## CFP2000 Result

**Compaq Computer Corporation**  
**AlphaServer GS320 Model 32 68/1001**

**SPECfp2000 = 756**

**SPECfp_base2000 = 585**

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Reference Time</th>
<th>Base Runtime</th>
<th>Base Ratio</th>
<th>Runtime</th>
<th>Ratio</th>
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<tbody>
<tr>
<td>168.wupwise</td>
<td>1600</td>
<td>332</td>
<td>482</td>
<td>239</td>
<td>669</td>
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<td>171.swim</td>
<td>3100</td>
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<td>172.mgrid</td>
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<td>343</td>
<td>385</td>
<td>468</td>
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<td>173.applu</td>
<td>2100</td>
<td>511</td>
<td>411</td>
<td>370</td>
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<td>177.mesa</td>
<td>1400</td>
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<td>178.galgel</td>
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<td>183.equake</td>
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<td>191.fma3d</td>
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<td>301.apsi</td>
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<td>514</td>
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</tr>
</tbody>
</table>

### Hardware
- **CPU:** Alpha 21264C
- **CPU MHz:** 1001
- **FPU:** Integrated
- **CPU(s) enabled:** 1 core, 1 chip, 1 core/chip
- **CPU(s) orderable:** 1 to 32
- **Parallel:** No
- **Primary Cache:** 64KB(I)+64KB(D) on chip
- **Secondary Cache:** 8MB off chip per CPU
- **L3 Cache:** None
- **Other Cache:** None
- **Memory:** 16GB
- **Disk Subsystem:** mfs (Memory File System)
- **Other Hardware:** None

### Software
- **Operating System:** Tru64 UNIX V5.1
  +Patch Kit 2
- **Compiler:**
  - Compaq C V6.4-214-46B59
  - Program Analysis Tools V2.0
  - Spike V5.2 DTK (1.461 46B5P)
  - Compaq Fortran V5.4A-1472-46B2F
  - Compaq Fortran 77 V5.4A-196-46B2F
  - KAP Fortran V4.3 000607
  - KAP Fortran 77 V4.1 980926
  - KAP C V4.1 000607
- **File System:** mfs
- **System State:** Multi-user

### Notes/Tuning Information

**Baseline**  
C: cc -arch ev6 -fast -O4 ONESTEP  
Fortran: f90 -arch ev6 -fast -O5 ONESTEP

**Peak:**  
All use -g3 -arch ev6 -non_shared ONESTEP  
Individual benchmark tuning:
- **168.wupwise:** kf77 -fast -O4 -pipeline -unroll 2 +PFB  
- **171.swim:** f90 -fast -O5  
- **172.mgrid:** kf77 -O5 -transform_loops -tune ev6 -unroll 8  
- **173.applu:** f90 -fast -O5 +PFB  
- **177.mesa:** cc -fast -O4 +CFB +IFB  
- **178.galgel:** f90 -fast -O5  
- **179.art:** kcc -fast -O4 -unroll 10 -ckapargs='-arl=4 -ur=4' +PFB  
- **183.equake:** cc -fast -xtasohort -assume restricted_pointers = all -ldensemalloc -none +PFB
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Notes/Tuning Information (Continued)

187.facerec: f90 -fast -O4 +PFB
188.ammp: cc -fast -O4 -xtaso_short -assume restricted_pointers
189.lucas: kf90 -O5 -fkapargs='-ur=1' +PFB
191.fma3d: kf90 -O4 -transform_loops +PFB
200.sixtrack: f90 -fast -O5 -assume accuracy_sensitive
               -notransform_loops +PFB
301.apsi: kf90 -O5 -transform_loops -unroll 8
           -fkapargs='-ur=1' +PFB

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: galgel: -fixed

Information on UNIX V5.1 Patches can be found at
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Notes/Tuning Information (Continued)


Spike, and the Program Analysis Tools, are part of the Developers' Tool Kit Supplement, http://www.tru64unix.compaq.com/dtk/. The features used in this SPEC submission will be available at the web site as a beta kit in August, 2001, and as a production release in October, 2001. The C compiler for this SPEC submission has been available at the same location, as a production release, since May, 2001.

sysconfigtab settings:

max_proc_per_user = 4096
max_threads_per_user = 4096
per_proc_data_size    = 21474836480
max_per_proc_data_size   = 21474836480
per_proc_address_space = 21474836480
max_per_proc_address_space = 21474836480