

---

CS - 89 - 85

---

# **Performance of Various Computers Using Standard Linear Equations Software**

Jack J. Dongarra\*

Electrical Engineering and Computer Science Department  
University of Tennessee  
Knoxville, TN 37996-1301

Computer Science and Mathematics Division  
Oak Ridge National Laboratory  
Oak Ridge, TN 37831

University of Manchester

CS - 89 - 85

February 5, 2013

\* Electronic mail address: [dongarra@eecs.utk.edu](mailto:dongarra@eecs.utk.edu).

An up-to-date version of this report can be found at <http://www.netlib.org/benchmark/performance.ps>  
This work was supported in part by the Applied Mathematical Sciences subprogram of the Office of Energy Research, U.S. Department of Energy, under Contract DE-AC05-96OR22464, and in part by the Science Alliance a state supported program at the University of Tennessee.

# Performance of Various Computers Using Standard Linear Equations Software

*Jack J. Dongarra*

Electrical Engineering and Computer Science Department  
University of Tennessee  
Knoxville, TN 37996-1301

Computer Science and Mathematics Division  
Oak Ridge National Laboratory  
Oak Ridge, TN 37831

University of Manchester

February 5, 2013

## Abstract

This report compares the performance of different computer systems in solving dense systems of linear equations. The comparison involves approximately a hundred computers, ranging from the Earth Simulator to personal computers.

## 1. Introduction and Objectives

The timing information presented here should in no way be used to judge the overall performance of a computer system. The results reflect only one problem area: solving dense systems of equations.

This report provides performance information on a wide assortment of computers ranging from the home-used PC up to the most powerful supercomputers. The information has been collected over a period of time and will undergo change as new machines are added and as hardware and software systems improve. The programs used to generate this data can easily be obtained over the Internet. While we make every attempt to verify the results obtained from users and vendors, errors are bound to exist and should be brought to our attention. We encourage users to obtain the programs and run the routines on their machines, reporting any discrepancies with the numbers listed here.

The first table reports three numbers for each machine listed (in some cases the numbers are missing because of lack of data). All performance numbers reflect an accuracy of full precision (usually 64-bit), unless noted. On some machines full precision may be single precision, such as the Cray, or double precision, such as the IBM. The first number is for the LINPACK [1] benchmark program for a matrix of order 100 in a Fortran environment. The second number is for solving a system of equations of order 1000, with no restriction on the method or its implementation. The third number is the theoretical peak performance of the machine.

LINPACK programs can be characterized as having a high percentage of floating-point arithmetic operations. The routines involved in this timing study, SGEFA and SGESL, use column-oriented algorithms. That is, the programs usually reference array elements sequentially down a column, not across a row. Column orientation is important in increasing efficiency because of the way Fortran stores arrays. Most floating-point operations in LINPACK take place in a set of subprograms, the Basic Linear Algebra Subprograms (BLAS) [3], which are called

repeatedly throughout the calculation. These BLAS, referred to now as Level 1 BLAS, reference one-dimensional arrays, rather than two-dimensional arrays.

In the first case, the problem size is relatively small (order 100), and no changes were made to the LINPACK software. Moreover, no attempt was made to use special hardware features or to exploit vector capabilities or multiple processors. (The compilers on some machines may, of course, generate optimized code that itself accesses special features.) Thus, many high-performance machines may not have reached their asymptotic execution rates.

In the second case, the problem size is larger (matrix of order 1000), and modifying or replacing the algorithm and software was permitted to achieve as high an execution rate as possible. Thus, the hardware had more opportunity for reaching near-asymptotic rates. An important constraint, however, was that all optimized programs maintain the same relative accuracy as standard techniques, such as Gaussian elimination used in LINPACK.

Furthermore, the driver program (supplied with the LINPACK benchmark) had to be run to ensure that the same problem is solved. The driver program sets up the matrix, calls the routines to solve the problem, verifies that the answers are correct, and computes the total number of operations to solve the problem (independent of the method) as  $2n^3/3 + 2n^2$ , where  $n = 1000$ .

The last column is based not on an actual program run, but on a paper computation to determine the theoretical peak Mflop/s rate for the machine. This is the number manufacturers often cite; it represents an upper bound on performance. That is, the manufacturer guarantees that programs will not exceed this rate—sort of a “speed of light” for a given computer.

The theoretical peak performance is determined by counting the number of floating-point additions and multiplications (in full precision) that can be completed during a period of time, usually the cycle time of the machine. As an example, the Cray Y-MP/8 has a cycle time of 6 ns. During a cycle the results of both an addition and a multiplication can be completed  $\frac{2 \text{ operations}}{1 \text{ cycle}} * \frac{1 \text{ cycle}}{6 \text{ ns}} = 333 \text{ Mflop/s}$  on a single processor. On the Cray Y-MP/8 there are 8 processors; thus, the peak performance is 2667 Mflop/s.

The information in this report is presented to users to provide a range of performance for the various computers and to show the effects of typical Fortran programming and the results that can be obtained through careful programming. The maximum rate of execution is given for comparison. The column labeled “Computer” gives the name of the computer hardware on which the program was run. In some cases we have indicated the number of processors in the configuration and, in some cases, the cycle time of the processor in nanoseconds.

The column labeled “LINPACK Benchmark” gives the operating system and compiler used. The run was based on two routines from LINPACK: SGEFA and SGESL were used for single precision, and DGEFA and DGESL were used for double precision. These routines perform standard LU decomposition with partial pivoting and backsubstitution. The timing was done on a matrix of order 100, where no changes are allowed to the Fortran programs.

The column labeled “TPP” (Toward Peak Performance) gives the results of hand optimization; the problem size was of order 1000.

The final column labeled “Theoretical Peak” gives the maximum rate of execution based on the cycle time of the hardware.

The same matrix was used to solve the system of equations. The results were checked

for accuracy by calculating a residual for the problem  $\|Ax - b\| / (\|A\| \|x\|)$ . The residual must be less than  $n\varepsilon$  where  $n$  is the order of the matrix and  $\varepsilon$  is the machine precision, on IEEE computers this is  $2^{-53}$ .

The term Mflop/s, used as a rate of execution, stands for millions of floating-point operations completed per second. For solving a system of  $n$  equations,  $2/3n^3 + 2n^2$  operations are performed (we count both additions and multiplications).

The information in the tables was compiled over a period of time. Subsequent systems software and hardware changes may alter the timings to some extent.

One further note: The following tables should not be taken too seriously. In multiprogramming environments it is often difficult to reliably measure the execution time of a single program. We trust that anyone actually evaluating machines and operating systems will gather more reliable and more representative data.

## 2. A Look at Parallel Processing

While collecting the data presented in Table 1, we were able to experiment with parallel processing on a number of computer systems. For these experiments, we used either the standard LINPACK algorithm or an algorithm based on matrix-matrix [2] techniques. In the case of the LINPACK algorithm, the loop around the SAXPY can be performed in parallel. In the matrix-matrix implementation the matrix product can be split into submatrices and performed in parallel. In either case, the parallelism follows a simple fork-and-join model where each processor gets some number of operations to perform.

For a problem of size 1000, we expect a high degree of parallelism. Thus, it is not surprising that we get such high efficiency (see Table 2). The actual percentage of parallelism, of course, depends on the algorithm and on the speed of the uniprocessor on the parallel part relative to the speed of the uniprocessor on the non-parallel part.

## 3. Highly Parallel Computing

With the arrival of massively parallel computers there is a need to benchmark such machines on problems that make sense. The problem size and rule for the runs reflected in the Tables 1 and 2 do not permit massively parallel computers to demonstrate their potential performance. The basic flaw is the problem size is too small. To provide a forum for comparing such machines the following benchmark was run on a number of massively parallel machines. The benchmark involves solving a system of linear equations (as was done in Tables 1 and 2). However in this case, the problem size is allowed to increase and the performance numbers reflect the largest problem run on the machine.

The ground rules are as follows: Solve systems of linear equations by some method, allow the size of the problem to vary, and measure the execution time for each size problem. In computing the floating-point execution rate, use  $2n^3/3 + 2n^2$  operations independent of the actual method used. (If you choose to do Gaussian Elimination, partial pivoting must be used.) Compute and report a residual for the accuracy of solution as  $\|Ax - b\| / (\|A\| \|x\|)$ . The residual must be less than  $n\varepsilon$  where  $n$  is the order of the matrix and  $\varepsilon$  is the machine precision, on IEEE computers this is  $2^{-53}$ .

The columns in Table 3 are defined as follows:

$R_{max}$  the performance in Gflop/s for the largest problem run on a machine.

$N_{max}$  the size of the largest problem run on a machine.

$N_{1/2}$  the size where half the  $R_{max}$  execution rate is achieved.

$R_{peak}$  the theoretical peak performance in Gflop/s for the machine.

In addition, the number of processors and the cycle time is listed.

## 4. Obtaining the Software and Running the Benchmarks

The software used to generate the data for this report can be obtained by sending electronic mail to *netlib@ornl.gov*.

### 1. LINPACK Benchmark

The first results listed in Table 1 involved no hand optimization of the LINPACK benchmark.

To receive the single-precision software for this benchmark, in the mail message to *netlib@ornl.gov* type:

*send linpacks from benchmark .*

To receive the double-precision software for the LINPACK Benchmark, type:

*send linpackd from benchmark .*

To run the timing programs, one must supply a real function SECOND which returns the time in seconds from some fixed starting time.

There is only one ground rule for running this benchmark:

- No changes are to be made to the Fortran source code, not even changes in the comments.

The compiler and operating system must be generally available. Results from a beta version of a compiler are allowed, however the standard compiler results must also be listed.

### 2. Toward Peak Performance

The second set of results listed in Table 1 reflected user optimization of the software.

To receive the single-precision software for the column labeled "Toward Peak Performance," in the mail message *netlib@ornl.gov* type:

*send 1000s from benchmark*

To receive the double-precision software, type:

*send 1000d from benchmark*

The ground rules for running this benchmark are as follows:

- Replacements or modifications are allowed in the routine LU.
- The user is allowed to supply any method for the solution of the system of equations.
- The Mflop/s rate will be computed based on the operation count for LU decomposition.
- In all cases, the main driver routine, with its test matrix generator and residual check, must be used.

This report is updated from time to time. A fax copy of this report can be supplied, for details contact the author. To obtain a Postscript copy of the report send mail to *netlib@ornl.gov* and in the message type:

*send performance from benchmark.*

To have results verified, please send the output of the runs to

Jack Dongarra

Computer Science Department  
University of Tennessee  
Knoxville, TN 37996-1301  
Email: dongarra@cs.utk.edu

There is a "Frequently Asked Questions" file for the Linpack benchmark and Top500 at <http://www.netlib.org/utk/people/JackDongarra/faq-linpack.html>.

Table 1: Performance in Solving a System of Linear Equations

| Computer   | “LINPACK Benchmark”<br>OS/Compiler   | n=100<br>Mflop/s | “TPP”<br>Best<br>Effort<br>n=1000<br>Mflop/s | “Theoretical<br>Peak”<br>Mflop/s |
|--|--|------------------|--|----------------------------------|
| Intel Pentium Woodcrest (1 core, 3 GHz)  | ifort -parallel -xT -O3 -ipo<br>-mP2OPT_hlo_loop_unroll_factor=2           | 3018             | 6542   | 12000                            |
| Intel Pentium Woodcrest (1 core, 2.67 GHz)                                     | ifort -O3 -ipo -xT -r8 -i8   | 2636             |  | 10680                            |
| Intel Core 2 Q6600 Kentsfield) (4 core, 2.4 GHz)                               |  |                  | 13130  | 38400                            |
| Intel Core 2 Q6600 Kentsfield) (3 core, 2.4 GHz)                               |  |                  | 11980  | 28800                            |
| Intel Core 2 Q6600 Kentsfield) (2 core, 2.4 GHz)                               |  |                  | 9669   | 19200                            |
| Intel Core 2 Q6600 Kentsfield) (1 core, 2.4 GHz)                               | ifort -O3 -xT -ipo -static -i8<br>-mP2OPT_hlo_loop_unroll_factor=2         | 2426             | 7519   | 9600                             |
| NEC SX-8/8 (8proc. 2 GHz)  |  |                  | 75140  | 128000                           |
| NEC SX-8/4 (4proc. 2 GHz)  |  |                  | 43690  | 64000                            |
| NEC SX-8/2 (2proc. 2 GHz)  |  |                  | 25060  | 32000                            |
| NEC SX-8/1 (1proc. 2 GHz)  | -pi -Wf"-prob_use"   | 2177             | 14960  | 16000                            |
| HCL Infiniti Global Line 4700 HW (4 proc Intel Xeon 3.16 GHz)                  | ifort -fast -r8 -align   | 1892             | 9917   | 25280                            |
| HP ProLiant BL20p G3 (2 proc (1 cpu core per single chip), 3.8GHz Intel Xeon)  |  |                  | 8185   | 14800                            |
| HP ProLiant BL20p G3 (1 proc (1 cpu core per single chip), 3.8GHz Intel Xeon)  | SuSE SLES 9 / Intel 8.1 Compile flags:<br>-fpp -xP -O3 -openmp -align -ipo | 1852             | 4851   | 7400                             |
| HP ProLiant DL360 G4 (2 proc, 3.6GHz/1MB Xeon)                                 |  |                  | 7031   | 14400                            |
| HP ProLiant DL360 G4 (1 proc, 3.6GHz/1MB Xeon)                                 | Intel 8.1 -fpp -xW -O2 -unroll -align<br>-openmp                           | 1821             | 4220   | 7200                             |
| HP ProLiant DL360 G4p (2 proc (1 cpu core per single chip), 3.8GHz Intel Xeon) |  |                  | 8155   | 14800                            |
| HP ProLiant DL360 G4p (1 proc (1 cpu core per single chip), 3.8GHz Intel Xeon) | SuSE SLES 9 / Intel 8.1 Compile flags:<br>-fpp -xP -O3 -openmp -align -ipo | 1861             | 4860   | 7400                             |
| HP ProLiant DL140 G2 (2 proc (1 cpu core per single chip), 3.8GHz Intel Xeon)  |  |                  | 8163   | 14800                            |
| HP ProLiant DL140 G2 (1 proc (1 cpu core per single chip), 3.8GHz Intel Xeon)  | SuSE SLES 9 / Intel 8.1 Compile flags:<br>-fpp -xP -O3 -openmp -align -ipo | 1861             | 4858   | 7400                             |
| HP ProLiant ML370 G4 (2 proc (1 cpu core per single chip), 3.8GHz Intel Xeon)  |  |                  | 8111   | 14800                            |
| HP ProLiant ML370 G4 (1 proc (1 cpu core per single chip), 3.8GHz Intel Xeon)  | SuSE SLES 9 / Intel 8.1 Compile flags:<br>-fpp -xP -O3 -openmp -align -ipo | 1851             | 4835   | 7400                             |
| HP ProLiant DL380 G4 (2 proc (1 cpu core per single chip), 3.8GHz Intel Xeon)  |  |                  | 8198   | 14800                            |
| HP ProLiant DL380 G4 (1 proc (1 cpu core per single chip), 3.8GHz Intel Xeon)  | SuSE SLES 9 / Intel 8.1 Compile flags:<br>-fpp -xP -O3 -openmp -align -ipo | 1851             | 4882   | 7400                             |
| Intel Pentium Nocona 3.6 GHz   | ifort -O3 -xP -ipo -align -r8  | 1803             | 3385   | 7200                             |
| Intel xeon 64 (dual) 3.6 GHz   | ifort -fast -r8 -align.  | 1779             | 7278   | 14400                            |
| IBM eServer p5 575 (8 proc, 1.9 GHz POWER5)                                    |  |                  | 34570  | 60800                            |
| IBM eServer p5 575 (1 proc, 1.9 GHz POWER5)                                    | -O3 -qarch=pwr5 -qtune=pwr5 -Pv<br>-Wp,-ea478,-g1                          | 1776             | 5872   | 7600                             |

| Computer  | “LINPACK Benchmark”<br>OS/Compiler  | n=100<br>Mflop/s | “TPP”<br>Best<br>Effort<br>n=1000<br>Mflop/s | “Theoretical<br>Peak”<br>Mflop/s |
|---|---|------------------|--|----------------------------------|
| SGI Altex 3700 Bx2 Itanium 2 (1 proc 1.6 GHz)                                   | -ipo -O3 -mP2OPT_hlo_loadpair=F<br>-mP2OPT_hlo_prefetch=F<br>-mP2OPT_hlo_loop_unroll_factor=2<br>-mP3OPT_ecg_mm_fp_ld_latency=8 | 1765             | 5953   | 6400                             |
| HP Integrity rx2620-2 (2 proc, 1.6GHz/3MB Itanium 2)                            |   |                  | 10210  | 12800                            |
| HP Integrity rx2620-2 (1 proc, 1.6GHz/3MB Itanium 2)                            | HP-UX, f90 +Ofaster +Oloop_unroll=2<br>+Onodataprefetch   | 1761             | 5603   | 6400                             |
| HP Integrity rx1620-2 (2 proc, 1.6GHz/3MB Itanium 2)                            |   |                  | 10320  | 12800                            |
| HP Integrity rx1620-2 (1 proc, 1.6GHz/3MB Itanium 2)                            | HP-UX, f90 +Ofaster +Oloop_unroll=2<br>+Onodataprefetch   | 1761             | 5655   | 6400                             |
| HP ProLiant DL140 G2 (2 proc (1 cpu core per single chip), 3.6GHz Intel Xeon)   |   |                  | 7870   | 14400                            |
| HP ProLiant DL140 G2 (1 proc (1 cpu core per single chip), 3.6GHz Intel Xeon)   | SuSE SLES 9 / Intel 8.1 Compile flags:<br>-fpp -xP -O3 -openmp -align -ipo  | 1756             | 4620   | 7200                             |
| HP Integrity rx4640-8 (4 proc, 1.6GHz/9MB Itanium 2)                            |   |                  | 19470  | 25600                            |
| HP Integrity rx4640-8 (2 proc, 1.6GHz/9MB Itanium 2)                            |   |                  | 10940  | 12800                            |
| HP Integrity rx4640-8 (1 proc, 1.6GHz/9MB Itanium 2)                            | HP-UX, f90 +Ofaster +Oloop_unroll=2<br>+Onodataprefetch   | 1756             | 5959   | 6400                             |
| HP ProLiant ML350 G4p (2 proc (1 cpu core per single chip), 3.6GHz Intel Xeon)  |   |                  | 7876   | 14400                            |
| HP ProLiant ML350 G4p (1 proc (1 cpu core per single chip), 3.6GHz Intel Xeon)  | SuSE SLES 9 / Intel 8.1 Compile flags:<br>-fpp -xP -O3 -openmp -align -ipo  | 1754             | 4646   | 7200                             |
| HP ProLiant BL20p G3 (2 proc (1 cpu core per single chip), 3.6GHz Intel Xeon)   |   |                  | 7851   | 14400                            |
| HP ProLiant BL20p G3 (1 proc (1 cpu core per single chip), 3.6GHz Intel Xeon)   | SuSE SLES 9 / Intel 8.1 Compile flags:<br>-fpp -xP -O3 -openmp -align -ipo  | 1754             | 4638   | 7200                             |
| HP ProLiant BL45p (4 proc (1 cpu core per single chip), 2.8GHz AMD 854 Opteron) |   |                  | 12860  | 22400                            |
| HP ProLiant BL45p (2 proc (1 cpu core per single chip), 2.8GHz AMD 854 Opteron) |   |                  | 7678   | 11200                            |
| HP ProLiant BL45p (1 proc (1 cpu core per single chip), 2.8GHz AMD 854 Opteron) | SuSE SLES 9 / PGI 5.2-4 Compile<br>Flags: -fastsse -tp k8-64  | 1717             | 4191   | 5600                             |
| HP ProLiant BL25p (2 proc (1 cpu core per single chip), 2.8GHz AMD 254 Opteron) |   |                  | 7683   | 11200                            |
| HP ProLiant BL25p (1 proc (1 cpu core per single chip), 2.8GHz AMD 254 Opteron) | SuSE SLES 9 / PGI 5.2-4 Compile<br>Flags: -fastsse -tp k8-64  | 1717             | 4199   | 5600                             |
| HP ProLiant DL385 (2 proc (1 cpu core per single chip), 2.8GHz AMD 254 Opteron) |   |                  | 7661   | 11200                            |
| HP ProLiant DL140 G2 (2 proc (1 cpu core per single chip), 3.8GHz Intel Xeon)   |   |                  | 8163   | 14800                            |
| HP ProLiant DL585 (4 proc (1 cpu core per single chip), 2.8GHz AMD 854 Opteron) |   |                  | 12910  | 22400                            |
| HP ProLiant DL585 (2 proc (1 cpu core per single chip), 2.8GHz AMD 854 Opteron) |   |                  | 7619   | 11200                            |



| Computer  | “LINPACK Benchmark”<br>OS/Compiler  | n=100<br>Mflop/s | “TPP”<br>Best<br>Effort<br>n=1000<br>Mflop/s | “Theoretical<br>Peak”<br>Mflop/s |
|---|---|------------------|--|----------------------------------|
| HP ProLiant DL585 (1 proc (1 cpu core per single chip), 2.8GHz AMD 854 Opteron) | SuSE SLES 9 / PGI 5.2-4 Compile<br>Flags: -fastsse -tp k8-64 -mp  | 1712             | 4166   | 5600                             |
| HP ProLiant DL385 (1 proc (1 cpu core per single chip), 2.8GHz AMD 254 Opteron) | SuSE SLES 9 / PGI 5.2-4 Compile<br>Flags: -fastsse -tp k8-64 -mp  | 1712             | 4238   | 5600                             |
| HP ProLiant BL30p (2 proc. 3.20 GHz, Xeon)                                      |   |                  | 6264   | 12800                            |
| HP ProLiant BL30p (1 proc. 3.20 GHz, Xeon)                                      | ifort -xW -O3 -parallel -ipo  | 1704             | 3522   | 6400                             |
| IBM eServer BladeCenter JS20 (2 proc, 2.2 GHz PowerPC 970)                      |   |                  | 5817   | 17600                            |
| IBM eServer BladeCenter JS20 (1 proc, 2.2 GHz PowerPC 970)                      | -O4 -qarch=auto -qtune=auto   | 1681             | 3840   | 8800                             |
| Fujitsu Siemens hpcLine (2 proc Intel Xeon 3.2 GHz)                             |   |                  | 5151   | 12800                            |
| Fujitsu Siemens hpcLine (1 proc Intel Xeon 3.2 GHz)                             | ifort -O3 -xN -ipo -align -r8   | 1679             | 3148   | 6400                             |
| SGI Altix 3000 (1.5 GHz Itanium 2)  | -O3 -mP2OPT_hlo_loadpair=F<br>-mP2OPT_hlo_prefetch=F<br>-mP2OPT_hlo_loop_unroll_factor=2<br>-mP3OPT_ecg_mm_fp_ld_latency=8<br>-ipo -fno-alias | 1659             | 5400   | 6000                             |
| HP Integrity Server rx2600 (2 proc 1.5GHz)                                      |   |                  | 10240  | 12000                            |
| HP Integrity Server rx2600 (1 proc 1.5GHz)                                      | f90 +DSitanium2 +O3<br>+Oinline_budget=100000<br>+Ono_ptrs_to_globals +Oloop_unroll=2<br>+Onodataprefetch                                     | 1635             | 5431   | 6000                             |
| HP Integrity Server rx5670 (4 proc 1.5GHz)                                      |   |                  | 18180  | 24000                            |
| HP Integrity Server rx5670 (2 proc 1.5GHz)                                      |   |                  | 10030  | 12000                            |
| HP Integrity Server rx5670 (1 proc 1.5GHz)                                      | f90 +DSitanium2 +O3<br>+Oinline_budget=100000<br>+Ono_ptrs_to_globals +Oloop_unroll=2<br>+Onodataprefetch                                     | 1631             | 5423   | 6000                             |
| HP ProLiant BL45p (4 proc (1 cpu core per single chip), 2.6GHz 852 Opteron)     |   |                  | 12030  | 20800                            |
| HP ProLiant BL45p (2 proc (1 cpu core per single chip), 2.6GHz 852 Opteron)     |   |                  | 7023   | 10400                            |
| HP ProLiant BL45p (1 proc (1 cpu core per single chip), 2.6GHz 852 Opteron)     | PGI 5.2-4 -fastsse -tp k8-64 -mp  | 1593             | 3894   | 5200                             |
| HP ProLiant BL25p (2 proc, 2.6GHz, Opteron)                                     |   |                  | 7153   | 10400                            |
| HP ProLiant BL25p (1 proc, 2.6GHz, Opteron)                                     | PGI 5.2-4 -O2 -tp k8-64 -mp   | 1593             | 3938   | 5200                             |
| Intel Xeon EM64T (Nocona 3.2 Ghz)   | ifort -fast   | 1593             |  | 6400                             |
| HP ProLiant DL585 (4 proc (1 cpu core per single chip), 2.6GHz 852 Opteron)     |   |                  | 11970  | 20800                            |
| HP ProLiant DL585 (2 proc (1 cpu core per single chip), 2.6GHz 852 Opteron)     |   |                  | 7098   | 10400                            |
| HP ProLiant DL585 (1 proc (1 cpu core per single chip), 2.6GHz 852 Opteron)     | PGI 5.2-4 -fastsse -tp k8-64 -mp  | 1586             | 3879   | 5200                             |
| HP ProLiant DL385 (2 proc, 2.6GHz, Opteron)                                     |   |                  | 7134   | 10400                            |
| HP ProLiant DL385 (1 proc, 2.6GHz, Opteron)                                     | PGI 5.2-4 -O2 -tp k8-64 -mp   | 1586             | 3917   | 5200                             |

| Computer   | “LINPACK Benchmark”<br>OS/Compiler                               | n=100<br>Mflop/s | “TPP”<br>Best<br>Effort<br>n=1000<br>Mflop/s | “Theoretical<br>Peak”<br>Mflop/s |
|--|--|------------------|--|----------------------------------|
| HP ProLiant DL585 (4 proc, 2.6GHz, Opteron)                                      |  |                  | 11450  | 20800                            |
| HP ProLiant DL585 (2 proc, 2.6GHz, Opteron)                                      |  |                  | 6913   | 10400                            |
| HP ProLiant DL585 (1 proc, 2.6GHz, Opteron)                                      | PGI 5.2-4 -O2 -tp k8-64 -mp                                      | 1586             | 3836   | 5200                             |
| Pentium IV with 3.0 GHz  | ifort -O3 -xW -ip -ipo -align -pad                               | 1573             | 3181   | 6000                             |
| Intel Pentium 4 3.0 GHz (Northwood core)   | ifort -xW -O3 -ipo -static -r8                                   | 1571             | 3650   | 6000                             |
| HP ProLiant BL20p G3 (2 proc 3.6GHZ)   |  |                  | 7200   | 14400                            |
| HP ProLiant BL20p G3 (1 proc 3.6GHZ)   | ifort -fpp -xP -O3   | 1565             | 4403   | 7200                             |
| IBM eServer pSeries 655 (8 proc 1.7GHz)  |  |                  | 25630  | 54400                            |
| IBM eServer pSeries 655 (4 proc 1.7GHz)  |  |                  | 14730  | 27200                            |
| IBM eServer pSeries 655 (1 proc 1.7GHz)  | -O3 -qarch=pwr4 -qtune=pwr4 -Pv<br>-Wp,-ea478,-g1                | 1486             | 3884   | 6800                             |
| HP ProLiant BL45p (8 proc (2 cpu cores per single chip), 2.4GHz AMD 880 Opteron) |  |                  | 15830  | 38400                            |
| HP ProLiant BL45p (4 proc (2 cpu cores per single chip), 2.4GHz AMD 880 Opteron) |  |                  | 11460  | 19200                            |
| HP ProLiant BL45p (2 proc (2 cpu cores per single chip), 2.4GHz AMD 880 Opteron) |  |                  | 6626   | 9600                             |
| HP ProLiant BL45p (1 proc (2 cpu cores per single chip), 2.4GHz AMD 880 Opteron) | SuSE SLES 9 / PGI 5.2-4 Compile<br>Flags: -fastsse -tp k8-64     | 1473             | 3604   | 4800                             |
| HP ProLiant BL25p (4 proc (2 cpu cores per single chip), 2.4GHz AMD 280 Opteron) |  |                  | 11590  | 19200                            |
| HP ProLiant BL25p (2 proc (2 cpu cores per single chip), 2.4GHz AMD 280 Opteron) |  |                  | 6715   | 9600                             |
| HP ProLiant BL25p (1 proc (2 cpu cores per single chip), 2.4GHz AMD 280 Opteron) | SuSE SLES 9 / PGI 5.2-4 Compile<br>Flags: -fastsse -tp k8-64     | 1471             | 3654   | 4800                             |
| IBM eServer pSeries 690 (16 proc 1.7GHz)   |  |                  | 36530  | 108800                           |
| IBM eServer pSeries 690 (8 proc 1.7GHz)  |  |                  | 25130  | 54400                            |
| HP ProLiant DL385 (4 proc (2 cpu cores per single chip), 2.4GHz AMD 280 Opteron) |  |                  | 11570  | 19200                            |
| HP ProLiant DL385 (2 proc (2 cpu cores per single chip), 2.4GHz AMD 280 Opteron) |  |                  | 6662   | 9600                             |
| HP ProLiant DL385 (1 proc (2 cpu cores per single chip), 2.4GHz AMD 280 Opteron) | SuSE SLES 9 / PGI 5.2-4 Compile<br>Flags: -fastsse -tp k8-64     | 1470             | 3657   | 4800                             |
| HP ProLiant DL585 (8 proc (2 cpu cores per single chip), 2.4GHz AMD 880 Opteron) |  |                  | 15020  | 38400                            |
| HP ProLiant DL585 (4 proc (2 cpu cores per single chip), 2.4GHz AMD 880 Opteron) |  |                  | 11320  | 19200                            |
| HP ProLiant DL585 (2 proc (2 cpu cores per single chip), 2.4GHz AMD 880 Opteron) |  |                  | 6566   | 9600                             |
| HP ProLiant DL585 (1 proc (2 cpu cores per single chip), 2.4GHz AMD 880 Opteron) | SuSE SLES 9 / PGI 5.2-4 Compile<br>Flags: -fastsse -tp k8-64 -mp | 1467             | 3581   | 4800                             |
| HP DL385 2.2 GHz (dual core) Opteron 275   | ifort -O3 -xW -ipo   | 1464             |  | 4400                             |
| IBM eServer pSeries 690 Tubro (1 proc 1.7GHz)                                    | -O3 -qarch=pwr4 -qtune=pwr4 -Pv<br>-Wp,-ea478,-g1                | 1462             | 3817   | 6800                             |
| HCL Infiniti Global Line 2700HL Xeon EM64T                                       | ifort -fast -ip -ipo -r8 -align                                  | 1444             | 6167   | 9600                             |

| Computer  | “LINPACK Benchmark”<br>OS/Compiler                | n=100<br>Mflop/s | “TPP”<br>Best<br>Effort<br>n=1000<br>Mflop/s | “Theoretical<br>Peak”<br>Mflop/s |
|---|---|------------------|--|----------------------------------|
| (Dual Core) 2.4 GHz   |   |                  |  |                                  |
| HCL Infiniti Global Line 2700AF Xeon EM64T<br>(Dual Core) 2.4 GHz               | ifort -fast -ip -ipo -r8 -align                   | 1438             | 6131   | 9600                             |
| HCL Infiniti Global Line 2700JR2 (Intel Xeon<br>EM64T 3.8 GHz)                  | ifort -fast -ip -ipo -r8 -align                   | 1433             | 5144   | 7600                             |
| HCL Infiniti Global Line 2700BD2 (Intel Xeon<br>3.16 GHz)                       | ifort -fast -r8 -align -ip -ipo                   | 1428             | 4474   | 6320                             |
| Intel Pentium 4 (3.06 GHz)  | ifc -O3 -r8 -xW -ip -ipo -align -pad              | 1414             | 2880   | 6120                             |
| AMD Opteron 275/2.2 Ghz (dual core, 4 proc)                                     |   |                  | 6147   | 17600                            |
| AMD Opteron 275/2.2 Ghz (dual core, 2 proc)                                     |   |                  | 4630   | 8800                             |
| AMD Opteron 275/2.2 Ghz (dual core, 1 proc)                                     | ifort -O3 -xW -ipo                                | 1385             | 2447   | 4400                             |
| HP ProLiant BL45p (8 proc (2 cpu cores per single<br>chip), 2.2GHz 875 Opteron) |   |                  | 14120  | 35200                            |
| HP ProLiant BL45p (4 proc (2 cpu cores per single<br>chip), 2.2GHz 875 Opteron) |   |                  | 10570  | 17600                            |
| HP ProLiant BL45p (2 proc (2 cpu cores per single<br>chip), 2.2GHz 875 Opteron) |   |                  | 6113   | 8800                             |
| HP ProLiant BL25p (4 proc (2 cpu cores per single<br>chip), 2.2GHz 275 Opteron) |   |                  | 10730  | 17600                            |
| HP ProLiant BL25p (2 proc (2 cpu cores per single<br>chip), 2.2GHz 275 Opteron) |   |                  | 6158   | 8800                             |
| HP ProLiant BL25p (1 proc (2 cpu cores per single<br>chip), 2.2GHz 275 Opteron) | PGI 5.2-4 -fastsse -tp k8-64                      | 1350             | 3347   | 4400                             |
| HP ProLiant DL385 (4 proc (2 cpu cores per single<br>chip), 2.2GHz 275 Opteron) |   |                  | 10600  | 17600                            |
| HP ProLiant DL385 (2 proc (2 cpu cores per single<br>chip), 2.2GHz 275 Opteron) |   |                  | 6115   | 8800                             |
| HP ProLiant DL385 (1 proc (2 cpu cores per single<br>chip), 2.2GHz 275 Opteron) | PGI 5.2-4 -fastsse -tp k8-64                      | 1349             | 3352   | 4400                             |
| HP ProLiant BL45p (1 proc (2 cpu cores per single<br>chip), 2.2GHz 875 Opteron) | PGI 5.2-4 -fastsse -tp k8-64                      | 1349             | 3325   | 4400                             |
| HP ProLiant DL585 (8 proc (2 cpu cores per single<br>chip), 2.2GHz 875 Opteron) |   |                  | 14040  | 35200                            |
| HP ProLiant DL585 (4 proc (2 cpu cores per single<br>chip), 2.2GHz 875 Opteron) |   |                  | 10480  | 17600                            |
| HP ProLiant DL585 (2 proc (2 cpu cores per single<br>chip), 2.2GHz 875 Opteron) |   |                  | 6083   | 8800                             |
| HP ProLiant DL585 (1 proc (2 cpu cores per single<br>chip), 2.2GHz 875 Opteron) | PGI 5.2-4 -fastsse -tp k8-64                      | 1348             | 3301   | 4400                             |
| Intel Pentium 4 (2.8 GHz)   | ifc -O3 -xW -ipo -ip -align                       | 1317             | 2444   | 5600                             |
| IBM eServer p5 575 (1.5 GHz POWER5)   | -O3 -qarch=pwr5 -qtune=pwr5 -Pv<br>-Wp,-ea478,-g1 | 1315             |  | 6000                             |
| HP ProLiant BL35p (2 proc, 2.4GHz, Opteron)                                     |   |                  | 6460   | 9600                             |
| HP ProLiant BL35p (1 proc, 2.4GHz, Opteron)                                     | PGI 5.2-4 -O2 -tp k8-64 -mp                       | 1300             | 3583   | 4800                             |
| IBM eServer pSeries 670 (16 proc 1.5GHz)  |   |                  | 33980  | 96000                            |
| IBM eServer pSeries 670 (8 proc 1.5GHz)   |   |                  | 22860  | 48000                            |
| IBM eServer pSeries 670 (1 proc 1.5GHz)   | -O3 -qarch=pwr4 -qtune=pwr4 -Pv                   | 1294             | 3401   | 6000                             |

| Computer   | “LINPACK Benchmark”<br>OS/Compiler                | n=100<br>Mflop/s | “TPP”<br>Best<br>Effort<br>n=1000<br>Mflop/s | “Theoretical<br>Peak”<br>Mflop/s |
|--|---|------------------|--|----------------------------------|
| IBM eServer pSeries 655 (8 proc 1.5GHz)                | -Wp,-ea478,-g1                                    |                  | 22770  | 48000                            |
| IBM eServer pSeries 655 Tubro (1 proc 1.5GHz)          | -O3 -qarch=pwr4 -qtune=pwr4 -Pv<br>-Wp,-ea478,-g1 | 1293             | 3421   | 6000                             |
| HP ProLiant DL585 (4 CPU, 2.4GHz 850 Opteron)          | SuSE SLES 9 / PGI 5.2-4 -O2 -tp k8-64<br>-mp      |                  | 10540  | 19200                            |
| HP ProLiant DL585 (2 CPU, 2.4GHz 850 Opteron)          | SuSE SLES 9 / PGI 5.2-4 -O2 -tp k8-64<br>-mp      |                  | 6313   | 9600                             |
| HP ProLiant DL585 (1 CPU, 2.4GHz 850 Opteron)          | SuSE SLES 9 / PGI 5.2-4 -O2 -tp k8-64             | 1293             | 3489   | 4800                             |
| IBM IntelliStation POWER 275 2 CPUs (1450 MHz POWER4+) |   |                  | 5993   | 11600                            |
| HP ProLiant DL145 (2 CPU, 2.4GHz 250 Opteron)          | SuSE SLES 9 / PGI 5.2-4 -O2 -tp k8-64<br>-mp      |                  | 6369   | 9600                             |
| HP ProLiant DL145 (1 CPU, 2.4GHz 250 Opteron)          | SuSE SLES 9 / PGI 5.2-4 -O2 -tp k8-64             | 1291             | 3485   | 4800                             |
| IBM IntelliStation POWER 275 1 CPU (1450 MHz POWER4+)  | -O3 -qarch=pwr4 -qtune=pwr4 -Pv<br>-Wp,-ea478,-g1 | 1245             | 3338   | 5800                             |
| IBM eServer pSeries 630 6E4 (4 proc 1.45GHz)           |   |                  | 10990  | 23200                            |
| IBM eServer pSeries 630 6E4 (1 proc 1.45GHz)           | -O3 -qarch=pwr4 -qtune=pwr4 -Pv<br>-Wp,-ea478,-g1 | 1229             | 3297   | 5800                             |
| IBM eServer pSeries 630 6C4 (4 proc 1.45GHz)           |   |                  | 10990  | 23200                            |
| IBM eServer pSeries 630 6C4 (1 proc 1.45GHz)           | -O3 -qarch=pwr4 -qtune=pwr4 -Pv<br>-Wp,-ea478,-g1 | 1229             | 3297   | 5800                             |
| NEC SX-6/1 (8 proc. 1.77 ns)                           |   |                  | 46260  | 72000                            |
| NEC SX-6/1 (4 proc. 1.77 ns)                           |   |                  | 26540  | 36000                            |
| NEC SX-6/1 (2 proc. 1.77 ns)                           |   |                  | 15020  | 18000                            |
| NEC SX-6/1 (1proc. 1.77 ns)                            | SUPER-UX R13.1 -pi -Wf"-prob_use"                 | 1289             | 8553   | 9000                             |
| AMD Opteron (2.192 GHz)                                | PGI -fastsse -tp k8-64                            | 1253             | 3145   | 4284                             |
| IBM eServer pSeries 650 6M2 8 proc(1450 MHz)           |   |                  | 19930  | 46400                            |
| IBM eServer pSeries 650 6M2 4 proc(1450 MHz)           |   |                  | 11190  | 23200                            |
| IBM eServer pSeries 650 6M2 2 proc(1450 MHz)           |   |                  | 6165   | 11600                            |
| IBM eServer pSeries 650 6M2 1 proc(1450 MHz)           | -O3 -qarch=pwr4 -qtune=pwr4 -Pv<br>-Wp,-ea478,-g1 | 1220             | 3245   | 5800                             |
| Intel Pentium 4 (2.53 GHz)                             | ifc -O3 -xW -ipo -ip -align                       | 1190             | 2355   | 5060                             |
| NEC SX-6/8 (8proc. 2.0 ns)                             |   |                  | 41520  | 64000                            |
| NEC SX-6/4 (4proc. 2.0 ns)                             |   |                  | 23680  | 32000                            |
| NEC SX-6/2 (2proc. 2.0 ns)                             |   |                  | 13350  | 16000                            |
| NEC SX-6/1 (1proc. 2.0 ns)                             | R12.1 -pi -Wf"-prob_use"                          | 1161             | 7575   | 8000                             |
| Fujitsu VPP5000/1(1 proc.3.33ns)                       | firt -Wv,-r128 -Of -KA32                          | 1156             | 8784   | 9600                             |
| IBM eServer pSeries 655 651 4 proc(1300 MHz)           |   |                  | 10880  | 20800                            |
| IBM eServer pSeries 655 651 1 proc(1300 MHz)           | -O3 -qarch=pwr4 -qtune=pwr4 -Pv<br>-Wp,-ea478,-g1 | 1135             | 2899   | 5200                             |
| Cray T932 (32 proc. 2.2 ns)                            |   |                  | 29360  | 57600                            |

| Computer  | “LINPACK Benchmark”<br>OS/Compiler                                    | n=100<br>Mflop/s | “TPP”<br>Best<br>Effort<br>n=1000<br>Mflop/s | “Theoretical<br>Peak”<br>Mflop/s |
|---|---|------------------|--|----------------------------------|
| Cray T928 (28 proc. 2.2 ns)                     |   |                  | 28340  | 50400                            |
| Cray T924 (24 proc. 2.2 ns)                     |   |                  | 26170  | 43200                            |
| Cray T916 (16 proc. 2.2 ns)                     |   |                  | 19980  | 28800                            |
| Cray T916 (8 proc. 2.2 ns)                      |   |                  | 10880  | 14400                            |
| Cray T94 (4 proc. 2.2 ns)                       | f90 -O3,inline2   | 1129             | 5735   | 7200                             |
| HP AlphaServer GS1280 7/1300 (8 proc 1.3 GHz)   |   |                  | 14260  | 20800                            |
| HP AlphaServer GS1280 7/1300 (4 proc 1.3 GHz)   |   |                  | 7781   | 10400                            |
| HP AlphaServer GS1280 7/1300 (2 proc 1.3 GHz)   |   |                  | 3890   | 5200                             |
| HP AlphaServer GS1280 7/1300 (1 proc 1.3 GHz)   | -fast -O4 -tune ev7 -arch ev7<br>-non_shared -lm                      | 1122             | 2132   | 2600                             |
| hp rx5670 Itanium 2(4 proc 1GHz)                |   |                  | 11430  | 16000                            |
| hp rx5670 Itanium 2(2 proc 1GHz)                |   |                  | 6284   | 8000                             |
| hp rx5670 Itanium 2(1 proc 1GHz)                | f90 +DSmckinley +O3<br>+Oinline_budget=100000<br>+Ono_ptrs_to_globals | 1102             | 3534   | 4000                             |
| hp rx2600 Itanium 2(2 proc 1GHz)                |   |                  | 6251   | 8000                             |
| hp rx2600 Itanium 2(1 proc 1GHz)                | f90 +DSmckinley +O3<br>+Oinline_budget=100000<br>+Ono_ptrs_to_globals | 1102             | 3528   | 4000                             |
| hp zx6000 Itanium 2(2 proc 1GHz)                |   |                  | 6315   | 8000                             |
| hp zx6000 Itanium 2(1 proc 1GHz)                | f90 +DSmckinley +O3<br>+Oinline_budget=100000<br>+Ono_ptrs_to_globals | 1102             | 3533   | 4000                             |
| IBM eServer pSeries 690 Turbo 16 proc(1300 MHz) |   |                  | 28080  | 83200                            |
| IBM eServer pSeries 690 Turbo 8 proc(1300 MHz)  |   |                  | 18290  | 41600                            |
| IBM eServer pSeries 690 Turbo 1 proc(1300 MHz)  | -O3 -qarch=pwr4 -qtune=pwr4 -Pv<br>-Wp,-ea478,-g1                     | 1074             | 2894   | 5200                             |
| Intel Xeon 2.4 GHz                              | ifort -ipo  | 1055             |  | 4800                             |
| Intel P4 2200 MHz                               | ifc -O3 -xW -align -ipo -Zp16 -r8                                     | 1033             | 1911   | 4400                             |
| IBM eServer pSeries 615 6C3 (1 proc 1.2GHz P4+) | -O3 -qarch=pwr4 -qtune=pwr4 -Pv<br>-Wp,-ea478,-g1                     | 1032             |  | 4800                             |
| IBM eServer pSeries 615 6E3 (1 proc 1.2GHz P4+) | -O3 -qarch=pwr4 -qtune=pwr4 -Pv<br>-Wp,-ea478,-g1                     | 1032             |  | 4800                             |
| hp AlphaServer ES45 68/1250(4 proc)             |   |                  | 7132   | 10000                            |
| hp AlphaServer ES45 68/1250(2 proc)             |   |                  | 3721   | 5000                             |
| hp AlphaServer ES45 68/1250(1 proc)             | v5.5-1877 -O4   | 1031             | 1945   | 2500                             |
| Cray T94 (3 proc. 2.2 ns)                       | f90 -O3,inline2   | 1029             | 4387   | 5400                             |
| IBM eServer pSeries 630 6C4 (4 proc 1.2GHz P4+) |   |                  | 9255   | 19200                            |
| IBM eServer pSeries 630 6C4 (1 proc 1.2GHz p4+) | -O3 -qarch=pwr4 -qtune=pwr4 -Pv<br>-Wp,-ea478,-g1                     | 1025             | 2727   | 4800                             |
| IBM eServer pSeries 630 6E4 (4 proc 1.2GHz P4+) |   |                  | 9255   | 19200                            |

| Computer  | “LINPACK Benchmark”<br>OS/Compiler                                    | n=100<br>Mflop/s | “TPP”<br>Best<br>Effort<br>n=1000<br>Mflop/s | “Theoretical<br>Peak”<br>Mflop/s |
|---|---|------------------|--|----------------------------------|
| IBM eServer pSeries 630 6E4 (1 proc 1.2GHz p4+)       | -O3 -qarch=pwr4 -qtune=pwr4 -Pv<br>-Wp,-ea478,-g1                     | 1025             | 2727   | 4800                             |
| Intel xeon 64 (dual 3.6 GHz)                          | icf -O3   | 1010             |  | 7200                             |
| HP AlphaServer ES80 7/1150 (8 proc 1.15 GHz)          |   |                  | 11410  | 18400                            |
| HP AlphaServer ES80 7/1150 (4 proc 1.15 GHz)          |   |                  | 6584   | 9200                             |
| HP AlphaServer ES80 7/1150 (2 proc 1.15 GHz)          |   |                  | 3424   | 4600                             |
| HP AlphaServer ES80 7/1150 (1 proc 1.15 GHz)          | -fast -O4 -tune ev7 -arch ev7<br>-non_shared -lm                      | 992              | 1884   | 2300                             |
| HP AlphaServer ES47 7/1150 (4 proc 1.15 GHz)          |   |                  | 6584   | 9200                             |
| HP AlphaServer ES47 7/1150 (2 proc 1.15 GHz)          |   |                  | 3424   | 4600                             |
| HP AlphaServer ES47 7/1150 (1 proc 1.15 GHz)          | -fast -O4 -tune ev7 -arch ev7<br>-non_shared -lm                      | 992              | 1884   | 2300                             |
| hp zx2000 Itanium 2(900MHz)                           | f90 +DSmckinley +O3<br>+Oinline_budget=100000<br>+Ono_ptrs_to_globals | 992              | 3081   | 3600                             |
| Fujitsu Siemens hpcLine(Xeon 2GHz)                    | fc -O3 -align -r8 -ipo -xW  | 969              | 1648   | 2000                             |
| AMD Opteron 242/1.6 Ghz (2 proc)                      |   |                  | 3377   | 6400                             |
| AMD Opteron 242/1.6 Ghz (1 proc)                      | ifort -xW -ipo -O3  | 988              | 1808   | 3200                             |
| Cray SV1ex-1-32(31 proc,500MHz)                       |   |                  | 15520  | 62000                            |
| Cray SV1ex-1-32(28 proc,500MHz)                       |   |                  | 15250  | 56000                            |
| Cray SV1ex-1-32(24 proc,500MHz)                       |   |                  | 14750  | 48000                            |
| Cray SV1ex-1-32(20 proc,500MHz)                       |   |                  | 14150  | 40000                            |
| Cray SV1ex-1-32(16 proc,500MHz)                       |   |                  | 13050  | 32000                            |
| Cray SV1ex-1-32(12 proc,500MHz)                       | f90 -O3,inline2   | 988              | 11250  | 24000                            |
| HCL Infiniti Global line 4700HW (Intel Xeon 3.16 GHz) | ifort -fast -r8 -align  | 981              | 3209   | 6320                             |
| Cray T94 (2 proc. 2.2 ns)                             | f90 -O3,inline2   | 962              | 2998   | 3600                             |
| IBM eServer pSeries 655 651 8 proc(1100 MHz)          |   |                  | 16170  | 35200                            |
| IBM eServer pSeries 655 651 1 proc(1100 MHz)          | -O3 -qarch=pwr4 -qtune=pwr4 -Pv<br>-Wp,-ea478,-g1                     | 937              | 2484   | 4400                             |
| Cray SV1ex-1-32(8 proc,500MHz)                        |   |                  | 8938   | 16000                            |
| Cray SV1ex-1-32(4 proc,500MHz)                        |   |                  | 5358   | 8000                             |
| Cray SV1ex-1-32(2 proc,500MHz)                        |   |                  | 2947   | 4000                             |
| Cray SV1ex-1-32(1 proc,500MHz)                        | f90 -O3,inline2   | 935              | 1554   | 2000                             |
| hp GS1280 7/1150 (4 proc,1.15 GHz)                    |   |                  | 6584   | 9200                             |
| hp GS1280 7/1150 (2 proc,1.15 GHz)                    |   |                  | 3493   | 4600                             |
| hp GS1280 7/1150 (1 proc,1.15 GHz)                    | KAP -O4   | 914              | 1879   | 2300                             |
| AMD Opteron 242/1.6 Ghz (2 proc)                      |   |                  | 4370   | 6400                             |
| Intel Xeon 2.4 GHz                                    | ifort -O3   | 884              |  | 4800                             |
| AMD Opteron 242/1.6 Ghz (1 proc)                      | pgf77 -fast -tp k8-64   | 882              | 2325   | 3200                             |
| Dell PowerEdge 1850s (3.2 GHz Intel)                  | Intel 9 FORTRAN   | 873              | 2800   | 6400                             |

| Computer  | “LINPACK Benchmark”<br>OS/Compiler   | n=100<br>Mflop/s | “TPP”<br>Best<br>Effort<br>n=1000<br>Mflop/s | “Theoretical<br>Peak”<br>Mflop/s |
|---|--|------------------|--|----------------------------------|
| EM64T)  |  |                  |  |                                  |
| IBM IntelliStation POWER 275 1 CPU (1000 MHz POWER4+) | -O3 -qarch=pwr4 -qtune=pwr4 -Pv -Wp,-ea478,-g1   | 860              | 2327   | 4000                             |
| NEC SX-5/1 (1 proc. 4.0 ns)                           | R9.1 -pi -wf"-prob_use"  | 856              | 7280   | 8000                             |
| HP 9000 rp8420-32 (1000MHz PA-8800), 8 proc           |  |                  | 14150  | 32000                            |
| HP 9000 rp8420-32 (1000MHz PA-8800), 4 proc           |  |                  | 9478   | 16000                            |
| HP 9000 rp8420-32 (1000MHz PA-8800), 2 proc           |  |                  | 5435   | 8000                             |
| HP 9000 rp8420-32 (1000MHz PA-8800), 1 proc           | HP-UX 11i, HP f90 11.11.74 f90 +O3<br>+Onolimit +Onodataprefetch<br>+Oinline_budget=1000000<br>+Oloop_unroll=6 | 843              | 2905   | 4000                             |
| HP 9000 Superdome (1000MHz PA-8800), 8 proc           |  |                  | 14070  | 32000                            |
| HP 9000 Superdome (1000MHz PA-8800), 4 proc           |  |                  | 9260   | 16000                            |
| HP 9000 Superdome (1000MHz PA-8800), 2 proc           |  |                  | 5432   | 8000                             |
| HP 9000 Superdome (1000MHz PA-8800), 1 proc           | HP-UX 11i, HP f90 11.11.74 f90 +O3<br>+Onolimit +Onodataprefetch<br>+Oinline_budget=1000000<br>+Oloop_unroll=6 | 843              | 2902   | 4000                             |
| IBM eServer pSeries 630 6C4 4 proc(1000 MHz)          | -O3 -qarch=pwr4 -qtune=pwr4 -Pv -Wp,-ea478,-g1   |                  | 6769   | 16000                            |
| IBM eServer pSeries 630 6C4 1 proc(1000 MHz)          | -O3 -qarch=pwr4 -qtune=pwr4 -Pv -Wp,-ea478,-g1   | 842              | 2173   | 4000                             |
| IBM eServer pSeries 630 6E4 4 proc(1000 MHz)          | -O3 -qarch=pwr4 -qtune=pwr4 -Pv -Wp,-ea478,-g1   |                  | 6769   | 16000                            |
| IBM eServer pSeries 630 6E4 1 proc(1000 MHz)          | -O3 -qarch=pwr4 -qtune=pwr4 -Pv -Wp,-ea478,-g1   | 842              | 2173   | 4000                             |
| AMD Athlon MP1800+(1 proc 1530MHz)                    | ifc -O3 -tpp6 -ipo   | 832              | 1705   | 3060                             |
| Compaq ES45 (4 proc. 1000 MHz)                        |  |                  | 5522   | 8000                             |
| Compaq ES45 (3 proc. 1000 MHz)                        |  |                  | 4076   | 6000                             |
| Compaq ES45 (2 proc. 1000 MHz)                        |  |                  | 2901   | 4000                             |
| Compaq ES45 (1 proc. 1000 MHz)                        | kf77 -fkapargs='-inline=daxpy -ur=8 -ur2=320' -arch host -assume nounderscore                                  | 824              | 1542   | 2000                             |
| NEC SX-5/16 (16 proc. 4.0 ns)                         |  |                  | 45030  | 64000                            |
| NEC SX-5/8 (8 proc. 4.0 ns)                           |  |                  | 32570  | 64000                            |
| NEC SX-5/4 (4 proc. 4.0 ns)                           |  |                  | 19220  | 32000                            |
| NEC SX-5/2 (2 proc. 4.0 ns)                           |  |                  | 11150  | 16000                            |
| Fujitsu VPP800/1 (1 proc 4.0ns)                       | frt -Wv,-r128 -Of -KA32  | 813              | 7091   | 8000                             |
| Intel P4 1700 MHz                                     | ifc -O3 -xW -align -r8 -ipo  | 796              |  | 3400                             |
| hp ES80 7/1000(4 proc,1 GHz)                          |  |                  | 5706   | 8000                             |
| hp ES80 7/1000(2 proc,1 GHz)                          |  |                  | 3003   | 4000                             |
| hp ES80 7/1000(1 proc,1 GHz)                          | KAP -O4  | 790              | 1635   | 2000                             |

| Computer                                  | “LINPACK Benchmark”<br>OS/Compiler  | n=100<br>Mflop/s | “TPP”<br>Best<br>Effort<br>n=1000<br>Mflop/s | “Theoretical<br>Peak”<br>Mflop/s |
|---|---|------------------|--|----------------------------------|
| hp ES47 7/1000(4 proc,1 GHz)              |   |                  | 5706   | 8000                             |
| hp ES47 7/1000(2 proc,1 GHz)              |   |                  | 3003   | 4000                             |
| hp ES47 7/1000(1 proc,1 GHz)              | KAP -O4   | 790              | 1635   | 2000                             |
| HP Superdome (16 proc 875 MHz)            |   |                  | 19210  | 56000                            |
| HP Superdome ( 8 proc 875 MHz)            |   |                  | 12370  | 28000                            |
| HP Superdome ( 4 proc 875 MHz)            |   |                  | 7257   | 14000                            |
| HP Superdome ( 2 proc 875 MHz)            |   |                  | 4046   | 7000                             |
| AMD Opteron 1.4 GHz                       | -O3 -tpp7 -axK -ipo -align -r8  | 781              | 2020   | 3800                             |
| HP Superdome ( 1 proc 875 MHz)            | f90 +O3 +Oinlinebudget=1000000<br>+Onodataprefetch +Oloop_unroll=6                  | 769              | 2305   | 3500                             |
| hp server rp8400(16 proc 875MHz)          |   |                  | 17750  | 56000                            |
| hp server rp8400(8 proc 875MHz)           |   |                  | 11710  | 28000                            |
| hp server rp8400(4 proc 875MHz)           |   |                  | 7096   | 14000                            |
| hp server rp8400(2 proc 875MHz)           |   |                  | 4033   | 7000                             |
| hp server rp8400(1 proc 875MHz)           | f90 +O3 +Oinlinebudget=1000000<br>+Onodataprefetch +Oloop_unroll=6                  | 769              | 2320   | 3500                             |
| hp server rp7410(8 proc 875MHz)           |   |                  | 12900  | 28000                            |
| hp server rp7410(4 proc 875MHz)           |   |                  | 7507   | 14000                            |
| hp server rp7410(2 proc 875MHz)           |   |                  | 4179   | 7000                             |
| hp server rp7410(1 proc 875MHz)           | f90 +O3 +Oinlinebudget=1000000<br>+Onodataprefetch +Oloop_unroll=6                  | 769              | 2337   | 3500                             |
| Cray SV1-1-32 (31 proc. 300 MHz)          |   |                  | 10910  | 37200                            |
| Cray SV1-1-32 (28 proc. 300 MHz)          |   |                  | 10770  | 33600                            |
| Cray SV1-1-32 (24 proc. 300 MHz)          |   |                  | 10420  | 28800                            |
| Cray SV1-1-32 (20 proc. 300 MHz)          |   |                  | 9945   | 24000                            |
| Cray SV1-1-32 (16 proc. 300 MHz)          | f90 -O3, inline2  | 751              | 9156   | 19200                            |
| Cray SV1-1-32 (12 proc. 300 MHz)          | f90 -O3, inline2  | 748              | 7837   | 14000                            |
| Tyan S2460/AMD Athlon XP(1533 MHz,2 proc) |   |                  | 2176   | 6132                             |
| Tyan S2460/AMD Athlon XP(1533 MHz,1 proc) | ifc -tpp6 -O3   | 732              | 1623   | 3066                             |
| Intel P4 ACER(Veriton 7200)1700 MHz       | ifc -O3 -xW -align -r8 -ipo   | 712              |  | 3400                             |
| Cray SV1-1-32 (8 proc. 300 MHz)           | f90 -O3, inline2  | 710              | 6055   | 9600                             |
| Cray T94 (1 proc. 2.2 ns)                 | f90 -O3,inline2   | 705              | 1603   | 1800                             |
| AMD Athlon Thunderbird 1.4GHz             | ifc -O3 -tpp6 -align -r8 -ipo   | 704              |  | 2800                             |
| Compaq DS20L 833 MHz (2 proc.)            |   |                  | 2316   | 3332                             |
| Compaq DS20L 833 MHz                      | kf77 -fkapargs='-inline=daxpy -ur=8<br>-ur2=320' -arch host -assume<br>nounderscore | 699              | 1232   | 1666                             |
| Fujitsu Siemens Celsius 460 (P4, 1.5 GHz) | Intel fortran90 -O3 -xW -align -r8  | 675              | 955  | 1500                             |



| Computer                           | “LINPACK Benchmark”<br>OS/Compiler                                 | n=100<br>Mflop/s | “TPP”<br>Best<br>Effort<br>n=1000<br>Mflop/s | “Theoretical<br>Peak”<br>Mflop/s |
|------------------------------------|--|------------------|--|----------------------------------|
| HP SuperDome (16 proc 750 MHz)     |  |                  | 17660  | 48000                            |
| HP SuperDome ( 8 proc 750 MHz)     |  |                  | 11260  | 24000                            |
| HP SuperDome ( 4 proc 750 MHz)     |  |                  | 6667   | 12000                            |
| HP SuperDome ( 2 proc 750 MHz)     |  |                  | 3711   | 6000                             |
| HP SuperDome ( 1 proc 750 MHz)     | f90 +O3 +Oinlinebudget=1000000<br>+Onodataprefetch +Oloop_unroll=6 | 669              | 2099   | 3000                             |
| hp server rp8400(16proc 750 MHz)   |  |                  | 16500  | 48000                            |
| hp server rp8400(8 proc 750 MHz)   |  |                  | 10810  | 24000                            |
| hp server rp8400(4 proc 750 MHz)   |  |                  | 6522   | 12000                            |
| hp server rp8400(2 proc 750 MHz)   |  |                  | 3681   | 6000                             |
| hp server rp8400(1 proc 750 MHz)   | f90 +O3 +Oinlinebudget=1000000<br>+Onodataprefetch +Oloop_unroll=6 | 669              | 2099   | 3000                             |
| hp server rp7400(8 proc 750 MHz)   |  |                  | 10550  | 24000                            |
| hp server rp7400(4 proc 750 MHz)   |  |                  | 6667   | 12000                            |
| hp server rp7400(2 proc 750 MHz)   |  |                  | 3681   | 6000                             |
| hp server rp7400(1 proc 750 MHz)   | f90 +O3 +Oinlinebudget=1000000<br>+Onodataprefetch +Oloop_unroll=6 | 669              | 2085   | 3000                             |
| AMD ATHLON Thunderbird 1.2GHz      | ifc -tpp7 -O3 -ipo   | 649              | 1402   | 2400                             |
| Compaq ES40 (833 MHz 4cpu)         |  |                  | 4626   | 6664                             |
| Compaq ES40 (833 MHz 2cpu)         |  |                  | 2411   | 3332                             |
| Compaq ES40 (833 MHz 1cpu)         | -assume nonderscore -O5  | 639              | 1277   | 1666                             |
| Dell PE7150 Itanium(800Mhz 4 proc) |  |                  | 7358   | 12800                            |
| Dell PE7150 Itanium(800Mhz 2 proc) |  |                  | 4504   | 6400                             |
| Dell PE7150 Itanium(800Mhz 1 proc) | efl -Ox -Ob2 -Ot   | 600              | 2382   | 3200                             |
| Cray T3E-1350 (16 proc 675 MHz)    |  |                  | 3204   | 24000                            |
| Cray T3E-1350 (12 proc 675 MHz)    |  |                  | 2716   | 18000                            |
| Cray T3E-1350 (8 proc 675 MHz)     |  |                  | 2518   | 12000                            |
| Cray T3E-1350 (6 proc 675 MHz)     |  |                  | 2199   | 9000                             |
| Cray T3E-1350 (4 proc 675 MHz)     |  |                  | 1797   | 6000                             |
| Cray T3E-1350 (2 proc 675 MHz)     |  |                  | 1197   | 3000                             |
| Cray T3E-1350 (1 proc 675 MHz)     | f90 ver. 3.5 -O3,inline2   | 591              | 728  | 1500                             |
| Cray SV1-1-32 (4 proc. 300 MHz)    | f90 -O3, inline2   | 596              | 3574   | 4800                             |
| Intel/HP Itanium 800 MHz           | f90 +Ofast +O3 +Onodataprefetch                                    | 580              | 2282   | 3200                             |
| HP i2000 Itanium 800 MHz(2 proc)   |  |                  | 3888   | 6400                             |
| HP i2000 Itanium 800 MHz(1 proc)   | f90 +Ofast +O3 +Onodatapretch                                      | 580              | 2282   | 3200                             |
| NEC SX-4/32 (32 proc. 8.0 ns)      |  |                  | 31060  | 64000                            |
| NEC SX-4/24 (24 proc. 8.0 ns)      |  |                  | 27440  | 48000                            |

| Computer   | “LINPACK Benchmark”<br>OS/Compiler  | n=100<br>Mflop/s | “TPP”<br>Best<br>Effort<br>n=1000<br>Mflop/s | “Theoretical<br>Peak”<br>Mflop/s |
|--|---|------------------|--|----------------------------------|
| NEC SX-4/16 (16 proc. 8.0 ns)                            |   |                  | 21470  | 32000                            |
| NEC SX-4/8 (8 proc. 8.0 ns)                              |   |                  | 12780  | 16000                            |
| NEC SX-4/4 (4 proc. 8.0 ns)                              |   |                  | 6780   | 8000                             |
| NEC SX-4/2 (2 proc. 8.0 ns)                              |   |                  | 3570   | 4000                             |
| NEC SX-4/1 (1 proc. 8.0 ns)                              | 137 R6.1 -fopp f=x inline   | 578              | 1944   | 2000                             |
| AMD Athlon Thunderbird 1200 Mhz                          | g77 -s -static -O3 -fomit-frame-pointer<br>-Wall -mpentiumpro -march=pentiumpro<br>-malign-functions=4 -funroll-loops<br>-fexpensive-optimizations<br>-malign-double -fschedule-insns2<br>-mwide-multiply | 558              | 1029   | 2400                             |
| Compaq Server DS20e(2 proc 667MHz)                       |   |                  | 1923   | 2668                             |
| Compaq Server DS20e(667 MHz)                             |   | 558              | 1025   | 1334                             |
| Compaq Server ES40(4 proc 667MHz)                        |   |                  | 3804   | 5336                             |
| Compaq Server ES40(2 proc 667MHz)                        |   |                  | 1923   | 2668                             |
| Compaq Server ES40(1 proc 667MHz)                        | kf77 -fkapargs='-inline=daxpy -ur=12<br>-ur2=320 ' -O5 -tune ev5 -assume<br>nounderscore  | 561              | 1031   | 1334                             |
| Cray SV1-1-32 (2 proc. 300 MHz)                          |   |                  | 1959   | 2400                             |
| Cray SV1-1-32 (1 proc. 300 MHz)                          | f90 -O3, inline2  | 549              | 1028   | 1200                             |
| NEC SX-4B/2(2proc.8.8ns)                                 |   |                  | 3246   | 3636                             |
| NEC SX-4B/1(1proc.8.8ns)                                 | R7.1 -fopp f=x inline   | 524              | 1767   | 1818                             |
| Tyan S2518/PentiumIII(1266 MHz,2 proc)                   |   |                  | 1478   | 2532                             |
| Tyan S2518/PentiumIII(1266 MHz,1 proc)                   | ifc -tpp6 -O3   | 503              | 830  | 1266                             |
| IBM RS/6000 44P-270 4 proc (450MHz,8MBL2)                |   |                  | 4396   | 7200                             |
| IBM RS/6000 44P-270 2 proc (450MHz,8MBL2)                |   |                  | 2521   | 3600                             |
| IBM RS/6000 44P-270 1 proc(450MHz,8MBL2)                 | -O -Q -qfloat=hsflt -qarch=pwr3<br>-qtune=pwr3 -Pv -Wp,-ea478,-g1   | 503              | 1451   | 1800                             |
| IBM eServer pSeries 610 Model B80 4 proc(450 MHz 8MB L2) |   |                  | 4396   | 7200                             |
| IBM eServer pSeries 610 Model B80 2 proc(450 MHz 8MB L2) |   |                  | 2521   | 3600                             |
| IBM eServer pSeries 610 Model B80 1 proc(450 MHz 8MB L2) | -O -Q -qfloat=hsflt -qarch=pwr3<br>-qtune=pwr3 -Pv -Wp,-ea478,-g1   | 503              | 1451   | 1800                             |
| IBM eServer pSeries 610 Model 6E1 2 proc(450 MHz 8MB L2) |   |                  | 2521   | 3600                             |
| IBM eServer pSeries 610 Model 6E1 1 proc(450 MHz 8MB L2) | -O -Q -qfloat=hsflt -qarch=pwr3<br>-qtune=pwr3 -Pv -Wp,-ea478,-g1   | 503              | 1451   | 1800                             |
| IBM eServer pSeries 610 Model 6C1 2 proc(450 MHz 8MB L2) |   |                  | 2521   | 3600                             |
| IBM eServer pSeries 610 Model 6C1 1 proc(450 MHz 8MB L2) | -O -Q -qfloat=hsflt -qarch=pwr3<br>-qtune=pwr3 -Pv -Wp,-ea478,-g1   | 503              | 1451   | 1800                             |
| IBM RS/6000 44P-170 (450 MHz)                            | -O -Q -qfloat=hsflt -qarch=pwr3<br>-qtune=pwr3 -Pv -Wp,-ea478,-g1   | 503              | 1440   | 1800                             |

