Hewlett-Packard Company
AlphaServer ES80 7/1000

SPECint_rate2000 = 8.83
SPECint_rate_base2000 = 8.00

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Base Copies</th>
<th>Base Runtime</th>
<th>Base Ratio</th>
<th>Copies</th>
<th>Runtime</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>164.gzip</td>
<td>1</td>
<td>276</td>
<td>5.89</td>
<td>1</td>
<td>272</td>
<td>5.97</td>
</tr>
<tr>
<td>175.vpr</td>
<td>1</td>
<td>196</td>
<td>8.28</td>
<td>1</td>
<td>191</td>
<td>8.51</td>
</tr>
<tr>
<td>176.gcc</td>
<td>1</td>
<td>147</td>
<td>8.65</td>
<td>1</td>
<td>132</td>
<td>9.67</td>
</tr>
<tr>
<td>181.mcf</td>
<td>1</td>
<td>291</td>
<td>7.18</td>
<td>1</td>
<td>182</td>
<td>11.5</td>
</tr>
<tr>
<td>186.crafty</td>
<td>1</td>
<td>117</td>
<td>9.93</td>
<td>1</td>
<td>117</td>
<td>9.93</td>
</tr>
<tr>
<td>197.parser</td>
<td>1</td>
<td>404</td>
<td>5.17</td>
<td>1</td>
<td>318</td>
<td>6.57</td>
</tr>
<tr>
<td>252.eon</td>
<td>1</td>
<td>156</td>
<td>9.64</td>
<td>1</td>
<td>158</td>
<td>9.53</td>
</tr>
<tr>
<td>253.perlbmk</td>
<td>1</td>
<td>273</td>
<td>7.66</td>
<td>1</td>
<td>256</td>
<td>8.16</td>
</tr>
<tr>
<td>254.gap</td>
<td>1</td>
<td>199</td>
<td>6.42</td>
<td>1</td>
<td>177</td>
<td>7.21</td>
</tr>
<tr>
<td>255.vortex</td>
<td>1</td>
<td>201</td>
<td>11.0</td>
<td>1</td>
<td>183</td>
<td>12.1</td>
</tr>
<tr>
<td>256.bzip2</td>
<td>1</td>
<td>210</td>
<td>8.29</td>
<td>1</td>
<td>199</td>
<td>8.76</td>
</tr>
<tr>
<td>300.twolf</td>
<td>1</td>
<td>341</td>
<td>10.2</td>
<td>1</td>
<td>336</td>
<td>10.3</td>
</tr>
</tbody>
</table>

**Hardware**

- CPU: Alpha 21364
- CPU MHz: 1000
- FPU: Integrated
- CPU(s) enabled: 1 core, 1 chip, 1 core/chip
- CPU(s) orderable: 2 to 8
- Primary Cache: 64KB(I)+64KB(D) on chip
- Secondary Cache: 1.75MB on chip per CPU
- L3 Cache: None
- Other Cache: None
- Memory: 4GB
- Disk Subsystem: None

**Software**

- Operating System: Tru64 UNIX V5.1B (Rev. 2650)
- Compiler: Compaq C V6.5-011-48C5K
- Program Analysis Tools V2.0
- Spike V5.2 (506A)
- Compaq C++ V6.5-028
- File System: ufs
- System State: Multi-user

**Notes/Tuning Information**

Baseline C: cc -arch ev7 -fast +CFB ONESTEP
C++: cxx -arch ev7 -O2 ONESTEP

Peak:
The following use: -g3 -arch ev7 ONESTEP
175.vpr 181.mcf 197.parser 253.perlbmk
The following use: -g3 -arch ev6 ONESTEP
164.gzip 176.gcc 254.gap 255.vortex 256.bzip2 300.twolf

Individual benchmark tuning:
164.gzip: -fast -O4 -non_shared +CFB
175.vpr: -fast -O4 -assume restricted_pointers +CFB
176.gcc: -fast -O4 -xtaso_short -all -ldensemalloc -none +CFB +IFB
181.mcf: -fast -xtaso_short +CFB +IFB +PFB
186.crafty: same as base
197.parser: -fast -O4 -xtaso_short -non_shared +CFB
252.eon: -arch ev7 -O2 -all -ldensemalloc -none
253.perlbmk: -fast -non_shared +CFB +IFB
254.gap: -fast -O4 -non_shared +CFB +IFB +PFB
255.vortex: -fast -non_shared +CFB +IFB
Hewlett-Packard Company
AlphaServer ES80 7/1000

Notes/Tuning Information (Continued)

256.bzip2: -fast -O4 -non_shared +CFB
300.twolf: -fast -O4
   -ldensemalloc -non_shared +CFB +IFB

Most benchmarks are built using one or more types of
profile-driven feedback. The types used are designated
by abbreviations in the notes:

+CFB: Code generation is optimized by the compiler, using
feedback from a training run. These commands are
done before the first compile (in phase "fdo_pre0"):

   mkdir /tmp/pp
   rm -f /tmp/pp/${baseexe}*

   and these flags are added to the first and second compiles:

   PASS1_CFLAGS = -prof_gen_noopt -prof_dir /tmp/pp
   PASS2_CFLAGS = -prof_use -prof_dir /tmp/pp

   (Peak builds use /tmp/pp above; base builds use /tmp/pb.)

+IFB: Icache usage is improved by the post-link-time optimizer
Spike, using feedback from a training run. These commands
are used (in phase "fdo_postN"):

   mv ${baseexe} oldexe
   spike oldexe -feedback oldexe -o ${baseexe}

+PFB: Prefetches are improved by the post-link-time optimizer
Spike, using feedback from a training run. These
commands are used (in phase "fdo_post_makeN"):

   rm -f *Counts*
   mv ${baseexe} oldexe
   pixie -stats dstride oldexe 1>pixie.out 2>pixie.err
   mv oldexe.pixie ${baseexe}

   A training run is carried out (in phase "fdo_runN"), and
   then this command (in phase "fdo_postN"):

   spike oldexe -fb oldexe -stride_prefetch -o ${baseexe}

When Spike is used for both Icache and Prefetch improvements,
only one spike command is actually issued, with the Icache
options followed by the Prefetch options.

Portability: gcc: -Dalloca=__builtin_alloca; crafty: -DALPHA
perlbmk: -DSPEC_CPU2000_DUNIX; vortex: -DSPEC_CPU2000_LP64
gap: -DSYS_HAS_CALLOC_PROTO -DSYS_IS_BSD -DSYS_HAS_IOCTL_PROTO
   -DSPEC_CPU2000_LP64

Information on UNIX V5.1B Patches can be found at
Hewlett-Packard Company
AlphaServer ES80 7/1000

SPECint_rate2000 = 8.83
SPECint_rate_base2000 = 8.00

Notes/Tuning Information (Continued)

vm:
vm_bigpg_enabled = 1
vm_bigpg_thres=16
vm_swap_eager = 0

proc:
max_per_proc_address_space = 0x400000000000
max_per_proc_data_size = 0x400000000000
max_per_proc_stack_size = 0x400000000000
max_proc_per_user = 2048
max_threads_per_user = 0
maxusers = 16384
per_proc_address_space = 0x400000000000
per_proc_data_size = 0x400000000000
per_proc_stack_size = 0x400000000000

In the ES80, there are two cpus per shelf. Each cpu has its own 4GB of memory. Neither of the cpus can be physically removed. For 1 cpu results measured on a 2 cpu system, one cpu was turned off at boot time using the /etc/sysconfigtab setting "cpu_enabled_mask=0". The cpu's 4GB of memory was also physically removed.