



# CFP2000 Result

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Compaq Computer Corporation  
AlphaServer ES45 Model 68/1000

SPECfp2000 = 960  
SPECfp\_base2000 = 776

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

Benchmark	Reference Time	Base Runtime	Base Ratio	Runtime	Ratio	
168.wupwise	1600	243	660	195	822	
171.swim	3100	206	1502	206	1502	
172.mgrid	1800	348	517	225	799	
173.applu	2100	283	741	224	938	
177.mesa	1400	175	800	155	903	
178.galgel	2900	177	1638	178	1628	
179.art	2600	146	1782	119	2183	
183.quake	1300	392	332	144	901	
187.facerec	1900	186	1024	170	1116	
188.amp	2200	372	592	313	702	
189.lucas	2000	225	891	204	980	
191.fma3d	2100	299	703	229	917	
200.sixtrack	1100	274	401	242	455	
301.apsi	2600	405	641	395	658	

**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  
Parallel: No  
Primary Cache: 64KB(I)+64KB(D) on chip  
Secondary Cache: 8MB off chip per CPU  
L3 Cache: None  
Other Cache: None  
Memory: 32GB  
Disk Subsystem: 2x 10000 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)  
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://ftpl.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.