| Computer                                  | “LINPACK Benchmark”<br>OS/Compiler   | n=100<br>Mflop/s | “TPP”<br>Best<br>Effort<br>n=1000<br>Mflop/s | “Theoretical<br>Peak”<br>Mflop/s |
|---|--|------------------|--|----------------------------------|
| NEC SX-4/Ce (1 proc. )                    | R7.1 -fopp f=x inline  | 500              | 980  | 1000                             |
| AMD Duron 900 (900 MHz)                   | ifc -static -O3 -tpp6 -ipo   | 486              | 977  | 1800                             |
| Fujitsu Siemens Celsius 460 (P4, 1.5 GHz) | pgf90 -fast  | 483              | 955  | 1500                             |
| Cray C90 (16 proc. 4.2 ns)                | CF77 5.0 -Zp -Wd-e68   | 479              | 10780  | 15238                            |
| HP SuperDome (16 proc 552 MHz)            |  |                  | 12220  | 35328                            |
| HP SuperDome (8 proc 552 MHz)             |  |                  | 8055   | 17664                            |
| HP SuperDome (4 proc 552 MHz)             |  |                  | 4319   | 8832                             |
| HP SuperDome (2 proc 552 MHz)             |  |                  | 2506   | 4416                             |
| HP SuperDome (1 proc 552 MHz)             | f77 +O3 +Oinline=daxpy   | 470              | 1497   | 2208                             |
| Cray C90 (8 proc. 4.2 ns)                 | CF77 5.0 -Zp -Wd-e68   | 468              | 6175   | 7619                             |
| HP N4000 (8 proc. 550 MHz)                |  |                  | 7762   | 17600                            |
| HP N4000 (4 proc. 550 MHz)                |  |                  | 4494   | 8800                             |
| HP N4000 (2 proc. 550 MHz)                |  |                  | 2662   | 4400                             |
| HP N4000 (1 proc. 550 MHz)                | f77 +O3 +Oinline=daxpy   | 468              | 1583   | 2200                             |
| NEC SX-4/16A(16proc.8.0ns)                |  |                  | 20620  | 32000                            |
| NEC SX-4/8A(8proc.8.0ns)                  |  |                  | 12490  | 16000                            |
| NEC SX-4/4A(4proc.8.0ns)                  |  |                  | 6692   | 8000                             |
| NEC SX-4/2A(2proc.8.0ns)                  |  |                  | 3525   | 4000                             |
| NEC SX-4/1A(1proc.8.0ns)                  | R7.1 -fopp f=x inline  | 467              | 1929   | 2000                             |
| NEC SX-4B/2A (2 proc. 8.8 ns)             |  |                  | 3204   | 3636                             |
| HP V2600 (16 proc 550 MHz)                |  |                  | 9068   | 35200                            |
| HP V2600 (8 proc 550 MHz)                 |  |                  | 6323   | 17600                            |
| HP V2600 (4 proc 550 MHz)                 |  |                  | 3448   | 8800                             |
| HP V2600 (2 proc 550 MHz)                 |  |                  | 2030   | 4400                             |
| Hewlett-Packard V2600(550 MHz)            | f77 +O3 +Oinline=daxpy   | 465              | 1221   | 2200                             |
| Compaq 8400 6/575(8proc 1.7 ns)           |  |                  | 5305   | 9600                             |
| Compaq 8400 6/575(6proc 1.7 ns)           |  |                  | 4085   | 6900                             |
| Compaq 8400 6/575(4proc 1.7 ns)           |  |                  | 3003   | 4600                             |
| Compaq 8400 6/575(2proc 1.7 ns)           |  |                  | 1615   | 2300                             |
| Compaq 8400 6/575(1proc 1.7 ns)           | kf77 -fkapargs='-inline=daxpy -ur=12'<br>-tune ev6 -O5   | 460              | 847  | 1150                             |
| NEC SX-4B/e (1 proc. 8.8ns)               | R7.1 -fopp f=x inline  | 454              | 890  | 909                              |
| AMD Opteron (1 proc. 1200 MHz)            | g77 -O3 -fforce-addr<br>-fomit-frame-pointer -funroll-loops<br>-frerun-cse-after-loop -frerun-loop-opt<br>-falign-functions=4 -static -s<br>-fexpensive-optimizations<br>-fschedule-insns2 | 443              |  | 2400                             |
| Compaq Alpha Server DS20/500MHz           | kf77 -fkapargs='-inline=daxpy -ur=12'  | 440              |  | 1000                             |

| Computer                                       | “LINPACK Benchmark”<br>OS/Compiler                                | n=100<br>Mflop/s | “TPP”<br>Best<br>Effort<br>n=1000<br>Mflop/s | “Theoretical<br>Peak”<br>Mflop/s |
|--|---|------------------|--|----------------------------------|
|  | -tune ev6 -O5   |                  |  |                                  |
| Compaq 8200 6/575(6proc 1.7 ns)                |   |                  | 3981   | 6900                             |
| Compaq 8200 6/575(4proc 1.7 ns)                |   |                  | 3003   | 4600                             |
| Compaq 8200 6/575(2proc 1.7 ns)                |   |                  | 1615   | 2300                             |
| Compaq 8200 6/575(1proc 1.7 ns)                | kf77 -fkapargs='-inline=daxpy -ur=12'<br>-tune ev6 -O5            | 431              | 831  | 1150                             |
| NEC SX-4B/1A (1 proc. 8.8 ns)                  | R7.1 -fopp f=x inline   | 427              | 1753   | 1818                             |
| IBM RS/6K 44P-270(4 proc 375 MHz)              |   |                  | 3879   | 6000                             |
| IBM RS/6K 44P-270(2 proc 375 MHz)              |   |                  | 2101   | 3000                             |
| IBM RS/6K 44P-270(1 proc 375 MHz)              | -O -Q -qfloat=hsflt -qarch=pwr3<br>-qtune=pwr3 -Pv -Wp,-ea478,-g1 | 426              | 1109   | 1500                             |
| IBM RS/6K 7026-B08(4 proc 375 MHz)             |   |                  | 3879   | 6000                             |
| IBM RS/6K 7026-B08(2 proc 375 MHz)             |   |                  | 2101   | 3000                             |
| IBM RS/6K 7026-B08(1 proc 375 MHz)             | -O -Q -qfloat=hsflt -qarch=pwr3<br>-qtune=pwr3 -Pv -Wp,-ea478,-g1 | 426              | 1109   | 1500                             |
| IBM eServer pSeries 640 (4 proc,375MHz,4MB L2) |   |                  | 3879   | 6000                             |
| IBM eServer pSeries 640 (2 proc,375MHz,4MB L2) |   |                  | 2101   | 3000                             |
| IBM eServer pSeries 640 (1 proc,375MHz,4MB L2) | -qarch=pwr3 -qtune=pwr3 -Pv<br>-Wp,-ea478,-g1                     | 426              | 1109   | 1500                             |
| IBM RS/6K 44P-270 (4 proc,375MHz,4MB L2)       |   |                  | 3879   | 6000                             |
| IBM RS/6K 44P-270 (2 proc,375MHz,4MB L2)       |   |                  | 2101   | 3000                             |
| IBM RS/6K 44P-270 (1 proc,375MHz,4MB L2)       | -O -Q -qfloat=hsflt -qarch=pwr3<br>-qtune=pwr3 -Pv -Wp,-ea478,-g1 | 426              | 1109   | 1500                             |
| IBM eServer pSeries 640 (4 proc,375MHz,8MB L2) |   |                  | 3902   | 6000                             |
| IBM eServer pSeries 640 (2 proc,375MHz,8MB L2) |   |                  | 2180   | 3000                             |
| IBM eServer pSeries 640 (1 proc,375MHz,8MB L2) | -qarch=pwr3 -qtune=pwr3 -Pv<br>-Wp,-ea478,-g1                     | 426              | 1234   | 1500                             |
| IBM RS/6K 44P-270 (4 proc,375MHz,8MB L2)       |   |                  | 3902   | 6000                             |
| IBM RS/6K 44P-270 (2 proc,375MHz,8MB L2)       |   |                  | 2180   | 3000                             |
| IBM RS/6K 44P-270 (1 proc,375MHz,8MB L2)       | -O -Q -qfloat=hsflt -qarch=pwr3<br>-qtune=pwr3 -Pv -Wp,-ea478,-g1 | 426              | 1234   | 1500                             |
| IBM RS/6K SP Power3(16 proc 375 MHz)           |   |                  | 7699   | 24000                            |
| IBM RS/6K SP Power3(12 proc 375 MHz)           |   |                  | 7187   | 18000                            |
| IBM RS/6K SP Power3(8 proc 375 MHz)            |   |                  | 5928   | 12000                            |
| IBM RS/6K SP Power3(4 proc 375 MHz)            |   |                  | 3728   | 6000                             |
| IBM RS/6K SP Power3(1 proc 375 MHz)            | -O -Q -qfloat=hsflt -qarch=pwr3<br>-qtune=pwr3 -Pv -Wp,-ea478,-g1 | 424              | 1208   | 1500                             |
| Cray 3-128 (4 proc. 2.11 ns)                   | CSOS 1.0 level 129  | 421              | 2862   | 3792                             |

| Computer                            | “LINPACK Benchmark”<br>OS/Compiler  | n=100<br>Mflop/s | “TPP”<br>Best<br>Effort<br>n=1000<br>Mflop/s | “Theoretical<br>Peak”<br>Mflop/s |
|-------------------------------------|---|------------------|--|----------------------------------|
| Compaq/DEC Alpha 21264 EV67 500 MHz | -O5 -arch host -tune host   | 412              | 637  | 1000                             |
| Hitachi S-3800/480(4 proc 2 ns)     |   |                  | 20640  | 32000                            |
| Hitachi S-3800/380(3 proc 2 ns)     |   |                  | 16880  | 24000                            |
| Hitachi S-3800/280(2 proc 2 ns)     |   |                  | 12190  | 16000                            |
| Hitachi S-3800/180(1 proc 2 ns)     | OSF/1 MJ FORTRAN:V03-00   | 408              | 6431   | 8000                             |
| IBM RS/6K SP (4 proc 375 MHz)       |   |                  | 3700   | 6000                             |
| IBM RS/6K SP (2 proc 375 MHz)       |   |                  | 2166   | 3000                             |
| IBM RS/6K SP (1 proc 375 MHz)       | xlf 6.1.0.3 -O3 -Q -qfloat=hsflt<br>-qarch=pwr3 -qtune=pwr3 -Pv<br>-Wp,-ea478,-g1 | 409              | 1236   | 1500                             |
| Cray 3-128 (2 proc. 2.11 ns)        | CSOS 1.0 level 129  | 393              | 1622   | 1896                             |
| Cray C90 (4 proc. 4.2 ns)           | CF77 5.0 -Zp -Wd-e68  | 388              | 3275   | 3810                             |
| Cray C90 (2 proc. 4.2 ns)           | CF77 5.0 -Zp -Wd-e68  | 387              | 1703   | 1905                             |
| Cray C90 (1 proc. 4.2 ns)           | CF77 5.0 -Zp -Wd-e68  | 387              | 902  | 952                              |
| HP N4000 (8 proc. 440 MHz)          |   |                  | 6410   | 14080                            |
| HP N4000 (4 proc. 440 MHz)          |   |                  | 3724   | 7040                             |
| HP N4000 (2 proc. 440 MHz)          |   |                  | 2212   | 3520                             |
| HP N4000 (1 proc. 440 MHz)          | f77 +O3 +Oinline=daxpy  | 375              | 1290   | 1760                             |
| HP V2500 (16 proc. 440 MHz)         |   |                  | 8217   | 28160                            |
| HP V2500 (12 proc. 440 MHz)         |   |                  | 6914   | 21120                            |
| HP V2500 (8 proc. 440 MHz)          |   |                  | 5111   | 14080                            |
| HP V2500 (4 proc. 440 MHz)          |   |                  | 3041   | 7040                             |
| HP V2500 (2 proc. 440 MHz)          |   |                  | 1751   | 3520                             |
| HP V2500 (1 proc. 440 MHz)          | f77 +O3 +Oinline=daxpy  | 375              | 1047   | 1760                             |
| NEC SX-3/44R (4 proc. 2.5 ns)       |   |                  | 15120  | 25600                            |
| NEC SX-3/42R (4 proc. 2.5 ns)       |   |                  | 8950   | 12800                            |
| NEC SX-3/41R (4 proc. 2.5 ns)       |   |                  | 4815   | 6400                             |
| NEC SX-3/34R (3 proc. 2.5 ns)       |   |                  | 12730  | 19200                            |
| NEC SX-3/32R (3 proc. 2.5 ns)       |   |                  | 6718   | 9600                             |
| NEC SX-3/31R (3 proc. 2.5 ns)       |   |                  | 3638   | 4800                             |
| NEC SX-3/24R (2 proc. 2.5 ns)       |   |                  | 9454   | 12800                            |
| NEC SX-3/22R (2 proc. 2.5 ns)       |   |                  | 5116   | 6400                             |
| NEC SX-3/21R (2 proc. 2.5 ns)       |   |                  | 2627   | 3200                             |
| NEC SX-3/14R (1 proc. 2.5 ns)       | f77sx 040 R2.2 -pi*:*   | 368              | 5199   | 6400                             |
| NEC SX-3/12R (1 proc. 2.5 ns)       | f77sx 040 R2.2 -pi*:*   | 368              | 2757   | 3200                             |
| Intel P4 1700 MHz                   | g77 -O3 -fomit-frame-pointer<br>-funroll-loops                                    | 363              | 1393   | 3400                             |

| Computer  | “LINPACK Benchmark”<br>OS/Compiler                                     | n=100<br>Mflop/s | “TPP”<br>Best<br>Effort<br>n=1000<br>Mflop/s | “Theoretical<br>Peak”<br>Mflop/s |
|---|--|------------------|--|----------------------------------|
| IBM eServer pSeries 620/6F1 6 CPUs(668 MHz 8 MB L2) |  |                  | 4529   | 8016                             |
| IBM eServer pSeries 620/6F1 4 CPUs(600 MHz 4 MB L2) |  |                  | 3144   | 4800                             |
| IBM eServer pSeries 620/6F1 2 CPUs(600 MHz 4 MB L2) |  |                  | 1650   | 2400                             |
| IBM eServer pSeries 620/6F1 1 CPU (600 MHz 2 MB L2) | xlf 7.1 -O -Q -qfloat=hsflt -qarch=pwr3 -qtune=pwr3 -Pv -Wp,-ea478,-g1 | 360              | 833  | 1200                             |
| IBM eServer pSeries 660/6H1 6 CPUs(668 MHz 8 MB L2) |  |                  | 4529   | 8016                             |
| IBM eServer pSeries 660/6H1 4 CPUs(600 MHz 4 MB L2) |  |                  | 3144   | 4800                             |
| IBM eServer pSeries 660/6H1 2 CPUs(600 MHz 4 MB L2) |  |                  | 1650   | 2400                             |
| IBM eServer pSeries 660/6H1 1 CPU (600 MHz 2 MB L2) | xlf 7.1 -O -Q -qfloat=hsflt -qarch=pwr3 -qtune=pwr3 -Pv -Wp,-ea478,-g1 | 360              | 833  | 1200                             |
| Acer TravelMate 803LMi Intel Pentium M (1.6GHz)     | f77 -O3  | 352              |  | 3200                             |
| Sun UltraSparc III 750 MHz                          | -fast -native -xsafe=mem -dalign -xO5 -xarch=v8plusa -xchip=ultra      | 343              | 769  | 1500                             |
| Cray 3-128 (1 proc. 2.11 ns)                        | CSOS 1.0 level 129   | 327              | 876  | 948                              |
| Intel P4 1500 MHz                                   | g77 -O3 -fomit-frame-pointer -funroll-loops                            | 326              | 1311   | 3000                             |
| Gigabyte GA-7VX/AMD Athlon(700 MHz)                 | ifc -tpp6 -O3  | 317              | 772  | 1400                             |
| IBM RS6000/397(160 MHz ThinNode)                    | -qarch=pwr2 -qhot -O3 -Pv -Wp,-ea478,-g1                               | 315              | 532  | 640                              |
| Compaq XP1000 (500 MHz)                             | kf77 -tune ev6 -O5 -fkapargs='-inline=daxpy -ur=12'                    | 335              |  | 1000                             |
| NEC SX-3/44 (4 proc. 2.9 ns)                        |  |                  | 13420  | 22000                            |
| NEC SX-3/24 (2 proc. 2.9 ns)                        |  |                  | 8149   | 11000                            |
| NEC SX-3/42 (4 proc. 2.9 ns)                        |  |                  | 7752   | 11000                            |
| NEC SX-3/22 (2 proc. 2.9 ns)                        |  |                  | 4404   | 5500                             |
| NEC SX-3/14 (1 proc. 2.9 ns)                        | f77sx 020 R1.13 -pi*:*   | 314              | 4511   | 5500                             |
| NEC SX-3/12 (1 proc. 2.9 ns)                        | f77sx 020 R1.13 -pi*:*   | 313              | 2283   | 2750                             |
| DEC 8400 5/625(8 proc,612 MHz)                      |  |                  | 3608   | 9792                             |
| DEC 8400 5/625(4 proc,612 MHz)                      |  |                  | 2377   | 4896                             |
| DEC 8400 5/625(2 proc,612 MHz)                      |  |                  | 1375   | 2448                             |
| DEC 8400 5/625(1 proc,612 MHz)                      | f77 -O5 -fast  | 287              | 764  | 1224                             |
| Apple PowerPC G4 1 GHz                              | f90 -q -YEXT_SFX=_ -O3 -YEXT_NAMES=LCS -YCFRL=1                        | 284              | 1000   | 2000                             |
| Cray Y-MP/832 (8 proc. 6 ns)                        | CF77 4.0 -Zp -Wd-e68   | 275              | 2144   | 2667                             |
| Compaq Alpha Server ds20/500MHz                     | -fast -O5 -arch ev6 -tune ev6  | 270              |  | 1000                             |
| DEC 8200 5/625(8 proc,612 MHz)                      |  |                  | 2696   | 9792                             |
| DEC 8200 5/625(4 proc,612 MHz)                      |  |                  | 2313   | 4896                             |

| Computer                              | “LINPACK Benchmark”<br>OS/Compiler   | n=100<br>Mflop/s | “TPP”<br>Best<br>Effort<br>n=1000<br>Mflop/s | “Theoretical<br>Peak”<br>Mflop/s |
|---------------------------------------|--|------------------|--|----------------------------------|
| DEC 8200 5/625(2 proc,612 MHz)        |  |                  | 1366   | 2448                             |
| DEC 8200 5/625(1 proc,612 MHz)        | f77 -O5 -fast  | 268              | 750  | 1224                             |
| IBM RS6K/595(135 MHz WideNode)        | -qarch=pwr2 -qhot -O3 -Pv<br>-Wp,-ea478,-g1  | 265              | 440  | 540                              |
| IBM RS6K SP Power3SMP(8 Proc 222 MHz) |  |                  | 3516   | 7104                             |
| IBM RS6K SP Power3SMP(6 Proc 222 MHz) |  |                  | 3014   | 5328                             |
| IBM RS6K SP Power3SMP(4 Proc 222 MHz) |  |                  | 2153   | 3552                             |
| IBM RS6K SP Power3SMP(2 Proc 222 MHz) |  |                  | 1247   | 1776                             |
| AMD Athlon (600 Mhz)                  | g77 -O3 -s -funroll-loops<br>-fomit-frame-pointer                                  | 260              | 557  | 1200                             |
| IBM RS6K SP Power3SMP(1 Proc 222 MHz) | -O3 -Q -qfloat=hsflt -qarch=pwr3<br>-qtune=pwr3 -bnso -bl:/lib/syscalls.exp<br>-Pv | 250              | 684  | 888                              |
| Fujitsu VP2600/10 (3.2 ns)            | FORTRAN77 EX/VP V11L10   | 249              | 4009   | 5000                             |
| DEC 500/500 (1 proc, 500 MHz)         | kf77 -inline=daxpy -ur=3 -fast -O5 -tune<br>ev5                                    | 235              | 590  | 1000                             |
| Intel Pentium III 933 MHz             | g77 -O3 -fomit-frame-pointer<br>-funroll-loops                                     | 234              | 514  | 933                              |
| IBM P2SC (120 MHz Thin Node)          | -qarch=pwr2 -qhot -O3 -Pv<br>-Wp,-ea478,-g1 -funroll-loops                         | 233              | 406  | 480                              |
| Apple PowerPC G4 533 MHz              | g77 -O3 -fomit-frame-pointer<br>-funroll-loops                                     | 231              | 478  | 1066                             |
| DEC PersonalWorkstation 600           | -O5 -fast -tune ev56 -inline all -speculate<br>all                                 | 227              |  | 1200                             |
| Cray Y-MP/832 (4 proc. 6 ns)          | CF77 4.0 -Zp -Wd-e68   | 226              | 1159   | 1333                             |
| Sun Ultra 80(4 proc 450MHz)           |  |                  | 2062.0                                       | 3600                             |
| Sun Ultra 80(3 proc 450MHz)           |  |                  | 1615.0                                       | 2700                             |
| Sun Ultra 80(2 proc 450MHz)           |  |                  | 1172.0                                       | 1800                             |
| Sun Ultra 80 (450MHz/4MB L2)          | -fast -xO5 -xarch=v8plusa -xchip=ultra   | 208              | 607  | 900                              |
| Fujitsu VPP500/1(1 proc. 10 ns)       | FORTRAN77EX/VP V12L20  | 206              | 1490   | 1600                             |
| DEC 8400 5/440(8 proc, 440 MHz)       | kf77 -inline=daxpy -ur=3 -fast -O5 -tune<br>ev5                                    |                  | 3112   | 7040                             |
| DEC 8100 5/440(4 proc, 440 MHz)       | kf77 -inline=daxpy -ur=3 -fast -O5 -tune<br>ev5                                    |                  | 1945   | 3520                             |
| DEC 8100 5/440(2 proc, 440 MHz)       | kf77 -inline=daxpy -ur=3 -fast -O5 -tune<br>ev5                                    |                  | 1090   | 1760                             |
| DEC 8100 5/440(1 proc, 440 MHz)       | kf77 -inline=daxpy -ur=3 -fast -O5 -tune<br>ev5                                    | 205              | 588  | 880                              |
| Cray Y-MP M98 (8 proc. 6 ns)          | CF77 5.0 -Zp -Wd-e68   | 204              | 1733   | 2666                             |
| Fujitsu VX/1 (1 proc. 7 ns)           | Fortran90/VP V10L10  | 203              | 1936   | 2200                             |
| Fujitsu VPP300/1 (1 proc. 7 ns)       | Fortran90/VP V10L10  | 203              | 1936   | 2200                             |
| Fujitsu VPP700/1 (1 proc. 7 ns)       | Fortran90/VP V10L10  | 203              | 1936   | 2200                             |
| Fujitsu VP2200/10 (3.2 ns)            | FORTRAN77 EX/VP V12L10   | 203              | 1048   | 1250                             |
| HP Exemplar V-Class(16 proc.240 MHz)  | +O3 +Oinline=daxpy   |                  | 5935   | 15360                            |

| Computer                             | “LINPACK Benchmark”<br>OS/Compiler  | n=100<br>Mflop/s | “TPP”<br>Best<br>Effort<br>n=1000<br>Mflop/s | “Theoretical<br>Peak”<br>Mflop/s |
|--------------------------------------|---|------------------|--|----------------------------------|
| HP Exemplar V-Class(14 proc.240 MHz) | +O3 +Oinline=daxpy  |                  | 5394   | 13440                            |
| HP Exemplar V-Class(12 proc.240 MHz) | +O3 +Oinline=daxpy  |                  | 5202   | 11520                            |
| HP Exemplar V-Class(10 proc.240 MHz) | +O3 +Oinline=daxpy  |                  | 4585   | 9600                             |
| HP Exemplar V-Class(8 proc.240 MHz)  | +O3 +Oinline=daxpy  |                  | 4125   | 7680                             |
| HP Exemplar V-Class(6 proc.240 MHz)  | +O3 +Oinline=daxpy  |                  | 3350   | 4760                             |
| HP Exemplar V-Class(4 proc.240 MHz)  | +O3 +Oinline=daxpy  |                  | 2414   | 3840                             |
| HP Exemplar V-Class(2 proc.240 MHz)  | +O3 +Oinline=daxpy  |                  | 1260   | 1920                             |
| HP Exemplar V-Class(1 proc.240 MHz)  | HP-UX 11.0 +O3 +Oinline=daxpy   | 203              | 743  | 960                              |
| Cray 2S/4-128 (4 proc. 4.1 ns)       | CSOS 1.0 level 129  | 202              | 1406   | 1951                             |
| NEC SX-3/11R (1 proc. 2.5 ns)        | f77sx 040 R2.2 -pi*:*   | 202              | 1418   | 1600                             |
| NEC SX-3/1LR (1 proc. 2.5 ns)        | f77sx 040 R2.2 -pi*:*   | 201              | 767  | 800                              |
| Hewlett-Packard C240 236 MHz         | +O3 +Oinline=daxpy  | 197              | 667  | 944                              |
| Intel Pentium III 933 MHz            | g77 -O3   | 192              | 507  | 933                              |
| DEC 500/400 (1 proc, 400 MHz)        | kf77 -inline=daxpy -ur=3 -fast -O5 -tune<br>ev5   | 189              | 449  | 800                              |
| DEC 4100 5/400(4 proc, 400 MHz)      | kf77 -inline=daxpy -ur=3 -fast -O5 -tune<br>ev5   |                  | 1821   | 3200                             |
| DEC 4100 5/400(2 proc, 400 MHz)      | kf77 -inline=daxpy -ur=3 -fast -O5 -tune<br>ev5   |                  | 1001   | 1600                             |
| DEC 4100 5/400(1 proc, 400 MHz)      | kf77 -inline=daxpy -ur=3 -fast -O5 -tune<br>ev5   | 189              | 531  | 800                              |
| DEC 1000A 5/400(1 proc, 400 MHz)     | kf77 -inline=daxpy -ur=3 -fast -O5 -tune<br>ev5   | 187              | 440  | 800                              |
| Sun HPC 450 (400 MHz, 4 proc)        |   |                  | 1841   | 3200                             |
| Sun HPC 450 (400 MHz, 2 proc)        |   |                  | 1050   | 1600                             |
| Sun HPC 450 (400 MHz, 4MB L2)        | -fast -xO5 -xarch=v8plusa -xchip=ultra  | 183              | 552  | 800                              |
| Cray Y-MP/832 (2 proc. 6 ns)         | CF77 5.0 -Zp -Wd-e68  | 181              | 604  | 667                              |
| Cray X-MP/416 (4 proc. 8.5 ns)       | CF77 4.0 -Zp -Wd-e68  | 178              | 822  | 940                              |
| Cray Y-MP M98 (4 proc. 6 ns)         | CF77 5.0 -Zp -Wd-e68  | 177              | 1114   | 1333                             |
| Sun UltraSparc II 300 MHz            | -fast -native -xsafe=mem -dalign -xO5<br>-xarch=v8plusa -xchip=ultra  | 176              | 296  | 600                              |
| SGI Origin 2000 (300 Mhz,16 proc)    |   |                  | 3970   | 9600                             |
| SGI Origin 2000 (300 Mhz, 8 proc)    |   |                  | 3032   | 4800                             |
| SGI Origin 2000 (300 Mhz, 4 proc)    |   |                  | 1957   | 2400                             |
| SGI Origin 2000 (300 Mhz, 2 proc)    |   |                  | 1074   | 1200                             |
| SGI Origin 2000 (300 Mhz)            | f77 -IPA -O3 -n32 -mips4 -r10000<br>-call_shared -TENV:X=4<br>-OPT:IEEE_arithmetic=3:roundoff=3<br>-LNO:blocking=off:ou_max=6:pf2=0<br>-INLINE:array_bounds | 173              | 553  | 600                              |
| NEC SX-3/11 (1 proc. 2.9 ns)         | f77sx 020 R1.13 -pi*:*  | 173              | 1223   | 1370                             |
| Sun UltraSparc II 300 MHz            | -fast -native -xsafe=mem -dalign -xO5   | 172              | 285  | 600                              |



| Computer                             | “LINPACK Benchmark”<br>OS/Compiler  | n=100<br>Mflop/s | “TPP”<br>Best<br>Effort<br>n=1000<br>Mflop/s | “Theoretical<br>Peak”<br>Mflop/s |
|--------------------------------------|---|------------------|--|----------------------------------|
|                                      | -xarch=v8plusa -xchip=ultra   |                  |  |                                  |
| NEC SX-3/1L (1 proc. 2.9 ns)         | f77sx 020 R1.13 -pi*:*  | 171              | 661  | 680                              |
| SGI Octane (360 MHz) IP30            | f77 -O  | 170              |  | 720                              |
| Fujitsu VP2400/10 (4 ns)             | FORTRAN77 EX/VP V11L10  | 170              | 1688   | 2000                             |
| HP Exemplar V-Class(16 proc.200 MHz) | HP-UX 11.0  |                  | 4832   | 12800                            |
| HP Exemplar V-Class(14 proc.200 MHz) | HP-UX 11.0  |                  | 4442   | 11200                            |
| HP Exemplar V-Class(12 proc.200 MHz) | HP-UX 11.0  |                  | 4109   | 8400                             |
| HP Exemplar V-Class(10 proc.200 MHz) | HP-UX 11.0  |                  | 3506   | 8000                             |
| HP Exemplar V-Class(8 proc.200 MHz)  | HP-UX 11.0  |                  | 3206   | 6400                             |
| HP Exemplar V-Class(6 proc.200 MHz)  | HP-UX 11.0  |                  | 2608   | 4200                             |
| HP Exemplar V-Class(4 proc.200 MHz)  | HP-UX 11.0  |                  | 1912   | 3200                             |
| HP Exemplar V-Class(2 proc.200 MHz)  | HP-UX 11.0  |                  | 1082   | 1600                             |
| HP Exemplar V-Class(1 proc.200 MHz)  | HP-UX 11.0 +O3 +Oinline=daxpy   | 169              | 613  | 800                              |
| SGI Octane R12000 IP30 270 MHz       | -O3 -64 -OPT:Olimit=15000<br>-TARG:platform=IP30<br>-LNO:blocking=OFF           | 169              | 400  | 540                              |
| Compaq Alpha 21164 EV56 533 MHz      | g77 -O3 -fomit-frame-pointer<br>-funroll-loops                                  | 168              | 508  | 1066                             |
| Cray 2S/4-128 (2 proc. 4.1 ns)       | CSOS 1.0 level 129  | 167              | 741  | 976                              |
| Hewlett-Packard C200 200 MHz         | +O3 +Oinline=daxpy  | 166              | 550  | 800                              |
| DEC 8400 5/350 (1 proc 350 MHz)      | kf77 -fkapargs='-inline=daxpy<br>-ur3=100' -tune ev5 -O5 -assume<br>nunderscore | 164              | 510  | 700                              |
| DEC 8400 5/300 (8 proc 300 MHz)      |   |                  | 2282   | 4800                             |
| DEC 8400 5/300 (6 proc 300 MHz)      |   |                  | 1902   | 3600                             |
| DEC 8400 5/300 (4 proc 300 MHz)      |   |                  | 1351   | 2400                             |
| DEC 8400 5/300 (2 proc 300 MHz)      |   |                  | 757  | 1200                             |
| Cray Y-MP/832 (1 proc. 6 ns)         | CF77 5.0 -Zp -Wd-e68  | 161              | 324  | 333                              |
| ASUS P2B-F/Celeron(433 MHz,1 Proc)   | ifc -tpp6 -O3   | 160              | 263  | 433                              |
| Convex C4/XA-4(4 proc) (7.41 ns)     | fc9.0.0.5 -tm c4 -O3 -ds -ep 4 -is .  | 160              | 2531   | 3240                             |
| Hewlett-Packard K460-EG 180 MHz      | +Oall +Oinline=daxpy  | 158              | 510  | 720                              |
| Hewlett-Packard C180-XP 180 MHz      | +Oall +Oinline=daxpy  | 158              | 480  | 720                              |
| HP Exemplar S-Class (16 proc)        | SPP-UX 5.2  |                  | 4609   | 11520                            |
| HP Exemplar S-Class (14 proc)        | SPP-UX 5.2  |                  | 4217   | 10080                            |
| HP Exemplar S-Class (12 proc)        | SPP-UX 5.2  |                  | 4019   | 8640                             |
| HP Exemplar S-Class (10 proc)        | SPP-UX 5.2  |                  | 3389   | 7200                             |
| HP Exemplar S-Class (8 proc)         | SPP-UX 5.2  |                  | 2979   | 5760                             |
| HP Exemplar S-Class (6 proc)         | SPP-UX 5.2  |                  | 2305   | 4320                             |
| HP Exemplar S-Class (4 proc)         | SPP-UX 5.2  |                  | 1629   | 2880                             |

| Computer                         | “LINPACK Benchmark”<br>OS/Compiler   | n=100<br>Mflop/s | “TPP”<br>Best<br>Effort<br>n=1000<br>Mflop/s | “Theoretical<br>Peak”<br>Mflop/s |
|----------------------------------|--|------------------|--|----------------------------------|
| HP Exemplar S-Class (2 proc)     | SPP-UX 5.2   |                  | 967  | 1440                             |
| HP Exemplar S-Class(1 proc)      | SPP-UX 5.2+Oall +Oinline=daxpy   | 156              | 545  | 720                              |
| Sun UltraSPARC II(30 proc)336MHz |  |                  | 5187   | 20160                            |
| Sun UltraSPARC II(24 proc)336MHz |  |                  | 4755   | 16128                            |
| Sun UltraSPARC II(16 proc)336MHz |  |                  | 3981   | 10752                            |
| Sun UltraSPARC II(14 proc)336MHz |  |                  | 3721   | 9408                             |
| Sun UltraSPARC II(8 proc)336MHz  |  |                  | 2481   | 5376                             |
| Sun UltraSPARC II(6 proc)336MHz  |  |                  | 1990   | 4032                             |
| Sun UltraSPARC II(4 proc)336MHz  |  |                  | 1438   | 2688                             |
| Sun UltraSPARC II(2 proc)336MHz  |  |                  | 843  | 1344                             |
| Sun UltraSPARC II(1 proc)336MHz  | -fast -xO5 -xarch=v8plusa -xchip=ultra<br>-o                                       | 154              | 461  | 672                              |
| Cray Y-MP M98 (2 proc. 6 ns)     | CF77 5.0 -Zp -Wd-e68   | 154              | 596  | 666                              |
| DEC AlphaStation 600 5/333 MHz   | -fkapargs='-inline=daxpy -ur3=100'<br>-tune ev5 -O5                                | 153              |  | 666                              |
| Convex C4/XA-3(3 proc) (7.41 ns) | fc9.0.0.5 -tm c4 -O3 -ds -ep 3 -is .   | 151              | 1933   | 2430                             |
| Cray Y-MP M98 (1 proc. 6 ns)     | CF77 5.0 -Zp -Wd-e68   | 150              | 307  | 333                              |
| Cray Y-MP M92 (2 proc. 6 ns)     | CF77 5.0 -Zp -Wd-e68   | 145              | 550  | 666                              |
| Cray Y-MP M92 (1 proc. 6 ns)     | CF77 5.0 -Zp -Wd-e68   | 145              | 332  | 333                              |
| Cray X-MP/416 (2 proc. 8.5 ns)   | CF77 5.0 -Zp -Wd-e68   | 143              | 426  | 470                              |
| IBM RS/6000-R24 (71.5 MHz)       | v3.1.1 xlf -Pv -Wp,-me,-ew -O3<br>-qarch=pwrx -qtune=pwrx -qhot-qhsflt<br>-qnosave | 142              | 246  | 284                              |
| DEC Alphastations 433 MHz        | f90 -O   | 141              |  | 866                              |
| Hewlett-Packard C160 160 MHz     | +Oall +Oinline=daxpy   | 140              | 421  | 640                              |
| IBM POWER2-990(71.5 MHz)         | -O-Pv-Wp-ea478-g1-qarch=pwrx   | 140              | 254  | 286                              |
| DEC 4100 5/300(4 proc, 300 MHz)  | kf77 -inline=daxpy -ur=3 -fast -O5 -tune<br>ev5                                    |                  | 1287   | 2400                             |
| DEC 4100 5/300(2 proc, 300 MHz)  | kf77 -inline=daxpy -ur=3 -fast -O5 -tune<br>ev5                                    |                  | 734  | 1200                             |
| DEC 4100 5/300(1 proc, 300 MHz)  | kf77 -inline=daxpy -ur=3 -fast -O5 -tune<br>ev5                                    | 140              | 420  | 600                              |
| DEC 8400 5/350 (8 proc 350 MHz)  |  |                  | 2853   | 5600                             |
| DEC 8400 5/350 (6 proc 350 MHz)  |  |                  | 2313   | 4200                             |
| DEC 8400 5/350 (4 proc 350 MHz)  |  |                  | 1678   | 2800                             |
| DEC 8400 5/350 (2 proc 350 MHz)  |  |                  | 938  | 1400                             |
| DEC 8400 5/300 (1 proc 300 MHz)  | -inline=daxpy -ur=3 -fast -O5 -tune ev5  | 140              | 411  | 600                              |
| DEC 8200 5/300 (6 proc 300 MHz)  |  |                  | 1821   | 3600                             |
| DEC 8200 5/300 (4 proc 300 MHz)  |  |                  | 1317   | 2400                             |
| DEC 8200 5/300 (2 proc 300 MHz)  |  |                  | 752  | 1200                             |

| Computer                             | “LINPACK Benchmark”<br>OS/Compiler   | n=100<br>Mflop/s | “TPP”<br>Best<br>Effort<br>n=1000<br>Mflop/s | “Theoretical<br>Peak”<br>Mflop/s |
|--------------------------------------|--|------------------|--|----------------------------------|
| DEC 8200 5/300 (1 proc 300 MHz)      | -inline=daxpy -ur=3 -fast -O5 -tune ev5  | 140              | 411  | 600                              |
| Pentium III (750 MHz)                | gnu f77 -O3  | 138              |  | 750                              |
| SGI Octane R12000 IP30 270 MHz       | -O3 -64 -OPT:Olimit=15000<br>-TARG:platform=IP30<br>-LNO:blocking=OFF  | 137              | 400  | 540                              |
| Apple PowerBook G4 (500 MHz)         | g77 -v   | 135              |  | 1000                             |
| IBM RS/6000-59H (66 MHz)             | v3.1.1 xlf -Pv -Wp,-me,-ew -O3<br>-qarch=pwrx -qtune=pwrx -qhot-qhsflt<br>-qnosave   | 132              | 230  | 264                              |
| IBM POWER2 model 590(66 MHz)         | -O-Pv-Wp,-ea478,-g1-qarch=pwrx   | 130              | 236  | 264                              |
| Convex C4/XA-2(2 proc) (7.41 ns)     | fc9.0.0.5 -tm c4 -O3 -ds -ep 2 -is .   | 129              | 1335   | 1620                             |
| Cray J916 (16 proc. 10 ns)           | CF77 6.0 -Zp -Wd-e68   |                  | 2471   | 3200                             |
| Cray J916 (12 proc. 10 ns)           | CF77 6.0 -Zp -Wd-e68   |                  | 2046   | 2400                             |
| Cray J916 (8 proc. 10 ns)            | CF77 6.0 -Zp -Wd-e68   |                  | 1439   | 1600                             |
| Cray J916 (7 proc. 10 ns)            | CF77 6.0 -Zp -Wd-e68   | 129              | 1254   | 1400                             |
| Fujitsu VP2200/10 (4 ns)             | FORTRAN77 EX/VP V11L10   | 127              | 842  | 1000                             |
| SGI Octane (270 MHz) IP30            | f77 -O   | 127              |  | 540                              |
| Cray J932 (32 proc. 10 ns)           | cf77 (6.0) -Zp -Wd-68  |                  | 4486   | 6400                             |
| Cray J932 (28 proc. 10 ns)           | cf77 (6.0) -Zp -Wd-68  |                  | 4235   | 5600                             |
| Cray J932 (24 proc. 10 ns)           | cf77 (6.0) -Zp -Wd-68  |                  | 3775   | 4800                             |
| Cray J932 (20 proc. 10 ns)           | cf77 (6.0) -Zp -Wd-68  |                  | 3238   | 4000                             |
| Cray J932 (16 proc. 10 ns)           | cf77 (6.0) -Zp -Wd-68  |                  | 2709   | 3200                             |
| Cray J932 (12 proc. 10 ns)           | cf77 (6.0) -Zp -Wd-68  |                  | 2029   | 2400                             |
| Cray J932 (8 proc. 10 ns)            | cf77 (6.0) -Zp -Wd-68  |                  | 1425   | 1600                             |
| Cray J932 (7 proc. 10 ns)            | cf77 (6.0) -Zp -Wd-68  | 126              | 1221   | 1400                             |
| SGI POWER CHALLENGE (90 MHz,16 proc) |  |                  | 3240   | 5760                             |
| SGI POWER CHALLENGE (90 MHz,8 proc)  |  |                  | 2045   | 2880                             |
| SGI POWER CHALLENGE (90 MHz,4 proc)  |  |                  | 1124   | 1440                             |
| SGI POWER CHALLENGE (90 MHz,2 proc)  |  |                  | 569  | 720                              |
| SGI POWER CHALLENGE (90 MHz,1 proc)  | -non_shared -OPT:<br>IEEE_arithmetic=3:roundoff=3<br>-TENV:X=4 -col120 -WK,-ur=12,<br>-ur2=200 -WK,-so=3,-ro=3,-o=5<br>-WK,-inline=daxpy:dscal:idamax<br>-SWP:max_pair_candidates=2<br>-SWP:strict_ivdep=false | 126              | 308  | 360                              |
| Cray J916 (4 proc. 10 ns)            | CF77 6.0 -Zp -Wd-e68   | 121              | 743  | 800                              |
| Cray X-MP/416 (1 proc. 8.5 ns)       | CF77 5.0 -Zp -Wd-e68   | 121              | 218  | 235                              |
| Cray 2S/4-128 (1 proc. 4.1 ns)       | CSOS 1.0 level 129   | 120              | 384  | 488                              |
| DEC 2100 5/250 (4 proc 250 MHz)      |  |                  | 1022   | 2000                             |

| Computer                              | “LINPACK Benchmark”<br>OS/Compiler   | n=100<br>Mflop/s | “TPP”<br>Best<br>Effort<br>n=1000<br>Mflop/s | “Theoretical<br>Peak”<br>Mflop/s |
|---------------------------------------|--|------------------|--|----------------------------------|
| DEC 2100 5/250 (2 proc 250 MHz)       |  |                  | 578  | 1000                             |
| DEC 2100 5/250 (1 proc 250 MHz)       | -inline=daxpy -ur=3 -fast -O5 -tune ev5  | 119              | 317  | 500                              |
| Cray J932 (4 proc. 10 ns)             | cf77 (6.0) -Zp -Wd-68  | 117              | 730  | 800                              |
| ASUS P2B-D/PentiumIII(600 MHz,2 proc) |  |                  | 745  | 1200                             |
| ASUS P2B-D/PentiumIII(600 MHz,1 proc) | ifc -tpp6 -O3  | 116              | 410  | 600                              |
| IBM RS/6000 F50 (332 MHz,4 proc)      |  |                  | 1049   | 2656                             |
| IBM RS/6000 F50 (332 MHz,3 proc)      |  |                  | 842  | 1992                             |
| IBM RS/6000 F50 (332 MHz,2 proc)      |  |                  | 599  | 1328                             |
| IBM RS/6000 F50 (332 MHz,1 proc)      | -O -qhot -qarch=ppc -qfloat=hsflt -Pv<br>-Wp,-ea478, -g1 -bnso<br>-bI:/lib/syscalls.exp -bnodelcsect   | 116              | 317  | 664                              |
| SGI Origin 2000 (195 MHz, 16 proc)    |  |                  | 3146   | 6240                             |
| SGI Origin 2000 (195 MHz, 8 proc)     |  |                  | 2182   | 3120                             |
| SGI Origin 2000 (195 MHz, 4 proc)     |  |                  | 1292   | 1560                             |
| SGI Origin 2000 (195 MHz, 2 proc)     |  |                  | 667  | 780                              |
| SGI Origin 2000 (195MHz,1proc)        | -n32 -mips4 -Ofast=ip27 -TENV:X=4<br>-LNO:blocking=off:ou_max=6:pf2=0  | 114              | 344  | 390                              |
| Sun UltraSparc II 250 MHz             | -fast -native -xsafe=mem -dalign -xO5<br>-xarch=v8plusa -xchip=ultra   | 114              | 117  | 500                              |
| Fujitsu VP2100/10 (4 ns)              | FORTRAN77 EX/VP V11L10   | 112              | 445  | 500                              |
| Cray J916 (2 proc. 10 ns)             | CF77 6.0 -Zp -Wd-e68   | 111              | 380  | 400                              |
| Sun Ultra HPC 6000(250 MHz,30 p)      |  |                  | 4755   | 15000                            |
| Sun Ultra HPC 6000(250 MHz,24 p)      |  |                  | 4389   | 12000                            |
| Sun Ultra HPC 6000(250 MHz,16 p)      |  |                  | 3493   | 8000                             |
| Sun Ultra HPC 6000(250 MHz,14 p)      |  |                  | 3112   | 7000                             |
| Sun Ultra HPC 6000(250 MHz, 8 p)      |  |                  | 2038   | 4000                             |
| Sun Ultra HPC 6000(250 MHz, 6 p)      |  |                  | 1607   | 3000                             |
| Sun Ultra HPC 6000(250 MHz, 4 p)      |  |                  | 1126   | 2000                             |
| Sun Ultra HPC 6000 (250 MHz,1MB L2)   | -fast -native -xarch=v8plusa -xsafe=mem<br>-dalign -libmil -xO5 -fsimple=2<br>-stackvar -xarch=v8plusa<br>-xcache=16/32/1:512/64/1 -xchip=ultra<br>-xdepend -xlibmil -xlibmopt<br>-xsafe=mem -Qoption cg<br>-Qms_pipe+float_loop_ld=16 -xcrossfile | 110              |  | 500                              |
| Cray J932 (2 proc. 10 ns)             | cf77 (6.0) -Zp -Wd-68  | 109              | 376  | 400                              |
| Hitachi S-820/80 (4 ns)               | FORT77/HAP V23-0C  | 107              |  | 3000                             |
| Cray J916 (1 proc. 10 ns)             | CF77 6.0 -Zp -Wd-e68   | 106              | 203  | 200                              |
| Cray J932 (1 proc. 10 ns)             | cf77 (6.0) -Zp -Wd-68  | 104              | 202  | 200                              |
| Dell Dimension XPS T500 500 MHz       | Intel v5.0 -O3 -G6 -QxM -Qip -Qauto<br>-Qrcd   | 104              |  | 500                              |

| Computer                                     | “LINPACK Benchmark”<br>OS/Compiler   | n=100<br>Mflop/s | “TPP”<br>Best<br>Effort<br>n=1000<br>Mflop/s | “Theoretical<br>Peak”<br>Mflop/s |
|--|--|------------------|--|----------------------------------|
| Cray 2S/8-128 (8 proc. 4.1 ns)               | CF77 4.0 -Zp -Wd-e68   | 102              | 2171   | 3902                             |
| IBM POWER2 model 58H(55 MHz)                 | -O-Pv-Wp-ea478-g1-qarch=pwrx   | 101              | 197  | 220                              |
| SGI POWER CHALLENGE (75 MHz,18 proc)         |  |                  | 3227   | 5400                             |
| SGI POWER CHALLENGE (75 MHz,16 proc)         |  |                  | 3033   | 4800                             |
| SGI POWER CHALLENGE (75 MHz,14 proc)         |  |                  | 2775   | 4200                             |
| SGI POWER CHALLENGE (75 MHz,12 proc)         |  |                  | 2499   | 3600                             |
| SGI POWER CHALLENGE (75 MHz,10 proc)         |  |                  | 2167   | 3000                             |
| SGI POWER CHALLENGE (75 MHz,8 proc)          |  |                  | 1818   | 2400                             |
| SGI POWER CHALLENGE (75 MHz,6 proc)          |  |                  | 1421   | 1800                             |
| SGI POWER CHALLENGE (75 MHz,4 proc)          |  |                  | 993  | 1200                             |
| SGI POWER CHALLENGE (75 MHz,2 proc)          |  |                  | 505  | 600                              |
| SGI POWER CHALLENGE (75 MHz,1 proc)          | -non_shared -OPT:<br>IEEE_arithmetic=3:roundoff=3<br>-TENV:X=4 -col120 -WK,-ur=12,<br>-ur2=200 -WK,-so=3,-ro=3,-o=5<br>-WK,-inline=daxpy:dscal:idamax<br>-SWP:max_pair_candidates=2<br>-SWP:strict_ivdep=false | 104              | 261  | 300                              |
| Convex C4/XA-1(1 proc.)(7.41 ns)             | fc9.0.0.5 -tm c4 -O2 -is .   | 99               | 705  | 810                              |
| Intel Pentium II Xeon (450 MHz)              | g77 -funroll-all-loops -O3   | 98               | 295  | 450                              |
| ETA 10-G (1 proc. 7 ns)                      | ETAV/FTN200  | 93               | 496  | 571                              |
| Convex C-3880 (8 proc.) (16.7 ns)            | fc7.0 -tm c38 -O3 -ep 8 -ds -is .  | 86               | 795  | 960                              |
| IBM ES/9000-982 VF(8 proc 7.1ns)             | VAST-2/VS Fortran V2R5   |                  | 2278   | 4507                             |
| IBM ES/9000-972 VF(7 proc 7.1ns)             | VAST-2/VS Fortran V2R5   |                  | 2072   | 3944                             |
| IBM ES/9000-962 VF(6 proc 7.1ns)             | VAST-2/VS Fortran V2R5   |                  | 1923   | 3380                             |
| IBM ES/9000-952 VF(5 proc 7.1ns)             | VAST-2/VS Fortran V2R5   |                  | 1681   | 2817                             |
| IBM ES/9000-942 VF(4 proc 7.1ns)             | VAST-2/VS Fortran V2R5   |                  | 1377   | 2254                             |
| IBM ES/9000-831 VF(3 proc 7.1ns)             | VAST-2/VS Fortran V2R5   |                  | 1082   | 1690                             |
| IBM ES/9000-821 VF(2 proc 7.1ns)             | VAST-2/VS Fortran V2R5   |                  | 767  | 1127                             |
| IBM ES/9000-711 VF(1 proc 7.1ns)             | VAST-2/VS Fortran V2R5   | 86               | 422  | 563                              |
| Dell Dimension XPS T500(500 MHz) Pentium III | Win98SE Intel Fortran -O3 -G6 -QaxK<br>-Qipo   | 86               |  | 500                              |
| Intel Pentium III 550 MHz                    | g77 -O3 -fomit-frame-pointer<br>-funroll-loops   | 86               | 325  | 550                              |
| HALstation 300 model 350(118MHz)             | -Kfast -Keval -KGREG -Kgs<br>-KV8PLUS -X7 -Kpreex -Kpreload<br>-Kfuse -x FLDFLAGS = -dn  | 85               | 177  | 236                              |
| Dell Pentium III 550 MHz                     | f77 -O3  | 80               |  | 550                              |
| SUN-Ultra 1 mod. 170                         | f77 v4.0 -fast -O4   | 76               |  |                                  |
| Convex C-3840 (4 proc.) (16.7 ns)            | fc7.0 -tm c38 -O3 -ep 4 -ds -is .  | 75               | 425  | 480                              |
| Intel Pentium III 550 MHz                    | g77 -O3  | 74               | 325  | 550                              |

| Computer                            | “LINPACK Benchmark”<br>OS/Compiler   | n=100<br>Mflop/s | “TPP”<br>Best<br>Effort<br>n=1000<br>Mflop/s | “Theoretical<br>Peak”<br>Mflop/s |
|-------------------------------------|--|------------------|--|----------------------------------|
| HALstation 300 model 330(101MHz)    | -Kfast -Keval -KGREG -Kgs<br>-KV8PLUS -X7 -Kpreex -Kpreload<br>-Kfuse -x FLDFLAGS = -dn  | 72               | 153  | 202                              |
| SGI CHALLENGE/Onyx (6.6ns, 32 proc) |  |                  | 539  | 2400                             |
| SGI CHALLENGE/Onyx (6.6ns, 28 proc) |  |                  | 531  | 2100                             |
| SGI CHALLENGE/Onyx (6.6ns, 24 proc) |  |                  | 499  | 1800                             |
| SGI CHALLENGE/Onyx (6.6ns, 20 proc) |  |                  | 474  | 1500                             |
| SGI CHALLENGE/Onyx (6.6ns, 18 proc) |  |                  | 458  | 1350                             |
| SGI CHALLENGE/Onyx (6.6ns, 16 proc) |  |                  | 431  | 1200                             |
| SGI CHALLENGE/Onyx (6.6ns, 14 proc) |  |                  | 393  | 1050                             |
| SGI CHALLENGE/Onyx (6.6ns, 12 proc) |  |                  | 374  | 900                              |
| SGI CHALLENGE/Onyx (6.6ns, 10 proc) |  |                  | 338  | 750                              |
| SGI CHALLENGE/Onyx (6.6ns, 8 proc)  | IRIX 5.2,f77,-O2-mips2-Wo,<br>-loopunroll,8-Olimit2000-Wf<br>-dchacheopt-jmpopt-non_shared -pfa<br>keep-WK, -WK,<br>-ipa=daxpy:saxpy,-ur=1,-mc=100 | 73               | 311  | 600                              |
| Convex C-3830 (3 proc.) (16.7 ns)   | fc7.0 -tm c38 -O3 -ep 3 -ds -is .  | 71               | 327  | 360                              |
| Sun UltraSPARC 1(24 proc)167MHz     |  |                  | 3566   | 8000                             |
| Sun UltraSPARC 1(20 proc)167MHz     |  |                  | 3170   | 6667                             |
| Sun UltraSPARC 1(16 proc)167MHz     |  |                  | 2761   | 5333                             |
| Sun UltraSPARC 1(12 proc)167MHz     |  |                  | 2238   | 4000                             |
| Sun UltraSPARC 1(8 proc)167MHz      |  |                  | 1607   | 2667                             |
| Sun UltraSPARC 1(4 proc)167MHz      |  |                  | 871  | 1333                             |
| Sun UltraSPARC 1(2 proc)167MHz      |  |                  | 456  | 667                              |
| Sun UltraSPARC 1(1 proc)167MHz      | -V -fast -native -dalign -libmil -xO4<br>-xsafe=3Dmem -Qoption cg=20<br>-Qms_pipe+float_loop_ld=3D16 -onetrip<br>-xcrossfile                       | 70               | 237  | 333                              |
| SGI CHALLENGE/Onyx (6.6ns, 6 proc)  | IRIX 5.2,f77,-O2-mips2-Wo,<br>-loopunroll,8-Olimit2000-Wf<br>-dchacheopt-jmpopt-non_shared -pfa<br>keep-WK, -WK,<br>-ipa=daxpy:saxpy,-ur=1,-mc=100 | 69               |  | 450                              |
| Intel Pentium II, 333MHz            | g77 -O3 -funroll-all-loops   | 69               |  | 333                              |
| AMD K6-2, 500 MHz                   | g77 -march=k6 -O3 -fomit-frame-pointer<br>-funroll-loops   | 69               | 100  | 250                              |
| Convex SPP-1600(8 proc) 120 MHz     |  |                  | 934  | 1920                             |
| Convex SPP-1200(8 proc) 120 MHz     |  |                  | 656  | 1920                             |
| Convex SPP-1600(7 proc) 120 MHz     |  |                  | 860  | 1680                             |
| Convex SPP-1600(6 proc) 120 MHz     |  |                  | 722  | 1440                             |

| Computer                           | “LINPACK Benchmark”<br>OS/Compiler   | n=100<br>Mflop/s | “TPP”<br>Best<br>Effort<br>n=1000<br>Mflop/s | “Theoretical<br>Peak”<br>Mflop/s |
|------------------------------------|--|------------------|--|----------------------------------|
| Convex SPP-1200(6 proc) 120 MHz    |  |                  | 530  | 1440                             |
| Convex SPP-1600(5 proc) 120 MHz    |  |                  | 633  | 1200                             |
| Convex SPP-1600(4 proc) 120 MHz    |  |                  | 518  | 960                              |
| Convex SPP-1200(4 proc) 120 MHz    |  |                  | 383  | 960                              |
| Convex SPP-1600(3 proc) 120 MHz    |  |                  | 415  | 720                              |
| Convex SPP-1600(2 proc) 120 MHz    |  |                  | 290  | 480                              |
| Convex SPP-1200(2 proc) 120 MHz    |  |                  | 213  | 480                              |
| Convex SPP-1600(1 proc) 120 MHz    | fc9.2.1 fc -is   | 65               | 195  | 240                              |
| Convex SPP-1200(1 proc) 120 MHz    | fc9.2.1 fc -is   | 65               | 123  | 240                              |
| Dell Pentium III 450 MHz           | f77 -O3  | 65               |  | 450                              |
| SUN-Ultra 1 mod. 140               | f77 v4.0 -fast -O4   | 63               |  |                                  |
| Convex C-3820 (2 proc.) (16.7 ns)  | fc7.0 -tm c38 -O3 -ep 2 -ds -is .  | 62               | 222  | 240                              |
| AMD K6-II (350 MHz) BCM-1541 ATX   | g77 -O3 -o g77ldst   | 64               |  | 350                              |
| Cray-2/4-256 (4 proc. 4.1 ns)      | cf77 3.0   | 62               | 1226   | 1951                             |
| ETA 10-E (1 proc. 10.5 ns)         | ETAV/FTN200  | 62               | 334  | 381                              |
| Gateway 2000 G6-200 PentiumPro     | MS Fortran NT /G5 /Oxb2  | 62               |  | 200                              |
| IBM ES/9000-900 VF(6 proc. 9 ns)   | VAST-2/VS Fortran V2R4   |                  | 1457   | 2664                             |
| IBM ES/9000-860 VF(5 proc. 9 ns)   | VAST-2/VS Fortran V2R4   |                  | 1210   | 2220                             |
| IBM ES/9000-820 VF(4 proc. 9 ns)   | VAST-2/VS Fortran V2R4   |                  | 1003   | 1776                             |
| IBM ES/9000-740 VF(3 proc. 9 ns)   | VAST-2/VS Fortran V2R4   |                  | 775  | 1332                             |
| IBM ES/9000-640 VF(2 proc. 9 ns)   | VAST-2/VS Fortran V2R4   |                  | 539  | 888                              |
| IBM ES/9000-660 VF(2 proc. 9 ns)   | VAST-2/VS Fortran V2R4   |                  | 535  | 888                              |
| IBM ES/9000-520 VF(1 proc. 9 ns)   | VAST-2/VS Fortran V2R4   | 60               | 338  | 444                              |
| SGI CHALLENGE/Onyx (6.6ns, 4 proc) | IRIX 5.2,f77,-O2-mips2-Wo,<br>-loopunroll,8-Olimit2000-Wf<br>-dchacheopt-jmpopt-non_shared -pfa<br>keep-WK, -WK,<br>-ipa=daxpy:saxpy,-ur=1,-mc=100 | 58               | 178  | 300                              |
| Cray X-MP/14se (10 ns)             | cf77 3.0   | 53               | 184  | 210                              |
| DEC 7000-760 (6 proc) 3.64 ns      |  |                  | 962  | 1650                             |
| DEC 7000-740 (4 proc) 3.64 ns      |  |                  | 693  | 1100                             |
| DEC 7000-720 (2 proc) 3.64 ns      |  |                  | 361  | 550                              |
| DEC 7000-710 (1 proc) 3.64 ns      | 3.6 -O5 -fast  | 53               | 208  | 275                              |
| IBM RS/6000-390 (66.5 MHz)         | v3.1.1 xlf -Pv -Wp,-fz,-me,-ew -O3 -Q<br>-qstrict -qarch=pwr-qtune =pwr-x -qhot<br>-qhsflt -qnosave  | 53               | 181  | 266                              |
| DEC 2100 4/275 A500MP(4 proc)      |  |                  | 625  | 1100                             |
| DEC 2100 4/275 A500MP(2 proc)      |  |                  | 348  | 550                              |
| DEC 2100 4/275 A500MP(1 proc)      | 3.6 -O5 -fast  | 52               | 208  | 275                              |

| Computer                            | “LINPACK Benchmark”<br>OS/Compiler               | n=100<br>Mflop/s | “TPP”<br>Best<br>Effort<br>n=1000<br>Mflop/s | “Theoretical<br>Peak”<br>Mflop/s |
|-------------------------------------|--|------------------|--|----------------------------------|
| DEC 3000-900 (1 proc) 3.64 ns       | 3.6 -O5 -fast                                    | 52               | 193  | 275                              |
| AMD K6-II 500 Mhz                   | g77 -O3  | 51               |  | 500                              |
| Convex SPP-1000(15 procs)100MHz     |  |                  | 965  | 3000                             |
| Convex SPP-1000(12 procs)100MHz     |  |                  | 916  | 2400                             |
| Convex SPP-1000(8 procs)100 MHz     |  |                  | 751  | 1600                             |
| Convex SPP-1000(4 procs)100 MHz     |  |                  | 442  | 800                              |
| Convex SPP-1000(2 procs)100 MHz     |  |                  | 255  | 400                              |
| Convex SPP-1000(1 proc) 100 MHz     | fc9.2.1 fc -is                                   | 48               | 123  | 200                              |
| Cray-2/4-256 (2 proc. 4.1 ns)       | cf77 3.0   | 48               | 709  | 976                              |
| IBM ES/9000-711 (1 proc 7.1ns)      | VAST-2/VS Fortran V2R5                           | 48               |  |                                  |
| DEC 3000-700 (1 proc) 4.44 ns       | 3.6 -O5 -fast                                    | 45               | 164  | 225                              |
| DEC 400 4/233 (1 proc) 4.3 ns       | 3.6 -O5 -fast                                    | 45               | 138  | 233                              |
| Compaq/DEC Alpha 21164 EV56 533 MHz | g77 -O3  | 45               | 501  | 1066                             |
| Convex C-3810 (1 proc.) (16.7 ns)   | fc7.0 -tm c38 -O2 -is .                          | 44               | 113  | 120                              |
| DEC 7000-660 (6 procs) 5.0 ns       |  |                  | 755  | 1200                             |
| DEC 7000-650 (5 procs) 5.0 ns       |  |                  | 641  | 1000                             |
| DEC 7000-640 (4 procs) 5.0 ns       |  |                  | 538  | 800                              |
| DEC 7000-630 (3 procs) 5.0 ns       |  |                  | 413  | 600                              |
| DEC 7000-620 (2 procs) 5.0 ns       |  |                  | 279  | 400                              |
| DEC 7000-610 (1 proc) 5.0 ns        | 1.3 -O5 -fast                                    | 44               | 156  | 200                              |
| DEC 3000-800 Alpha AXP 5.0 ns       | 1.3 -O5 -fast                                    | 44               | 145  | 200                              |
| DEC 2100-A500MP(4 procs)5.25 ns     | 1.3 -O5 -fast                                    |                  | 358  | 760                              |
| DEC 2100-A500MP(3 procs)5.25 ns     | 1.3 -O5 -fast                                    |                  | 293  | 570                              |
| DEC 2100-A500MP(2 procs)5.25 ns     | 1.3 -O5 -fast                                    |                  | 209  | 380                              |
| DEC 2100-A500MP(1 proc) 5.25 ns     | 1.3 -O5 -fast                                    | 43               | 129  | 190                              |
| DEC 10000-660 Alpha AXP(6 proc)     |  |                  | 751  | 1200                             |
| DEC 10000-650 Alpha AXP(5 proc)     |  |                  | 639  | 1000                             |
| DEC 10000-640 Alpha AXP(4 proc)     |  |                  | 523  | 800                              |
| DEC 10000-630 Alpha AXP(3 proc)     |  |                  | 403  | 600                              |
| DEC 10000-620 Alpha AXP(2 proc)     |  |                  | 273  | 400                              |
| DEC 10000-610 Alpha AXP 200 MHz     | 3.2 inl=daxpy,ur=4,ur2=240                       | 43               | 155  | 200                              |
| NEC SX-2 (6 ns)                     | FORTRAN 77/SX                                    | 43               | 885  | 1300                             |
| Cray Y-MP EL (4 proc. 30 ns)        | CF77 5.0 -Zp -Wd-e68                             | 41               | 345  | 532                              |
| HP 9000/735 (99 MHz)                | +OP3 -Wl,-aarchive -WP,-nv -w,<br>ConvexMLIB 1.2 | 41               | 120  | 198                              |
| Compaq Proliant 5000 200 MHz        | MS Power Stat. 4.0 Full Opt                      | 40               |  | 200                              |
| Cray Y-MP EL98 (8 proc. 30 ns)      | CF77 5.0 -Zp -Wd-e68                             | 40               | 567  | 1068                             |



