## CINT2000 Result

**Hewlett-Packard Company**  
**AlphaServer ES47 7/1000**  

**SPECint2000 = 761**  
**SPECint_base2000 = 689**  

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Reference Time</th>
<th>Base Runtime</th>
<th>Base Ratio</th>
<th>Runtime</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>164.gzip</td>
<td>1400</td>
<td>276</td>
<td>507</td>
<td>272</td>
<td>515</td>
</tr>
<tr>
<td>175.vpr</td>
<td>1400</td>
<td>196</td>
<td>713</td>
<td>191</td>
<td>734</td>
</tr>
<tr>
<td>176.gcc</td>
<td>1100</td>
<td>147</td>
<td>746</td>
<td>132</td>
<td>834</td>
</tr>
<tr>
<td>181.mcf</td>
<td>1800</td>
<td>291</td>
<td>619</td>
<td>182</td>
<td>988</td>
</tr>
<tr>
<td>186.crafty</td>
<td>1000</td>
<td>117</td>
<td>856</td>
<td>117</td>
<td>856</td>
</tr>
<tr>
<td>197.parser</td>
<td>1800</td>
<td>404</td>
<td>446</td>
<td>318</td>
<td>566</td>
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<tr>
<td>252.eon</td>
<td>1300</td>
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<td>831</td>
<td>158</td>
<td>822</td>
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<tr>
<td>253.perlbmk</td>
<td>1800</td>
<td>273</td>
<td>660</td>
<td>256</td>
<td>703</td>
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<tr>
<td>254.gap</td>
<td>1100</td>
<td>199</td>
<td>553</td>
<td>177</td>
<td>621</td>
</tr>
<tr>
<td>255.vortex</td>
<td>1900</td>
<td>201</td>
<td>947</td>
<td>183</td>
<td>1041</td>
</tr>
<tr>
<td>256.bzip2</td>
<td>1500</td>
<td>210</td>
<td>715</td>
<td>199</td>
<td>755</td>
</tr>
<tr>
<td>300.twolf</td>
<td>3000</td>
<td>341</td>
<td>881</td>
<td>336</td>
<td>892</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 4  
- **Parallel:** No  
- **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  
- **Other Hardware:** 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 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 -04 -non_shared +CFB`  
175.vpr: `-fast -04 -assume restricted_pointers +CFB`  
176.gcc: `-fast -04 -xtaso_short -all -ldensemalloc -none +CFB +IFB`  
181.mcf: `-fast -xtaso_short +CFB +IFB +PFB`  
186.crafty: `same as base`  
197.parser: `-fast -04 -xtaso_short -non_shared +CFB`  
252.eon: `-arch ev7 -02 -all -ldensemalloc -none`  
253.perlbmk: `-fast -non_shared +CFB +IFB`
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Notes/Tuning Information (Continued)

254.gap: -fast -O4 -non_shared +CFB +IFB +PFB
255.vortex: -fast -non_shared +CFB +IFB
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"):

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

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

```bash
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"):

```bash
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"):

```bash
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"):

```bash
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.


Information on UNIX V5.1B Patches can be found at http://ftp1.service.digital.com/public/unix/v5.1b/
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Notes/Tuning Information (Continued)

vm:
  vm_bigpg_enabled = 1
  vm_bigpg_thresh=16
  vm_swap_sager = 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 ES47, 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.