

HPC Consultancy

Open Networking

Global Managed Services

Enterprise IT Solutions

BIOS IT is a global IT consultancy and solution provider, specialising in the latest high-performance, power efficient IT solutions.



www.bios-it.com

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SALES AND INTEGRATION FACILITIES

INTRODUCTION

BIOS IT is a global HPC consultancy and solution provider, focused on delivering the latest high-performance, power efficient IT solutions. From fully built clusters to liquid-cooled overclocked servers, cloud and managed services, we deliver and support bespoke solutions tailored to meet your exact requirements.

Working with a leading ecosystem of IT partners in both hardware and software from across the industry, BIOS IT is positioned to design and create the most innovative solutions optimized for speed and efficiency, that provides you with that imperative edge over the competition.

BIOS IT brings years of experience in HPC and has worked with a number of the world's leading universities and research centres to enhance the speed of scientific discovery. Our world class HPC solutions come perfectly balanced with leading edge hardware and application specific software stacks, tailor-made for your requirements. Combined with our in-house team of technical experts and support staff, BIOS IT can deliver our customers scalable, power efficient and reliable HPC solutions. At BIOS IT's integration and labs facility, our advanced, green computing solutions can be quickly configured, optimized and validated to accelerate deployment and increase IT efficiency and workflows.

> Wally Liaw, Sr. Vice President of Sales at Supermicro

BIOS IT WORKFLOW From concept to completion, our team of experts are with you every step of the way.

HPC CONSULTANCY SERVICES

Our team of HPC experts are constantly benchmarking new solutions. This enables us to collaborate with our customers, share knowledge and expertise to deliver optimised solutions.

BIOS IT LABS

Our facilities are available to customers either onsite or via remote access, to test out the latest technologies and architectures. The BIOS IT lab enables customers to run benchmarks and simulations on evaluation systems prior to purchase.





TAILOR MADE DESIGN

BIOS IT design bespoke solutions in line with customer applications and requirements, including the utilisation of hardware and software accelerators designed for improved performance and faster workflows.

PLANNING & INSTALLATION

Understanding technical dependencies and business requirements ensures a well thought out implementation and ensures the shortest installation period. Our team of senior engineers ensure this complex task is managed and completed in a professional manner.





CONFIGURATION & QUALITY ASSURANCE

Our in-house engineering team ensure our solutions are engineered to the highest standards for both quality, stability and performance. Our state of the art build facility is ISO:9001 certified.



MANAGED SERVICES & SUPPORT

We provide our customers with tailor-made SLA solutions to suit your specifications. We offer bespoke service level work packages for ongoing support and global onsite warranty.

HPC CLUSTER ARCHITECTURE AND WORKFLOW

Clusters, comprised of commodity server hardware and software is gaining acceptance as the enterprise solution to an ever-increasing number of problems in the datacentre. Clusters are reshaping the High Performance Computing (HPC) market, driven primarily by price / performance and the Linux open source operating system.

Getting a cluster up and running and learning how to use it requires skilled resources, services and time. Ultimately, this leads to poorly planned clusters, flawed choices of software and implementation plans that can lead to higher than anticipated costs and time to production. As a result, many IT departments turn to expensive SMP alternatives because of the standardization shortcomings of cluster computing.

The process of building and managing Linux clusters needs to be simplified, minimizing the cost and time to get a cluster fully operational. BIOS IT helps simplify the deployment, usage and management of clustered computer systems by providing a standardized and replicable way to build clusters and run off-the shelf high performance applications.

We offer a range of both open source and commercial cluster management packages, that are selected in-line with our clients environment and workflow. We pre-engineer and test multiple variations of hardware and software packages, making our Linux compute clusters easy to deploy, simple to use, consistent, transparent, turnkey and available.





HPC CLUSTER HARDWARE

NETWORKING

BIOS IT has partnered with the industries leading networking companies to deliver the highest performance networking solutions available on the market today.

COMPUTE

BIOS IT is agnostic in the CPU technologies it delivers. Our application engineers can work with you to asses and evaluate the best architecture for your environment.

ACCELERATED COMPUTE

Certain workloads can benefit from computational offload engines such as GPUs or FPGAs. BIOS IT have a number of offerings that can accommodate varying numbers of accelerators to suit your most demanding workloads

FASTTIER

Balancing the storage and compute architecture is a constant struggle. Ensure your systems are kept busy by having a well architected sale-out storage platform behind it.

ARCHIVE, OBJECT STORAGE

With more and more data being generated, processed and stored the need for intelligent archives has grown. Its no longer sustainable to just dump data on to tape for long term storage. There is value in being able to examine and search through all your old data. Our online object storage archives allow you to keep all your data online and searchable (via elastic search) all the time at a price point similar to tape.

