## Intel Xeon E5-2699 v4 SPECfn Performance Results

**Hewlett Packard Enterprise**

**Test Sponsor:** HPE

**ProLiant DL120 Gen9**

(2.20 GHz, Intel Xeon E5-2699 v4)

---

### SPECfp2006 = 120

### SPECfp_base2006 = 114

<table>
<thead>
<tr>
<th>Test Sponsor</th>
<th>HPE</th>
<th>Hardware Availability</th>
<th>May-2016</th>
<th>Software Availability</th>
<th>Mar-2016</th>
</tr>
</thead>
</table>

### CPU

- **CPU Name:** Intel Xeon E5-2699 v4
- **CPU Characteristics:** Intel Turbo Boost Technology up to 3.60 GHz
- **CPU MHz:** 2200
- **FPU:** Integrated
- **CPU(s) enabled:** 22 cores, 1 chip, 22 cores/chip, 2 threads/core
- **CPU(s) orderable:** 1 chip
- **Primary Cache:** 32 KB I + 32 KB D on chip per core
- **Secondary Cache:** 256 KB I+D on chip per core

---

### Software

- **Operating System:** Red Hat Enterprise Linux Server release 7.2 (Maipo) Kernel 3.10.0-327.el7.x86_64
- **Compiler:** C/C++: Version 16.0.0.101 of Intel C++ Studio XE for Linux;
  Fortran: Version 16.0.0.101 of Intel Fortran Studio XE for Linux
- **Auto Parallel:** Yes
- **File System:** xfs

---

### Benchmark Results

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>SPECfp2006</th>
<th>SPECfp_base2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>410.bwaves</td>
<td>47.4</td>
<td>364</td>
</tr>
<tr>
<td>416.gamess</td>
<td>37.7</td>
<td>139</td>
</tr>
<tr>
<td>433.milc</td>
<td>83.2</td>
<td>88</td>
</tr>
<tr>
<td>434.zeusmp</td>
<td>266</td>
<td>266</td>
</tr>
<tr>
<td>435.gromacs</td>
<td>48.0</td>
<td>430</td>
</tr>
</tbody>
</table>

---

**Continued on next page**
**SPEC CFP2006 Result**

**Hewlett Packard Enterprise**
(Test Sponsor: HPE)
ProLiant DL120 Gen9
(2.20 GHz, Intel Xeon E5-2699 v4)

**SPECfp2006 = 120**
**SPECfp_base2006 = 114**

CPU2006 license: 3
Test sponsor: HPE
Tested by: HPE
Test date: May-2016
Hardware Availability: Mar-2016
Test sponsor: HPE
Hardware Availability: Nov-2015
L3 Cache: 55 MB I+D on chip per chip
Other Cache: None
Memory: 128 GB (4 x 32 GB 2Rx4 PC4-2400T-R)
Disk Subsystem: 2 x 400 GB SAS SSD, RAID 1
Other Hardware: None
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 32/64-bit
Other Software: None

### Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Base</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Peak</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Base</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Peak</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>410.bwaves</td>
<td>37.6</td>
<td>361</td>
<td>37.3</td>
<td>365</td>
<td>37.3</td>
<td>364</td>
<td>37.6</td>
<td>361</td>
<td>37.3</td>
<td>365</td>
<td>37.3</td>
<td>364</td>
<td></td>
<td></td>
</tr>
<tr>
<td>416.gamess</td>
<td>519</td>
<td>37.7</td>
<td>519</td>
<td>37.7</td>
<td>519</td>
<td>37.7</td>
<td>412</td>
<td>47.5</td>
<td>414</td>
<td>47.4</td>
<td>414</td>
<td>47.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>433.milc</td>
<td>113</td>
<td>81.5</td>
<td>110</td>
<td>83.2</td>
<td>110</td>
<td>83.4</td>
<td>113</td>
<td>81.5</td>
<td>110</td>
<td>83.2</td>
<td>110</td>
<td>83.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>434.zeusmp</td>
<td>34.3</td>
<td>266</td>
<td>34.3</td>
<td>266</td>
<td>34.3</td>
<td>265</td>
<td>34.3</td>
<td>266</td>
<td>34.3</td>
<td>266</td>
<td>34.3</td>
<td>265</td>
<td></td>
<td></td>
</tr>
<tr>
<td>435.gromacs</td>
<td>149</td>
<td>48.0</td>
<td>151</td>
<td>47.4</td>
<td>149</td>
<td>48.0</td>
<td>149</td>
<td>48.0</td>
<td>151</td>
<td>47.4</td>
<td>149</td>
<td>48.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>436.cactusADM</td>
<td>13.2</td>
<td>907</td>
<td>13.1</td>
<td>909</td>
<td>13.0</td>
<td>920</td>
<td>13.2</td>
<td>907</td>
<td>13.1</td>
<td>909</td>
<td>13.0</td>
<td>920</td>
<td></td>
<td></td>
</tr>
<tr>
<td>437.leslie3d</td>
<td>19.2</td>
<td>490</td>
<td>19.1</td>
<td>492</td>
<td>19.2</td>
<td>489</td>
<td>19.2</td>
<td>490</td>
<td>19.1</td>
<td>492</td>
<td>19.2</td>
<td>489</td>
<td></td>
<td></td>
</tr>
<tr>
<td>444.namd</td>
<td>252</td>
<td>31.9</td>
<td>252</td>
<td>31.9</td>
<td>252</td>
<td>31.9</td>
<td>246</td>
<td>32.6</td>
<td>246</td>
<td>32.6</td>
<td>246</td>
<td>32.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>447.dealII</td>
<td>166</td>
<td>69.1</td>
<td>165</td>
<td>69.3</td>
<td>164</td>
<td>69.6</td>
<td>166</td>
<td>69.1</td>
<td>165</td>
<td>69.3</td>
<td>164</td>
<td>69.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>450.soplex</td>
<td>163</td>
<td>51.3</td>
<td>166</td>
<td>50.3</td>
<td>163</td>
<td>51.3</td>
<td>163</td>
<td>51.3</td>
<td>166</td>
<td>50.3</td>
<td>163</td>
<td>51.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>453.povray</td>
<td>83.3</td>
<td>63.9</td>
<td>83.0</td>
<td>64.1</td>
<td>83.0</td>
<td>64.1</td>
<td>73.0</td>
<td>72.9</td>
<td>73.5</td>
<td>72.4</td>
<td>73.7</td>
<td>72.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>454.calculix</td>
<td>146</td>
<td>56.4</td>
<td>147</td>
<td>56.3</td>
<td>148</td>
<td>55.9</td>
<td>136</td>
<td>60.6</td>
<td>135</td>
<td>61.1</td>
<td>133</td>
<td>61.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>459.GemsFDTD</td>
<td>54.6</td>
<td>194</td>
<td>54.6</td>
<td>194</td>
<td>54.5</td>
<td>195</td>
<td>52.2</td>
<td>203</td>
<td>52.0</td>
<td>204</td>
<td>52.1</td>
<td>203</td>
<td></td>
<td></td>
</tr>
<tr>
<td>465.tonto</td>
<td>226</td>
<td>43.5</td>
<td>226</td>
<td>43.5</td>
<td>225</td>
<td>43.8</td>
<td>171</td>
<td>57.6</td>
<td>169</td>
<td>58.3</td>
<td>167</td>
<td>58.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>470.lbm</td>
<td>28.9</td>
<td>475</td>
<td>29.0</td>
<td>474</td>
<td>29.0</td>
<td>474</td>
<td>28.9</td>
<td>475</td>
<td>29.0</td>
<td>474</td>
<td>29.0</td>
<td>474</td>
<td></td>
<td></td>
</tr>
<tr>
<td>481.wrf</td>
<td>86.0</td>
<td>130</td>
<td>87.1</td>
<td>128</td>
<td>86.4</td>
<td>129</td>
<td>86.0</td>
<td>130</td>
<td>87.1</td>
<td>128</td>
<td>86.4</td>
<td>129</td>
<td></td>
<td></td>
</tr>
<tr>
<td>482.sphinx3</td>
<td>274</td>
<td>71.1</td>
<td>273</td>
<td>71.3</td>
<td>275</td>
<td>70.8</td>
<td>274</td>
<td>71.1</td>
<td>273</td>
<td>71.3</td>
<td>275</td>
<td>70.8</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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"
Transparent Huge Pages enabled with:
echo always > /sys/kernel/mm/transparent_hugepage/enabled

### Platform Notes

BIOS Configuration:
- HP Power Profile set to Custom
- HP Power Regulator to HP Static High Performance Mode
- Minimum Processor Idle Power Core C-State set to CLE State
- Minimum Processor Idle Power Package C-State set to No Package State
- Collaborative Power Control set to Disabled
- Thermal Configuration set to Maximum Cooling
- Processor Power and Utilization Monitoring set to Disabled

Continued on next page
SPEC CFP2006 Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL120 Gen9
(2.20 GHz, Intel Xeon E5-2699 v4)

