PDC Newsletter

Reorganization of Swedish HPCN Support

The Swedish initiative in High Performance Computing and Networking was suddenly reorganized this fall. In 1994 the Swedish government took the initiative to construct a dedicated council aimed at supplying HPCN resources to the Swedish academic society. An investigation had revealed that Sweden was lagging behind in computational intense areas of science in a time where simulation and other aspects of HPCN was becoming more and more important in almost all sciences on the global arena. The council got to be known as HPDR and resided under the Swedish Research Council for Engineering Sciences (TFR). HPDR has since then evaluated the Swedish HPCN society and contracts have been made with computing centers in Sweden in order to provide computational resources for Swedish scientists. In the case of PDC, the contracted time spans the three year period 1997-99. Other contracts have also been written with NSC (Linköping) and HPC2N (Umeå), but for shorter time periods.

Joint letter

The HPCN centers in Sweden were taken by surprise when it became known that the government in its budget for 1998 suddenly had decided to dissolve HPDR and move its funding to the accounts of The Swedish Council for Planning and Coordination of Research (FRN). This caused the chairs of the three major HPCN centers in Sweden to write a joint letter to the Swedish Parliament. In this letter they expressed their concern regarding the loss of HPDR as a party dedicated to expand the HPCN activities in Sweden. The centers expressed their worries that the future of HPCN in Sweden might be at risk if efforts was to be transformed from the long term agreements that HPDR was aiming at to short term research proposal grants typical for local research groups. In such an environment it would be hard to maintain a sound computational infrastructure and competence.

Future HPCN efforts

The picture is now somewhat clearer as to the nearest future of Swedish HPCN. FRN has expressed their intent to continue the contracts agreed upon by HPDR. This would mean that the financial situation of PDC is such that it can continue to provide the Swedish scientific community with computer resource until year 2000. The situation for the smaller centers is today less clear since the contract periods for these sites are shorter.

The worst case scenario today is that future efforts in the HPCN area will be dominated by single events like computer system installations at the expense of maintaining know-how and human resources. It may also be a case of conflicting interests when individual research groups are to compete with commitments to national computational centers if the government grants to FRN are not separated in this regard.

The over all picture is that HPCN in Sweden is not endangered by the expiration of HPDR. However, there is an uncertainty as regards what the national commitment will look like in the future. This uneasiness is perhaps exaggerated by the historical experience where high performance

PDC goes into orbit, see page 7.

In This Issue

Editorial

On the cover of the last PDC Newsletter the headline reads "New HPDR Contract" and my editorial opened with the following lines "For the first time it is possible for PDC to plan for a somewhat longer time than the immediate future". HPDR and PDC/KTH had then just signed a contract for the three-year period 1997-99. How ironic that a few weeks after the newsletter was printed the government decided to eliminate HPDR and thereby the contract.

Even a three-year contract period in high performance computing is short by international standards. It takes time to build a quality infrastructure at a computing center and it is important to protect the heavy investment in program development of researchers from all our universities. The recent actions of the Department of Education easily send the dangerous signal that the government is not interested in supporting leading edge computing.

PDC has, together with NSC in Linköping and HPC2N in Umeå, petitioned the authorities for continued support of high performance computing in Sweden. At present, FRN has the responsibility of continuing the funding. The level will be slightly lower than what was expected from HPDR. Our contacts with FRN have, however, been very good and we look forward to working with them in the future.

One effect of the uncertainty during the fall was that Peter Carlsson, who produced our newsletter, left PDC. This was the reason why we only published two issues last year. Fortunately all others stayed and on the technical and scientific side the last few months have been very rewarding.

PDC has been able to use the funds for 1997 to upgrade the hardware and thus follow our plan to meet most of the demand from the user community. It is important to continuously modernize the equipment in order to protect the investments in code development and and to give our users from academia and industry competitive tools.

The IBM SP system, Strindberg, now has 130 new 160MHz nodes, which together with 16 of the old wide nodes, is a very powerful computer. Some impressive performance data is given on page 8. The Onyx2, which was on loan from SGI, has been bought and slightly upgraded. The Fujitsu VX2 will be upgraded to VX3 later in the spring.

Anther positive development at PDC is the different recent collaborations. We have worked with HPC2N in running jobs over the net which were distributed between the two SP systems and we have also harmonized our application processes for computing time. We hope to establish similar cooperation with NSC.

On the international side we are working on the communications project GLOBUS with different supercomputing centers in the US. The European cooperation within the TTN network is now fully developed and we have several exciting projects with industry. We will later also participate in a project sponsored by the European Commission on parallelization tools. It goes under the acronym SEPTOOLS. These activities help us to follow the latest development and thus, we hope, to improve the overall service.

Björn Engquist

Director

Time to apply for computer time

Next dead-line for submitting computer resource applications to be reviewed by the scientific board is May 4. This meeting will decide over projects in the third and fourth quarters of 1998. However, in case of available resources interim allocations can be provided so it is a good idea to send in applications earlier. Early applications also have the advantage that they can be discussed with pdc staff and then modified when needed.

The application kit is available at
http://www.pdc.kth.se/support/accounts.html

PDC Conference

Keynote speaker at the PDC Conference was Dr Sid Karin. Formerly head of San Diego Supercomputer Center (SDSC) and now director for Center for Advanced Computational Science and Engineering (CACSE) under which SDSC is organized.

