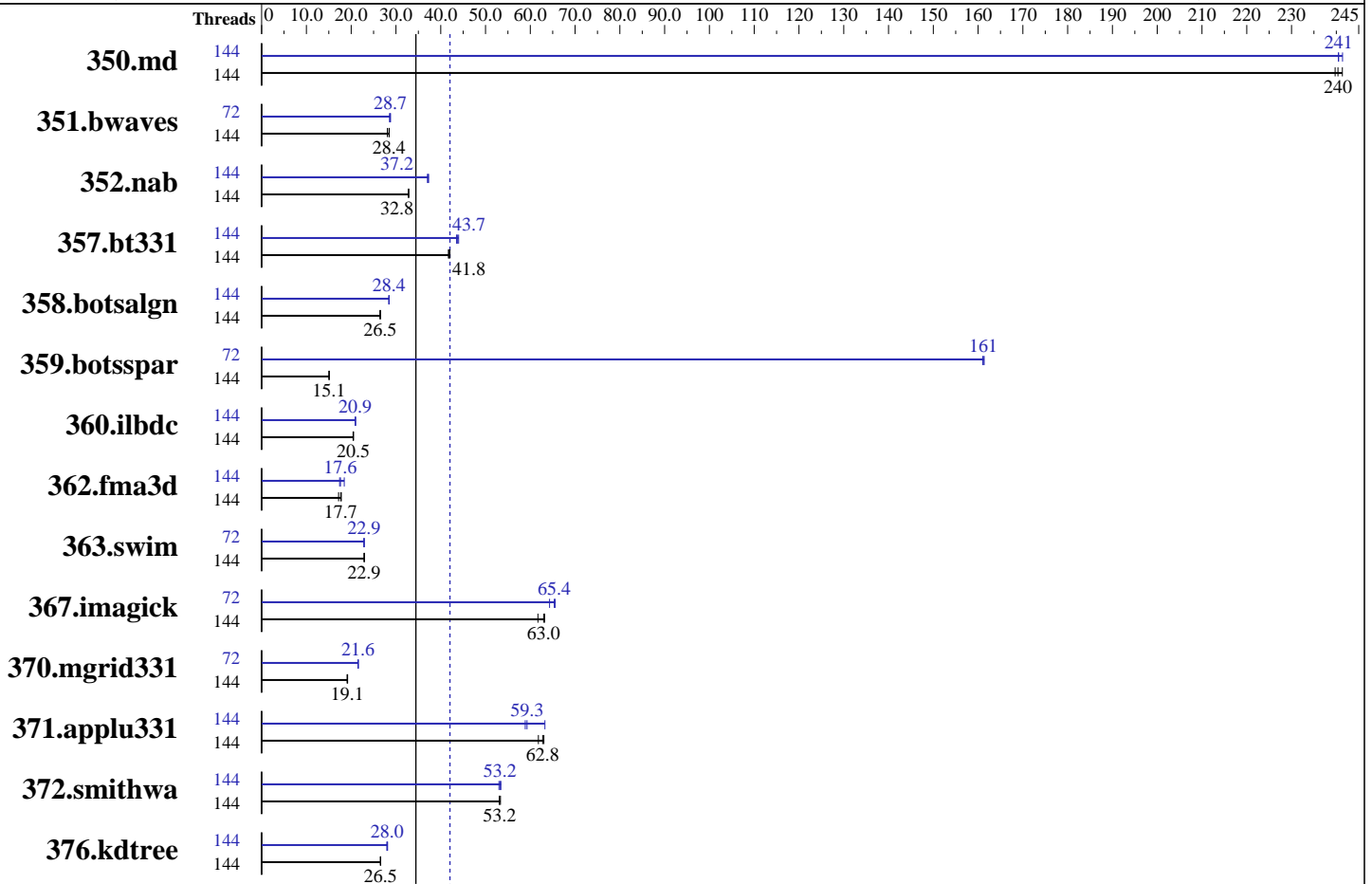
$SPECompG\_base2012 =$ 34.4

**OMP2012 license:** 13

**Test sponsor:** Intel

**Tested by:** Intel

**Test date:** Apr-2021

**Hardware Availability:** Mar-2021

**Software Availability:** Mar-2021



**SPECompG_base2012 = 34.4**

**SPECompG_peak2012 = 42.1**

## Hardware

| | |
|---|---|
| CPU Name: | Intel Xeon Platinum 8360Y |
| CPU Characteristics: | Intel Turbo Boost Technology  : Up to 3.50 Ghz |
| CPU MHz: | 2400 |
| CPU MHz Maximum: | 3500 |
| FPU: | Integrated |
| CPU(s) enabled: | 72 cores, 2 chips, 36 cores/chip, 2 threads/core |
| CPU(s) orderable: | 1,2 Chips |
| Primary Cache: | 32 KB I + 48 KB D on chip per core |
| Secondary Cache: | 1.25 MB I+D on chip per core |
| L3 Cache: | 54 MB I+D on chip per chip |
| Other Cache: | None |
| Memory: | 256 GB (16 x 16 GB 2Rx8 DDR4-3200Y-R) |
| Disk Subsystem: | SSDSC2KG96 960GB |
| Other Hardware: | -- |
| Base Threads Run: | 144 |
| Minimum Peak Threads: | 72 |

## Software

| | |
|---|---|
| Operating System: | CentOS Linux release 8.3.2011 (Core) |
| Compiler: | C/C++/Fortran: Version 2021.2.0.2883 of Intel Composer XE for Linux |
| Auto Parallel: | No |
| File System: | Linux ext3 |
| System State: | Run Level 3 (multi-user) |
| Base Pointers: | 64-bit |
| Peak Pointers: | 64-bit |
| Other Software: | None |

**Continued on next page**

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Maximum Peak Threads:    144

## Results Table

| Benchmark | Base | | | | | | | Peak | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Threads | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio | Threads | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio |
| 350.md | 144 | 19.3 | 240 | **19.3** | **240** | 19.2 | 241 | 144 | 19.3 | 240 | **19.3** | **241** | 19.2 | 241 |
| 351.bwaves | 144 | 161 | 28.1 | 159 | 28.5 | **159** | **28.4** | 72 | 157 | 28.8 | **158** | **28.7** | 159 | 28.6 |
| 352.nab | 144 | 118 | 32.8 | 119 | 32.8 | **118** | **32.8** | 144 | **105** | **37.2** | 105 | 37.0 | 104 | 37.3 |
| 357.bt331 | 144 | 113 | 42.1 | 114 | 41.7 | **113** | **41.8** | 144 | **108** | **43.7** | 108 | 44.0 | 109 | 43.5 |
| 358.botsalgn | 144 | 165 | 26.4 | **164** | **26.5** | 164 | 26.5 | 144 | 153 | 28.5 | **153** | **28.4** | 153 | 28.4 |
| 359.botsspar | 144 | 349 | 15.0 | **348** | **15.1** | 348 | 15.1 | 72 | **32.6** | **161** | 32.5 | 161 | 32.6 | 161 |
| 360.ilbdc | 144 | 173 | 20.5 | **174** | **20.5** | 174 | 20.4 | 144 | 170 | 20.9 | 170 | 21.0 | **170** | **20.9** |
| 362.fma3d | 144 | 221 | 17.2 | 214 | 17.8 | **215** | **17.7** | 144 | 206 | 18.5 | 218 | 17.4 | **216** | **17.6** |
| 363.swim | 144 | 198 | 22.9 | **198** | **22.9** | 197 | 23.0 | 72 | **198** | **22.9** | 198 | 22.9 | 198 | 22.8 |
| 367.imagick | 144 | **112** | **63.0** | 114 | 61.7 | 111 | 63.2 | 72 | 107 | 65.6 | 109 | 64.3 | **108** | **65.4** |
| 370.mgrid331 | 144 | 231 | 19.1 | 230 | 19.2 | **231** | **19.1** | 72 | 205 | 21.6 | **205** | **21.6** | 205 | 21.5 |
| 371.applu331 | 144 | 96.1 | 63.0 | **96.5** | **62.8** | 98.0 | 61.8 | 144 | **102** | **59.3** | 95.8 | 63.3 | 103 | 58.9 |
| 372.smithwa | 144 | 101 | 53.1 | **101** | **53.2** | 100 | 53.3 | 144 | 100 | 53.4 | 101 | 53.0 | **101** | **53.2** |
| 376.kdtree | 144 | 169 | 26.6 | 170 | 26.5 | **170** | **26.5** | 144 | **160** | **28.0** | 161 | 28.0 | 160 | 28.1 |