SPECfp2006 = 120
SPECfp_base2006 = 114

CPU2006 license: 3
Test sponsor: HPE
Tested by: HPE

Test date: May-2016
Hardware Availability: Mar-2016
Software Availability: Nov-2015

Platform Notes (Continued)

Memory Refresh Rate set to 1x Refresh
Intel Hyperthreading set to Enabled
QPI Snoop Configuration set to Home Snoop
Sysinfo program /cpu2006-HP/config/sysinfo.rev6914
$Rev: 6914 $ $Date:: 2014-06-25 #$ e3fbb8667b5a285932ceab81e28219e1

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/cpu2006/Docs/config.html#sysinfo

From /proc/cpuinfo
model name : Intel(R) Xeon(R) CPU E5-2699 v4 @ 2.20GHz
  1 "physical id"s (chips)
  44 "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 : 22
  siblings : 44
  physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 16 17 18 19 20 21 24 25 26 27 28
  cache size : 56320 KB

From /proc/meminfo
MemTotal: 131597360 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
os-release:
NAME="Red Hat Enterprise Linux Server"
VERSION="7.2 (Maipo)"
ID="rhel"
ID_LIKE="fedora"
VERSION_ID="7.2"
PRETTY_NAME="Red Hat Enterprise Linux Server 7.2 (Maipo)"
ANSI_COLOR="0;31"
CPE_NAME="cpe:/o:redhat:enterprise_linux:7.2:GA:server"
redhat-release: Red Hat Enterprise Linux Server release 7.2 (Maipo)
system-release: Red Hat Enterprise Linux Server release 7.2 (Maipo)

uname -a:
Linux DL120.Nishanth 3.10.0-327.el7.x86_64 #1 SMP Thu Oct 29 17:29:29 EDT 2015 x86_64 x86_64 x86_64 GNU/Linux

run-level 3 May 4 03:38

SPEC is set to: /cpu2006-HP
Filesystem Type Size Used Avail Use% Mounted on
/dev/mapper/rhel-root xfs 50G 18G 33G 36% /
SPEC CFP2006 Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL120 Gen9
(2.20 GHz, Intel Xeon E5-2699 v4)

SPECfp2006 = 120
SPECfp_base2006 = 114

CPU2006 license: 3
Test sponsor: HPE
Tested by: HPE

Platform Notes (Continued)

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.

BIOS HP P86 02/22/2016
Memory:
4x UNKNOWN NOT AVAILABLE
4x UNKNOWN NOT AVAILABLE 32 GB 2 rank 2400 MHz

(End of data from sysinfo program)
Regarding the sysinfo display about the memory installed, the correct amount of memory is 128 GB and the dmidecode description should have one line reading as:
4x UNKNOWN NOT AVAILABLE 32 GB 2 rank 2400 MHz

General Notes

Environment variables set by runspec before the start of the run:
KMP_AFFINITY = "granularity=fine,compact,1,0"
OMP_NUM_THREADS = "22"
LD_LIBRARY_PATH = "/cpu2006-HP/libs/32:/cpu2006-HP/libs/64:/cpu2006-HP/sh"

Binaries compiled on a system with 1x Intel Xeon E5-2660 v4 CPU + 128GB memory using RedHat EL 7.2

Base Compiler Invocation

C benchmarks:
icc  -m64

C++ benchmarks:
icpc -m64

Fortran benchmarks:
ifort  -m64

Benchmarks using both Fortran and C:
icc  -m64 ifort  -m64

Base Portability Flags

410.bwaves:  -DSPEC_CPU_LP64
416.gamest:  -DSPEC_CPU_LP64
433.milc:  -DSPEC_CPU_LP64

Continued on next page
SPEC CFP2006 Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL120 Gen9
(2.20 GHz, Intel Xeon E5-2699 v4)

SPECfp2006 = 120
SPECfp_base2006 = 114

CPU2006 license: 3
Test sponsor: HPE
Tested by: HPE

Test date: May-2016
Hardware Availability: Mar-2016
Software Availability: Nov-2015

Base Portability Flags (Continued)

434.zeusmp: -DSPEC_CPU_LP64
435.gromacs: -DSPEC_CPU_LP64 -nofor_main
436.cactusADM: -DSPEC_CPU_LP64 -nofor_main
437.leslie3d: -DSPEC_CPU_LP64
444.namd: -DSPEC_CPU_LP64
447.dealII: -DSPEC_CPU_LP64
450.soplex: -DSPEC_CPU_LP64
453.povray: -DSPEC_CPU_LP64
454.calculix: -DSPEC_CPU_LP64 -nofor_main
459.GemsFDTD: -DSPEC_CPU_LP64
465.tonto: -DSPEC_CPU_LP64
470.lbm: -DSPEC_CPU_LP64 -DSPEC_CPU_CASE_FLAG -DSPEC_CPU_LINUX
481.wrf: -DSPEC_CPU_LP64
482.sphinx3: -DSPEC_CPU_LP64

