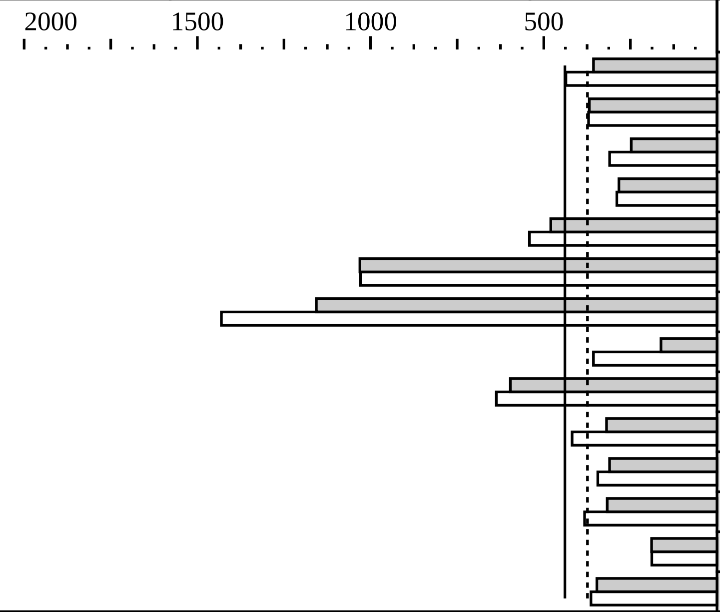
CFP2000 Result

Compaq Computer Corporation
AlphaServer SC40 Cluster (16 Nodes)

SPECfp_rate2000 = 439

SPECfp_rate_base2000 = 374

SPEC license #:	2	Tested by:	Compaq NH	Test date:	Apr-2002	Hardware Avail:	Jan-2002	Software Avail:	Jan-2002



Benchmark	Base Copies	Base Runtime	Base Ratio	Copies	Runtime	Ratio
168.wupwise	64	333	356	64	272	436
171.swim	64	624	369	64	621	371
172.mgrid	64	540	248	64	431	310
173.applu	64	551	283	64	539	289
177.mesa	64	217	480	64	192	541
178.galgel	64	209	1031	64	209	1029
179.art	64	167	1157	64	135	1431
183.equake	64	597	162	64	271	357
187.facerec	64	236	596	64	221	637
188.ammp	64	512	319	64	390	418
189.lucas	64	479	310	64	431	344
191.fma3d	64	492	317	64	408	382
200.sixtrack	64	432	189	64	434	188
301.apsi	64	557	347	64	531	364

Hardware

CPU:	Alpha 21264B
CPU MHz:	833
FPU:	Integrated
CPU(s) enabled:	64 cores, 64 chips, 1 core/chip
CPU(s) orderable:	1 to 4 per node
Parallel:	No
Primary Cache:	64KB(I)+64KB(D) on chip
Secondary Cache:	8MB off chip per CPU
L3 Cache:	None
Other Cache:	None
Memory:	Node 0 = 16GB, Nodes 1-15 = 4GB
Disk Subsystem:	6x18GB 10K RPM disks, in a RAID-0 HSG80 stripe, attached to node 0
Other Hardware:	None

Software

Operating System:	Tru64 UNIX V5.1 Tru64 5.1 Patch Kit 2 - SC V2.0-PK1
Compiler:	Compaq C V6.4-215 Program Analysis Tools V2.0 Spike V5.2 DTK (1.471.2.2 46B5P) Compaq Fortran V5.5-1877-48BBF Compaq Fortran 77 V5.5-1877-48BBF KAP Fortran V4.4 k340504 20010517 KAP Fortran 77 V4.1 980926 KAP C V4.2 k010737s 010515
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='-arl=4
                -ur=4' +PFB
```

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Notes/Tuning Information (Continued)

```
      183.equake: cc -fast -xtaso_short -assume
                  restricted_pointers -all -ldensemalloc -none +PFB
     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
```

Notes/Tuning Information (Continued)

Information on UNIX V5.1 Patches can be found at
http://ftp1.service.digital.com/public/unix/v5.1/

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 have been available at the web site as a production release since October, 2001. The C compiler for this SPEC submission has been available at the same location, as a production release, since August, 2001.

Users are distributed across the nodes of the cluster via:

```
submit= echo "$command" > dobmk; prun -n 1 sh dobmk
command_add_redirect=1
```