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

## Platform Notes

```
    Sysinfo program /global/panfs02/innl/aknyaze1/OMP2012/1.1/Docs/sysinfo
    Revision 563 of 2016-06-10 (097295389cf6073d8c3b03fa376740a5)
    running on eij379 Mon Apr 19 00:38:29 2021

    This section contains SUT (System Under Test) info as seen by
    some common utilities.  To remove or add to this section, see:
      http://www.spec.org/omp2012/Docs/config.html#sysinfo

    From /proc/cpuinfo
      model name : Intel(R) Xeon(R) Platinum 8360Y CPU @ 2.40GHz
         2 "physical id"s (chips)
         144 "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 : 36
         siblings  : 72
         physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
         22 23 24 25 26 27 28 29 30 31 32 33 34 35
         physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
         22 23 24 25 26 27 28 29 30 31 32 33 34 35
      cache size : 55296 KB
```

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## Platform Notes (Continued)

```
From /proc/meminfo
   MemTotal:       263785224 kB
   HugePages_Total:        0
   Hugepagesize:        2048 kB

From /etc/*release* /etc/*version*
   centos-release: CentOS Linux release 8.3.2011
   centos-release-upstream: Derived from Red Hat Enterprise Linux 8.3
   os-release:
      NAME="CentOS Linux"
      VERSION="8"
      ID="centos"
      ID_LIKE="rhel fedora"
      VERSION_ID="8"
      PLATFORM_ID="platform:el8"
      PRETTY_NAME="CentOS Linux 8"
      ANSI_COLOR="0;31"
   redhat-release: CentOS Linux release 8.3.2011
   system-release: CentOS Linux release 8.3.2011
   system-release-cpe: cpe:/o:centos:centos:8

uname -a:
   Linux eij379 4.18.0-240.22.1.el8_3.crt1.x86_64 #1 SMP Thu Apr 8 10:38:43 MDT
   2021 x86_64 x86_64 x86_64 GNU/Linux

run-level 3 Apr 15 17:10

SPEC is set to: /global/panfs02/innl/aknyaze1/OMP2012/1.1
   Filesystem                 Type  Size  Used Avail Use% Mounted on
   panfs://36.101.212.1/innl panfs  269T  210T   59T  79% /global/panfs02/innl
Additional information from dmidecode:

   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.


(End of data from sysinfo program)
```

## General Notes

```
========================================================================
General base OMP Library Settings
  ENV_KMP_AFFINITY=compact,0,verbose

========================================================================
General peak OMP Library Settings
  ENV_KMP_AFFINITY=compact,0,verbose

========================================================================
```

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## General Notes (Continued)

```
Per benchmark peak OMP Library Settings


========================================================================
System settings notes:
   Intel Turbo Boost Technology (Turbo)  : Enabled


========================================================================
General OMP Library Settings
   KMP_LIBRARY=turnaround
   KMP_STACKSIZE=292M
   KMP_BLOCKTIME=infinite
   OMP_DYNAMIC=FALSE
   OMP_NESTED=FALSE
   OMP_SCHEDULE=static

Spectre and Meltdown
Yes: 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.
========================================================================
351.bwaves:peak:
   ENV_KMP_AFFINITY=compact,1,verbose


========================================================================
359.botsspar:peak:
   ENV_KMP_AFFINITY=compact,1,verbose


========================================================================
363.swim:peak:
   ENV_KMP_AFFINITY=compact,1,verbose


========================================================================
367.imagick:peak:
   ENV_KMP_AFFINITY=compact,1,verbose


========================================================================
370.mgrid331:peak:
   ENV_KMP_AFFINITY=compact,1,verbose


========================================================================
370.mgrid331:peak:
Compiler: Fortran: Version 19.0.3.199 of Intel Composer XE for Linux
```

## Base Compiler Invocation

C benchmarks:
```
   icc
```

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# Base Compiler Invocation (Continued)

C++ benchmarks:
    icpc

Fortran benchmarks:
    ifort

# Base Portability Flags

    350.md: -FR
    357.bt331: -mcmodel=medium
    363.swim: -mcmodel=medium
    367.imagick: -std=c99