| Computer                           | “LINPACK Benchmark”<br>OS/Compiler   | n=100<br>Mflop/s | “TPP”<br>Best<br>Effort<br>n=1000<br>Mflop/s | “Theoretical<br>Peak”<br>Mflop/s |
|------------------------------------|--|------------------|--|----------------------------------|
| Cray Y-MP EL98 (4 proc. 30 ns)     | CF77 5.0 -Zp -Wd-e68   | 40               | 357  | 534                              |
| Cray Y-MP EL94 (4 proc. 30 ns)     | CF77 5.0 -Zp -Wd-e68   | 40               | 331  | 532                              |
| Cray S-MP/11v2 (1 proc. 30 ns)     | uf77 5.1.2 vec=collapse pi+  | 39               | 206  | 267                              |
| Cray Y-MP EL94 (2 proc. 30 ns)     | CF77 5.0 -Zp -Wd-e68   | 39               | 190  | 266                              |
| Cray Y-MP EL (2 proc. 30 ns)       | CF77 5.0 -Zp -Wd-e68   | 39               | 191  | 266                              |
| DEC 4000-720 (2 procs) 5.25 ns     |  |                  | 235  | 380                              |
| DEC 4000-710 (1 procs) 5.25 ns     | 1.3 -O5 -fast  | 39               | 143  | 190                              |
| DEC 1000 4/200 (5 ns)              | 3.6 -O5 -fast  | 39               | 147  | 200                              |
| HP9000/J200 (100 MHz)              | +O3 +DC7200 +Odataprefetch   | 38               |  |                                  |
| Cray-2/4-256 (1 proc. 4.1 ns)      | cf77 3.0   | 38               | 360  | 488                              |
| IBM RISC Sys/6000-580 (62.5MHz)    | v2.3 xlf -O -P -Wp,-ea478  | 38               | 104  | 125                              |
| IBM RISC Sys/6000-980 (62.5MHz)    | v2.3 xlf -O -P -Wp,-ea478  | 38               | 104  | 125                              |
| IBM ES/9000-520 (1 proc. 9 ns)     | VAST-2/VS Fortran V2R4   | 38               |  |                                  |
| IBM ES/9000-820 (1 proc. 9 ns)     | VAST-2/VS Fortran V2R4   | 38               |  |                                  |
| SGI CHALLENGE/Onyx (6.6ns, 2 proc) | IRIX 5.2,f77,-O2-mips2-Wo,<br>-loopunroll,8-Olimit2000-Wf<br>-dchacheopt-jmpopt-non_shared -pfa<br>keep-WK, -WK,<br>-ipa=daxpy:saxpy,-ur=1,-mc=100 | 38               | 93.5   | 150                              |
| DEC 4000-610 Alpha AXP(160 MHz)    | 3.2 inl=daxpy,ur=4,ur2=240   | 36               | 114  | 160                              |
| Pentium Pro 200 Mhz                | Solaris 2.5 GNU F77 v0.5.5   | 38               |  | 200                              |
| NEC SX-1                           | FORTTRAN 77/SX   | 36               | 422  | 650                              |
| Cray Y-MP EL98 (2 proc. 30 ns)     | CF77 5.0 -Zp -Wd-e68   | 35               | 192  | 267                              |
| Apple Macintosh 9500/233           | MF -O4 -Asched=2,targ=604  | 34               |  |                                  |
| Apple Macintosh 6500/275           | MF -O4 -Asched=2,targ=604  | 20               |  |                                  |
| Convex C-3440 (4 proc.)            | fc7.0 fc -O3 -ep 4 -ds -is .   | 34               | 172  | 200                              |
| Cray Y-MP EL98 (1 proc. 30 ns)     | CF77 5.0 -Zp -Wd-e68   | 34               | 107  | 133                              |
| ETA 10-Q (1 proc. 19 ns)           | ETA V/FTN200   | 34               | 185  | 210                              |
| Cray Y-MP EL94 (1 proc. 30 ns)     | CF77 5.0 -Zp -Wd-e68   | 34               | 107  | 133                              |
| Cray Y-MP EL (1 proc. 30 ns)       | CF77 5.0 -Zp -Wd-e68   | 34               | 107  | 133                              |
| DEC 3000-600 Alpha AXP 5.7 ns      | 1.3 -O5 -fast  | 34               | 129  | 180                              |
| Cray S-MP/MCP784(84 proc. 25 ns)   |  |                  | 742  | 3360                             |
| Cray S-MP/MCP756(56 proc. 25 ns)   |  |                  | 678  | 2240                             |
| Cray S-MP/MCP728(28 proc. 25 ns)   |  |                  | 508  | 1120                             |
| Cray S-MP/MCP707 (7 proc. 25 ns)   | MCP Release 2.2  | 33               | 194  | 280                              |
| DEC 200 4/166 (1 proc) 6 ns        | 3.6 -O5 -fast  | 33               | 100  | 167                              |
| FPS 510S MCP784 (84 proc. 25 ns)   |  |                  | 548  | 3360                             |
| FPS 510S MCP756 (56 proc. 25 ns)   |  |                  | 513  | 2240                             |
| FPS 510S MCP728 (28 proc. 25 ns)   |  |                  | 414  | 1120                             |
| FPS 510S MCP707 (7 proc. 25 ns)    | pgf77 -O4 -Minline   | 33               | 184  | 280                              |

| Computer                             | “LINPACK Benchmark”<br>OS/Compiler  | n=100<br>Mflop/s | “TPP”<br>Best<br>Effort<br>n=1000<br>Mflop/s | “Theoretical<br>Peak”<br>Mflop/s |
|--------------------------------------|---|------------------|--|----------------------------------|
| CDC Cyber 2000V                      | Fortran V2  | 32               |  |                                  |
| Convex C-3430 (3 proc.)              | fc7.0 fc -O3 -ep 3 -ds -is .  | 32               | 132  | 150                              |
| Macintosh 7300/200MHz                | 4.4, Absoft Corp.-c -O -o   | 32               |  | 200                              |
| NEC SX-1E                            | FORTRAN 77/SX   | 32               | 221  | 325                              |
| SGI Indigo2 (R4400/200MHz)           | -mips2 -Olimit 3000 -Wo, -loopunroll,8<br>-Wf,-dcacheopt -Wf,-dcacheoptx -O3<br>-non_shared | 32               |  |                                  |
| Alliant FX/2800-200 (14 proc)        | fortran 1.1.27 -O -inline   | 31               | 325  | 560                              |
| IBM RISC Sys/6000-970 (50 MHz)       | v2.2.1 xlf -O -P -Wp,-ea478   | 31               | 84   | 100                              |
| IBM RS/6000 Cluster(8 proc 62.5 MHz) |   |                  | 269  | 1000                             |
| IBM RS/6000 Cluster(4 proc 62.5 MHz) |   |                  | 206  | 500                              |
| IBM RS/6000 Cluster(2 proc 62.5 MHz) |   |                  | 144  | 250                              |
| IBM RS/6000 Cluster(8 proc 50 MHz)   |   |                  | 194  | 800                              |
| IBM RS/6000 Cluster(6 proc 50 MHz)   |   |                  | 174  | 600                              |
| IBM RS/6000 Cluster(4 proc 50 MHz)   |   |                  | 152  | 400                              |
| IBM RS/6000 Cluster(2 proc 50 MHz)   |   |                  | 111  | 200                              |
| IBM RISC Sys/6000-560 (50 MHz)       | v2.2.1 xlf -O -P -Wp,-ea478   | 31               | 84   | 100                              |
| IBM ES/9000-742 VF(4 proc 11ns)      | VAST-2/VS Fortran V2R5  |                  | 441  | 752                              |
| IBM ES/9000-732 VF(3 proc 11ns)      | VAST-2/VS Fortran V2R5  |                  | 352  | 545                              |
| IBM ES/9000-622 VF(2 proc 11ns)      | VAST-2/VS Fortran V2R5  |                  | 244  | 364                              |
| IBM ES/9000-621 VF(2 proc 11ns)      | VAST-2/VS Fortran V2R5  |                  | 244  | 364                              |
| IBM ES/9000-521 VF(2 proc 11ns)      | VAST-2/VS Fortran V2R5  |                  | 185  | 364                              |
| IBM ES/9000-511 VF(1 proc 11ns)      | VAST-2/VS Fortran V2R5  | 30               | 130  | 182                              |
| DEC 3000-500 Alpha AXP(150 MHz)      | 3.2 inl=daxpy,ur=4,ur2=240  | 30               | 107  | 150                              |
| Hitachi SR2201(1 proc 150 MHz)       | f90 PVEC,OPT(0(S),FOLD(2))  | 30               | 248  | 300                              |
| SGI CHALLENGES 200Mhz R4400SC        | IRIX 5.3 f77 -O4 -mips2   | 30               |  |                                  |
| Alliant FX/2800-200 (12 proc)        | fortran 1.1.27 -O -inline   | 29               | 290  | 480                              |
| HP 9000/715 (75 MHz)                 | HP-UX f77 +OP4  | 29               |  |                                  |
| IBM 9672-R12                         | VAST-2/VS Fortran 2.5   | 29               |  | 83                               |
| Sun Sparc 20 90 MHz, (1 proc)        | Sun 5.3 -fast -unroll=4 -O4   | 29               |  |                                  |
| Intel Pentium 166 MHz                | ifc -O3 -ip -align  | 28.37            | 79.37  | 166                              |
| Alliant FX/2800-200 (10 proc)        | fortran 1.1.27 -O -inline   | 27               | 250  | 400                              |
| ETA 10-P (1 proc. 24 ns)             | ETA V/FTN200  | 27               | 146  | 167                              |
| Convex C-3420 (2 proc.)              | fc7.0 fc -O3 -ep 2 -ds -is .  | 27               | 90   | 100                              |
| Cray-1S (12.5 ns)                    | cf77 2.1  | 27               | 110  | 160                              |
| Convex C-3240 (4 proc.)              | fc -O3 -ep 2 -uo -pp=fcpp1 -is .  | 26               | 171  | 200                              |
| Convex C-240 (4 proc.)               | 6.1 -O3 -ep2 -uo -pp=fcpp1 -is .  | 26               | 166  | 200                              |
| Convex C-3230 (3 proc.)              | fc -O3 -ep 2 -uo -pp=fcpp1 -is .  | 26               | 132  | 150                              |

| Computer                           | “LINPACK Benchmark”<br>OS/Compiler   | n=100<br>Mflop/s | “TPP”<br>Best<br>Effort<br>n=1000<br>Mflop/s | “Theoretical<br>Peak”<br>Mflop/s |
|------------------------------------|--|------------------|--|----------------------------------|
| Convex C-230 (3 proc.)             | 6.1 -O3 -ep2 -uo -pp=fcpp1 -is .   | 26               | 128  | 150                              |
| DEC 2000-300 Alpha AXP 6.7 ns      | 1.3 -O5 -fast  | 26               | 88   | 150                              |
| DEC 3000-400 Alpha AXP(133 MHz)    | 3.2 inl=daxpy,ur=4,ur2=240   | 26               | 90   | 133                              |
| IBM RISC Sys/6000-950 (42 MHz)     | v2.2.1 xlf -O -P -Wp,-ea478  | 26               | 70   | 84                               |
| IBM RISC Sys/6000-550 (42 MHz)     | v2.2.1 xlf -O -P -Wp,-ea478  | 26               | 70   | 84                               |
| IBM RISC Sys/6000-375(62.5 MHz)    | v2.3.0 xlf -O -P -Wp,-ea478  | 26               | 90   | 125                              |
| IBM RISC Sys/6000-370(62.5 MHz)    | v2.3.0 xlf -O -P -Wp,-ea478  | 26               | 90   | 125                              |
| SGI CHALLENGE/Onyx (6.6ns, 1 proc) | IRIX 5.2,f77,-O2-mips2-Wo,<br>-loopunroll,8-Olimit2000-Wf<br>-dchacheopt-jmpopt-non_shared -pfa<br>keep-WK, -WK,<br>-ipa=daxpy:saxpy,-ur=1,-mc=100 | 26               | 48.4   | 75                               |
| Alliant FX/2800 210 (1 proc)       | fortran 1.3.02 -Ovg -inline  | 25               | 34   | 50                               |
| Alliant FX/2800-200 (8 proc)       | fortran 1.1.27 -O -inline  | 25               | 207  | 320                              |
| NAS AS/EX 100 VPF (4 proc)         |  |                  | 320  | 484                              |
| NAS AS/EX 90 VPF (3 proc)          |  |                  | 251  | 363                              |
| NAS AS/EX 80 VPF (2 proc)          |  |                  | 173  | 242                              |
| NAS AS/EX 60 VPF                   | VAST-2/VS 2.3.0 opt=3  | 25               | 94   | 121                              |
| HP 9000/750 (66 MHz)               | +OP3 -Wl,-aarchive -WP,-nv -w  | 24               | 47   | 66                               |
| HP 9000/730 (66 MHz)               | +OP3 -Wl,-aarchive -WP,-nv -w  | 24               | 49   | 66                               |
| IBM ES/9000 Model 480 VF           | VAST-2/VS Fortran V2R4   |                  | 180  | 266                              |
| IBM ES/9000-340 VF (14.5 ns)       | VAST-2/VS Fortran V2R4   | 23               |  | 138                              |
| IBM ES/9000-411 VF(1 proc 11ns)    | VAST-2/VS Fortran V2R5   | 23               | 99   | 182                              |
| Meiko CS2 (64 proc)                |  |                  | 652  | 11520                            |
| Meiko CS2 (32 proc)                |  |                  | 649  | 5760                             |
| Meiko CS2 (16 proc)                |  |                  | 530  | 2880                             |
| Meiko CS2 (8 proc)                 |  |                  | 420  | 1440                             |
| Meiko CS2 (4 proc)                 |  |                  | 289  | 720                              |
| Meiko CS2 (2 proc)                 |  |                  | 169  | 360                              |
| Meiko CS2 (1 proc)                 | -dalign -O5 -XT=ss10h,unroll=1   | 24               | 97   | 180                              |
| Fujitsu M1800/20                   | EX V10L20 fit -Of -Ne  | 23               |  |                                  |
| Intel Pentium 166 MHz              | g77 -march=pentium -O3<br>-fomit-frame-pointer -funroll-loops  | 23               | 78   | 166                              |
| Sun Sparc 10-52 (1 proc)           | Sun 3.0 -fast -O4 -unroll=4 -Bstatic   | 23               |  |                                  |
| DEC VAX 9000 420VP(2 proc 16 ns)   | HPO V1.3-163V, DXML  |                  | 155  | 250                              |
| DEC VAX 9000 410VP(1 proc 16 ns)   | HPO V1.3-163V, DXML  | 22               | 89   | 125                              |
| IBM ES/9000-610 VF (4 proc 15 ns)  | VAST-2/VS Fortran V2R4   |                  | 335  | 532                              |
| IBM ES/9000-570 VF (3 proc 15 ns)  | VAST-2/VS Fortran V2R4   |                  | 252  | 399                              |
| Apple Macintosh 9500/132           | MF77 -O4 -Ashed=2,target=604   | 22               |  |                                  |

| Computer                          | “LINPACK Benchmark”<br>OS/Compiler   | n=100<br>Mflop/s | “TPP”<br>Best<br>Effort<br>n=1000<br>Mflop/s | “Theoretical<br>Peak”<br>Mflop/s |
|-----------------------------------|--|------------------|--|----------------------------------|
| IBM ES/9000-490 VF (2 proc 15 ns) | VAST-2/VS Fortran V2R4   |                  | 171  | 266                              |
| IBM ES/9000-320 VF (1 proc 15 ns) | VAST-2/VS Fortran V2R4   | 22               | 91   | 133                              |
| IBM RISC Sys/6000-570 (50 MHz)    | v2.3.0 xlf -O -P -Wp,-ea478  | 22               | 73   | 100                              |
| IBM RISC Sys/6000-365 (50 MHz)    | v2.3.0 xlf -O -P -Wp,-ea478  | 22               | 73   | 100                              |
| IBM RISC Sys/6000-360 (50 MHz)    | v2.3.0 xlf -O -P -Wp,-ea478  | 22               | 73   | 100                              |
| Multiflow TRACE 28/300            | Fortran 2.2.1  | 22               | 69   | 123                              |
| Convex C-3220 (2 proc.)           | fc -O3 -ep 2 -uo -pp=fcpp1 -is .   | 22               | 89   | 100                              |
| Convex C-220 (2 proc.)            | 6.1 -O3 -ep2 -uo -pp=fcpp1 -is .   | 22               | 87   | 100                              |
| Alliant FX/2800-200 (6 proc)      | fortran 1.1.27 -O -inline  | 21               | 148  | 240                              |
| Siemens VP400-EX (7 ns)           | Fortran 77/VP V10L30   | 21               | 794  | 1714                             |
| IBM ES/9221-211 (16 ns)           | VAST-2/VS Fortran 2.5  | 21               |  |                                  |
| Apple Macintosh 6500/275          | MF -O4 -Asched=2,targ=604  | 20               |  |                                  |
| Apple Power Mac 8500/120          | Absoft Power PC v4.1 -O -U   | 20               |  |                                  |
| FPS Model 522                     | F77 4.2  | 20               | 105  | 133                              |
| Fujitsu VP-400                    | Fortran 77 V10L30  | 20               |  | 1142                             |
| IBM RISC Sys/6000-530H(33 MHz)    | v2.2.1 xlf -O -P -Wp,-ea478  | 20               | 55   | 66                               |
| IBM RS/6000-C10(601 - 80 MHz)     | v3.1.1 xlf -Pv -Wp,-fz,-me, -ew -O3<br>-qarch=ppc -qhot -qhsflt -qnosave<br>-qnofold | 20               | 63   | 80                               |
| IBM ES/9672-R11 (16 ns)           | VAST-2/VS Fortran 2.5  | 20               |  |                                  |
| Siemens VP200-EX (7 ns)           | Fortran 77 V10L30  | 20               | 472  | 857                              |
| Amdahl 1400                       | 77/VP V10L20   | 19               | 521  | 1142                             |
| Amdahl 1200                       | 77/VP V10L20   | 19               | 424  | 571                              |
| Apple Power Mac 9500/132          | Absoft Power PC v4.1 -O -U   | 19               |  |                                  |
| Convex C-3410 (1 proc.)           | fc7.0 fc -O2 -is .   | 19               | 47   | 50                               |
| Gateway 2000 P5-133               | MS PS 32 NT /G5 /Oxb2  | 19               |  |                                  |
| IBM ES/9000 Model 260 VF (15 ns)  | VAST-2/VS Fortran V2R4   | 19               | 78   | 133                              |
| IBM RISC Sys/6000-550L(42 MHz)    | v2.3.0 xlf -O -P -Wp,-ea478  | 19               | 61   | 82                               |
| IBM RISC Sys/6000-540 (30 MHz)    | v2.2.1 xlf -O -P -Wp,-ea478  | 19               | 50   | 60                               |
| IBM RISC Sys/6000-355 (42 MHz)    | v2.3.0 xlf -O -P -Wp,-ea478  | 19               | 61   | 84                               |
| IBM RISC Sys/6000-350 (42 MHz)    | v2.2.1 xlf -O -P -Wp,-ea478  | 19               | 61   | 84                               |
| IBM RISC Sys/6000-34H (42 MHz)    | v2.3.0 xlf -O -P -Wp,-ea478  | 19               | 61   | 84                               |
| IBM ES/9000-311 VF(1 proc 11ns)   | VAST-2/VS Fortran V2R5   | 19               | 82   | 182                              |
| Cray S-MP/11 (1 proc. 30 ns)      | uf77 5.1.2 -Oc a2  | 18               | 60   | 67                               |
| Compaq Deskpro 4000 166 MHz       | MS Power Stat. 4.0 Full Opt  | 18               |  | 166                              |
| Fujitsu VP-200                    | Fortran 77   | 18               | 422  | 533                              |
| HP 9000/720 (50 MHz)              | HP-UX 8.05 f77 +OP4 +O3  | 18               | 36   | 50                               |
| IBM ES/9221-201 (16 ns)           | VAST-2/VS Fortran 2.5  | 18               |  |                                  |
| NAS AS/EX 50 VPF                  | VAST-2/VS 2.3.0  | 18               | 82   | 121                              |
| SGI 4D/480(8 proc) 40MHz          | f77 -O2 -mp  | 18               | 71   | 128                              |

| Computer                           | “LINPACK Benchmark”<br>OS/Compiler                            | n=100<br>Mflop/s | “TPP”<br>Best<br>Effort<br>n=1000<br>Mflop/s | “Theoretical<br>Peak”<br>Mflop/s |
|------------------------------------|---|------------------|--|----------------------------------|
| Siemens VP100-EX (7 ns)            | Fortran 77/VP V10L30  | 18               | 254  | 428                              |
| Sun 670MP Ross Hypersparc(55Mhz)   | -cg89 -dalign -libmil -O4                                     | 18               |  |                                  |
| Pentium 133 MHz                    | g77 -march=pentium -O3<br>-fomit-frame-pointer -funroll-loops | 17.61            | 60.65  | 133                              |
| Apple PowerMacintosh 8100/100      | Motorola MF77 -O4   | 17               |  |                                  |
| Apple Power Mac 6500/275           | Absoft f77 v4.4 -O  | 17               |  |                                  |
| Alliant FX/2800-200 (4 proc)       | fortran 1.1.27 -O -inline                                     | 17               | 94   | 160                              |
| Amdahl 1100                        | 77/VP V10L20  | 17               | 248  | 285                              |
| CDC CYBER 205 (4-pipe)             | FTN   | 17               | 195  | 400                              |
| CDC CYBER 205 (2-pipe)             | FTN   | 17               | 113  | 200                              |
| Convex C-3210 (1 proc.)            | fc -O2 -uo -pp=fcpp1 -is .                                    | 17               | 44   | 50                               |
| Convex C-210 (1 proc.)             | 6.1 -O2 -uo -pp=fcpp1 -is .                                   | 17               | 44   | 50                               |
| Cray XMS (55 ns)                   | cf77 5.0 -Zp -Wd-e68  | 17               | 34   | 36                               |
| Hitachi S-810/20                   | FORT77/HAP  | 17               |  | 840                              |
| IBM ES/9000 Model 210 VF (15 ns)   | VAST-2/VS Fortran V2R4  | 17               | 72   | 133                              |
| Siemens VP50-EX (7 ns)             | Fortran 77/VP V10L30  | 17               | 238  | 285                              |
| Multiflow TRACE 14/300             | Fortran 2.2.1   | 17               | 42   | 63                               |
| Amdahl 500                         | 77/VP V10L20  | 16               | 133  | 142                              |
| Fujitsu VP-100                     | Fortran 77  | 16               |  | 267                              |
| Hitachi M680H/vector               | Fort 77 E2 V04-0I   | 16               |  |                                  |
| Hitachi S-810/10                   | HAP V21.00  | 16               |  | 315                              |
| IBM 3090/600J VF (6 proc, 14.5 ns) |   |                  | 540  | 828                              |
| IBM 3090/500J VF (5 proc, 14.5 ns) |   |                  | 458  | 690                              |
| IBM 3090/400J VF (4 proc, 14.5 ns) |   |                  | 370  | 552                              |
| IBM 3090/380J VF (3 proc, 14.5 ns) |   |                  | 282  | 414                              |
| IBM 3090/300J VF (3 proc, 14.5 ns) |   |                  | 284  | 414                              |
| IBM 3090/280J VF (2 proc, 14.5 ns) |   |                  | 191  | 276                              |
| IBM 3090/200J VF (2 proc, 14.5 ns) |   |                  | 192  | 276                              |
| IBM 3090/180J VF (1 proc, 14.5 ns) | VS Fortran V2R3   | 16               | 97   | 138                              |
| PowerPC 601/100 MHz                | LS Fortran 1.5 prerelease                                     | 16               |  |                                  |
| SGI Crimson(1 proc 50 MHz R4000)   | -O2 -mips2 -G 8192  | 16               | 32   | 50                               |
| SGI 4D/380(8 proc) 33MHz           | f77 -O2 -mp   | 16               | 60   | 106                              |
| SGI Indigo2 Extreme(R4000/100MHz)  | -O2 -mips2 -G 8192  | 15               |  |                                  |
| FPS Model 511                      | F77 4.2   | 15               | 56   | 67                               |
| Hitachi M680H                      | Fort 77 E2 V04-0I   | 15               |  |                                  |
| IBM RISC Sys/6000-930 (25 MHz)     | v2.2.1 xlf -O -P -Wp,-ea478                                   | 15               | 42   | 50                               |
| IBM RISC Sys/6000-530 (25 MHz)     | v2.2.1 xlf -O -P -Wp,-ea478                                   | 15               | 42   | 50                               |
| IBM RISC Sys/6000-340 (33 MHz)     | v2.2.1 xlf -O -P -Wp,-ea478                                   | 15               | 49   | 66                               |

| Computer                         | “LINPACK Benchmark”<br>OS/Compiler | n=100<br>Mflop/s | “TPP”<br>Best<br>Effort<br>n=1000<br>Mflop/s | “Theoretical<br>Peak”<br>Mflop/s |
|----------------------------------|------------------------------------|------------------|--|----------------------------------|
| IBM ES/9000-511 (1 proc 11ns)    | VAST-2/VS Fortran V2R5             | 15               |  |                                  |
| Kendall Square (32 proc)         |                                    |                  | 513  | 1280                             |
| Kendall Square (16 proc)         |                                    |                  | 307  | 640                              |
| Kendall Square (8 proc)          |                                    |                  | 146  | 320                              |
| Kendall Square (4 proc)          |                                    |                  | 47   | 160                              |
| Kendall Square (1 proc)          | ksrf77 -O2 -r8 -inline_auto        | 15               | 31   | 40                               |
| NAS AS/EX 60                     | Fortran                            | 15               |  | 40                               |
| SGI 4D/440(4 proc) 40MHz         | f77 -O2 -mp                        | 15               | 42   | 64                               |
| Siemens H120F                    | Fortran 77                         | 15               |  |                                  |
| Apple Power Mac 5500/250         | Absoft f77 v4.4 -O                 | 14               |  |                                  |
| Power Computing 100/601/100      | Absoft f77 Power PC v4.1           | 14               |  |                                  |
| Cydrome CYDRA 5                  | Fortran 77 Rel 2.4.1               | 14               |  | 25                               |
| Fujitsu VP-50                    | Fortran 77                         | 14               |  | 133                              |
| IBM ES/9000 Model 190 VF(15 ns)  | VAST-2/VS Fortran V2R4             | 14               | 60   | 133                              |
| IBM ES/9221-191 (16 ns)          | VAST-2/VS Fortran 2.5              | 14               |  |                                  |
| Apple Power Mac 7100/80          | Absoft f77 Power PC v4.1           | 13               |  |                                  |
| DELL XMT5133 Pentium 133MHz      | PS 32 NT V 1.0 /G5 /Oxb2           | 14               |  |                                  |
| IBM POWERPC 250 (66 MHz)         | -O-Pv-Wp-ea478-g1-qarch=pwrX       | 13               |  | 66                               |
| IBM 3090/180E VF                 | VS 2.1.1 opt=3                     | 13               | 71   | 116                              |
| SGI 4D/340(4 proc) 33MHz         | f77 -O2 -mp                        | 13               | 36   | 53                               |
| Apple Power Mac 7500/100         | Absoft f77 Power PC v4.1           | 12               |  |                                  |
| Apple Power Mac 8100/80          | Absoft f77 Power PC v4.1           | 12               |  |                                  |
| CDC CYBER 990E                   | FTN V2 VL=HIGH                     | 12               |  |                                  |
| Cray-1S (12.5 ns, 1983 run)      | CFT 1.12                           | 12               | 110  | 160                              |
| Gateway 2000 P5-100XL            | MS PS 32 /G5 /Ox /D "NDEBUG"       | 12               |  |                                  |
| IBM 3090/180 VF                  | VS Fortran V2                      | 12               | 65   | 108                              |
| IBM RISC Sys/6000-520H(25 MHz)   | v2.2.1 xlf -O -P -Wp,-ea478        | 12               | 37   | 50                               |
| IBM RISC Sys/6000-320H(25 MHz)   | v2.2.1 xlf -O -P -Wp,-ea478        | 12               | 37   | 50                               |
| SGI Indigo 4000 50MHz            | -O2 -mips2 -G 8192 -sopt           | 12               |  |                                  |
| Stardent 3040                    | 3.0 -inline -nmax=300              | 12               | 77   | 128                              |
| Stardent 3030                    | 3.0 -inline -nmax=300              | 12               | 63   | 96                               |
| Stardent 2040 (Stellar GS2000)   | f77 -O3 -is R2.1                   | 12               |  | 40                               |
| Stardent 1040 (Stellar GS1000)   | f77 -O3 -is -re R2.0               | 12               |  | 40                               |
| CDC 4680InfoServer (60 MHz)      | f77 2.20 -O3 -mips2 -Wb,-r6000     | 11               |  |                                  |
| Cray S-MP/MCP101 (1 proc. 25 ns) | MCP Release 2.2                    | 11               | 31   | 40                               |
| FPS 510S MCP101 (1 proc. 25 ns)  | pgf77 -O4                          | 11               | 30   | 40                               |

| <b>Computer</b>                    | <b>“LINPACK Benchmark”<br/>OS/Compiler</b>      | <b>n=100<br/>Mflop/s</b> | <b>“TPP”<br/>Best<br/>Effort<br/>n=1000<br/>Mflop/s</b> | <b>“Theoretical<br/>Peak”<br/>Mflop/s</b> |
|------------------------------------|---|--------------------------|---|---|
| IBM ES/9000 Model 340              | VAST-2/VS Fortran V2R4                          | 11                       |   |   |
| IBM ES/9000-411 (1 proc 11ns)      | VAST-2/VS Fortran V2R5                          | 11                       |   |   |
| Meiko Comp. Surface (32 proc)      |   |                          | 210   | 1280                                      |
| Meiko Comp. Surface (16 proc)      |   |                          | 187   | 640                                       |
| Meiko Comp. Surface (8 proc)       |   |                          | 147   | 320                                       |
| Meiko Comp. Surface (4 proc)       |   |                          | 98  | 160                                       |
| Meiko Comp. Surface (2 proc)       | -O4 -Mvect=smallvect                            |                          | 58  | 80  |
| Meiko Comp. Surface (1 proc)       | -Minline=daxpy                                  | 11                       | 31  | 40  |
| Gateway 2000 P5-90(90 MHz Pentium) | Windows NT /G5 /Oxb2                            | 11                       |   |   |
| SGI Power Series 50MHz R4000       | -O2 -mips2 -G 8192 -sopt                        | 11                       |   |   |
| Stardent 3020                      | 3.0 -inline -nmax=300                           | 11                       | 46  | 64  |
| Sperry 1100/90 ext w/ISP           | UCS level 2                                     | 11                       |   |   |
| Multiflow TRACE 7/300              | Fortran 2.2.1                                   | 11                       | 22  | 31  |
| Alliant FX/2800-200 (2 proc)       | fortran 1.1.27 -O -inline                       | 10                       | 53  | 80  |
| Alliant FX/80 (8 proc.)            | -O -DAS -inline                                 | 10                       | 69  | 188                                       |
| IBM 3090/180J                      | VS Fortran V2R3                                 | 10                       |   |   |
| Intel Paragon (1 proc)             | -O4 -Mvect=smallvect -Minline=daxpy<br>-Knoieee | 10                       | 34  | 50  |
| MIPS RC6280 (60.0MHz)              | f77 2.20 -O                                     | 10                       | 16  | 24  |
| MIPS RC6260 (60.0MHz)              | f77 2.20 -O                                     | 10                       | 16  | 24  |
| Multiflow TRACE 14/200             | Fortran 1.7                                     | 10                       |   | 31  |
| Stardent 3010                      | 3.0 -inline -nmax=300                           | 10                       | 25  | 32  |
| Stardent 1540 (Ardent Titan-4)     |   |                          | 47  | 64  |
| Stardent 1530 (Ardent Titan-3)     |   |                          | 37  | 48  |
| Stardent 1520 (Ardent Titan-2)     | f77 1.0 -O3 -inline                             | 10                       | 25  | 32  |
| Sun Sparc2000(50 MHz)(16 proc)     |   |                          | 333   | 800                                       |
| Sun Sparc2000(50 MHz)(12 proc)     |   |                          | 295   | 600                                       |
| Sun Sparc2000(50 MHz)(8 proc)      |   |                          | 223   | 400                                       |
| Sun Sparc2000(50 MHz)(1 proc)      |   |                          | 28  | 50  |
| Sun Sparc1000(50 MHz)(8 proc)      |   |                          | 198   | 400                                       |
| Sun Sparc1000(50 MHz)(4 proc)      |   |                          | 107   | 200                                       |
| Sun Sparc1000(50 MHz)(2 proc)      |   |                          | 53  | 100                                       |
| Sun Sparc1000(50 MHz)(1 proc)      |   |                          | 25  | 50  |
| Sun Sparc10/514(50 MHz)(4 proc)    |   |                          | 98  | 200                                       |
| Sun Sparc10/512(50 MHz)(2 proc)    |   |                          | 57  | 100                                       |
| Sun Sparc10/51(50 MHz)(1 proc)     |   |                          | 27  | 50  |

| Computer                        | “LINPACK Benchmark”<br>OS/Compiler | n=100<br>Mflop/s | “TPP”<br>Best<br>Effort<br>n=1000<br>Mflop/s | “Theoretical<br>Peak”<br>Mflop/s |
|---------------------------------|------------------------------------|------------------|--|----------------------------------|
| Sun Sparc10/402(40 MHz)(2 proc) |                                    |                  | 41   | 81                               |
| Sun Sparc10/40(40 MHz)(1 proc)  | -fast -O4 -unroll=4 -Bstatic       | 10               | 23   | 40                               |
| Intel iPSC/Delta (512 proc)     |                                    |                  | 446  | 20480                            |
| Intel iPSC/Delta (256 proc)     |                                    |                  | 418  | 10240                            |
| Intel iPSC/Delta (128 proc)     |                                    |                  | 393  | 5120                             |
| Intel iPSC/Delta (64 proc)      |                                    |                  | 352  | 2560                             |
| Intel iPSC/Delta (32 proc)      |                                    |                  | 304  | 1280                             |
| Intel iPSC/Delta (16 proc)      |                                    |                  | 231  | 640                              |
| Intel iPSC/Delta (8 proc)       |                                    |                  | 163  | 320                              |
| Intel iPSC/Delta (4 proc)       |                                    |                  | 100  | 160                              |
| Intel iPSC/Delta (2 proc)       | if77 -O4 -Mvect=smallvect          |                  | 58   | 80                               |
| Intel iPSC/Delta (1 proc)       | -Minline=daxpy -Knoieee            | 9.8              | 34   | 40                               |
| Intel iPSC/860 d7 (128 proc)    |                                    |                  | 219  | 5120                             |
| Intel iPSC/860 d6 (64 proc)     |                                    |                  | 208  | 2560                             |
| Intel iPSC/860 d5 (32 proc)     |                                    |                  | 167  | 1280                             |
| Intel iPSC/860 d4 (16 proc)     |                                    |                  | 131  | 640                              |
| Intel iPSC/860 d3 (8 proc)      |                                    |                  | 103  | 320                              |
| Intel iPSC/860 d2 (4 proc)      |                                    |                  | 75   | 160                              |
| Intel iPSC/860 d1 (2 proc)      | if77 -O4 -Mvect=smallvect          |                  | 52   | 80                               |
| Intel iPSC/860 d0 (1 proc)      | -Minline=daxpy -Knoieee            | 9.8              | 34   | 40                               |
| SGI 4D/240(4 proc) 25MHz        | f77 -O2 -mp                        | 9.8              | 28   | 40                               |
| Apple Power Mac 6100/66         | Absoft f77 Power PC v4.1           | 9.7              |  |                                  |
| Apple Power Macintosh 6100/60   | Absoft v4.0 F77 -O                 | 9.6              |  |                                  |
| IBM 3090/180S                   | VS Fortran 2.3.0                   | 9.6              | 92   | 133                              |
| Alliant FX/80 (7 proc.)         | -O -DAS -inline                    | 9.5              | 63   | 165                              |
| CDC CYBER 4680                  | f77 2.11.2 o2                      | 9.4              |  |                                  |
| IBM Power Vis. Sys. (32 proc.)  |                                    |                  | 310  | 1280                             |
| IBM Power Vis. Sys. (1 proc.)   | -O4 -Minline=daxpy                 | 9.3              |  |                                  |
| NAS AS/EX 50                    | Fortran                            | 9.3              |  | 28                               |
| Sun SPARCsystem 10/30 36MHz     | f77 -O4 -cg89 -libmil -native      | 9.3              |  |                                  |
| SGI 4D/420(2 proc) 40MHz        | f77 -O2 -mp                        | 9.3              | 23   | 32                               |
| IBM RISC Sys/6000-520 (20 MHz)  | v2.2.1 xlf -O -P -Wp,-ea478        | 9.0              | 29   | 40                               |
| IBM RISC Sys/6000-320 (20 MHz)  | v2.2.1 xlf -O -P -Wp,-ea478        | 9.0              | 29   | 40                               |
| IBM ES/9000-180 VF(15 ns)       | VAST-2/VS Fortran V2R4             | 8.9              | 48   | 133                              |
| Solbourne 6/904 (Viking sparc)  | f77 -O3 -cg89 -dalign              | 8.9              |  |                                  |
| Intel Pentium 75 MHz            | g77 -march=pentium -O3             | 8.92             | 30.8   | 75                               |



| Computer                          | “LINPACK Benchmark”<br>OS/Compiler | n=100<br>Mflop/s | “TPP”<br>Best<br>Effort<br>n=1000<br>Mflop/s | “Theoretical<br>Peak”<br>Mflop/s |
|-----------------------------------|------------------------------------|------------------|--|----------------------------------|
|                                   | -fomit-frame-pinter -funroll-loops |                  |  |                                  |
| IBM RISC Sys/6000-230 (45 MHz)    | v2.3.0 xlf -O -P -Wp,-ea478        | 8.8              | 19   | 90                               |
| DEC VAXvector 6000/520 (2 proc)   | Fortran HPO V1.2                   | 8.8              | 51   | 90                               |
| Comparex 8/92 (Fujitsu M382)      | VS/FORTRAN 2.4.0                   | 8.7              |  |                                  |
| DEC VAXstation 4000-90            | V 5.2                              | 8.7              |  |                                  |
| Apple Power Macintosh 7100/66     | Absoft v4.0 F77 -O                 | 8.6              |  |                                  |
| IBM ES/9000-311 (1 proc 11ns)     | VAST-2/VS Fortran V2R5             | 8.6              |  |                                  |
| IBM ES/9000 Model 320             | VAST-2/VS Fortran V2R4             | 8.5              |  |                                  |
| NAS AS/9160                       | VAST/VS 1.4.1 opt=3                | 8.3              |  |                                  |
| Alliant FX/80 (5 proc.)           | -O -DAS -inline                    | 8.1              | 49   | 118                              |
| IBM ES/9000 Model 260             | VAST-2/VS Fortran V2R4             | 8.0              |  |                                  |
| SCS-40                            | CFT 1.13                           | 8.0              | 17   | 45                               |
| SGI 4D/320(2 proc) 33MHz          | f77 -O2 -mp                        | 8.0              | 20   | 26                               |
| IBM ES/9000 Model 210             | VAST-2/VS Fortran V2R4             | 7.7              |  |                                  |
| IBM ES/9000 Model 320             | VS/FORTRAN V2R4                    | 7.6              |  |                                  |
| IBM 3090/120E VF                  | VS 2.1.1 opt=3                     | 7.5              | 54   | 108                              |
| IBM 3090/180E                     | VS 2.1.1 opt=3                     | 7.4              | 71   | 116                              |
| Siemens 7890F                     | Fortran 77 V10.3                   | 7.2              |  |                                  |
| Convex C-130                      | Fortran 4.0                        | 7.2              | 31   | 36                               |
| Alliant FX/80 (4 proc.)           | -O -DAS -inline                    | 7.2              | 33   | 94                               |
| DEC VAXvector 6000/510 (1 proc)   | Fortran HPO V1.2                   | 7.0              | 28   | 45                               |
| CECpx XL 560 Pentium 60 MHz       | 10.5 wfc386 /l=dos4g /ox           | 7.2              |  |                                  |
| Sun SPARCsystem 10/41 40MHz       | f77 -native -fast -O4 -Bstatic     | 7.0              |  |                                  |
| Stardent 1510 (Ardent Titan-1)    | f77 1.0 -O2 -inline                | 6.9              | 13   | 16                               |
| IBM 3090/180                      | VS opt=3                           | 6.8              | 65   | 108                              |
| Alliant FX/40 (4 proc.)           | -O -DAS -inline                    | 6.7              | 33   | 94                               |
| IBM RS/6000-N40(PowerPC601 50MHz) | xlf -O -P -Wp,-ea478               | 6.7              |  | 50                               |
| IBM RISC Sys/6000-M20 (33 MHz)    | v2.3.0 xlf -O -P -Wp,-ea478        | 6.6              | 14   | 66                               |
| IBM RISC Sys/6000-M2A (33 MHz)    | v2.3.0 xlf -O -P -Wp,-ea478        | 6.6              | 14   | 66                               |
| IBM ES/9000 Model 190             | VAST-2/VS Fortran V2R4             | 6.6              |  | 133                              |
| Convex C-120                      | fc 5.1                             | 6.5              | 17   | 20                               |
| IBM RISC Sys/6000-220 (33 MHz)    | v2.2.1 xlf -O -P -Wp,ea478         | 6.5              | 14   | 66                               |
| Alliant FX/4 (4 proc.)            | -O -DAS -inline                    | 6.4              | 21   | 47                               |
| Alliant FX/2800-200 (1 proc)      | fortran 1.1.27 -O -inline          | 6.4              | 28   | 40                               |
| Apple PowerBook PB1400cs(133 MHz) | MF -O4 -Asched=2,targ=604          | 6.3              |  |                                  |
| Fujitsu M-380                     | Fortran 77, opt=3                  | 6.3              |  |                                  |
| DEC VAX 6620                      | V5.5                               | 6.2              |  |                                  |
| Multiflow TRACE 7/200             | Fortran 1.4                        | 6.0              |  | 15                               |

| Computer                       | “LINPACK Benchmark”<br>OS/Compiler | n=100<br>Mflop/s | “TPP”<br>Best<br>Effort<br>n=1000<br>Mflop/s | “Theoretical<br>Peak”<br>Mflop/s |
|--------------------------------|------------------------------------|------------------|--|----------------------------------|
| SGI 4D/420(1 proc) 40MHz       | f77 -O2                            | 6.0              | 12   | 16                               |
| Apple Performa 6230CD/603/75   | Absoft f77 Power PC v4.1           | 5.9              |  |                                  |
| Siemens 7890G                  | Fortran 77 V10.3 opt=4             | 5.9              |  |                                  |
| IBM 3090/150E                  | VS 2.1.1 opt=3                     | 5.9              | 64   | 112                              |
| FPS-264 (M64/60)               | F02 APFTN64 OPT=4                  | 5.9              | 34   | 38                               |
| Alliant FX/80 (3 proc.)        | -O -DAS -inline                    | 5.9              | 32   | 71                               |
| SGI 4D/220(2 proc) 25MHz       | f77 -O2 -mp                        | 5.9              | 15   | 20                               |
| Apollo DN10000                 | f77,10.7                           | 5.8              |  |                                  |
| DEC VAX 4000                   | opt=4, DEC Fortran V6.5            | 5.7              |  |                                  |
| HP9000/J200 (100 MHz)          | fort77 -o                          | 5.5              |  |                                  |
| Alliant FX/40 (3 proc.)        | -O -DAS -inline                    | 5.6              | 27   | 71                               |
| Gateway P5-60 (60 MHz Pentium) | F77L-EM32 5.01 /4 /Z1              | 5.4              |  |                                  |
| DEC 5900 RISC                  | Ultrix 4.1                         | 5.3              |  |                                  |
| DEC 5000/240                   | Ultrix                             | 5.3              |  |                                  |
| Gateway P5-60 (60 MHz Pentium) | 77/32/mf/d1/warn/5/fp5/ot          | 5.3              |  |                                  |
| Alliant FX/4 (3 proc.)         | -O -DAS -inline                    | 5.1              | 17   | 35                               |
| CDC 4330-300 (33 MHz)          | f77 2.20 -O3                       | 5.1              |  |                                  |
| Number-Smasher 860 40MHz       | NDP -vast-inline-on-OLM-fdiv       | 5.1              |  |                                  |
| VAXstation 4000-90             | DEC FORTRAN V5.2                   | 5.1              |  |                                  |
| DEC VAX 6000/610 (1 proc)      | VMS V5.2                           | 5.0              |  |                                  |
| Intel iPSC/2 d4/VX (16 proc)   |                                    |                  | 39   |                                  |
| Intel iPSC/2 d5/VX (32 proc)   |                                    |                  | 52   |                                  |
| SGI 4D/310(1 proc) 33MHz       | f77 -O2                            | 5.0              | 10   | 13                               |
| Honeywell DPS90                | ES F77V 1.0                        | 5.0              |  |                                  |
| Siemens 7890D                  | Fortran 77 V10.3                   | 5.0              |  |                                  |
| IBM ES/9000 Model 180 (15 ns)  | VAST-2/VS Fortran V2R4             | 4.9              |  |                                  |
| CDC CYBER 875                  | FTN 5 opt=3                        | 4.8              |  |                                  |
| Number Smasher i860 40MHz      | -on -OLM -fdiv -inline             | 4.7              |  | 40                               |
| CDC CYBER 176                  | FTN 5.1 opt=2                      | 4.6              |  |                                  |
| MIPS RC3360 (33.3MHz)          | f77 2.20 -O                        | 4.5              | 11   | 13                               |
| Alliant FX/80 (2 proc.)        | -O -DAS -inline                    | 4.4              | 22   | 47                               |
| AMD 486DX5-133                 | f2c and gcc2.7.0                   | 4.4              |  |                                  |
| Alliant FX/40 (2 proc.)        | -O -DAS -inline                    | 4.3              | 19   | 47                               |
| NAS AS/EX 30                   | VS 1.4.1 opt=3                     | 4.3              |  |                                  |
| SGI 4D/35                      | f77 -O3                            | 4.3              |  |                                  |
| Sun 4/600 MP                   | f77 1.4 -O3 -cg89 -dalign          | 4.3              |  |                                  |

| Computer                        | “LINPACK Benchmark”<br>OS/Compiler | n=100<br>Mflop/s | “TPP”<br>Best<br>Effort<br>n=1000<br>Mflop/s | “Theoretical<br>Peak”<br>Mflop/s |
|---------------------------------|------------------------------------|------------------|--|----------------------------------|
| IBM ES/9221-170 (16 ns)         | VAST-2/VS Fortran 2.5              | 4.1              |  |                                  |
| Sun SPARCstation IPX            | f77 1.4 -O3 -cg89 -dalign          | 4.1              |  |                                  |
| Sun 4/50 IPX                    | f77 1.4 -O3 -cg89 -dalign          | 4.1              |  |                                  |
| CDC CYBER 4360                  | f77 2.11.2 o2                      | 4.0              |  |                                  |
| Sun SPARCstation 2              | f77 1.4 -O3 -cg89 -dalign          | 4.0              |  |                                  |
| SGI Indigo 33MHz R3000          | -O2 -G 8192 -sopt                  | 4.0              |  |                                  |
| Amdahl 5860 HSFPP               | H enhanced opt=3                   | 3.9              |  |                                  |
| MIPS M/2000 (25.0MHz)           | f77 2.20 -O                        | 3.9              | 7.9  | 10                               |
| MIPS RC3260 (25.0MHz)           | f77 2.20 -O                        | 3.9              | 7.9  | 10                               |
| Alliant FX/4 (2 proc.)          | -O -DAS -inline                    | 3.8              | 12   | 24                               |
| SGI 4D/210(1 proc) 25MHz        | f77 -O2                            | 3.9              | 7.8  | 10                               |
| Amdahl 5860 HSFPP               | VS opt=3                           | 3.8              |  |                                  |
| CDC 4320                        | f77 2.20 opt=02                    | 3.7              |  |                                  |
| DEC station 5000/200 (25 Mhz)   | MIPS f77 2.0                       | 3.7              |  |                                  |
| MIPS RS3230 (25.0MHz)           | f77 2.20 -O                        | 3.7              | 7.8  | 10                               |
| DEC VAXvector 6000/420 (2 proc) | Fortran HPO V1.0                   |                  | 43   | 90                               |
| DEC VAXvector 6000/410 (1 proc) | Fortran HPO V1.0                   | 3.6              | 24   | 45                               |
| Sun 4/490                       | 4.1.1 f77 -O3                      | 3.6              |  |                                  |
| CDC 4330                        | f77 2.20 opt=02                    | 3.5              |  |                                  |
| Apple Power Macintosh 6100/60   | Absoft F77 SDK                     | 3.4              |  |                                  |
| NAS 8093 w/HSA                  | VS 1.4.0 opt=3                     | 3.5              |  |                                  |
| CDC 7600                        | FTN                                | 3.3              |  |                                  |
| Sun Sparc ELC                   | -dalign -xcg89 -fsimple -O4        | 3.3              |  |                                  |
| CDC CYBER 960-31                | NOS/VE 1.3.1 FTN 1.6               | 3.1              |  |                                  |
| Gould NP1                       | Fortran                            | 3.1              |  |                                  |
| IBM 3090/120E                   | VS 2.1.1 opt=3                     | 3.1              | 54   | 108                              |
| MIPS RC3240 (25.0MHz)           | f77 2.20 -O                        | 3.1              | 7.1  | 10                               |
| Tadpole SPARCbook 2             | f77 -O                             | 3.1              |  |                                  |
| CDC CYBER 4340                  | f77 2.11.2 o2                      | 3.0              |  |                                  |
| Convex C-1/XP                   | Fortran 2.0                        | 3.0              |  | 20                               |
| DEC VAX 6540                    | VMS 5.4-2                          | 3.0              |  |                                  |
| FPS-264/20 (M64/50)             | F02 APFTN64 OPT=4                  | 3.0              | 17   |                                  |
| Harris Nighthawk 4802 (88100)   | f77                                | 3.0              |  |                                  |
| Convex C-1/XL                   | Fortran 1.6                        | 2.9              |  | 20                               |
| IBM ES/9000 Model 150           | VS Fortran V2R4                    | 2.9              |  |                                  |

| Computer                      | “LINPACK Benchmark”<br>OS/Compiler | n=100<br>Mflop/s | “TPP”<br>Best<br>Effort<br>n=1000<br>Mflop/s | “Theoretical<br>Peak”<br>Mflop/s |
|-------------------------------|------------------------------------|------------------|--|----------------------------------|
| NAS AS/EX 25                  | VS 1.4.1 opt=3                     | 2.9              |  |                                  |
| Solbourne 5/602               | f77 (Sun) 1.2 -O3 -dalign          | 2.9              |  |                                  |
| Sun 4/330                     | f77 1.4 -O3 -dalign                | 2.7              |  |                                  |
| Sun 4/370                     | f77 1.3.1 -O3 -cg89 -dalign        | 2.7              |  |                                  |
| CDC CYBER 760                 | FTN 5, opt=3                       | 2.6              |  |                                  |
| CyberPlus                     | CPFTN 1.1-07                       | 2.6              |  |                                  |
| IBM 370/195                   | H enhanced opt=3                   | 2.5              |  |                                  |
| Sun 4/330 SparcServer         | f77 1.2, -O3 -dalign               | 2.5              |  |                                  |
| Alliant FX/80 (1 proc.)       | -O -DAS -inline                    | 2.4              | 12   | 24                               |
| Alliant FX/40 (1 proc.)       | -O -DAS -inline                    | 2.4              | 10   | 24                               |
| Gateway 2000 66 MHz 80486-DX2 | F77L-EM32 5.01 /4 /Z1              | 2.4              |  |                                  |
| Apple Mac Quadra 840AV        | Absoft -w -v -O -f -s -N40         | 2.3              |  |                                  |
| HP-APOLLO 9000/425e (68040)   | f77 -O4 rev 10.3.5                 | 2.3              |  |                                  |
| NAS AS/EX 20                  | VS 1.4.1 opt=3                     | 2.2              |  |                                  |
| Fujitsu AP1000 (512 proc.)    |                                    |                  | 610  | 2844                             |
| Fujitsu AP1000 (256 proc.)    |                                    |                  | 333  | 1422                             |
| Fujitsu AP1000 (128 proc.)    |                                    |                  | 193  | 711                              |
| Fujitsu AP1000 (64 proc.)     |                                    |                  | 100  | 356                              |
| Fujitsu AP1000 (1 proc.)      | Sun f77 1.3.1 -O3 -dalign          | 2.2              | 1.7  | 5.6                              |
| HP-APOLLO 9000/425t (68040)   | f77 -O4 rev 10.3.4                 | 2.2              |  |                                  |
| Alliant FX/4 (1 proc.)        | -O -DAS -inline                    | 2.1              | 6.3  | 12                               |
| CDC CYBER 175                 | FTN 5 opt=2                        | 2.1              |  |                                  |
| CDC CYBER 180-860             | NOS/VE OPT=HIGH                    | 2.1              |  |                                  |
| FPS-M64/30                    | APFTN464 OPT=4                     | 2.1              | 10   |                                  |
| IBM ES/9000 Model 130         | VS Fortran V2R4                    | 2.1              |  |                                  |
| IBM 3081 K (1 proc.)          | H enhanced opt=3                   | 2.1              |  |                                  |
| MIPS M120-5                   | UMIPS v.3 3.0 f771.31 -O           | 2.1              | 3.6  | 8.3                              |
| MIPS M/120 (16.7MHz)          | f77 2.20 -O                        | 2.1              | 4.8  | 6.7                              |
| Prism" 486-50 (50 MHz)        | Salford v2.69 /optimise            | 2.1              |  |                                  |
| Tadpole SPARCbook (25 MHz)    | f77 -O                             | 2.1              |  |                                  |
| Apple Macintosh QUADRA 950    | Absoft -w -v -O -f -s -N40         | 2.0              |  |                                  |
| CDC 7600                      | Local                              | 2.0              |  |                                  |
| IBM 3081 K (1 proc.)          | VS opt=3                           | 2.0              |  |                                  |
| Culler PSC                    | CSD Fortran 3.21                   | 2.0              |  | 5                                |
| FPS M64/35                    | APFTN464                           | 2.0              |  |                                  |

| Computer                         | “LINPACK Benchmark”<br>OS/Compiler | n=100<br>Mflop/s | “TPP”<br>Best<br>Effort<br>n=1000<br>Mflop/s | “Theoretical<br>Peak”<br>Mflop/s |
|----------------------------------|------------------------------------|------------------|--|----------------------------------|
| Micronics 486-50MHz EISA2        | NDP Fortran 486: -on               | 2.0              |  |                                  |
| HP 425T (68040)                  |                                    | 1.9              |  |                                  |
| CDC CYBER 175                    | FTN 5 opt=1                        | 1.8              |  |                                  |
| HP 9000 Series 835               | 2.1 fc -O                          | 1.8              |  |                                  |
| Sperry 1100/90                   | FTN opt=ZEO                        | 1.8              |  |                                  |
| Sun SPARCstation 1+              | f77 1.4 -O3 -cg89 -dalign          | 1.8              |  |                                  |
| ELXSI 6420 (5 proc.)             |                                    |                  | 6.4  |                                  |
| ELXSI 6420 (3 proc.)             |                                    |                  | 4.0  |                                  |
| ELXSI 6420 (2 proc.)             |                                    |                  | 2.7  |                                  |
| ELXSI 6420 (1 proc.)             | EMBOS 6.3 +opt+inline+vector       | 1.7              | 1.4  |                                  |
| FPS-164/364 (M64/40)             | F02 APFTN64 OPT=4                  | 1.7              | 9  |                                  |
| Honeywell DPS 8/88               | FR7X                               | 1.7              |  |                                  |
| IBM 3033                         | H enhanced opt=3                   | 1.7              |  |                                  |
| IBM 3033                         | VS opt=3                           | 1.7              |  |                                  |
| IBM 3081 D                       | VS opt=3                           | 1.7              |  |                                  |
| MIPS RS2030 (16.7MHz)            | f77 2.20 -O                        | 1.7              | 4.7  | 6.7                              |
| Sperry 1100/90 ext               | UFTN                               | 1.7              |  |                                  |
| HP 9000 Series 850 w/fp          | 2.0 fc -O                          | 1.6              |  |                                  |
| Amdahl 470 V/8                   | H enhanced opt=3                   | 1.6              |  |                                  |
| CDC CYBER 170-750                | FTN 5.1, opt=3                     | 1.6              |  |                                  |
| CDC CYBER 180-850                | NOS/VE OPT=HIGH                    | 1.6              |  |                                  |
| DECstation 3100                  | V3.0/V1.31 -O                      | 1.6              |  |                                  |
| DEC 5400                         | f77 -O3                            | 1.6              |  |                                  |
| Amdahl 470 V/8                   | VS opt=3                           | 1.5              |  |                                  |
| DEC VAXstation 4000-60           | V 5.2                              | 1.5              |  |                                  |
| MIPS M/1000 (15.0MHz)            | f77 2.20 -O                        | 1.5              | 3.7  | 6                                |
| NAS 8093                         | VS 1.4.0 opt=3                     | 1.5              |  |                                  |
| Siemens 7570-P                   | For1 1.6A                          | 1.5              |  |                                  |
| ALR 486/33 m-board, 256K cache   | Lahey F77L3, v5.0 /Z1              | 1.4              |  |                                  |
| Apple Mac Quadra 700             | Absoft -w -v -O -f -s -N40         | 1.4              |  |                                  |
| Compaq Deskpro 486/331-120 w/487 | Microway NDPF487 -O -OL -on        | 1.4              |  |                                  |
| NeXTCube                         | 2.0 gcc 1.36 -O                    | 1.4              |  |                                  |
| Sun SPARCstation 1               | f77 1.3.1 -O3 -cg89 -dalign        | 1.4              |  |                                  |
| IBM 4381-23                      | VS Fortran 2.1.1 opt=3             | 1.3              |  |                                  |

| Computer                         | “LINPACK Benchmark”<br>OS/Compiler | n=100<br>Mflop/s | “TPP”<br>Best<br>Effort<br>n=1000<br>Mflop/s | “Theoretical<br>Peak”<br>Mflop/s |
|----------------------------------|------------------------------------|------------------|--|----------------------------------|
| Compaq Deskpro 486/331-120 w/487 | Salford FTN77/ optimized           | 1.3              |  |                                  |
| Compaq Deskpro 486/331-120 w/487 | Watcom WFC386P /OL /OT             | 1.3              |  |                                  |
| ALR 486/33 m-board, 256K cache   | Lahey F77L3, v5.0 /nZ1             | 1.2              |  |                                  |
| CDC 7600                         | CHAT, No opt                       | 1.2              |  |                                  |
| CSPI MAP-6430                    | Fortran 1.5.35                     | 1.2              |  |                                  |
| DEC VAX 6000/460 (6 proc)        |                                    |                  | 8.4  | 15                               |
| DEC VAX 6000/450 (5 proc)        |                                    |                  | 7.1  | 13                               |
| DEC VAX 6000/440 (4 proc)        |                                    |                  | 5.8  | 10                               |
| DEC VAX 6000/430 (3 proc)        |                                    |                  | 4.4  | 7.6                              |
| DEC VAX 6000/420 (2 proc)        |                                    |                  | 3.0  | 5.1                              |
| DEC VAX 6000/410 (1 proc)        | VMS V5.2                           | 1.2              | 1.5  | 2.6                              |
| ELXSI 6420                       | Fortran 5.14 opt=10                | 1.2              | 1.4  |                                  |
| Gateway 2000/Micronics 486DX/33  | f2c emx/gcc -O2 -m486              | 1.2              |  |                                  |
| Gateway Pentium (66MHz)          | Lahey F77, 4.00                    | 1.2              |  |                                  |
| IBM ES/9000 Model 120            | VS Fortran V2R4                    | 1.2              |  |                                  |
| IBM 370/168 Fast Mult            | H Ext                              | 1.2              |  |                                  |
| IBM 4381 90E                     | VS Fortran 2.1.1 opt=3             | 1.2              |  |                                  |
| IBM 4381-13                      | VS 1.4.0 opt=3                     | 1.2              |  |                                  |
| MIPS M/800 (12.5MHz)             | f77 1.31 -O                        | 1.2              |  | 5                                |
| Prime P6350                      | f77 rev 20.2.b2 -opt               | 1.2              |  |                                  |
| Siemens 7580-E                   | BS2000                             | 1.2              |  |                                  |
| Amdahl 470 V/6                   | H opt=2                            | 1.1              |  |                                  |
| Compaq Deskpro 486/331-120 w/487 | Lahey F77L3 /Z1                    | 1.1              |  |                                  |
| Sun 4/260                        | f77 -O sys4-beta2                  | 1.1              | 1.1  | 3.3                              |
| ES1066 (1 proc. 80 ns Russian)   | f77(like IBM VS1.4.1 OPT=3)        | 1.0              |  |                                  |
| Sony Playstation 2               | gcc 2.95.2 Linux                   | .995             |  |                                  |
| CDC CYBER 180-840                | NOS/VE OPT=HIGH                    | .99              |  |                                  |
| DEC VAX 8800 (4 proc)            |                                    |                  | 4.9  |                                  |
| DEC VAX 8800 (3 proc)            |                                    |                  | 3.7  |                                  |
| DEC VAX 8800 (2 proc)            |                                    |                  | 2.5  |                                  |
| DEC VAX 8550/8700/8800           | VMS v4.5                           | .99              | 1.3  |                                  |
| Solbourne                        | f77 -O                             | .98              |  |                                  |
| IBM 4381-22                      | VS Fortran 2.1.1 opt=3             | .97              |  |                                  |
| IBM 4381 MG2                     | VS Fortran opt=3                   | .96              |  |                                  |

| Computer                       | “LINPACK Benchmark”<br>OS/Compiler | n=100<br>Mflop/s | “TPP”<br>Best<br>Effort<br>n=1000<br>Mflop/s | “Theoretical<br>Peak”<br>Mflop/s |
|--------------------------------|------------------------------------|------------------|--|----------------------------------|
| IBM 4381-12                    | VS Fortran 1.4.0 opt=3             | .95              |  |                                  |
| ICL 3980 w/FPU                 | FORTRAN77 PLUS V10.02              | .93              |  |                                  |
| IBM-486 33MHz                  | Microsoft 5.1                      | .94              |  |                                  |
| Siemens 7860E                  | Fortran 77 V10.3                   | .92              |  |                                  |
| Concurrent 3280XP              | Fortran VII,Z 8.1                  | .87              |  |                                  |
| MIPS M800 w/R2010 FP           | f77 1.10                           | .87              |  |                                  |
| Gould PN 9005                  | VTX/32 2.0 Fortran 77              | .87              |  |                                  |
| VAXstation 3100-76             | DEC FORTRAN V5.2                   | .85              |  |                                  |
| IBM 9370-90                    | VS Fortran 1.3.0 opt=3             | .78              |  |                                  |
| nCUBE 2, 1024 proc             |                                    |                  | 258  | 2409                             |
| nCUBE 2, 512 proc              |                                    |                  | 204  | 1205                             |
| nCUBE 2, 256 proc              |                                    |                  | 165  | 602                              |
| nCUBE 2, 128 proc              |                                    |                  | 116  | 301                              |
| nCUBE 2, 64 proc               |                                    |                  | 76.9   | 151                              |
| nCUBE 2, 32 proc               |                                    |                  | 46.0   | 75                               |
| nCUBE 2, 16 proc               |                                    |                  | 26.1   | 38                               |
| nCUBE 2, 8 proc                |                                    |                  | 14.2   | 19                               |
| nCUBE 2, 4 proc                |                                    |                  | 7.50   | 9.4                              |
| nCUBE 2, 2 proc                |                                    |                  | 3.91   | 4.7                              |
| nCUBE 2, 1 proc                | Fort77/ncc -O3                     | .78              | 2.02   | 2.35                             |
| IBM 370/165 Fast Mult          | H Ext                              | .77              |  |                                  |
| Prime P9955II                  | f77 rev 20.2.b2 -opt               | .72              |  |                                  |
| DEC VAX 8530                   | VMS v4.6                           | .73              |  |                                  |
| HP 9000 Series 850             | 2.0 fc -O                          | .71              |  |                                  |
| DEC VAX 8650                   | VMS v4.5                           | .70              |  |                                  |
| DEC VAX 8500                   | VMS v4.5                           | .65              |  |                                  |
| HP/Apollo DN4500 (68030 + FPA) |                                    | .60              |  |                                  |
| Mentor Graphics Computer       | fortran                            | .60              |  |                                  |
| MIPS M/500 ( 8.3HHz)           | f77 1.21 -O                        | .60              |  | 3.3                              |
| Data General MV/20000          | f77                                | .59              |  |                                  |
| IBM 9377-80                    | VS Fortran 2.1.1 opt=3             | .58              |  |                                  |
| Sperry 1100/80 w/SAM           | FTN opt=ZEO                        | .58              |  |                                  |
| CDC CYBER 930-31               | NOS/VE 1.2.2                       | .58              |  |                                  |
| Russian PS-2100                | FORTRAN-PS                         | .57              | 1.6  |                                  |