The PDC annual conference was traditionally held just before Christmas holidays last december. The topic was "Future Directions in High Performance Computing" and several interesting talks where given in an attempt to predict where HPCN is heading. Keynote speaker was Dr Sid Karin. Formerly head of San Diego Supercomputer Center (SDSC) and now director for Center for Advanced Computational Science and Engineering (CACSE) under which SDSC is organized he - if anyone - is able to highlight the current trends.

One of the key issues in future HPCN seems to lie in the enabling of science. HPCN has traditionally been a tool for a rather limited number of research areas in which the time and effort to implement complex theories in even more complex computer environments has been regarded as fruitful. Today we are facing an immense number of sciences asking for increasing computer resources in order to be able to explore their fields further. This raises new challenges in supercomputing. Today supercomputers must be made as easy to use as the researcher's everyday workstation. The complexity of the machines used must be hidden behind a well designed user interface in order that the scientist will be able to focus on his research topic. This can be accomplished by joint efforts between a research group and supercomputer center of sufficient size. The center is not only a provider of computer resources in the traditional sense of providing access to hardware. The know-how and implementation skills of the people at the center is used to form a joint activity in which new software and user interfaces are developed for the researchers.

Dr John Toole, Deputy Director Alliance Programs at the National Center for Supercomputing Applications (NCSA) was the representative of the other national computer center in USA and expressed the same experience. Both of these centers are involved in a number of projects with research groups in different areas. Several computer vendors where represented at the conference giving their view on the future of high performance computing. From these presentations it was obvious that HPCN is breaking new ground which was not imaginable just a few years ago. Today multi-national corporations are in a situation where they have an immense amount of data collected over the years spread out over different continents that may contain information that can prove crucial when competing with other companies. This gives rise to many interesting problems as regards distributed data processing, security issues when transporting sensitive corporate information between computers, management of and mining in large data sets.

Examples were given in the financial area, as well as from insurance companies taking on super-computing, but also it turned out that searching for patent information was a HPCN area of the future. This type of storing, managing and analysing data collections of a size unheard of just some year ago is now becoming an accepted and necessary task not only for traditional research, but also in the commercial arena to keep in pace with corporate competition.

The conference also included a presentation given by a user of the PDC computer facilities in order to show visitors what kind of activities are done at PDC. Dr Rikard Gebart from Luleå University of Technology gave a speech on "High Performance Computing for the Design of Hydraulic Turbines" describing progress made in the area of applied fluid dynamics.

More information about NSF super computing centers can be found at:

http://www.ncsa.uiuc.edu/

Navier-Stokes Calculations on a Full Configuration Aircraft using Parallel Computers

The following is an extended review of an article [1] to appear in the PDC annual report. The authors of the original article are: Anders Ytterström, KTH; Carlos Weber; Arthur Rizzi, KTH and Jan Vos, EPFL.

Background

The European Commission initiated a program entitled EUROPORT 1 to demonstrate the benefits of using parallel computers. In this effort several wide spread commercial softwares were parallelized. The present article is based on work within the EC ESPRIT III project Parallel Aero which was a part of the EUROPORT 1 effort. The objective of Parallel Aero was to investigate whether massively parallel computers where capable of solving turbulent aerodynamic problems within a time such that it could be used in the design phase of an airplane. Also, a second objective was to investigate the feasibility of a machine-independent, scalable parallel Navier-Stokes computer software.

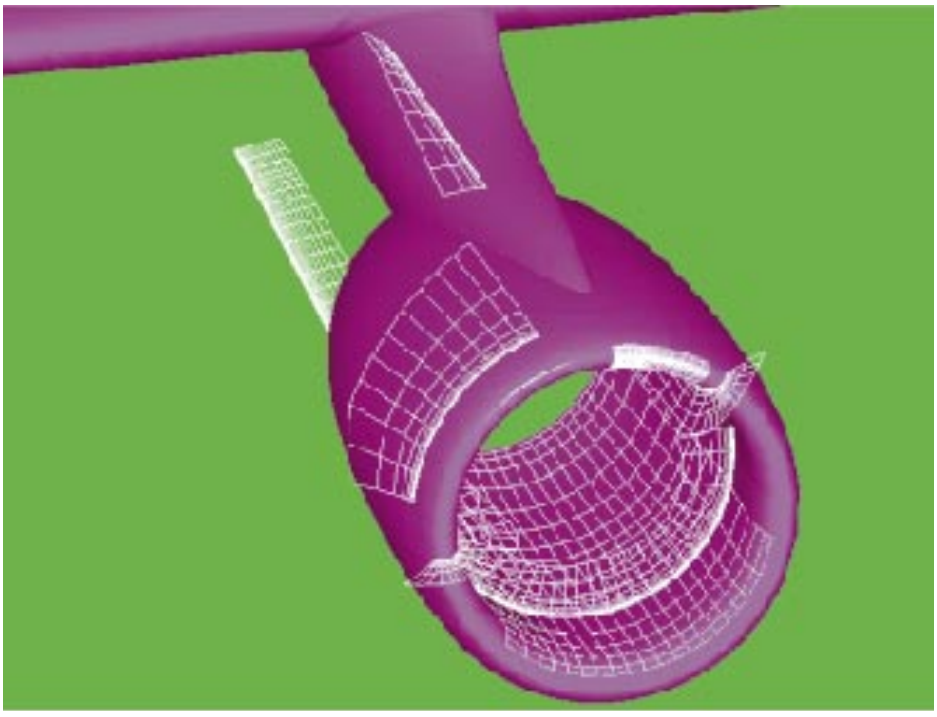


Fig.1 *A part of the mesh used for the analysis.*

Implementation

The procedure was to parallelize a particular code, NSMB, using standard message passing libraries and in a machine-independent implementation, then use this code to investigate the objectives above. The NSMB code is a multi-block based code for solving turbulent flows. The Navier-Stokes equations are solved using a space-centered finite volume scheme and time integration was done by both implicit LU-SGS and Diagonal-ADI.

