

# HPC newsletter



Information for the HPC Community of Bull, Architect of an Open World™

## EDITORIAL



*Just imagine what it would be like if people had to keep up with the computing power of Europe's fastest supercomputer. How many intelligent inhabitants of the Earth would we need for this task?*

*Every single one!*

*And they all have to be able to solve innumerable calculations at an unbelievable speed. To be exact: 8,500 per second! All together, it would equal the performance of a TERA-10, which, with 50 TFLOPS, is the fastest high-performance computer in Europe today. The French Atomic Energy Authority (CEA) has been using this system, one of the most powerful in the world, since December 2005. It is based on Bull NovaScale servers and was able to be brought into productive operation earlier than planned after a highly successful beta phase. Of course, TERA-10 also includes a high-performance storage solution. A contribution from Toine Beckers, Director of HPC Sales at DataDirect Networks, will provide you with more information on their 6th generation RAID system.*

*In order to keep pace with technological developments in the US and Asia, we need our own HPC know-how in Europe. We have impressively shown with TERA-10 that Bull is leading the way on the European HPC market. We are extremely proud of this accomplishment!*

*Being one of the leading providers of IT solutions in Europe, the Bull Group, which recorded yet another increase in turnover to 1.173 billion euros in 2005, provides flexible and secure information systems to companies and public clients. We want to emphasise our focus on "open standards" even more using a new slogan "Architect of an Open World™". This will also be achieved, of course, through appropriate activities, such as our status as a founder member of the Itanium Solutions Alliance, which we will report on further in this issue.*

*We received a lot of positive feedback on the first issue of our new HPC Newsletter and would like to thank you all for your contributions. This response can be seen as a sign that we are going in the right direction and also be used as an incentive to continue bringing you information on interesting topics and research projects in the HPC world. This second issue has a new design and will hopefully be received just as positively.*

Auke Kuiper

## ITANIUM SOLUTIONS ALLIANCE ANNOUNCES \$10 BILLION COLLECTIVE INVESTMENT

**Itanium Solutions catalogue, comprising more than 6,000 applications, to be greatly extended in the future**

In September 2005, the who's who of the IT industry launched the Itanium Solutions Alliance to assist in the final breakthrough of the Intel Itanium platform. Top industry members, including Intel and Bull, recently announced that they would invest an additional \$10 billion to accelerate Intel Itanium deployment. This budget will be particularly used to increase the availability of applications optimised for Itanium.



On the occasion of the formation of the Itanium Solutions Alliance, IDC published a series of figures in a White Paper which trace the thoroughly positive development of the Itanium market. The authors of the paper see a great future for the Intel processor, last but not least due to the announced initiative of the Itanium Alliance. Top founder members, system providers such as Bull, Fujitsu, Fujitsu Siemens, Hitachi, HP, Intel, NEC, SGI and Unisys, as well as software specialists BEA, Microsoft, Novell, Oracle, Red Hat and SAS, must certainly enjoy hearing this and have announced substantial investments within the scope of the Alliance.

According to the authors, the Itanium Solutions Alliance has been able to begin its work on a more than stable foundation. And

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EMEA DataDirect Networks*

*25 Years of UNIX Know-How:  
The Successful Basis for Bull HPC  
NovaScale!*

this does not only refer to the HPC market, where Intel's Itanium has already prevailed widely, but also in the hard-fought market for ERP solutions. More than 70,000 Itanium-based systems were installed in companies before the formation of the Alliance in September 2005. IT managers who are always struggling with tight budgets have thus shown great trust in the Intel 64 bit solution. In particular, company decision-makers appear to be convinced by a good price/performance ratio, the expected return on investment and guaranteed future of their new Itanium solutions. Last but not least, a wide range of available applications certainly helps in making this choice.

In September 2005, the Itanium application catalogue already included a grand total of more than 5,000 applications and has quickly grown to over 6,000 applications today. Further increases are expected as a mere result of the new \$10 billion budget of the Alliance. A large portion of the funds is earmarked for expanding the software catalogue.

Thus, investments in the Itanium architecture began to pay off for Intel and the other members of the Alliance. Altogether, the value for Itanium servers sold worldwide between 2002 and 2005 amounts to more than \$3 billion.