APPLICATION SPECIFIC APPLIANCES COMPUTE

Twin Architecture is the foundation of the most advanced server platforms in HPC. These high performance, high density systems feature optimum airflow for energy efficient cooling, easy maintenance and high availability with hot-swappable nodes and redundant power supply modules.

Facing budget limitations and energy efficiency initiatives alongside growing demands for greater processing power and capacity in the datacentre, organisations seek solutions that help lower their power consumption and operational costs while enhancing the scalability of their IT infrastructure. BIOS IT Twin servers are a smart, yet affordable investment for enterprises and institutions that need to build, expand or future-proof advanced computing infrastructures.

Custom built for your particular application and environment, BIOS IT allows you to rapidly adapt your infrastructure to your changing needs and service delivery models, accelerating deployment in demanding, fast-evolving industries.

APPLICATION READY

Twin architecture can be custom built to further satisfy the ever-increasing demands of today's applications:

- High Performance Computing (HPC) Clusters
- Datacentre Infrastructure
- Web Server & Virtualization
- Cloud & Hyperscale environments
- Financial Analysis
- Scientific Computing

The Twin architecture is designed to further satisfy the ever-increasing efficiency, density, and low-TCO demands of today's High Performance Computing (HPC) clusters

CERN

BIOS IT has delivered over 50PB of storage to CERN for the LHC project and over 20K CPU cores based on TWIN architectures. As a long standing contributor to the CERN project and their centralised IT infrastructure, we have provided a wide range of systems and have become a key strategic partner that has introduced significant changes in CERN's technology. The CERN Large Hadron Collider is the largest, most powerful particle accelerator, and as of 2017, the LHC remains the biggest and most complex experimental facility ever built.

BIOS IT HAVE DELIVERED OVER 50PB OF STORAGE AND OVER 20,000 CPU CORES TO CERN FOR THE LARGE HADRON COLLIDER PROJECT



ACCELERATED COMPUTE

HYPERSPEED

The innovative range of Hyper-Speed Solutions are designed to deliver ultra-fast, world record performance for high frequency trading and other low latency sensitive environments.

Co-engineering with Supermicro, BIOS IT are able to accelerate and enhance the latest Intel ® processors in order to achieve application performance benefits of up to 30%.

These IMPACT certified solutions are available in bespoke configurations within an extremely dense 1U form factor - perfect for co-location when considering price vs performance.

SUPERFREQ

The SuperFreq features innovative and reliable cooling methods to offer guaranteed and robust over-clocking performance, along with full enterprise-class server management capabilities. The closed loop, maintenance-free liquid cooling module, optimizes thermal distribution internally, ensuring the highest possible performance of the inner components including CPU & system memory, without sacrificing stability.

SuperFreq is IPMI 2.0 compliant and boasts full server remote manageability. Support teams will be able to monitor SuperFreqs including temperature and voltage readings, as well as being able to access the BIOS for further settings alterations.

BIOS IT servers also have been deployed for the Xetra cash market migration to T7. In this context median round-trip times have been improved by 85% from about 500µsec to about 75µsec.

Source Deutsche Börse AG

"BIOS IT's highly optimised solutions are tailor made for speed and efficiency, providing customers such as Deutsche Börse AG with that imperative edge over the competition and helping to ensure they continue to lead the international financial marketplace."

Ian Mellett, General Manager, BIOS IT

DEUTSCHE BÖRSE AG

BIOSIT responded to Deutsche Börse AG's performance requirements by providing custom systems that have been put through BIOS IT's accelerated methodology process 'IMPACT' (Improved & Modified Performance by Accelerating, Customising & Tuning). Featuring a custom motherboard, the specialised BIOS IT servers are designed to deliver ultra-fast performance for high frequency trading within mission critical and latency sensitive environments. Additional benefits of these BIOS IT IMPACT systems include world record performance with permanent accelerated mode, extreme expandability for versatile configurations and an optimized cooling design, providing enterprise reliability.

"In Q1/2017, Deutsche Börse AG has upgraded the majority of its core T7 servers using BIOS IT solutions for its derivatives market Eurex (matching engines, EMDI publishers and high-frequency gateways). The use of these servers enabled Eurex to reduce the median roundtrip times by 60µsec from 140µsec to 80µsec - an improvement of over 40% compared to last year.

In Q2/2017 BIOS IT servers also have been deployed for the Xetra cash market migration to T7. In this context median round-trip times have been **improved by 85% from about 500µsec to about 75µsec.**" -Deutsche Börse AG



ACCELERATED CO-PROCESSORS BIOS ANNA

Artificial Intelligence and Machine Learning are revolutionising the way we see and interact with the world around us. The BIOS ANNA (Artificial Neural Network Accelerator) is a range of hardware accelerated appliances, specifically designed to enhance the performance of Artificial Intelligence algorithms. By combining the latest in CPU, GPU, FPGA and/ or other co-processing technologies, with a Deep Learning framework repository, the BIOS ANNA removes the initial challenges of Al infrastructure deployment.