In order to efficiently use parallel computers with NSMB a domain partitioning tool has been developed that reads a NSMB blocked mesh, generates a partitioned mesh and designates these new blocks onto processors for optimal load balance.

Benchmark test case

In the present article the performance of this code is compared between two parallel computers, IBM SP2 and Cray T3D. There is also a comparison of these computers with respect to single node performance on two vector computers, NEC/SX-4 and Fujitsu/VX. The comparisons are made using a model of a complete aircraft, AS28G, with a mesh with as many as 3.5 million grid points. The flight condition chosen is such that the

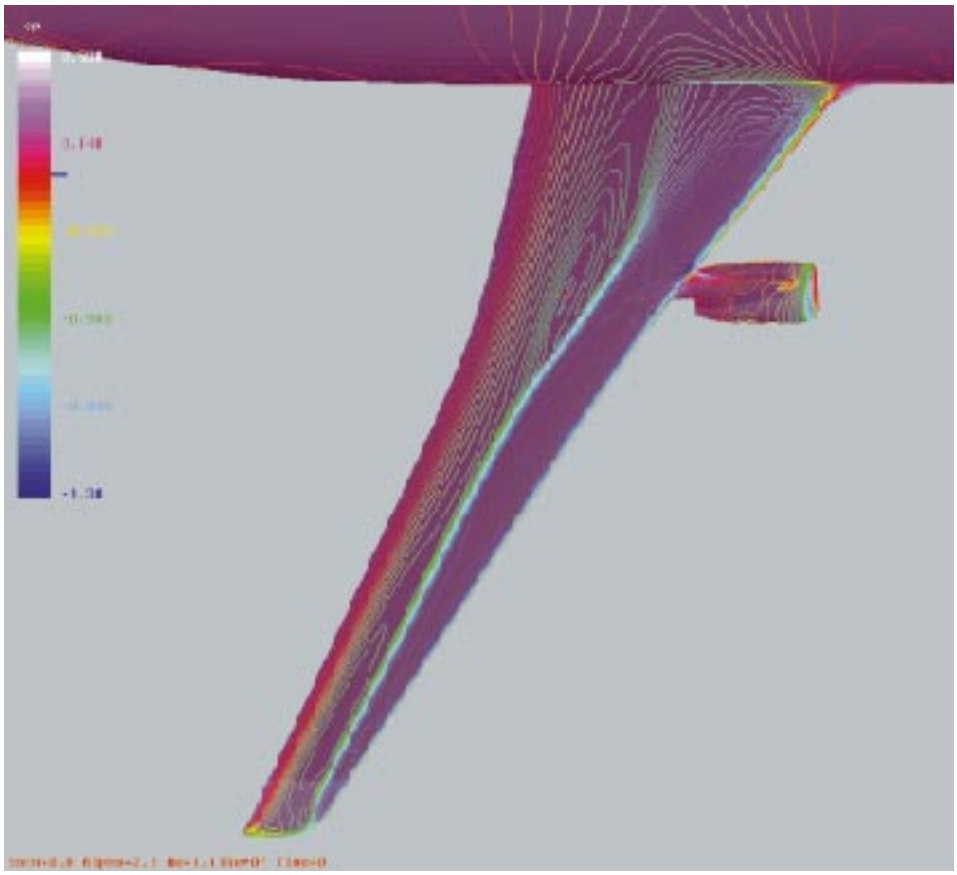


Fig. 2 *Iso-pressure lines on top of the AS28G wing. The shock position is where the pressure gradient is large (many lines close together).*

flow conditions are, $Re/m = 11.16 \cdot 10^6$, $a = 2.2°$ and $M = 0.8$.

Results

Among the results reported in the article are performance on 64 IBM SP2 processors (67MHz and 35MByte/s switch) using a 106 block mesh and 64 Cray T3D processors using a 109 block mesh. For the reference computations the vector computers run a 109 block mesh. All reported computations are on the same fine blocked mesh of the full aircraft although this mesh is differently partitioned for the parallel computations. The message passing library used in the article is PVM. Among the different turbulent models available within NSMB the Baldwin-Lomax model was chosen.

An extract of some reported values is shown in table 1. The sustained performance on the NEC/SX-4 was reported to be around 500 MFlop/s for this calculation. This would thus amount to a sustained performance of around 350 MFlop/s for the Fujitsu VX. For other meshes with more favorable vector length the authors report that sustained performance of 900 MFlop/s was accomplished on the Fujitsu. The corresponding number for the IBM SP is reported as 40 MFlop/s. This is also a typical experience that a well vectorized code may run at 50% of peak performance while a well tuned code on a scalar architecture has a much lower ratio between actual sustained and theoretical performance.