## News:

### TERA-10 Holds the New European Record with 50 TFLOPS

The TERA-10 supercomputer installed by Bull at the French Atomic Energy Authority (CEA) was delivered to our client at the end of last year. This system, based on NovaScale servers, is currently Europe's fastest supercomputer at a peak performance of more than 50 TFLOPS. During the beta phase, TERA-10 was already number 62 in the Top500.org rankings, placing it at the top in Europe. The performance measured now in real operation will make the TERA-10 one of the top 10 fastest HPC systems worldwide.

### New HPC Consultant

The Bull HPC team in Germany has strengthened its ranks of competent consultants with Thomas Luszczynski. The 40-year-old was previously active in the network interconnect and HPC cluster management sectors as a system engineer at Madge and Scali among others, developers of HPC cluster management software. Thomas Luszczynski now places his know-how and experience at the disposal of Bull's HPC clients. He will be particularly occupied with topics such as high-speed interconnect, as well as the design and management of HPC cluster solutions.

### Bull Listed as a Hardware Partner at Fluent.

A leading provider of solutions for computer-aided computational fluid dynamics, Fluent ([www.fluent.de](http://www.fluent.de)) has listed Bull as one of its hardware partners. A contract to this effect was signed between Bull and Fluent in December 2005.

Further information on the partnership can be found at: <http://www.fluent.com/partners/company/bull.htm>.

In any case, the Itanium Solutions Alliance will not simply be satisfied with the success documented by the IDC, even if 70 of today's Fortune 100 companies use Itanium-based systems for their company-critical applications and numerous renowned HPC users have implemented their supercomputers using Itanium-based server clusters. Examples of this include Europe's fastest supercomputer with a peak performance of more than 50 TFLOPS, the TERA-10 system at the French Atomic Energy Authority (CEA), or the HPC system at Dassault Aviation. Itanium-based Bull NovaScale servers were integrated in both applications.

"With the announcement of the comprehensive funds lasting until 2010, which Bull and the rest of the Itanium Solutions Alliance will invest in Itanium technology, Bull once again emphasises its commitment to NovaScale and Itanium processor technology. NovaScale servers have established themselves widely in companies, as well as in the HPC segment, including Europe's fastest supercomputer based on NovaScale. The announced investment, along with the upcoming, new versions of Itanium will drastically improve our market presence," states Pierre Duval, NovaScale Enterprise Business Unit VP.

Further information on the Itanium Solutions Alliance can be found at: [www.itaniumsolutionsalliance.com](http://www.itaniumsolutionsalliance.com) ■

## INTERVIEW WITH VIC CORNELL

Research Development Manager,  
Information Technology Group, at  
National Oceanography Centre

The National Oceanography Centre (NOC) in Southampton is a world leader in deep-sea sensor and platform technology design and development. NOC opened in 1995 and is a purpose-built development creating a centre for some 450 research scientists, lecturing and support staff as well over 600 undergraduate and postgraduate students. With a turnover of around £20 million per annum, the Centre's objective is clear and ambitious: to play a strategic role in global interdisciplinary marine and earth sciences.

A wide range of oceanographic, climate modelling and geophysical applications

use HPC. For these tasks the NOC is using a cluster-based Itanium Bull NovaScale Server.

**Question:** We know that the purchase of a HPC System is always a difficult decision and which brings up a lot of questions. Which question was the most difficult one for the NOC?

**Vic Cornell:** We were asking which system would provide us with the best return on our fixed investment in terms of work done for our wide spread of users. This involves evaluating a matrix of factors including performance, architectural suitability, compiler maturity, system functionality, and support.



Bull put in an excellent return to our tender and proposed a system which had both shared memory and distributed memory components with a single interconnect and a single management interface. This solved our problem of needing both OpenMP and MPI resources and simplified the installation and management.

**Question:** In this edition of the HPC Newsletter we are reporting amongst other things about the Itanium Solutions Alliance, which is supporting the distribution of the same name Intel-CPU. You have decided for Itanium-based systems. Which was the main argument for it?

**Vic Cornell:** We wanted 64 bit capable systems at near commodity prices. At the time



**National Oceanography  
Centre, Southampton**

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NATURAL ENVIRONMENT RESEARCH COUNCIL

the compilers for both Itanium and Opteron were in an early stage of development. We decided that there was more chance that Intel would get theirs right. This decision has been borne out in practice with the compiler products increasing in maturity with each upgrade.

**Question:** In your point-of-view is there a mistake which one should definitely try to avoid when purchasing an HPC System?