| Computer                    | “LINPACK Benchmark”<br>OS/Compiler | n=100<br>Mflop/s | “TPP”<br>Best<br>Effort<br>n=1000<br>Mflop/s | “Theoretical<br>Peak”<br>Mflop/s |
|-----------------------------|------------------------------------|------------------|--|----------------------------------|
| Gateway 486DX-2 (66MHz)     | Lahey F77, 4.00                    | .56              |  |                                  |
| Harris H1200                | VOS 4.1 opt g                      | .56              |  |                                  |
| HP/Apollo DN4500 (68030)    |                                    | .55              |  |                                  |
| HP 9000 Series 825          | 2.0 fc -O                          | .53              |  |                                  |
| HP-APOLLO 9000/400t (68030) | f77 -O4 rev 10.8(190)              | .51              |  |                                  |
| Harris HCX-9                | hf77 -O3                           | .50              |  |                                  |
| Pyramid 9810                | OSx 4.0                            | .50              |  |                                  |
| HP 9000 Series 840          | 2.0 fc -O                          | .49              |  |                                  |
| DEC VAX 8600                | VMS v4.5                           | .48              |  |                                  |
| Harris HCX-7 w/fpp          | f77 1.0                            | .48              |  |                                  |
| CDC 6600                    | FTN 4.6 opt=2                      | .48              |  |                                  |
| CDC CYBER 170-835           | FTN 5 opt=2                        | .47              |  |                                  |
| CCI Power 6/32 w/fpa        | UNIX 4.2 bsd f77                   | .47              |  |                                  |
| IBM 4381-21                 | VS Fortran 2.1.1 opt=3             | .47              |  |                                  |
| Sperry 7000                 | 4.2                                | .47              |  |                                  |
| Gould PN9000                | UNIX                               | .47              |  |                                  |
| SUN-3/260 + FPA             | 3.2 f77 -O -ffpa                   | .46              |  |                                  |
| IBM 4381 MG1                | VS Fortran opt=3                   | .46              |  |                                  |
| DEC VAX 6210 (1 proc.)      | VMS v5.0                           | .46              |  |                                  |
| CDC CYBER 170-835           | FTN 5 opt=1                        | .44              |  |                                  |
| HP 9000 Series 840          | HP-UX 14.3                         | .43              |  |                                  |
| IBM RT 135                  | AIX-2.2                            | .42              |  |                                  |
| Harris H1000                | VOS 3.3 opt g                      | .41              |  |                                  |
| microVAX 3200/3500/3600     | VMS v4.6                           | .41              |  |                                  |
| Apple Macintosh IIx         | A/UX 2.0 f77                       | .41              |  |                                  |
| Apollo DN5xxT FPX           | DOMAIN/IX SR9.7 opt 4              | .40              |  |                                  |
| microVAX 3200/3500/3600     | ULTRIX 2.2/VFU                     | .40              |  |                                  |
| IBM 9370-60                 | VS Fortran 1.4.0 opt=3             | .40              |  |                                  |
| Sun-3/160 + FPA             | 3.2 f77 -O -ffpa                   | .40              |  |                                  |
| Prime P9755                 | f77 rev 20.2.b2 -opt               | .40              |  |                                  |
| Ridge 3200 Model 90         | ROS/rf                             | .39              |  |                                  |
| IBM 4381-11                 | VS Fortran 1.4.0 opt=3             | .39              |  |                                  |
| Gould 32/9705 mult acc      | fort77+ 4.3                        | .39              |  |                                  |
| NORSK DATA ND-570/2         | Fortran-500-E                      | .38              |  |                                  |



| Computer                      | “LINPACK Benchmark”<br>OS/Compiler | n=100<br>Mflop/s | “TPP”<br>Best<br>Effort<br>n=1000<br>Mflop/s | “Theoretical<br>Peak”<br>Mflop/s |
|-------------------------------|------------------------------------|------------------|--|----------------------------------|
| Sperry 1100/80                | FTN opt=ZEO                        | .38              |  |                                  |
| Apple Mac IIfx                | Absoft -w -v -O -f -s              | .37              |  |                                  |
| CDC CYBER 930-11              | NOS/VE OPT=High                    | .37              |  |                                  |
| CSA w/T800C-20                | Fortran 3L                         | .37              |  |                                  |
| Inmos T800 (20 MHz)           | Fortran 3L -:o0                    | .37              |  |                                  |
| Sequent Symmetry (386 w/fpa)  | Fortran -fpa -O3                   | .37              |  |                                  |
| CONCEPT 32/8750               | UTX/32                             | .36              |  |                                  |
| Celerity C1230                | UNIX 4.2 bsd f77                   | .36              |  |                                  |
| IBM RT PC 6150/115 fpa2       | f77                                | .36              |  |                                  |
| IBM 9373-30                   | VS Fortran 2.1.1 opt=3             | .36              |  |                                  |
| CDC 6600                      | RUN                                | .36              |  |                                  |
| Gould PN9080                  | UTX/32                             | .35              |  |                                  |
| Prime 9950                    | F77 19.4.2                         | .34              |  |                                  |
| Opus Series 300pm 30 MHz      | UNIX Greenhills                    | .33              |  |                                  |
| Masscomp MC5600 w/fpa         | f77 v1.2 -O3 rtv v3.1              | .33              |  |                                  |
| Data General MV/10000         | f77 opt level 2                    | .30              |  |                                  |
| IBM 4361 MG5                  | VS Fortran opt=3                   | .30              |  |                                  |
| DATEK 80386-33 /w 64KB Cache  | MS Fortran 5.0 -Ox -AH -G2         | .27              |  |                                  |
| Inmos T800 (20 MHz)           | Fortran 3L -:o1                    | .26              |  |                                  |
| Apollo DN3500                 | FTN -CPU 3000 -opt 4               | .25              |  |                                  |
| IRIS 2400 Turbo/FPA           | f77                                | .24              |  |                                  |
| CDC CYBER 180-830             | NOS/VE OPT=HIGH                    | .24              |  |                                  |
| Apple Macintosh PowerBook 170 | Absoft -w -v -O -f -s              | .23              |  |                                  |
| Gould PN 6005                 | VTX/32 2.0 Fortran 77              | .23              |  |                                  |
| Harris 800                    | Fortran 77                         | .23              |  |                                  |
| IBM 370/158                   | H opt=3                            | .23              |  |                                  |
| IBM 370/158                   | VS Fortran opt=3                   | .22              |  |                                  |
| NORSK DATA ND-560             | Fortran-500                        | .22              |  |                                  |
| Celerity C1200                | UNIX 4.2 bsd f77                   | .21              |  |                                  |
| Honeywell DPS 8/70            | FR7X                               | .21              |  |                                  |
| Denelcor HEP                  | f77 UPX                            | .21              |  |                                  |
| VAX 11/785 FPA                | VMS v4.5                           | .20              |  |                                  |
| CDC CYBER 170-720             | FTN 5, opt=2                       | .20              |  |                                  |
| Apple Macintosh IIsi          | Absoft -w -v -O -f -s              | .19              |  |                                  |

| Computer                    | “LINPACK Benchmark”<br>OS/Compiler | n=100<br>Mflop/s | “TPP”<br>Best<br>Effort<br>n=1000<br>Mflop/s | “Theoretical<br>Peak”<br>Mflop/s |
|-----------------------------|------------------------------------|------------------|--|----------------------------------|
| Itel AS/5 mod 3             | H                                  | .19              |  |                                  |
| NORSK DATA ND-500           | Fortran-500-E                      | .19              |  |                                  |
| KONTRON KSM/386             | UNIX SVS F77 2.8                   | .19              |  |                                  |
| Sun 386i/250 25 MHz         | SunOS 4.0; Sun 1.1 -O              | .19              |  |                                  |
| CDC CYBER 170-825           | FTN 5, opt=2                       | .19              |  |                                  |
| IBM 4341 MG10               | VS Fortran opt=3                   | .19              |  |                                  |
| Apollo DN2500               |                                    | .18              |  |                                  |
| Pyramid 98xe                | OSx 4.0                            | .18              |  |                                  |
| IBM 9370-40                 | VS Fortran 1.4.0 opt=3             | .18              |  |                                  |
| VAX 11/785 FPA              | UNIX 4.2 bsd f77                   | .18              |  |                                  |
| DEC VAX 8250/8350 (UP)      | VMS v4.6                           | .18              |  |                                  |
| CDC CYBER 170-825           | FTN 5, opt=1                       | .18              |  |                                  |
| Ridge Server/RT EFP         | ROS/rf                             | .18              |  |                                  |
| CDC CYBER 170-720           | FTN 5, opt=1                       | .17              |  |                                  |
| Ridge 32/130                | OS 3.3/RISC                        | .17              |  |                                  |
| PC Craft 2400/25MHz w/80387 | PLI Fortran 2.09                   | .17              |  |                                  |
| Concurrent 3252             | OS 6.2.4 fortran z                 | .17              |  |                                  |
| Tandy 5000 MC 20 MHz        | LPI Fortran 3.0                    | .17              |  |                                  |
| Tektronix 4315 w/68882      | UTEK f77                           | .17              |  |                                  |
| CDC CYBER 180-810           | NOS/VE OPT=HIGH                    | .17              |  |                                  |
| Prime P2755                 | f77 rev 20.2.b2 -opt               | .17              |  |                                  |
| Apple Macintosh IIx         | A/UX 2.0 f77                       | .16              |  |                                  |
| Concurrent 3242             | OS 32 v7.2 f77                     | .16              |  |                                  |
| Compaq 386/20 w/387         | Microsoft Fortran 4.1              | .16              |  |                                  |
| Apple Macintosh IIcx        | Absoft -w -v -O -f -s              | .15              |  |                                  |
| Apple Macintosh IIx         | Absoft -w -v -O -f -s              | .15              |  |                                  |
| DEC VAX 8200/8300           | VMS v4.5                           | .15              |  |                                  |
| IBM PS/2-70 (20 MHz)        | AIX 1.2                            | .15              |  |                                  |
| Apple Macintosh SE 30       | Absoft -w -v -O -f -s              | .14              |  |                                  |
| Apollo DN4000               | DOMAIN/IX SR9.7 opt 4              | .14              |  |                                  |
| ICL 2988                    | f77 OPT=2                          | .14              |  |                                  |
| IBM 9370-20                 | VS Fortran 1.4.0 opt=3             | .14              |  |                                  |
| HP Vectra RS/20C 20 MHz     | LPI Fortran 3.0                    | .14              |  |                                  |
| VAX 11/780 FPA              | VMS v4.5                           | .14              |  |                                  |

| Computer                         | “LINPACK Benchmark”<br>OS/Compiler | n=100<br>Mflop/s | “TPP”<br>Best<br>Effort<br>n=1000<br>Mflop/s | “Theoretical<br>Peak”<br>Mflop/s |
|----------------------------------|------------------------------------|------------------|--|----------------------------------|
| Compaq 386/20 w/387              | RM/Forrtan 2.43                    | .13              |  |                                  |
| microVAX II                      | VMS v4.5                           | .13              |  |                                  |
| Prime P2450                      | f77 rev 20.2.b2 -opt               | .13              |  |                                  |
| Apple Macintosh IIsi             | Fortran                            | .12              |  |                                  |
| Apple Mac II/16 Mhz/25 Mhz 68882 | Absoft 2.4 -w -v -O -f -s          | .12              |  |                                  |
| CDC 6500                         | FUN                                | .12              |  |                                  |
| CONCEPT 32/6750                  | UTX/32                             | .12              |  |                                  |
| IBM PS/2-70 (16 MHz)             | AIX 1.2                            | .12              |  |                                  |
| IBM RT w/68881                   | f77                                | .12              |  |                                  |
| VAX 11/750 FPA                   | VMS v4.1                           | .12              |  |                                  |
| micro VAX II                     | ULTRIX 2.2/VFU                     | .12              |  |                                  |
| Concurrent 3230                  | OS 6.2.2 fortran 5.2               | .11              |  |                                  |
| Definicon DSI-780                | SVS Fortran (MSDOS)                | .11              |  |                                  |
| ENCORE Multimax NS32332          | f77                                | .11              |  |                                  |
| HP 9000 Series 350               | HP-UX, f77 5.2                     | .11              |  |                                  |
| Northgate 386/387 (25MHz)        | Lahey F77, 4.00                    | .11              |  |                                  |
| Prime 750                        | Primos f77 v19.1                   | .11              |  |                                  |
| Sun 3/260, 20 MHz 68881          | 3.2 f77 -O -f68881                 | .11              |  |                                  |
| Tektronix 4315 w/68881           | UTEK f77                           | .11              |  |                                  |
| VAX 11/780 FPA                   | UNIX 4.3 BSD f77 -O                | .11              |  |                                  |
| Sun 3/160, 16.7 MHz 68881        | 3.2 f77 -O -f68881                 | .10              |  |                                  |
| NCUBE (1 proc. 8 MHz)            | Fortran                            | .10              |  |                                  |
| Apple Mac SE/30                  | ABSOFT 2.4                         | .10              |  |                                  |
| Apollo DN590                     | DOMAIN/IX SR9.7 opt 4              | .099             |  |                                  |
| Masscomp MC5600 68881            | f77 v1.2 -O3 rtv v3.1              | .099             |  |                                  |
| VAX 11/750 FPA                   | UNIX 4.2 bsd f77                   | .096             |  |                                  |
| Prime 850                        | Primos                             | .095             |  |                                  |
| Sperry 1100/60                   | FTN opt=ZEO                        | .093             |  |                                  |
| Pyramid 90X FPA                  | UNIX 4.2 bsd f77                   | .088             |  |                                  |
| Apple Mac II/16 Mhz/25 Mhz 68882 | Absoft 2.4                         | .087             |  |                                  |
| SUN-3/50, 16.7 MHz 68881         | 3.2 f77 -O -f68881                 | .087             |  |                                  |
| HP 9000 Series 330               | HP-UX, f77 5.2                     | .087             |  |                                  |
| Apple Macintosh II               | Absoft -w -v -O -f -s              | .083             |  |                                  |
| microVAX II                      | f77 Ultrix 1.1                     | .082             |  |                                  |

| Computer                    | “LINPACK Benchmark”<br>OS/Compiler | n=100<br>Mflop/s | “TPP”<br>Best<br>Effort<br>n=1000<br>Mflop/s | “Theoretical<br>Peak”<br>Mflop/s |
|-----------------------------|------------------------------------|------------------|--|----------------------------------|
| Apple Mac SE + 20 MHz 68881 | ABSOF 2.4                          | .082             |  |                                  |
| Ridge 32/110                | ROS 3.3/RISC                       | .081             |  |                                  |
| Data General MV/8000        | f77 opt level 2                    | .078             |  |                                  |
| Apple MAC II w/882          |                                    | .078             |  |                                  |
| Prime P2350                 | f77 rev 20.2.b2 -opt               | .077             |  |                                  |
| Apple Mac/Levco Prodigy 4   | ABSOF MacFort 020                  | .076             |  |                                  |
| Apple Mac II w/68020        | FORTRAN                            | .074             |  |                                  |
| HP 9000 Series 320          | HP-UX, f77 5.2                     | .073             |  |                                  |
| Apollo DN3000               | DOMAIN/IX SR9.7 opt 4              | .071             |  |                                  |
| Apollo DN460/660            | AEGIS 8.0 FTN                      | .069             |  |                                  |
| Masscomp MC500 w/FPP        | 3.1 Fortran                        | .061             |  |                                  |
| Harris HS-20 w/FPP          | Fortran 77 3.1                     | .061             |  |                                  |
| Sequent Balance 8000        | DYNIX Fortran 2.4.4                | .059             |  |                                  |
| Definicon DSI-32/10         | Greenhills f77 (MSDOS)             | .057             |  |                                  |
| VAX 11/750                  | VMS v4.1                           | .057             |  |                                  |
| Encore Multimax             | f77                                | .055             |  |                                  |
| HP 9000 Series 500          | Fortran 1.7                        | .043             |  |                                  |
| Opus 32.32                  | UNIX, f77 4.2 bsd                  | .043             |  |                                  |
| ATT 3B20 FP                 | UNIX V 2.0/4                       | .040             |  |                                  |
| Acorn Cambridge             | fortran                            | .039             |  |                                  |
| IBM 4331 MG2                | H opt=3                            | .038             |  |                                  |
| Burroughs B6800             | Fortran 77 ver 34                  | .037             |  |                                  |
| VAX 11/725 FPA              | VMS v4.1                           | .037             |  |                                  |
| Masscomp MCS-541 w/FPB      | Fortran 3.1                        | .037             |  |                                  |
| IBM RT PC Model 20          | f77                                | .036             |  |                                  |
| VAX 11/730 FPA              | VMS                                | .036             |  |                                  |
| Prime 2250                  | Fortran 77                         | .034             |  |                                  |
| IBM PC-AT/370               | VS Fortran opt=3                   | .033             |  |                                  |
| IBM PC-XT/370               | H opt=3                            | .031             |  |                                  |
| VAX 11/750                  | UNIX 4.2 bsd f77                   | .029             |  |                                  |
| Apollo DN320                | AEGIS 8.0 FTN                      | .028             |  |                                  |
| Sun 2/50 + SKY FFP          | f77 -O -fsky 3.0                   | .027             |  |                                  |
| Ametek S14/32 (1 node)      | RM Fortran 2.11                    | .026             |  |                                  |
| Apollo DN550 FPA            | AEGIS 8.0 FTN                      | .025             |  |                                  |

| Computer                         | “LINPACK Benchmark”<br>OS/Compiler | n=100<br>Mflop/s | “TPP”<br>Best<br>Effort<br>n=1000<br>Mflop/s | “Theoretical<br>Peak”<br>Mflop/s |
|----------------------------------|------------------------------------|------------------|--|----------------------------------|
| AMSTRAC 1512 8086/8087 9.54 MHz  | MS-Fortran 4.0 -Ox -AH             | .022             |  |                                  |
| microVAX I                       | VMS                                | .023             |  |                                  |
| Canaan                           | VS                                 | .021             |  |                                  |
| Chas. River Data 6835+SKY        | SVS Fortran 77                     | .018             |  |                                  |
| Apollo DN 420 PEB                | AEGIS 7+ FTN                       | .017             |  |                                  |
| IBM AT w/80287                   | PROFORT 1.0                        | .012             |  |                                  |
| IBM PC w/8087                    | PROFORT 1.0                        | .012             |  |                                  |
| Cadtrak DS1/8087                 | Intel Fortran 77                   | .011             |  |                                  |
| Apple Mac Classic II/16 MHz68030 | Absoft 2.4                         | .011             |  |                                  |
| IBM PC/AT w/80287                | Microsoft 3.2                      | .0091            |  |                                  |
| Chas. River Data 6835            | SVS Fortran 77                     | .0088            |  |                                  |
| Apollo DN300                     | AEGIS 8.0 FTN                      | .0071            |  |                                  |
| Masscomp MC500                   | 3.1 Fortran                        | .0070            |  |                                  |
| IBM PC w/8087                    | Microsoft 3.2                      | .0069            |  |                                  |
| Apple Mac II                     | ABSOFT 2.4                         | .0064            |  |                                  |
| HP 9000 Series 200               | HP-UX                              | .0062            |  |                                  |
| Sun 2/50                         | f77 -O -fsoft 3.0                  | .0055            |  |                                  |
| Atari ST                         | ABSOFT AC/Fortran v2.2             | .0051            |  |                                  |
| Apple Macintosh                  | ABSOFT 2.0b                        | .0038            |  |                                  |
| Palm Pilot III                   |                                    | .00169           |  |                                  |

Table 2: A Look at Parallel Processing

| Computer             | 1000 x 1000 Problem with Parallel Processing |              |                 |         |            |
|----------------------|--|--------------|-----------------|---------|------------|
|                      | Time uniprocessor                            | no. of procs | Time multiprocs | Speedup | Efficiency |
| Hitachi S-3800/480   | 0.104  | 4            | .0324           | 3.21    | .80        |
| Hitachi S-3800/380   | 0.104  | 3            | .0396           | 2.63    | .88        |
| Hitachi S-3800/280   | 0.104  | 2            | .0549           | 1.89    | .95        |
| NEC SX-3/*4R         | 0.128  | 4            | .0442           | 2.91    | .73        |
| NEC SX-3/*4R         | 0.128  | 2            | .0707           | 1.82    | .91        |
| NEC SX-3/*4          | 0.148  | 4            | .0498           | 2.98    | .74        |
| NEC SX-3/*4          | 0.148  | 2            | .0821           | 1.81    | .90        |
| NEC SX-3/*2R         | 0.243  | 4            | .0747           | 3.25    | .81        |
| NEC SX-3/*2R         | 0.243  | 2            | .1307           | 1.86    | .93        |
| NEC SX-3/*2          | 0.293  | 4            | .0863           | 3.40    | .85        |
| NEC SX-3/*2          | 0.293  | 2            | .1518           | 1.93    | .96        |
| Cray C90             | 0.740  | 16           | .0618           | 11.95   | .75        |
| Cray C90             | 0.740  | 8            | .108            | 6.85    | .86        |
| Cray C90             | 0.740  | 4            | .204            | 3.63    | .91        |
| Cray C90             | 0.740  | 2            | .392            | 1.89    | .94        |
| NEC SX-3             | 0.149  | 2            | .0820           | 1.82    | .91        |
| NEC SX-3/*1R         | 0.472  | 4            | .139            | 3.40    | .85        |
| NEC SX-3/*1R         | 0.472  | 2            | .255            | 1.85    | .93        |
| Convex C4/XA         | 0.949  | 4            | .264            | 3.59    | .90        |
| Convex C4/XA         | 0.949  | 3            | .346            | 2.74    | .91        |
| Convex C4/XA         | 0.949  | 2            | .501            | 1.89    | .95        |
| IBM ES/9000 (7.1 ns) | 1.58   | 8            | .293            | 5.34    | .67        |
| IBM ES/9000 (7.1 ns) | 1.58   | 7            | .322            | 4.91    | .70        |
| IBM ES/9000 (7.1 ns) | 1.58   | 6            | .347            | 4.56    | .76        |
| IBM ES/9000 (7.1 ns) | 1.58   | 5            | .397            | 3.98    | .80        |
| IBM ES/9000 (7.1 ns) | 1.58   | 4            | .485            | 3.26    | .82        |
| IBM ES/9000 (7.1 ns) | 1.58   | 3            | .617            | 2.56    | .85        |
| IBM ES/9000 (7.1 ns) | 1.58   | 2            | .871            | 1.82    | .91        |
| Cray Y-MP/8          | 2.17   | 8            | .312            | 6.96    | .87        |
| Cray Y-MP/8          | 2.17   | 4            | .577            | 3.76    | .94        |
| Cray Y-MP/8          | 2.17   | 3            | .754            | 2.88    | .96        |
| Cray Y-MP/8          | 2.17   | 2            | 1.11            | 1.96    | .98        |
| Cray Y-MP/98         | 2.17   | 8            | .386            | 5.65    | .71        |
| Cray Y-MP/98         | 2.17   | 4            | .600            | 3.63    | .91        |
| Cray Y-MP/98         | 2.17   | 2            | 1.12            | 1.94    | .97        |
| IBM ES/9000 (9 ns)   | 1.98   | 6            | .458            | 4.31    | .72        |
| IBM ES/9000 (9 ns)   | 1.98   | 5            | .552            | 3.58    | .72        |
| IBM ES/9000 (9 ns)   | 1.98   | 4            | .666            | 2.97    | .74        |
| IBM ES/9000 (9 ns)   | 1.98   | 3            | .862            | 2.29    | .76        |
| IBM ES/9000 (9 ns)   | 1.98   | 2            | 1.24            | 1.59    | .80        |
| Cray 2S              | 1.76   | 4            | .476            | 3.66    | .91        |
| Cray 2S              | 1.76   | 3            | .617            | 2.82    | .94        |

| Computer             | 1000 x 1000 Problem with Parallel Processing |              |                 |         |            |
|----------------------|--|--------------|-----------------|---------|------------|
|                      | Time uniprocessor                            | no. of procs | Time multiprocs | Speedup | Efficiency |
| Cray 2S              | 1.76   | 2            | .902            | 1.93    | .96        |
| Cray X-MP/4          | 3.10   | 4            | .813            | 3.78    | .94        |
| Cray X-MP/4          | 3.10   | 3            | 1.07            | 2.87    | .96        |
| Cray X-MP/4          | 3.10   | 2            | 1.57            | 1.96    | .98        |
| Convex C3880         | 5.90   | 8            | .841            | 7.02    | .88        |
| Convex C3840         | 5.90   | 4            | 1.58            | 3.74    | .94        |
| Convex C3830         | 5.90   | 3            | 2.05            | 2.88    | .96        |
| Convex C3820         | 5.90   | 2            | 3.01            | 1.96    | .98        |
| DEC 10000 Alpha      | 4.31   | 6            | .889            | 4.85    | .81        |
| DEC 10000 Alpha      | 4.31   | 5            | 1.04            | 4.12    | .82        |
| DEC 10000 Alpha      | 4.31   | 4            | 1.28            | 3.37    | .84        |
| DEC 10000 Alpha      | 4.31   | 3            | 1.66            | 2.60    | .87        |
| DEC 10000 Alpha      | 4.31   | 2            | 2.44            | 1.76    | .88        |
| Convex SPP-1000      | i 5.45                                       | 8            | 0.8905          | 6.120   | .77        |
| Convex SPP-1000      | i 5.45                                       | 4            | 1.513           | 3.602   | .90        |
| Convex SPP-1000      | i 5.45                                       | 2            | 2.628           | 2.073   | 1.03       |
| Cray S-MP/MCP784     | 21.4   | 84           | .902            | 23.7    | .28        |
| Cray S-MP/MCP756     | 21.4   | 56           | .986            | 21.7    | .39        |
| Cray S-MP/MCP728     | 21.4   | 28           | 1.32            | 16.2    | .58        |
| Cray S-MP/MCP707     | 21.4   | 7            | 3.46            | 6.19    | .88        |
| DEC 7000 Alpha       | 4.74   | 6            | .978            | 4.84    | .81        |
| DEC 7000 Alpha       | 4.74   | 5            | 1.14            | 4.16    | .83        |
| DEC 7000 Alpha       | 4.74   | 4            | 1.38            | 3.43    | .86        |
| DEC 7000 Alpha       | 4.74   | 3            | 1.81            | 2.62    | .87        |
| DEC 7000 Alpha       | 4.74   | 2            | 2.67            | 1.77    | .89        |
| Meiko CS2            | 6.89   | 64           | 1.03            | 6.69    | .10        |
| Meiko CS2            | 6.89   | 32           | 1.03            | 6.69    | .21        |
| Meiko CS2            | 6.89   | 16           | 1.26            | 5.47    | .34        |
| Meiko CS2            | 6.89   | 8            | 1.59            | 4.33    | .54        |
| Meiko CS2            | 6.89   | 4            | 2.32            | 2.97    | .74        |
| Meiko CS2            | 6.89   | 2            | 3.96            | 1.74    | .87        |
| Fujitsu AP1000       | 160  | 512          | 1.10            | 147     | .29        |
| Fujitsu AP1000       | 160  | 256          | 1.50            | 108     | .42        |
| Fujitsu AP1000       | 160  | 128          | 2.42            | 66.5    | .52        |
| Fujitsu AP1000       | 160  | 64           | 3.51            | 46.0    | .72        |
| Fujitsu AP1000       | 160  | 32           | 6.71            | 24.0    | .75        |
| Fujitsu AP1000       | 160  | 16           | 11.5            | 13.9    | .87        |
| Fujitsu AP1000       | 160  | 8            | 22.6            | 7.12    | .89        |
| Fujitsu AP1000       | 160  | 4            | 41.3            | 3.90    | .97        |
| Fujitsu AP1000       | 160  | 2            | 81.4            | 1.96    | .98        |
| IBM 3090/J (14.5 ns) | 6.8832                                       | 6            | 1.24            | 5.57    | .93        |
| IBM 3090/J (14.5 ns) | 6.8832                                       | 5            | 1.46            | 4.72    | .94        |
| IBM 3090/J (14.5 ns) | 6.8832                                       | 4            | 1.80            | 3.81    | .95        |
| IBM 3090/J (14.5 ns) | 6.8832                                       | 3            | 2.35            | 2.93    | .98        |

| Computer                      | 1000 x 1000 Problem with Parallel Processing |              |                 |         |            |
|-------------------------------|--|--------------|-----------------|---------|------------|
|                               | Time uniprocessor                            | no. of procs | Time multiprocs | Speedup | Efficiency |
| IBM 3090/J (14.5 ns)          | 6.8832                                       | 2            | 3.48            | 1.98    | .99        |
| IBM 3090/600S VF              | 7.27   | 6            | 1.29            | 5.64    | .94        |
| IBM 3090/500S VF              | 7.27   | 5            | 1.52            | 4.78    | .96        |
| IBM 3090/400S VF              | 7.27   | 4            | 1.89            | 3.85    | .96        |
| IBM 3090/300S VF              | 7.27   | 3            | 2.46            | 2.96    | .99        |
| IBM 3090/280S VF              | 7.27   | 2            | 3.65            | 1.99    | .99        |
| IBM 3090/200S VF              | 7.27   | 2            | 3.64            | 1.99    | .99        |
| Kendall Square Research       | 21.5   | 32           | 1.30            | 16.5    | .52        |
| Kendall Square Research       | 21.5   | 16           | 2.17            | 9.90    | .62        |
| Kendall Square Research       | 21.5   | 8            | 4.57            | 4.71    | .59        |
| Kendall Square Research       | 21.5   | 4            | 14.2            | 1.52    | .38        |
| IBM ES/9000 (11 ns)           | 5.14   | 4            | 1.51            | 3.39    | .85        |
| IBM ES/9000 (11 ns)           | 5.14   | 3            | 1.90            | 2.71    | .90        |
| IBM ES/9000 (11 ns)           | 5.14   | 2            | 2.74            | 1.88    | .94        |
| Intel Delta                   | 22   | 512          | 1.5             | 14.7    | .03        |
| Intel Delta                   | 22   | 256          | 1.6             | 13.8    | .05        |
| Intel Delta                   | 22   | 128          | 1.7             | 12.9    | .10        |
| Intel Delta                   | 22   | 64           | 1.9             | 11.5    | .18        |
| Intel Delta                   | 22   | 32           | 2.2             | 10.0    | .31        |
| Intel Delta                   | 22   | 16           | 2.9             | 7.59    | .47        |
| Intel Delta                   | 22   | 8            | 4.1             | 5.37    | .67        |
| Intel Delta                   | 22   | 4            | 6.7             | 3.28    | .82        |
| Intel Delta                   | 22   | 2            | 11.6            | 1.90    | .95        |
| IBM 3090/600E VF              | 9.36   | 6            | 1.73            | 5.41    | .90        |
| IBM 3090/500E VF              | 9.36   | 5            | 2.02            | 4.63    | .93        |
| IBM 3090/400E VF              | 9.36   | 4            | 2.48            | 3.77    | .94        |
| IBM 3090/300E VF              | 9.36   | 3            | 3.21            | 2.92    | .97        |
| IBM 3090/200E VF              | 9.36   | 2            | 4.73            | 1.98    | .99        |
| Sun Sparc2000(50 MHz)         | 23.85  | 16           | 2.01            | 11.89   | .74        |
| Sun Sparc2000(50 MHz)         | 23.85  | 12           | 2.26            | 10.54   | .88        |
| Sun Sparc2000(50 MHz)         | 23.85  | 8            | 2.99            | 7.96    | .99        |
| Alliant FX/2800-200           | 22.9   | 14           | 2.06            | 11.1    | .79        |
| Alliant FX/2800-200           | 22.9   | 12           | 2.30            | 10.0    | .83        |
| Alliant FX/2800-200           | 22.9   | 10           | 2.68            | 8.54    | .85        |
| Alliant FX/2800-200           | 22.9   | 8            | 3.24            | 7.07    | .88        |
| Alliant FX/2800-200           | 22.9   | 4            | 6.07            | 3.77    | .94        |
| Alliant FX/2800-200           | 22.9   | 2            | 11.8            | 1.94    | .97        |
| IBM PVS                       | 20.4   | 32           | 2.17            | 9.35    | .29        |
| IBM PVS                       | 20.4   | 16           | 2.35            | 8.64    | .54        |
| IBM PVS                       | 20.4   | 8            | 3.41            | 5.95    | .74        |
| IBM PVS                       | 20.4   | 4            | 5.71            | 3.56    | .89        |
| IBM PVS                       | 20.4   | 2            | 10.6            | 1.92    | .96        |
| IBM RS/6000 Cluster (62.5 ns) | 7.42   | 8            | 2.48            | 2.99    | .37        |
| IBM RS/6000 Cluster (62.5 ns) | 7.42   | 4            | 3.24            | 2.29    | .57        |



| Computer                       | 1000 x 1000 Problem with Parallel Processing |              |                 |         |            |
|--------------------------------|--|--------------|-----------------|---------|------------|
|                                | Time uniprocessor                            | no. of procs | Time multiprocs | Speedup | Efficiency |
| IBM RS/6000 Cluster (62.5 ns)  | 7.42   | 2            | 4.64            | 1.60    | .80        |
| nCUBE 2                        | 331  | 1024         | 2.59            | 128     | .12        |
| nCUBE 2                        | 331  | 512          | 3.29            | 101     | .20        |
| nCUBE 2                        | 331  | 256          | 4.05            | 81.7    | .32        |
| nCUBE 2                        | 331  | 128          | 5.74            | 57.7    | .45        |
| nCUBE 2                        | 331  | 64           | 8.70            | 38.0    | .59        |
| nCUBE 2                        | 331  | 32           | 14.5            | 22.8    | .71        |
| nCUBE 2                        | 331  | 16           | 25.6            | 12.9    | .81        |
| nCUBE 2                        | 331  | 8            | 46.9            | 7.04    | .88        |
| nCUBE 2                        | 331  | 4            | 89.1            | 3.71    | .93        |
| nCUBE 2                        | 331  | 2            | 171.            | 1.93    | .97        |
| Intel iPSC/860                 | 22   | 128          | 2.8             | 7.68    | .06        |
| Intel iPSC/860                 | 22   | 64           | 3.2             | 6.72    | .11        |
| Intel iPSC/860                 | 22   | 32           | 4.0             | 5.38    | .17        |
| Intel iPSC/860                 | 22   | 16           | 5.1             | 4.22    | .26        |
| Intel iPSC/860                 | 22   | 8            | 6.5             | 3.31    | .41        |
| Intel iPSC/860                 | 22   | 4            | 8.9             | 2.42    | .60        |
| Intel iPSC/860                 | 22   | 2            | 12.8            | 1.68    | .84        |
| Meiko Computing Surface (i860) | 21.9   | 32           | 3.19            | 6.85    | .21        |
| Meiko Computing Surface (i860) | 21.9   | 24           | 3.30            | 6.62    | .28        |
| Meiko Computing Surface (i860) | 21.9   | 16           | 3.57            | 6.12    | .38        |
| Meiko Computing Surface (i860) | 21.9   | 8            | 4.56            | 4.79    | .60        |
| Meiko Computing Surface (i860) | 21.9   | 4            | 6.83            | 3.20    | .80        |
| Meiko Computing Surface (i860) | 21.9   | 2            | 11.6            | 1.88    | .94        |
| IBM RS/6000 Cluster (50 ns)    | 7.95   | 8            | 3.44            | 2.31    | .29        |
| IBM RS/6000 Cluster (50 ns)    | 7.95   | 6            | 3.84            | 2.07    | .35        |
| IBM RS/6000 Cluster (50 ns)    | 7.95   | 4            | 4.39            | 1.81    | .45        |
| IBM RS/6000 Cluster (50 ns)    | 7.95   | 2            | 6.02            | 1.32    | .66        |
| Sun Sparc2000(50 MHz)          | 26.71  | 8            | 3.37            | 7.92    | .99        |
| Sun Sparc2000(50 MHz)          | 26.71  | 4            | 6.24            | 4.28    | 1.07       |
| Sun Sparc2000(50 MHz)          | 26.71  | 2            | 12.60           | 2.12    | 1.06       |
| Convex C3240                   | 14.9   | 4            | 3.92            | 3.81    | .95        |
| Convex C3230                   | 14.9   | 3            | 5.06            | 2.95    | .98        |
| Convex C3220                   | 14.9   | 2            | 7.50            | 1.99    | .99        |
| Convex C-240                   | 15   | 4            | 4.03            | 3.76    | .94        |
| Convex C-230                   | 15   | 3            | 5.20            | 2.91    | .97        |
| Convex C-220                   | 15   | 2            | 7.65            | 1.98    | .99        |
| Parsytec FT-400                | 1075   | 400          | 4.90            | 219.    | .55        |
| Parsytec FT-400                | 1075   | 256          | 6.59            | 163.    | .64        |
| Parsytec FT-400                | 1075   | 100          | 13.2            | 81.4    | .81        |

| Computer                       | 1000 x 1000 Problem with Parallel Processing |              |                 |         |            |
|--------------------------------|--|--------------|-----------------|---------|------------|
|                                | Time uniprocessor                            | no. of procs | Time multiprocs | Speedup | Efficiency |
| Parsytec FT-400                | 1075   | 64           | 19.1            | 56.3    | .88        |
| Parsytec FT-400                | 1075   | 16           | 69.2            | 15.5    | .97        |
| Sun Sparc10/514(50 MHz)        | 24.73  | 4            | 6.81            | 3.63    | .91        |
| Sun Sparc10/514(50 MHz)        | 24.73  | 2            | 11.71           | 2.11    | 1.06       |
| FPS Model 522                  | 12   | 2            | 6.36            | 1.89    | .95        |
| Suprenum S1C1                  | 51   | 16           | 6.4             | 8.0     | .50        |
| Suprenum S1C1                  | 51   | 14           | 7.1             | 7.2     | .51        |
| Suprenum S1C1                  | 51   | 12           | 7.9             | 6.5     | .54        |
| Suprenum S1C1                  | 51   | 10           | 8.9             | 5.8     | .58        |
| Suprenum S1C1                  | 51   | 8            | 10.4            | 4.9     | .61        |
| Suprenum S1C1                  | 51   | 6            | 13.1            | 3.9     | .65        |
| Suprenum S1C1                  | 51   | 4            | 18.1            | 2.8     | .70        |
| Suprenum S1C1                  | 51   | 2            | 33.4            | 1.5     | .75        |
| Alliant FX/800-200             | 24.2   | 4            | 7.09            | 3.41    | .85        |
| Alliant FX/800-200             | 24.2   | 2            | 12.7            | 1.91    | .95        |
| Alliant FX/80                  | 57.7   | 8            | 9.64            | 5.99    | .75        |
| Alliant FX/80                  | 57.7   | 7            | 10.6            | 5.44    | .78        |
| Alliant FX/80                  | 57.7   | 6            | 11.8            | 4.89    | .82        |
| Alliant FX/80                  | 57.7   | 5            | 13.6            | 4.24    | .85        |
| Alliant FX/80                  | 57.7   | 4            | 16.2            | 3.56    | .89        |
| Alliant FX/80                  | 57.7   | 3            | 20.7            | 2.79    | .93        |
| Alliant FX/80                  | 57.7   | 2            | 29.8            | 1.94    | .97        |
| Stardent 1540 (Ardent Titan-4) | 51.2   | 4            | 14.3            | 3.57    | .89        |
| Stardent 1530 (Ardent Titan-3) | 51.2   | 3            | 18.3            | 2.80    | .93        |
| Stardent 1520 (Ardent Titan-2) | 51.2   | 2            | 26.3            | 1.95    | .97        |
| SGI 4D/480 40 MHz              | 54.0   | 8            | 9.48            | 5.70    | .71        |
| SGI 4D/440 40 MHz              | 54.0   | 4            | 15.91           | 3.39    | .85        |
| SGI 4D/420 40 MHz              | 54.0   | 2            | 28.80           | 1.88    | .94        |
| SGI 4D/380 33 MHz              | 65.0   | 8            | 11.13           | 5.84    | .73        |
| SGI 4D/340 33 MHz              | 65.0   | 4            | 18.62           | 3.49    | .87        |
| SGI 4D/320 33 MHz              | 65.0   | 2            | 34.17           | 1.90    | .95        |
| Sun Sparc10/402(40 MHz)        | 29.03  | 2            | 16.28           | 1.78    | .89        |
| Alliant FX/40                  | 66.1   | 4            | 20.5            | 3.22    | .81        |
| Alliant FX/40                  | 66.1   | 3            | 24.9            | 2.65    | .88        |
| Alliant FX/40                  | 66.1   | 2            | 34.8            | 1.90    | .95        |
| SGI 4D/240 25 MHz              | 85.2   | 4            | 23.89           | 3.57    | .89        |
| SGI 4D/220 25 MHz              | 85.2   | 2            | 44.89           | 1.90    | .95        |
| Alliant FX/4                   | 106  | 4            | 32.3            | 3.28    | .82        |
| Alliant FX/4                   | 106  | 3            | 38.7            | 2.74    | .91        |
| Alliant FX/4                   | 106  | 2            | 55.8            | 1.90    | .95        |
| DEC VAX 6000-460               | 439  | 6            | 80              | 5.5     | .92        |
| DEC VAX 6000-450               | 439  | 5            | 94              | 4.7     | .94        |
| DEC VAX 6000-440               | 439  | 4            | 114             | 3.8     | .96        |
| DEC VAX 6000-430               | 439  | 3            | 152             | 2.9     | .96        |

**Computer**                      **1000 x 1000 Problem with Parallel Processing**

|                       | <b>Time<br/>uniprocessor</b> | <b>no. of<br/>procs</b> | <b>Time<br/>multiprocs</b> | <b>Speedup</b> | <b>Efficiency</b> |
|-----------------------|------------------------------|-------------------------|----------------------------|----------------|-------------------|
| DEC VAX 6000-420      | 439                          | 2                       | 222                        | 1.9            | .99               |
| ELXSI 6420            | 475                          | 5                       | 104                        | 4.57           | .91               |
| ELXSI 6420            | 475                          | 3                       | 167                        | 2.84           | .95               |
| ELXSI 6420            | 475                          | 2                       | 245                        | 1.94           | .97               |
| DEC VAX 6240          | 1295                         | 4                       | 332                        | 3.90           | .98               |
| DEC VAX 6230          | 1295                         | 3                       | 439                        | 2.95           | .98               |
| DEC VAX 6220          | 1295                         | 2                       | 654                        | 1.98           | .99               |
| Sequent Balance 21000 | 11111                        | 30                      | 445                        | 25.0           | .83               |

Table 3: Highly Parallel Computing

| Computer<br>(Full Precision)   | Number<br>of Procs<br>or Cores | $R_{max}$<br>GFlop/s | $N_{max}$<br>Order | $N_{1/2}$<br>Order | $R_{Peak}$<br>GFlop/s |
|--|--------------------------------|----------------------|--------------------|--------------------|-----------------------|
| IBM Blue Gene/Q Power BCQ 1.6 GHz (96 racks * 1024 nodes/rack * 16 cores/node) w/custom  | 1572864                        | 16324751             | 12681215           |                    | 20132659              |
| IBM Blue Gene/Q Power BCQ 1.6 GHz (72 racks * 1024 nodes/rack * 16 cores/node) w/custom  | 1179648                        | 12003644             | 10715135           |                    | 15099494              |
| K computer, Fujitsu SPARC64 VIIIfx 2.0GHz, 8 core w/Tofu interconnect  | 705024                         | 10510000             | 11870208           |                    | 11280384              |
| K computer, Fujitsu SPARC64 VIIIfx 2.0GHz, 8 core w/Tofu interconnect  | 548352                         | 8162000              | 10725120           |                    | 8773632               |
| IBM Blue Gene/Q Power BCQ 1.6 GHz (48 racks * 1024 nodes/rack * 16 cores/node) w/custom  | 786432                         | 8152590              | 8912895            |                    | 10066330              |
| IBM Blue Gene/Q Power BCQ 1.6 GHz (24 racks * 1024 nodes/rack * 16 cores/node) w/custom  | 393216                         | 4141180              | 6422527            |                    | 5033165               |
| IBM iDataPlex DX360M4 Intel Sandybridge 2.7 GHz (9216 nodes * 2 sockets * 8 cores/socket) w/InfiniBand   | 147456                         | 2897000              | 5201920            |                    | 3185050               |
| TH-1A (14336 6-core Intel X5670 2.93 GHz + 7168 Nvidia M2050 w/custom interconnect)  | 186368                         | 2566000              | 3600000            | 1000000            | 4701061               |
| IBM iDataPlex DX360M4 Intel Sandybridge 2.7 GHz (7168 nodes * 2 sockets * 8 cores/socket) w/InfiniBand   | 114688                         | 2072000              | 4464640            |                    | 2477261               |
| IBM Power 775 (IBM POWER7 3.836 GHz w/Custom (equivlent to 247.5 drawers x 8 sockets per drawer x 32 cores per socket) )   | 63360                          | 1515000              | 2280960            |                    | 1944392               |
| IBM Blue Gene/Q Power BCQ 1.6 GHz (8 racks * 1024 nodes/rack * 16 cores/node) w/custom   | 131072                         | 1358197              | 3899391            |                    | 1677721               |
| 464 Dawning TC3600 Blade System 4640 Computing Nodes (2*Intel 6 core X5650 2.666 GHz, 1*Nvidia Tesla C2050 GPU) w/InfiniBand   | 120640                         | 1271000              | 2359296            |                    | 2983520               |
| IBM Power 775 (POWER7 3.836 GHz, w/custom) (8 sockets per drawer x 32 cores per socket)  | 47488                          | 1183000              | 3419136            |                    | 1457311               |
| IBM BladeCenter cluster of 3240 nodes dual socket 1.8 GHz Opteron (dual core) LS21 blades plus 6480 nodes dual socket 3.2 GHz PowerXCell 8i (8 SPU + 1 PPU cores) QS22 blades w/InfiniBand               | 129600                         | 1105000              | 2329599            |                    | 1456704               |
| TSUBAME 2.0; 1357 HP Proliant SL390s G7 nodes w/ Xeon X5670 (2.93GHz) 6cores x 2sockets, NVIDIA Tesla M2050 (1.15GHz) 14cores x 3chips and QDR InfiniBand x 2rails; SUSE Linux Enterprise server 11      | 73278                          | 1192000              | 2490368            |                    | 2287630               |
| Cray XT5 (Opteron quad core 2.3 GHz)   | 150152                         | 1059000              | 4712799            |                    | 1381400               |
| Cray XE6 (AMD 12-core, 2.1Ghz w/custom interconnect)   | 153408                         | 1054000              | 4537344            |                    | 1288627               |
| IBM BladeCenter cluster of 3060 nodes dual socket 1.8 GHz Opteron (dual core) LS21 blades plus 6120 nodes dual socket 3.2 GHz PowerXCell 8i (8 SPU + 1 PPU cores) QS22 blades w/InfiniBand               | 122400                         | 1042000              | 2249343            |                    | 1375776               |
| DOE/NNSA/LANL IBM BladeCenter cluster of 3060 nodes dual socket 1.8 GHz Opteron (dual core) LS21 blades plus 6120 nodes dual socket 3.2 GHz PowerXCell 8i (8 SPU + 1 PPU cores) QS22 blades w/InfiniBand | 122400                         | 1026000              | 2236927            |                    | 1375776               |
| Cray XT5 (AMD six-core 2.6 GHz Istanbul)   | 112800                         | 919100               | 3844936            |                    | 1173000               |
| IBM Power 775 (IBM POWER7 3.836 GHz (155 drawers x 256 cores/drawer)) w/Custom   | 39680                          | 886400               | 3571200            |                    | 1217700               |
| Cray XT-5 AMD six-core 2.6 GHz Istanbul  | 98928                          | 831750               | 3718960            |                    | 1028851               |

| <b>Computer<br/>(Full Precision)</b>  | <b>Number<br/>of Procs<br/>or Cores</b> | <b><math>R_{max}</math><br/>GFlop/s</b> | <b><math>N_{max}</math><br/>Order</b> | <b><math>N_{1/2}</math><br/>Order</b> | <b><math>R_{peak}</math><br/>GFlop/s</b> |
|---|---|---|---------------------------------------|---------------------------------------|--|
| IBM Blue Gene/P Solutiuon (Quad core 0.85 GHz PowerPC 450 w/custom)   | 294912                                  | 825500                                  | 4043519                               |                                       | 10027000                                 |
| IBM Blue Gene/P Solutiuon (Quad core 0.85 GHz PowerPC 450 w/custom)   | 294912                                  | 819600                                  | 3981311                               |                                       | 1002700                                  |
| Mole-8.5 256 computing nodes, each node contains: 2 2.267GHz 4-core Xeon 5520, 6 nVidia Tesla C2050 (Fermi) GPU cards, w/QDR Infiniband   | 23552                                   | 809611                                  | 710400                                |                                       | 1497000                                  |
| National Research Center of Parallel Computer Engineering & Technology 8704 Propriety nodes, 16 core (.975 GHz w/InfiniBand QDR)  | 137200                                  | 795900                                  | 3375120                               |                                       | 1070160                                  |
| IBM Blue Gene/Q Power BCQ 1.6 GHz (4 racks * 1024 nodes/rack * 16 cores/node) w/custom  | 65536                                   | 689758                                  | 2752511                               |                                       | 838861                                   |
| IBM Blue Gene/Q IBM BQC 1.6 GHz w/ Proprietary Nodes: 4096 Cores/node: 16   | 65536                                   | 677104                                  | 2719743                               |                                       | 838800                                   |
| Lomonosov 4420 nodes of 2 x Intel Xeon 5570 Nehalem (4 cores, 2.93 GHz) + 680 nodes of 2 x Intel Xeon 5670 Westmere (6 cores, 2.93 GHz) + 777 nodes of 2 x Intel Xeon 5670 Westmere (4 cores, 2.53 GHz) 2 x M2070 Tesla   | 71492                                   | 674100                                  | 2073599                               |                                       | 1373000                                  |
| SGI Altix ICE 8200EX ( 92 racks Xeon QC 3.0 Ghz + 18 racks Xeon 2.93 Ghz w/Infiniband)  | 56320                                   | 544300                                  | 2458680                               |                                       | 673259                                   |
| IBM BlueGene/L DD2 Prototype cluster (dual 0.7 GHz PowerPC 440 w/custom)  | 212992                                  | 478200                                  | 2456063                               |                                       | 596378                                   |
| IBM System Blue Gene/P Solution (Quad core 0.85 GHz PowerPC 450 w/Custom)   | 163840                                  | 450300                                  | 2580479                               |                                       | 557056                                   |
| Cray XT5 (Opteron quad core 2.3 GHz)  | 66000                                   | 463300                                  | 2078999                               |                                       | 607000                                   |
| IBM Blue Gene/P Solutiuon (Quad core 0.85 GHz PowerPC 450 w/custom)   | 147456                                  | 415700                                  | 2958335                               |                                       | 501350                                   |
| IBM iDataPlex DX360M4 (2 socket 8 core Sandybridge 2.6 GHz ) Number of nodes: 464 CPU cores: 7,424 (464 nodes x 2 sockets/node x 8 cores/socket) Accelerator: 464 Intel Phi (MIC) - 1 per node Accelerator cores; 27,840 (464 Phi x 60 cores/Phi ) w/Infiniband QDR | 35264                                   | 368455                                  | 768000                                |                                       | 623467                                   |
| T-Platforms T-Blade2 (Intel Xeon X5570 quad core, 2.933 Ghz, w/QDR InfiniBand)  | 35360                                   | 350100                                  | 2489344                               |                                       | 414419                                   |
| IBM Blue Gene/Q IBM BQC 1.6 GHz w/ Proprietary Nodes: 2048 Cores/node: 16   | 32768                                   | 339834                                  | 1949695                               |                                       | 419400                                   |
| Cray XE6 (12Core AMD Opteron 6174 (Magny-Cours) 2.2 GHz)  | 45504                                   | 295500                                  | 2472456                               |                                       | 400430                                   |
| IBM iDataPlex DX360M4 Intel Sandybridge 2.7 GHz (9216 nodes * 2 sockets * 8 cores/socket) w/InfiniBand  | 147456                                  | 2877000                                 | 5038080                               |                                       | 3185049                                  |
| IBM BlueGene/L DD2 Prototype cluster (dual 0.7 GHz PowerPC 440 w/custom)  | 131072                                  | 280600                                  | 1769471                               |                                       | 367001                                   |
| HITACHI SR16000/M1 322 nodes (3836MHz)  | 10304                                   | 253000                                  | 1858560                               |                                       | 316209                                   |
| HITACHI SR16000-M1/320 (3830MHz)  | 9984                                    | 243900                                  | 1576960                               |                                       | 306389                                   |
| IBM iDataPlex DX360M2 Intel Nehalem 2.53 GHz (3824 nodes * 2 sockets/node * 4 cores/socket) w/InfiniBand  | 30592                                   | 261631                                  | 2526944                               |                                       | 309591                                   |
| IBM iDataPlex DX360M4 (2 socket Sandybridge 2.6 GHz nodes: 234 CPU cores: 3,744 (234 nodes x 2 sockets/node x 8 cores/socket) Accelerator: 234 Intel Phi (MIC) - 1 per node Accelerator cores; 14,040 (234 * 60) Internconnet: Infiniband                           | 17784                                   | 220031                                  | 896000                                |                                       | 302515                                   |
| IBM Blue Gene/Q Power BCQ 1.6 GHz (1 racks * 1024 nodes/rack * 16 cores/node) w/custom  | 16384                                   | 172691                                  | 1376255                               |                                       | 209715                                   |

| Computer<br>(Full Precision)   | Number<br>of Procs<br>or Cores | $R_{max}$<br>GFlop/s | $N_{max}$<br>Order | $N_{1/2}$<br>Order | $R_{peak}$<br>GFlop/s |
|--|--------------------------------|----------------------|--------------------|--------------------|-----------------------|
| 320 hybrid nodes (Intel 2-way 2.267GHz 4-core Xeon 5520 plus 6 nVidia Tesla C2050 (Fermi) GPU cards per node) connected with QDR Mellanox Infiniband   | 29440                          | 207300               | 1113600            |                    | 1012653               |
| Intel (6-core Xeon X5660, 2.8 GHz, 2 sockets/node, IB QDR)   | 23040                          | 192500               | 2255040            |                    | 258000                |
| IBM Blue Gene/P Solution (Quad core 0.85 GHz PowerPC 450 w/custom)   | 65536                          | 190900               | 2654207            |                    | 222822                |
| IBM Power 775 IBM POWER7 3.836 GHz w/Custom  | 8192                           | 185100               | 1433088            |                    | 251396                |
| Dawning 5000A, AMD 8347 HE Opteron (quadcore, 1.9GHz, w/Infiniband, Windows HPC server 1920 nodes)   | 30720                          | 180600               | 300208             |                    | 233472                |
| IBM iDataPlex DX360M4 Intel Sandybridge 2.7 GHz w/InfiniBand (512 nodes * 2 sockets * 8 cores/socket)  | 8192                           | 176947               | 1198080            |                    | 164800                |
| IBM Blue Gene/Q IBM BQC 1.6 GHz w/Proprietary Nodes: 1024 Cores/node: 16   | 16384                          | 172494               | 1376255            |                    | 209700                |
| IBM System x iDataPlex (2.53 GHz Quad Core Intel Xeon w/GigE)  | 29920                          | 168600               | 2716430            |                    | 302790                |
| IBM System Blue Gene/P Solution (Quad core 0.85 GHz PowerPC 450 w/ Custom)   | 65536                          | 167300               | 1766399            |                    | 222820                |
| IBM System x iDataPlex dx360 M3 1360 nodes (Intel Xeon X5670 (Westmere EP) 2.93 GHz w/Infiniband 4x QDR QLogic)  | 16320                          | 168800               | 1958400            |                    | 191270                |
| IBM System x iDataPlex dx360 M3 (Intel Xeon X5670 (Westmere EP) 2.93 GHz w/Infiniband 4x QDR QLogic)   | 8160                           | 165300               | 1305600            |                    | 191270                |
| IBM Power 775 (IBM POWER7 3.836 GHz custom interconnect)   | 6912                           | 159600               | 1429000            |                    | 212115                |
| 256 x HP DL165 dual socket 2.3GHz AMD(12 core); 368 x HP SL160 dual socket 2.67GHz Opteron (hex core); 150 x IBM dx360 dual socket 2.67GHz Opteron (hex core); 564 x IBM dx340 dual socket 2.33GH Xeon (quad core); 376 x Sun/Oracle X2200 dual socket 2.3GHz Opteron (quad core); 512 x Dell 1950e dual socket 2.32GHz Xeon (quad core); 2225 nodes w/ Myricom 10G interconnect | 20925                          | 149900               | 1790200            |                    | 193900                |
| 256 hybrid nodes (Intel 2-way 2.267GHz 4-core Xeon 5520 plus 6 nVidia Tesla C2050 (Fermi) GPU cards per node) connected with QDR Mellanox Infiniband   | 23552                          | 149700               | 710400             |                    | 809611                |
| IBM System Blue Gene/P Solution (Quad core 0.85 GHz PowerPC 450 w/ Custom)   | 65536                          | 145400               | 1757183            |                    | 222820                |
| IBM iDataPlex DX360M2 (Intel Westmere 2.4 GHz Nodes 256 CPU Cores: 3072 (256 nodes * 2 sockets * 6 cores) GPU: 512 nVIDIA M2070 w/InfiniBand ) (256 nodes * 2 sockets * 6 cores * 4 fp per cycle) + (512 GPUs * 515.2 fp per GPU)  | 10240                          | 142700               | 1159000            |                    | 293273                |
| IBM BlueGene/L DD2 Prototype cluster (dual 0.7 GHz PowerPC 440 w/custom)   | 65536                          | 136800               | 1277951            |                    | 183500                |
| 1200 IBM System x iDataPlex dx360 M3 (Intel Xeon X5650 (Westmere EP) 2.66 GHz w/Infiniband QDR QLogic)   | 14400                          | 136300               | 1532160            |                    | 153216                |
| HP Cluster Platform 3000 BL460c (Dual Intel Xeon 3 GHz quad core E5365 (Clovertown) w/Infiniband 4X DDR)   | 14400                          | 132800               | 1850000            | 250000             | 172608                |
| Intel (6-core Xeon X5660, 2.8 GHz, 2 sockets/node, IB QDR)   | 15444                          | 131500               | 1894464            |                    | 173000                |
| Cluster Platform 3000 BL460c, Xeon 53xx 3GHz, Infiniband   | 14240                          | 129300               | 1750000            |                    | 170880                |
| SGI Altix ICE 8200, Xeon quad core 3.0 GHz   | 14336                          | 126900               | 1831872            |                    | 172032                |
| IBM BladeCenter cluster (360 nodes dual socket 1.8 GHz Opteron (dual core) & 720 nodes dual socket 3.2 GHz PowerXCell 8i QS22 blades w/InfiniBand)   | 14400                          | 126500               | 805759             |                    | 161856                |

| Computer<br>(Full Precision)   | Number<br>of Procs<br>or Cores | $R_{max}$<br>GFlop/s | $N_{max}$<br>Order | $N_{1/2}$<br>Order | $R_{peak}$<br>GFlop/s |
|--|--------------------------------|----------------------|--------------------|--------------------|-----------------------|
| USC Cluster (256 x HP SL160 dual socket 2.67GHz Opteron (hex core) 160 x IBM dx360 dual socket 2.67GHz Opteron (hex core) 112 x HP SL160 dual socket 2.67GHz Xeon (hex core) 180 x IBM dx340 dual socket 2.33GHz Xeon (quad core) 384 x IBM dx340 dual socket 2.33GHz Xeon (quad core) 128 x Sun/Oracle X2200 dual socket 2.3GHz Opteron (quad core) 512 x Dell 1950e dual socket 2.32GHz Xeon (quad core) 256 x Sun/Oracle x2200 dual socket 2.3GHz Opteron (quad core) w/Myrinet 10G | 17280                          | 126400               | 1718800            |                    | 145500                |
| Cray XT5 (quad core 2.3 GHz Optron)  | 17956                          | 125128               | 1367871            |                    | 165195                |
| NEC SX-9/E/1280M160  | 1280                           | 122400               | 1556480            |                    | 131072                |
| HITACHI SR16000-M1/176(3830MHz)  | 5504                           | 121600               | 1400000            |                    | 168907                |
| IBM Power 575 4.7 GHz (w/IB)   | 8064                           | 115900               | 1128959            |                    | 151603                |
| IBM Power 775 IBM POWER7 3.836 GHz w/Custom  | 4608                           | 114800               | 1184256            |                    | 86395                 |
| Fujitsu FX1Quadcore SPARC64VII (Quad core 2.52GHz infiniband DDR)  | 12032                          | 110600               | 3308800            |                    | 121282                |
| Intel Xenon E5-2650 (8 core, 2 GHz) + Nvidia M2050 + Infiniband (Node = 2 Socket + 3 GPU)  | 7424                           | 98920                | 638975             |                    | 148378                |
| SGI Altix ICE 8200EX (Xeon quad core 3.0 GHz w/infiniband)   | 10240                          | 106100               | 1535480            |                    | 122880                |
| Cluster Platform 3000 BL460c, Xeon 53xx 2.66GHz, Infiniband  | 13728                          | 102800               |                    |                    | 181612                |
| Cray XT3 Red Storm (AMD Opteron 2.4 GHz w/custom)  | 26569                          | 102200               | 1700000            |                    | 127531                |
| T2K Open Supercomputer (Todai Combined Cluster) AMD Quad Core Opteron (2.3GHz) 4 sockets per node Myrinet-10G  | 15104                          | 101700               | 1740800            |                    | 139000                |
| Cray XT3 dual-core Optron 2.6 Ghz  | 22592                          | 101700               | 2220160            |                    | 117478                |
| HITACHI HA8000-tc/HT225 504nodes (2300MHz)   | 16128                          | 100600               | 1152000            |                    | 1483778               |
| Intel Xeon   |                                |                      |                    |                    |                       |
| IBM Power 575 4.7 GHz (w/IB)   | 6720                           | 98240                | 1058399            |                    | 126336                |
| IBM Power 575 4.7 GHz (w/ IB)  | 6656                           | 92980                | 960000             |                    | 125133                |
| IBM System Blue Gene/P Solution (Quad core 0.85 GHz PowerPC 450 w/Custom)  | 32768                          | 92960                | 1302527            |                    | 111411                |
| IBM eServer Blue Gene Solution (2way 0.7 GHz PowerPC 440 w/Custom)   | 40960                          | 91290                | 983039             |                    | 114688                |
| Appro Xtreme-X (Opteron 8-core 2.4GHz QDR infiniband)  | 12512                          | 91030                | 1630720            |                    | 120115                |
| IBM BladeCenter cluster HS21 (3.0 GHz Quad Core Intel Xeon w/ IB)  | 9920                           | 89010                | 1778304            |                    | 119040                |
| Fujitsu PRIMERGY RX200S5, X5570 (2.93GHz Infiniband DDR)   | 8256                           | 87890                | 1188864            | 129024             | 96760                 |
| TSUBAME Grid cluster and TSUBASA cluster TSUBAME: SunFire X4600 w/(Opteron 880 (2.4GHz) 2cores x 8sockets; Nvidia GT200 (1.44GHz) 30multiprocessors x 1chip x 2boards; ClearSpeed CSX600 (210MHz) 1core x 2sockets x 1board) plus SunFire X4600 with ClearSpeed X620 w/( Opteron 880 (2.4GHz) 2cores x 8sockets ClearSpeed CSX600 (210MHz) 1core x 2sockets x 1board) TSUBASA: SunBlade X6250 68 nodes( Xeon E5440 (2.83GHz) 4cores x 2sockets )                                       | 30976                          | 87010                | 1059839            |                    | 161816                |
| IBM Blue Gene/Q Prototype II (IBM BQC 1.6 GHz Nodes:512 Cores/node:16 w/custom)  | 8192                           | 85879                | 983039             |                    | 104857                |
| IBM System Blue Gene/P Solution (Quad core 0.85 GHz  | 32768                          | 84310                | 1302527            |                    | 111411                |