The large difference between the computation time per iteration and the elapsed time per iteration for the IBM SP the authors believe to arise from poor performance of the public domain PVM implementation for the IBM SP.

TABLE 1. Timings for the finest mesh using the LU-SGS scheme on different computers

Computer	*Estimated CPU time / iteration*	*Elapsed total time / iteration*
64 proc IBM SP	11	30
64 proc Cray T3D	21	22
1 proc Fujitsu/VX	27	29
1 proc NEC/SX-4	40	42

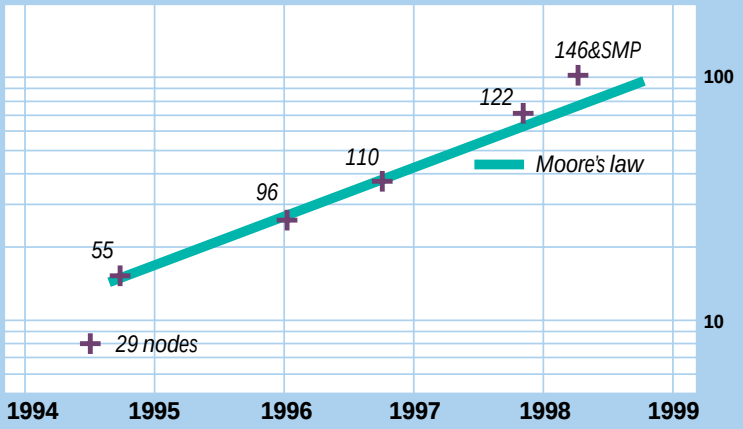
Based on the favorable test cases the authors conclude that it takes about 20-25 IBM SP nodes to achieve the same turn-around time as for a single noded modern vector computer. In this regard the vectorcomputer prove a high price/performance ratio in comparison to the parallel computers for this software. In the article the authors provide several comparisons between the computed solutions and values measured in wind tunnel experiments to demonstrate that relevant design parameters can accurately be

References

[1] Ytterström, A., Weber, C., Rizzi, A., Vos, J., "Navier-Stokes Calculations on a Full Configuration Aircraft using Parallel Computers", PDC progress report 1997, to

More computing power at PDC

PDC has recently upgraded strindberg increasing processor power, available memory, memory bandwidth and more. As the computer hardware develops over time the demand for scientific computing resources increases. There is a well known relation called Moore's law that predicts that the available computer power doubles every 18 months. In order to provide our users with resources comparable to researchers in other countries it is therefore vital to continously watch the computer market and increase available resources.



Strindberg performance in comparision to Moore's law.

After a thorough survey of available possibilities to upgrade PDC chose to do a major upgrade of its current IBM SP installation in November 1997. The upgrade concerned all parts of the machine since an upgrade only affecting peak CPU performance would not be of any real use to the PDC user community. The upgrade affected the peak CPU performance of each batch node by a factor 2.5, available memory by a factor of 2, network bandwidth by a factor 3 and the number of nodes in the machine increased from 110 to 122. By upgrading the machine in a uniform manner user applications are expected to be able to take full benefit from the upgrade.

Many users may also notice performance increases due to the version 5 of the Fortran compiler which is said to be able to optimize codes even better than the previous compiler. As part of a research effort with IBM, PDC will later in the spring have symmetric multiprocessor (SMP) nodes added to the system.

Press stop

During the writing of this PDC NewsLetter still another contract was signed with IBM regarding upgrade of strindberg. This second upgrade will add even more nodes to the batch pool. As the upgrade is finished there will be 128 nodes or more available for parallel batch runs. All batch nodes will run at 160MHz (640MFlop/s) and have 256MByte RAM memory or more. There will also be a separate pool of nodes available for serial computations. The machine will have a total peak performance of 88GFlop/s and 47GByte of RAM. When the SMP nodes are installed later this spring the machine will peak at more than 100GFlop/s.

