



# CFP2000 Result

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Hewlett-Packard Company  
AlphaServer ES47 7/1150

SPECfp\_rate2000 = 34.2  
SPECfp\_rate\_base2000 = 26.0

SPEC license #: 2 | Tested by: HP | Test date: Jun-2004 | Hardware Avail: Jul-2004 | Software Avail: Jul-2004

Benchmark	Base Copies	Base Runtime	Base Ratio	Copies	Runtime	Ratio
168.wupwise	2	184	20.2	2	76.0	48.8
171.swim	2	87.1	82.6	2	87.1	82.6
172.mgrid	2	254	16.4	2	169	24.7
173.applu	2	140	34.8	2	130	37.6
177.mesa	2	153	21.2	2	134	24.2
178.galgel	2	139	48.5	2	137	49.0
179.art	2	130	46.3	2	81.7	73.8
183.equake	2	248	12.2	2	82.7	36.5
187.facerec	2	173	25.5	2	154	28.6
188.amp	2	300	17.0	2	261	19.6
189.lucas	2	131	35.5	2	120	38.6
191.fma3d	2	206	23.6	2	156	31.3
200.sixtrack	2	228	11.2	2	210	12.1
301.apsi	2	209	28.8	2	197	30.6

### Hardware

CPU: Alpha 21364  
 CPU MHz: 1150  
 FPU: Integrated  
 CPU(s) enabled: 2 cores, 2 chips, 1 core/chip  
 CPU(s) orderable: 2 to 4  
 Parallel: No  
 Primary Cache: 64KB(I)+64KB(D) on chip  
 Secondary Cache: 1.75MB on chip per CPU  
 L3 Cache: None  
 Other Cache: None  
 Memory: 4GB per CPU; 512MB RIMMs  
 Disk Subsystem: AdvFS  
 Other Hardware: None

### Software

Operating System: Tru64 UNIX V5.1B + IPK  
 Compiler: Compaq C V6.5-011-48C5K  
 Program Analysis Tools V2.0  
 Spike V5.2 (510 USG)  
 HP Fortran V5.5A-3548-48D88  
 HP Fortran 77 V5.5A-3548-48D88  
 KAP Fortran V4.3 000607  
 KAP Fortran 77 V4.1 980926  
 KAP C V4.1 000607  
 File System: MFS, 8GB  
 System State: Multi-user

## Notes/Tuning Information

Baseline C: cc -arch ev7 -fast -O4 ONESTEP  
 Fortran: f90 -arch ev7 -fast -O5 ONESTEP

### Peak:

All use -g3 -arch ev7 -non\_shared ONESTEP  
 except these (which use only the tunings shown below):  
 173.applu 188.amp 191.fma3d  
 Individual benchmark tuning:  
 168.wupwise: kf77 -call\_shared -inline all -tune ev67  
 -unroll 12 -automatic -align commons -arch ev67  
 -fkapargs=' -aggressive=c -fuse  
 -fuselevel=1 -so=2 -r=1 -o=1 -interleave  
 -ur=6 -ur2=060 ' +PFB  
 171.swim: same as base  
 172.mgrid: kf90 -call\_shared -arch generic -O5 -inline  
 manual -nopipeline -transform\_loops -unroll 9 -automatic



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```

-fkparms='-aggressive=a -fuse -interleave
-ur=2 -ur3=5 -cachesize=128,16000 ' +PFB
173.applu: kf90 -O5 -transform_loops
-fkparms='-o=0 -nointerleave -ur=14
-ur2=260 -ur3=18' +PFB
177.mesa: kcc -fast -O4 +CFB +IFB
178.galgel: f90 -O5 -fast -unroll 5 -automatic
179.art: kcc -assume whole_program -ldensemalloc
-call_shared -assume restricted_pointers
-unroll 16 -inline none -ckparms='
-fuse -fuselevel=1 -ur=3' +PFB
183.equake: cc -call_shared -arch generic -fast -O4
-ldensemalloc -assume restricted_pointers
-inline speed -unroll 13 -xtaso_short +PFB
187.facerec: f90 -O4 -nopipeline -inline all
-non_shared -speculate all -unroll 7
-automatic -assume accuracy_sensitive
-math_library fast +IFB
188.amp: cc -arch host -O4 -ifo -assume nomath_errno
-assume trusted_short_alignment -fp_reorder
-readonly_strings -ldensemalloc -xtaso_short
-assume restricted_pointers -unroll 9
-inline speed +CFB +IFB +PFB
189.lucas: kf90 -O5 -fkparms='-ur=1' +PFB
191.fma3d: kf90 -O4 -transform_loops -fkparms='-cachesize=128,16000 ' +PFB
200.sixtrack: f90 -fast -O5 -assume accuracy_sensitive
-notransform_loops +PFB
301.apsi: kf90 -O5 -inline none -call_shared -speculate all
-align commons -fkparms=' -aggressive=ab
-tune=ev5 -fuse -ur=1 -ur2=60 -ur3=20
-cachesize=128,16000'

```

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_feedback -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}

```



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## Notes/Tuning Information (Continued)

+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.

vm:

```
vm_bigpg_enabled = 1
vm_bigpg_thresh = 6
vm_swap_eager = 0
ubc_maxpercent = 50
```

proc:

```
max_per_proc_address_space = 34359738368
max_per_proc_data_size = 34359738368
max_per_proc_stack_size = 34359738368
max_proc_per_user = 2048
max_threads_per_user = 4096
maxusers = 2048
per_proc_address_space = 34359738368
per_proc_data_size = 34359738368
per_proc_stack_size = 34359738368
```

Portability: galgel: -fixed

Information on UNIX V5.1B Patches can be found at <http://ftpl.service.digital.com/public/unix/v5.1b/>

Processes were bound to CPUs using "runon".

This result was measured on model ES80.  
Model ES47 and model ES80 are electronically equivalent.