The modular nature of the range allows platforms to be easily configured to address both the training and inference side of the deep learning landscape.

BIOS ANNA GPU

One of the most interesting features of the P100 & V100 SXM2 is the NVLink interconnect system, crowning it as the Universal Datacenter GPU. This makes it the perfect backbone for the BIOS ANNA system and ensures it is a contender for the title of 'world's fastest deep learning appliance'.

Using a traditional PCI-E multi-GPU configuration, the limited PCI-E bandwidth is shared between GPUs and the links become even more saturated when peer to peer GPU traffic is factored in. NVLink addresses this problem by providing a highspeed 80Gb/s interconnect wholly devoted to peer GPU-to-GPU connections. BIOS ANNA is Available in a 1U form factor with space for 4 P100/V100 GPUs as well as a 4U version with space for up to 8 P100/V100 GPUs.

> Integrated Deep Learning repository: Caffe Torche Tensorflow Theano Lasagne BigDL Keras MXNet

INTELLIGENT VOICE

Speech to text from telephone calls, audio and video that can be ingested into any eDiscovery or ECM System. Intelligent Voice® was designed by a team that has actually had to perform review, and the toolset is easy to use and intuitive. In particular, the unique (and patent pending) JumpTo[™] audio player cuts down review times significantly. Intelligent Voice gives great power out of the box, but only exposes what is relevant to an individual user or organization.

Turn your company's phone calls, email & IM into smart data using the world's fastest speech to text engine. - the BIOS ANNA. Intelligent Voice indexes key words and phrases from your telephone calls (and email and IM). This allows you to search for telephone calls as if they were text. Add-on modules allow you to analyze your calls to track anomalous behavior.

The BIOS ANNA, with NVIDIA® GPU technology processes telephone calls at up to 400x real time.





STORAGE MILLIONS OF IOPS TO AFFORDABLE BIG DATA

BIOS IT is excited to offer a wide range of storage solutions to support Enterprise and HPC Customers. These include:

The fasted NVMe option:

18 Million IOPS of Storage Performance in a 2U Ultra Server featuring 20 NVMe SSDs each directly connected by non-blocking Gen 3 PCI-e x4.

NVMe over Fabric:

Distributed NVMe harnessed in storage Pools By NVMesh developed by Excelero to offer blistering block storage Performance and maximum utilisation in an Software Defined Storage appliance. NVMesh logically disaggregates storage from compute and it bypasses the CPU to avoid noisy neighbours.

Accelerated Flash SSD:

A compact, high-value 1U flash appliance providing outstanding I/O performance without costly proprietary hardware. Utilising FlexiRemap technology developed by AccelStor we effectively handle intensive random writes and I/O workloads. FlexiRemap remaps data whenever beneficial before passing it to the underlying flash memory, avoiding unnecessary overhead and extending the lifespan of SSDs.

Affordable Large Capacity:

A 90 bay JBOD offering the staggering ability to Support 900TB in a single 4U rackmount chassis that is optimised for HPC, Cloud & Big Data workloads. Supports up to 20+ GB/s Data transfer rate and flexible HDD Zoning. Hot-swappable Tool-less Modular Design for Easy Service and Maintenance.

> A wide range of storage solutions to support Enterprise and HPC Customers, including NVMe, NVMe oF, and Accelerated Flash.



WELLCOME TRUST SANGER INST.

The Informatics Support Group was tasked with building a shared scientific computing resource. This flexible compute platform would provide researchers with a trusted, open environment for sharing and analysing scientific data, and connect research groups across borders and scientific disciplines - enabling out of the box collaboration.

To meet this challenge, the Sanger Institute proposed a future scientific compute platform offering "Science as a Service" to its research teams, designed around a flexible architecture, with seamless high-speed, secure connectivity and big data storage for HPC access.

BIOS-IT was tasked to deploy a flexible and robust cloud computing architecture. The grunt for the platform comes from over 2,600 physical Intel Xeon Broadwell cores and 49TB of 2400MHz, DDR4 RAM. BIOS IT's Twin architecture, which provides extreme density, incorporates industry leading components and has the advantage of extreme power and cost efficiency.

Versatile configurations allow the systems to be optimized for many different environments including Enterprise, Data Center, Cloud Computing, HPC, Financial, Science and Engineering, File and Storage Servers, and it has proven itself as the perfect hardware platform for the Sanger Institute to build its flexible compute platform on.



NETWORKING INTEL® OMNI-PATH ARCHITECTURE

Omni-Path is the next generation high performance fabric from Intel®; the successor to the already very successful True Scale Fabric.

