Supermicro
(Test Sponsor: HZDR)
NVIDIA Tesla K20m
Supermicro X9DRG-HF

SPECaccel_ocl_peak = 1.89
SPECaccel_ocl_base = 1.70

ACCEL license: 65A
Test sponsor: HZDR
Tested by: HZDR

Test date: Aug-2017
Hardware Availability: Jan-2013
Software Availability: Aug-2016

1.32
1.33
1.81
2.60
2.06
2.63
1.64
4.08
1.14
2.13
1.64
2.15
1.08
1.09
1.74
1.36
2.23
1.13
1.02
1.45
2.75
0.670
0.921

SPECaccel_ocl_base = 1.70
SPECaccel_ocl_peak = 1.89
**SPEC ACCEL OCL Result**

<table>
<thead>
<tr>
<th>Hardware</th>
<th>Accelerator</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Name: Intel Xeon E5-2609</td>
<td>Accel Model Name: Tesla K20m</td>
</tr>
<tr>
<td>CPU Characteristics: No TURBO</td>
<td>Accel Vendor: NVIDIA</td>
</tr>
<tr>
<td>CPU MHz: 2400</td>
<td>Accel Name: NVIDIA Tesla K20m</td>
</tr>
<tr>
<td>CPU MHz Maximum: 2400</td>
<td>Type of Accel: GPU</td>
</tr>
<tr>
<td>FPU: Integrated</td>
<td>Accel Connection: PCIe 2.0 16x</td>
</tr>
<tr>
<td>CPU(s) enabled: 8 cores, 2 chips, 4 cores/chip</td>
<td>Does Accel Use ECC: yes</td>
</tr>
<tr>
<td>CPU(s) orderable: 1,2 chips</td>
<td>Accel Description: NVIDIA Tesla K20m, 2688 CUDA cores, 732 MHz</td>
</tr>
<tr>
<td>Primary Cache: 32 KB I + 32 KB D on chip per core</td>
<td>Accel Driver: NVIDIA UNIX x86_64 Kernel Module 367.48</td>
</tr>
<tr>
<td>Secondary Cache: 256 KB I+D on chip per core</td>
<td></td>
</tr>
<tr>
<td>L3 Cache: 10 MB I+D on chip per chip</td>
<td></td>
</tr>
<tr>
<td>Other Cache: None</td>
<td></td>
</tr>
<tr>
<td>Memory: 64 GB (8 x 8 GB 2Rx4 PC3-12800R-11, ECC, running at 1066MHz)</td>
<td></td>
</tr>
<tr>
<td>Disk Subsystem: 60 GB INTEL SSDSC2CW060A3</td>
<td></td>
</tr>
<tr>
<td>Other Hardware: None</td>
<td></td>
</tr>
<tr>
<td>Software</td>
<td>Operating System: Ubuntu 14.04.5 LTS</td>
</tr>
<tr>
<td>Compiler: GNU Compiler C/C++ Version 6.2.0</td>
<td></td>
</tr>
<tr>
<td>File System: ext3</td>
<td>System State: Run level 5 (user-level)</td>
</tr>
<tr>
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<td>Other Software: NVIDIA Cuda SDK 7.0, driver version 367.48</td>
</tr>
</tbody>
</table>

**Tested by: HZDR**

**Test Sponsor: HZDR**

**Software Availability: Jan-2013**

**Hardware Availability: Jan-2013**

**ACCEL license: 65A**

**Test date: Aug-2017**

**Hardware**

- CPU Name: Intel Xeon E5-2609
- CPU Characteristics: No TURBO
- CPU MHz: 2400
- CPU MHz Maximum: 2400
- FPU: Integrated
- CPU(s) enabled: 8 cores, 2 chips, 4 cores/chip
- CPU(s) orderable: 1,2 chips
- Primary Cache: 32 KB I + 32 KB D on chip per core
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- Disk Subsystem: 60 GB INTEL SSDSC2CW060A3
- Other Hardware: None

**Operating System:** Ubuntu 14.04.5 LTS

**Compiler:** GNU Compiler C/C++ Version 6.2.0

**File System:** ext3

**System State:** Run level 5 (user-level)

**Other Software:** NVIDIA Cuda SDK 7.0, driver version 367.48

**Accelerator**

- Accel Model Name: Tesla K20m
- Accel Vendor: NVIDIA
- Accel Name: NVIDIA Tesla K20m
- Type of Accel: GPU
- Accel Connection: PCIe 2.0 16x
- Does Accel Use ECC: yes
- Accel Description: NVIDIA Tesla K20m, 2688 CUDA cores, 732 MHz
- Accel Driver: NVIDIA UNIX x86_64 Kernel Module 367.48
## SPEC ACCEL OCL Result