Base Optimization Flags

C benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -static -parallel -opt-prefetch
-ansi-alias -fp-model fast=2
-qopt-prefetch-issue-excl-hint

C++ benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -static -opt-prefetch -ansi-alias
-fp-model fast=2
-qopt-prefetch-issue-excl-hint

Fortran benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -static -parallel -opt-prefetch
-fp-model fast=2
-qopt-prefetch-issue-excl-hint

Benchmarks using both Fortran and C:
-xCORE-AVX2 -ipo -O3 -no-prec-div -static -parallel -opt-prefetch
-ansi-alias -fp-model fast=2
-qopt-prefetch-issue-excl-hint

Peak Compiler Invocation

C benchmarks:
icc -m64

C++ benchmarks:
icpc -m64

Continued on next page
Peak Compiler Invocation (Continued)

Fortran benchmarks:
ifort -m64

Benchmarks using both Fortran and C:
icc   -m64
    ifort -m64

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:

433.milc: basepeak = yes
470.lbm: basepeak = yes
482.sphinx3: basepeak = yes

C++ benchmarks:

444.namd: -xCORE-AVX2(pass 2) -prof-gen:threadsafe(pass 1)
    -ipo(pass 2) -O3(pass 2) -no-prec-div(pass 2)
    -par-num-threads=1(pass 1) -prof-use(pass 2) -fno-alias
    -auto-ilp32

447.dealII: basepeak = yes
450.soplex: basepeak = yes
453.povray: -xCORE-AVX2(pass 2) -prof-gen:threadsafe(pass 1)
    -ipo(pass 2) -O3(pass 2) -no-prec-div(pass 2)
    -par-num-threads=1(pass 1) -prof-use(pass 2) -unroll14
    -ansi-alias

Fortran benchmarks:

410.bwaves: basepeak = yes
416.gamess: -xCORE-AVX2(pass 2) -prof-gen:threadsafe(pass 1)
    -ipo(pass 2) -O3(pass 2) -no-prec-div(pass 2)
    -par-num-threads=1(pass 1) -prof-use(pass 2) -unroll12
    -inline-level=0 -scalar-rep—
Spec CFP2006 Result
Hewlett Packard Enterprise  
(test sponsor: HPE)  
ProLiant DL120 Gen9  
(2.20 GHz, Intel Xeon E5-2699 v4)  

SPECfp2006 = 120  
SPECfp_base2006 = 114

CPU2006 license: 3  
Test sponsor: HPE  
Tested by: HPE  

Test date: May-2016  
Hardware Availability: Mar-2016  
Software Availability: Nov-2015

Peak Optimization Flags (Continued)

434.zeusmp: basepeak = yes
437.leslie3d: basepeak = yes
459.GemsFDTD: -xCORE-AVX2 (pass 2) -prof-gen:threadsafe(pass 1) -ipo(pass 2) -O3(pass 2) -no-prec-div(pass 2) -par-num-threads=1(pass 1) -prof-use(pass 2) -unroll2 -inline-level=0 -opt-prefetch -parallel
465.tonto: -xCORE-AVX2 (pass 2) -prof-gen:threadsafe(pass 1) -ipo(pass 2) -O3(pass 2) -no-prec-div(pass 2) -par-num-threads=1(pass 1) -prof-use(pass 2) -inline-calloc -opt-malloc-options=3 -auto -unroll4

Benchmarks using both Fortran and C:
435.gromacs: basepeak = yes
436.cactusADM: basepeak = yes
454.calculix: -xCORE-AVX2 -ipo -O3 -no-prec-div -auto-ilp32 -ansi-alias
481.wrf: basepeak = yes

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2006/flags/HP-Compiler-Flags-Intel-V1.2-HSW-revF.html
http://www.spec.org/cpu2006/flags/HP-Platform-Flags-Intel-V1.2-HSW-revE.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2006/flags/HP-Compiler-Flags-Intel-V1.2-HSW-revF.xml
http://www.spec.org/cpu2006/flags/HP-Platform-Flags-Intel-V1.2-HSW-revE.xml

SPEC and SPECfp are registered trademarks of the Standard Performance Evaluation Corporation. All other brand and product names appearing in this result are trademarks or registered trademarks of their respective holders.

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

Tested with SPEC CPU2006 v1.2.
Originally published on 1 June 2016.