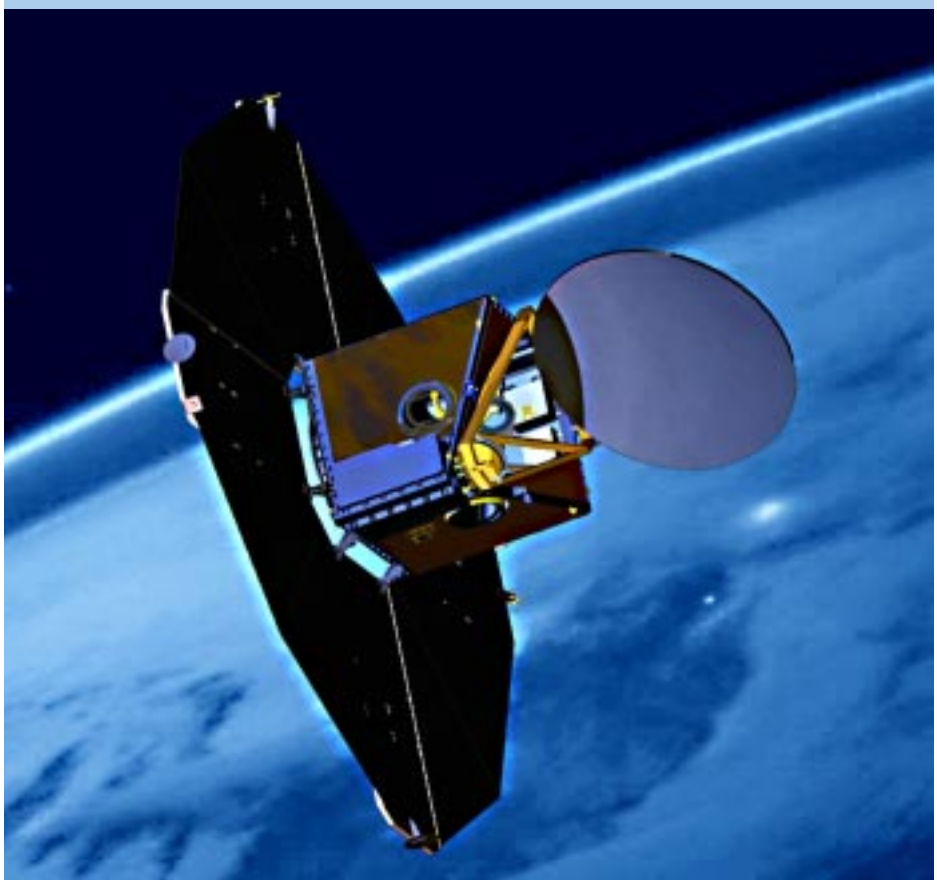
Moore's law

The accompaning graph shows the peak performance of strindberg over the years. In this graph Moore's law is shown origining in September 1994 when PDC installed the 55 node IBM SP. As can be seen strindberg has just barely followed the predicted evolution until the upgrade this fall.

"Moore's Law" is due to Gordon E. Moore who in 1965 made a prediction on the developement of micro chip manufacturing which has proven to be amazingly correct. As the micro chip evolution is closely related to the available computer performance this "law" is often used when discussing the future of high performance computing.

An interesting essay on Moore's law can be found at **http://www.research.microsoft.com/research/**

ODIN data distributed from PDC



PDC is engaged in a cooperation with the Swedish Space Corporation (SSC) for the activities related to ODIN satellite scheduled for launch in autumn of 1998. The satellite is a joint operation between the Swedish National Space Board (SNSB), CSA of Canada, TEKES of Finland and CNES of France, with the main part of the project financed by SNSB, and the implementation of the operation carried out by SSC.

The scientific goal of the Odin project is two-fold. The astronomic research project is to analyze the amount of several substances in stellar molecular clouds. Clouds that in the long run may form stars as they contract due to gravitational forces. Among the substances of interest are water, molecular oxygen and carbon. The other goal is directed towards the earth's atmosphere and is to examine the ozone layer and its interaction with other gases, such as chlorofluorocarbons (CFC).

The satellite's main instrument is a radiometer for spectrographic analysis in the frequency ranges 119GHz, 486-504GHz and 541-581GHz. These frequencies are choosen since they are characteristic for several substances including carbon, water and oxygen that are not possible to detect at ground level of earth since they emit radio frequency waves that are absorbed and thus shaded by the water and carbon compounds in the atmosphere.

By deploying the instrument in orbit around earth the two types of analysis can be accomplished by alternately directing the radioscope towards interesting points in space and sweeping across the atmospheric layer of earth.

The satellite will make about 15 orbits per 24 hours. Data will be communicated to the Esrange Satellite Station on 11 of these 15 passes. The data transfer rate is 720kbit/s and the produced amount of data varies between 3 and 22MByte/orbit depending on the type of observation being done. The on board data storage is around 100MByte.

The raw data (level 0 data) from the satellite will be transfered from Esrange to PDC where it will be available for the primary research groups for processing. The research groups will thus have more or less direct access to the satellite data. Also, they will have access to the complete data set gathered during the life time of the satellite on-line. The research groups will download their processed data to PDC so that this level 1 data will be easily accessible.

The project is as regards the participation of PDC an example of HPCN use not in consuming large CPU resources, but emphasizes the value of high performing networks and storage facilities. Crucial for selecting PDC as a partner in the project has been data storage availability and the high level of access via PDC's central position within the SUNET network. The emphasis for SSC lies in demonstrating the applicability and advantages of using small low-cost space-crafts as also previously has been demonstrated by the satellites Viking, Freja and Astrid. The 250kg satellite is not only less costly than more conventional satellite projects but also has the very distinct advantage of shorter development time.

There will no doubt be reason to come back to this project in later issues of PDC NewsLetter.

The interested reader is also suggested to study the following URL:s

http://www.ssc.se/ssd/

http://www.snsb.se/

NAS benchmarks released

The NAS parallel benchmarks (NPB) has been released for several interesting computer platforms including the newly upgraded strindberg. The NPB is a set of typical scientific application codes. They are written in Fortran77 and uses MPI for communication. The applications used are: Fourier transforms(FT), 3D Multigrid(MG), LU factorization(LU), Conjugate gradient method(CG), Solving a three(BT) and five(SP) diagonal matrix, Integer sort(IS) and Random number generation(EP).

The NAS benchmarks version 2 are such that the hardware vendors are not allowed to change the code, but may use compiler optimization techniques on the provided sources. This is an effort to mimic the situation of a researcher who typically has an existing code that is to run on several computer platforms.

