

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Base Copies</th>
<th>Base Runtime</th>
<th>Base Ratio</th>
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<th>Ratio</th>
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<tbody>
<tr>
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<td>140</td>
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<td>64</td>
<td>142</td>
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<td>64</td>
<td>244</td>
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<td>64</td>
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</tr>
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</table>

**Hardware**

- CPU: Alpha 21364
- CPU MHz: 1150
- FPU: Integrated
- CPU(s) enabled: 64 cores, 64 chips, 1 core/chip
- CPU(s) orderable: 2 to 64
- 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: 256GB (64 * 10 * 512MB RIMMs, both controllers populated)
- Disk Subsystem: MFS 16GB (Memory File System)
- Other Hardware: None

**Software**

- Operating System: Tru64 UNIX V5.1B (Rev. 2650) +PK3
- Compiler: Compaq C V6.5-011-48C5K
- Program Analysis Tools V2.0
- Spike V5.2 (509 DTK)
- Compaq C++ V6.5-035
- File System: MFS 16GB
- System State: Multi-user

**Notes/Tuning Information**

Baseline C : cc -arch ev7 -fast +CFB ONESTEP  
C++: cxx -arch ev7 -O2 ONESTEP

Peak:

- 164.gzip: cc -g3 -arch ev6 ONESTEP -fast -O4 -non_shared +CFB
- 175.vpr: cc -g3 -arch ev7 ONESTEP -fast -O4 -assume restricted_pointers +CFB
- 176.gcc: cc -g3 -arch ev7 ONESTEP -fast -O4 -xtaso_short -all -ldensemalloc -none +CFB +IFB
- 181.mcf: cc -g3 -arch ev7 ONESTEP -fast -xtaso_short +CFB +IFB +PFB
- 186.crafty: same as base (cc...)
- 197.parser: cc -g3 -arch ev7 ONESTEP -fast -O4 -xtaso_short -non_shared +CFB
- 252.eon: cxx -arch ev7 ONESTEP -O2 -all -ldensemalloc -none
- 253.perlbmk: cc -g3 -arch ev7 ONESTEP -fast -non_shared +CFB +IFB
- 254.gap: cc -g3 -arch ev6 ONESTEP -fast -O4 -non_shared +CFB +IFB
- 255.vortex: cc -g3 -arch ev6 ONESTEP -fast -non_shared +CFB +IFB
- 256.bzip2: cc -g3 -arch ev6 ONESTEP -fast -O4 -non_shared +CFB
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Notes/Tuning Information (Continued)

300.twolf: cc -g3 -arch ev6 ONESTEP -fast -O4
         -ldensemalloc -non_shared +CFB +IFB

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.

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
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SPECint_rate2000 = 632
SPECint_rate_base2000 = 573

Notes/Tuning Information (Continued)

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: gcc: -Dalloca=__builtin_alloca; crafty: -DALPHA
perlbench: -DSPEC_CPU2000_DUNIX; vortex: -DSPEC_CPU2000_LP64
gap: -DSYS_HAS_CALLOC_PROTO -DSYS_IS_BSD -DSYS_HAS_IOCTL_PROTO -DSPEC_CPU2000_LP64

Information on UNIX V5.1B Patches can be found at

Processes were bound to CPUs using "runon".