



# CFP2000 Result

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Compaq Computer Corporation  
AlphaServer DS20E Model 68/833

SPECfp2000 = 784  
SPECfp\_base2000 = 643

SPEC license #: 2 Tested by: Compaq NH Test date: Jun-2001 Hardware Avail: Jun-2001 Software Avail: Aug-2001

Benchmark	Reference Time	Base Runtime	Base Ratio	Runtime	Ratio	
168.wupwise	1600	295	542	241	665	
171.swim	3100	279	1112	278	1114	
172.mgrid	1800	429	420	290	620	
173.applu	2100	370	568	298	705	
177.mesa	1400	210	667	188	744	
178.galgel	2900	214	1354	216	1342	
179.art	2600	158	1649	126	2061	
183.quake	1300	461	282	185	703	
187.facerec	1900	209	909	197	962	
188.amp	2200	413	533	360	611	
189.lucas	2000	297	672	252	794	
191.fma3d	2100	373	563	288	728	
200.sixtrack	1100	323	341	290	380	
301.apsi	2600	479	543	478	544	

### Hardware

CPU: Alpha 21264B  
CPU MHz: 833  
FPU: Integrated  
CPU(s) enabled: 1 core, 1 chip, 1 core/chip  
CPU(s) orderable: 1 to 2  
Parallel: No  
Primary Cache: 64KB(I)+64KB(D) on chip  
Secondary Cache: 8MB off chip per CPU  
L3 Cache: None  
Other Cache: None  
Memory: 4GB  
Disk Subsystem: 1x18GB  
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)  
Compaq Fortran V5.4A-1472-46B2F  
Compaq Fortran 77 V5.4A-196-46B2F  
KAP Fortran V4.3 000607  
KAP Fortran 77 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='-arl=4  
-ur=4' +PFB  
183.quake: cc -fast -xtaso\_short -assume  
restricted\_pointers -all -ldensemalloc -none +PFB



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## Notes/Tuning Information (Continued)

```

187.facerec: f90 -fast -O4 +PFB
188.amp: 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

Information on UNIX V5.1 Patches can be found at



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## Notes/Tuning Information (Continued)

<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 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.

All of the benchmarks were compiled with the "-v" flag. This flag turns on "verbose mode" when compiling, and has no impact on performance.