SPEC Benchmarks

Must buy the set of benchmarks.
Tuning of operating system and compiler allowed.
Changing of code not allowed, must trust vendor.
Cache sizes and memory speed and size should be stated.
Integer set of 8 programs in C, one number reported.
Floating point set of 10 programs in Fortran, one number reported.

go	Artificial intelligence; plays the game of Go
m88ksim	Motorola 88K chip simulator; runs test program
gcc	The Gnu C compiler generating SPARC code
compress	Compresses and decompresses file in memory
li	Lisp interpreter
ijpeg	Graphic compression and decompression
perl	Manipulates strings and prime numbers in the special-purpose programming l
vortex	A database program
tomcatv	A mesh generation program
swim	Shallow water model with 513 x 513 grid
su2cor	Quantum physics; Monte Carlo simulation
hydro2d	Astrophysics; Hydrodynamic Naiver Stokes equations
mgrid	Multigrid solver in 3-D potential field
applu	Parabolic/elliptic partial differential equations
turb3d	Simulates isotropic, homogeneous turbulence in a cube
apsi	Solves problems regarding temperature, wind velocity, and distribution of pollu
fpppp	Quantum chemistry
wave5	Plasma physics; electromagnetic particle simulation

$$\text{ARITHMETIC MEAN} = \frac{1}{N} \sum_{i=1}^{N} TIME_i$$

$$\text{GEOMETRIC MEAN} = \sqrt[N]{\prod_{i=1}^{N} TIME_i}$$

3-3
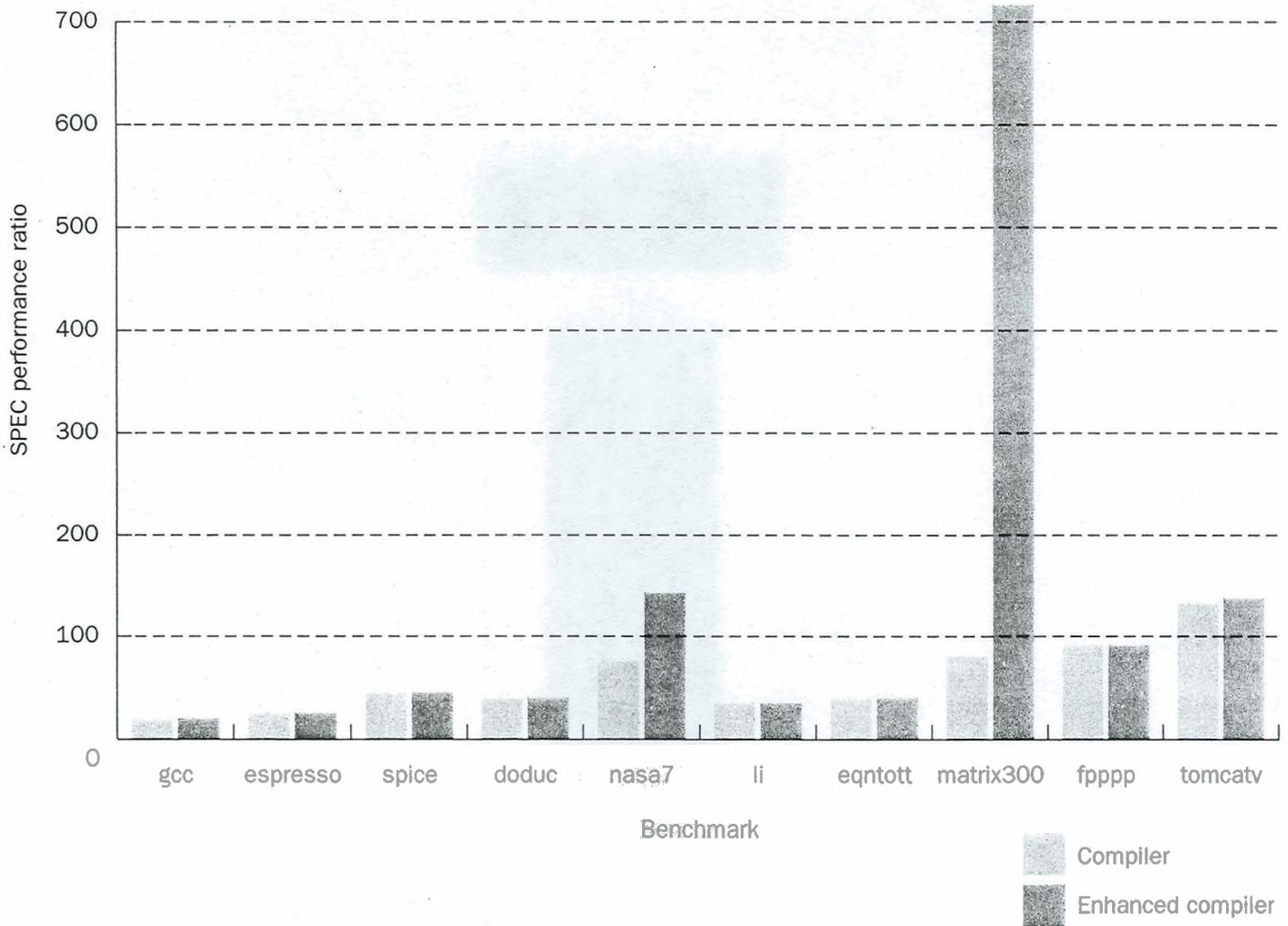
SPEC89 performance ratios for the IBM Powerstation 550 using two different compilers. The higher numbers on matrix300 (and nasa7) result from applying an optimization technique to these two kernel-oriented benchmarks. For the enhanced compiler, special flags are passed to the compiler for both nasa7 and matrix300, which are not used for the other benchmarks. In both programs, the compiler transforms the program by blocking the matrix operations that are in the inner loops. These blocking transformations substantially lower the number of memory accesses required and transform the inner loops from having high cache miss rates to having almost negligible cache miss rates. Interestingly, the original motivation for including matrix300 was to exercise the computer's memory system; however, this optimization basically reorganizes the program to minimize memory usage. This data appeared in two SPEC reports during the fall and winter of 1991. The susceptibility of this benchmark to compiler optimization, and the relatively uninteresting behavior of the benchmark after optimization, led to the elimination of matrix300 from the 1992 release of the SPEC benchmarks.