### Supermicro

**Test Sponsor:** HZDR  
**NVIDIA Tesla K20m**  
**Supermicro X9DRG-HF**

### SPECaccel_ocl_peak = 1.89

### SPECaccel_ocl_base = 1.70

**ACCEL license:** 65A  
**Test date:** Aug-2017  
**Test sponsor:** HZDR  
**Hardware Availability:** Jan-2013  
**Tested by:** HZDR  
**Software Availability:** Aug-2016

### Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Base</th>
<th>Peak</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Seconds</td>
<td>Ratio</td>
</tr>
<tr>
<td>101.tpacf</td>
<td>80.3</td>
<td>1.33</td>
</tr>
<tr>
<td>103.stencil</td>
<td>69.1</td>
<td>1.81</td>
</tr>
<tr>
<td>104.lbm</td>
<td>54.6</td>
<td>2.05</td>
</tr>
<tr>
<td>110.fft</td>
<td><strong>42.2</strong></td>
<td><strong>2.63</strong></td>
</tr>
<tr>
<td>112.spmv</td>
<td>89.6</td>
<td>1.64</td>
</tr>
<tr>
<td>114.mriq</td>
<td>26.7</td>
<td>4.08</td>
</tr>
<tr>
<td>116.histo</td>
<td>100</td>
<td>1.14</td>
</tr>
<tr>
<td>117.bfs</td>
<td>70.3</td>
<td>1.66</td>
</tr>
<tr>
<td>118.cutcp</td>
<td>46.1</td>
<td>2.15</td>
</tr>
<tr>
<td>120.kmeans</td>
<td>93.1</td>
<td><strong>1.07</strong></td>
</tr>
<tr>
<td>121.lavamd</td>
<td>22.7</td>
<td>4.80</td>
</tr>
<tr>
<td>122.cfd</td>
<td>72.4</td>
<td>1.74</td>
</tr>
<tr>
<td>123.nw</td>
<td>84.4</td>
<td><strong>1.36</strong></td>
</tr>
<tr>
<td>124.hotspot</td>
<td>51.2</td>
<td>2.23</td>
</tr>
<tr>
<td>125.lud</td>
<td>118</td>
<td>1.01</td>
</tr>
<tr>
<td>126.ge</td>
<td>56.8</td>
<td>2.73</td>
</tr>
<tr>
<td>127.srad</td>
<td><strong>78.6</strong></td>
<td><strong>1.45</strong></td>
</tr>
<tr>
<td>128.heartwall</td>
<td>158</td>
<td>0.670</td>
</tr>
<tr>
<td>140.bplustree</td>
<td>117</td>
<td>0.923</td>
</tr>
</tbody>
</table>

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

### Platform Notes

Sysinfo program /tmp/spec/1.2/Docs/sysinfo  
$Rev: 6965 $ $Date:: 2015-04-21#$ c05a7f14b1b1765e3fe1df68447e8a35  
running on kepler002 Thu Aug 24 13:13:30 2017

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/accel/Docs/config.html#sysinfo

From /proc/cpuinfo  
model name : Intel(R) Xeon(R) CPU E5-2609 0 @ 2.40GHz  
2 "physical id"s (chips)  
8 "processors"  
cores, siblings (Caution: counting these is hw and system dependent. The following excerpts from /proc/cpuinfo might not be reliable. Use with caution.)

Continued on next page
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Platform Notes (Continued)

- cpu cores : 4
- siblings : 4
- physical 0: cores 0 1 2 3
- physical 1: cores 0 1 2 3
- cache size : 10240 KB

From /proc/meminfo
- MemTotal: 65949360 kB
- HugePages_Total: 0
- Hugepagesize: 2048 kB

/usr/bin/lsb_release -d
- Ubuntu 14.04.5 LTS

From /etc/*release* /etc/*version*
- debian_version: jessie/sid
- os-release:
  - NAME="Ubuntu"
  - VERSION="14.04.5 LTS, Trusty Tahr"
  - ID=ubuntu
  - ID_LIKE=debian
  - PRETTY_NAME="Ubuntu 14.04.5 LTS"
  - VERSION_ID="14.04"
  - HOME_URL="http://www.ubuntu.com/
  - SUPPORT_URL="http://help.ubuntu.com/
- redhat-release: Red Hat Enterprise Linux Server release 6.5 (Santiago)
- rh-release: Red Hat Enterprise Linux Server release 7.2 (Maipo)

uname -a:
- Linux kepler002 4.4.0-38-generic #57~14.04.1-Ubuntu SMP Tue Sep 6 17:20:43 UTC 2016 x86_64 x86_64 x86_64 GNU/Linux

run-level 5 Jan 23 15:07

SPEC is set to: /tmp/spec/1.2
- Filesystem Type Size Used Avail Use% Mounted on
- /dev/sdal ext3 30G 14G 15G 47% /

