# CINT2000 Result

**Compaq Computer Corporation**

**AlphaServer GS320 Model 32 68/1001**

**SPEC license #:** 2

**Tested by:** Compaq NH

**Test date:** Jun-2001

**Hardware Avail:** Jun-2001

**Software Avail:** Aug-2001

## Benchmark Results

<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>32</td>
<td>302</td>
<td>172</td>
<td>32</td>
<td>298</td>
<td>175</td>
</tr>
<tr>
<td>175.vpr</td>
<td>32</td>
<td>295</td>
<td>176</td>
<td>32</td>
<td>307</td>
<td>169</td>
</tr>
<tr>
<td>176.gcc</td>
<td>32</td>
<td>188</td>
<td>217</td>
<td>32</td>
<td>160</td>
<td>256</td>
</tr>
<tr>
<td>181.mcf</td>
<td>32</td>
<td>503</td>
<td>133</td>
<td>32</td>
<td>371</td>
<td>180</td>
</tr>
<tr>
<td>186.crafty</td>
<td>32</td>
<td>140</td>
<td>265</td>
<td>32</td>
<td>140</td>
<td>265</td>
</tr>
<tr>
<td>197.parser</td>
<td>32</td>
<td>438</td>
<td>153</td>
<td>32</td>
<td>344</td>
<td>194</td>
</tr>
<tr>
<td>252.eon</td>
<td>32</td>
<td>166</td>
<td>291</td>
<td>32</td>
<td>170</td>
<td>284</td>
</tr>
<tr>
<td>253.perlbmk</td>
<td>32</td>
<td>326</td>
<td>205</td>
<td>32</td>
<td>317</td>
<td>211</td>
</tr>
<tr>
<td>254.gap</td>
<td>32</td>
<td>373</td>
<td>109</td>
<td>32</td>
<td>312</td>
<td>131</td>
</tr>
<tr>
<td>255.vortex</td>
<td>32</td>
<td>277</td>
<td>254</td>
<td>32</td>
<td>243</td>
<td>290</td>
</tr>
<tr>
<td>256.bzip2</td>
<td>32</td>
<td>250</td>
<td>222</td>
<td>32</td>
<td>231</td>
<td>241</td>
</tr>
<tr>
<td>300.twolf</td>
<td>32</td>
<td>366</td>
<td>304</td>
<td>32</td>
<td>369</td>
<td>302</td>
</tr>
</tbody>
</table>

## Hardware Information

- **CPU:** Alpha 21264C
- **CPU MHz:** 1001
- **FPU:** Integrated
- **CPU(s) enabled:** 32 cores, 32 chips, 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:** 256GB
- **Disk Subsystem:** mfs (Memory File System)
- **Other Hardware:** None

## Software Information

- **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 C++ V6.3-010-46B2F
- **File System:** mfs
- **System State:** Single-user

## Notes/Tuning Information

Baseline C  : cc  -arch ev6 -fast +CFB ONESTEP  
C++: cxx -arch ev6 -O2 ONESTEP

Peak:
All but 252.eon: cc -g3 -arch ev6 ONESTEP

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: cxx -arch ev6 -O2 -all -ldensemalloc -none
253.perlbmk: -fast -non_shared +CFB +IFB
254.gap: -fast -04 -non_shared +CFB +IFB +PFB
255.vortex: -fast -non_shared +CFB +IFB
256.bzip2: -fast -04 -non_shared +CFB
300.twolf: -fast -04 -assume restricted_pointers -all -ldensemalloc -none +CFB +IFB

Standard Performance Evaluation Corporation  
info@spec.org  
http://www.spec.org
Compaq Computer Corporation
AlphaServer GS320 Model 32 68/1001

SPECint_rate2000 = 218
SPECint_rate_base2000 = 200

Notes/Tuning Information (Continued)

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 V5.1 Patches can be found at

```
submit = runon <cpu #> $command
sysconfigtab settings:
    max_proc_per_user = 4096
    max_threads_per_user = 4096
    per_proc_data_size = 21474836480
```

Standard Performance Evaluation Corporation
info@spec.org
http://www.spec.org
Compaq Computer Corporation
AlphaServer GS320 Model 32 68/1001

SPECint_rate2000 = 218
SPECint_rate_base2000 = 200

Notes/Tuning Information (Continued)

max_per_proc_data_size = 21474836480
per_proc_address_space = 21474836480
max_per_proc_address_space = 21474836480

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.