| <b>Computer<br/>(Full Precision)</b>   | <b>Number<br/>of Procs<br/>or Cores</b> | <b><math>R_{max}</math><br/>GFlop/s</b> | <b><math>N_{max}</math><br/>Order</b> | <b><math>N_{1/2}</math><br/>Order</b> | <b><math>R_{peak}</math><br/>GFlop/s</b> |
|--|---|---|---------------------------------------|---------------------------------------|--|
| PowerPC 450 w/Custom)  |   |   |                                       |                                       |  |
| BullX Cluster (602 dual socket Intel X5650 2.67 GHz, 215 dual socket Intel X5550 2.67 GHz, 16 quad socket Intel X7560 w/InfiniBand)  | 9376                                    | 85900                                   | 1446480                               |                                       | 99316                                    |
| T2K Open Supercomputer (AMD Opteron quad-core, 2.3 GHz) w/ Myrinet 10G   | 12288                                   | 82980                                   | 1433600                               |                                       | 113000                                   |
| IBM BladeCenter cluster HS21 (3.0 GHz Quad Core Intel Xeon w/ IB)  | 9824                                    | 80940                                   | 1623744                               |                                       | 117888                                   |
| IBM Power 575 4.7 GHz (w/ IB)  | 6400                                    | 80320                                   | 1056000                               |                                       | 120320                                   |
| IBM Power 575 4.7 GHz (w/ IB)  | 6656                                    | 80000                                   | 1096000                               |                                       | 125133                                   |
| Dell C6100 670 nodes (Intel Xeon CPU X5670 2.93GHz (12-cores/node) w/Infiniband)   | 8040                                    | 79800                                   | 1800000                               |                                       | 94229                                    |
| IBM Power 575 4.7 GHz (w/IB)   | 5376                                    | 78680                                   | 907199                                |                                       | 101068                                   |
| TSUBAME Grid cluster and TSUBASA cluster TSUBAME: SunFire X4600 w/(Opteron 880 (2.4GHz) 2cores x 8sockets; NVidia GT200 (1.44GHz) 30multiprocessors x 1chip x 2boards; ClearSpeed CSX600 (210MHz) 1core x 2sockets x 1board) plus SunFire X4600 with ClearSpeed X620 w/( Opteron 880 (2.4GHz) 2cores x 8sockets ClearSpeed CSX600 (210MHz) 1core x 2sockets x 1board) TSUBASA: SunBlade X6250 68 nodes( Xeon E5440 (2.83GHz) 4cores x 2sockets ) | 30976                                   | 77480                                   | 995328                                |                                       | 161816                                   |
| T2K Open Supercomputer (Tsukuba) Appro Xtreme-X3 (AMD Opteron quad-core 2.3 GHz Infiniband 4X x 4 rail)  | 10000                                   | 76460                                   | 1508000                               |                                       | 92000                                    |
| IBM System x iDataPlex (2.53 GHz Quad Core Intel Xeon w/GigE)  | 13440                                   | 76030                                   | 1808000                               |                                       | 136013                                   |
| IBM eServer pSeries p5 575 (8-way 1.9 GHz POWER5 w/HP Sw Interconnect)   | 12208                                   | 75760                                   | 1383600                               |                                       | 92781                                    |
| HITACHI SR16000-XM1/108(3300MHz)   | 3456                                    | 73350                                   | 1145440                               |                                       | 91238.4                                  |
| SuperMicro Xeon Cluster, E5462 4 core, 2.8 GHz, Nvidia Tesla s2050 GPU, (128 nodes; w/2 socket & 2 GPU / node) w/Infiniband  | 4608                                    | 75296                                   | 685567                                |                                       | 143300                                   |
| USC system (384 Sun x2200 2.3GHz AMD 2356, 512 Dell pe1950 2.3GHz Intel, Interconnect 10G Myrinet)   | 10240                                   | 72050                                   | 1285200                               |                                       | 94208                                    |
| IBM BladeCenter PS702 Express (IBM POWER7 3.00 GHz (Intelligent Energy Optimization enabled, up to 3.30 GHz) w/Infiniband) (245 nodes x 16 cores/node)   | 3920                                    | 72030                                   | 940800                                |                                       | 103488                                   |
| IBM eServer Blue Gene Solution (0.7 GHz PowerPC 440 w/custom interconnect)   | 32768                                   | 71900                                   | 884735                                |                                       | 91750                                    |
| IBM Power 775 IBM POWER7 3.836 GHz w/Custom  | 2816                                    | 70760                                   | 907776                                |                                       | 86395                                    |
| IBM BlueGene/L DD2 Prototype cluster (dual 0.7 GHz PowerPC 440 w/custom)   | 32768                                   | 70720                                   | 933887                                |                                       | 91750                                    |
| IBM Power 775 (IBM POWER7 3.836 GHz Interconnect: Custom)  | 2816                                    | 68320                                   | 710000                                |                                       | 86395                                    |
| IBM System x iDataPlex (2.26 GHz Quad Core Intel Xeon w/InfiniBand)  | 8000                                    | 66680                                   | 1610000                               |                                       | 72320                                    |
| IBM System x iDataPlex (2.26 GHz Quad Core Intel Xeon w/InfiniBand)  | 8000                                    | 66500                                   | 1554280                               |                                       | 72320                                    |
| IBM System x iDataPlex (2.26 GHz Quad Core Intel Xeon w/InfiniBand)  | 7992                                    | 65780                                   | 1374072                               |                                       | 72248                                    |
| Columbia - SGI Altix 1.5 GHz, Voltaire Infiniband  | 13608                                   | 66567                                   | 1478736                               |                                       | 82944                                    |
| IBM BladeCenter HX5 205 nodes (Intel Xeon E7-4870)   | 8000                                    | 64860                                   | 1099224                               |                                       | 78720                                    |



| <b>Computer<br/>(Full Precision)</b>  | <b>Number<br/>of Procs<br/>or Cores</b> | <b><math>R_{max}</math><br/>GFlop/s</b> | <b><math>N_{max}</math><br/>Order</b> | <b><math>N_{1/2}</math><br/>Order</b> | <b><math>R_{peak}</math><br/>GFlop/s</b> |
|---|---|---|---------------------------------------|---------------------------------------|--|
| (Westmere EX) 2.40 GHz (10 core) Cores: 8,000 (200 nodes * 4 sockets * 10 cores) w/Infiniband QDR   |   |   |                                       |                                       |  |
| Sun Blade 6048 (Xeon X5560 quad core 2.8 GHz w/Infiniband QDR)  | 6464                                    | 64630                                   | 1405152                               |                                       | 72397                                    |
| BladeCenter JS21 Cluster, PPC 970, 2.3GHz, Myrinet  | 10000                                   | 63830                                   | 1458000                               |                                       | 92000                                    |
| IBM eServer pSeries p5 575 (8-way 1.9 GHz POWER5 w/HPsw)  | 10240                                   | 63390                                   | 1280000                               |                                       | 77824                                    |
| IBM BladeCenter JS21 Cluster (PPC 970, 2.3GHz w/Myrinet)  | 10000                                   | 62630                                   | 1458000                               |                                       | 92000                                    |
| IBM Blue Gene Q Prototype (IBM BQC 1.6 GHz, 16 core, Interconnect Proprietary)  | 8192                                    | 65347                                   | 434175                                |                                       | 104857                                   |
| IBM Power 750 Express (POWER7 3.55 GHz (w/ Intelligent Energy Optimization enable up to 3.86 GHz) w/10G Ethernet Nodes 85 4 sockets * 8 cores)  | 2720                                    | 61260                                   | 1100000                               |                                       | 83994                                    |
| 252 nodes Dell PE1950 Xeon quad core 2.33 GHz plus 254 nodes Dell PE1950 Xeon quad core 2.33 GHz plus 255 nodes Sun X2200M2x64 Opteron quad core 2.3 GHz plus 254 nodes IBM iDataPlex DX340 quad core Xeon 2.33 GHz w/10G Myrinet | 8120                                    | 60670                                   | 1156600                               |                                       | 74704                                    |
| IBM eServer pSeries p5 575 (8-way 1.9 GHz POWER5 w/HP Sw Interconnect)  | 9408                                    | 60490                                   | 1100000                               |                                       | 72048                                    |
| IBM Power 575 4.7 GHz (w/ IB)   | 4256                                    | 60030                                   | 800000                                |                                       | 80013                                    |
| IBM Power 575 4.7 GHz (w/IB)  | 4032                                    | 59250                                   | 816479                                |                                       | 75801                                    |
| IBM Power 750 Express (POWER7 3.55 GHz (w/ Intelligent Energy Optimization enable up to 3.86 GHz) Nodes 80 w/10G Ethernet)  | 2560                                    | 58310                                   | 1050000                               |                                       | 79052                                    |
| IBM System x iDataPlex (2.53 GHz Quad Core Intel Xeon w/InfiniBand)   | 6720                                    | 56810                                   | 1256000                               |                                       | 68006                                    |
| Hitachi SR16000 Model 2 (POWER6 4.7GHz (32way), InfiniBand Fat Tree Network)  | 4096                                    | 56650                                   | 1100000                               |                                       | 77004.8                                  |
| SGI Altix 4700 (Itanium 1.6 GHz)  | 9614                                    | 56520                                   | 1583232                               |                                       | 61530                                    |
| TSUBAME Sun Fire X4600 (2.4 GHz Opteron 880 (648 nodes * 8 sockets * 2 cores) + 648 ClearSpeed accelerator cards * 2 CSX600 processors) w/Voltaire Infiniband)  | 11664                                   | 56430                                   | 1123200                               |                                       | 102560                                   |
| IBM Power 750 Express (POWER7 3.55 GHz (w/ Intelligent Energy Optimization enable up to 3.86 GHz)) w/10G Ethernet Nodes 80  | 2560                                    | 56200                                   | 1050000                               |                                       | 79052                                    |
| Xenon Systems 128 nodes, Dual quad core Xeon E5462, 2.8 GHz + NVIDIA Tesla S2050 w/infiniband   | 114688                                  | 52550                                   | 670000                                | 335000                                | 143308                                   |
| IBM Power 575 4.7 GHz (w/IB)  | 3584                                    | 52810                                   | 767999                                |                                       | 67380                                    |
| NASA Project Columbia (20x508proc SGI Altix 3000 1.5 GHz Itanium2 w/Infiniband)   | 10160                                   | 51870                                   | 1290240                               |                                       | 60960                                    |
| SGI Altix 4700 (Itanium 1.6 GHz)  | 9108                                    | 51441                                   | 1260000                               |                                       | 58291                                    |
| HITACHI SR16000-L2/121(4700MHz)   | 3872                                    | 51210                                   | 844800                                |                                       | 72794                                    |
| BM Power 750 Express (86 nodes * 4 sockets * 8 cores) (POWER7 3.55 GHz (w/ Intelligent Energy Optimization enable up to 3.86 GHz) 10G Ethernet)   | 2752                                    | 50710                                   | 1100000                               |                                       | 84982                                    |
| T2K Open Supercomputer/Kyodai, HX600, Opteron Quad Core 2.3GHz, InfiniBand Fujitsu  | 6656                                    | 50510                                   | 1223040                               | 215000                                | 61235                                    |

| <b>Computer<br/>(Full Precision)</b>   | <b>Number<br/>of Procs<br/>or Cores</b> | <b><math>R_{max}</math><br/>GFlop/s</b> | <b><math>N_{max}</math><br/>Order</b> | <b><math>N_{1/2}</math><br/>Order</b> | <b><math>R_{peak}</math><br/>GFlop/s</b> |
|--|---|---|---------------------------------------|---------------------------------------|--|
| IBM System x iDataPlex (2.53 GHz Quad Core Intel Xeon w/InfiniBand)  | 6048                                    | 49900                                   | 1192000                               |                                       | 61206                                    |
| IBM Power 575 4.7 GHz (w/ IB)  | 3296                                    | 48550                                   | 950000                                |                                       | 61965                                    |
| IBM Power 575 4.7 GHz (w/ IB)  | 3520                                    | 47970                                   | 796000                                |                                       | 66176                                    |
| TSUBAME Sun Fire X4600 (2.6 GHz Opteron 885 (16 nodes * 8 sockets * 2 cores) + 2.4 GHz Opetron 880 (632 nodes * 8 sockets * 2 cores + 360 ClearSpeed accelerator cards * 2 CSX600 processors) w/Voltaire Infiniband) | 11088                                   | 47380                                   | 1148160                               |                                       | 82125                                    |
| T-Platforms T-Blade solution Intel Xeon E5472 (quad core, 3GHz) w/InfiniBand   | 5000                                    | 47170                                   | 750000                                |                                       | 60000                                    |
| IBM System Blue Gene/P Solution (Quad core 0.85 GHz PowerPC 450 w/Custom)  | 16384                                   | 46830                                   | 933887                                |                                       | 55706                                    |
| Dell PE1955 dual-core Intel 2.66 Ghz blade w/2 sockets/node w/Mellanox Infiniband  | 5848                                    | 46730                                   | 1187200                               |                                       | 62220                                    |
| IBM BladeCenter cluster HS21 (2.5GHz Quad Core Intel Xeon L5420 w/ IB)   | 5376                                    | 46040                                   | 1113600                               |                                       | 53670                                    |
| IBM cluster (866 dual socket, 2.6 GHz Opteron, 87 quad socket, 2.6 GHz Opteron, 627 dual socket, 2.5 GHz Shanghai, 8 quad socket, QC 2.5 GHz Shanghai, with Infiniband)  | 9304                                    | 45730                                   | 1200000                               |                                       | 73072                                    |
| IBM System x iDataPlex (2.53 GHz Quad Core Intel Xeon w/InfiniBand)  | 5376                                    | 45480                                   | 1124000                               |                                       | 54405                                    |
| Tsubame Sun Galaxy 4 (2.6 GHz Opteron 885 (16 nodes * 8 sockets * 2 cores) + 2.4 GHz Opetron 880 (632 nodes * 8 sockets * 2 cores + 360 ClearSpeed accelerator cards) w/Voltaire Infiniband)                         | 10728                                   | 45200                                   | 971520                                |                                       | 84429                                    |
| IBM QPACE Cluster (3.2 GHz IBM PowerXCell8i with Custom Interconnect)  | 4608                                    | 44500                                   | 487551                                |                                       | 55706                                    |
| Cray XT3 dual-core Optron 2.6 Ghz  | 10404                                   | 43480                                   | 1064520                               |                                       | 54101                                    |
| IBM x3455 cluster (822 nodes dual socket dual core 2.6 GHz Opteron & 641 nodes dual socket dual core 2.5 GHz Shanghai w/ Infiniband)   | 8416                                    | 43460                                   | 591000                                |                                       | 68378                                    |
| IBM System Blue Gene/P Solution (Quad core 0.85 GHz PowerPC 450 w/Custom)  | 16384                                   | 43160                                   | 909311                                |                                       | 55706                                    |
| Bull NovaScale 5160, Itanium2 1.6 GHz, Quadrics  | 8704                                    | 42900                                   |                                       |                                       | 55706                                    |
| NASA Project Columbia (16x504proc SGI Altix 3000 1.5 GHz Itanium2 w/Infiniband)  | 8064                                    | 42707                                   | 1075200                               |                                       | 48384                                    |
| Dell 1955 (dual-core 2.66 GHz IB: Topspin/PCI-X)   | 5168                                    | 41460                                   | 1097600                               |                                       | 54988                                    |
| Dell PowerEdge C6100 cluster (2.66 GHz Six Core Xeon X5650 w/ IB)  | 4428                                    | 40310                                   | 1100000                               |                                       | 47110                                    |
| IBM System x iDataPlex (2.53 GHz Quad Core Intel Xeon w/InfiniBand)  | 4704                                    | 39630                                   | 1051000                               |                                       | 47604                                    |
| IBM System x iDataPlex (2.8 GHz Quad Core Intel Xeon w/InfiniBand)   | 4104                                    | 38990                                   | 1190000                               |                                       | 45965                                    |
| IBM System x iDataPlex (2.53 GHz Quad Core Intel Xeon w/GigE)  | 6720                                    | 38790                                   | 1256000                               |                                       | 68006                                    |
| Thunderbird - Dell PowerEdge 1850 (Pentium 3.6 GHz, Infiniband)  | 8000                                    | 38270                                   | 1150000                               |                                       | 64512                                    |
| Tsubame Sun Galaxy 4 (2.6 GHz Opteron 885 (16 nodes * 8 sockets * 2 cores) + 2.4 GHz Opetron 880 (632 nodes * 8 sockets * 2 cores) w/Voltaire Infiniband)  | 10368                                   | 38180                                   | 1334160                               |                                       | 49869                                    |
| IBM eServer Blue Gene Solution (2 way 0.7 GHz PowerPC 440 w/custom interconnect)   | 16384                                   | 37330                                   | 663551                                |                                       | 45875                                    |

| Computer<br>(Full Precision)   | Number<br>of Procs<br>or Cores | $R_{max}$<br>GFlop/s | $N_{max}$<br>Order | $N_{1/2}$<br>Order | $R_{peak}$<br>GFlop/s |
|--|--------------------------------|----------------------|--------------------|--------------------|-----------------------|
| IBM Power 750 Express (POWER7 3.55 GHz w/ Intelligent Energy Optimization enable up to 3.86 GHz) (47 nodes * 4 sockets * 8 cores) Interconnect: Infiniband DDR | 1504                           | 36880                | 1100416            |                    | 46443                 |
| IBM eServer BlueGene/L Solution (2way 0.7GHz PowerPC440 w/Custom interconnect)   | 16384                          | 36490                | 688127             |                    | 45875.2               |
| Cray XT3 Red Storm (AMD Opteron 2.4 GHz w/custom)  | 10848                          | 36190                | 1100000            |                    | 43392                 |
| IBM BlueGene/L DD2 Prototype cluster (2way 0.7 GHz PowerPC 440 w/custom interconnect)  | 16384                          | 36010                | 655359             |                    | 45875                 |
| Earth Simulator ****   | 5120                           | 35860                | 1075200            | 266240             | 40960                 |
| Dell PowerEdge 1950 (Intel Dural 2.33GHz Quad-core w/Infiniband)   | 5408                           | 34780                | 761392             | 30000              | 50402                 |
| IBM System x iDataPlex (2.53 GHz Quad Core Intel Xeon w/InfiniBand)  | 4032                           | 32980                | 974000             |                    | 40804                 |
| IBM QPACE Cluster (3.2 GHz IBM PowerXCell8i with Custom Interconnect)  | 3456                           | 32850                | 421631             |                    | 41779                 |
| Dell PowerEdge M600 (Intel quad core 2.33 GHz), w/Infiniband   | 4032                           | 31800                | 1309280            | 158280             | 37578                 |
| IBM BladeCenter HS22 cluster (2.66 GHz Quad Core Intel Xeon w/InfiniBand)  | 7992                           | 31310                | 752640             |                    | 34048                 |
| IBM System x iDataPlex (2.8 GHz 6C Intel Westmere w/InfiniBand)  | 3072                           | 30130                | 774144             |                    | 34406                 |
| IBM System x iDataPlex (2.53 GHz Quad Core Intel Xeon w/InfiniBand)  | 3360                           | 28360                | 888000             |                    | 34003                 |
| IBM eServer Blade Center JS20+ (2-way PowerPC970 2.2Ghz w/Myrinet)   | 4800                           | 27910                | 977816             |                    | 42144                 |
| Fujitsu RX200 S5 socket quad core Intel 2.266 GHz 10 GbE   | 6000                           | 27777                | 1966080            |                    | 54000                 |
| HP BL460c (Intel Xeon 3 GHz Quad core w/GigE)  | 5184                           | 27720                | 1537920            |                    | 62208                 |
| IBM eServer Blue Gene Solution (PowerPC 440 0.7 GHz w/Custom)  | 12288                          | 27450                | 516095             |                    | 34406                 |
| Intel (1100 node Woodcrest quad core 3 GHz w/Infiniband)   | 4400                           | 27210                | 400000             |                    | 52800                 |
| IBM System x iDataPlex (2.8 GHz Quad Core Intel Nehalem w/InfiniBand)  | 2592                           | 27140                | 870912             |                    | 29030                 |
| IBM System x iDataPlex (2.8 GHz Quad Core Intel Nehalem w/InfiniBand)  | 2512                           | 26270                | 791280             |                    | 28134                 |
| HP BL460c (Intel Xeon 3 GHz Quad core w/GigE)  | 4000                           | 25530                | 1351040            |                    | 48000                 |
| IBM BladeCenter cluster HS21 (2.66GHz Quad Core Intel Xeon w/GigE)   | 5040                           | 24670                | 781600             |                    | 53626                 |
| SGI Altix 4700 (Intel Itanium2 dual-core 1.6GHz w/SGI NUMAlink)  | 4096                           | 23817                | 881664             |                    | 26214                 |
| IBM Power 575 4.7 GHz (w/ IB)  | 1536                           | 23470                | 768000             |                    | 28876.8               |
| IBM Power 595 p6 5.0 GHz w/ InfiniBand   | 1536                           | 23370                | 684000             |                    | 30720                 |
| IBM System Blue Gene/P Solution (Quad core 0.85 GHz PowerPC 450 w/Custom)  | 8192                           | 23270                | 651263             |                    | 27853                 |
| System G 324 Mac Pro towers, dual quad core 2.8GHz Xeon w/Infiniband   | 2520                           | 22320                | 545000             |                    | 28224                 |
| IBM System Blue Gene/P Solution (Quad core 0.85 GHz PowerPC 450 w/Custom)  | 8192                           | 21910                | 602111             |                    | 27853                 |
| Sun Constellation (quad core Intel Xeon X5570 2.93Ghz IB Mellanox)   | 2144                           | 21330                | 551712             |                    | 25128                 |
| T2K Open Supercomputer (Todai) AMD Opteron 8356 (quad core, 2.3GHz)  | 4096                           | 21090                | 400000             |                    | 37683                 |

| Computer<br>(Full Precision)   | Number<br>of Procs<br>or Cores | $R_{max}$<br>GFlop/s | $N_{max}$<br>Order | $N_{1/2}$<br>Order | $R_{peak}$<br>GFlop/s |
|--|--------------------------------|----------------------|--------------------|--------------------|-----------------------|
| IBM System Blue Gene/P Solution (Quad core 0.85 GHz PowerPC 450 w/Custom)                                    | 8192                           | 20860                | 602111             |                    | 27850                 |
| IBM eServer Blade Center JS20+ (2-way PowerPC970 2.2Ghz w/Myrinet)   | 3564                           | 20530                | 812592             | 180576             | 31363                 |
| Cray XT3, (AMD Opteron 2.4 GHz w/custom)   | 5200                           | 20527                |                    |                    | 24960                 |
| IBM System p p575 1.9GHz (w/HPS)   | 3072                           | 20070                | 700000             |                    | 23347                 |
| Intel Itanium2 Tiger4 (4-way) 1.4GHz Itanium2 w/Quadrics Elan4 (QsNetII)                                     | 4096                           | 19940                | 975000             | 110000             | 22938                 |
| IBM BladeCenter cluster HS21 (3.0 GHz Dual Core Xeon 5160 w/ IB)   | 2080                           | 19910                | 968000             |                    | 24960                 |
| IBM System x iDataPlex (2.53 GHz Quad Core Intel Xeon w/GigE)  | 3360                           | 19580                | 900000             |                    | 34003                 |
| NASA Project Columbia (8x512proc SGI Altix 3000 1.5 GHz Itanium2 w/Infiniband)                               | 4032                           | 19564                | 800000             |                    | 24192                 |
| IBM BladeCenter cluster HS21 (3.0GHz Dual Core Xeon 5160 w/ IB)  | 2072                           | 19550                | 900000             |                    | 24860                 |
| Intel Itanium2 Tiger4 (4-way) 1.4GHz Itanium2 w/Quadrics Elan4 (QsNetII)                                     | 4032                           | 19470                | 960000             | 110000             | 22579                 |
| IBM BladeCenter cluster HS21 (3.0GHz Dual Core Xeon 5160 w/ IB)  | 2072                           | 19390                | 844000             |                    | 24860                 |
| IBM BladeCenter cluster HS21 (3.0GHz Dual Core Xeon 5160 w/ IB)  | 2064                           | 18730                | 660000             |                    | 24770                 |
| IBM BladeCenter cluster HS21 (2.33 GHz Xeon 5140 w/ GigE)  | 3840                           | 18600                | 600000             |                    | 35790                 |
| IBM BladeCenter QS22 cluster (4.0 GHz "Prototype" IBM PowerXcell 8i w/ IB)                                   | 2016                           | 18570                | 325375             | 115455             | 30464                 |
| Dell Cluster Intel Pentium Woodcrest (3 GHz w/Pathscale Infiniband)  | 2340                           | 18270                | 713000             |                    | 28080                 |
| IBM eServer Blue Gene Solution (2way 0.7 GHz PowerPC 440 w/Custom)   | 8192                           | 18200                | 442367             |                    | 22937.6               |
| IBM eServer Blue Gene Solution, BlueGene/L (IBM PowerPC 700 MHz 440x5 processors w/Proprietary Interconnect) | 8196                           | 17810                | 675839             |                    | 22940                 |
| IBM Blue Gene/L (0.7GHz Power PC440 w/ custom)   | 8192                           | 17730                | 442367             |                    | 22938                 |
| Cray XT3 Opteron dual core 2.6 GHz   | 4096                           | 17280                | 598672             |                    | 21420                 |
| SGI Altix XE 1300 Cluster Solution (512 Xeon 5355 quad-core 2.66GHz w/Infiniband DDRx )                      | 2048                           | 17250                | 638448             |                    | 21791                 |
| IBM BladeCenter cluster HS21 (2.33GHz Quad Core Intel Xeon 5345 w/ IB)                                       | 2504                           | 17140                | 720000             |                    | 23337                 |
| IBM System x cluster (864 x3455 nodes and 86 x3755 nodes, 2.6 GHz Dual Core Opteron w/ IB)                   | 4144                           | 17100                | 670000             |                    | 21549                 |
| IBM System x iDataPlex (2.53 GHz Quad Core Intel Xeon w/InfiniBand)  | 2016                           | 17050                | 689000             |                    | 20402                 |
| Sun Blade 6048 with X6420 blades (quad core AMD 2.0 GHz) w/Infiniband  | 3072                           | 16990                | 854784             |                    | 24576                 |
| Cray XT3, (AMD Opteron 2.6 GHz w/custom)   | 4096                           | 16975                |                    |                    | 21299                 |
| Dell Cluster Intel Pentium Woodcrest (3 GHz w/Pathscale Infiniband)  | 2208                           | 16570                | 698000             |                    | 26496                 |
| Apple Xserve G5 (IBM PowerPC 970FX 2 GHz w/Myrinet)  | 3072                           | 16180                | 750000             | 160000             | 24576                 |
| Intel (X5550 2.67 GHz dual-quad core w/Infiniband DDR)   | 1760                           | 15890                | 759296             | 100000             | 18304                 |
| HITACHI SR11000-J2/128(2300MHz)  | 128                            | 15811                | 645120             | 116640             | 18841                 |

| Computer<br>(Full Precision)  | Number<br>of Procs<br>or Cores | $R_{max}$<br>GFlop/s | $N_{max}$<br>Order | $N_{1/2}$<br>Order | $R_{peak}$<br>GFlop/s |
|---|--------------------------------|----------------------|--------------------|--------------------|-----------------------|
| IBM System x iDataPlex (2.5 GHz Quad Core Intel Xeon w/ IB)   | 2048                           | 15810                | 642000             |                    | 20480                 |
| IBM BladeCenter cluster LS20 (2.2 GHz AMD Opteron w/ GigE)  | 6400                           | 15760                | 840000             |                    | 28160                 |
| Cray X1E (1.13 GHz)   | 1020                           | 15706                |                    |                    | 18442                 |
| IBM BladeCenter QS22 cluster (3.2 GHz IBM PowerXcell 8i w/ IB)  | 2016                           | 15700                | 325375             | 111615             | 24371                 |
| IBM System x cluster (2.6 GHz Dual Core Opteron w/ IB)  | 4144                           | 15350                | 560000             |                    | 21550                 |
| IBM BladeCenter cluster HS21 (2.33GHz Quad Core Intel Xeon 5345 w/ IB)  | 2120                           | 15290                | 483000             |                    | 19758                 |
| IBM BladeCenter cluster HS21 (2.33 GHz Xeon 5140 w/ GigE)   | 3072                           | 15160                | 550000             |                    | 28630                 |
| Fujitsu PRIMERGY RX200S3 (3.0 GHz Dual Core Xeon 5160 w/ IB)  | 1536                           | 15090                | 500000             | 95000              | 18432                 |
| IBM eServer BladeCenter JS21 (4way PowerPC 970 2.5GHz w/Myrinet)  | 2016                           | 15040                | 653184             | 145152             | 20160                 |
| Cray X1E (1.13 GHz)   | 1014                           | 14955                |                    |                    | 18333                 |
| IBM BladeCenter cluster HS21 (2.66GHz Quad Core Intel Xeon 5355 w/ IB)  | 1792                           | 14910                | 588672             |                    | 19067                 |
| Intel Xeon X5550, Quad core 2.67GHz Infiniband DDR  | 1568                           | 14710                | 704000             | 100000             | 16746                 |
| SGI Altix 4700 (Itanium 1.6 GHz)  | 2540                           | 14593                | 483800             |                    | 16256                 |
| IBM eServer Blade Center JS20+ (2-way PowerPC970 2.195Ghz w/Myrinet)  | 2520                           | 14550                | 670320             |                    | 22126                 |
| Cray XT3 (AMD Opteron 2.4 GHz w/custom)   | 3700                           | 14170                | 452000             |                    | 17760                 |
| IBM System x3755 cluster (2.2 GHz AMD Dual Core Opteron w/ IB)  | 4576                           | 14070                | 1000000            |                    | 20130                 |
| IBM BladeCenter QS22 cluster (3.2 GHz IBM PowerXcell 8i w/ IB)  | 1800                           | 13990                | 309759             | 104063             | 21760                 |
| IBM System p p575 (1.9 GHz w/HPS)   | 2240                           | 13990                | 550000             |                    | 17024                 |
| ASCI Q AlphaServer EV-68(1.25 GHz w/Quadrics)   | 8160                           | 13880                | 633000             |                    | 20480                 |
| IBM iDataPlex DX360M2 Westmere (2.4 GHz 6 core) + 504 nVIDIA M2070 Nodes 252 w/InfiniBand                                   | 3024                           | 137600               | 1150000            |                    | 288691                |
| IBM eServer pSeries p5 575 (8-way 1.9 GHz POWER5 w/HPSw)  | 2048                           | 13090                | 806400             | 54000              | 15565                 |
| IBM p5 575 (1.5 GHz w/ HPS)   | 2560                           | 12940                | 600000             |                    | 15360                 |
| Dell PowerEdge Cluster 1955 (Intel dual core 2.67 GHz w/GigE)   | 2520                           | 12510                | 750000             |                    | 13459                 |
| Apple XServe platform (1100 dual 2.3 GHz IBM PowerPC 970 w/Mellanox Infiniband and Cisco Gigabit Ethernet secondary fabric) | 2200                           | 12250                | 620000             |                    | 20240                 |
| T-Platforms T-Blade solution Intel Xeon E5472 (quad core, 3GHz) w/InfiniBand  | 1328                           | 12200                | 380000             |                    | 15936                 |
| SGI Altix 4700 (Itanium 1.6 GHz) 4  | 2024                           | 12072                | 655872             |                    | 12954                 |
| SGI Altix 4700 (1.6 GHz Itanium2 dual-core w/SGI NUMalink4 within nodes and between nodes 4x256)                            | 2016                           | 11913                | 440832             |                    | 13107                 |
| SGI Altix 3700 Bx2 (1.6 GHz Itanium2 configured 16x128 SGI NUMALink)  | 2016                           | 11814                | 494592             |                    | 12902                 |
| Apple XServe platform (1080 dual 2.3 GHz IBM PowerPC 970 w/Mellanox Infiniband and Cisco Gigabit Ethernet secondary fabric) | 2160                           | 11770                | 590000             |                    | 19872                 |

| <b>Computer<br/>(Full Precision)</b>  | <b>Number<br/>of Procs<br/>or Cores</b> | <b><math>R_{max}</math><br/>GFlop/s</b> | <b><math>N_{max}</math><br/>Order</b> | <b><math>N_{1/2}</math><br/>Order</b> | <b><math>R_{peak}</math><br/>GFlop/s</b> |
|---|---|---|---------------------------------------|---------------------------------------|--|
| IBM System Blue Gene/P Solution (Quad core 0.85 GHz PowerPC 450 w/Custom)   | 4096                                    | 11710                                   | 466943                                |                                       | 13926                                    |
| IBM BlueGene/L DD1 Prototype (0.5 GHz PowerPC 440 w/custom)   | 8192                                    | 11680                                   | 331775                                |                                       | 16384                                    |
| SGI Altix 3700 (Itanium Bx2, 1.6 GHz, NUMALink)   | 2024                                    | 11652                                   | 440832                                |                                       | 12954                                    |
| SGI Altix 3700 Bx2 (1.6 GHz Itanium2 configured 4x512 SGI NUMALink)   | 2016                                    | 11636                                   | 440832                                |                                       | 12902                                    |
| IBM System p p575 1.9GHz (w/IB) 2   | 1920                                    | 11470                                   | 576000                                |                                       | 14590                                    |
| IBM Blue Gene Solution, BlueGene/P (IBM PowerPC 850 MHz 450 processors w/Proprietary Interconnect)                          | 4092                                    | 11320                                   | 466943                                |                                       | 13500                                    |
| IBM BladeCenter cluster HS21 (3.0 GHz Dual Core Intel Xeon 5160 w/ IB)  | 1280                                    | 11230                                   | 518400                                |                                       | 15360                                    |
| IBM BladeCenter cluster HS21 (3.0GHz Dual Core Xeon 5160 w/ IB)   | 1360                                    | 11170                                   | 537200                                | 85000                                 | 16320                                    |
| IBM System Blue Gene/P Solution (Quad core 0.85 GHz PowerPC 450 w/Custom)   | 4096                                    | 11110                                   | 466943                                |                                       | 13930                                    |
| IBM BladeCenter QS22 cluster (3.2 GHz IBM PowerXcell 8i w/ IB)  | 1512                                    | 11110                                   | 273919                                | 94591                                 | 18278                                    |
| Apple XServe platform (1024 dual 2.3 GHz IBM PowerPC 970 w/Mellanox Infiniband and Cisco Gigabit Ethernet secondary fabric) | 2048                                    | 10930                                   | 520000                                |                                       | 18841.6                                  |
| Fujitsu PRIMEQUEST580 (1.6GHz Dual Core Itanium2 w/ IB)   | 2048                                    | 10850                                   | 580000                                | 100000                                | 13107                                    |
| Intel WA Endeavor (285 node Woodcrest 2-dual core 3 GHz w/Infiniband)   | 1140                                    | 10770                                   | 512000                                |                                       | 13680                                    |
| Sun Constellation (quad core Intel Xeon X5570 2.93Ghz IB Mellanox)  | 2112                                    | 10720                                   | 200000                                |                                       | 24752                                    |
| IBM System p p575 1.9GHz (w/IB)   | 1920                                    | 10610                                   | 576000                                |                                       | 14592                                    |
| PACS-CS (Hitachi and Fujitsu) Intel Xeon (2.8 GHz w/GigE)   | 2560                                    | 10350                                   | 722944                                |                                       | 14336                                    |
| IBM eServer pSeries 655 (8-way 1.7 GHz POWER4+)   | 2880                                    | 10310                                   | 400000                                |                                       | 19584                                    |
| Apple G5 dual 2.0 GHz IBM Power PC 970s, w/Infiniband 4X primary fabric, Cisco Gigabit Ethernet secondary fabric            | 2200                                    | 10280                                   | 520000                                | 152000                                | 17600                                    |
| Dell PowerEdge 1750, P4 Xeon 3.06 GHz, w/Myrinet  | 2500                                    | 9819                                    | 630000                                |                                       | 15300                                    |
| BlueGene/L DD2 Prototype (dual PowerPC 440 0.7 GHz)   | 4096                                    | 9433                                    | 479231                                |                                       | 11469                                    |
| BlueGene/L DD2 Prototype (dual PowerPC 440 0.7 GHz)   | 4096                                    | 9360                                    | 331775                                |                                       | 11469                                    |
| IBM System Cluster 1350 2.33GHz Intel Xeon 5345 (w/GigE)  | 1536                                    | 9287                                    | 616000                                |                                       | 14315                                    |
| IBM eServer pSeries 690 (32 way 1.9 GHz POWER4+)  | 2176                                    | 9241                                    | 370000                                |                                       | 16538                                    |
| Fujitsu PFU RG1000 (1.5GHz Core2Duo w/ GbE)   | 2048                                    | 9045                                    | 487680                                | 180480                                | 12288                                    |
| HITACHI SR11000-K1/80 (2.1 GHz)   | 80                                      | 9036                                    | 547200                                |                                       | 10752                                    |
| IBM eServer pSeries 690 (32 way 1.9 GHz POWER4+)  | 2112                                    | 8955                                    | 350000                                |                                       | 16051                                    |
| HITACHI SR11000-K1/80(2.1 GHz)  | 80                                      | 8893                                    | 489600                                |                                       | 10752                                    |
| RIKEN Super Combined Cluster(dual Xeon 3.06GHz multiple clusters w/(1x512-1x128-InfiniBand4X; 3x128-Myrinet)GigE secondary) | 2048                                    | 8728                                    | 474200                                | 120000                                | 12534                                    |
| HP RX2600 Itanium 2 1.5GHz w/Quadrics   | 1936                                    | 8633                                    | 835000                                | 140000                                | 11616                                    |
| HP 256 Intel Xeon Processor E5472 (3 GHz w/Infiniband)  | 1024                                    | 8616                                    | 301056                                |                                       | 12288                                    |
| IBM BladeCenter cluster AMD Opteron LS20 (2.0 GHz AMD Opteron w/ GigE)  | 3920                                    | 8509                                    | 660000                                |                                       | 15680                                    |
| SGI Altix 3000 (Itanium 1500 MHz 4 clustered w infiniband)  | 2016                                    | 8397                                    | 600000                                |                                       | 12100                                    |

| <b>Computer<br/>(Full Precision)</b>   | <b>Number<br/>of Procs<br/>or Cores</b> | <b><math>R_{max}</math><br/>GFlop/s</b> | <b><math>N_{max}</math><br/>Order</b> | <b><math>N_{1/2}</math><br/>Order</b> | <b><math>R_{peak}</math><br/>GFlop/s</b> |
|--|---|---|---------------------------------------|---------------------------------------|--|
| IBM System x3550 cluster (2.66GHz Dual Core Intel Xeon 5160 w/ IB)                               | 1008                                    | 8368                                    | 333000                                |                                       | 10725                                    |
| HP xw8600 workstations Intel X5450 @ 3GHz Infiniband 4x  | 864                                     | 8295                                    | 645000                                |                                       | 10368                                    |
| IBM System x3455 cluster (2.6 GHz AMD Dual Core Opteron w/ IB)                                   | 2080                                    | 8210                                    | 299520                                |                                       | 10820                                    |
| IBM BladeCenter cluster HS21 (2.66 GHz Quad-core Intel Xeon 5355 w/ IB)                          | 1024                                    | 8189                                    | 320000                                |                                       | 10895                                    |
| IBM eServer pSeries 690 (32 way 1.9 GHz POWER4+)   | 2048                                    | 8174                                    | 360000                                |                                       | 15565                                    |
| Dawning 4000A (quad Opteron 848 2.2Ghz w/Mirinet2000)  | 2560                                    | 8061                                    | 728480                                | 180000                                | 11264                                    |
| AMD Opteron 2 GHz, w/Myrinet   | 2816                                    | 8051                                    | 761160                                | 109208                                | 11264                                    |
| Intel Xeon 3.2GHz w/Myrinet  | 1536                                    | 7737                                    | 4000000                               |                                       | 9830                                     |
| ASCI Q AlphaServer EV-68 1.25 GHz w/Quadrics   | 4096                                    | 7727                                    | 590000                                | 126100                                | 10240                                    |
| ASCI Q AlphaServer EV-68 1.25 GHz w/Quadrics   | 4096                                    | 7679                                    | 576000                                | 138600                                | 10240                                    |
| Linux NetworX/Quadrics(2.4 GHz Xeon w/Quadrics)  | 2304                                    | 7634                                    | 350000                                | 75000                                 | 11059                                    |
| Intel Xeon x5355 Quad-core (2.66 GHz w/InfiniBand)   | 1024                                    | 7500                                    | 300000                                |                                       | 10895                                    |
| IBM eServer pSeries p5 575 (16-way 1.5 GHz dual core POWER5 w/HP sw)                             | 1536                                    | 7395                                    | 400000                                |                                       | 9216                                     |
| IBM SP Power3 416 nodes 375 MHz  | 6656                                    | 7304                                    | 640000                                |                                       | 9984                                     |
| ASCI White-Pacific, IBM SP Power 3(375 MHz)  | 8000                                    | 7226                                    | 518096                                | 179000                                | 12000                                    |
| IBM eServer Itanium2 (248 dual 1.3 GHz & 640 dual 1.5 GHz w/Myrinet)                             | 1776                                    | 7215                                    | 540000                                |                                       | 10259                                    |
| IBM eServer Opteron e325 (2 way, 2.2 GHz AMD Opteron w/Myrinet)                                  | 2320                                    | 7185                                    | 600000                                |                                       | 10208                                    |
| Dell 1855 blade system (dual 3.2 GHz Intel EM64T, InfiniBand TopSpin)                            | 1300                                    | 6989                                    | 442624                                |                                       | 8320                                     |
| IBM Power 795 (4.00 GHz POWER7, RHEL 6, Intelligent Energy Optimization enabled, up to 4.14 GHz) | 256                                     | 6902                                    | 427776                                | 22888                                 | 8487                                     |
| Dell PowerEdge SC1425 (2 way Intel Xeon EM64T 3.60GHz w/Infiniband)                              | 1140                                    | 6888                                    | 650000                                |                                       | 8208                                     |
| Fujitsu PRIMEPOWER HPC2500 (2.08GHz)   | 1664                                    | 6860                                    | 850720                                | 118326                                | 13844                                    |
| Intel WA Endeavor (232 node Woodcrest 2-dual core 3 GHz w/Infiniband)                            | 928                                     | 6855                                    | 430000                                |                                       | 11136                                    |
| IBM Power 795 (4.00 GHz POWER7, SLES 11 SP1)   | 256                                     | 6830                                    | 427776                                | 22888                                 | 8487                                     |
| IBM eServer pSeries p5 575 (16-way 1.5 GHz dual core POWER5 w/High Perf Sw)                      | 1472                                    | 6748                                    | 500000                                |                                       | 8832                                     |
| IBM Power 795 (4.0 GHz POWER7)   | 256                                     | 6653                                    | 360000                                | 58000                                 | 8486                                     |
| Dell PowerEdge SC1425 (2 way Intel Xeon EM64T 3.60GHz w/Infiniband Topspin)                      | 1152                                    | 6615                                    | 600000                                | 300000                                | 8294                                     |
| IBM BladeCenter cluster HS21 (3.0 GHz Dual Core Intel Xeon 5160 w/ GigE)                         | 1760                                    | 6521                                    | 404800                                |                                       | 21120                                    |
| IBM/Quadrics (2.4 GHz Xeon w/Quadrics QsNet)   | 1920                                    | 6586                                    | 425000                                | 90000                                 | 9216                                     |
| IBM eServer pSeries 690 (32 way 1.7 GHz POWER4+)   | 1664                                    | 6363                                    | 360000                                |                                       | 11315                                    |
| HITACHI SR11000-K2/50(2300MHz)   | 50                                      | 6272                                    | 450000                                |                                       | 7360                                     |
| IBM eServer 1350-xSeries 335 (2 way 3.06 GHz Xeon w/Quadrics)                                    | 1456                                    | 6232                                    | 400000                                | 67000                                 | 8911                                     |
| IBM eServer pSeries 690 (32 way 1.7 GHz POWER4+)   | 1600                                    | 6188                                    | 355000                                |                                       | 10880                                    |
| IBM eServer Opteron e325 (AMD Opteron 2.0 GHz w/Myrinet)   | 2048                                    | 6155                                    | 678912                                |                                       | 8192                                     |

| <b>Computer<br/>(Full Precision)</b>   | <b>Number<br/>of Procs<br/>or Cores</b> | <b><math>R_{max}</math><br/>GFlop/s</b> | <b><math>N_{max}</math><br/>Order</b> | <b><math>N_{1/2}</math><br/>Order</b> | <b><math>R_{peak}</math><br/>GFlop/s</b> |
|--|---|---|---------------------------------------|---------------------------------------|--|
| SGI Altix 3700 (Itanium Bx2, 1.6 GHz, NUMALink)  | 1012                                    | 6028                                    | 440832                                |                                       | 6477                                     |
| SGI Altix 4700 (Intel Itanium2 dual-core 1.6GHz w/SGI NUMALink)                          | 1024                                    | 6015                                    | 423360                                |                                       | 6554                                     |
| SGI Altix 3700 (Itanium Bx2, 1.6 GHz, NUMALink, 10GigEthernet)                           | 1016                                    | 6007                                    | 573888                                |                                       | 6502                                     |
| IBM eServer pSeries p5 575 (8-way 1.9 GHz POWER5 w/HP Sw Interconnect)                   | 896                                     | 5917                                    | 480000                                |                                       | 6810                                     |
| Cray X1 (800 MHz)  | 504                                     | 5895                                    | 494592                                | 53760                                 | 6451                                     |
| IBM eServer pSeries p5 575 (8-way 1.9 GHz POWER5 w/HP Sw Interconnect)                   | 864                                     | 5735                                    | 532800                                |                                       | 6566                                     |
| IBM eServer Blade Center JS20+ (2-way PowerPC970 2.195Ghz w/Myrinet)                     | 1024                                    | 5659                                    | 440000                                |                                       | 8991                                     |
| IBM eServer pSeries 690 (41x32 way 1.7 GHz POWER4+)                                      | 1312                                    | 5568                                    | 660000                                | 60000                                 | 8921                                     |
| Dell Power Edge 1855 (2-way Intel Xeon 3.60GHz EM64T w/GigE)                             | 1260                                    | 5439                                    | 200000                                |                                       | 9072                                     |
| Fujitsu PRIMEPOWER HPC2500(1.3GHz)   | 2304                                    | 5406                                    | 658800                                | 100080                                | 11980                                    |
| MVS-15000BM Cluster IBM JS20 (dual IBM PowerPC 970FX - 2.2 GHz w/Myrinet)                | 924                                     | 5355                                    | 415800                                | 110000                                | 8131                                     |
| Cray X1 (800 MHz)  | 441                                     | 5156                                    | 451584                                | 48384                                 | 5645                                     |
| IBM BladeCenter cluster LS21 (2.6 GHz AMD Opteron w/Voltaire 4X Infiniband)              | 1136                                    | 5005                                    | 410000                                |                                       | 5907                                     |
| HITACHI SR11000-J1/50 (1.9 GHz)  | 50                                      | 4993                                    | 396000                                |                                       | 6080                                     |
| IBM System x3550 cluster (3.0GHz Dual Core Intel Xeon 5160 w/ 10G Myrinet)               | 512                                     | 4919                                    | 349440                                |                                       | 6144                                     |
| HP RX2600 Itanium 2 (1GHz w/Quadrics)  | 1540                                    | 4881                                    | 550000                                | 110000                                | 6160                                     |
| Cray XT3 (AMD Opterons 2.6 Ghz w/custom)   | 1100                                    | 4782                                    | 349760                                |                                       | 5720                                     |
| IBM e326 cluster (2.8 GHz AMD Dual Opteron w/ Myrinet)                                   | 1024                                    | 4754                                    | 522240                                |                                       | 5734                                     |
| IBM BlueGene/L DD2 Prototype (0.7 GHz PowerPC 440)                                       | 2048                                    | 4713                                    | 233471                                |                                       | 5734                                     |
| Cray X1 (800 MHz)  | 400                                     | 4684                                    | 440320                                | 43520                                 | 5120                                     |
| SGI Altix 4700 (dual-core Itanium2 1.6GHz w/SGI NUMALink)                                | 768                                     | 4603                                    | 387072                                |                                       | 4915                                     |
| HITACHI SR11000-K1/40 (2.1 GHz)  | 40                                      | 4596                                    | 446400                                |                                       | 5376                                     |
| Fujitsu PRIMERGY RX200 (Xeon 3.06GHz/Infiniband 4X)                                      | 1024                                    | 4564                                    | 485568                                | 91584                                 | 6266                                     |
| IBM BladeCenter cluster HS21 (2.33 GHz Xeon 5140 w/ GigE)                                | 768                                     | 4554                                    | 280000                                |                                       | 7158                                     |
| Fujitsu PRIMEPOWER HPC2500 (Sparc 1.56GHz)   | 1472                                    | 4552                                    | 749340                                | 90390                                 | 9185                                     |
| HP 256 Intel Xeon Processor E5472 (3 GHz w/Gigabit)                                      | 1024                                    | 4547                                    | 401408                                |                                       | 8640                                     |
| IBM System x3455 cluster (2.6 GHz AMD Dual Core Opteron w/ IB)                           | 1024                                    | 4517                                    | 460000                                |                                       | 5325                                     |
| Compaq AlphaServer SC ES45/EV68 1GHz   | 3016                                    | 4463                                    | 280000                                | 85000                                 | 6032                                     |
| IBM BladeCenter cluster (2.2 GHz AMD Opteron w/ Infiniband SDR)                          | 1152                                    | 4379                                    | 700000                                |                                       | 5069                                     |
| IBM eServer pSeries 655 (8-way 1.7 GHz POWER4+)  | 1152                                    | 4379                                    | 450000                                | 60000                                 | 7833.6                                   |
| IBM eServer pSeries p5 575 (dual core 16-way 1.5 GHz POWER5 w/Myrinet)                   | 1024                                    | 4307                                    | 515000                                |                                       | 6144                                     |
| Dell PowerEdge 1750 (dual Xeon 3.2 GHz w/Myrinet)  | 1020                                    | 4298                                    | 420000                                |                                       | 6528                                     |
| Legend DeepComp 6800, Itanium2 1.3 GHz QsNet   | 1024                                    | 4193                                    | 491488                                | 120000                                | 5324.8                                   |
| IBM pSeries p690 Turbo ( 1.3 GHz 50 servers/32 processors/server) 2 planes Colony switch | 1600                                    | 4184                                    | 550000                                | 93000                                 | 8320                                     |



| <b>Computer<br/>(Full Precision)</b>   | <b>Number<br/>of Procs<br/>or Cores</b> | <b><math>R_{max}</math><br/>GFlop/s</b> | <b><math>N_{max}</math><br/>Order</b> | <b><math>N_{1/2}</math><br/>Order</b> | <b><math>R_{peak}</math><br/>GFlop/s</b> |
|--|---|---|---------------------------------------|---------------------------------------|--|
| Dell 1855 blade, Intel Irwindale dual 3.2 GHz w/InfiniBand w/MS Windows                            | 896                                     | 4106                                    | 440000                                |                                       | 5734                                     |
| IBM BladeCenter cluster LS21 (2.6 GHz AMD Opteron w/ Votaire 4X Infiniband)                        | 1024                                    | 4099                                    | 180000                                |                                       | 5325                                     |
| Compaq AlphaServer SC ES45/EV68 1GHz   | 3024                                    | 4059                                    | 525000                                | 105000                                | 6048                                     |
| Linux NetworX/Quadrics(2.4 GHz Xeon w/Quadrics)  | 1900                                    | 4049                                    | 350000                                | 75000                                 | 9120                                     |
| Compaq AlphaServer SC ES45/EV68(1GHz w/Quadrics)   | 2560                                    | 3980                                    | 360000                                | 85000                                 | 5120                                     |
| Dell PowerEdge 1750 (dual Xeon 3.2 GHz w/Myrinet)  | 992                                     | 3975                                    | 300000                                |                                       | 6349                                     |
| HP Proliant DL140 G3 (dual processor dual core Intel Xeon 3GHz 5160 nodes w/Infiniband 4X DDR)     | 512                                     | 3859                                    | 320000                                |                                       | 6000                                     |
| IBM eServer pSeries p5 575 (16-way 1.5 GHz dual core POWER5 w/HP sw)                               | 768                                     | 3851                                    | 300000                                |                                       | 4608                                     |
| IBM eServer pSeries 655 (8 way 1.5 GHz POWER4+)  | 1024                                    | 3812                                    | 428800                                | 42400                                 | 6144                                     |
| IBM Power 795 (4.25 GHz POWER7, SLES 11 SP1, TurboCore mode enabled)                               | 128                                     | 3784                                    | 427776                                | 20429                                 | 4358                                     |
| EDA Express (2.4-2.8 GHz AMD x86-64 Opteron - 816 cores from IBM plus 384 cores from HP w/GigE)    | 1200                                    | 3782                                    | 352000                                |                                       | 5760                                     |
| IBM eServer 1350-xSeries 335 (dual 3.06 GHz Xeon w/GigE)   | 1000                                    | 3755                                    | 390000                                |                                       | 6120                                     |
| IBM eServer pSeries 655 (8 way 1.5 GHz POWER4+)  | 1008                                    | 3686                                    | 403200                                | 40000                                 | 6048                                     |
| IBM Power 795 ( 4.25 GHz POWER7 )  | 128                                     | 3676                                    | 260000                                | 48000                                 | 4358                                     |
| IBM JS21 Blade Center (128 PowerPC 970 2.5 GHz, 128 nodes 4proc/node w/Myrinet)                    | 512                                     | 3637                                    | 331776                                | 69632                                 | 5120                                     |
| Intel Xeon 3 GHz dual core w/Myrinet 2000  | 544                                     | 3601                                    | 241684                                |                                       | 6528                                     |
| IBM Power 780 (3.7 GHz POWER7+, RHEL 6.3, Intelligent Energy Optimization enabled, up to 4144 MHz) | 128                                     | 3575                                    | 321451                                | 21000                                 | 4243                                     |
| Cray X1 (800 MHz)  | 300                                     | 3522                                    | 376320                                | 38400                                 | 3840                                     |
| IBM pSeries 690 Turbo 1.3GHz   | 1280                                    | 3406                                    | 317000                                |                                       | 6656                                     |
| IBM eServer pSeries p5 575 (8-way 1.9 GHz POWER5 w/HP Sw Interconnect)                             | 512                                     | 3392                                    | 320000                                |                                       | 3891                                     |
| HPTi Intel Xeon(2.2 Ghz,dual w/Myrinet)  | 1536                                    | 3337                                    | 285000                                | 75000                                 | 6758                                     |
| HITACHI SR11000-H1/56 (1700MHz)  | 896                                     | 3310                                    | 413280                                | 52920                                 | 6093                                     |
| HITACHI SR11000-H1/50(1700MHz)   | 50                                      | 3295                                    | 392400                                | 49860                                 | 5440                                     |
| Dell PowerEdge 1850 (Xeon EM64T 3.2 GHz w/Infiniband)  | 896                                     | 3256                                    | 148224                                |                                       | 5734                                     |
| IBM p575+ 32 nodes w/16 processor SMP/node   | 512                                     | 3247                                    | 392000                                |                                       | 3891.2                                   |
| IBM eServer 1350-xSeries 335 (2 way 3.06 GHz Xeon w/Myrinet-2000)                                  | 768                                     | 3231                                    | 301000                                | 59000                                 | 4700                                     |
| IBM p690 cluster, Power 4 1.3 GHz  | 1200                                    | 3210                                    | 300000                                |                                       | 6240                                     |
| HP CP3000 (576 Intel Xeon Processor X3.6GHz/800-2MB w/Infiniband)                                  | 576                                     | 3059                                    | 300000                                |                                       | 4082                                     |
| SGI Altix 3700 Bx2 (Itanium2, 1.6 GHz 9MB)   | 510                                     | 3073                                    | 312480                                |                                       | 3264                                     |
| SGI Altix 4700 (dual-core Itanium2 processors @ 1.6 GHz w/SGI NUMAlink)                            | 512                                     | 3071                                    | 311808                                |                                       | 3277                                     |
| IBM eServer pSeries 570 (8 way 1.9 GHz POWER5 w/GigE)  | 720                                     | 3068                                    | 375500                                |                                       | 5472                                     |
| Dell Cluster Pentium 4 (3.2 GHz, w/GigE)   | 860                                     | 3064                                    | 460000                                |                                       | 5504                                     |
| IBM eServer HS20 cluster (2 way 3.2GHz Intel Xeon EM64T w/GigE)                                    | 1000                                    | 3059                                    | 326000                                |                                       | 6400                                     |

| <b>Computer<br/>(Full Precision)</b>   | <b>Number<br/>of Procs<br/>or Cores</b> | <b><math>R_{max}</math><br/>GFlop/s</b> | <b><math>N_{max}</math><br/>Order</b> | <b><math>N_{1/2}</math><br/>Order</b> | <b><math>R_{peak}</math><br/>GFlop/s</b> |
|--|---|---|---------------------------------------|---------------------------------------|--|
| IBM SP Power3 208 nodes 375 MHz  | 3328                                    | 3052                                    | 371712                                |                                       | 4992                                     |
| HP Cluster (Dual Intel Quad Core Xeon EM64 processor w/Infiniband)                                     | 320                                     | 2999                                    | 224128                                |                                       | 3943                                     |
| HP Cluster (Dual Intel Quad Core Xeon EM64 processor w/Infiniband)                                     | 320                                     | 2976                                    | 202144                                |                                       | 4044                                     |
| IBM eServer Blade Center JS20 (2-way PowerPC970 2.2Ghz w/Myrinet)                                      | 504                                     | 2948                                    | 310000                                |                                       | 4435.2                                   |
| Cray X-1 (800 MHz)   | 252                                     | 2932.9                                  | 338688                                | 44288                                 | 3225.6                                   |
| Compaq Alphaserver SC ES45/EV68(1GHz w/Quadrics)   | 2048                                    | 2916                                    | 272000                                |                                       | 4096                                     |
| NEC SX-8/192M24 (24 nodes 8 proc/node)   | 192                                     | 2914                                    | 431616                                |                                       | 3072                                     |
| HITACHI SR11000-H1/50 (1700MHz)  | 800                                     | 2909                                    | 396000                                | 84600                                 | 5440                                     |
| SGI Altix 3700 Bx2 (1.5 GHz Itanium2 configured 18x64 GigE)  | 1200                                    | 2887                                    | 336000                                |                                       | 7200                                     |
| SGI Altix 3700 Bx2 (1.5 GHz Itanium2)  | 510                                     | 2869                                    | 317520                                |                                       | 3060                                     |
| Dell 1855 blade system (dual 3.2 GHz Intel Irwindale w/MS, InfiniBand)                                 | 854                                     | 2864                                    | 300000                                |                                       | 5466                                     |
| IBM Xeon Cluster 2.4 MHz w/ Myrinet  | 1024                                    | 2847                                    | 230000                                |                                       | 4915                                     |
| IBM eServer Blade Center JS20+ (2-way PowerPC970 2.195Ghz w/Myrinet)                                   | 528                                     | 2816                                    | 320000                                |                                       | 4635.84                                  |
| Cray X-1 (800 MHz)   | 240                                     | 2793.2                                  | 337920                                | 43264                                 | 3072.0                                   |
| IBM eServer Opteron e326 Cluster (2 way, 2.4 GHz AMD Opteron w/GigE)                                   | 920                                     | 2791                                    | 417430                                |                                       | 4416                                     |
| IBM eServer Opteron e326 Cluster (2 way, 2.4 GHz AMD Opteron w/InfiniBand)                             | 704                                     | 2724                                    | 337920                                |                                       | 3379                                     |
| Cray X-1 (800 MHz)   | 234                                     | 2719.0                                  | 329472                                | 44544                                 | 2995.2                                   |
| IBM eServer pSeries 690 Turbo(1.3 GHz Power 4)   | 1056                                    | 2713.0                                  | 240000                                |                                       | 5491                                     |
| Cray X-1 (800 MHz)   | 225                                     | 2614.2                                  | 330240                                | 38400                                 | 2880.0                                   |
| HP Cluster (Dual Intel Quad Core Xeon EM64 processor w/Infiniband)                                     | 320                                     | 2614                                    | 129408                                |                                       | 3940                                     |
| Cray X-1 (800 MHz)   | 224                                     | 2609.5                                  | 329728                                | 38912                                 | 2867.2                                   |
| IBM eServer HS20 cluster (2 way 3.2GHz Intel Xeon EM64T w/GigE)  | 640                                     | 2554                                    | 272009                                |                                       | 4096                                     |
| Dell PowerEdge 1850, Xeon EM64T (3.2 GHz w/Myrinet)  | 784                                     | 2540                                    | 200000                                |                                       | 5017                                     |
| IBM SP Power3 158 nodes 375 MHz  | 2528                                    | 2526.                                   | 371712                                | 102400                                | 3792                                     |
| IBM Power 780 (3.44 GHz POWER7, SLES 11 SP1, Intelligent Energy Optimization enabled, up to 3.780 GHz) | 96                                      | 2512                                    | 310176                                | 15508                                 | 2903                                     |
| Cray X-1 (800 MHz)   | 220                                     | 2481                                    | 317440                                |                                       | 2816                                     |
| Intel dual Pentium Xeon (3.06 GHz w/Myrinet)   | 598                                     | 2455                                    | 252000                                |                                       | 3660                                     |
| SGI Altix 3000 (1500 MHz Itanium 2)  | 510                                     | 2439                                    | 252960                                |                                       | 3060                                     |
| Cray X-1 (800 MHz)   | 208                                     | 2416.5                                  | 292864                                | 38912                                 | 2662.4                                   |
| ASCI Red Intel Pentium II Xeon core 333MHz   | 9632                                    | 2379.6                                  | 362880                                | 75400                                 | 3207                                     |
| Cray X-1 (800 MHz)   | 252                                     | 2368                                    | 135555                                |                                       | 3226                                     |
| SGI Altix 3000 (1.3 GHz Itanium2)  | 496                                     | 2338                                    | 193536                                |                                       | 2579                                     |
| IBM p690 cluster, Power 4 1.3 GHz  | 864                                     | 2310                                    | 275000                                | 62000                                 | 4493                                     |
| Dell Power Edge 1855 (2-way Intel Xeon 3.60GHz EM64T w/Infiniband)                                     | 420                                     | 2303                                    | 529200                                |                                       | 3024                                     |
| Cray X-1 (800 MHz)   | 196                                     | 2276.4                                  | 301056                                | 34304                                 | 2508.8                                   |

| Computer<br>(Full Precision)   | Number<br>of Procs<br>or Cores | $R_{max}$<br>GFlop/s | $N_{max}$<br>Order | $N_{1/2}$<br>Order | $R_{peak}$<br>GFlop/s |
|--|--------------------------------|----------------------|--------------------|--------------------|-----------------------|
| IBM BlueGene/L DD2 Prototype (0.7 GHz PowerPC 440 w/custom)  | 1024                           | 2220                 | 172031             |                    | 2867                  |
| Atipa Tech. Pentium 4 (1.8 GHz w/Myrinet)  | 1024                           | 2207.                | 280000             | 56000              | 3686                  |
| NEC SX-6/248M31(typeE) (1.77ns)  | 248                            | 2155                 | 220224             | 22816              | 2894.16               |
| ASCI Blue-Pacific SST, IBM SP 604E(332 MHz)  | 5808                           | 2144.                | 431344             | 432344             | 3868                  |
| Dell PE1855 blade (dual 3.2GHz Intel 64-bit Xeons w/ Topspin Infiniband)                               | 400                            | 2141                 | 290560             |                    | 2560                  |
| ASCI Red Intel Pentium II Xeon core 333MHz   | 9472                           | 2121.3               | 251904             | 66000              | 3154                  |
| Apple Xserve G5 (dual 2.0 GHz w/Myrinet)   | 448                            | 2104                 | 221376             | 64000              | 3584                  |
| Cray X-1 (800 MHz)   | 180                            | 2099.9               | 291840             | 34816              | 2304.0                |
| Compaq Alphaserver SC ES45/EV68 1GHz   | 1520                           | 2096                 | 390000             | 71000              | 3040                  |
| IBM eServer Intel Tiger4 (quad 1.3GHz Itanium2 w/Myrinet)  | 512                            | 2082                 | 490160             |                    | 2662                  |
| Apple Xserve G5 (dual 2 GHz IBM Power PC 970)  | 448                            | 2073                 | 220032             |                    | 3584                  |
| Intel (dual-core Xeon 3.2 GHz w/IB switch)   | 448                            | 2060                 | 230000             |                    | 2867                  |
| NEC SX-8R/64M8   | 64                             | 2056                 | 352256             |                    | 2253                  |
| Compaq Alphaserver SC ES45/EV68 1.25GHz  | 1024                           | 2037                 | 320000             |                    | 2560                  |
| Fujitsu M9000 (SPARC64 VII 2.52GHz, quad core)   | 256                            | 2032.0               | 268128             | 46000              | 2580.48               |
| Sun M9000 (SPARC64 VII 2.52GHz, quad core)   | 256                            | 2032.0               | 268128             | 46000              | 2580.48               |
| Self-made AMD Opteron dual (2.2GHz w/Infiniband)   | 576                            | 2028                 | 274000             | 24950              | 2534                  |
| IBM eServer Cluster HS20 (2.8 GHz Xeon w/GigE)   | 610                            | 2026                 | 340600             |                    | 3416                  |
| HP-DL580-G5 (Intel Xeon (Tigerton) 2.933 GHz quad core quad processor X7350 nodes w/10Gbps PARAMNet-3) | 256                            | 2013                 | 351232             |                    | 3000                  |
| IBM eServer HS20 cluster (2 way 3.2GHz Intel Xeon EM64T w/GigE)  | 640                            | 2010                 | 272009             |                    | 4096                  |
| PowerEdge HPC Cluster (2.4 GHz Xeon w/GigE)  | 600                            | 2004.                | 253400             | 42200              | 2880                  |
| IBM p690 cluster, Power 4 1.3 GHz  | 768                            | 2002                 | 252000             |                    | 3994                  |
| Self made (256 nodes dual 3.06GHz Intel Xeon w/ GigE)  | 512                            | 1997                 | 331968             |                    | 3133                  |
| Linux Networx (dual 3.06GHz Intel Xeon processor w/GigE)   | 512                            | 1997                 | 331968             |                    | 3133                  |
| Fujitsu-Siemens hpcLine (Xeon "Nocona" 64-bit 3.2GHz w/InfiniBand)                                     | 400                            | 1978                 | 220000             | 3200               | 2560                  |
| IBM Power 575 (4.7 GHz POWER6 SLES 10 SP2)   | 128                            | 1975                 | 200000             | 22500              | 2406.4                |
| Cray X-1 (800 MHz)   | 169                            | 1965.9               | 281216             | 31616              | 2163.2                |
| BM Power 770 (3.8 GHz POWER7+, RHEL 6.3, Intelligent Energy Optimization enabled, up to 4312 MHz)      | 64                             | 1948                 | 336384             | 14750              | 2208                  |
| IBM AMD Opteron (2.2 GHz w/Infiniband)   | 600                            | 1930                 | 400000             |                    | 2640                  |
| Apple Xserve G5 (dual 2 GHz IBM Power PC 970)  | 440                            | 1911                 | 208896             |                    | 3520                  |
| SGI Altix 3000 (Itanium 2, 1.3 GHz)  | 416                            | 1793                 | 298799             | 298799             | 2163                  |
| IBM SP 112 nodes (375 MHz POWER3 High)   | 1792                           | 1791                 | 275000             | 275000             | 2688                  |
| IBM Power 780 (3.86 GHz POWER7, RHEL 6, Intelligent Energy Optimization enabled, up to 3.94 GHz)       | 64                             | 1772                 | 224256             | 11700              | 2021                  |
| IBM eServer Cluster 1350-xSeries 335 2.8 GHz Xeon w/Myrinet  | 512                            | 1762                 | 240000             | 37000              | 2867                  |
| IBM p690+ POWER4+ (1.7 GHz w-plane SP Switch2)   | 544                            | 1760                 | 400000             |                    | 3699                  |
| IBM xSeries x335 (dual 2.4 GHz Intel Xeon w/GigE)  | 1024                           | 1755                 | 335000             | 41600              | 4915                  |
| IBM eServer pSeries 690 (32 way 1.9 GHz POWER4+)   | 352                            | 1714                 | 372000             |                    | 2675.2                |