Cannot run dmidecode; consider saying 'chmod +s /usr/sbin/dmidecode'

(End of data from sysinfo program)

Base Runtime Environment

C benchmarks:
- OpenCL Platform: NVIDIA CUDA, OpenCL 1.2 CUDA 8.0.44
- OpenCL Device #0: Tesla K20m, v 367.48
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Base Runtime Environment (Continued)

C++ benchmarks:
OpenCL Platform: NVIDIA CUDA, OpenCL 1.2 CUDA 8.0.44
OpenCL Device #0: Tesla K20m, v 367.48

Base Compiler Invocation

C benchmarks:
gcc
C++ benchmarks:
g++

Base Portability Flags

116.histo: -DSPEC_LOCAL_MEMORY_HEADROOM=2
122.cfd: -std=gnu++98

Base Optimization Flags

C benchmarks:
-02 -I/opt/pkg/devel/cuda/7.0/include -L/opt/pkg/devel/cuda/7.0/libb64
-1OpenCL

C++ benchmarks:
-02 -I/opt/pkg/devel/cuda/7.0/include -L/opt/pkg/devel/cuda/7.0/libb64
-1OpenCL

Peak Runtime Environment

C benchmarks:
OpenCL Platform: NVIDIA CUDA, OpenCL 1.2 CUDA 8.0.44
OpenCL Device #0: Tesla K20m, v 367.48

C++ benchmarks:
OpenCL Platform: NVIDIA CUDA, OpenCL 1.2 CUDA 8.0.44
OpenCL Device #0: Tesla K20m, v 367.48
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Peak Compiler Invocation

C benchmarks:
  gcc

C++ benchmarks:
  g++

Peak Portability Flags

116.histo: -DSPEC_LOCAL_MEMORY_HEADROOM=2
122.cfd: -std=gnu++98

Peak Optimization Flags

C benchmarks:

110.fft: basepeak = yes
114.mriq: basepeak = yes
116.histo: basepeak = yes
117.bfs: -O2 -DSPEC_ACCEL_WG_SIZE_0_0=64 -DSPEC_ACCEL_WG_SIZE_1_0=64
         -I/opt/pkg/devel/cuda/7.0/include
         -L/opt/pkg/devel/cuda/7.0/libb64 -lOpenCL
118.cutcp: basepeak = yes
121.lavamd: basepeak = yes
124.hotspot: basepeak = yes
127.srad: basepeak = yes
128.heartwall: basepeak = yes
140.bplustree: basepeak = yes

C++ benchmarks:

101.tpacf: -O2 -DSPEC_ACCEL_WG_SIZE_0_0=1024
           -I/opt/pkg/devel/cuda/7.0/include
           -L/opt/pkg/devel/cuda/7.0/libb64 -lOpenCL

Continued on next page
Peak Optimization Flags (Continued)

103. stencil: basepeak = yes

104. lbm: -O2 -DSPEC_ACCEL_WG_SIZE_0_0=32 -DSPEC_ACCEL_WG_SIZE_0_1=1
       -I/opt/pkg/devel/cuda/7.0/include
       -L/opt/pkg/devel/cuda/7.0/libb64 -lOpenCL

112. spmv: -O2 -DSPEC_ACCEL_WG_SIZE_0_0=96
         -I/opt/pkg/devel/cuda/7.0/include
         -L/opt/pkg/devel/cuda/7.0/libb64 -lOpenCL

120. kmeans: -O2 -DSPEC_ACCEL_WG_SIZE_0_0=288
           -I/opt/pkg/devel/cuda/7.0/include
           -L/opt/pkg/devel/cuda/7.0/libb64 -lOpenCL

122. cfd: -O2 -DSPEC_ACCEL_WG_SIZE_3_0=288
       -I/opt/pkg/devel/cuda/7.0/include
       -L/opt/pkg/devel/cuda/7.0/libb64 -lOpenCL

123. nw: basepeak = yes

125. lud: -O2 -DSPEC_ACCEL_WG_SIZE_0_0=32
        -I/opt/pkg/devel/cuda/7.0/include
        -L/opt/pkg/devel/cuda/7.0/libb64 -lOpenCL

126. ge: -O2 -DSPEC_ACCEL_WG_SIZE_0_0=512 -DSPEC_ACCEL_WG_SIZE_1_0=1
       -DSPEC_ACCEL_WG_SIZE_1_1=512
       -I/opt/pkg/devel/cuda/7.0/include
       -L/opt/pkg/devel/cuda/7.0/libb64 -lOpenCL

The flags file that was used to format this result can be browsed at
https://www.spec.org/accel/flags/flags-advanced.20170929.html

You can also download the XML flags source by saving the following link:
https://www.spec.org/accel/flags/flags-advanced.20170929.xml