be easily ported to a machine, but this is no longer true. Using small programs as benchmarks was an attempt to make fair comparisons among different machines, but use of anything less than real programs after initial design studies is likely to give misleading results and lure the designer astray.

3-4
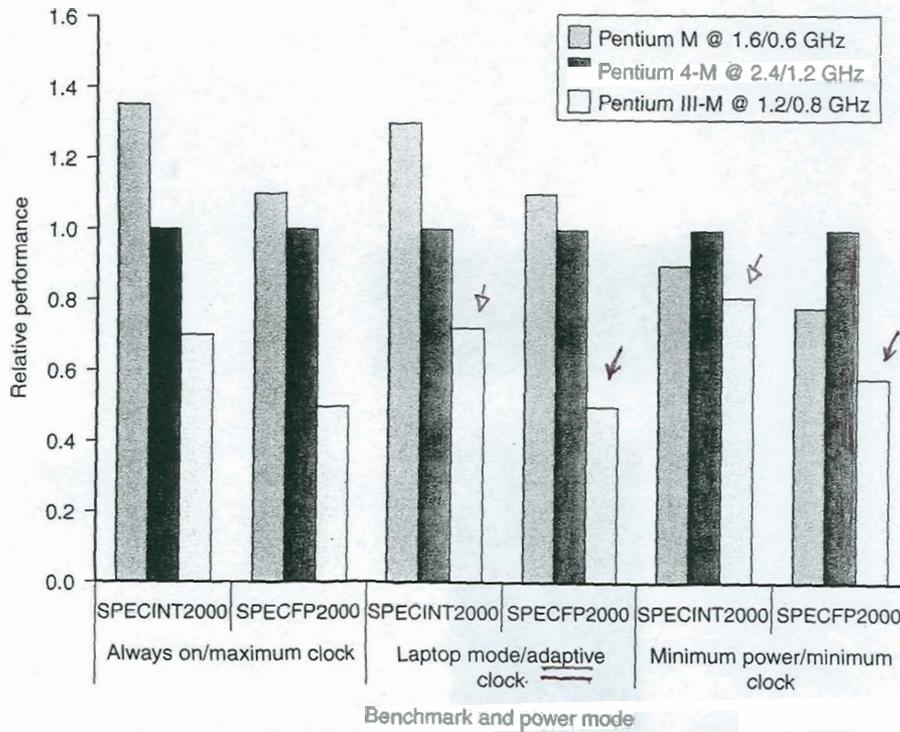
Relative performance of three Intel processors on SPECINT2000 and SPECFP2000 in three different modes. Each processor operates at two different clock rates, listed in the legend.

A FASTER CLOCKS NEEDS MORE POWER WHEN EVERY THING ELSE STAYS THE SAME

SMALLER FEATURE SIZE NEEDS LESS POWER WHEN EVERY THING ELSE STAYS THE SAME

ADAPTIVE (AUTOMATIC) IS NOT ALWAYS BETTER THAN MANUAL CONTROL

3-5