In the results published by NASA the balanced design of the IBM SP shows in that the accomplished MFlop/s/node related to the theoretical peak performance of each node is high compared to many other platforms. The NASA published results have been reproduced at PDC and in most cases with higher performance than reported. The higher performance is due to the later compiler revision that is installed on strindberg.

The accomplished performance on strindberg is shown in the second graph where the NASA Ames reported performance for an IBM SP with 66MHz nodes is used as reference. This is a configuration comparable to the old strindberg although with a higher memory bandwith than our old configuration. The graph shows 64 node performance for strindberg and some other platforms except for the EP test case where 128 node values where used due to lack of reference data for 64 nodes. Also, the EP performance for the T3E-600 machine is extrapolated from T3E-900 data provided by NASA since no T3E-600 EP performance figures were at hand. The SGI Origin data were taken from the NASA published results.

The actual performance gain of the PDC upgrade is actually larger than indicated by the numbers in the graph since the upgrade includes a doubled memory bandwidth and an increase of nodes by 32%.

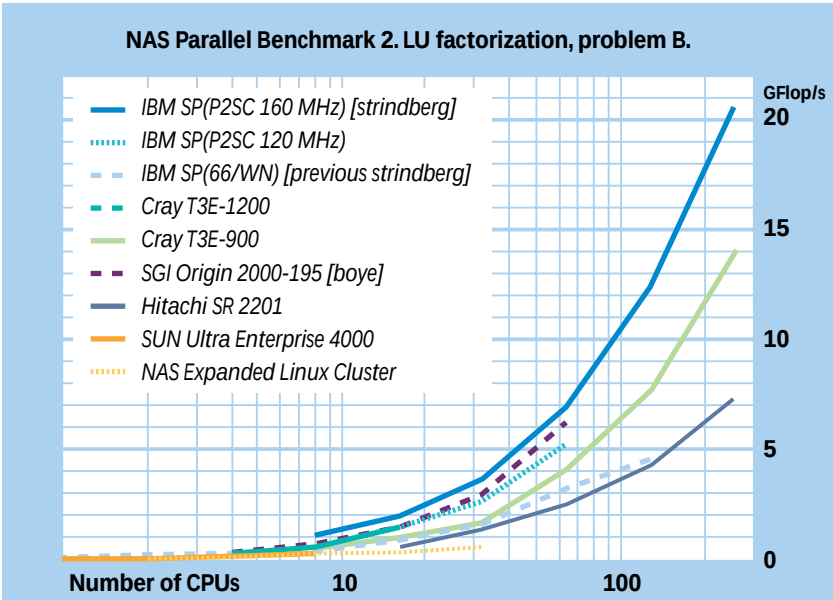


Fig . 1 *Floating point performance for some interesting platforms as reported by NASA*

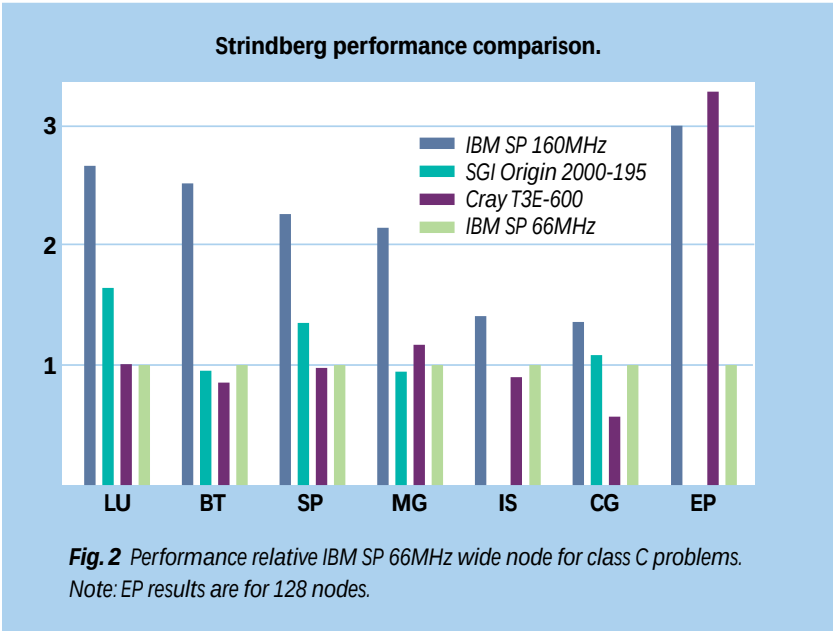


Fig. 2 *Performance relative IBM SP 66MHz wide node for class C problems. Note: EP results are for 128 nodes.*

The full NASA published test is available **http://science.nas.nasa.gov/Software/NPB/NPB2Results/**

README

- **Serial nodes on Strindberg.** Two new sets of nodes have appeared after the upgrade of strindberg. G nodes and S nodes. In particular the G node may be of interest to Gaussian users for serial execution. The node has 2GByte of memory and a 13GByte striped /scratch partition. See **http://www.pdc.kth.se/compresc/machines/strindberg.html**
- **Gaussian-94 reminder.** Contrary to what is indicated in the Gaussian manuals parallel Gaussian jobs do not need an extra "master" node. It is sufficient to allocate the same number of nodes as the number of nodes given in the input file (%NProc directive).
- **Gaussian-94 on Fujitsu.** Gaussian is available on the Fujitsu VX/2 vector computer at PDC. Several procedures perform very well. Interested users are encouraged to contact **pdc-staff@pdc.kth.se**
- **xlFortran update.** A new version (5.1) of the IBM Fortran compiler xlf is installed on strindberg. The new compiler has proved to be very efficient.
  A new compiler option (-O4) offers automatic detection of the hardware configuration of the compiling machine. Read the IBM SP documentation **http://www.pdc.kth.se/doc** for more information.
- **Secure X connections. rxtelnet** is the recommended way to connect to PDC. This is an extension to the Kerberos telnet command that in addition to a telnet session also opens a secure X connection. With rxtelnet there is no need to use **xhost** or **xauth** in order to be able to open windows on your local terminal from PDC.