| Computer<br>(Full Precision)   | Number<br>of Procs<br>or Cores | $R_{max}$<br>GFlop/s | $N_{max}$<br>Order | $N_{1/2}$<br>Order | $R_{peak}$<br>GFlop/s |
|--|--------------------------------|----------------------|--------------------|--------------------|-----------------------|
| HITACHI SR8000/MPP/1152(450MHz)  | 1152                           | 1709.1               | 141000             | 16000              | 2074                  |
| IBM eServer pSeries 690 Turbo(1.3 GHz Power 4)   | 624                            | 1696.0               | 221000             |                    | 3245                  |
| Cray X-1 (800 MHz)   | 144                            | 1676.9               | 258048             | 29184              | 1843.2                |
| IBM xSeries Cluster Dual Xeon 3.06 GHz w/Myrinet   | 486                            | 1667                 | 213120             |                    | 2974                  |
| HITACHI SR8000-F1/168(375MHz)  | 168                            | 1653.                | 160000             | 19560              | 2016                  |
| IBM eServer Intel Tiger4 (4 way 1.3 GHz Itanium2 w/Myrinet)                                    | 512                            | 1636                 | 430079             |                    | 2662                  |
| IBM eServer pSeries 655 (8 way 1.7 GHz POWER4+ w/GigE)   | 544                            | 1636                 | 335000             |                    | 3699.2                |
| ASCI Red Intel Pentium II Xeon core 333Mhz   | 6720                           | 1633.3               | 306720             | 52500              | 2238                  |
| IBM eServer Intel Tiger4 (4 way 1.3 GHz Itanium2 w/Myrinet)                                    | 500                            | 1616                 | 419999             |                    | 2600                  |
| SGI ASCI Blue Mountain   | 5040                           | 1608.                | 374400             | 138000             | 2520                  |
| IBM eServer Cluster HS20 (2.8 GHz Xeon w/GigE)   | 480                            | 1602                 | 275600             |                    | 2688                  |
| Dell PowerEdge 1850s (dual 3.2 GHz Intel EM64T w/Myrinet)                                      | 400                            | 1578                 | 190000             |                    | 2560                  |
| IBM eServer (Opteron 2.2 GHz w/Infiniband)   | 576                            | 1575                 | 200000             |                    | 2534.4                |
| NEC SX-6/192M24  | 192                            | 1484                 | 200064             | 16128              | 1536                  |
| IBM eServer pSeries 655 (4 way 1.7 GHz POWER4+)  | 384                            | 1477                 | 174000             | 40000              | 2611                  |
| Cray X-1 (800 MHz)   | 126                            | 1473.3               | 241920             | 30080              | 1612.8                |
| IBM eServer (Opteron 2.2 GHz w/Infiniband)   | 484                            | 1447                 | 200000             |                    | 2129.6                |
| IBM eServer pSeries 690 Turbo(1.3 GHz Power 4 w/Federation)                                    | 512                            | 1456.0               | 307200             |                    | 2662                  |
| IBM BlueGene/L Test Prototype, PowerPC 440 500MHz (custom processor/interconnect)              | 1024                           | 1435                 | 98304              |                    | 2048                  |
| IBM eServer pSeries 690 Turbo (1.7 GHz POWER4+)  | 384                            | 1424                 | 325000             |                    | 2611.2                |
| IBM SP 328 nodes (375 MHz POWER3 Thin)   | 1312                           | 1417.                | 374000             | 374000             | 1968                  |
| Cray X-1 (800 MHz)   | 121                            | 1411.1               | 239360             | 26240              | 1548.8                |
| SGI Altix 3700 (1.5 GHz Itanium2)  | 255                            | 1405                 | 211680             |                    | 1530                  |
| MVS-5000BM Cluster IBM JS20 (dual IBM PowerPC 970 - 1.6 GHz w/Myrinet)                         | 330                            | 1401                 | 280000             | 45000              | 2112                  |
| Cray X-1 (800 MHz)   | 120                            | 1400.4               | 230400             | 26496              | 1536.0                |
| IBM xSeries 335 cluster (dual 3.06GHz Xeon w/InfiniBand)                                       | 384                            | 1389                 | 120000             |                    | 2350                  |
| IBM eServer pSeries 690 Turbo(1.3 GHz Power 4 w/Colony)  | 512                            | 1384.0               | 200000             |                    | 2662                  |
| NEC SX-7/160M5(1.81ns)   | 160                            | 1378                 | 200000             | 15200              | 1412.8                |
| Dell PowerEdge 1850 (Xeon 64 3.2GHz w/Topspin InfiniBand)                                      | 256                            | 1349                 | 220440             | 110220             | 1638                  |
| Intel ASCI Option Red (200 MHz Pentium Pro)  | 9152                           | 1338.                | 235000             | 63000              | 1830                  |
| Legend DeepComp 1800 (2GHz Pentium 4 w/Myrinet)  | 512                            | 1297                 | 172000             |                    | 2048                  |
| Self Made Pentium4 Xeon (80-3.06 GHz, 72-2.8 GHz, 112-2.4 GHz, 256-2.2 GHz w/GigE)             | 520                            | 1283                 | 260000             |                    | 2557                  |
| Intel EM64T (2 way 3.2 GHz Intel EM64T w/Myrinet D)  | 256                            | 1269                 | 241920             |                    | 1638                  |
| IBM Power 760 (3.4 GHz POWER7+, AIX, Intelligent Energy Optimization enabled, up to 3.787 GHz) | 48                             | 1268                 | 217600             | 9344               | 1454                  |

| Computer<br>(Full Precision)   | Number<br>of Procs<br>or Cores | $R_{max}$<br>GFlop/s | $N_{max}$<br>Order | $N_{1/2}$<br>Order | $R_{peak}$<br>GFlop/s |
|--|--------------------------------|----------------------|--------------------|--------------------|-----------------------|
| IBM Power 760 (3.4 GHz POWER7+, SLES11SP2, Intelligent Energy Optimization enabled, up to 3.787 GHz) | 48                             | 1259.0               | 232223             | 9600               | 1454                  |
| HP Integrity rx2600 Itanium2 (1.3 GHz w/Myrinet)   | 304                            | 1253                 | 256000             |                    | 1580                  |
| IBM eServer (Opteron 2.2 GHz w/Infiniband)   | 400                            | 1246                 | 200000             |                    | 1760                  |
| IBM eServer HS20 cluster (2 way 3.2GHz Intel Xeon EM64T w/Myrinet)                                   | 252                            | 1196                 | 160922             |                    | 1612.8                |
| NEC SX-5/128M8(3.2ns)  | 128                            | 1192.0               | 129536             | 10240              | 1280                  |
| SGI Altix 4700 (Intel Itanium2 (Montvale) @ 1.66 GHz processor cores w/NUMALink interconnect)        | 200                            | 1183                 | 164640             | 32000              | 1328                  |
| IBM xSeries Cluster Dual Xeon (3.06 GHz w/Myrinet)   | 490                            | 1172                 | 180000             |                    | 1499                  |
| Visual Technology SuperNova / AMD Opteron 1.8 GHz GigtEth  | 512                            | 1169.0               | 220000             | 59000              | 1843.2                |
| Cray X-1 (800 MHz)   | 100                            | 1167.1               | 217600             | 23040              | 1280.0                |
| SGI Altix Itanium 2 1300 MHz   | 256                            | 1142                 | 334080             | 46000              | 1331.2                |
| NEC SX-6/128M16(1.77ns)  | 128                            | 1141.0               | 327680             | 8960               | 1152                  |
| HP rx2600 Itanium2 (1.3 GHz w/Myrinet)   | 304                            | 1137                 | 240000             |                    | 1580.8                |
| Bull NovaScale 5160 16x16 Itanium2 1.3GHz w/Quadrics Elan 4  | 256                            | 1131                 | 335872             | 32000              | 1331                  |
| NEC SX-6/144M18 (2 ns)   | 144                            | 1130                 | 225216             | 11232              | 1152                  |
| IBM eServer Opteron e325 Cluster (2 way, 2.2 GHz Opteron w/Myrinet)                                  | 352                            | 1128                 | 185800             |                    | 1548.8                |
| CRAY T3E-1200 (600 MHz)  | 1488                           | 1127                 | 148800             | 28272              | 1786                  |
| IBM eServer Opteron e325 Cluster (2 way, 2.2 GHz AMD Opteron w/Myrinet)                              | 352                            | 1120                 | 185000             |                    | 1548.8                |
| IBM eServer pSeries 655 (32x8-way 1.7 GHz POWER4+)   | 256                            | 1107                 | 224000             | 14000              | 1740.8                |
| IBM eServer Blade Center Cluster HS20 (dual 3.2 GHz Xeon EM64T w/GigE)                               | 252                            | 1104                 | 160000             |                    | 1613                  |
| Dell 1750 cluster Intel Xeon (dual 3.06 GHz w/Gnet)  | 304                            | 1095                 | 175000             | 40000              | 1860                  |
| Intel P4 Xeon (3.06 GHz w/Myrinet 2000)  | 252                            | 1084                 | 247000             | 38000              | 1542                  |
| Intel ASCI Option Red (200 MHz Pentium Pro)  | 7264                           | 1068.                | 215000             | 53400              | 1453                  |
| Linux Networx dual Intel Xeon (3.06GHz w/Myrinet)  | 256                            | 1060                 | 159432             | 29858              | 1566.72               |
| IBM AVIDD-B+AVIDD-I(2.4 GHz Xeon Force10)  | 384                            | 1058.                | 220000             |                    | 1843                  |
| Linux Networx Dual AMD Opteron (1.8 GHz w/Infiniband)  | 512                            | 1053                 | 114000             | 22202              | 1843                  |
| Cray X-1 (800 MHz)   | 90                             | 1050.1               | 195840             | 23808              | 1152.0                |
| IBM Power 595 (5.0 GHz POWER6 SLES 11)   | 64                             | 1050                 | 130000             | 9500               | 1280                  |
| IBM xSeries Cluster Xeon 2.4 GHz w/Gig-E   | 448                            | 1040                 | 195000             |                    | 2150                  |
| IBM eServer pSeries 690 Turbo(1.3 GHz Power 4)   | 384                            | 1038.                | 245000             |                    | 1997                  |
| Intel Pentium 4 dual-Xeon 2.8Ghz w/Quadrics Elan3  | 256                            | 1036                 | 170000             | 30600              | 1434                  |
| HITACHI SR8000-F1/112(375MHz)  | 112                            | 1035.0               | 120000             | 15160              | 1344                  |
| IBM eServer Opteron e325 Cluster (2 way, 2.0 GHz AMD Opteron w/GigE)                                 | 432                            | 1034                 | 215000             |                    | 1728                  |
| Fujitsu SPARC Enterprise M9000 (2.4 GHz dual core)   | 128                            | 1032.0               | 331045             | 48108              | 1228.8                |
| Sun SPARC Enterprise M9000 (2.4 GHz dual core)   | 128                            | 1032.0               | 331045             | 48108              | 1228.8                |
| IBM Power 595 (5.0 GHz POWER6 RHEL 5.2)  | 64                             | 1032                 | 120000             | 9100               | 1280                  |
| IBM eServer 1350-xSeries 335 (2 way 3.06GHz Xeon w/Infiniband)                                       | 252                            | 1032                 | 180000             |                    | 1542                  |
| Cray X-1 (800 MHz)   | 88                             | 1029.6               | 202752             | 23936              | 1126.4                |

| Computer<br>(Full Precision)   | Number<br>of Procs<br>or Cores | $R_{max}$<br>GFlop/s | $N_{max}$<br>Order | $N_{1/2}$<br>Order | $R_{peak}$<br>GFlop/s |
|--|--------------------------------|----------------------|--------------------|--------------------|-----------------------|
| IBM Power 595 (5.0 GHz POWER6)   | 64                             | 1028                 | 183800             | 17000              | 1280                  |
| Self Made P4(256/2.2GHz+112/2.4GHz+32/2.53w/Genet)   | 400                            | 1011                 | 257912             |                    | 1843                  |
| HP Compaq AlphaServer SC ES40/833 (833 MHz)  | 812                            | 1007                 | 252700             | 39954              | 1352.8                |
| Linux NetworX/Quadrics(2.4 GHz Xeon w/Myrinet)   | 391                            | 1007                 | 208000             | 25000              | 1732                  |
| Galactic Computing (2.8Ghz Pentium 4 Xeon, w/InfiniBand 4x)  | 264                            | 1003                 | 153000             | 30850              | 1478.4                |
| IMSc-Netweb-Summation Intel dual Xeon 2.4 GHz w/Dolphin 3D SCI   | 288                            | 1002                 | 183000             |                    | 1382.4                |
| IBM eServer Opteron e325 Cluster (dual 2.0 GHz AMD Opteron w/GigE)   | 432                            | 987.1                | 215000             |                    | 1728                  |
| IBM Power 750 Express (4.0 GHz POWER7+, AIX, Intelligent Energy Optimization enabled, up to 4.431 GHz)       | 32                             | 984.5                | 163200             | 8930               | 1134                  |
| NEC SX-6/128M16  | 128                            | 982.0                | 204800             | 12800              | 1024                  |
| IBM Power 750 Express (4.0 GHz POWER7+, SLES11SP2, Intelligent Energy Optimization enabled, up to 4.431 GHz) | 32                             | 980.2                | 160000             | 7400               | 1134                  |
| IBM eServer pSeries 690 Turbo (1.7 GHz POWER4+)  | 256                            | 976.0                | 280000             |                    | 1740.8                |
| Intel dual Xeon 2.4 GHz w/Dolphin 3D SCI   | 288                            | 970.3                | 182000             |                    | 1382                  |
| Linux NetworX/Quadrics(2.4 GHz Xeon w/Myrinet)   | 352                            | 962.8                | 200000             | 33000              | 1690                  |
| Self-made Intel Pentium 2.2 GHz w/SCI3D  | 400                            | 960.4                | 220800             | 32800              | 1760                  |
| Self-made Intel Dual Xeon 2.4 GHz w/Dolphin 3D SCI   | 288                            | 957.1                | 184000             | 33050              | 1382.4                |
| IBM eServer 1350-xSeries 335 (2 way 3.06GHz Xeon w/Infiniband)   | 256                            | 947.7                | 110000             |                    | 1566.7                |
| Cray X-1 (800 MHz)   | 80                             | 937.0                | 194560             | 21376              | 1024.0                |
| SunFire X4200 & X4100 (Dual Core AMD Opteron(tm) 2.39 GHz Processor 280 w/Infiniband SDR 4x (10Gb))          | 256                            | 934.5                | 157184             |                    | 1196.6                |
| SP Power3 375 MHz Nighthawk 2  | 1056                           | 929.8                | 220000             | 62000              | 1584                  |
| NEC SX-6/120M15(2ns)   | 120                            | 927.6                | 204000             | 19440              | 960                   |
| IBM eServer Opteron e325 Cluster (2 way, 2.0 GHz AMD Opteron w/GigE)   | 432                            | 926.6                | 201600             |                    | 1728                  |
| HITACHI SR8000-F1/100(375MHz)  | 100                            | 917.2                | 115000             | 15000              | 1200                  |
| IBM XSeries Xeon 2.8GHz, NPACI-ROCKS, Myrinet  | 256                            | 916.5                | 150000             | 25000              | 1433.6                |
| IBM p690 cluster, Power 4 1.3 GHz  | 360                            | 910                  | 210000             |                    | 1872                  |
| IBM Power 750 Express (3.5 GHz POWER7+, AIX, Intelligent Energy Optimization enabled, up to 3.955 GHz)       | 32                             | 895.7                | 163200             | 8930               | 1012                  |
| IBM eServer xSeries Linux cluster (2.4 GHz Pentium IV Xeon w/ Gigabit Ethernet)                              | 768                            | 894.9                | 210000             |                    | 3686.4                |
| CRAY T3E-1200E (600 MHz)   | 1080                           | 891.5                | 259200             | 26400              | 1296                  |
| Fujitsu VPP5000/100 (3.33nsec)   | 100                            | 886.0                | 195600             | 18000              | 960                   |
| HITACHI SR8000/128(250MHz)   | 128                            | 873.6                | 120000             | 16000              | 1024                  |
| IBM Power 750 Express (3.55 GHz POWER7, RHEL 6, Intelligent Energy Optimization enabled, up to 3.86 GHz)     | 32                             | 870.0                | 150016             | 7680               | 989                   |
| IBM eServer xSeries Linux (2.4GHz P4 Xeon)   | 768                            | 868.6                | 200000             |                    | 3686                  |
| SGI Origin 3000 (R14000A 600 MHz)  | 1024                           | 852.9                | 129024             | 31744              | 1229                  |
| HP XC1 Itanium 2 (1 GHz w/Quadrics)  | 256                            | 851.0                | 232000             | 24650              | 1024                  |
| Grendels dual 2.4 GHz Intel Xeons w/Myrinet  | 252                            | 840.5                | 175760             | 27768              | 1210                  |
| IBM eServer 1350-xSeries 335 (2 way Xeon 2.4 GHz w/Myrinet)  | 250                            | 829.8                | 154000             |                    | 1200                  |

| Computer<br>(Full Precision)   | Number<br>of Procs<br>or Cores | $R_{max}$<br>GFlop/s | $N_{max}$<br>Order | $N_{1/2}$<br>Order | $R_{peak}$<br>GFlop/s |
|--|--------------------------------|----------------------|--------------------|--------------------|-----------------------|
| IBM eServer pSeries 690 (1.1 GHz Power4)   | 512                            | 826.5                | 185000             | 60000              | 2253                  |
| Apple G5 dual 2.0 GHz IBM Power PC 970s, Infiniband 4X primary fabric, Cisco Gigabit Ethernet secondary fabric | 256                            | 821                  | 120000             |                    | 1024                  |
| CRAY T3E-900 (450 MHz)   | 1320                           | 815.1                | 134400             | 26880              | 1188                  |
| Compaq AlphaServer SC ES45/1Ghz  | 512                            | 809                  | 215000             | 27000              | 1024                  |
| HITACHI SR8000-G1/64(450MHz)   | 64                             | 790.7                | 110000             | 8504               | 921.6                 |
| Compaq AlphaServer SC ES45/1GHz  | 480                            | 772                  | 140000             | 22950              | 960                   |
| LANL Space Simulator(Intel P4 2.53 GHz+1Gb)  | 288                            | 757.1                | 180000             | 44000              | 1457                  |
| HP Integrity Superdome (1.6GHz/24MB Dual Core Itanium 2)   | 128                            | 745.5                | 240000             | 27040              | 819.2                 |
| IBM eServer pSeries 690 Turbo(1.3 GHz Power 4)   | 256                            | 736.6                | 285000             | 25000              | 1331                  |
| Legend Group DeepComp 1800 - P4 Xeon 2.4 GHz - Myrinet   | 256                            | 735.8                | 114920             | 28000              | 1228.8                |
| Self-Made MVS1000M EV67 (667 MHz Myrinet)  | 768                            | 734.6                | 270000             | 30000              | 1024                  |
| Fujitsu VPP5000/80 (3.33nsec)  | 80                             | 730.2                | 273600             | 15360              | 768.0                 |
| IBM eServer pSeries 655/651(1.1GHz Power 4)  | 256                            | 726.3                | 300000             | 20000              | 1126                  |
| IBM SP 176 nodes (375 MHz)   | 704                            | 723.4                | 187000             | 37500              | 1056                  |
| Self-made MVS-5000BM Cluster IBM PowerPC 970 (1.6 GHz w/Myrinet)   | 84                             | 722.1                | 200000             | 33000              | 1075.2                |
| Presto III Athlon MP 1900+(1.6Ghz Myrinet)   | 480                            | 716.1                | 100000             |                    | 1536                  |
| Cray X-1 (800 MHz)   | 60                             | 706.3                | 168960             | 18432              | 768.0                 |
| Compaq AlphaServer SC ES45/1GHz  | 480                            | 706.0                | 205000             | 31400              | 960                   |
| IBM eServer pSeries 690 Turbo(1.3 GHz Power 4)   | 224                            | 704.8                | 135000             |                    | 1165                  |
| IBM eServer pSeries 690 Turbo(1.3 GHz Power 4)   | 256                            | 701.5                | 224000             |                    | 1331                  |
| HITACHI SR8000-E1/80(300MHz)   | 80                             | 691.3                | 120000             | 9408               | 768                   |
| IBM Cluster 1350 (208 proc 2.4GHz P4 Xeon)   | 208                            | 682.6                | 170000             |                    | 998.4                 |
| NCSA Titan Cluster(Itanium 800MHz w/Myrinet)   | 320                            | 677.9                | 183000             | 32000              | 1024                  |
| CRAY X1 (800 MHz, 60 procs)  | 60                             | 675.5                | 168960             | 17610              | 768.0                 |
| SGI Altix 3000 (1.5 GHz)   | 128                            | 668.3                | 224000             |                    | 768                   |
| LANL Space Simulator P4(2.53GHz)+1000Mb/sw   | 288                            | 665.1                | 180000             | 65000              | 1457                  |
| Compaq AlphaServer SC ES45/1GHz  | 480                            | 660.8                | 210000             | 47000              | 960                   |
| Self-made MVS-5000BM Cluster IBM JS20, IBM PowerPC 970 1.6 GHz w/Myrinet                                       | 152                            | 655.5                | 185000             | 29000              | 972.8                 |
| NEC Magi Cluster (PIII 933 MHz w/Myrinet)  | 1012                           | 654.8                | 217600             | 29000              | 944                   |
| Intel Pentium 4(dual 2.0 GHz w/Myrinet 2000)   | 240                            | 654.7                | 159000             |                    | 960                   |
| SGI Altix 3000 (Itanium 2, 1.5 GHz)  | 128                            | 651.7                | 160000             | 160000             | 768                   |
| IBM eServer Opteron Cluster (2-way Opteron 2.0 GHz w/GigE)   | 240                            | 651.4                | 166000             | 43200              | 960                   |
| IBM eServer pSeries 690 (1.5 GHz POWER4+)  | 192                            | 651.4                | 220000             |                    | 1152.0                |
| Pentium 4 (256-2.2GHz,72-2.4GHz,32-2.8GHz)   | 360                            | 644.                 | 234000             |                    | 1651                  |
| HP Superdome (1.5GHz Itanium 2, w/HyperPlex  | 128                            | 642.9                | 235040             | 68000              | 768.0                 |
| IBM x335 Cluster dual Xeon 2.8 GHz + GIG-E   | 258                            | 638.8                | 160000             | 65000              | 1433.6                |
| IBM eServer xSeries Cluster(2.8 GHz Pentium 4)   | 184                            | 629.7                | 103000             | 20700              | 1030                  |
| SGI Origin 3000 (R14000 500 MHz)   | 768                            | 623.2                | 163000             | 25000              | 768                   |
| RWC (933MHz 512-dual Pent III w/Myrinet2000)   | 1012                           | 618.3                | 146000             | 23000              | 955.4                 |

| <b>Computer<br/>(Full Precision)</b>  | <b>Number<br/>of Procs<br/>or Cores</b> | <b><math>R_{max}</math><br/>GFlop/s</b> | <b><math>N_{max}</math><br/>Order</b> | <b><math>N_{1/2}</math><br/>Order</b> | <b><math>R_{peak}</math><br/>GFlop/s</b> |
|---|---|---|---------------------------------------|---------------------------------------|--|
| Dell 2650 Windows(Pentium 4 2.4 GHz w/Gnet)   | 256                                     | 618.0                                   | 166000                                | 50000                                 | 1228                                     |
| IBM BladeCenter Xeon Dual Processor 2.4 GHz GigE  | 280                                     | 613.9                                   | 200000                                |                                       | 1344                                     |
| IBM SP 140 nodes (222 MHz POWER3)   | 1120                                    | 613.02                                  | 170000                                | 50000                                 | 994.6                                    |
| HITACHI SR8000-F1/64(375MHz)  | 64                                      | 605.3                                   | 92000                                 | 10048                                 | 768                                      |
| Intel Pentium 4(dual 2.0 GHz w/Myrinet 2000)  | 256                                     | 605.2                                   | 154000                                |                                       | 1024                                     |
| SGI Altix 3000 (Itanium 2, 1.3 GHz)   | 128                                     | 594.9                                   | 320000                                | 320000                                | 665.6                                    |
| Linux Cluster UIUC-NCSA (1 GHz Pentium III)   | 1008                                    | 594.5                                   | 235000                                |                                       | 1008                                     |
| MEGWARE Computer GmbH (dual Intel Xeon 3.06GHz, FSB533, 8Gb/s Infiniband)   | 128                                     | 593.7                                   | 154856                                | 16432                                 | 783.36                                   |
| IBM eServer pSeries 690 Turbo(1.3 GHz Power 4)  | 256                                     | 590.2                                   | 158000                                | 158000                                | 1331                                     |
| ASCI Red Intel Pentium II Xeon core 333Mhz  | 2336                                    | 581.1                                   | 180864                                | 31500                                 | 778                                      |
| HITACHI SR8000-F1/60(375MHz)  | 60                                      | 577.5                                   | 89000                                 | 10000                                 | 720                                      |
| Apple Xserve G5 (2GHz PowerPC 970 w/Myrinet)  | 88                                      | 575.4                                   | 114000                                |                                       | 704                                      |
| Cray X-1 (800 MHz)  | 49                                      | 572.5                                   | 150528                                | 15232                                 | 627.2                                    |
| Compaq Alpha 21264A(667MHz,dual w/Myrinet)  | 742                                     | 564.2                                   | 230000                                | 37440                                 | 989.8                                    |
| Fujitsu VPP5000/64 (3.33nsec)   | 64                                      | 563.0                                   | 235776                                | 12288                                 | 614.4                                    |
| IBM BladeCenter PS704 Express (2.46 GHz POWER7, RHEL 6,Intelligent Energy Optimization not enabled)                                       | 32                                      | 560.5                                   | 160000                                | 7552                                  | 630.78                                   |
| IBM BladeCenter PS704 Express (2.46 GHz POWER7, RHEL 6, Intelligent Energy Optimization not enabled)                                      | 32                                      | 559.6                                   | 160000                                | 7552                                  | 630.78                                   |
| IBM eServer pSeries 690 Turbo(1.3 GHz Power 4)  | 192                                     | 558.2                                   | 245000                                | 22000                                 | 998.4                                    |
| IBM SP 120 nodes (222 MHz POWER3)   | 960                                     | 558.13                                  | 200000                                | 53000                                 | 852.5                                    |
| HITACHI SR8000-E1/64(300MHz)  | 64                                      | 556.5                                   | 110000                                | 8000                                  | 614                                      |
| IBM eServer pSeries 655 (16x8-way 1.7 GHz POWER4+)  | 128                                     | 556.5                                   | 156000                                | 10000                                 | 870.4                                    |
| IBM pSeries 690 Turbo(7x32 1.3GHz w/Gigenet)  | 224                                     | 555.3                                   | 226800                                |                                       | 1165                                     |
| SGI Origin 3000, 700 MHz  | 512                                     | 553.0                                   | 230000                                | 230000                                | 717                                      |
| CRAY X1 (800 MHz, 49 procs)   | 49                                      | 550.5                                   | 150528                                | 16128                                 | 627.2                                    |
| Fujitsu M8000 (SPARC64 VII 2.52GHz, quad core)  | 64                                      | 548.2                                   | 156200                                | 12000                                 | 645.12                                   |
| Sun M8000 (SPARC64 VII 2.52GHz, quad core)  | 64                                      | 548.2                                   | 156200                                | 12000                                 | 645.12                                   |
| RWC SCore Cluster III Pentium III (933MHz)  | 960                                     | 547.9                                   | 140000                                | 24000                                 | 955.4                                    |
| IBM SP 475 nodes (332 MHz 604e)   | 1900                                    | 547.0                                   | 244000                                | 58000                                 | 1262                                     |
| IBM SP 32 nodes (375 MHz POWER3 High)   | 512                                     | 546.3                                   | 148000                                | 33000                                 | 768.0                                    |
| SGI Origin 2000 (250 MHz)   | 1536                                    | 543.2                                   | 203904                                | 64512                                 | 768                                      |
| IBM eServer xSeries Linux (2.4GHz P4 Xeon)  | 512                                     | 540.2                                   | 224200                                |                                       | 2458                                     |
| IBM SP 128 nodes (375 MHz POWER3 Thin)  | 512                                     | 538.4                                   | 163000                                |                                       | 768                                      |
| Bull Novascale 5160 (8x16 Itanium2 1.3 GHz w/Quadrics)  | 128                                     | 535.9                                   | 236544                                | 36864                                 | 665.6                                    |
| PARAM Padma C-DAC IBM p630(Quad P4-1.0GHz)w/PARAMNet-II   | 248                                     | 532.2                                   | 224000                                | 43895                                 | 992                                      |
| IBM x3850 X5 [Dual Chassis configuration with QPI (Quick Path Interconnect) (Intel Xeon X7560 @ 2.27 GHz, 64 cores ( 8 sockets * 8 cores) | 64                                      | 526                                     | 168000                                |                                       | 581                                      |
| ASCI Red Intel Pentium II Xeon core -333Mhz   | 2336                                    | 522.5                                   | 121856                                | 25300                                 | 778                                      |
| IBM Power 740 Express (4.2 GHz POWER7+, AIX, Intelligent Energy Optimization enabled, up to 4.540 GHz)                                    | 16                                      | 517.1                                   | 117504                                | 3500                                  | 581                                      |
| IBM Power 730 Express (4.2 GHz POWER7+, AIX,  | 16                                      | 514.3                                   | 117504                                | 3500                                  | 581                                      |



| Computer<br>(Full Precision)  | Number<br>of Procs<br>or Cores | $R_{max}$<br>GFlop/s | $N_{max}$<br>Order | $N_{1/2}$<br>Order | $R_{peak}$<br>GFlop/s |
|---|--------------------------------|----------------------|--------------------|--------------------|-----------------------|
| Intelligent Energy Optimization enabled, up to 4.540 GHz)   |                                |                      |                    |                    |                       |
| CPlant/Ross(Alpha EV6 466 MHz w/Myrinet)  | 1000                           | 512.43               | 142300             |                    | 932                   |
| Compaq AlphaServer SC ES45/1Ghz   | 324                            | 512                  | 170000             | 20000              | 648                   |
| IBM PowerLinux 7R2 (4.2 GHz POWER7+, SLES11SP2,<br>Intelligent Energy Optimization enabled, up to 4.540 GHz)    | 16                             | 508.2                | 112128             | 4000               | 581                   |
| IBM Power 730 Express (4.2 GHz POWER7+, SLES11SP2,<br>Intelligent Energy Optimization enabled, up to 4.540 GHz) | 16                             | 508.5                | 112128             | 4000               | 581                   |
| IBM Power 740 Express (4.2 GHz POWER7+, SLES11SP2,<br>Intelligent Energy Optimization enabled, up to 4.540 GHz) | 16                             | 508.5                | 115383             | 4200               | 581                   |
| Compaq ES40/EV67 AlphaServer SC   | 512                            | 507.6                | 200000             | 30000              | 683                   |
| IBM Power 575 (4.7 GHz POWER6 RHEL 5.2)   | 32                             | 500.0                | 105400             | 7000               | 601.6                 |
| IBM eServer pSeries 655 (8-way 1.5 GHz POWER4+)   | 128                            | 498.5                | 224000             | 15000              | 768                   |
| BM Flex System p260 (4.1 GHz POWER7+, AIX, Intelligent<br>Energy Optimization enabled, up to 4.340 GHz) 16      | 496                            | 117504               | 3500               |                    | 555                   |
| NEC SX-6/64M8   | 64                             | 495.2                | 122880             | 6656               | 512                   |
| Fujitsu VPP5000/56 (3.33nsec)   | 56                             | 492.4                | 228480             | 12768              | 538                   |
| IBM Flex System p260 (4.1 GHz POWER7+, SLES11SP2,<br>Intelligent Energy Optimization enabled, up to 4.340 GHz)  | 16                             | 485.4                | 112128             | 4300               | 555                   |
| IBM eServer pSeries 690 (1.1 GHz Power4)  | 256                            | 485.2                | 158000             |                    | 1126                  |
| Fujitsu VPP800/63 (4.0nsec)   | 63                             | 482.5                | 234360             | 12852              | 504                   |
| AMD Athlon MP2000+ cluster(1.667GHz,w/Fenet)  | 240                            | 480.7                | 116100             | 24570              | 800                   |
| IBM SP 28 nodes (375 MHz POWER3 High)   | 448                            | 480.4                | 138000             | 31000              | 672.0                 |
| SKIF K-500 Pentium Xeon 2.8 GHz SCI 3D  | 128                            | 475.3                | 123000             | 18304              | 716.8                 |
| PARRAM Padma (IBM p630 w/PARAMNet-II)   | 240                            | 475.0                | 230400             | 72850              | 960                   |
| HP Superdome (750 MHz, HyperPlex)   | 256                            | 470.93               | 340092             | 90072              | 768                   |
| IBM ASCI Option Blue Pacific (332 MHz)  | 1344                           | 468.2                | 205000             | 65000              | 892                   |
| Sun Fire Supercluster (1050MHz 3x100)   | 300                            | 468.1                | 230400             | 38400              | 630                   |
| IBM Power 575 (4.7 GHz POWER6)  | 32                             | 467                  | 110000             | 9000               | 602                   |
| SGI Origin 3000 (R14000A 600 MHz)   | 512                            | 466.0                | 111104             | 19840              | 614.4                 |
| IBM eServer Blade Center JS20 (2-way PowerPC970 1.6Ghz<br>w/GigE)   | 164                            | 462                  | 140000             |                    | 1049.6                |
| HITACHI SR8000/64(250MHz)   | 64                             | 449.7                | 92000              | 9160               | 512                   |
| HP Superdome (750 MHz, 1000bT)  | 256                            | 449.44               | 340092             | 110052             | 768                   |
| IBM Power 570 (4.2 GHz POWER6)  | 32                             | 449.2                | 110000             | 18000              | 537.6                 |
| CRAY T3E (300 MHz)  | 1024                           | 448.6                | 119808             | 19008              | 614                   |
| CRAY T3E-1200E (600 MHz)  | 540                            | 447.8                | 181440             | 17280              | 648                   |
| IBM SP 96 nodes (222 MHz POWER3)  | 768                            | 446.20               | 183000             | 45000              | 682.0                 |
| IBM xSeries(2.8 GHz Intel P4 w/Myrinet 2000)  | 126                            | 443.7                | 125000             |                    | 705.6                 |
| CRAY T3E-900 (450 MHz)  | 690                            | 443.1                | 144000             | 18720              | 621                   |
| IBM Power 740 Express (3.55 GHz POWER7)   | 16                             | 439.3                | 130400             | 400                | 494.6                 |
| IBM Power 740 Express (3.55 GHz POWER7, RHEL 6,<br>Intelligent Energy Optimization enabled, up to 3.86 GHz)     | 16                             | 435.8                | 112129             | 5200               | 494                   |
| IBM Power 730 Express (3.55 GHz POWER7)   | 16                             | 435.4                | 112128             | 5376               | 494                   |
| IBM Power 570 (4.2 GHz POWER6 RHEL 5.2)   | 32                             | 433.7                | 110000             | 7000               | 537.6                 |
| NEC SX-6/56M7   | 56                             | 433.6                | 107520             | 5824               | 448                   |
| IBM Power 730 Express (3.55 GHz POWER7)   | 16                             | 432.9                | 92000              | 4000               | 494.6                 |

| Computer<br>(Full Precision)   | Number<br>of Procs<br>or Cores | $R_{max}$<br>GFlop/s | $N_{max}$<br>Order | $N_{1/2}$<br>Order | $R_{Peak}$<br>GFlop/s |
|--|--------------------------------|----------------------|--------------------|--------------------|-----------------------|
| Cray X-1 (800 MHz)   | 36                             | 422.1                | 129024             | 13056              | 460.8                 |
| Dell Cluster (2.4 GHz XEON w/Myrinet)  | 128                            | 421.9                | 117200             |                    | 614.4                 |
| Sun HPC 4500 Cluster/64 (400MHz/8MB L2)  | 896                            | 420.44               | 144000             | 43200              | 716.8                 |
| Intel Itanium 2 (1.3 GHz Quad proc w/Myrinet 2000)   | 96                             | 418.4                | 136000             | 18000              | 499.2                 |
| IBM eServer p5 595 (1.9GHz POWER5)   | 64                             | 418.0                | 152000             | 8000               | 486.4                 |
| IBM eServer p5 595 (1.9GHz POWER5)   | 64                             | 416.8                | 157000             | 12000              | 486.4                 |
| Intel dual Pentium Xeon (768-3.06 GHz & 252-3.2 GHz w/Myrinet)   | 1020                           | 415.2                | 321600             |                    | 631.1                 |
| CRAY T3E-900 (450 MHz)   | 640                            | 413.7                | 138240             | 18432              | 576                   |
| SGI Origin 3000 (500 MHz)  | 512                            | 405.60               | 230000             | 130560             | 512                   |
| CRAY X1 (800 MHz, 36 procs)  | 36                             | 404.3                | 129024             | 12416              | 460.8                 |
| AMD Athlon 1900+ 1.6 GHz Myrinet-2000  | 240                            | 403.6                | 142000             | 26000              | 768                   |
| Self-made Xenia / IBM Intellistation(Xeon 2.4 GHz) Myrinet   | 128                            | 401.4                | 85000              | 14600              | 614.4                 |
| HITACHI SR8000-G1/32(450MHz)   | 32                             | 395.6                | 85000              | 5320               | 460.8                 |
| IBM eServer xSeries Linux (2.4GHz P4 Xeon)   | 256                            | 381.1                | 158600             |                    | 1229                  |
| SGI Origin 2000 (250 MHz)  | 1024                           | 379.6                | 164736             | 40500              | 512                   |
| SGI Altix 3000, 900 Mhz  | 128                            | 378.9                | 110400             | 30000              | 461                   |
| IBM eServer pSeries 690 Turbo(1.3 GHz Power 4)   | 128                            | 378.2                | 200000             | 16000              | 665.6                 |
| IBM BladeCenter PS702 Express (3.00 GHz POWER7, RHEL 6, Intelligent Energy Optimization enabled, up to 3.30 GHz) | 16                             | 375.7                | 112128             | 6408               | 423                   |
| NEC SX-6/48M6  | 48                             | 374.5                | 107520             | 4992               | 384                   |
| CP-PACS* (150 MHz PA-RISC based CPU)   | 2048                           | 368.2                | 103680             | 30720              | 614                   |
| Intel Pentium III (572@1GHz, 452@1.266GHz)   | 1024                           | 366.0                | 242000             |                    | 1144                  |
| NEC SX-5/48M3 (4 nsec)   | 48                             | 364.6                | 76800              |                    | 384                   |
| IBM eServer pSeries 655/651(1.1GHz Power 4)  | 128                            | 364.5                | 210000             | 13000              | 563                   |
| IBM xSeries 2.8 Ghz x335 Pentium IV Linux cluster  | 128                            | 361.6                | 112000             |                    | 716.8                 |
| Fujitsu VPP5000/38 (3.33nsec)  | 38                             | 351.1                | 196080             | 9120               | 364.8                 |
| IBM SP (200 MHz Power 3 nodes)   | 768                            | 350.4                | 113000             | 30000              | 614                   |
| Intel Pentium4 1.7GHz(1) / 2.0GHz(98) / 2.4GHz(44) / 2.53GHz(35) / 2.8GHz(4) Giganet                             | 182                            | 349.3                | 144800             |                    | 806.1                 |
| Compaq AlphaServer SC ES40/833   | 256                            | 344.1                | 142000             | 17000              | 427                   |
| PowerEdge 2650(P-4,2GHz+120 P-4,2.2GHz w/Gnet)   | 180                            | 343.4                | 100000             |                    | 768                   |
| CRAY T3E (300 MHz)   | 784                            | 342.8                | 104832             | 17280              | 470                   |
| HP Superdome (1.5GHz Itanium 2, 6.0MB L3 Cache)  | 64                             | 341.7                | 154080             | 15040              | 384.0                 |
| SGI Altix 3000 (Itanium 2, 1.5 GHz)  | 64                             | 338.0                | 160000             | 160000             | 384                   |
| HP Superdome (1.5GHz Itanium2, 6MB L3 Cache)   | 64                             | 335.45               | 150080             | 15200              | 384.0                 |
| IBM Power 730 Express(3.7 GHz POWER7)  | 12                             | 335.2                | 108000             | 440                | 376.3                 |
| Self Made P4(95/2GHz+341/2.4GHz+32/2.53 w/Gnet)  | 168                            | 334.9                | 138990             | 40000              | 739                   |
| IBM Power 730 Express (3.72 GHz POWER7, RHEL 6, Intelligent Energy Optimization enabled, up to 3.92 GHz)         | 12                             | 333.1                | 112128             | 5504               | 376.32                |
| Compaq AlphaServer SC ES40/EV67 833 MHz  | 256                            | 332.2                | 192000             | 20000              | 426.5                 |
| Athlon MP 1.2Ghz, w/Myrinet 2000   | 252                            | 331.7                | 90720              |                    | 614.4                 |
| Cray X-1 (800 MHz)   | 28                             | 329.8                | 114688             | 12160              | 358.4                 |

| Computer<br>(Full Precision)                     | Number<br>of Procs<br>or Cores | $R_{max}$<br>GFlop/s | $N_{max}$<br>Order | $N_{1/2}$<br>Order | $R_{peak}$<br>GFlop/s |
|--|--------------------------------|----------------------|--------------------|--------------------|-----------------------|
| PowerEdge HPC Cluster (2.4 GHz Xeon w/Gnet)      | 198                            | 327.9                | 100000             |                    | 950                   |
| Compaq AlphaServerSC ES40(833 MHz Quadrics)      | 300                            | 326.4                | 110000             | 38000              | 499.8                 |
| Xenia/IBM Intellistation(Xeon 2.4 GHz w/Myrinet) | 128                            | 323.4                | 86000              | 14600              | 614.4                 |
| Helix(Cardiff 108@2.2 GHz, 36@2.4 GHz w/Dophin)  | 144                            | 322.5                | 105000             | 17000              | 648                   |
| CRAY T3E-900 (450 MHz)                           | 512                            | 321.1                | 122880             | 15360              | 461                   |
| Fujitsu VPP700/160E (6.5nsec)                    | 160                            | 319.4                | 168000             | 24000              | 384                   |
| CRAY X1 (800 MHz, 28 procs)                      | 28                             | 318.1                | 114688             | 11302              | 358.4                 |
| IBM xSeries Xeon Dual Processor 2.4 GHz          | 168                            | 317.8                | 137000             |                    | 806.4                 |
| SGI Origin 3000 400 MHz, 512 CPU                 | 512                            | 315.5                | 130560             | 108800             | 409.6                 |
| HITACHI SR8000-F1/32(375MHz)                     | 32                             | 313.3                | 65000              | 6000               | 384                   |
| IBM SP 256 nodes (332 MHz 604e)                  | 1024                           | 311.9                | 180000             | 40000              | 680                   |
| NEC SX-6/40M5                                    | 40                             | 311.7                | 102400             | 4480               | 320                   |
| CPlant/Siberia(Alpha EV6 500 MHz w/Myrinet)      | 552                            | 309.2                | 105700             |                    | 552                   |
| Dell PowerEdge HPC(P4 2.4 GHz Xeon w/Myrinet)    | 128                            | 308.3                | 115000             |                    | 614.4                 |
| IBM SP 64 nodes (222 MHz POWER3)                 | 512                            | 307.63               | 148000             | 35000              | 454.7                 |
| IBM pSeries 690 Turbo(4x32 1.3GHz w/Gigenet)     | 128                            | 306.4                | 112000             |                    | 665.8                 |
| SGI Origin 3000 (500 MHz, 384 CPU)               | 384                            | 306.30               | 384000             | 96768              | 967.7                 |
| SGI Origin 2800 (400MHz)                         | 512                            | 300.23               | 130560             | 21216              | 409.6                 |
| SGI Origin 2000 (400 MHz, 512 CPU)               | 512                            | 300.20               | 130560             | 130560             | 409.6                 |
| SGI Altix 3000 (Itanium 2, 1.3 GHz)              | 64                             | 297.2                | 160000             | 160000             | 332.8                 |
| Fujitsu VPP5000/32 (3.33nsec)                    | 32                             | 296.1                | 170880             | 7680               | 307                   |
| IBM SP 256 nodes (200 MHz POWER3)                | 512                            | 287.84               | 140000             | 30000              | 410                   |
| COMPAS-ECCO (Pentium III, 1GHZ w/Myrinet)        | 480                            | 285.9                | 150000             | 17000              | 480                   |
| Compaq AlphaServer SC ES45/1GHz (ev68)           | 176                            | 285.3                | 124000             | 14000              | 352                   |
| Intel Paragon XP/S MP (50 MHz OS=SUNMOS)         | 6768                           | 281.1                | 128600             | 25700              | 338                   |
| Dell Precision 530(Pentium 4-1.7 GHz, GigE)      | 208                            | 280.4                | 96000              |                    | 707                   |
| NEC SX-7/32 (1.81ns)                             | 32                             | 280.3                | 72000              | 2064               | 282.5                 |
| SGI Origin 3000, 700 MHz                         | 256                            | 279.9                | 163000             | 163000             | 358                   |
| HP rx26000 Itanium2 1.3GHz Cluster w/InfiniBand  | 64                             | 278.7                | 98304              | 9216               | 332.8                 |
| IBM SP 16 nodes (375 MHz POWER3 High)            | 256                            | 278.3                | 107000             | 21200              | 384.0                 |
| Dell PowerEdge HPC Cluster(2.4 GHz Xeon w/genet) | 128                            | 277.8                | 115000             | 30000              | 614                   |
| IBM Power 570 (5.0 GHz POWER6)                   | 16                             | 277.7                | 104000             | 5600               | 320.6                 |
| IBM eServer xSeries Linux (2.4GHz P4 Xeon)       | 128                            | 274.0                | 112000             |                    | 614.4                 |
| Sun HPC4500 Cluster/60 (336MHz/4MB L2)           | 720                            | 272.1                | 192000             |                    | 483.8                 |
| Compaq Alphaserver SC512(500Mhz w/Quadrics)      | 512                            | 271.4                | 140000             |                    | 512                   |
| Fujitsu VPP700/128E (6.5nsec)                    | 128                            | 268.9                | 166400             | 23040              | 307                   |
| Fujitsu SPARC Enterprise M9000 (2.4 GHz)         | 32                             | 268.6                | 162085             | 6500               | 307.2                 |
| Sun SPARC Enterprise M9000 (2.4 GHz)             | 32                             | 268.6                | 162085             | 6500               | 307.2                 |
| Compaq ES40/EV67 AlphaServer SC                  | 256                            | 263.6                | 106000             | 20000              | 342                   |
| hp server rp8400 (750 MHz, HyperPlex)            | 128                            | 261.09               | 234144             | 50004              | 384                   |
| IBM eServer pSeries 690 (1.1 GHz Power4)         | 128                            | 259.5                | 112000             | 21000              | 563.2                 |
| IBM SP 64 nodes (375 MHz POWER3 Thin)            | 256                            | 257.82               | 148000             | 24000              | 384                   |
| Intel Paragon XP/S MP (50 MHz OS=SUNMOS)         | 6144                           | 256.2                | 122500             | 24300              | 307                   |

| Computer<br>(Full Precision)                    | Number<br>of Procs<br>or Cores | $R_{max}$<br>GFlop/s | $N_{max}$<br>Order | $N_{1/2}$<br>Order | $R_{peak}$<br>GFlop/s |
|---|--------------------------------|----------------------|--------------------|--------------------|-----------------------|
| HITACHI SR8000/36(250MHz)                       | 36                             | 255.9                | 69000              | 5968               | 288                   |
| Fujitsu SPARC Enterprise M9000 (2.28 GHz)       | 32                             | 255.3                | 158045             | 6500               | 291.8                 |
| Sun SPARC Enterprise M9000 (2.28 GHz)           | 32                             | 255.3                | 158045             | 6500               | 291.8                 |
| NEC SX-6  | 32                             | 253.6                | 76800              | 3328               | 256                   |
| NEC SX-6/32M4                                   | 32                             | 251.2                | 92160              | 3584               | 256                   |
| hp server rp8400 (750 MHz, 1000bT)              | 128                            | 251.11               | 234144             | 70092              | 384                   |
| HP Superdome (750 MHz, HyperPlex)               | 128                            | 248.90               | 220104             | 36072              | 384                   |
| IBM eServer pSeries 655 (8-way 1.5 GHz POWER4+) | 64                             | 248.7                | 160000             | 11000              | 384                   |
| NEC SX-5/32M2 (4 nsec)                          | 32                             | 247.0                | 55296              |                    | 256                   |
| HP Superdome (750 MHz, 1000bT)                  | 128                            | 245.11               | 220968             | 43092              | 384                   |
| SGI Origin 3000 (R14000A 600 MHz)               | 256                            | 245.1                | 120000             | 120000             | 307.2                 |
| SGI Origin 2000 300 MHz, 512 CPU                | 512                            | 241.40               | 147456             | 33984              | 307.2                 |
| IBM Power 570 (4.7GHz, POWER6)                  | 16                             | 239.4                | 92000              | 4400               | 301                   |
| IBM Power 570 (4.7GHz POWER6)                   | 16                             | 239.4                | 92000              | 4400               | 300.8                 |
| LosLobos Supercluster(PIII 733MHz w/Myrinet)    | 500                            | 237.0                | 150000             | 20000              | 366.5                 |
| IBM Power 570 (4.7 GHz POWER6)                  | 16                             | 235.1                | 90000              | 7230               | 300.8                 |
| CRAY T3E (300 MHz)                              | 540                            | 234.9                | 86400              | 14400              | 324                   |
| HELIX (AMD 1.76GHz w/gnet)                      | 132                            | 234.8                | 82080              | 25000              | 466                   |
| HITACHI SR2201/1024(150MHz)                     | 1024                           | 232.3                | 155520             | 34560              | 307                   |
| Numerical Wind Tunnel* (9.5 ns)                 | 167                            | 229.7                | 66132              | 18018              | 281                   |
| HITACHI SR8000/32(250MHz)                       | 32                             | 229.5                | 65000              | 5632               | 256                   |
| IBM Power 570 (4.7 GHz POWER6 RHEL 5.1)         | 16                             | 229.4                | 110000             | 8400               | 300.8                 |
| Intel Paragon XP/S MP (50 MHz OS=SUNMOS)        | 5376                           | 223.6                | 114500             | 22900              | 269                   |
| CRAY T3E (300 MHz)                              | 512                            | 222.3                | 84480              | 12480              | 307                   |
| CLiC (Pentium III 800 MHz)                      | 529                            | 221.6                | 176640             | 28272              | 423.2                 |
| Korean Inst S&T(Pentium 4 1.7GHz w/Myrinet)     | 128                            | 221.6                | 115000             | 18000              | 435.2                 |
| SGI Altix 3000, 1 Ghz                           | 64                             | 219.4                | 167039             | 167039             | 256                   |
| IBM eServer p5 595 (1.9GHz POWER5)              | 32                             | 217.1                | 130000             | 9000               | 243.2                 |
| Fujitsu VPP700/116(7nsec)                       | 116                            | 213.0                | 111360             | 18560              | 255                   |
| Titech Grid Cluster, Pentium III-S 1.4Ghz       | 256                            | 212.7                | 115000             |                    | 358.4                 |
| CRAY T3E-1200E (600 MHz)                        | 256                            | 211.8                | 125952             | 11520              | 307                   |
| Compaq SC232 (667 MHz)                          | 232                            | 211.0                | 120000             |                    | 309.5                 |
| IBM SP 128 nodes (332 MHz 604e)                 | 512                            | 210.2                | 100000             | 20872              | 340                   |
| SGI Origin 3000 (500 MHz)                       | 256                            | 210.20               | 163200             | 163000             | 256                   |
| HITACHI SR8000-F1/20(375MHz)                    | 20                             | 206.15               | 68000              | 4440               | 240                   |
| Intel EPG (dual 3.06GHz Xeon w/Myrinet)         | 64                             | 202.7                | 100000             |                    | 391.7                 |
| Fujitsu VPP500/153(10nsec)                      | 153                            | 200.6                | 62730              | 17000              | 245                   |
| HITACHI SR8000-G1/16(450MHz)                    | 16                             | 199.1                | 62000              | 3440               | 230.4                 |
| Self Made(91-P4 2GHz + 35-P4 2.4GHz w/Genet)    | 126                            | 198.7                | 85000              | 30000              | 532.0                 |
| IBM ASCI Option Blue Pacific (332 MHz)          | 672                            | 198.6                | 95000              | 37000              | 446                   |
| SGI Origin 3000 Cluster2x128(R14000A 600 MHz)   | 256                            | 198.5                | 160000             | 160000             | 307.2                 |
| SGI Altix 3000, 900 MHz                         | 64                             | 197.4                | 119039             | 119039             | 230                   |
| Self-Made Intel Pentium 4 Xeon(1.7GHz w/GigE)   | 208                            | 197.2                | 90000              |                    | 707                   |

| Computer<br>(Full Precision)                          | Number<br>of Procs<br>or Cores | $R_{max}$<br>GFlop/s | $N_{max}$<br>Order | $N_{1/2}$<br>Order | $R_{peak}$<br>GFlop/s |
|---|--------------------------------|----------------------|--------------------|--------------------|-----------------------|
| HPTi ACL-276/667 (Alpha 667 MHz w/Myrinet)            | 270                            | 196.34               | 80000              |                    | 360                   |
| SGI Origin 2000 (250 MHz)                             | 512                            | 195.6                | 110592             | 23040              | 256                   |
| Numerical Wind Tunnel* (9.5 ns)                       | 140                            | 195.0                | 60480              | 15730              | 236                   |
| HP Integrity rx8640 (1.6GHz/24MB Dual-Core Itanium 2) | 32                             | 192.4                | 116000             | 7520               | 204.8                 |
| Intel Paragon XP/S MP (50 MHz OS=SUNMOS)              | 4608                           | 191.5                | 106000             | 21000              | 230                   |
| IBM eServer pSeries 690 Turbo(1.3 GHz Power 4)        | 64                             | 191.4                | 148000             | 11000              | 332.8                 |
| NEC SX-6/24M3   | 24                             | 188.7                | 69120              | 2688               | 192                   |
| Cray X-1 (800 MHz)                                    | 16                             | 188.5                | 81920              | 8064               | 204.8                 |
| IBM eServer p5 590 (1.65GHz POWER5)                   | 32                             | 187.8                | 113000             | 5800               | 211.2                 |
| IBM eServer pSeries 655/651(1.1GHz Power 4)           | 64                             | 184.7                | 150000             | 9000               | 282                   |
| Netfinity Xseries(X330) PIII 1GHz                     | 320                            | 184.4                | 120000             | 1500               | 320                   |
| IBM x330 Cluster PIII 1GHz w/100Mb enet               | 420                            | 182.4                | 192000             | 192000             | 420                   |
| CRAY X1 (800 MHz, 16 procs)                           | 16                             | 182.3                | 81920              | 8242               | 204.8                 |
| NEC TX7/i9510 Itanium2 1.6GHz                         | 32                             | 181.92               | 200848             | 7824               | 204.8                 |
| Numerical Wind Tunnel* (9.5 ns)                       | 128                            | 179.2                | 56832              | 14800              | 216                   |
| Compaq AlphaServerSC ES40/EV68 833MHz                 | 160                            | 178.0                | 71000              | 20000              | 266.5                 |
| Sun Fire 15K (1050MHz/8MB E\$)                        | 106                            | 177.2                | 206116             | 18000              | 222.6                 |
| NEC TX7/i9510 Itanium2 1.5GHz                         | 32                             | 172.30               | 161936             | 7440               | 192                   |
| SGI Altix 3000 (Itanium 2, 1.5 GHz)                   | 32                             | 171.9                | 16000              | 16000              | 192.0                 |
| SGI Itanium 2, 800 MHz                                | 64                             | 171.8                | 115199             | 115199             | 204.8                 |
| HP 9000 Superdome (1000MHz PA-8800)                   | 64                             | 171.8                | 120800             | 10000              | 256                   |
| IBM QS22 blade (2 PowerXCell 8i processors)           | 18                             | 170.7                | 48895              |                    | 217.6                 |
| Fujitsu VPP500/128(10nsec)                            | 128                            | 170.2                | 56832              | 14804              | 205                   |
| Intel Pentium III (1 GHz w/100 Mb enet)               | 512                            | 169.4                | 16000              |                    | 512                   |
| Sun Fire 15K (1050MHz/8MB E\$)                        | 104                            | 168.5                | 96116              | 17000              | 218.4                 |
| IBM S80s (450 MHz, SP switch)                         | 360                            | 167.87               | 113000             | 31000              | 324                   |
| Compaq AlphaServer SC ES40/EV67 (667MHz )             | 184                            | 167.5                | 99900              | 22500              | 245.5                 |
| Self Made(6-P4 1.7GHz + 99-P4 2GHz w/Genet)           | 105                            | 167.2                | 77900              | 27000              | 416.4                 |
| Origin 3000 400 MHz Cluster(2x128)                    | 256                            | 167.1                | 204800             | 163000             | 204.8                 |
| IBM eServer pSeries 690 (1.1 GHz Power4)              | 64                             | 163.8                | 148000             |                    | 332.8                 |
| SGI Origin 3000 400 MHz, 256 CPU                      | 256                            | 163.5                | 163200             | 81920              | 204.8                 |
| IBM eServer pSeries 690(2x32w/Genet 1.3GHz)           | 64                             | 161.9                | 80000              |                    | 281.6                 |
| CRAY T3E-900 (450 MHz)                                | 256                            | 161.6                | 84480              | 10080              | 230                   |
| Intel P 4 cluster(92-2.0GHz+6-1.7GHz w/Genet)         | 98                             | 160.4                | 75500              | 24000              | 388                   |
| HITACHI SR8000-F1/16(375MHz)                          | 16                             | 159.5                | 46000              | 3800               | 192                   |
| Pentium 4 (2 GHz w/Giganet)                           | 91                             | 157.8                | 73500              | 26000              | 364                   |
| IBM S80s (450 MHz, SP switch)                         | 336                            | 157.75               | 109000             | 29000              | 302                   |
| Sun Fire 15K (1050 MHz/8MB E\$)                       | 96                             | 157.6                | 96116              | 16000              | 201.6                 |
| IBM SP 32 nodes (222 MHz POWER3)                      | 256                            | 157.46               | 107000             | 25000              | 227.3                 |
| Compaq AS SC256 (500 MHz EV6 Quadrics sw)             | 256                            | 154.4                | 120000             | 26000              | 256                   |
| SGI Origin 2000 400 MHz, 256 CPU                      | 256                            | 152.20               | 163200             | 163200             | 204.8                 |
| SGI Altix 3000 (Itanium 2, 1.3 GHz)                   | 32                             | 151.8                | 160000             | 160000             | 166.4                 |
| IBM SP/472 (120 MHz)                                  | 460                            | 151.8                | 61000              | 22600              | 221                   |

| Computer<br>(Full Precision)                    | Number<br>of Procs<br>or Cores | $R_{max}$<br>GFlop/s | $N_{max}$<br>Order | $N_{1/2}$<br>Order | $R_{peak}$<br>GFlop/s |
|---|--------------------------------|----------------------|--------------------|--------------------|-----------------------|
| Intel Paragon XP/S MP (50 MHz OS=SUNMOS)        | 3648                           | 151.7                | 95000              | 18100              | 182                   |
| SGI Origin 3000 (400 MHz) (2x128 cpu)           | 256                            | 151.20               | 112640             | 112640             | 204.8                 |
| HITACHI SR8000-G1/12(450MHz)                    | 12                             | 150.11               | 54000              | 3000               | 172.8                 |
| IBM SP 128 nodes (200 MHz POWER3)               | 256                            | 149.36               | 100000             | 18500              | 205                   |
| Sun Blade 1000 750MHz Cluster w/Myrinet2000     | 196                            | 149.2                | 70560              | 70560              | 294                   |
| Compaq ES40/EV68 AlphaServer SC (833 MHz)       | 128                            | 149.1                | 70000              |                    | 213.2                 |
| Fujitsu VPP5000/16 (3.33nsec)                   | 16                             | 149.1                | 120768             | 4416               | 154                   |
| Compaq AlphaServerSC ES40(833 MHz Quadrics)     | 160                            | 148.                 | 71000              | 2000               | 266.5                 |
| SGI Origin 2000 (250 MHz)                       | 384                            | 147.1                | 96768              | 17280              | 192                   |
| IBM S80s (450 MHz, SP switch)                   | 312                            | 146.26               | 104800             | 28000              | 281                   |
| Sun Fire 15K (1050MHz/8MB E\$)                  | 88                             | 144.6                | 96116              | 15000              | 184.8                 |
| HITACHI SR8000/20(250MHz)                       | 20                             | 144.5                | 48000              | 4000               | 160                   |
| Intel Paragon XPS-140 (50 MHz OS=SUNMOS)        | 3680                           | 143.4                | 55700              | 20500              | 184                   |
| IBM eServer pSeries 690 Turbo(1.7GHz POWER4+)   | 32                             | 143.3                | 151000             | 5000               | 217.6                 |
| HP AlphaServer GS1280 7/1300 (1.3 GHz)          | 64                             | 142.8                | 122500             |                    | 166.4                 |
| NEC SX-6/16M2 (1.77ns)                          | 16                             | 142.8                | 51200              | 2048               | 144                   |
| Cray X-1 (800 MHz)                              | 12                             | 142.4                | 73728              | 7040               | 153.6                 |
| SGI Origin 2000 (195 MHz)                       | 480                            | 141.2                | 108864             | 21312              | 187                   |
| HITACHI SR8000-E1/16(300MHz)                    | 16                             | 140.8                | 62000              | 3200               | 154                   |
| SGI 1100 Cluster (Dual Pentium III, 1 GHz)      | 324                            | 140.5                | 133000             |                    | 324                   |
| IBM SP 8 nodes (375 MHz POWER3 High)            | 128                            | 138.8                | 76000              | 16000              | 192.0                 |
| IBM Power 550 (5.0 GHz POWER6+)                 | 8                              | 137.6                | 64200              | 1900               | 160.0                 |
| CRAY X1 (800 MHz, 12 procs)                     | 12                             | 137.6                | 73728              | 6294               | 153.6                 |
| IBM S80s (450 MHz, SP switch)                   | 288                            | 137.17               | 100800             | 26000              | 259                   |
| IBM Power 550 (5.0 GHz POWER6+ SLES 11)         | 8                              | 137.1                | 85000              | 3500               | 160.0                 |
| IBM eServer pSeries 690 Turbo(1.1 GHz)          | 64                             | 137.1                | 80000              | 13500              | 281.6                 |
| Compaq ES40/EV6 AlphaServer SC                  | 256                            | 135.7                | 120000             |                    | 256                   |
| Fujitsu VPP500/100(10nsec)                      | 100                            | 135.3                | 51000              | 12816              | 160                   |
| HP Superdome (750 MHz)                          | 64                             | 133.82               | 138888             |                    | 192                   |
| IBM SP 32 nodes (375 MHz POWER3 Thin)           | 128                            | 132.75               | 107000             | 15400              | 192                   |
| hp server rp8400 (750 MHz, HyperPlex)           | 64                             | 132.71               | 137808             | 21384              | 192                   |
| hp server rp8400 (750 MHz, 1000bT)              | 64                             | 132.69               | 165456             | 29268              | 192                   |
| Sun Fire 15K (1050MHz/8MB E\$)                  | 80                             | 132.6                | 96116              | 14000              | 168.0                 |
| Intel Itanium 2 1.3 GHz                         | 32                             | 132.5                | 73400              |                    | 166.4                 |
| Dell PowerEdge HPC(Dual Pentium III, 1 GHz)     | 400                            | 131.0                | 130000             | 65000              | 400                   |
| Fujitsu VPP500/96 (10nsec)                      | 96                             | 129.5                | 49728              | 12430              | 154                   |
| Fujitsu VPP700/64 (7nsec)                       | 64                             | 129.5                | 115200             | 12800              | 141                   |
| Paragon XP/S MP(1024 Nodes, OS=SUNMOS S1.6)     | 3072                           | 127.1                | 86000              | 17800              | 154                   |
| NEC SX-8/8 (2 GHz)                              | 8                              | 126.2                | 30720              |                    | 128                   |
| NEC SX-5/16 (4 nsec)                            | 16                             | 125.8                | 55296              |                    | 128                   |
| NEC SX-6/16M2 (2 nsec)                          | 16                             | 125.70               | 51200              | 2240               | 128                   |
| SGI Origin 3000 600 MHz, 128 CPU                | 128                            | 125.5                | 81920              | 81920              | 154                   |
| IBM eServer pSeries 655 (8-way 1.5 GHz POWER4+) | 32                             | 125.2                | 112000             | 6000               | 192                   |

