



# CFP2000 Result

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Compaq Computer Corporation  
AlphaServer ES45 Model 68/1000

SPECfp\_rate2000 = 11.1  
SPECfp\_rate\_base2000 = 9.00

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

Benchmark	Base Copies	Base Runtime	Base Ratio	Copies	Runtime	Ratio
168.wupwise	1	243	7.65	1	195	9.54
171.swim	1	206	17.4	1	206	17.4
172.mgrid	1	348	5.99	1	225	9.26
173.applu	1	283	8.60	1	224	10.9
177.mesa	1	175	9.28	1	155	10.5
178.galgel	1	177	19.0	1	178	18.9
179.art	1	146	20.7	1	119	25.3
183.quake	1	392	3.85	1	144	10.4
187.facerec	1	186	11.9	1	170	12.9
188.amp	1	372	6.87	1	313	8.14
189.lucas	1	225	10.3	1	204	11.4
191.fma3d	1	299	8.15	1	229	10.6
200.sixtrack	1	274	4.65	1	242	5.28
301.apsi	1	405	7.44	1	395	7.63

### 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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```
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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<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.