Courses at PDC

HPC summer school

The annual summer school in High Performance Computing will this summer be arranged at the KTH campus August 17-28. More details about accomodation, schedules, preparatory material etc will be available at the PDC web pages.

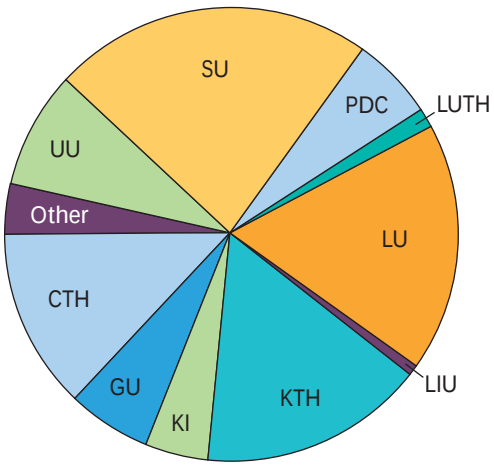
IBM SP introduction

The course "Introduction to Parallel Computing on the IBM SP at PDC" will be given at the KTH campus March 4-5 and April 21-22. This is an introduction to the PDC environment, how to install and use the kerberos travelkit and parallel programming using MPI with emphasis on the IBM SP system Strindberg.

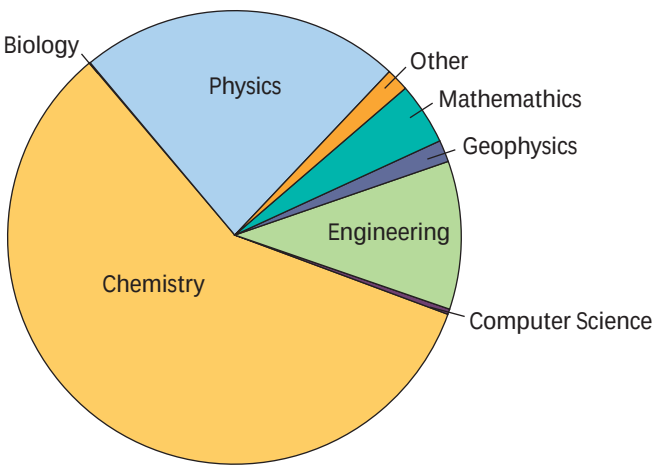
PDC usage profile

These pie charts show, for each university and scientific subject, the fraction of used computer time on the IBM SP Strindberg during the second half of 1997.

Geographical distribution



Scientific distribution



Calendar of Events

March

4–5 Introduction to Parallel Computing on the IBM SP at PDC, PDC, Stockholm
http://www.pdc.kth.se/training/

25–27 Workshop on Practical Aspects of Algebraic Multigrid Methods, Stuttgart, Germany
http://www.ica3.uni-stuttgart.de/events.html

31/3–3/4 Conference On Numerical Methods For Fluid Dynamics, Oxford, UK
http://www.comlab.ox.ac.uk/oucl/

April

4–9 2nd Euro-Conference on Parallel and Distributed Computing for Computational Mechanics, Sintra, Portugal
http://www.saxe-coburg.co.uk/euro.htm

5–9 HIGH PERFORMANCE COMPUTING '98 Grand Challenges in Computer Simulation, Boston, Massachusetts

21–22 Introduction to Parallel Computing on the IBM SP at PDC, PDC, Stockholm
http://www.pdc.kth.se/training/

21–23 HPCN Europe '98, Amsterdam, The Netherlands.
http://www.wins.uva.nl/events/

May

14–15 Fortran Futures '98, Heathrow, London, UK
http://extweb.nag.co.uk/other/ff98_announce.html

11–14 Parallel Computational Fluid Dynamics, Hsinchu, Taiwan
http://www.nchc.gov.tw/parcfd98

13–15 AFM 1998, Advances in Fluid Mechanics, Udine, Italy
http://www.wessex.ac.uk/conferences/afm98/

20–22 The 12th Annual International Symposium on High Performance Computing Systems (HPCS '98), Alberta, Canada
http://www.cs.ualberta.ca/

June

14–17 PARA98 – International Workshop on Applied Parallel Computing, Large Scale Scientific and Industrial Problems, Umeå University, Sweden
http://www.hpc2n.umu.se/para98/

15–19 Cray User Group Conference, Stuttgart, Germany.
http://www.cug.org/

21–23 VECPAR'98, 3rd International Meeting on Vector and Parallel Processing, Faculdade de Engenharia da Universidade do Porto, Porto, Portugal.
http://www.fe.up.pt/~vecpar98/

25–26 HPF User Group workshop, HUG'98, Porto, Portugal.
http://www.vcpc.univie.ac.at/activities/news/HUG98/