| Computer<br>(Full Precision)                           | Number<br>of Procs<br>or Cores | $R_{max}$<br>GFlop/s | $N_{max}$<br>Order | $N_{1/2}$<br>Order | $R_{peak}$<br>GFlop/s |
|--|--------------------------------|----------------------|--------------------|--------------------|-----------------------|
| IBM S80s (450 MHz, SP switch)                          | 264                            | 124.66               | 96800              | 25000              | 238                   |
| Sun HPC 10000 Cluster/4 (336 MHz, 4MB L2)              | 256                            | 123.9                | 80640              | 26880              | 172                   |
| HITACHI SR8000-G1/10(450MHz)                           | 10                             | 123.4                | 49440              | 2648               | 144.0                 |
| Origin 3000 400 MHz Cluster(64+128)                    | 192                            | 122.3                | 96000              | 111000             | 153.6                 |
| NEC SX-4/64M2 (8.0 ns)                                 | 64                             | 122.2                | 30080              | 4352               | 128                   |
| Compaq AlphaServer SC40 EV/67 667 MHz                  | 112                            | 121.3                | 107520             |                    | 149                   |
| Dell PowerEdge Cluster W2K(Dual PIII,1GHz/Gnet)        | 252                            | 120.7                | 155000             | 50000              | 252                   |
| IBM Power 570 (4.7GHz, POWER6)                         | 8                              | 120.6                | 58000              | 3400               | 150                   |
| IBM Power 570 (4.7GHz POWER6)                          | 8                              | 120.6                | 58000              | 3400               | 150.4                 |
| Sun Fire 15K (1050MHz/8MB E\$)                         | 72                             | 119.8                | 96116              | 12500              | 151.2                 |
| IBM Power 570 (4.7 GHz POWER6)                         | 8                              | 118.4                | 79680              | 4000               | 150.4                 |
| Linux cluster PIII(1.0 GHz, w/100 Mb/s enet)           | 256                            | 118.1                | 157000             | 157000             | 256                   |
| Fujitsu PRIMEPOWER2000(675MHz)                         | 128                            | 118.0                | 116480             | 43000              | 259.2                 |
| IBM Power 570 (4.7 GHz POWER6 RHEL 5.1)                | 8                              | 116.4                | 83000              | 4400               | 150.4                 |
| CRAY T3E-900 (450 MHz)                                 | 192                            | 116.0                | 51840              | 8448               | 171                   |
| HITACHI SR8000/16(250MHz)                              | 16                             | 115.9                | 42928              | 3584               | 128                   |
| Fujitsu PRIMERGY CL460J (Pentium4 1.7GHz)              | 64                             | 115.7                | 40000              | 9000               | 217.6                 |
| Cray T3E-1350 (675 MHz)                                | 128                            | 113.9                | 89088              | 7488               | 172.8                 |
| IBM S80s (450 MHz, SP switch)                          | 240                            | 113.31               | 92000              | 24000              | 216                   |
| IBM BladeCenter JS43 Express (4.2 GHz POWER6+ SLES 11) | 8                              | 113.1                | 65000              | 3300               | 134.4                 |
| CRAY T3E (300 MHz)                                     | 256                            | 112.8                | 59904              | 8832               | 154                   |
| SGI Altix 3000, 1 Ghz                                  | 32                             | 111.9                | 100000             | 100000             | 128                   |
| IBM SP (160 MHz, P2SC)                                 | 256                            | 111.64               | 52000              | 13100              | 163                   |
| IBM System p5 575 (1.9GHz POWER5+)                     | 16                             | 111.4                | 92400              | 1340               | 121.6                 |
| SGI 1100 Cluster (Pentium III 1GHz)                    | 266                            | 110.4                | 119000             |                    | 266                   |
| Fujitsu VPP700/56 (7nsec)                              | 56                             | 110.3                | 109200             | 10752              | 123                   |
| Sun UltraSPARC II 450MHz 40 E420R 4proc/node           | 160                            | 110.0                | 136080             | 136080             | 144                   |
| Fujitsu VPP500/80 (10nsec)                             | 80                             | 109.8                | 46400              | 11030              | 128                   |
| SGI Origin 2000 300 MHz Cluster(2x128)                 | 256                            | 109.5                | 81920              | 81920              | 153.6                 |
| Dell PowerEdge HPC (Dual Pentium III, 1 GHz)           | 320                            | 109.0                | 120000             | 60000              | 320                   |
| IBM SP 64 nodes (332 MHz 604e)                         | 256                            | 108.1                | 81460              | 14180              | 170                   |
| SGI Origin 3000 (500 MHz)                              | 128                            | 106.9                | 81920              | 81920              | 128                   |
| Sun Fire 15K (1050MHz/8MB E\$)                         | 64                             | 106.9                | 96116              | 12000              | 134.4                 |
| Sun Fire E6900 (UltraSPARC IV 1.35 Ghz w/custom)       | 48                             | 106.6                | 141565             | 8900               | 129.6                 |
| CRAY T3E-1200E(600 MHz)                                | 128                            | 106.0                | 89088              | 7488               | 154                   |
| IBM S80s (450 MHz, SP switch)                          | 216                            | 104.92               | 87000              | 22000              | 194                   |
| IBM System p5 560Q (1.8 GHz POWER5+)                   | 16                             | 104.7                | 87400              | 4080               | 115.2                 |
| IBM Power 550 (4.2GHz, POWER6)                         | 8                              | 104.6                | 76000              | 1700               | 135                   |
| IBM Power 550 (4.2GHz POWER6)                          | 8                              | 104.6                | 76000              | 1700               | 134.4                 |
| IBM Power 550 (4.2 GHz POWER6 RHEL 5.1)                | 8                              | 104.2                | 85000              | 6100               | 134.4                 |
| IBM System p5 560Q (1.8GHz POWER5)                     | 16                             | 104.2                | 92300              | 1400               | 115.2                 |
| Sun Fire 15K (900MHz/8MB L2\$, perflib)                | 72                             | 103.7                | 96116              | 10700              | 129.6                 |
| IBM eServer p5 570 (1900 MHz POWER5)                   | 16                             | 103.1                | 72000              | 4000               | 121.60                |

| Computer<br>(Full Precision)   | Number<br>of Procs<br>or Cores | $R_{max}$<br>GFlop/s | $N_{max}$<br>Order | $N_{1/2}$<br>Order | $R_{peak}$<br>GFlop/s           |
|--|--------------------------------|----------------------|--------------------|--------------------|---------------------------------|
| IBM SP (375 MHz POWER3 )   | 90                             | 102.8                | 90000              |                    | 135.0                           |
| Fujitsu PRIMEPOWER2000(563MHz)   | 128                            | 102.0                | 116480             | 44000              | 216                             |
| NEC TX7/i9510 (Itanium2,1GHz)  | 32                             | 101.77               | 128016             | 21840              | 128                             |
| SGI Origin 2000 (250 MHz)  | 256                            | 101.4                | 86400              | 13248              | 128                             |
| HITACHI SR8000-G1/8(450MHz)  | 8                              | 101.3                | 44000              | 2432               | 115.2                           |
| Compaq AlphaServer SC40 EV/67 667 MHz  | 96                             | 101.2                | 96000              | 10000              | 128                             |
| SGI Origin 3000 500 MHz, 128 CPU   | 128                            | 101.0                | 115000             |                    | 128                             |
| Pentium 4 (2 GHz, Giganet + F-enet)  | 56                             | 100.7                | 55000              | 16000              | 224                             |
| Cray T3D 1024 (150 MHz)  | 1024                           | 100.5                | 81920              | 10224              | 152                             |
| Sun Ultra HPC10000 Cluster/4(250 MHz,4MB L2)   | 256                            | 100.4                | 80640              | 22528              | 128                             |
| IBM SP (375 MHz POWER3 )   | 88                             | 99.7                 | 88000              |                    | 132.0                           |
| SGI Origin 2000 250/300 MHz Cluster<br>(2x64x250+2x64x300)   | 256                            | 98.87                | 81920              | 81920              | 140.8                           |
| Sun Fire 6900 (UltraSPARC IV, 1.2 GHz)   | 48                             | 98.26                | 96116              | 8300               | 115.2                           |
| IBM Cell BE (3.2 GHz)*****   | 9                              | 98.05                | 4096               | 1536               | 14.6 (64 bit)<br>204.8 (32 bit) |
| SGI Altix 3000, 900 MHz  | 32                             | 97.67                | 82079              | 82079              | 115                             |
| HP Integrity rx7640 (1.6GHz/18MB Dual-Core Itanium 2)  | 16                             | 96.85                | 76520              | 4320               | 102.4                           |
| Kepler (192 PIII@650 MHz + 4 PIII@733 MHz)   | 196                            | 96.25                | 109760             | 12320              | 127.7                           |
| IBM SP (375 MHz POWER3 )   | 84                             | 95.5                 | 88000              |                    | 126.0                           |
| IBM eServer pSeries 690 Turbo(1.3 GHz Power 4)   | 32                             | 95.26                | 108000             | 7000               | 166.4                           |
| Cray X-1 (800 MHz)   | 8                              | 95.2                 | 61440              | 5632               | 102.4                           |
| Fujitsu VPP700/46 ( 7nsec)   | 46                             | 94.3                 | 100280             | 8280               | 101                             |
| SGI Origin 300 (500 MHz, w/Myrinet)  | 128                            | 94.15                | 81920              | 81920              | 128                             |
| HP 9000 rp8420-32 (1000MHz PA-8800)  | 32                             | 94.1                 | 58960              | 5200               | 128                             |
| ClearSpeed CSX600 Advance accelerator boards (dual<br>ClearSpeed boards each 250 MHz) (frontend HP ProLiant<br>DL380 G5, dual node Intel Xeon 5100 dual core, 3 GHz) | 6                              | 93.3                 | 45000              |                    | 240                             |
| SGI Origin 2000 250 MHz Cluster(2x128)   | 256                            | 92.99                | 81920              | 81920              | 128                             |
| NEC SX-4/48M2 (8.0 ns)   | 48                             | 92.63                | 30080              | 2688               | 96                              |
| Sun Ultra HPC10000 Cluster/4(250 MHz,4MB L2)   | 244                            | 92.6                 | 80640              | 21504              | 122                             |
| Sun Fire 15K (900MHz/8MB L2\$, perflib)  | 64                             | 92.58                | 96116              | 10000              | 115.2                           |
| CRAY X1 (800 MHz, 8 procs)   | 8                              | 92.4                 | 61440              | 4996               | 102.4                           |
| IBM eServer pSeries 655/651(1.1GHz Power 4)  | 32                             | 92.24                | 106000             | 6000               | 141                             |
| IBM eServer pSeries 690 Turbo (1300 MHz)   | 32                             | 91.32                | 72000              | 3800               | 166.4                           |
| CRAY T3E-1200E   | 112                            | 90.4                 | 58368              | 6432               | 134                             |
| Fujitsu VPP500/64 (10nsec)   | 64                             | 89.3                 | 41472              | 9820               | 102                             |
| Sun Fire E6900 (UltraSPARC IV 1.35 Ghz w/custom)   | 40                             | 89.03                | 119565             | 7300               | 108.0                           |
| HP Integrity rx8620 (1.5GHz Itanium2, 6MB L3 Cache)  | 16                             | 88.8                 | 58600              | 4200               | 96.0                            |
| IBM SP2-T2 (66 MHz)  | 512                            | 88.4                 | 73500              | 20150              | 136                             |
| Sun Ultra HPC10000 Cluster/4(250 MHz,4MB L2)   | 224                            | 87.94                | 80640              | 19200              | 112                             |
| IBM System p5 560Q (1.5GHz POWER5+)  | 16                             | 87.77                | 92400              | 1320               | 96.0                            |
| Compaq Alphaserver GS320 (731Mhz 4MB L2)   | 128                            | 87.51                | 110000             | 110000             | 170.8                           |
| IBM eServer p5 575 (1.5 GHz POWER5)  | 16                             | 87.34                | 71050              | 1320               | 96.0                            |
| Presto III Athlon Cluster(1.33GHz, Myrinet)  | 78                             | 87.25                | 75160              | 25000              | 207.5                           |



| Computer<br>(Full Precision)                     | Number<br>of Procs<br>or Cores | $R_{max}$<br>GFlop/s | $N_{max}$<br>Order | $N_{1/2}$<br>Order | $R_{peak}$<br>GFlop/s          |
|--|--------------------------------|----------------------|--------------------|--------------------|--------------------------------|
| Hewlett-Packard SuperDome 552 MHz                | 64                             | 86.45                | 41000              | 3960               | 141.3                          |
| SGI Origin 3000 400 MHz, 128 CPU                 | 128                            | 85.44                | 65536              | 65536              | 102.4                          |
| IBM Cell BE (2.1 GHz)*****                       | 9                              | 84.52                | 3712               | 1792               | 9.6 (64 bit)<br>134.4 (32 bit) |
| Bull NovaScale 5160 Intel Itanium 2 (1.5 GHz)    | 16                             | 83.25                | 85760              | 4736               | 96                             |
| CRAY T3E (300 MHz)                               | 192                            | 83.07                | 51840              | 7680               | 115                            |
| Sun Fire 6900 (UltraSPARC IV, 1.2 GHz)           | 40                             | 82.12                | 96116              | 6500               | 96.0                           |
| SGI Origin 3000 400 MHz, 256 CPU                 | 256                            | 81.90                | 81920              | 81920              | 102.5                          |
| SGI Origin 2000 400 MHz, 128 CPU                 | 128                            | 81.76                | 65536              | 65536              | 102.4                          |
| H-P e-vectra Pentium III 733 MHz                 | 225                            | 81.60                | 80370              | 23265              | 165.9                          |
| Origin 3000 400 MHz Cluster(2x64)                | 128                            | 81.56                | 153600             | 81920              | 102.4                          |
| Sun Fire 15K (900MHz/8MB L2\$, perflib)          | 56                             | 81.27                | 96116              | 8400               | 100.8                          |
| IBM S80s (450 MHz, SP switch)                    | 168                            | 80.87                | 77000              | 20000              | 151                            |
| IBM SP 16 nodes (222 MHz POWER3)                 | 128                            | 80.83                | 76000              | 15000              | 113.7                          |
| Sun Fire 15K (1050MHz/8MB E\$)                   | 48                             | 80.75                | 96116              | 8500               | 100.8                          |
| HITACHI SR8000-F1/8(375MHz)                      | 8                              | 80.25                | 30352              | 2504               | 96                             |
| Compaq AlphaserverSC 833mhz                      | 64                             | 80.00                | 60000              | 10000              | 106.6                          |
| Sony PlayStation 3 (3.2 GHz)*****                | 7                              | 79.9                 | 2000               | 900                | 11 (64 bit)<br>154 (32 bit)    |
| CRAY T3E-900 (450 MHz)                           | 128                            | 79.59                | 42240              | 6432               | 115                            |
| Sun HPC 10000 Cluster/2 (400MHz/4MB L2)          | 128                            | 79.36                | 57120              | 10752              | 102                            |
| Hitachi S-3000 cluster/412 (3x4) (2 ns)          | 12                             | 78.2                 | 31120              | 4880               | 96                             |
| Presto III Athlon Cluster(1.33GHz, F-enet)       | 78                             | 77.4                 | 75160              | 25000              | 207.5                          |
| IBM SP 64 nodes (200 MHz POWER3)                 | 128                            | 76.77                | 89000              | 11500              | 102                            |
| Fujitsu-Siemens hpcLine(Pentium III,850 MHz)     | 192                            | 76.1                 | 66720              | 12960              | 163.2                          |
| Sun Ultra HPC10000 Cluster/3(250 MHz,4MB L2)     | 192                            | 75.65                | 65520              | 19200              | 96                             |
| Sun Ultra HPC10000 Cluster/4(250 MHz,4MB L2)     | 192                            | 75.58                | 80640              | 16320              | 96                             |
| Fujitsu VPP5000/8 (3.33nsec)                     | 8                              | 74.89                | 85440              | 2688               | 76.8                           |
| Intel Paragon XPS-140 (50 MHz)                   | 1872                           | 72.9                 | 55000              | 17500              | 94                             |
| SGI Origin 2000 300 MHz Cluster(128+32)          | 160                            | 72.57                | 61440              | 61440              | 96                             |
| NEC SX-6/8 (1.77ns)                              | 8                              | 71.67                | 30720              | 800                | 72                             |
| Sun Fire E6900 (UltraSPARC IV 1.35 Ghz w/custom) | 32                             | 71.60                | 119565             | 5900               | 86.4                           |
| HP AlphaServer GS1280 7/1300 (1.3 GHz)           | 32                             | 71.13                | 65536              |                    | 83.2                           |
| IBM S80s (450 MHz, SP switch)                    | 144                            | 70.94                | 72000              | 18000              | 130                            |
| IBM SP 4 nodes (375 MHz POWER3 High)             | 64                             | 70.65                | 54000              | 11000              | 96.0                           |
| Sun Fire 15K (900MHz/8MB L2\$, perflib)          | 48                             | 69.88                | 96116              | 7500               | 86.4                           |
| IBM SP 16 nodes (375 MHz POWER3 Thin)            | 64                             | 67.78                | 76000              | 10400              | 96                             |
| Sun Fire 15K (1050MHz/8MB E\$)                   | 40                             | 67.52                | 96116              | 7500               | 84.0                           |
| Fujitsu VPP700/32 ( 7nsec)                       | 32                             | 67.3                 | 83200              | 5760               | 70                             |
| Sun HPC 10000 Cluster/2 (336 MHz, 4MB L2)        | 128                            | 66.93                | 57120              | 10080              | 86                             |
| NEC SX-4/32 (8.0 ns) ***                         | 32                             | 66.53                | 15360              | 1792               | 64                             |
| IBM System p5 575 (2.2GHz POWER5+)               | 8                              | 66.44                | 57200              | 860                | 70.4                           |
| Sun Fire 6900 (UltraSPARC IV, 1.2 GHz)           | 32                             | 65.94                | 96116              | 5400               | 76.8                           |
| IBM eServer pSeries 670 (1.5GHz POWER4+)         | 16                             | 65.06                | 80000              | 1200               | 96.0                           |
| IBM Power 520 (4.7 GHz POWER6+)                  | 4                              | 65.01                | 47600              | 840                | 75.2                           |
| RWC SCore Cluster II(Dual PIII 800MHz+Myrinet)   | 132                            | 64.7                 | 58000              | 8000               | 105.6                          |

| Computer<br>(Full Precision)                                 | Number<br>of Procs<br>or Cores | $R_{max}$<br>GFlop/s | $N_{max}$<br>Order | $N_{1/2}$<br>Order | $R_{peak}$<br>GFlop/s |
|--|--------------------------------|----------------------|--------------------|--------------------|-----------------------|
| IBM Power 520 (4.7 GHz POWER6+ SLES 11)                      | 4                              | 64.42                | 60000              | 1900               | 75.2                  |
| Origin 3000 600 MHz, 64 CPU                                  | 64                             | 64.15                | 81920              | 81920              | 76.8                  |
| IBM eServer pSeries 655 (8-way 1.5 GHz POWER4+)              | 16                             | 64.07                | 80000              | 4000               | 96                    |
| Paragon XP/S MP(512 Nodes, OS=SUNMOS S1.6)                   | 1516                           | 64.0                 | 61000              | 12200              | 77                    |
| Compaq Alphaserver GS320 (731Mhz 4MB L2)                     | 64                             | 63.81                | 60000              | 9000               | 85.4                  |
| Compaq ES40/EV67 AlphaServer SC                              | 64                             | 63.8                 | 60000              | 9000               | 85.4                  |
| NEC SX-8/4 (2 GHz)   | 4                              | 63.30                | 30720              |                    | 64                    |
| NEC SX-6/8 (2 nsec)  | 8                              | 63.21                | 30720              | 800                | 64                    |
| hp AlphaServer GS1280 7/1150(1.15 GHz)                       | 32                             | 62.89                | 65536              |                    | 73.6                  |
| HP Kayak Intel Cluster (NT 550 MHz PIII)                     | 256                            | 62.59                | 122500             | 20500              | 141                   |
| SGI Origin 2000 (300 Mhz)                                    | 128                            | 62.25                | 60032              | 9000               | 77                    |
| Cray T932 (2.2 ns) ***                                       | 32                             | 61.8                 | 16384              | 1280               | 58                    |
| NEC SX-4/32 (8.0 ns)   | 32                             | 61.77                | 20480              | 1688               | 64                    |
| IBM Power 570 (4.7GHz, POWER6)                               | 4                              | 61.6                 | 39200              | 660                | 75                    |
| IBM Power 570 (4.7GHz POWER6)                                | 4                              | 61.56                | 39200              | 660                | 75.2                  |
| NEC SX-4/32M2 (8.0 ns)                                       | 32                             | 61.32                | 20480              | 2432               | 64                    |
| Alphleet (Alpha cluster/Myranet, 500 MHz)                    | 140                            | 61.3                 | 56000              | 22000              | 140                   |
| IBM Power 570 (4.7 GHz POWER6 RHEL 5.1)                      | 4                              | 60.37                | 59000              | 3500               | 75.2                  |
| IBM Power 570 (4.7 GHz POWER6)                               | 4                              | 60.08                | 55000              | 3000               | 75.2                  |
| Thinking Machines CM-5                                       | 1024                           | 59.7                 | 52224              | 24064              | 131                   |
| Hitachi S-3000 cluster/309 (3x3) (2 ns)                      | 9                              | 59.0                 | 26940              | 3180               | 72                    |
| IBM S80s (450 MHz, SP switch)                                | 120                            | 58.97                | 65000              | 17000              | 108                   |
| Sun Fire 12K (1050MHz/8MB E\$)                               | 36                             | 58.92                | 66166              | 6500               | 75.6                  |
| HITACHI SR2201/256(150MHz)                                   | 256                            | 58.68                | 77760              | 13440              | 78                    |
| Sun Fire 15K (900MHz/8MB L2\$, perflib)                      | 40                             | 58.41                | 96116              | 6500               | 72.0                  |
| HITACHI SR8000/8(250MHz)                                     | 8                              | 58.3                 | 30352              | 2304               | 64                    |
| Fujitsu VPP700/26E (6.5nsec)                                 | 26                             | 58.0                 | 74880              | 5200               | 62                    |
| IBM SP2 (160 MHz)  | 128                            | 57.24                | 39000              | 9180               | 82                    |
| IBM BladeCenter JS23 Express (4.2 GHz POWER6+ SLES 11)       | 4                              | 57.14                | 58000              | 2000               | 67.2                  |
| Cray T3E-1350 (675 MHz)                                      | 64                             | 57.0                 | 62976              | 5040               | 86.4                  |
| Sun Ultra HPC10000 Cluster/3(250 MHz,4MB L2)                 | 144                            | 56.97                | 65520              | 14400              | 72                    |
| IBM eServer p5 575 (1.9GHz POWER5)                           | 8                              | 56.78                | 61000              | 2800               | 60.8                  |
| CRAY T3E (300 MHz)   | 128                            | 55.72                | 42240              | 5952               | 76.8                  |
| IBM eServer p5 575 (1.9GHz POWER5)                           | 8                              | 56.67                | 57200              | 796                | 60.8                  |
| Sun HPC 450 Cluster/40(300MHz/2MB L2 cache)                  | 160                            | 55.44                | 89600              | 22400              | 96.0                  |
| SGI2400(Origin 2000)Enet-Cluster(6x32 250MHz)                | 192                            | 54.68                | 99840              | 99840              | 96                    |
| IBM SP 32 nodes (332 MHz 604e)                               | 128                            | 54.27                | 57600              | 9376               | 85                    |
| IBM Blade Server: BladeCenter T-HS20 w/2.8 GHz Xeon and GigE | 16                             | 54.16                | 38000              | 7600               | 89.6                  |
| Hitachi S-3000 cluster/408 (2x4) (2 ns)                      | 8                              | 54.1                 | 31200              | 3760               | 64                    |
| IBM eServer Cluster 1350-xSeries 335 w/2.8 GHz Xeon and GigE | 16                             | 54.05                | 38000              | 7600               | 89.6                  |
| Sun Fire E6900 (UltraSPARC IV 1.35 Ghz w/custom)             | 24                             | 53.81                | 101658             | 4500               | 64.8                  |
| IBM eServer p5 570 (1900 MHz POWER5)                         | 8                              | 53.80                | 53600              | 10000              | 60.8                  |

| Computer<br>(Full Precision)                          | Number<br>of Procs<br>or Cores | $R_{max}$<br>GFlop/s | $N_{max}$<br>Order | $N_{1/2}$<br>Order | $R_{peak}$<br>GFlop/s |
|---|--------------------------------|----------------------|--------------------|--------------------|-----------------------|
| IBM Power 520 (4.2GHz, POWER6)                        | 4                              | 53.6                 | 47400              | 800                | 67                    |
| IBM Power 520 (4.2GHz POWER6)                         | 4                              | 53.59                | 47400              | 800                | 67.2                  |
| SGI Origin 3000 (500 MHz)                             | 64                             | 53.16                | 81920              | 81920              | 64                    |
| CRAY T3E-1200E (600 MHz)                              | 64                             | 53.07                | 62976              | 4992               | 76.8                  |
| Presto II PC cluster(PIII 824MHz w/fast enet)         | 132                            | 52.83                | 68520              | 68520              | 108.8                 |
| IBM S80s (450 MHz, SP switch)                         | 96                             | 52.65                | 58000              | 13000              | 86.4                  |
| Sun Fire 12K (1050MHz/8MB E\$)                        | 32                             | 52.58                | 66166              | 6000               | 67.2                  |
| Sun Fire 12K (900MHz/8MB L2\$, perflib)               | 36                             | 52.05                | 48108              | 5500               | 64.8                  |
| IBM Power 520 (4.2 GHz POWER6 SLES 10 SP1)            | 4                              | 51.5                 | 39840              | 2950               | 67.2                  |
| SGI Origin 2000 (250 MHz)                             | 128                            | 51.44                | 61000              | 10000              | 64                    |
| Cray T932 (2.2 ns) ***                                | 24                             | 51.1                 | 16384              | 1000               | 43                    |
| Sun Ultra HPC10000 Cluster/2(250 MHz,4MB L2)          | 128                            | 51.08                | 44352              | 12096              | 64                    |
| Cray T3D 512 (150 MHz)                                | 512                            | 50.8                 | 57856              | 7136               | 76                    |
| HITACHI SR8000-G1/4(450MHz)                           | 4                              | 50.59                | 31248              | 1704               | 57.6                  |
| Sun Fire 6900 (UltraSPARC IV, 1.2 GHz)                | 24                             | 49.64                | 96116              | 4100               | 57.6                  |
| IBM System p5 550Q (1.65GHz POWER5+)                  | 8                              | 48.96                | 57200              | 840                | 52.8                  |
| Sun Ultra HPC10000 Cluster/4(250 MHz,4MB L2)          | 128                            | 48.85                | 80640              | 10368              | 64                    |
| LANL Avalon Cluster:Alpha 533 Mhz+100Mb/s sw          | 140                            | 48.6                 | 62720              | 25200              | 149.4                 |
| HP Integrity rx6600 (1.6GHz/24MB Dual-Core Itanium 2) | 8                              | 48.55                | 47000              | 920                | 51.2                  |
| SGI2400(Origin 2000)Cluster(4x32 300 MHz)             | 128                            | 48.33                | 57600              | 9500               | 76.8                  |
| Cray SV1ex-1-32, 500MHz                               | 32                             | 48.17                | 40320              | 4150               | 64                    |
| Cray X-1 (800 MHz)                                    | 4                              | 47.8                 | 41984              | 3456               | 51.2                  |
| HP 9000 rp7420-16 (1000MHz PA-8800)                   | 16                             | 47.5                 | 30600              | 1020               | 64                    |
| SGI Origin 200 (2x64 300 MHz w/fast enet)             | 128                            | 47.49                | 43000              | 86300              | 47.5                  |
| Intel Cluster PIII 500 MHz quad w/Giganet+NT4         | 252                            | 47.38                | 65520              | 98280              | 126                   |
| Hewlett-Packard V2600 (552 MHz)                       | 48                             | 47.24                | 50040              | 9548               | 105.9                 |
| Compaq Alphaserver GS320 (1001Mhz 4MB L2)             | 32                             | 47.1                 | 40000              | 5000               | 64.0                  |
| Hewlett-Packard SuperDome 552 MHz                     | 32                             | 47.01                | 41000              | 1472               | 70.7                  |
| IBM eServer pSeries 655/651(1.1GHz Power 4)           | 16                             | 46.92                | 75000              | 4000               | 70.4                  |
| Sun Fire 12K (900MHz/8MB L2\$, perflib)               | 32                             | 46.63                | 48108              | 5000               | 57.6                  |
| Sun Ultra HPC6000 Cluster/4(250 MHz,4MB L2)           | 120                            | 46.56                | 53760              | 24192              | 60                    |
| CRAY X1 (800 MHz, 4 procs)                            | 4                              | 46.5                 | 41984              | 3048               | 51.2                  |
| HP Integrity rx4640 (1.6GHz/24MB Dual-Core Itanium 2) | 8                              | 46.31                | 49000              | 920                | 51.2                  |
| Cray SV1ex-1-32, 500MHz                               | 30                             | 46.21                | 39690              | 4600               | 60                    |
| Fujitsu VPP500/32 (10nsec)                            | 32                             | 46.1                 | 29760              | 5350               | 51                    |
| Sun Fire 12K (1050MHz/8MB E\$)                        | 28                             | 46.04                | 66166              | 5500               | 58.8                  |
| Fujitsu VPP700/22 (7nsec)                             | 22                             | 45.9                 | 67320              | 4840               | 48.4                  |
| SGI Origin 2000 (300 Mhz)                             | 96                             | 45.70                | 53248              | 8000               | 58                    |
| IBM System p5 550Q (1.5GHz POWER5+)                   | 8                              | 44.68                | 65000              | 820                | 48.0                  |
| Sun HPC 10000(400MHz 8MB L2 Cache)                    | 64                             | 44.57                | 39936              | 4032               | 51.2                  |
| HP Integrity rx7620 (1.5GHz Itanium2, 6MB L3 Cache)   | 8                              | 44.4                 | 33000              | 1000               | 48.0                  |
| Cray SV1ex-1-32, 500MHz                               | 28                             | 44.28                | 37044              | 4000               | 56                    |
| IBM SP2-T2 (66 MHz)                                   | 256                            | 44.2                 | 53000              | 13500              | 68                    |
| HITACHI SR8000/6(250MHz)                              | 6                              | 43.91                | 28000              | 2000               | 48                    |
| Sun HPC 10000(400MHz 4MB L2 Cache)                    | 64                             | 43.82                | 39936              | 4032               | 51.2                  |

| Computer<br>(Full Precision)                     | Number<br>of Procs<br>or Cores | $R_{max}$<br>GFlop/s | $N_{max}$<br>Order | $N_{1/2}$<br>Order | $R_{peak}$<br>GFlop/s |
|--|--------------------------------|----------------------|--------------------|--------------------|-----------------------|
| SGI Origin 3000 400 MHz, 64 CPU                  | 64                             | 43.15                | 36864              | 36864              | 51.2                  |
| Cray SV1ex-1-32, 500MHz                          | 27                             | 42.44                | 35721              | 4150               | 54                    |
| IBM SP 8 nodes (222 MHz POWER3)                  | 64                             | 41.76                | 53000              | 10000              | 56.8                  |
| Sun E6000 "WildFire" 4 servers (250 MHz)         | 104                            | 41.58                | 34944              | 9408               | 52                    |
| SGI Origin 2000 400 MHz, 64 CPU                  | 64                             | 41.53                | 81920              | 81920              | 51.2                  |
| CRAY T3E-900 (450 MHz)                           | 64                             | 41.52                | 43776              | 4608               | 58                    |
| Fujitsu-Siemens hpcLine(Pentium II,450 MHz)      | 192                            | 41.45                | 56480              | 11136              | 86.4                  |
| Sun HPC 10000(400MHz 4MB L2 Cache)               | 60                             | 41.19                | 39936              | 3840               | 48.0                  |
| Sun Fire 12K (900MHz/8MB L2\$, perflib)          | 28                             | 40.95                | 48108              | 4200               | 50.4                  |
| Hitachi S-3000 cluster/306 (2x3) (2 ns)          | 6                              | 40.9                 | 27000              | 2400               | 48                    |
| HITACHI SR8000-F1/4(375MHz)                      | 4                              | 40.76                | 23000              | 1720               | 48                    |
| Hitachi S-3000 cluster/206 (3x2) (2 ns)          | 6                              | 40.6                 | 21600              | 2160               | 48                    |
| Compaq ES40/EV6 AlphaServer SC                   | 64                             | 40.3                 | 57000              |                    | 64                    |
| SGI Origin 2000 (195 MHz)                        | 128                            | 40.25                | 60000              | 6000               | 49.9                  |
| IBM SP 32 nodes (200 MHz POWER3)                 | 64                             | 39.90                | 63000              | 7400               | 51.2                  |
| Sun Fire 12K (1050MHz/8MB E\$)                   | 24                             | 39.65                | 66166              | 4500               | 50.4                  |
| SGI Origin2000 (8x16 250 MHz w/fast enet)        | 128                            | 39.40                | 82000              | 26000              | 64.0                  |
| Cray SV1ex-1-32, 500MHz                          | 25                             | 39.09                | 34650              | 4150               | 50                    |
| Sun HPC 10000(400MHz 4MB L2 Cache)               | 56                             | 38.53                | 39936              | 3456               | 44.8                  |
| Sun Ultra HPC6000 Cluster/4(250 MHz,4MB L2)      | 96                             | 38.44                | 53760              | 19968              | 48                    |
| Cray SV1ex-1-32, 500MHz                          | 24                             | 38.31                | 34776              | 3700               | 48                    |
| IBM S80s (450 MHz, SP switch)                    | 72                             | 38.25                | 50000              | 11000              | 64.8                  |
| Sun E6000 "WildFire" 4 servers (250 MHz)         | 96                             | 38.13                | 29568              | 8064               | 48                    |
| Sun Ultra HPC10000 Cluster/2(250 MHz,4MB L2)     | 96                             | 37.79                | 50400              | 6528               | 48                    |
| Fujitsu VPP5000/4 (3.33nsec)                     | 4                              | 37.60                | 60384              | 1584               | 38.4                  |
| SGI Origin 2000 Ether Cluster(250 MHz,4x32)      | 128                            | 37.31                | 56000              | 23000              | 64                    |
| IBM eServer pSeries 655 (1.7GHz POWER4+)         | 8                              | 37.29                | 55000              | 600                | 54.4                  |
| Sun Ultra HPC10000 Cluster/3(250 MHz,4MB L2)     | 96                             | 36.91                | 65520              | 8640               | 48                    |
| Compaq GS140 cluster                             | 64                             | 36.70                | 40932              | 5200               | 67                    |
| Cray T932 (2.2 ns) ***                           | 16                             | 36.6                 | 16384              | 1000               | 29                    |
| Fujitsu VPP300/16E (6.5nsec)                     | 16                             | 36.4                 | 57600              | 3520               | 38                    |
| Fujitsu VPP700/16E (6.5nsec)                     | 16                             | 36.4                 | 57600              | 3520               | 38                    |
| IBM SP 2 nodes (375 MHz POWER3 High)             | 32                             | 36.27                | 38000              | 7200               | 48.0                  |
| Sun Fire E6900 (UltraSPARC IV 1.35 Ghz w/custom) | 16                             | 36.16                | 84155              | 3600               | 43.2                  |
| Hewlett-Packard V2600 (550 MHz)                  | 32                             | 36.01                | 41000              | 5040               | 70.4                  |
| Sun HPC 10000(400MHz 4MB L2 Cache)               | 52                             | 35.83                | 39936              | 3264               | 41.6                  |
| Sun Fire 6800 (900MHz/8MB L2)                    | 24                             | 35.63                | 48108              | 5000               | 43.2                  |
| HP AlphaServer GS1280 7/1300 (1.3 GHz)           | 16                             | 35.6                 | 40000              |                    | 41.6                  |
| HITACHI SR8000-E1/4(300MHz)                      | 4                              | 35.57                | 31248              | 1600               | 38.4                  |
| Sun Fire 12K (900MHz/8MB L2\$, perflib)          | 24                             | 35.06                | 48108              | 3700               | 43.2                  |
| IBM SP 8 nodes (375 MHz POWER3 Thin)             | 32                             | 34.51                | 53000              | 7000               | 48                    |
| NEC SX-4/16 (8.0 ns) ***                         | 16                             | 34.42                | 14336              | 960                | 32                    |
| Parnass2 Cluster (PII 400 MHz w/Myricon)         | 144                            | 34.23                | 64224              | 7200               | 57.6                  |
| Sun HPC 10000(333MHz 4MB L2 Cache)               | 64                             | 34.17                | 20352              | 3648               | 42.6                  |

| Computer<br>(Full Precision)   | Number<br>of Procs<br>or Cores | $R_{max}$<br>GFlop/s | $N_{max}$<br>Order | $N_{1/2}$<br>Order | $R_{peak}$<br>GFlop/s |
|--|--------------------------------|----------------------|--------------------|--------------------|-----------------------|
| Fujitsu VPP300/16 ( 7nsec)   | 16                             | 34.1                 | 59200              | 3520               | 35                    |
| Fujitsu VPP700/16 ( 7nsec)   | 16                             | 34.1                 | 59200              | 3520               | 35                    |
| Sun HPC 10000(400MHz 8MB L2 Cache)   | 48                             | 33.85                | 39936              | 3072               | 38.4                  |
| IBM eServer BladeCenter JS21 (2.5 GHz Power PC)  | 4                              | 33.72                | 30800              | 3700               | 40.0                  |
| Compaq GS140 cluster   | 56                             | 33.70                | 40932              | 4588               | 58                    |
| SGI Origin2000 (6x16 300 MHz w/fast enet)  | 96                             | 33.61                | 71500              | 21000              | 57.6                  |
| Compaq Alphaserver GS320 (731Mhz 4MB L2)   | 32                             | 33.54                | 40000              | 4700               | 46.8                  |
| Sun HPC 10000(400MHz 4MB L2 Cache)   | 48                             | 33.09                | 39936              | 3072               | 38.4                  |
| Sun Fire 12K (1050MHz/8MB E\$)   | 20                             | 33.08                | 66166              | 4500               | 42.0                  |
| Sun Fire 6900 (UltraSPARC IV, 1.2 GHz)   | 16                             | 32.88                | 66166              | 320                | 38.4                  |
| IBM eServer pSeries 655 (1.5GHz POWER4+)   | 8                              | 32.59                | 55000              | 600                | 48.0                  |
| NEC Express5800/1160Xa (800MHz)  | 16                             | 32.29                | 62504              | 7000               | 51.2                  |
| SGI Origin2000 (300 Mhz)   | 64                             | 32.29                | 81976              | 12324              | 38.4                  |
| Sun HPC 10000(333MHz 4MB L2 Cache)   | 60                             | 32.27                | 20352              | 3456               | 40.0                  |
| IBM BladeCenter JS21 dual-core PowerPC 970MP, 2.5 GHz  | 4                              | 32.22                | 39100              | 2052               | 40.0                  |
| Cray SV1ex-1-32, 500MHz  | 20                             | 32.11                | 32760              | 3350               | 40                    |
| Intel Core 2 Q6600 Kentsfield) (4 core, 2.4 GHz)   | 4                              | 31.90                | 15000              | 1664               | 38.4                  |
| SGI Origin2000 (3x32 250 MHz w/fast enet)  | 96                             | 31.84                | 58000              | 20000              | 48.0                  |
| NEC SX-8/2 ( 2 GHz)  | 2                              | 31.72                | 30720              |                    | 32                    |
| Paragon XP/S MP(256 Nodes, OS=SUNMOS S1.6)   | 768                            | 31.7                 | 43500              | 8400               | 38                    |
| HP V2500 (32 proc. 440 MHz)  | 32                             | 31.59                | 41000              | 4720               | 56.3                  |
| IBM System p5 550 (2.1GHz POWER5+)   | 4                              | 31.50                | 53100              | 500                | 33.6                  |
| hp AlphaServer GS1280 7/1150(1.15 GHz)   | 16                             | 31.46                | 40000              |                    | 36.8                  |
| SGI Origin 2000 Ether Cluster(195 MHz,4x32)  | 128                            | 31.36                | 56000              | 21000              | 50                    |
| NEC SX-4/16 (8.0 ns)   | 16                             | 31.10                | 20480              | 960                | 32                    |
| NEC SX-4/16M2 (8.0 ns)   | 16                             | 31.09                | 20480              | 2048 32            |                       |
| Sun HPC 6500 Cluster/4 (250 MHz, 4MB L2)   | 80                             | 30.98                | 24192              | 13440              | 40                    |
| DEC AlphaServer 8400 5/612 (625 MHz)   | 64                             | 30.90                | 30704              | 8360               | 80                    |
| NEC SX-4/16A (8.0 ns)  | 16                             | 30.83                | 20480              | 960                | 32                    |
| Cray SV1-1-32 (300 MHz)  | 32                             | 30.72                | 40320              | 4150               | 39.2                  |
| SGI Origin 2000 Ether Cluster(250 MHz,3x32)  | 96                             | 30.70                | 49000              | 17000              | 48                    |
| Thinking Machines CM-5   | 512                            | 30.4                 | 36864              | 16384              | 66                    |
| Sun HPC 10000(400MHz 4MB L2 Cache)   | 44                             | 30.33                | 39936              | 2688               | 35.2                  |
| Sun HPC 10000(333MHz 4MB L2 Cache)   | 56                             | 30.27                | 20352              | 3264               | 37.3                  |
| ClearSpeed CSX600 Advance accelerator boards (250 MHz)<br>(frontend IBM Intellistation (dual Opteron 250 2.4 GHz<br>PCI-X board) | 3                              | 30.2                 | 20256              | 4712               | 100.8                 |
| Cray SV1-1-32 (300 MHz)  | 30                             | 30.04                | 39690              | 4600               | 36                    |
| Sun Fire 6800 (750MHz/8MB L2\$)  | 24                             | 29.65                | 48108              |                    | 36                    |
| Hitachi SR2201/128(150MHz)   | 128                            | 29.46                | 51840              | 7680               | 38.4                  |
| IBM SP2 (160 MHz)  | 64                             | 29.45                | 27500              | 5700               | 41                    |
| Sun Fire 12K (900MHz/8MB L2\$, perflib)  | 20                             | 29.30                | 48108              | 3300               | 36.0                  |
| HITACHI SR8000/4(250MHz)   | 4                              | 29.1                 | 21464              | 1600               | 32                    |
| IBM SP2-T2 (66 MHz)  | 160                            | 28.7                 | 42200              | 10300              | 42                    |

| Computer<br>(Full Precision)                           | Number<br>of Procs<br>or Cores | $R_{max}$<br>GFlop/s | $N_{max}$<br>Order | $N_{1/2}$<br>Order | $R_{peak}$<br>GFlop/s |
|--|--------------------------------|----------------------|--------------------|--------------------|-----------------------|
| Compaq GS140 cluster                                   | 48                             | 28.58                | 40932              | 4200               | 50                    |
| Cray T3E-1350 (675 MHz)                                | 32                             | 28.5                 | 44544              | 3456               | 43.2                  |
| IBM System p5 550 (1.9GHz POWER5+)                     | 4                              | 28.49                | 53100              | 250                | 30.0                  |
| IBM eServer pSeries 650 6M2(1.45GHz POWER4+)           | 8                              | 28.41                | 60000              | 600                | 46.4                  |
| Hitachi S-3800/480 (2 ns)                              | 4                              | 28.4                 | 15500              | 830                | 32                    |
| Sun HPC 10000(333MHz 4MB L2 Cache)                     | 52                             | 28.32                | 20352              | 3072               | 34.6                  |
| CRAY T3E (300 MHz)                                     | 64                             | 28.31                | 29952              | 4032               | 38.4                  |
| IBM SP 16 nodes (332 MHz 604e)                         | 64                             | 28.12                | 36000              | 6760               | 42                    |
| Cray SV1-1-32 (300 MHz)                                | 28                             | 28.01                | 37044              | 4000               | 33.6                  |
| Hitachi S-3000 cluster/204 (2x2) (2 ns)                | 4                              | 27.9                 | 21600              | 1640               | 32                    |
| HP Exemplar X-Class SPP-UX 5.2                         | 64                             | 27.56                | 29956              | 4584               | 46                    |
| Sun HPC 10000(400MHz 4MB L2 Cache)                     | 40                             | 27.56                | 39936              | 2496               | 32.0                  |
| IBM eServer p5 570 (1900 MHz POWER5)                   | 4                              | 27.52                | 38000              | 1400               | 30.40                 |
| IBM S80s (450 MHz, SP switch)                          | 48                             | 27.28                | 41000              | 9000               | 43.2                  |
| Hitachi S-3000 cluster/404 (1x4) (2 ns)                | 4                              | 27.2                 | 31200              | 2680               | 32                    |
| CRAY SV1-1-32 (300 MHz)                                | 27                             | 26.82                | 35721              | 4150               | 32                    |
| SGI POWER CHALLENGE (90 MHz)                           | 128                            | 26.7                 | 53000              | 20000              | 46                    |
| CRAY T3E-1200E (600 MHz)                               | 32                             | 26.58                | 44544              | 3456               | 38.4                  |
| Sun Fire 12K (1050MHz/8MB ES)                          | 16                             | 26.57                | 66166              | 3500               | 33.6                  |
| Sun Ultra HPC 10000(250 MHz 4MB L2 Cache)              | 64                             | 26.45                | 19968              | 3072               | 32                    |
| Sun HPC 10000(333MHz 4MB L2 Cache)                     | 48                             | 26.38                | 20352              | 2880               | 32.0                  |
| SGI Origin 2000 (250 MHz)                              | 64                             | 26.24                | 43520              | 5200               | 32                    |
| HITACHI SR8000-G1/2(450MHz)                            | 2                              | 25.55                | 23000              | 1256               | 28.8                  |
| Sun HPC 6500 Cluster/4 (250 MHz, 4MB L2)               | 64                             | 25.40                | 26880              | 10752              | 32                    |
| DEC AlphaServer 8400 5/612 (625 MHz)                   | 56                             | 25.39                | 26864              | 8360               | 70                    |
| Cray T3D 256 (150 MHz)                                 | 256                            | 25.3                 | 40960              | 4918               | 38                    |
| Compaq GS140 cluster                                   | 40                             | 25.17                | 40932              | 3824               | 42                    |
| CRAY SV1-1-32 (300 MHz)                                | 25                             | 25.02                | 34650              | 4150               | 30                    |
| HP Integrity rx4640-8 (1.6GHz/9MB Itanium 2)           | 4                              | 24.49                | 38680              | 560                | 25.6                  |
| Sun Ultra HPC 10000(250 MHz 4MB L2 Cache)              | 60                             | 24.83                | 19968              | 2800               | 30                    |
| Sun HPC 10000(400MHz 4MB L2 Cache)                     | 36                             | 24.77                | 39936              | 2304               | 28.8                  |
| Sun Fire 6800 (750MHz/8MB L2\$)                        | 20                             | 24.71                | 48108              |                    | 30                    |
| DEC 8400 5/440 (440 MHz)                               | 64                             | 24.7                 | 30712              | 4584               | 56.3                  |
| IBM BladeCenter JS12 Express (3.8 GHz POWER6 RHEL 5.1) | 2                              | 24.67                | 55000              | 2500               | 30.4                  |
| HP V2500 (24 proc. 440 MHz)                            | 24                             | 24.64                | 41000              | 3120               | 42.2                  |
| HP Integrity rx3600 (1.6GHz/18MB Dual-Core Itanium 2)  | 4                              | 24.61                | 39480              | 560                | 25.6                  |
| SGI Origin 2000 Ether Cluster(195 MHz,3x32)            | 96                             | 24.58                | 49000              | 15000              | 37                    |
| HP Integrity rx2660 (1.6GHz/18MB Dual-Core Itanium 2)  | 4                              | 24.54                | 38760              | 560                | 25.6                  |
| HP Integrity BL860c (1.6GHz/18MB Dual-Core Itanium 2)  | 4                              | 24.48                | 34920              | 560                | 25.6                  |
| Sun HPC 10000(333MHz 4MB L2 Cache)                     | 44                             | 24.36                | 20352              | 2688               | 29.3                  |
| HP Integrity rx2620 (1.6GHz/18MB Dual Core Itanium 2)  | 4                              | 24.22                | 38000              | 560                | 25.6                  |
| Cray SV1ex-1-32, 500MHz                                | 16                             | 24.22                | 30240              | 2950               | 32                    |
| IBM eServer OpenPower 720 (1.65GHz POWER5)             | 4                              | 24.12                | 63000              | 1500               | 26.40                 |
| Sun Fire 6800 (900MHz/8MB L2)                          | 16                             | 24.12                | 48108              | 3500               | 28.8                  |

| <b>Computer<br/>(Full Precision)</b>                  | <b>Number<br/>of Procs<br/>or Cores</b> | <b><math>R_{max}</math><br/>GFlop/s</b> | <b><math>N_{max}</math><br/>Order</b> | <b><math>N_{1/2}</math><br/>Order</b> | <b><math>R_{peak}</math><br/>GFlop/s</b> |
|---|---|---|---------------------------------------|---------------------------------------|--|
| Cray SV1-1-32 (300 MHz)                               | 24                                      | 24.03                                   | 34776                                 | 3700                                  | 28.8                                     |
| Fujitsu VPP500/16 (10nsec)                            | 16                                      | 23.6                                    | 21120                                 | 3360                                  | 26                                       |
| SGI Origin 300 (500 MHz)                              | 32                                      | 23.59                                   | 29000                                 | 29000                                 | 32                                       |
| IBM eServer p5 550 (1650 MHz POWER5)                  | 4                                       | 23.57                                   | 62000                                 | 1600                                  | 26.4                                     |
| Sun Fire 12K (900MHz/8MB L2\$, perflib)               | 16                                      | 23.48                                   | 48108                                 | 2800                                  | 28.8                                     |
| IBM eServer pSeries 655/651(1.1GHz Power 4)           | 8                                       | 23.47                                   | 53000                                 | 600                                   | 35.2                                     |
| IBM SP2 thin-node2,SP-sw,256MB/node(66 MHz)           | 128                                     | 23.45                                   | 56000                                 | 9200                                  | 33.6                                     |
| Sun Ultra HPC 10000(250 MHz 4MB L2 Cache)             | 56                                      | 23.38                                   | 19968                                 | 2880                                  | 28                                       |
| NEC SX-3/44R (2.5 ns)                                 | 4                                       | 23.2                                    | 6400                                  | 830                                   | 26                                       |
| IBM SP2-T2 (66 MHz)                                   | 128                                     | 22.9                                    | 37000                                 | 9200                                  | 34                                       |
| Sun HPC 10000(400MHz 8MB L2 Cache)                    | 32                                      | 22.63                                   | 39936                                 | 2112                                  | 25.6                                     |
| IBM POWER2 Super Chip RS/6000 SP(120 MHz)             | 64                                      | 22.55                                   | 27400                                 | 6500                                  | 31                                       |
| IBM eServer pSeries 655 651(1.1GHz POWER4)            | 8                                       | 22.34                                   | 36000                                 | 600                                   | 35.2                                     |
| Sun HPC 10000(333MHz 4MB L2 Cache)                    | 40                                      | 22.27                                   | 20352                                 | 2496                                  | 26.6                                     |
| Sun HPC 10000(400MHz 4MB L2 Cache)                    | 32                                      | 21.98                                   | 39936                                 | 2112                                  | 25.6                                     |
| HP Integrity rx3600 (1.4GHz/12MB Dual-Core Itanium 2) | 4                                       | 21.83                                   | 39000                                 | 560                                   | 25.6                                     |
| DEC 8400 5/440 (440 MHz)                              | 56                                      | 21.8                                    | 26856                                 | 4072                                  | 49.3                                     |
| HP Integrity Server rx5670 (1500MHz, 6.0MB L3 Cache)  | 4                                       | 21.713                                  | 51040                                 | 500                                   | 24.0                                     |
| Sun Ultra HPC 10000(250 MHz 4MB L2 Cache)             | 52                                      | 21.68                                   | 19968                                 | 2496                                  | 26                                       |
| IBM eServer p5 550 Express (1500 MHz POWER5)          | 4                                       | 21.64                                   | 53000                                 | 500                                   | 24.0                                     |
| Sun HPC 6500(400MHz 8MB L2 Cache)                     | 30                                      | 21.61                                   | 39936                                 | 2688                                  | 24.0                                     |
| Hitachi S-3800/380 (2 ns)                             | 3                                       | 21.6                                    | 15680                                 | 760                                   | 24                                       |
| Hitachi S-3000 cluster/303 (1x3) (2 ns)               | 3                                       | 21.5                                    | 27000                                 | 1560                                  | 24                                       |
| HP Integrity rx2620 (1.4GHz/12MB Dual Core Itanium 2) | 4                                       | 21.41                                   | 36760                                 | 560                                   | 25.6                                     |
| Sun Ultra HPC 10000(250 MHz 1MB L2 Cache)             | 64                                      | 21.37                                   | 15000                                 | 4200                                  | 32.0                                     |
| Sun Ultra HPC 10000(250 MHz 1MB L2 Cache)             | 63                                      | 21.14                                   | 15000                                 | 4200                                  | 31.5                                     |
| SGI Origin 2000 Ether Cluster(250 MHz,2x32)           | 64                                      | 21.05                                   | 40000                                 | 14000                                 | 32                                       |
| Sun Ultra HPC 10000(250 MHz 4MB L2 Cache)             | 50                                      | 21.05                                   | 19968                                 | 2496                                  | 25                                       |
| IBM SP 4 nodes (222 MHz POWER3)                       | 32                                      | 21.00                                   | 38000                                 | 5200                                  | 28.4                                     |
| CRAY T3E-900 (450 MHz)                                | 32                                      | 20.86                                   | 31104                                 | 3072                                  | 29                                       |
| SGI Origin 2000 (195 MHz)                             | 64                                      | 20.75                                   | 43520                                 | 4608                                  | 25.0                                     |
| Cray C90 (240 MHz)***                                 | 16                                      | 20.65                                   | 13312                                 | 700                                   | 15                                       |
| DEC AlphaServer 8400 5/612 (625 MHz)                  | 40                                      | 20.54                                   | 24552                                 | 8960                                  | 50                                       |
| HITACHI SR8000-F1/2(375MHz)                           | 2                                       | 20.50                                   | 15176                                 | 1208                                  | 24                                       |
| Hewlett-Packard V2600 (550 MHz)                       | 16                                      | 20.45                                   | 41000                                 | 2040                                  | 35.2                                     |
| Sun Ultra HPC 10000(250 MHz 1MB L2 Cache)             | 60                                      | 20.31                                   | 15000                                 | 3600                                  | 30.0                                     |
| Sun Ultra HPC 10000(250 MHz 4MB L2 Cache)             | 48                                      | 20.30                                   | 19968                                 | 2496                                  | 24                                       |
| Compaq GS140 cluster                                  | 32                                      | 20.22                                   | 30712                                 | 3056                                  | 34                                       |
| Sun HPC 6500(400MHz 8MB L2 Cache)                     | 28                                      | 20.20                                   | 39936                                 | 2496                                  | 22.4                                     |
| Cray SV1-1-32 (300 MHz)                               | 20                                      | 20.18                                   | 32760                                 | 3350                                  | 24                                       |
| Sun HPC 10000(333MHz 4MB L2 Cache)                    | 36                                      | 20.11                                   | 20352                                 | 2304                                  | 24.0                                     |
| NEC SX-3/44 (2.9 ns)                                  | 4                                       | 20.0                                    | 6144                                  | 832                                   | 22                                       |
| IBM SP 16 nodes (200 MHz POWER3)                      | 32                                      | 19.92                                   | 44800                                 | 4750                                  | 25.6                                     |
| Sun Fire 6800 (750MHz/8MB L2\$)                       | 16                                      | 19.90                                   | 48108                                 |                                       | 24                                       |

| Computer<br>(Full Precision)                          | Number<br>of Procs<br>or Cores | $R_{max}$<br>GFlop/s | $N_{max}$<br>Order | $N_{1/2}$<br>Order | $R_{peak}$<br>GFlop/s |
|---|--------------------------------|----------------------|--------------------|--------------------|-----------------------|
| Sun HPC 6500 Cluster/2 (250 MHz, 4MB L2)              | 48                             | 19.42                | 18816              | 5376               | 24                    |
| LANL Avalon Cluster:Alpha 533 Mhz+100Mb/s sw          | 68                             | 19.33                | 30464              | 14376              | 72.5                  |
| Cray SV1ex-1-32, 500MHz                               | 12                             | 19.26                | 25704              | 2700               | 24                    |
| DEC 8400 5/440 (440 MHz)                              | 48                             | 19.2                 | 23032              | 4048               | 42.2                  |
| Sun HPC 10000(400MHz 4MB L2 Cache)                    | 28                             | 19.16                | 39936              | 1920               | 22.4                  |
| Sun Ultra HPC 10000(250 MHz 1MB L2 Cache)             | 56                             | 19.14                | 15000              | 3600               | 28.0                  |
| IBM eServer pSeries 655 (1.7GHz POWER4+)              | 4                              | 18.99                | 38000              | 400                | 27.2                  |
| IBM eServer BladeCenter JS21 (2.7 GHz Power PC)       | 2                              | 18.96                | 30800              | 2500               | 21.6                  |
| Fujitsu VPP5000/2 (3.33nsec)                          | 2                              | 18.82                | 42720              | 1056               | 19.2                  |
| Sun HPC 6500(400MHz 8MB L2 Cache)                     | 26                             | 18.78                | 39936              | 2304               | 20.8                  |
| Sun Ultra HPC 10000(250 MHz 4MB L2 Cache)             | 44                             | 18.67                | 19968              | 2496               | 22                    |
| Fujitsu VPP300/8E (6.5nsec)                           | 8                              | 18.6                 | 41600              | 2400               | 19                    |
| Fujitsu VPP700/8E (6.5nsec)                           | 8                              | 18.6                 | 41600              | 2400               | 19                    |
| SGI POWER CHALLENGE (75 MHz)                          | 96                             | 18.5                 | 53000              | 20000              | 29                    |
| Thinking Machines CM-200 (half precision)             | 2048                           | 18.5                 | 39936              | 14336              | 40                    |
| IBM SP 1 node (375 MHz POWER3 High)                   | 16                             | 18.25                | 27000              | 1300               | 24.0                  |
| Sun Fire 6800 (900MHz/8MB L2)                         | 12                             | 18.17                | 48108              | 2680               | 21.6                  |
| Sun Fire E6900 (UltraSPARC IV 1.35 Ghz w/custom)      | 8                              | 17.98                | 60118              | 2200               | 21.6                  |
| DEC AlphaServer 8400 5/612 (625 MHz)                  | 32                             | 17.96                | 25624              | 4088               | 40                    |
| HP AlphaServer GS1280 7/1300 (1.3 GHz)                | 8                              | 17.93                | 32768              |                    | 20.8                  |
| Sun HPC 10000(333MHz 4MB L2 Cache)                    | 32                             | 17.91                | 20352              | 2112               | 21.3                  |
| Sun HPC 6000(336MHz 4MB L2 Cache)                     | 30                             | 17.89                | 20352              | 2112               | 20.2                  |
| IBM SP 4 nodes (375 MHz POWER3 Thin)                  | 16                             | 17.66                | 38000              | 3300               | 24                    |
| IBM BladeCenter JS21 dual-core PowerPC 970MP, 2.7 GHz | 2                              | 17.65                | 41000              | 600                | 21.6                  |
| IBM Power 570 (5.0 GHz POWER6)                        | 1                              | 17.47                | 20000              | 280                | 20.0                  |
| HP V2500 (16 proc. 440 MHz)                           | 16                             | 17.47                | 41000              | 1580               | 28.2                  |
| SGI Origin 2000 Ether Cluster(195 MHz,2x32)           | 64                             | 17.46                | 40000              | 13000              | 25                    |
| NEC SX-3/34R (2.5 ns)                                 | 3                              | 17.4                 | 6144               | 691                | 19                    |
| Sun HPC 6500(400MHz 8MB L2 Cache)                     | 24                             | 17.35                | 39936              | 2112               | 19.2                  |
| Intel Core 2 Q6600 Kentsfield) (2 core, 2.4 GHz)      | 2                              | 17.25                | 15000              | 1664               | 19.2                  |
| Sun Ultra HPC 10000(250 MHz 4MB L2 Cache)             | 40                             | 17.12                | 19968              | 2496               | 20                    |
| Fujitsu VPP300/8 ( 7nsec)                             | 8                              | 17.1                 | 41600              | 2080               | 18                    |
| Fujitsu VPP700/8 ( 7nsec)                             | 8                              | 17.1                 | 41600              | 2080               | 18                    |
| Sun HPC 6000(336MHz 4MB L2 Cache)                     | 28                             | 16.74                | 20352              | 2112               | 18.8                  |
| Sun Ultra2/2200 Sparc Cluster                         | 32                             | 16.71                | 28416              | 9216               | 25.6                  |
| DEC 8400 5/440 (440 MHz)                              | 40                             | 16.7                 | 20456              | 3200               | 35.2                  |
| Sun Ultra HPC 10000(250 MHz 1MB L2 Cache)             | 48                             | 16.66                | 15000              | 3600               | 24.0                  |
| IBM Power 595 (5.0 GHz POWER6)                        | 1                              | 16.4                 | 22900              | 300                | 20                    |
| Sun HPC 10000(400MHz 4MB L2 Cache)                    | 24                             | 16.39                | 39936              | 1728               | 19.2                  |
| Sun Fire 6900 (UltraSPARC IV, 1.2 GHz)                | 8                              | 16.36                | 48108              | 220                | 19.2                  |
| Cray SV1-1-32 (300 MHz)                               | 16                             | 16.23                | 30240              | 2950               | 19.6                  |
| Paragon XP/S MP(128 Nodes, OS=SUNMOS S1.6)            | 384                            | 16.0                 | 30700              | 5700               | 19                    |
| Cray C90 (240 MHz)***                                 | 12                             | 15.97                | 13312              | 600                | 12                    |
| Sun HPC 4500 Cluster/4 (250 MHz, 4MB L2)              | 44                             | 15.96                | 26880              | 8064               | 22                    |
| Sun HPC 6500(400MHz 8MB L2 Cache)                     | 22                             | 15.92                | 39936              | 1920               | 17.6                  |



| Computer<br>(Full Precision)                               | Number<br>of Procs<br>or Cores | $R_{max}$<br>GFlop/s | $N_{max}$<br>Order | $N_{1/2}$<br>Order | $R_{peak}$<br>GFlop/s |
|--|--------------------------------|----------------------|--------------------|--------------------|-----------------------|
| IBM IntelliStation POWER 285 (2.1 GHz Power5+)             | 2                              | 15.88                | 41100              | 310                | 16.8                  |
| NEC SX-8/1 (2 GHz)   | 1                              | 15.87                | 30720              |                    | 16                    |
| SGI Origin 2000 (300 Mhz)                                  | 32                             | 15.77                | 30720              | 4500               | 19                    |
| hp AlphaServer GS1280 7/1150(1.15 GHz)                     | 8                              | 15.72                | 30000              |                    | 18.4                  |
| Sun HPC 10000(333MHz 4MB L2 Cache)                         | 28                             | 15.66                | 20352              | 1728               | 18.6                  |
| HP AlphaServer ES80 7/1150 (1.15 GHz)                      | 8                              | 15.62                | 30000              |                    | 18.4                  |
| SGI POWER CHALLENGE (90 MHz)                               | 64                             | 15.6                 | 37000              | 8500               | 23                    |
| Sun HPC 6000(336MHz 4MB L2 Cache)                          | 26                             | 15.59                | 20352              | 1920               | 17.5                  |
| IBM Power 570 (4.7GHz POWER6)                              | 1                              | 15.53                | 26600              | 280                | 18.8                  |
| NEC SX-4/8M2 (8.0 ns)                                      | 8                              | 15.44                | 9984               | 1920 16            |                       |
| NEC SX-4/8 (8.0 ns)  | 8                              | 15.43                | 9984               | 860                | 16                    |
| Sun Ultra HPC 10000(250 MHz 4MB L2 Cache)                  | 36                             | 15.42                | 19968              | 2112               | 18                    |
| IBM eServer pSeries 630 6C4 (1.45GHz POWER4+)              | 4                              | 15.34                | 38000              | 400                | 23.2                  |
| IBM eServer pSeries 630 6E4 (1.45GHz POWER4+)              | 4                              | 15.34                | 38000              | 400                | 23.2                  |
| Compaq GS140 cluster                                       | 24                             | 15.31                | 30712              | 2200               | 25                    |
| NEC SX-4/8A (8.0 ns)                                       | 8                              | 15.31                | 9984               | 860                | 16                    |
| IBM IntelliStation POWER 185 (2.5GHz)                      | 2                              | 15.28                | 29000              | 1400               | 20.0                  |
| IBM System p5 185 (2.5GHz)                                 | 2                              | 15.28                | 29000              | 1400               | 20.0                  |
| Intel Paragon XPS-35 (50 MHz, OS=R1.1)                     | 512                            | 15.2                 | 23000              | 9000               | 26                    |
| IBM S80 (450 MHz)  | 24                             | 15.17                | 29000              | 4400               | 21.6                  |
| hp server rx5670 (1000MHz, 3.0MB L3 Cache)                 | 4                              | 15.13                | 37920              | 1440               | 16                    |
| Thinking Machines CM-5                                     | 256                            | 15.1                 | 26112              | 12032              | 33                    |
| HP Exemplar X-Class SPP-UX 5.2                             | 32                             | 15.01                | 26848              | 1840               | 23                    |
| IBM Power 575 (4.7 GHz POWER6)                             | 1                              | 15.0                 | 19500              | 300                | 19                    |
| Sun Fire 6800 (750MHz/8MB L2\$)                            | 12                             | 14.96                | 48108              |                    | 18                    |
| IBM SP2 (160 MHz)  | 32                             | 14.93                | 20000              | 3840               | 20                    |
| HITACHI SR2201/64(150MHz)                                  | 64                             | 14.89                | 38880              | 6720               | 19                    |
| Hitachi S-3800/280 (2 ns)                                  | 2                              | 14.6                 | 15680              | 570                | 16                    |
| HITACHI SR8000/2(250MHz)                                   | 2                              | 14.6                 | 15176              | 1192               | 16                    |
| IBM Power 570 (4.2 GHz POWER6)                             | 1                              | 14.57                | 20000              | 360                | 16.8                  |
| Sun HPC 10000(333MHz 4MB L2 Cache)                         | 26                             | 14.53                | 20352              | 1728               | 17.3                  |
| Hitachi S-3000 cluster/202 (1x2) (2 ns)                    | 2                              | 14.5                 | 21600              | 1100               | 16                    |
| IBM SP2 (77 MHz, switch of 4/96)                           | 64                             | 14.5                 | 27000              | 5100               | 20                    |
| Sun HPC 6000(336MHz 4MB L2 Cache)                          | 24                             | 14.49                | 20352              | 1728               | 16.1                  |
| Sun HPC 6500(400MHz 8MB L2 Cache)                          | 20                             | 14.49                | 39936              | 1728               | 16.0                  |
| IBM eServer pSeries 650 6M2(1.45GHz POWER4+)               | 4                              | 14.48                | 36000              | 400                | 23.2                  |
| Cray T3E-1350 (675 MHz)                                    | 16                             | 14.4                 | 31680              | 2352               | 21.6                  |
| IBM IntelliStation POWER 285 Workstation (1.9 GHz POWER5+) | 2                              | 14.35                | 41200              | 300                | 15.2                  |
| IBM System p5 505 (1.9 GHz POWER5+)                        | 2                              | 14.31                | 41200              | 300                | 15.2                  |
| Sun Ultra HPC 10000(250 MHz 1MB L2 Cache)                  | 40                             | 14.06                | 15000              | 3000               | 20.0                  |
| CRAY T3E (300 MHz)   | 32                             | 14.03                | 21120              | 2832               | 19.2                  |
| Intel Delta (40 MHz)                                       | 512                            | 13.9                 | 25000              | 7500               | 20                    |
| DEC AlphaServer 8400 5/612 (625 MHz)                       | 24                             | 13.79                | 25624              | 3072               | 30                    |

