



CFP2000 Result

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Hewlett-Packard Company
AlphaServer ES47 7/1000

SPECfp2000 = 1288
SPECfp_base2000 = 975

SPEC license #: 2 Tested by: HP Test date: Dec-2002 Hardware Avail: Jan-2003 Software Avail: Jan-2003

| Benchmark | Reference Time | Base Runtime | Base Ratio | Runtime | Ratio | |
|----------------|----------------|--------------|------------|---------|-------|--|
| 168.wupwise | 1600 | 210 | 760 | 86.7 | 1846 | |
| 171.swim | 3100 | 99.1 | 3130 | 99.1 | 3130 | |
| 172.mgrid | 1800 | 293 | 614 | 192 | 938 | |
| 173.applu | 2100 | 159 | 1318 | 156 | 1345 | |
| 177.mesa | 1400 | 173 | 808 | 145 | 965 | |
| 178.galgel | 2900 | 158 | 1830 | 157 | 1851 | |
| 179.art | 2600 | 149 | 1741 | 92.4 | 2814 | |
| 183.earthquake | 1300 | 290 | 449 | 94.2 | 1381 | |
| 187.facerec | 1900 | 198 | 961 | 178 | 1069 | |
| 188.amp | 2200 | 345 | 638 | 299 | 735 | |
| 189.lucas | 2000 | 150 | 1331 | 138 | 1453 | |
| 191.fma3d | 2100 | 238 | 883 | 177 | 1186 | |
| 200.sixtrack | 1100 | 272 | 404 | 252 | 437 | |
| 301.apsi | 2600 | 241 | 1078 | 225 | 1158 | |

Hardware

CPU: Alpha 21364
CPU MHz: 1000
FPU: Integrated
CPU(s) enabled: 1 core, 1 chip, 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
Disk Subsystem: 36GB SCSI
Other Hardware: None

Software

Operating System: Tru64 UNIX V5.1B (Rev. 2650)
+IPK
Compiler: Compaq C V6.5-011-48C5K
Spike V5.2 (506A)
Compaq Fortran V5.5-2602-48C8L
Compaq Fortran 77 V5.5-2602-48C8L
KAP Fortran V4.3 k3105171 000607
KAP Fortran 77 V4.1 k310440 980926
KAP C V4.1 k010726 000607
File System: ufs
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 -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



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Notes/Tuning Information (Continued)

```

manual -nopipeline -transform_loops -unroll 9 -automatic
-fkapargs='-aggressive=a -fuse -interleave
-ur=2 -ur3=5 -cachesize=128,16000 ' +PFB
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 -arch ev6 -non_shared -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"):



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Notes/Tuning Information (Continued)

```
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.

vm:

```
vm_bigpg_enabled = 1
vm_bigpg_thresh=16
vm_swap_eager = 0
```

proc:

```
max_per_proc_address_space = 0x40000000000
max_per_proc_data_size = 0x40000000000
max_per_proc_stack_size = 0x40000000000
max_proc_per_user = 2048
max_threads_per_user = 0
maxusers = 16384
per_proc_address_space = 0x40000000000
per_proc_data_size = 0x40000000000
per_proc_stack_size = 0x40000000000
```

Portability: galgel: -fixed

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

In the ES47, there are two cpus per shelf. Each cpu has its own 4GB of memory. Neither of the cpus can be physically removed. For 1 cpu results measured on a 2 cpu system, one cpu was turned off at boot time using the /etc/sysconfigtab setting "cpu_enabled_mask=0". The cpu's 4GB of memory was also physically removed.