CINT2000 Result

Hewlett-Packard Company
hp AlphaServer ES45 68/1250

SPECint_rate2000 = 21.3
SPECint_rate_base2000 = 19.7

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Base Copies</th>
<th>Base Runtime</th>
<th>Base Ratio</th>
<th>Copies</th>
<th>Runtime</th>
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<tbody>
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<td>164.gzip</td>
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<td>175.vpr</td>
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<td>176.gcc</td>
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<td>21.0</td>
<td>2</td>
<td>112</td>
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<td>181.mcf</td>
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<td>165</td>
<td>25.3</td>
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<td>186.crafty</td>
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<td>197.parser</td>
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<td>2</td>
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<td>253.perlbmk</td>
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<td>254.gap</td>
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<td>293</td>
<td>23.8</td>
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</tbody>
</table>

Hardware
- CPU: Alpha 21264C
- CPU MHz: 1250
- FPU: Integrated
- CPU(s) enabled: 2 cores, 2 chips, 1 core/chip
- CPU(s) orderable: 1 to 4
- Parallel: No
- Primary Cache: 64KB(I)+64KB(D) on chip
- Secondary Cache: 16MB off chip per CPU
- L3 Cache: None
- Memory: 16GB
- Disk Subsystem: 9 GB SCSI
- Other Hardware: None

Software
- Operating System: Tru64 UNIX T5.1B
- Compiler: Compaq C V6.5-011-48C5K
- Spike V5.2 (506 48C5K)
- Compaq C++ V6.5-028
- File System: ufs
- System State: Multi-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 -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: cxx -arch ev6 -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
256.bzip2: -fast -O4 -non_shared +CFB
300.twolf: -fast -O4 -ldensemalloc -non_shared +CFB +IFB

Standard Performance Evaluation Corporation
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http://www.spec.org
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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"):

```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.

vm:

```bash
vm_bigpg_enabled = 1
vm_bigpg_thresh=16
vm_swap_eager = 0
```

proc:

```bash
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
```
<table>
<thead>
<tr>
<th>Notes/Tuning Information (Continued)</th>
</tr>
</thead>
<tbody>
<tr>
<td>per_proc_data_size = 0x400000000000</td>
</tr>
<tr>
<td>per_proc_stack_size = 0x400000000000</td>
</tr>
</tbody>
</table>

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