### CINT2000 Result

**Hewlett-Packard Company**  
**AlphaServer ES80 7/1150**

<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>
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<tbody>
<tr>
<td>164.gzip</td>
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<td>4</td>
<td>240</td>
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<td>168</td>
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<td>176.gcc</td>
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<td>254.gap</td>
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<td>46.8</td>
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</tbody>
</table>

#### Hardware

- **CPU:** Alpha 21364  
- **CPU MHz:** 1150  
- **FPU:** Integrated  
- **CPU(s) enabled:** 4 cores, 4 chips, 1 core/chip  
- **CPU(s) orderable:** 2 to 8  
- **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 per CPU; 512MB RIMMs  
- **Disk Subsystem:** AdvFS  
- **Other Hardware:** None

#### Software

- **Operating System:** Tru64 UNIX V5.1B + IPK  
- **Compiler:** Compaq C V6.5-011-48C5K  
- **Program Analysis Tools V2.0**  
- **Spike V5.2 (510 USG)**  
- **Compaq C++ V6.5-041**  
- **File System:** MFS, 8GB  
- **System State:** Multi-user

#### Notes/Tuning Information

**Baseline C**:  
```
cc -arch ev7 -fast +CFB ONESTEP
```

**Baseline C++**:  
```
cxx -arch ev7 -O2 ONESTEP
```

**Peak**:  
```
All but 252.eon: cc -g3 -arch ev7 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 ev7 -02 -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 -ldensemalloc -non_shared +CFB +IFB
```
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_feedback -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.

vm:

    vm_bigpg_enabled = 1
    vm_bigpg_thresh = 6
    vm_swap_eager = 0
    ubc_maxpercent = 50

proc:

    max_per_proc_address_space = 34359738368
    max_per_proc_data_size = 34359738368
    max_per_proc_stack_size = 34359738368
    max_proc_per_user = 2048
    max_threads_per_user = 4096
    maxusers = 2048
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SPEC_int_rate2000 = 40.3
SPEC_int_rate_base2000 = 36.6

Notes/Tuning Information (Continued)

per_proc_address_space = 34359738368
per_proc_data_size = 34359738368
per_proc_stack_size = 34359738368

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

Processes were bound to CPUs using "runon".

This result was measured on model ES80.
Model ES47 and model ES80 are electronically equivalent.