Compaq Computer Corporation
AlphaServer ES45 Model 68/1000

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Hardware
- CPU: Alpha 21264C
- CPU MHz: 1000
- FPU: Integrated
- CPU(s) enabled: 1 core, 1 chip, 1 core/chip
- CPU(s) orderable: 1 to 4
- Primary Cache: 64KB(I)+64KB(D) on chip
- Secondary Cache: 8MB off chip per CPU
- L3 Cache: None
- Memory: 32GB
- Disk Subsystem: 2x10000 RPM: BD018635C4 BD0186349B
- 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)
- KAP Fortran V5.4A-196-46B2F
- KAP Fortran 77 V5.4A-196-46B2F
- KAP Fortran V4.3 000607
- KAP Fortran V4.1 980926
- KAP C V4.1 000607
- File System: AdvFs
- 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=-'ar1=4
                   -ur=4' +PFB
          183.equake: cc -fast -xtaso_short -assume
                    restricted_pointers -all -ldensemalloc -none +PFB
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"):

```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.

Portability: galgel: -fixed

Information on UNIX V5.1 Patches can be found at
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.