25–26 8TH STOCKHOLM OPTIMIZATION DAYS, Stockholm, Sweden
http://www.optsyst.math.kth.se/~optdays/

25–27 IMACS'98 : International Conference on Scientific Computing and Mathematical Modeling, Alicante, Spain
http://www.ux1.eiu.edu/~cfskd/imacs.html

29/6–1/7 Parallel Computing and Algorithms in Economics and Finance

July

cefes98/conf.htm

1–3 Fourth World Congress On Computational Mechanics, Buenos Aires, Argentina
http://venus.unl.edu.ar/wccm.html

5–17 VIIIth EPSRC Numerical Analysis Summer School, Leicter, UK
http://www.mcs.le.ac.uk/research/num-analysis.sumsch/

6–9 16th International Conference on Numerical Methods in Fluid Dynamics, Arcachon, France
http://www.math.u-bordeaux.fr/

icnmfd

August

September

October

Deep Blue, Jr. put to the test at PDC

The game of chess has long since been one of the primary vehicles for judging the progress of certain aspects of AI and Computer Science. In May of 1997 Deep Blue, which is a version of the IBM SP system, defeated Garry Kasparov. IBM toured Europe during October with a smaller version, aptly called Deep Blue, Jr. For Sweden the natural venue for this tour was KTH and PDC.

Around 200 people attended the event where Prof. Stefan Arnborg gave an overview of "Man vs. Machine" and Dr. Murray Campbell, who is a member of the IBM-team behind Deep Blue, presented the research that went into building it.

For the two exhibition games with Deep Blue, Jr. Bo Ländin from Stockholms Schackförbund had enlisted the current Swedish Junior Chess Champion, Erik Hedman.

Erik was a little nervous during the very short first game and made a nearly mistake. The second game was decidedly different. Erik managed to obtain a good position and the game ended in a draw by repetition. The reactions from the audience when this outcome was declared clearly showed that Erik had a lot of supporters in the audience. Erik's result was better than any other player's on the Deep Blue, Jr. tour.

The complete games are documented at **http://www.pdc.kth.se/news/newsletter/newsletter1-98/deepbluejr.html**

Carl G. Tengwall, IBM

Globus exhibit at SC-97

The globally growing demand of easy access to large scale computing facilities is a challenge to computer science to further develop the basis for supercomputing applications. PDC is participating in one such project, Globus, conducted by Argonne's Distributed Supercomputing Laboratory and Information Sciences Institute, USC.

The overall objective is to lay the groundwork for tomorrow's "High-Performance Computational Grids", in which access to supercomputing resources is consistent, dependable, and pervasive. Globus addresses the issues relating to security, communications, resource management, quality of service, programming methodologies, and tools. Important is to deploy applications, so as to allow practical exploration of the computational grid concepts.

In the fall 97, a testbed, Globus Ubiquitous Supercomputing Testbed (GUSTO), was set up and demonstrated during the SC97 exhibition In San José. As most the computational resources of 17 sites was gathered of which two outside the US, Parallelldatorcentrum (PDC) and Rechenzentrum Garching der Max-Planck-Gesellschaft. This was the largest computational grid ever constructed with 330 computers and 3600 processors, providing an aggregated peak performance of 2 Tflop/s. PDC contributed to this demonstration with

As previously reported PDC was selected a Technology Transfer Node (TTN) in the programme HPCNTTN initiated by the European Commission. A TTN aims to raise awareness of High Performance Computing & Networking in industry, especially small and medium sized companies. This is done by joint activities in which industry and computational centers co-operates to demonstrate how existing applications may benefit from the use of HPCN technology.

The contract period is April 1 1997 to April 1 1999 and there are already five activities running within PDCTTN:

VIDEOGRAPH; use of high performance computing in video and special effects production.

OPTI-BLADE; design of fan blades

SIMMILL; simulation of flow pumps in paper industry

IDASTAR; heat control in buildings

OPTIMOM; optimization of injection moulding in plastic industry.

Seven more proposals were submitted last December and as of today – beginning of February – approvals are still to wait for.

As no more proposals will be accepted after this, PDCTTN will now concentrate on disseminating results from the activities. The dissemination procedure for PDCTTN will have its emphasis onexperience and results applicable to the machinery industry as PDCTTN is appointed sector leader for this particular group of industries. The full list of sector groups is:

- Aerospace
- Automotive
- Construction
- Environment and transport
- Finance, insurance and retail
- Food, agri-culture and fisheries
- Forging, casting and moulding
- Machinery
- Medical
- Pharmaceutical and chemical
- Quality control and inspection
- Security

For those interested, more information is available at

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Editor: Björn Engquist

Editorial staff: Nils Jönsson

Email: pdc-quarterly@pdc.kth.se

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How to Contact PDC

Visiting address: Lindstedtsvägen 3, Plan 5, KTH, Stockholm

Mail: PDC, KTH, S-100 44 STOCKHOLM

Email: pdc-staff@pdc.kth.se

WWW: http://www.pdc.kth.se/

Phone: +46 8 790 79 07

Fax: +46 8 24 77 84

PDCTTN

Contact: Marina Backer Skaar

Email: pdcttn@pdc.kth.se

WWW: http://www.pdc.kth.se/pdcttn

Phone: +46 8 790 69 23