**Vic Cornell:** No knowing what it is your users really want.

**Question:** Speaking of mistakes. Can you give our readers a hint on how one can avoid making mistakes generally?

**Vic Cornell:** Keep planning and keep talking.

**Question:** In the last year the NOC has increased its HPS-System once more. Was this a trouble-free upgrade process?

**Vic Cornell:** It was – we handed over the system to Bull and they gave it back to us two days later with the extra nodes configured and working. We have found Bull hardware support to be excellent and have also found rewards in being on the same time-zone as their developers and 3rd line support staff.

**Question:** Lean budgets are surely also a problem for the NOC. However if you had unlimited means which systems would you choose?

**Vic Cornell:** If I had an unlimited budget I would always choose global shared memory systems. There is not doubt that these are easier to program and thus give a shorter time to resolution for small to medium size problems where programming resource is limited. I would also choose a system from a single vendor and buy it directly from that vendor. Too many problems come from a lack of clarity when responsibility for problems is being assigned! ■

## GUEST ARTICLE

### DATADIRECT S2A9500: THE LEADER IN HIGH PERFORMANCE STORAGE SOLUTIONS

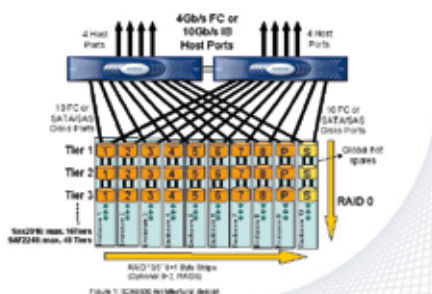
Toine Beckers, Director HPC Sales  
EMEA DataDirect Networks

With the new S2A9500 Silicon Storage Appliance, DataDirect Networks position as leading high performance storage solution is further enhanced. The new 48 slot SATA enclosure SAF2248 allows for innovative near line storage solutions.

### S2A9500: FC-4 and InfiniBand RAID Storage System

The S2A9500, DataDirect's 6th generation RAID storage networking system, was designed specifically to provide optimal block level and file system performance for highly scalable, open system computing environments, and surpasses all storage performance records with sustained read and write performance of up to 3 Gigabytes/second.

Its highly modular architecture offers up to eight plug and play FC-4 and Infiniband host side connections, optimized for use with a broad range of file systems, CPUs and interconnect technologies. The S2A9500 supports over one thousand SATA and Fibre-Channel disk drives through its twenty high speed disk-side ports. A detailed figure of its architecture is provided in Figure 1.



The Silicon Storage Appliance S2A9500 provides a patent-pending, fully parallelized, distributed and multitasking hardware RAID implementation that uses an 8+1+1 parity scheme called DirectRAID. This is a unique implementation that combines the virtues of RAID 3, RAID 5 and RAID 0. Like RAID 3 a dedicated parity drive is used per (8+1 or 4+1) parity group. DirectRAID exhibits RAID 3 characteristics such as tremendous large block-transfer - READ and WRITE - capability with NO performance degradation in crippled mode.

Like RAID 5 however, DirectRAID does not lock drive spindles and does allow the disks to re-order commands to minimize seek latency, and the RAID 0-like functionality allows multiple parity groups to be striped, providing PowerLUNs that can span 100's of disk drives. These „PowerLUNs“ support very high throughput (over 1400MB/s in the S2A9500) and a greatly enhanced ability to handle small I/O (particularly as disk spindles are added) and many, many streams of realtime content. Parity groups (or „Tiers“) of drives are added 9 drives at a time, with any arbitrary number of global hot spares supported.

A separate loop is utilized for the spare disks. Up to 112 Tiers can be configured behind a single S2A9500. 112 tiers of drives yields up to 112\*8=896 usable data drives which results, when using 500GB drives, in a usable capacity of 448 TB.

## News:

Bull at the CeBIT – 9th to 15th  
March

Business Intelligence Solutions on  
NovaScale Servers

Intel stand – hall 2 stand C46

A visit to the Intel stand in hall 2 will not only be worthwhile to HPC users, but also IT decision-makers at companies. As an Intel partner and important member of the Itanium Solutions Alliance, Bull will be there to present its strategic products from the NovaScale server family in practical applications. Enterprise computing solutions will be exhibited on the Itanium-based systems in particular.