| Computer<br>(Full Precision)                   | Number<br>of Procs<br>or Cores | $R_{max}$<br>GFlop/s | $N_{max}$<br>Order | $N_{1/2}$<br>Order | $R_{peak}$<br>GFlop/s |
|--|--------------------------------|----------------------|--------------------|--------------------|-----------------------|
| Sun Ultra HPC 10000(250 MHz 4MB L2 Cache)      | 32                             | 13.77                | 19968              | 1920               | 16                    |
| Sun HPC 10000(400MHz 4MB L2 Cache)             | 20                             | 13.74                | 39936              | 1536               | 16.0                  |
| Cray Y-MP C90 (240 MHz 4.2 ns)                 | 16                             | 13.7                 | 10000              | 650                | 15                    |
| DEC 8400 5/440 (440 MHz)                       | 32                             | 13.7                 | 19176              | 4584               | 28.2                  |
| IBM Power 550 (4.2GHz POWER6)                  | 1                              | 13.60                | 26500              | 360                | 16.8                  |
| hp server rx5670 ( 900MHz, 1.5MB L3 Cache)     | 4                              | 13.53                | 37920              | 1440               | 14.4                  |
| IBM Power 520 (4.2GHz POWER6)                  | 1                              | 13.53                | 23700              | 300                | 16.8                  |
| IBM eServer pSeries 655 651(1.3GHz POWER4)     | 4                              | 13.52                | 36000              | 400                | 20.8                  |
| CRAY T3E-1200E (600 MHz)                       | 16                             | 13.41                | 31680              | 2304               | 19.2                  |
| Sun HPC 10000(333MHz 4MB L2 Cache)             | 24                             | 13.39                | 20352              | 1728               | 16.0                  |
| Sun Ultra HPC 6000(250 MHz 4MB L2 Cache)       | 30                             | 13.39                | 19968              | 1920               | 15                    |
| Sun HPC 6000(336MHz 4MB L2 Cache)              | 22                             | 13.33                | 20352              | 1728               | 14.8                  |
| IBM eServer BladeCenter JS20 (2.2GHz Power PC) | 2                              | 13.27                | 20000              | 2100               | 17.60                 |
| SGI Origin 2000 (250 MHz)                      | 32                             | 13.22                | 30720              | 3200               | 16                    |
| Sun HPC 6500(400MHz 8MB L2 Cache)              | 18                             | 13.05                | 39936              | 1536               | 14.4                  |
| IBM eServer pSeries 630 6C4(1.2GHz POWER4+)    | 4                              | 13.03                | 38000              | 400                | 19.2                  |
| IBM eServer pSeries 630 6E4(1.2GHz POWER4+)    | 4                              | 13.03                | 38000              | 400                | 19.2                  |
| HITACHI SR8000-G1/1(450MHz)                    | 1                              | 13.0                 | 16000              | 888                | 14.4                  |
| HITACHI SR2201/56(150MHz)                      | 56                             | 12.98                | 33600              | 4480               | 17                    |
| Cray SV1ex-1-32, 500MHz                        | 8                              | 12.96                | 21672              | 1900               | 16                    |
| Sun HPC 6500 Cluster/2 (250 MHz, 4MB L2)       | 32                             | 12.85                | 17472              | 5376               | 16                    |
| Cray T3D 128 (150 MHz)                         | 128                            | 12.8                 | 20736              | 3408               | 19                    |
| Sun Ultra HPC 6000(250 MHz 4MB L2 Cache)       | 28                             | 12.53                | 19968              | 1728               | 14                    |
| IBM SP2 thin-node2,SP-sw,256MB/node(66 MHz)    | 64                             | 12.50                | 39000              | 7000               | 16.8                  |
| Intel Paragon XPS-35 (50 MHz)                  | 296                            | 12.5                 | 29400              | 5000               | 15                    |
| IBM System p5 505 (1.65GHz POWER5)             | 2                              | 12.47                | 30500              | 1000               | 13.2                  |
| Sun Ultra HPC 6000 250 MHz (1MB L2 Cache)      | 30                             | 12.42                | 15700              | 4000               | 15.0                  |
| IBM System p5 505 (1.65 GHz POWER5)            | 2                              | 12.39                | 41200              | 310                | 13.2                  |
| DEC 4100 5/400 (400 MHz)                       | 32                             | 12.37                | 15340              | 6120               | 25.6                  |
| Hewlett-Packard N4000 (550 MHz)                | 8                              | 12.37                | 28000              | 540                | 17.6                  |
| Sun HPC 10000(333MHz 4MB L2 Cache)             | 22                             | 12.32                | 20352              | 1536               | 14.7                  |
| Cray SV1-1-32 (300 MHz)                        | 12                             | 12.18                | 25704              | 2700               | 14.7                  |
| IBM eServer p5 510 (1.65GHz POWER5)            | 2                              | 12.14                | 46000              | 300                | 13.2                  |
| Sun HPC 6000(336MHz 4MB L2 Cache)              | 20                             | 12.13                | 20352              | 1536               | 13.4                  |
| IBM eServer OpenPower 710 (1.65GHz POWER5)     | 2                              | 12.12                | 63000              | 1400               | 13.20                 |
| HP Integrity rx1620-2 (1.6GHz/3MB Itanium 2)   | 2                              | 12.05                | 29000              | 360                | 12.8                  |
| Sun Ultra HPC 10000(250 MHz 4MB L2 Cache)      | 28                             | 12.05                | 19968              | 1728               | 14                    |
| Fujitsu VPP500/8 (10nsec)                      | 8                              | 12.0                 | 14960              | 2216               | 13                    |
| HP Integrity rx2620-2 (1.6GHz/3MB Itanium 2)   | 2                              | 11.98                | 29000              | 360                | 12.8                  |
| Sun Fire 6800 (900MHz/8MB L2)                  | 8                              | 11.98                | 28956              | 1800               | 14.4                  |
| IBM eServer p5 520 (1650 MHz POWER5)           | 2                              | 11.78                | 58000              | 320                | 13.2                  |
| Sun Ultra HPC 6000(250 MHz 4MB L2 Cache)       | 26                             | 11.66                | 19968              | 1728               | 13                    |
| NEC SX-3/24R (2.5 ns)                          | 2                              | 11.6                 | 4352               | 492                | 13                    |
| NEC SX-3/42R (2.5 ns)                          | 4                              | 11.6                 | 4352               | 516                | 13                    |
| Sun HPC 6500(400MHz 8MB L2 Cache)              | 16                             | 11.60                | 39936              | 1536               | 12.8                  |

| Computer<br>(Full Precision)                           | Number<br>of Procs<br>or Cores | $R_{max}$<br>GFlop/s | $N_{max}$<br>Order | $N_{1/2}$<br>Order | $R_{peak}$<br>GFlop/s |
|--|--------------------------------|----------------------|--------------------|--------------------|-----------------------|
| HP Integrity Server rx5670 (1500MHz, 6.0MB L3 Cache)   | 2                              | 11.490               | 35016              | 300                | 12.0                  |
| HP Integrity Server rx2600 (1500MHz, 6.0MB L3 Cache)   | 2                              | 11.420               | 35000              | 300                | 12.0                  |
| IBM SP2-T2 (66 MHz)                                    | 64                             | 11.4                 | 26500              | 6250               | 16                    |
| IBM POWER2 Super Chip RS/6000 SP(120 MHz)              | 32                             | 11.38                | 19500              | 4100               | 15                    |
| Sun Ultra HPC 10000(250 MHz 1MB L2 Cache)              | 32                             | 11.34                | 15000              | 2400               | 16.0                  |
| Sun HPC 10000(333MHz 4MB L2 Cache)                     | 20                             | 11.24                | 20352              | 1536               | 13.3                  |
| Dell PE3250 server (Itanium 2 1.5 GHz, 1.5MB L3 Cache) | 2                              | 11.23                | 24000              |                    | 12                    |
| Sun Ultra HPC 10000(250 MHz 4MB L2 Cache)              | 26                             | 11.20                | 19968              | 1728               | 13                    |
| Sun HPC 10000(400MHz 4MB L2 Cache)                     | 16                             | 11.11                | 39936              | 1344               | 12.8                  |
| IBM SP 2 nodes (222 MHz POWER3)                        | 16                             | 11.08                | 27000              | 3000               | 14.2                  |
| Compaq GS140 cluster                                   | 16                             | 11.01                | 30712              | 1200               | 17                    |
| Sun HPC 6000(336MHz 4MB L2 Cache)                      | 18                             | 10.94                | 20352              | 1344               | 12.1                  |
| Cray C90 (240 MHz)***                                  | 8                              | 10.93                | 13312              | 490                | 7.7                   |
| DEC 8400 5/440 (440 MHz)                               | 24                             | 10.9                 | 15340              | 4088               | 21.1                  |
| SGI Origin 2000 (195 MHz, 4MB L2 Cache)                | 32                             | 10.9                 | 32000              | 6400               | 12.5                  |
| HITACHI SR8000-F1/1(375MHz)                            | 1                              | 10.88                | 10728              | 880                | 12                    |
| IBM eServer p5 520 Express (1500 MHz POWER5)           | 2                              | 10.85                | 38000              | 300                | 12.0                  |
| Sun Ultra HPC 6000(250 MHz 4MB L2 Cache)               | 24                             | 10.78                | 19968              | 1728               | 12                    |
| HP Exemplar V-Class (240 MHz)                          | 16                             | 10.65                | 14944              | 896                | 15                    |
| Hewlett-Packard V2600 (550 MHz)                        | 8                              | 10.59                | 41000              | 880                | 17.6                  |
| CRAY T3E-900 (450 MHz)                                 | 16                             | 10.45                | 22080              | 2016               | 14                    |
| Thinking Machines CM-2 (half precision)                | 2048                           | 10.4                 | 33920              | 14000              | 28                    |
| Intel Itanium 1.396 GHz Dual                           | 2                              | 10.36                | 15000              |                    | 2.8                   |
| Sun Ultra HPC 10000(250 MHz 4MB L2 Cache)              | 24                             | 10.35                | 19968              | 1728               | 12                    |
| IBM SP 8 nodes (332 MHz 604e)                          | 32                             | 10.33                | 31600              | 5000               | 21                    |
| HP N4000 (440 MHz)                                     | 8                              | 10.22                | 28000              | 516                | 14                    |
| Intel Delta (40 MHz)                                   | 384                            | 10.2                 | 20000              | 6000               | 15                    |
| Dell PE3250 server (Itanium 2 1.4 GHz, 1.5MB L3 Cache) | 2                              | 10.18                | 24000              |                    | 11.2                  |
| Sun HPC 6500(400MHz 8MB L2 Cache)                      | 14                             | 10.16                | 39936              | 1344               | 11.2                  |
| Berkeley NOW:UltraSPARC-1(167-Mhz)+Myricom             | 100                            | 10.14                | 32768              | 8192               | 33.4                  |
| Sun HPC 4500(400MHz 4MB L2 Cache)                      | 14                             | 10.05                | 20352              | 1344               | 11.2                  |
| IBM SP 8 nodes (200 MHz POWER3)                        | 16                             | 10.04                | 31600              | 2900               | 12.8                  |
| NEC SX-3/24 (2.9 ns)                                   | 2                              | 10.0                 | 4352               | 500                | 11                    |
| NEC SX-3/42 (2.9 ns)                                   | 4                              | 10.0                 | 4608               | 640                | 11                    |
| Sun Ultra HPC 6000 250 MHz (1MB L2 Cache)              | 24                             | 9.992                | 15700              | 1632               | 12.0                  |
| Sun Ultra HPC 6000(250 MHz 4MB L2 Cache)               | 22                             | 9.887                | 19968              | 1728               | 11                    |
| Sun Fire 6800 (750MHz/8MB L2\$)                        | 8                              | 9.848                | 15180              |                    | 12                    |
| Thinking Machines CM-200 (10 MHz)                      | 2048                           | 9.8                  | 29696              | 11264              | 20                    |
| Intel Itanium 2 1.3 GHz                                | 2                              | 9.754                | 24000              |                    | 10.4                  |
| Sun HPC 6000(336MHz 4MB L2 Cache)                      | 16                             | 9.715                | 20352              | 1344               | 10.8                  |
| DEC AlphaServer 8400 5/612 (625 MHz)                   | 16                             | 9.592                | 25624              | 3072               | 20                    |
| Sun Ultra HPC 10000(250 MHz 4MB L2 Cache)              | 22                             | 9.513                | 19968              | 1728               | 11                    |
| DEC 4100 5/400 (400 MHz)                               | 24                             | 9.48                 | 15344              | 3600               | 19.2                  |

| Computer<br>(Full Precision)                     | Number<br>of Procs<br>or Cores | $R_{max}$<br>GFlop/s | $N_{max}$<br>Order | $N_{1/2}$<br>Order | $R_{peak}$<br>GFlop/s |
|--|--------------------------------|----------------------|--------------------|--------------------|-----------------------|
| Fujitsu VPP5000/1 (3.33nsec)                     | 1                              | 9.475                | 30000              | 340                | 9.6                   |
| Cray T94 (2.2 ns) ***                            | 4                              | 9.414                | 8192               | 420                | 7.2                   |
| SGI POWER CHALLENGE (90 MHz)                     | 40                             | 9.4                  | 27000              | 6775               | 14                    |
| Fujitsu VPP300/4E (6.5nsec)                      | 4                              | 9.33                 | 28800              | 1280               | 9.6                   |
| Fujitsu VPP700/4E (6.5nsec)                      | 4                              | 9.33                 | 28800              | 1280               | 9.6                   |
| Fujitsu VX/4E (6.5nsec)                          | 4                              | 9.33                 | 28800              | 1280               | 9.6                   |
| HP V2500 (8 proc. 440 MHz)                       | 8                              | 9.26                 | 41000              | 800                | 14.1                  |
| HP Exemplar V-Class (200 MHz)                    | 16                             | 9.203                | 14944              | 868                | 12.8                  |
| Sun HPC 10000(333MHz 4MB L2 Cache)               | 16                             | 9.107                | 20352              | 1344               | 10.7                  |
| IBM SP 2 nodes (375 MHz POWER3 Thin)             | 8                              | 9.09                 | 27000              | 1700               | 12                    |
| HITACHI SR8000-E1/1(300MHz)                      | 1                              | 9.047                | 16000              | 792                | 9.6                   |
| HP AlphaServer GS1280 7/1300 (1.3 GHz)           | 4                              | 9.04                 | 26000              |                    | 10.4                  |
| Sun Ultra HPC 6000(250 MHz 4MB L2 Cache)         | 20                             | 8.997                | 19968              | 1344               | 10                    |
| Intel Core 2 Q6600 Kentsfield) (1 core, 2.4 GHz) | 1                              | 8.878                | 15000              | 1664               | 9.6                   |
| SGI Origin 2000 (300 Mhz)                        | 16                             | 8.712                | 24580              | 1156               | 9.6                   |
| Sun HPC 6500(400MHz 8MB L2 Cache)                | 12                             | 8.711                | 39936              | 1344               | 9.6                   |
| NEC SX-3/32R (2.5 ns)                            | 3                              | 8.7                  | 6144               | 717                | 9.6                   |
| Sun Ultra HPC 10000(250 MHz 4MB L2 Cache)        | 20                             | 8.679                | 19968              | 1344               | 10                    |
| Fujitsu VPP300/4 ( 7nsec)                        | 4                              | 8.6                  | 28800              | 1280               | 8.8                   |
| Fujitsu VPP700/4 ( 7nsec)                        | 4                              | 8.6                  | 28800              | 1280               | 8.8                   |
| Fujitsu VX/4 ( 7nsec)                            | 4                              | 8.6                  | 28800              | 1280               | 8.8                   |
| Sun HPC 6000(336MHz 4MB L2 Cache)                | 14                             | 8.527                | 20352              | 1344               | 9.4                   |
| IBM System p5 575 (2.2GHz POWER5+)               | 1                              | 8.33                 | 20300              | 260                | 8.8                   |
| Cray C90 (240 MHz)***                            | 6                              | 8.29                 | 13312              | 450                | 5.8                   |
| SGI POWER CHALLENGE (195 MHz, 2MB cache)         | 32                             | 8.233                | 16000              | 4000               | 12                    |
| HP Exemplar V-Class (240 MHz)                    | 12                             | 8.228                | 14944              | 736                | 11.5                  |
| Cray SV1-1-32 (300 MHz)                          | 8                              | 8.150                | 21672              | 1900               | 9.6                   |
| Sun Ultra HPC 6000(250 MHz 4MB L2 Cache)         | 18                             | 8.113                | 19968              | 1344               | 9                     |
| Parsytec GC/Power Plus (80 MHz)                  | 192                            | 8.0                  | 27192              | 9500               | 15                    |
| HP AlphaServer ES80 7/1150 (1.15 GHz)            | 4                              | 7.93                 | 26000              |                    | 9.2                   |
| HP AlphaServer ES47 7/1150 (1.15 GHz)            | 4                              | 7.93                 | 26000              |                    | 9.2                   |
| SGI Origin 2000 (195 MHz, 4MB cache)             | 24                             | 7.928                | 19000              | 3500               | 9.4                   |
| hp AlphaServer GS1280 7/1150(1.15 GHz)           | 4                              | 7.82                 | 20000              |                    | 9.2                   |
| Sun Ultra HPC 6000 167 MHz (1MB L2 Cache)        | 30                             | 7.806                | 14000              | 1000               | 10.0                  |
| Paderborn SCI Cluster: SNI/Scali(300MHz PII)     | 64                             | 7.8                  | 28000              | 8000               | 19.2                  |
| SGI POWER CHALLENGE (75 MHz)                     | 40                             | 7.8                  | 27000              | 6775               | 12                    |
| HP Exemplar S-Class SPP-UX 5.2                   | 16                             | 7.783                | 13320              | 1044               | 11.5                  |
| DEC 8400 5/440 (440 MHz)                         | 16                             | 7.7                  | 15340              | 3270               | 14.1                  |
| Thinking Machines CM-5                           | 128                            | 7.7                  | 18432              | 8192               | 16                    |
| IBM IntelliStation POWER 275 (1.45GHz POWER4+)   | 2                              | 7.69                 | 26000              | 300                | 11.6                  |
| SGI POWER CHALLENGE (195 MHz, 2MB cache)         | 28                             | 7.635                | 15000              | 4000               | 11                    |
| Cray J932 (10 ns) ***                            | 32                             | 7.622                | 19456              | 800                | 6.4                   |
| Intel Paragon XPS-35 (50 MHz, OS=R1.1)           | 256                            | 7.6                  | 16000              | 4000               | 13                    |
| IBM SP2 (160 MHz)                                | 16                             | 7.57                 | 13500              | 2280               | 10                    |

| Computer<br>(Full Precision)                  | Number<br>of Procs<br>or Cores | $R_{max}$<br>GFlop/s | $N_{max}$<br>Order | $N_{1/2}$<br>Order | $R_{peak}$<br>GFlop/s |
|---|--------------------------------|----------------------|--------------------|--------------------|-----------------------|
| HITACHI SR8000/1(250MHz)                      | 1                              | 7.50                 | 10728              | 696                | 8                     |
| SGI POWER CHALLENGE (90 MHz)                  | 32                             | 7.5                  | 22000              | 5600               | 16                    |
| Cray J928 (10 ns) ***                         | 28                             | 7.413                | 19456              | 750                | 5.6                   |
| Hitachi S-3800/180 (2 ns)                     | 1                              | 7.4                  | 15680              | 470                | 8                     |
| IBM SP2 (77 MHz, switch of 4/96)              | 32                             | 7.3                  | 19500              | 3500               | 10                    |
| DEC 8400 5/625 (612 MHz)                      | 12                             | 7.283                | 9548               | 1800               | 14.7                  |
| IBM System p5 505 (1.9 GHz POWER5+)           | 1                              | 7.281                | 29100              | 200                | 7.6                   |
| IBM eServer pSeries 650 6M2(1.45GHz POWER4+)  | 2                              | 7.28                 | 24000              | 300                | 11.6                  |
| Sun HPC 6500(400MHz 8MB L2 Cache)             | 10                             | 7.266                | 39936              | 1344               | 8.0                   |
| IBM System p5 550 (1.9GHz POWER5+)            | 1                              | 7.254                | 26550              | 230                | 7.6                   |
| Sun Ultra HPC 6000(250 MHz 4MB L2 Cache)      | 16                             | 7.219                | 19968              | 1344               | 8                     |
| Cray T3E-1350 (675 MHz)                       | 8                              | 7.2                  | 22272              | 1536               | 10.8                  |
| IBM System p5 575 (1.9GHz POWER5+)            | 1                              | 7.14                 | 23100              | 820                | 7.6                   |
| CRAY T3E (300 MHz)                            | 16                             | 7.133                | 14976              | 1728               | 9.6                   |
| IBM eServer p5 575 (1.9GHz POWER5)            | 1                              | 7.12                 | 40000              | 230                | 7.6                   |
| Cray T94 (2.2 ns) ***                         | 3                              | 7.112                | 8192               | 370                | 5.4                   |
| HP Exemplar V-Class (200 MHz)                 | 12                             | 7.094                | 14944              | 696                | 9.6                   |
| Sun Ultra HPC 10000(250 MHz 4MB L2 Cache)     | 16                             | 7.023                | 19968              | 1344               | 8                     |
| Intel Delta (40 MHz)                          | 256                            | 7.0                  | 18000              | 5000               | 10                    |
| DEC 4100 5/400 (400 MHz)                      | 16                             | 6.89                 | 15344              | 2760               | 12.8                  |
| SGI POWER CHALLENGE (195 MHz, 2MB cache)      | 24                             | 6.819                | 15000              | 3500               | 9.4                   |
| IBM System p5 560Q (1.5GHz POWER5)            | 1                              | 6.8                  | 23100              | 200                | 7.2                   |
| Sun Ultra HPC 6000 250 MHz (1MB L2 Cache)     | 16                             | 6.688                | 15700              | 1088               | 8.0                   |
| DEC Alphaserver 8400 5/440(440MHz, 4MB cache) | 12                             | 6.678                | 9548               | 1028               | 10.6                  |
| CRAY T3E-1200E (600 MHz)                      | 8                              | 6.674                | 22272              | 1536               | 9.6                   |
| Cray J924 (10 ns) ***                         | 24                             | 6.645                | 19456              | 700                | 4.8                   |
| IBM SP2 thin-node2,SP-sw,256MB/node(66 MHz)   | 32                             | 6.569                | 28000              | 5200               | 8.4                   |
| Hewlett-Packard N4000 (550 MHz)               | 4                              | 6.568                | 28000              | 376                | 8.8                   |
| Cray SV1ex-1-32, 500MHz                       | 4                              | 6.527                | 15372              | 1250               | 8                     |
| Compaq Alphaserver ES45 (1001Mhz 8MB L2)      | 4                              | 6.435                | 14000              | 1050               | 8.0                   |
| Cray T3D 64 (150 MHz)                         | 64                             | 6.4                  | 20736              | 2368               | 9.6                   |
| Sun Ultra HPC 6000 167 MHz (1MB L2 Cache)     | 24                             | 6.350                | 14000              | 800                | 8.0                   |
| Sun Ultra HPC 6000 250 MHz (4MB L2 Cache)     | 14                             | 6.251                | 15552              | 1152               | 7.0                   |
| IBM System p5 505 (1.65 GHz POWER5)           | 1                              | 6.231                | 29100              | 200                | 6.6                   |
| Convex SPP-1000(64 procs)100 MHz              | 64                             | 6.192                | 41000              | 11400              | 12.8                  |
| SGI POWER CHALLENGE (195 MHz, 1 MB cache)     | 24                             | 6.118                | 15000              | 3100               | 9.3                   |
| Fujitsu VPP500/4 (10nsec)                     | 4                              | 6.1                  | 10560              | 1390               | 6.4                   |
| Sun Fire 6800 (900MHz/8MB L2)                 | 4                              | 6.016                | 28956              | 1200               | 7.2                   |
| HP Exemplar S-Class SPP-UX 5.2                | 12                             | 6.005                | 13320              | 800                | 8.6                   |
| Cray J920 (10 ns) ***                         | 20                             | 5.917                | 19456              | 675                | 4.0                   |
| DEC 8400 5/350 (12 proc 350 MHz)              | 12                             | 5.904                | 9548               | 3010               | 8.4                   |
| SGI POWER CHALLENGE (195 MHz, 2MB cache)      | 20                             | 5.872                | 15000              | 3000               | 7.8                   |
| Sun Ultra HPC 6000 250 MHz (1MB L2 Cache)     | 14                             | 5.856                | 15700              | 960                | 7.0                   |
| DEC Alphaserver 8400 5/440(440MHz, 4MB cache) | 10                             | 5.845                | 9548               | 1124               | 8.8                   |
| SGI POWER CHALLENGE (195 MHz, 1 MB cache)     | 22                             | 5.812                | 15000              | 2900               | 8.6                   |

| Computer<br>(Full Precision)                         | Number<br>of Procs<br>or Cores | $R_{max}$<br>GFlop/s | $N_{max}$<br>Order | $N_{1/2}$<br>Order | $R_{peak}$<br>GFlop/s |
|--|--------------------------------|----------------------|--------------------|--------------------|-----------------------|
| Sun HPC 6500(400MHz 8MB L2 Cache)                    | 8                              | 5.810                | 39936              | 1344               | 6.4                   |
| IBM SP2-T2 (66 MHz)                                  | 32                             | 5.8                  | 18000              | 4500               | 8.4                   |
| NEC SX-3/14R (2.5 ns)                                | 1                              | 5.8                  | 2816               | 282                | 6.4                   |
| NEC SX-3/22R (2.5 ns)                                | 2                              | 5.8                  | 3072               | 370                | 6.4                   |
| NEC SX-3/41R (2.5 ns)                                | 4                              | 5.8                  | 3584               | 414                | 6.4                   |
| Sun HPC 4500(400MHz 4MB L2 Cache)                    | 8                              | 5.772                | 20352              | 960                | 6.4                   |
| IBM POWER2 Super Chip RS/6000 SP(120 MHz)            | 16                             | 5.767                | 13500              | 2600               | 7.7                   |
| Cray C90 (240 MHz)***                                | 4                              | 5.75                 | 13312              | 420                | 3.8                   |
| HP Integrity Server rx2600 (1500MHz, 6.0MB L3 Cache) | 1                              | 5.711                | 30000              | 300                | 6.0                   |
| HP Integrity Server rx5670 (1500MHz, 6.0MB L3 Cache) | 1                              | 5.683                | 35016              | 300                | 6.0                   |
| HP Exemplar V-Class (240 MHz)                        | 8                              | 5.657                | 14944              | 560                | 7.68                  |
| Hewlett-Packard V2600 (550 MHz)                      | 4                              | 5.650                | 41000              | 600                | 8.8                   |
| IBM System p5 560Q (1.8GHz POWER5+)                  | 1                              | 5.65                 | 23000              | 240                | 6.0                   |
| IBM GF11** (half precision) (51.9 ns)                | 500                            | 5.6                  | 2500               | 1060               | 9.6                   |
| IBM System p5 550Q (1.5GHz POWER5+)                  | 1                              | 5.596                | 20500              | 220                | 6.0                   |
| IBM SP 1 node (222 MHz POWER3)                       | 8                              | 5.54                 | 13000              | 800                | 7.1                   |
| Convex SPP-1600(32 procs)120 MHz                     | 32                             | 5.452                | 27000              | 4500               | 7.7                   |
| SGI POWER CHALLENGE (195 MHz, 1 MB cache)            | 20                             | 5.430                | 15000              | 2600               | 7.8                   |
| HP N4000 (440 MHz)                                   | 4                              | 5.394                | 28000              | 356                | 7.0                   |
| IBM SP 4 nodes (332 MHz 604e)                        | 16                             | 5.37                 | 22400              | 3200               | 11                    |
| SGI Origin 2000 (195 MHz, 4MB cache)                 | 16                             | 5.300                | 16000              | 1000               | 6.2                   |
| CRAY T3E-900 (450 MHz)                               | 8                              | 5.243                | 15552              | 1488               | 7.2                   |
| Intel Delta (40 MHz)                                 | 192                            | 5.2                  | 15000              | 4500               | 7.7                   |
| Parsytec GC/Power Plus (80 MHz)                      | 128                            | 5.2                  | 22000              | 7800               | 10                    |
| Thinking Machines CM-2 (7 MHz)                       | 2048                           | 5.2                  | 26624              | 11000              | 14                    |
| IBM SP 4 nodes (200 MHz POWER3)                      | 8                              | 5.13                 | 22400              | 1600               | 6.4                   |
| Compaq ES40/EV67 AlphaServer SC (833 MHz)            | 4                              | 5.105                | 12800              | 1000               | 6.66                  |
| DEC AlphaServer 8400 5/300                           | 12                             | 5.0                  | 9548               | 1148               | 7.2                   |
| Meiko CS2  | 64                             | 5.0                  | 18688              | 6144               | 11.5                  |
| NEC SX-3/14 (2.9 ns)                                 | 1                              | 5.0                  | 3072               | 384                | 5.5                   |
| NEC SX-3/22 (2.9 ns)                                 | 2                              | 5.0                  | 3072               | 384                | 5.5                   |
| Thinking Machines CM-200 (10 MHz)                    | 1024                           | 5.0                  | 21504              | 8192               | 10                    |
| SGI POWER CHALLENGE (195 MHz, 2MB cache)             | 18                             | 4.992                | 15000              | 2350               | 7.0                   |
| Sun Fire 6800 (750MHz/8MB L2\$)                      | 4                              | 4.968                | 15180              |                    | 6                     |
| Intel Pentium 4 3.0 GHz (Northwood core)             | 1                              | 4.937                | 12800              |                    | 6                     |
| Cray J916 (10 ns) ***                                | 16                             | 4.911                | 19456              | 640                | 3.2                   |
| SGI POWER CHALLENGE (75 MHz)                         | 24                             | 4.9                  | 18000              | 3500               | 7.2                   |
| Cray T94 (2.2 ns) ***                                | 2                              | 4.886                | 8192               | 350                | 3.6                   |
| Sun HPC 6000(336MHz 4MB L2 Cache)                    | 8                              | 4.886                | 20352              | 960                | 5.4                   |
| IBM eServer pSeries 655 (1.7GHz POWER4+)             | 1                              | 4.87                 | 38000              | 200                | 6.8                   |
| SGI POWER CHALLENGE (195 MHz, 2MB cache)             | 16                             | 4.862                | 15000              | 2500               | 6.2                   |
| HP Exemplar V-Class (200 MHz)                        | 8                              | 4.860                | 14944              | 552                | 6.4                   |
| Alliant CAMPUS/800 (40 MHz)                          | 192                            | 4.8                  | 17024              | 5768               | 7.7                   |
| IBM SP-1   | 64                             | 4.8                  | 26000              | 6000               | 8                     |

| Computer<br>(Full Precision)                   | Number<br>of Procs<br>or Cores | $R_{max}$<br>GFlop/s | $N_{max}$<br>Order | $N_{1/2}$<br>Order | $R_{peak}$<br>GFlop/s |
|--|--------------------------------|----------------------|--------------------|--------------------|-----------------------|
| DEC AlphaServer 8400 5/440(440MHz, 4MB cache)  | 8                              | 4.754                | 7644               | 1500               | 7.0                   |
| HP V2500 (4 proc. 440 MHz)                     | 4                              | 4.70                 | 41000              | 600                | 7.04                  |
| IBM eServer pSeries 640 (375 MHz, 8MB L2)      | 4                              | 4.64                 | 19000              | 340                | 6                     |
| IBM RS/6000 44P-270 (375 MHz, 8MB L2)          | 4                              | 4.64                 | 19000              | 340                | 6                     |
| IBM RS/6000 44P-270 (4 proc,375 MHz,8 MB L2)   | 4                              | 4.64                 | 19000              | 340                | 6                     |
| IBM SP 1 node (375 MHz POWER3 Thin)            | 4                              | 4.62                 | 19000              | 440                | 6                     |
| SGI POWER CHALLENGE (90 MHz)                   | 18                             | 4.620                | 2500               | 540                | 6.5                   |
| Intel Pentium 4 3.0 GHz (Northwood core)       | 1                              | 4.725                | 7600               | 365                | 6                     |
| Compaq Digital AlphaServer 8400 (575 MHz)      | 6                              | 4.600                | 11504              | 900                | 6.9                   |
| IBM eServer pSeries 640 (375 MHz, 4MB L2)      | 4                              | 4.53                 | 19000              | 400                | 6                     |
| IBM RS/6000 44P-270 (375 MHz, 4MB L2)          | 4                              | 4.53                 | 19000              | 400                | 6                     |
| IBM RS/6000 44P-270 (4 proc,375 MHz,4 MB L2)   | 4                              | 4.53                 | 19000              | 180                | 6                     |
| IBM RS/6000 7026-B80(4 proc,375 MHz,4 MB L2)   | 4                              | 4.53                 | 19000              | 400                | 6                     |
| SGI POWER CHALLENGE (195 MHz, 1 MB cache)      | 16                             | 4.527                | 15000              | 2200               | 6.2                   |
| HP AlphaServer GS1280 7/1300 (1.3 GHz)         | 2                              | 4.52                 | 14142              |                    | 5.2                   |
| Compaq Digital AlphaServer 8200 (575 MHz)      | 6                              | 4.450                | 11504              | 800                | 6.9                   |
| NEC SX-3/31R (2.5 ns)                          | 3                              | 4.4                  | 6144               | 414                | 5.4                   |
| Sun HPC 6500(400MHz 8MB L2 Cache)              | 6                              | 4.356                | 39936              | 768                | 4.8                   |
| Sun HPC 4500(400MHz 4MB L2 Cache)              | 6                              | 4.334                | 20352              | 960                | 4.8                   |
| SGI POWER CHALLENGE (90 MHz)                   | 16                             | 4.323                | 2500               | 540                | 5.8                   |
| Cray C90 (240 MHz)***                          | 3                              | 4.31                 | 13312              | 380                | 2.9                   |
| Sun Ultra HPC 6000 167 MHz (1MB L2 Cache)      | 16                             | 4.305                | 14000              | 700                | 5.3                   |
| SGI POWER CHALLENGE (75 MHz)                   | 18                             | 4.142                | 2604               | 570                | 5.4                   |
| Compaq ES40/EV67 AlphaServer SC (667 MHz)      | 4                              | 4.111                | 10000              | 850                | 5.34                  |
| Cray SV1-1-32 (300 MHz)                        | 4                              | 4.105                | 15372              | 1250               | 4.8                   |
| HP Exemplar S-Class SPP-UX 5.2                 | 8                              | 4.103                | 13320              | 520                | 5.8                   |
| Alliant CAMPUS/800 (40 MHz)                    | 168                            | 4.1                  | 16016              | 5516               | 6.7                   |
| SGI POWER CHALLENGE (195 MHz, 1 MB cache)      | 14                             | 4.041                | 15000              | 2000               | 5.5                   |
| SGI Origin 2000 (195 MHz, 4MB cache)           | 12                             | 4.038                | 15000              | 1000               | 4.7                   |
| IBM IntelliStation POWER 275 (1.45GHz POWER4+) | 1                              | 4.02                 | 26000              | 200                | 5.8                   |
| DEC 8400 5/625 (612 MHz)                       | 6                              | 4.003                | 9156               | 1100               | 7.34                  |
| Intel Paragon XPS-35 (50 MHz, OS=R1.1)         | 128                            | 4.0                  | 12000              | 3000               | 6.4                   |
| hp AlphaServer GS1280 7/1150(1.15 GHz)         | 2                              | 3.98                 | 7500               |                    | 4.6                   |
| HP AlphaServer ES80 7/1150 (1.15 GHz)          | 2                              | 3.97                 | 14142              |                    | 4.6                   |
| HP AlphaServer ES47 7/1150 (1.15 GHz)          | 2                              | 3.97                 | 14142              |                    | 4.6                   |
| Convex SPP-1200(32 procs)120 MHz               | 32                             | 3.962                | 27700              | 4500               | 7.7                   |
| DEC AlphaServer 8400 5/300                     | 10                             | 3.9                  | 9540               | 812                | 6.0                   |
| Parsytec GC/Power Plus (80 MHz)                | 96                             | 3.9                  | 19000              | 6599               | 7.7                   |
| IBM SP2 (160 MHz)                              | 8                              | 3.83                 | 10000              | 1320               | 5.1                   |
| Thinking Machines CM-5                         | 64                             | 3.8                  | 13056              | 6016               | 8                     |
| Cray J912 (10 ns) ***                          | 12                             | 3.768                | 19456              | 690                | 2.4                   |
| SGI POWER CHALLENGE (90 MHz)                   | 14                             | 3.767                | 2000               | 470                | 5.0                   |
| HITACHI SR2201/16(150MHz)                      | 16                             | 3.74                 | 19440              | 2880               | 4.8                   |
| IBM SP2 (77 MHz, switch of 4/96)               | 16                             | 3.7                  | 13500              | 2200               | 5                     |

| Computer<br>(Full Precision)                 | Number<br>of Procs<br>or Cores | $R_{max}$<br>GFlop/s | $N_{max}$<br>Order | $N_{1/2}$<br>Order | $R_{peak}$<br>GFlop/s |
|--|--------------------------------|----------------------|--------------------|--------------------|-----------------------|
| SGI POWER CHALLENGE (75 MHz)                 | 16                             | 3.7                  | 2500               | 540                | 4.8                   |
| IBM eServer pSeries 650 6M2(1.45GHz POWER4+) | 1                              | 3.68                 | 24000              | 200                | 5.8                   |
| Sun HPC 6000(336MHz 4MB L2 Cache)            | 6                              | 3.672                | 20352              | 960                | 4.0                   |
| SGI POWER CHALLENGE (195 MHz, 2MB cache)     | 12                             | 3.604                | 10000              | 2000               | 4.7                   |
| Sun Ultra HPC 6000 250 MHz (4MB L2 Cache)    | 8                              | 3.589                | 15552              | 768                | 4.0                   |
| DEC 4100 5/400 (400 MHz)                     | 8                              | 3.57                 | 8964               | 1340               | 6.4                   |
| CRAY T3E (300 MHz)                           | 8                              | 3.542                | 10560              | 1152               | 4.8                   |
| Alliant CAMPUS/800 (40 MHz)                  | 144                            | 3.5                  | 15484              | 4956               | 5.8                   |
| Intel Delta (40 MHz)                         | 128                            | 3.5                  | 12500              | 3500               | 5                     |
| SGI POWER CHALLENGE (195 MHz, 1 MB cache)    | 12                             | 3.496                | 15000              | 1650               | 4.7                   |
| IBM eServer pSeries 655 651(1.3GHz POWER4)   | 1                              | 3.45                 | 24000              | 200                | 5.2                   |
| IBM SP2 thin-node2,SP-sw,256MB/node(66 MHz)  | 16                             | 3.414                | 19000              | 3400               | 4.2                   |
| SGI POWER CHALLENGE (90 MHz)                 | 12                             | 3.398                | 2000               | 450                | 4.3                   |
| Hewlett-Packard N4000 (550 MHz)              | 2                              | 3.391                | 28000              | 276                | 4.4                   |
| CRAY T3E-1200E (600 MHz)                     | 4                              | 3.372                | 15936              | 960                | 4.8                   |
| Sun Ultra HPC 6000 250 MHz (1MB L2 Cache)    | 8                              | 3.328                | 15700              | 700                | 4.0                   |
| Cray SV1ex-1-32, 500MHz                      | 2                              | 3.318                | 11088              | 600                | 4.0                   |
| Convex SPP-1000(32 procs)100 MHz             | 32                             | 3.306                | 25800              | 4700               | 6.4                   |
| Intel Pentium 4 (2.53 GHz)                   | 1                              | 3.210                | 9000               | 340                | 5.09                  |
| SGI POWER CHALLENGE (75 MHz)                 | 14                             | 3.203                | 2000               | 470                | 4.2                   |
| Cray T3D 32 (150 MHz)                        | 32                             | 3.2                  | 14592              | 1616               | 3.6                   |
| DEC AlphaServer 8400 5/300                   | 8                              | 3.2                  | 7668               | 540                | 4.8                   |
| Sun Ultra 80 (450MHz/4MB L2)                 | 4                              | 3.090                | 20352              | 576                | 3.6                   |
| IBM SP2-T2 (66 MHz)                          | 16                             | 3.0                  | 13000              | 2600               | 4.2                   |
| IBM eServer pSeries 655 651(1.1GHz POWER4)   | 1                              | 2.93                 | 24000              | 200                | 4.4                   |
| Cray C90 (240 MHz)***                        | 2                              | 2.92                 | 13312              | 350                | 1.9                   |
| HP Exemplar V-Class (240 MHz)                | 4                              | 2.910                | 14944              | 400                | 3.84                  |
| Alliant CAMPUS/800 (40 MHz)                  | 120                            | 2.9                  | 14000              | 4620               | 4.8                   |
| NEC SX-3/12R (2.5 ns)                        | 1                              | 2.9                  | 2048               | 174                | 3.2                   |
| NEC SX-3/21R (2.5 ns)                        | 2                              | 2.9                  | 2560               | 257                | 3.2                   |
| Sun HPC 6500(400MHz 8MB L2 Cache)            | 4                              | 2.898                | 39936              | 576                | 3.2                   |
| Sun HPC 4500(400MHz 4MB L2 Cache)            | 4                              | 2.893                | 20352              | 960                | 3.2                   |
| Sun HPC 450 (400 MHz)                        | 4                              | 2.879                | 20252              | 960                | 3.2                   |
| IBM POWER2 Super Chip RS/6000 SP(120 MHz)    | 8                              | 2.876                | 9500               | 1500               | 3.8                   |
| SGI POWER CHALLENGE (75 MHz)                 | 12                             | 2.874                | 2000               | 450                | 3.6                   |
| Convex SPP-1600(16 procs)120 MHz             | 16                             | 2.840                | 18000              | 2400               | 3.8                   |
| Convex SPP-1200(24 procs)120 MHz             | 24                             | 2.830                | 21100              | 3400               | 5.8                   |
| SGI POWER CHALLENGE (90 MHz)                 | 10                             | 2.830                | 2000               | 400                | 3.6                   |
| IBM IntelliStation POWER 275 (1GHz POWER4+)  | 1                              | 2.82                 | 26000              | 200                | 4.0                   |
| Meiko CS2                                    | 32                             | 2.8                  | 13824              | 3488               | 5.8                   |
| Parsytec GC/Power Plus (80 MHz)              | 64                             | 2.8                  | 16000              | 4500               | 5.1                   |
| HP N4000 (440 MHz)                           | 2                              | 2.761                | 28000              | 268                | 3.5                   |
| Sun Ultra HPC 6000 250 MHz (4MB L2 Cache)    | 6                              | 2.694                | 15552              | 672                | 3.0                   |
| SGI Origin 2000 (195 MHz, 4MB cache)         | 8                              | 2.678                | 10000              | 1000               | 3.1                   |
| CRAY T3E-900 (450 MHz)                       | 4                              | 2.630                | 11040              | 880                | 3.6                   |



| Computer<br>(Full Precision)                 | Number<br>of Procs<br>or Cores | $R_{max}$<br>GFlop/s | $N_{max}$<br>Order | $N_{1/2}$<br>Order | $R_{peak}$<br>GFlop/s |
|--|--------------------------------|----------------------|--------------------|--------------------|-----------------------|
| Intel iPSC/860 (40 MHz)                      | 128                            | 2.6                  | 12000              | 4500               | 5.                    |
| Cray J908 (10 ns) ***                        | 8                              | 2.585                | 19456              | 520                | 1.6                   |
| SGI POWER CHALLENGE (195 MHz, 2MB cache)     | 8                              | 2.513                | 10000              | 1500               | 3.1                   |
| NEC SX-3/12 (2.9 ns)                         | 1                              | 2.5                  | 2048               | 256                | 2.8                   |
| HP Exemplar V-Class (200 MHz)                | 4                              | 2.495                | 14944              | 384                | 3.2                   |
| Sun Fire 6800 (750MHz/8MB L2\$)              | 2                              | 2.486                | 15180              |                    | 3                     |
| Sun Ultra HPC 6000 250 MHz (1MB L2 Cache)    | 6                              | 2.483                | 15700              | 700                | 3.0                   |
| Cray T94 (2.2 ns) ***                        | 1                              | 2.474                | 8192               | 280                | 1.8                   |
| Sun HPC 6000(336MHz 4MB L2 Cache)            | 4                              | 2.452                | 20352              | 960                | 2.7                   |
| DEC AlphaServer 8200 5/300                   | 6                              | 2.4                  | 9640               | 540                | 3.6                   |
| DEC AlphaServer 8400 5/300                   | 6                              | 2.4                  | 9640               | 540                | 3.6                   |
| IBM SP-1                                     | 32                             | 2.4                  | 16000              | 4000               | 4                     |
| Thinking Machines CM-200 (10 MHz)            | 512                            | 2.4                  | 14848              | 5632               | 5                     |
| SGI POWER CHALLENGE (75 MHz)                 | 10                             | 2.395                | 2000               | 470                | 3.0                   |
| IBM eServer pSeries 640 (375 MHz, 8MB L2)    | 2                              | 2.38                 | 12000              | 200                | 3                     |
| IBM RS/6000 44P-270 (2 proc,375 MHz,8 MB L2) | 2                              | 2.38                 | 12000              | 200                | 3                     |
| IBM RS/6000 44P-270 (375 MHz, 8MB L2)        | 2                              | 2.38                 | 12000              | 200                | 3                     |
| SGI POWER CHALLENGE (90 MHz)                 | 8                              | 2.318                | 1900               | 360                | 2.9                   |
| Alliant CAMPUS/800 (40 MHz)                  | 96                             | 2.3                  | 13020              | 4396               | 3.8                   |
| Fujitsu AP1000                               | 512                            | 2.3                  | 25600              | 2500               | 2.8                   |
| Intel iPSC/860 (40 MHz)                      | 120                            | 2.3                  | 12000              | 4500               | 4.8                   |
| HP AlphaServer GS1280 7/1300 (1.3 GHz)       | 1                              | 2.27                 | 10000              |                    | 2.6                   |
| IBM eServer pSeries 640 (375 MHz, 4MB L2)    | 2                              | 2.27                 | 13000              | 180                | 3                     |
| IBM RS/6000 44P-270 (2 proc,375 MHz,4 MB L2) | 2                              | 2.27                 | 13000              | 400                | 3                     |
| IBM RS/6000 44P-270 (375 MHz, 4MB L2)        | 2                              | 2.27                 | 13000              | 180                | 3                     |
| IBM RS/6000 7026-B80(2 proc,375 MHz,4 MB L2) | 2                              | 2.27                 | 13000              | 180                | 3                     |
| Sun Ultra HPC 6000 167 MHz (1MB L2 Cache)    | 8                              | 2.185                | 14000              | 500                | 2.7                   |
| HP Exemplar S-Class SPP-UX 5.2               | 4                              | 2.121                | 13320              | 520                | 2.9                   |
| Sun Ultra HPC 450 (300 MHz)                  | 4                              | 2.09                 | 10944              | 492                | 2.4                   |
| Cray SV1-1-32 (300 MHz)                      | 2                              | 2.073                | 11088              | 600                | 2.4                   |
| Convex SPP-1200(16 procs)120 MHz             | 16                             | 2.032                | 19000              | 2800               | 3.8                   |
| DEC 4100 5/400 (400 MHz)                     | 4                              | 2.019                | 4929               | 1280               | 3.2                   |
| HP AlphaServer ES80 7/1150 (1.15 GHz)        | 1                              | 2.01                 | 10000              |                    | 2.3                   |
| HP AlphaServer ES47 7/1150 (1.15 GHz)        | 1                              | 2.01                 | 10000              |                    | 2.3                   |
| hp AlphaServer GS1280 7/1150(1.15 GHz)       | 1                              | 2.00                 | 5000               |                    | 2.3                   |
| Intel Paragon XPS-35 (50 MHz, OS=R1.1)       | 64                             | 2.0                  | 8000               | 2000               | 3.2                   |
| SGI POWER CHALLENGE (75 MHz)                 | 8                              | 1.955                | 1900               | 360                | 2.4                   |
| Intel iPSC/860 (40 MHz)                      | 96                             | 1.9                  | 11000              | 4000               | 3.8                   |
| nCUBE 2 (20 MHz)                             | 1024                           | 1.9                  | 21376              | 3193               | 2.4                   |
| Thinking Machines CM-5                       | 32                             | 1.9                  | 9216               | 4096               | 4                     |
| CRAY T3E (300 MHz)                           | 4                              | 1.806                | 7488               | 768                | 2.4                   |
| IBM SP2 (77 MHz, switch of 4/96)             | 8                              | 1.8                  | 9500               | 1200               | 2.5                   |
| Sun Ultra HPC 6000 250 MHz (4MB L2 Cache)    | 4                              | 1.798                | 15552              | 576                | 2.0                   |
| IBM SP2 thin-node2,SP-sw,256MB/node(66 MHz)  | 8                              | 1.768                | 12000              | 1700               | 2.1                   |

| Computer<br>(Full Precision)              | Number<br>of Procs<br>or Cores | $R_{max}$<br>GFlop/s | $N_{max}$<br>Order | $N_{1/2}$<br>Order | $R_{peak}$<br>GFlop/s |
|---|--------------------------------|----------------------|--------------------|--------------------|-----------------------|
| AMD ATHLON Thunderbird 1.2GHz             | 1                              | 1.755                | 3800               | 295                | 2.4                   |
| Intel Delta (40 MHz)                      | 64                             | 1.7                  | 8000               | 2500               | 2.6                   |
| SGI POWER CHALLENGE (90 MHz)              | 6                              | 1.690                | 2000               | 294                | 2.2                   |
| CRAY T3E-1200E (600 MHz)                  | 2                              | 1.675                | 11040              | 576                | 2.4                   |
| Cray SV1ex-1-32, 500MHz                   | 1                              | 1.671                | 7452               | 350                | 2.0                   |
| Alliant CAMPUS/800 (40 MHz)               | 72                             | 1.6                  | 12012              | 3724               | 2.9                   |
| MasPar MP-2216 (80ns)                     | 16384                          | 1.6                  | 11264              | 1920               | 2.4                   |
| Sun Ultra 80 (450MHz/4MB L2)              | 2                              | 1.560                | 20352              | 384                | 1.8                   |
| Sun Ultra HPC 6000 250 MHz (1MB L2 Cache) | 4                              | 1.560                | 15700              | 500                | 2.0                   |
| DEC 4100 5/300 (300 MHz)                  | 4                              | 1.544                | 4436               | 500                | 2.4                   |
| Sun Fire 6800 (900MHz/8MB L2)             | 1                              | 1.509                | 28956              | 600                | 1.8                   |
| IBM SP2-T2 (66 MHz)                       | 8                              | 1.5                  | 9000               | 1680               | 2.1                   |
| Meiko CS2                                 | 16                             | 1.5                  | 10880              | 1952               | 2.9                   |
| NEC SX-3/11R (2.5 ns)                     | 1                              | 1.5                  | 2048               | 130                | 1.6                   |
| Parsytec GC/Power Plus (80 MHz)           | 32                             | 1.5                  | 11000              | 3500               | 2.5                   |
| Convex SPP-1600(8 procs)120 MHz           | 8                              | 1.455                | 11000              | 750                | 1.9                   |
| Sun HPC 450 (400 MHz)                     | 2                              | 1.455                | 20252              | 960                | 1.6                   |
| SGI POWER CHALLENGE (75 MHz)              | 6                              | 1.430                | 2000               | 294                | 1.8                   |
| Intel iPSC/860 (40 MHz)                   | 72                             | 1.4                  | 9000               | 3500               | 2.9                   |
| Intel iPSC/860 (40 MHz)                   | 64                             | 1.4                  | 9000               | 3500               | 2.6                   |
| SGI Origin 2000 (195 MHz, 4MB cache)      | 4                              | 1.385                | 10000              | 1000               | 1.6                   |
| CRAY T3E-900 (450 MHz)                    | 2                              | 1.323                | 7776               | 528                | 1.8                   |
| SGI POWER CHALLENGE (195 MHz, 2MB cache)  | 4                              | 1.305                | 10000              | 1000               | 1.6                   |
| Meiko Computing Surface (40 MHz)          | 62                             | 1.3                  | 8500               | 3500               | 2.5                   |
| NEC SX-3/11 (2.9 ns)                      | 1                              | 1.3                  | 2816               | 192                | 1.4                   |
| SGI CHALLENGE (6.6ns)                     | 36                             | 1.284                | 8000               | 2000               | 2.7                   |
| Sun Fire 6800 (750MHz/8MB L2\$)           | 1                              | 1.260                | 15180              |                    | 1.5                   |
| SGI CHALLENGE (6.6ns)                     | 32                             | 1.254                | 8000               | 2000               | 2.4                   |
| DEC AlphaServer 2100 5/250                | 4                              | 1.2                  | 4056               | 800                | 2.0                   |
| Fujitsu AP1000                            | 256                            | 1.2                  | 18000              | 1600               | 1.4                   |
| IBM SP-1                                  | 16                             | 1.2                  | 12000              | 2300               | 2                     |
| Thinking Machines CM-200 (10 MHz)         | 256                            | 1.2                  | 10752              | 4096               | 2.5                   |
| SGI POWER CHALLENGE (90 MHz)              | 4                              | 1.182                | 1000               | 240                | 1.4                   |
| SGI CHALLENGE (6.6ns)                     | 28                             | 1.153                | 8000               | 2000               | 2.1                   |
| Alliant CAMPUS/800 (40 MHz)               | 48                             | 1.1                  | 10024              | 3024               | 1.9                   |
| Sun Ultra HPC 450 (300 MHz)               | 2                              | 1.05                 | 10944              | 192                | 1.2                   |
| SGI POWER CHALLENGE (75 MHz)              | 4                              | 1.046                | 14000              | 1000               | 1.2                   |
| Cray SV1-1-32 (300 MHz)                   | 1                              | 1.044                | 7452               | 350 1.2            |                       |
| Convex SPP-1200(8 procs)120 MHz           | 8                              | 1.026                | 11000              | 750                | 1.9                   |
| SGI CHALLENGE/Onyx (6.6ns)                | 24                             | 1.014                | 8000               | 1000               | 1.8                   |
| Sun HPC 2 (300 MHz)                       | 2                              | 1.01                 | 7104               | 288                | 1.2                   |
| Convex SPP-1000(8 procs)100 MHz           | 8                              | 1.005                | 11000              | 550                | 1.6                   |
| SGI POWER CHALLENGE (75 MHz)              | 4                              | .993                 | 1000               | 240                | 1.2                   |
| Intel iPSC/860 (40 MHz)                   | 48                             | .98                  | 7000               | 3000               | 1.9                   |

| Computer<br>(Full Precision)              | Number<br>of Procs<br>or Cores | $R_{max}$<br>GFlop/s | $N_{max}$<br>Order | $N_{1/2}$<br>Order | $R_{peak}$<br>GFlop/s |
|---|--------------------------------|----------------------|--------------------|--------------------|-----------------------|
| Thinking Machines CM-5                    | 16                             | .98                  | 6528               | 3008               | 2                     |
| nCUBE 2 (20 MHz)                          | 512                            | .958                 | 15200              | 2240               | 1.2                   |
| HITACHI SR2201/4(150MHz)                  | 4                              | .941                 | 9720               | 1200               | 1.2                   |
| IBM PVS (40MHz)                           | 32                             | .925                 | 6000               | 1560               | 1.3                   |
| Intel Delta (40 MHz)                      | 32                             | .9                   | 6000               | 2000               | 1.3                   |
| CRAY T3E (300 MHz)                        | 2                              | 0.896                | 5280               | 384                | 1.2                   |
| SGI CHALLENGE/Onyx (6.6ns)                | 20                             | .866                 | 7000               | 1000               | 1.5                   |
| Meiko Computing Surface (40 MHz)          | 32                             | .825                 | 7000               | 3000               | 1.3                   |
| Meiko CS2                                 | 8                              | .8                   | 8064               | 1088               | 1.4                   |
| SGI CHALLENGE/Onyx (6.6ns)                | 18                             | .796                 | 8000               | 1000               | 1.35                  |
| Sun Ultra 80 (450MHz/4MB L2)              | 1                              | .781                 | 20352              | 192                | .9                    |
| NEC SX-3/ILR (2.5 ns)                     | 1                              | .78                  | 2304               | 112                | 0.8                   |
| Sun HPC 450 (400 MHz)                     | 1                              | 0.729                | 20252              | 960                | 0.8                   |
| SGI CHALLENGE/Onyx (6.6ns)                | 16                             | .702                 | 8000               | 1000               | 1.2                   |
| SGI Origin 2000 (195 MHz, 4MB cache)      | 2                              | .699                 | 10000              | 600                | .78                   |
| IBM RS/6000 Cluster (PARC) (62.5 MHz)     | 8                              | .694                 | 10000              | 1500               | 1.0                   |
| Parsytec GC/Power Plus (80 MHz)           | 16                             | .68                  | 7700               | 2200               | 1.3                   |
| NEC SX-3/1L (2.9 ns)                      | 1                              | .67                  | 2048               | 128                | .68                   |
| SGI POWER CHALLENGE (195 MHz, 2MB cache)  | 2                              | .663                 | 10000              | 600                | .78                   |
| Intel iPSC/860 (40 MHz)                   | 32                             | .64                  | 6000               | 2500               | 1.3                   |
| SGI CHALLENGE/Onyx (6.6ns)                | 14                             | .631                 | 8000               | 1000               | 1.05                  |
| SGI POWER CHALLENGE (90 MHz)              | 2                              | .601                 | 1000               | 180                | .72                   |
| Fujitsu AP1000                            | 128                            | .566                 | 12800              | 1100               | .71                   |
| SGI CHALLENGE/Onyx (6.6ns)                | 12                             | .554                 | 7000               | 1000               | .9                    |
| IBM RS/6000 Cluster (PARC) (50 MHz)       | 8                              | .520                 | 7500               | 1300               | .8                    |
| Sun Ultra HPC 450 (300 MHz)               | 1                              | .52                  | 10944              | 192                | .6                    |
| SGI POWER CHALLENGE (75 MHz)              | 2                              | .505                 | 1000               | 180                | .6                    |
| Alliant CAMPUS/800 (40 MHz)               | 24                             | .504                 | 7000               | 2492               | .96                   |
| Sun HPC 2 (300 MHz)                       | 1                              | .50                  | 7104               | 288                | .6                    |
| Intel iPSC/860 (40 MHz)                   | 24                             | .49                  | 5000               | 2000               | .96                   |
| nCUBE 2 (20 MHz)                          | 256                            | .482                 | 10784              | 1504               | .64                   |
| MasPar MP-1216 (80ns)                     | 16384                          | .473                 | 11264              | 1280               | .55                   |
| SGI CHALLENGE/Onyx (6.6ns)                | 10                             | .472                 | 8000               | 1000               | .75                   |
| Intel Delta (40 MHz)                      | 16                             | .45                  | 4000               | 1000               | .64                   |
| Meiko Computing Surface (40 MHz)          | 16                             | .445                 | 5000               | 2000               | .64                   |
| MasPar MP-1 (80 ns)                       | 16384                          | .44                  | 5504               | 1180               | .58                   |
| IBM RS/6000 Cluster (PARC) (50 MHz)       | 6                              | .404                 | 7000               | 1200               | .6                    |
| ALR Revolution Quad 6 (4 Pentium 200 MHz) | 4                              | .403                 | 2750               | 530                | .8                    |
| MasPar MP-2204 (80ns)                     | 4096                           | .374                 | 5632               | 896                | .60                   |
| IBM RS/6000 Cluster (PARC) (62.5 MHz)     | 4                              | .37                  | 5500               | 850                | .50                   |
| Intel iPSC/860 (40 MHz)                   | 16                             | .36                  | 4500               | 1500               | .64                   |
| SGI Origin 2000 (195 MHz, 4MB cache)      | 1                              | .356                 | 10000              | 200                | .39                   |
| SGI POWER CHALLENGE (195 MHz, 2MB cache)  | 1                              | .334                 | 10000              | 200                | .39                   |
| SGI POWER CHALLENGE (90 MHz)              | 1                              | .311                 | 1000               | 100                | .36                   |
| IBM RS/6000 Cluster (PARC) (50 MHz)       | 4                              | .293                 | 5500               | 1000               | .4                    |

| Computer<br>(Full Precision)     | Number<br>of Procs<br>or Cores | $R_{max}$<br>GFlop/s | $N_{max}$<br>Order | $N_{1/2}$<br>Order | $R_{peak}$<br>GFlop/s |
|----------------------------------|--------------------------------|----------------------|--------------------|--------------------|-----------------------|
| Fujitsu AP1000                   | 64                             | .291                 | 10000              | 648                | .36                   |
| SGI POWER CHALLENGE (75 MHz)     | 1                              | .261                 | 1000               | 100                | .3                    |
| nCUBE 2 (20 MHz)                 | 128                            | .242                 | 7776               | 1050               | .32                   |
| HITACHI SR2201/1(150MHz)         | 1                              | .237                 | 4860               | 420                | .3                    |
| Meiko Computing Surface (40 MHz) | 8                              | .235                 | 3500               | 750                | .32                   |
| Parsytec FT-400 (20 MHz)         | 400                            | .232                 | 7999               | 814                | .6                    |
| Intel Delta (40 MHz)             | 8                              | .23                  | 3000               | 1000               | .32                   |
| Intel iPSC/860 (40 MHz)          | 8                              | .19                  | 3000               | 850                | .32                   |
| Meiko Computing Surface (40 MHz) | 4                              | .121                 | 2500               | 500                | .16                   |
| nCUBE 2 (20 MHz)                 | 64                             | .121                 | 5472               | 701                | .15                   |
| Intel Delta (40 MHz)             | 4                              | .12                  | 2000               | 500                | .16                   |
| MasPar MP-1204 (80ns)            | 4096                           | .116                 | 5632               | 640                | .138                  |
| Intel iPSC/860 (40 MHz)          | 4                              | .10                  | 2250               | 550                | .16                   |
| IBM RS/6000 (62.5 MHz)           | 1                              | .096                 | 3000               |                    | .125                  |
| MasPar MP-2201 (80ns)            | 1024                           | .092                 | 2816               | 448                | .15                   |
| Thinking Machines CM-5           | 1                              | .068                 | 1632               | 672                | .128                  |
| Meiko Computing Surface (40 MHz) | 2                              | .062                 | 1750               | 250                | .08                   |
| nCUBE 2 (20 MHz)                 | 32                             | .061                 | 3888               | 486                | .075                  |
| Intel Delta (40 MHz)             | 2                              | .06                  | 1500               | 500                | .08                   |
| Intel iPSC/860 (40 MHz)          | 2                              | .058                 | 1500               | 400                | .08                   |
| nCUBE 2 (20 MHz)                 | 16                             | .032                 | 5580               | 342                | .038                  |
| Meiko Computing Surface (40 MHz) | 1                              | .031                 | 1250               |                    | .04                   |
| MasPar MP-1201 (80ns)            | 1024                           | .029                 | 2816               | 320                | .034                  |
| Intel iPSC/860 (40 MHz)          | 1                              | .024                 | 750                |                    | .040                  |
| nCUBE 2 (20 MHz)                 | 8                              | .0161                | 3960               | 241                | .019                  |
| nCUBE 2 (20 MHz)                 | 4                              | .0080                | 2760               | 143                | .0094                 |
| nCUBE 2 (20 MHz)                 | 2                              | .0040                | 1280               | 94                 | .0047                 |
| nCUBE 2 (20 MHz)                 | 1                              | .0020                | 1280               | 51                 | .0024                 |

\* The Numerical Wind Tunnel is not a commercial product; it is a computer of the National Aerospace Laboratory in Japan and is based on the Fujitsu vector processor board.

The CP-PACS (Computational Physics by Parallel Array Computer System) is not a commercial product, it is a computer of the University of Tsukuba, Japan. Hitachi modified several points in their SR-2201 computer. The processor, manufactured by Hitachi, is a custom superscalar processor. It is based on the PA-RISC Architecture enhanced with a PVP-SW (pseudo vector processor based on slide window registers) scheme.

\*\* The IBM GF11 is an experimental research computer and not a commercial product.

\*\*\* Indicates Strassen Algorithm was used in computing the solution. Note the "achieved rate" is large than the "peak rate" for the computer. The rate of execution for this problem is based on the number of floating point operations divided by the time to solve the problem. The floating point operation count  $2/3n^3 + O(n^2)$  is based on a conventional Gaussian Elimination implementation. Strassen's Algorithm reduced the number of operations actually performed. The results obtained for the computation presented here using Strassen Algorithm are as accurate as that from Gaussian Elimination. In general however Strassen's algorithm has less favorable stability properties than conventional matrix multiplication.

\*\*\*\* The Earth Simulator is not a commercial product; it is a computer of the Earth Simulator Center, the arm of the Japan Marine Science and Technology Center. It is based on vector processors that are manufactured by NEC.

The columns in Table 3 are defined as follows:

- $R_{max}$  the performance in Gflop/s for the largest problem run on a machine.
- $N_{max}$  the size of the largest problem run on a machine.
- $N_{1/2}$  the size where half the  $R_{max}$  execution rate is achieved.
- $R_{peak}$  the theoretical peak performance in Gflop/s for the machine.

In addition, the number of processors and the cycle time is listed. Full or half precision reflects the computation was computed using 64 or 32-bit floating point arithmetic respectively.

\*\*\*\*\* The algorithm used in obtaining this performance is based on an iterative refinement approach where both 32 and 64 bit floating point arithmetic is used. The method performs a LU factorization in 32 bit arithmetic and uses an iterative refinement approach which selectively uses 64 bit arithmetic to improve the solution to full 64 bit accuracy. The accuracy obtained is equivalent to the 64 bit implementation. In this case the  $R_{peak}$  is quoted for both the peak rates for 32 and 64 bit floating point arithmetic. A negative aspect of this approach is that the method need 1.5 times the memory of the approach used in the normal 64 bit implementation of LU factorization. See <http://icl.cs.utk.edu/iter-ref/> for additional details.

### 3. Acknowledgments

I am indebted to the many people who have helped put together this collection.

## References

1. J. Dongarra, J. Bunch, C. Moler, and G. W. Stewart. *LINPACK User's Guide*. SIAM, Philadelphia, PA, 1979.
2. J. J. Dongarra, I. S. Duff, D. C. Sorensen, and H. A. Van der Vorst. *Solving Linear Systems on Vector and Shared Memory Computers*. SIAM Publications, Philadelphia, PA, 1990.
3. C. Lawson, R. Hanson, D. Kincaid, and F. Krogh. Basic linear algebra subprograms for Fortran usage. *ACM Trans. Math. Softw.*, 5:308–323, 1979.