



# CFP2000 Result

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Hewlett-Packard Company  
hp AlphaServer GS160 68/1224

SPECfp2000 = 1014  
SPECfp\_base2000 = 747

SPEC license #: 2 | Tested by: HP | Test date: Sep-2002 | Hardware Avail: Aug-2002 | Software Avail: Dec-2002

Benchmark	Reference Time	Base Runtime	Base Ratio	Runtime	Ratio	
168.wupwise	1600	291	550	145	1106	
171.swim	3100	331	937	331	937	
172.mgrid	1800	486	370	298	605	
173.applu	2100	318	660	283	741	
177.mesa	1400	143	977	118	1188	
178.galgel	2900	127	2280	124	2341	
179.art	2600	104	2502	80.4	3235	
183.earthquake	1300	659	197	180	720	
187.facerec	1900	136	1397	107	1769	
188.ammp	2200	280	785	209	1051	
189.lucas	2000	327	612	258	774	
191.fma3d	2100	453	464	349	602	
200.sixtrack	1100	222	496	203	543	
301.apsi	2600	329	791	304	855	

### Hardware

CPU: Alpha 21264C  
 CPU MHz: 1224  
 FPU: Integrated  
 CPU(s) enabled: 1 core, 1 chip, 1 core/chip  
 CPU(s) orderable: 1 to 16  
 Parallel: No  
 Primary Cache: 64KB(I)+64KB(D) on chip  
 Secondary Cache: 16MB off chip per CPU  
 L3 Cache: None  
 Other Cache: None  
 Memory: 16GB  
 Disk Subsystem: 9GB Hard Drive  
 Other Hardware: None

### Software

Operating System: Compaq Tru64 UNIX T5.1B-6 (Rev. 2610)  
 Compiler: Compaq C V6.5-011-48C5K  
 Spike V5.2 (506 48C5K)  
 Compaq Fortran V5.5-1877-48BBF  
 Compaq Fortran 77 V5.5-1877-48BBF  
 KAP Fortran V4.4 k340504 20010517  
 KAP Fortran 77 V4.1 k310440 980926  
 KAP C V4.2 k010737S 010515  
 File System: ufs  
 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 -arch ev6 -non\_shared ONESTEP (except applu and ammp)

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 -unroll 9 -automatic -transform\_loops  
 -fkapargs=' -aggressive=a -fuse -interleave  
 -ur=2 -ur3=5 -cachesize=128,16000 ' +PFB



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## Notes/Tuning Information (Continued)

```

173.applu: kf90 -O5 -transform_loops
          -fkapargs=' -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 -ckapargs='
          -fuse -fuselevel=1 -ur=3' +PFB
183.quake: 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.ammp: 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 -fkapargs='-ur=1' +PFB
191.fma3d: kf90 -O4 -transform_loops -fkapargs='-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 -fkapargs=' -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 -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



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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=16
vm_swap_eager = 0
```

proc:

```
max_per_proc_address_space = 0x4000000000
max_per_proc_data_size = 0x4000000000
max_per_proc_stack_size = 0x4000000000
max_proc_per_user = 2048
max_threads_per_user = 0
maxusers = 16384
per_proc_address_space = 0x4000000000
per_proc_data_size = 0x4000000000
per_proc_stack_size = 0x4000000000
```

Portability: galgel: -fixed  
submit = runon cpu

System is single QBB (4-cpu) with only 1 cpu enabled at console