The Bull systems at the fair will include both the 32-bit blade servers and the 64-bit Intel Itanium2 servers (code name Montecito). The latter will be used to show the high-performance abilities of today's typical business intelligence solutions. Another highlight of the Bull CeBIT presentation: NovaScale master. This is a powerful administration tool that can be used to effectively configure the entire management of business intelligence solutions.

Bull SAN and NAS Solutions

EMC stand – hall 1 stand F71

Bull will also be present during the CeBIT at another partner's stand (EMC) in hall 1. The main focus here will be on Bull's SAN and NAS network infrastructure solutions, particularly those used in conjunction with storage solutions from EMC. Besides all this, Bull will also exhibit the StoreWay Virtuo application, a virtual mass storage solution that permits distributed and secure backup of complete company databases, along with DataCrypt. An additional highlight will be the Bull service range available for this segment.



To further increase data reliability the system can also be configured with double parity (8+2, also called RAID6).

#### SAF2248: 48 slot SATA Drive Enclosure

DataDirect Networks' disk-based S2A Nearline SATA Solution has been specifically designed to enable the creation of the world's largest, most scalable nearline disk-based storage solution. It is up to 5 times more scaleable than other disk based storage systems fitting 480TB in a two rack footprint for the industry's best price per capacity per square foot storage solution. (See Figure 2)

### 25 YEARS OF UNIX KNOW-HOW: THE SUCCESSFUL BASIS FOR BULL HPC NOVA-SCALE!

The years of experience Bull developers have acquired in Unix and multi-processor systems are the reason why the FAME architecture of the Bull NovaScale running on Linux continues to break performance records - in the HPC sector, as well as with commercial data processing!

Bull has been working with the open operating system UNIX since the beginning of the 1980s. Since 1993, Bull specialists have also developed parts of the AIX operating system. These are the same professionals who enabled the AIX 4 to deal with multi-processor systems. Bull then took the opportunity to develop the first hardware architecture for PowerPC systems, back then still based on microchannel technology.

Even today, over 40 Bull specialists work in a team with IBM employees to develop this robust UNIX operating system even further. Bull contributed, for example, parts of

As organizations consolidate greater portions of their data into large disk pools, additional levels of robustness and resiliency will be required. The S2A Nearline Solution's groundbreaking ability to withstand multiple drive failures within individual parity groups maintains data availability, host performance and quality of service under the most severe failure modes. With multiple levels of redundancy, and double parity protection, the S2A Nearline Solution delivers enterprise-class reliability with SATA drive cost.

DataDirect Networks' Nearline Solution is a combination of its industry leading, 6th generation Silicon Storage Appliance (S2A9500) and a volume metric efficient 48 SATA drive package. The S2A9500 with its built in intelligence delivers continuous on-the-fly data protection with no loss in performance, designed to provide optimal block level and file system performance with massive capacity for support across a broad range of computational, and visualization environments with nearline needs. DataDirect's S2A offers broad infrastructure support powering compute environments from IBM, Dell, HP, Cray, SGI, Bull and others. ■

the micro-partitioning and performance tools for the current AIX 5.3 release.

Escala, the Bull server based on AIX, supports up to 64 POWER5 processors today and is 100% compatible with the e-Server p5 model series from IBM.

However, Bull integrates and certifies its AIX server line along with other market-leading technologies (e.g. storage from EMC and Net App), turning them into open and secure IT infrastructures where all the components do not have to necessarily come from the same manufacturer. This is what sets us apart from IBM.

The AIX developers and support specialists at Bull are headquartered in Paris and Grenoble, France, not in the USA. Thus, Bull is in a position to provide its customers with continual support from level 1 to level 3 (labs) without any breaks in the chain of performance. All done promptly and, if need be, even on site!

Bull HPC users profit from the fact that we have a high level of know-how in integrating GPFS parallel file systems. These can be integrated with Lustre via a gateway – staying true to our motto: Bull, Architect of an Open World™. ■

### News:

HPC Spring Event in Cologne, Germany from 30 – 31 March

The ZKI supercomputing research group (AK SC) will be hosting its 25th meeting from 30 - 31 March. The AK SC has once again been able to entice numerous speakers from research and teaching to attend, along with renowned IT companies. Detailed information on its interesting lecture program can be found at:

[http://portal.pik-potsdam.de/members/kramer/aksc/meeting25/index\\_html/view](http://portal.pik-potsdam.de/members/kramer/aksc/meeting25/index_html/view)

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