# Base Optimization Flags

C benchmarks:
    -O3 -qopenmp -xCORE-AVX512 -qopt-zmm-usage=high -fp-model fast=2
    -ansi-alias -no-prec-div -no-prec-sqrt -qopt-prefetch=0 -ipo

C++ benchmarks:
    -O3 -qopenmp -xCORE-AVX512 -qopt-zmm-usage=high -fp-model fast=2
    -ansi-alias -no-prec-div -no-prec-sqrt -qopt-prefetch=0 -ipo

Fortran benchmarks:
    -O3 -qopenmp -xCORE-AVX512 -qopt-zmm-usage=high -fp-model fast=2
    -ansi-alias -no-prec-div -no-prec-sqrt -qopt-prefetch=0 -ipo
    -align all

# Peak Compiler Invocation

C benchmarks (except as noted below):
    icx

    367.imagick: icc

    372.smithwa: icc

C++ benchmarks:
    icpx

Fortran benchmarks (except as noted below):
    ifort

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# Peak Compiler Invocation (Continued)

370.mgrid331: `ifx`

371.applu331: `/opt/intel/compiler/2019u3/bin/ifort`

# Peak Portability Flags

350.md: `-FR`
357.bt331: `-mcmodel=medium`
363.swim: `-mcmodel=medium`
367.imagick: `-std=c99`

# Peak Optimization Flags

C benchmarks:

352.nab: `-O3 -qopenmp -xCORE-AVX512 -qopt-zmm-usage=high -fno-alias -ipo`

358.botsalgn: `Same as 352.nab`

359.botsspar: `-O3 -qopenmp -xCORE-AVX512 -qopt-zmm-usage=high -fno-alias`

367.imagick: `-O3 -qopenmp -xCORE-AVX512 -qopt-zmm-usage=high -fp-model fast=2 -fno-alias -no-prec-div -no-prec-sqrt -ipo`

372.smithwa: `-O3 -qopenmp -xCORE-AVX512 -qopt-zmm-usage=high -fp-model fast=2 -fno-alias -no-prec-div -no-prec-sqrt -ipo  -qopt-prefetch=0 -ipo`

C++ benchmarks:
`-O3 -qopenmp -xCORE-AVX512 -qopt-zmm-usage=high -fno-alias -ipo`

Fortran benchmarks:

350.md: `-O3 -qopenmp -xCORE-AVX512 -qopt-zmm-usage=high -fp-model fast=2 -fno-alias -no-prec-div -no-prec-sqrt -ipo  -qopt-prefetch=0 -ipo -align all`

351.bwaves: `-O3 -qopenmp -xCORE-AVX512 -qopt-zmm-usage=high -fp-model fast=2 -fno-alias -no-prec-div -no-prec-sqrt -qopt-prefetch=2 -ipo -align all`

357.bt331: `-O3 -qopenmp -xCORE-AVX512 -qopt-zmm-usage=high -fp-model fast=2 -fno-alias -no-prec-div -no-prec-sqrt -qopt-prefetch=1 -ipo -align all`

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# Peak Optimization Flags (Continued)

```
360.ilbdc: -O3 -qopenmp -xCORE-AVX512 -qopt-zmm-usage=high
           -fp-model fast=2 -fno-alias -no-prec-div -no-prec-sqrt
           -qopt-prefetch=4 -ipo -align all

362.fma3d: Same as 350.md

363.swim: -O3 -qopenmp -xCORE-AVX512 -qopt-zmm-usage=high
          -fp-model fast=2 -no-prec-div -no-prec-sqrt -fno-alias
          -qopt-malloc-options=3 -qopt-prefetch=0 -ipo -align all

370.mgrid331: -O3 -qopenmp -xCORE-AVX512 -qopt-zmm-usage=high -fno-alias
              -ipo -align all

371.applu331: -O3 -qopenmp -xCORE-AVX512 -qopt-zmm-usage=high
              -fp-model fast=2 -fno-alias -no-prec-div -no-prec-sqrt
              -qopt-prefetch=0 -align all
```

The flags file that was used to format this result can be browsed at
http://www.spec.org/omp2012/flags/Intel-ic19-linux64.20210507.html

You can also download the XML flags source by saving the following link:
http://www.spec.org/omp2012/flags/Intel-ic19-linux64.20210507.xml

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

Tested with SPEC OMP2012 v1.1.
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