Intel® Omni-Path (OPA) brings a plethora of new technologies to the Technical Computing space with emphasis on High Performance Computing (HPC). Built on the foundations of Intel® True Scale Fabric and additional IP acquired from Cray, Intel® is looking to dominate the HPC arena with a low latency, high bandwidth cost efficient fabric.

Intel Omni-Path Architecture and Intel® Scalable System Framework provide organizations like Northumbria University with the performance they need for tomorrow's HPC workloads, and the ability to scale to tens of thousands of nodes at a price competitive with today's technologies

Barry Davis, General Manager, HPC Compute & Networking, Data Center Group, Intel.

NORTHUMBRIA UNIVERSITY

BIOS-IT worked with Northumbria University to deploy Intel OPA on top quality, optimised Supermicro 2U Twin architecture. The combination of Intel and Supermicro enables clustered multi-user capacity with the servers providing in excess of 1Tflops/s performance per node, as measured with the industry standard Linpack benchmark. The system caters effortlessly to the heavy demands of intense HPC applications and has the ability to scale to thousands of nodes as required thus preparing Northumbria for future workloads.

Dr Leanne Wake, from the university's Geography department has explained the benefits for her students:

"The installation of the HPC cluster at Northumbria will enable researchers in the Geography department to efficiently perform multiple high-resolution simulations of Earth systems, thus allowing us to explore more deeply the interactions between the cryosphere and climate over a range of temporal and spatial scales.

"Not only has the installation proved a success for growing workload capabilities, but in the education of the students too. Dr Wake adds: "Additionally, the multi-user capacity of the cluster allows a unique opportunity for undergraduates on the Geography course to add a more computational dimension to their degree."





NETWORKING MELLANOX INFINIBAND

Mellanox's family of InfiniBand switches deliver the highest performance and port density with complete fabric management solutions to enable compute clusters and converged datacenters to operate at any scale while reducing operational costs and infrastructure complexity. Mellanox switches includes a broad portfolio of Edge and Director switches supporting 40, 56 and 100Gb/s port speeds and ranging from 8 ports to 648 ports. These switches allow IT managers to build the most cost-effective and scalable switch fabrics ranging from small clusters up to 10's-of-thousands of nodes, and can carry converged traffic with the combination of assured bandwidth and granular quality of service ensuring the highest productivity.

Mellanox's family of high density and high performance Ethernet switches offer scalability to any scale thanks to their chassis and fabric management. This family includes a broad portfolio of Top-of-Rack (TOR) switches that range from 18 to 64 ports, and support 10/40/56Gb/s per port. These switches allow IT managers to build cost-effective and scalable switch fabrics for small to large clusters up to 10's-of-thousands of nodes.

Mellanox switches deliver high bandwidth with low latency to get highest server efficiency and application productivity

NVMe&NVMe over Fabrics

NVMe[™] - Non-Volatile Memory Express is a communications interface/ protocol developed specially for SSDs, it reduces latency and provides faster CPU to data storage device performance.

Non-Volatile Memory Express over Fabrics(NVMe-oF), is designed to enable NVMe message-based commands to transfer data between a host computer and a target solid-state storage device or system over a network such as Ethernet, Fibre Channel, or InfiniBand. Considering the latest Ethernet and InfiniBand speeds, NVMe oF is set to dramatically improve the performance of existing storage network applications and accelerate the adoption of new and future storage architectures.



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VSCALER PRIVATE CLOUD

BIOS IT's vScaler solution simplifies data centre infrastructure by integrating server, storage and network resources into a turnkey appliance that can be deployed in as little as 15 minutes and can run any application at any scale.

By implementing a vScaler appliance you have access to a secure, scalable and flexible IT infrastructure that allows rapid transformation and operational efficiency and generate true business benefit.

Developed on top of Openstack technology, a leading open source IaaS provider that powers many of the world's most notable science and research organisations, vScaler enables agile development and rapid deployment of scalable, production-ready private cloud environments.

vScaler allows you to provision full HPC-on-Demand clusters, Big Data analytics, accelerated GPU compute (for Machine Learning) and tiered and accelerated storage platforms.

BIOS IT delivered a centralised HPC cluster for the whole University. The UI has been great. Our users submit and monitor their own jobs with ease, and we can focus on monitoring and managing the cluster with increased facility and insight."

Pol Llovet, Associate Director of Cyberinfrastructure

MONTANA UNIVERSITY

MSU's Information Technology Center's Research Cyberinfrastructure(R-Ci) group was tasked with building a shared community computing resource. Their goal was to build a flexible infrastructure that would let them offer compute and storage services at an affordable price. It had to be scalable in small increments, easy to administer, and able to use off-premise resources to extend the infrastructure when necessary. It also had to be easy enough for students to use, and reliable enough for researchers to count on for their grant projects.

MSU's blueprint called for a modest-scale on-site cluster, virtualized clusters, and the ability to expand use of off -premise resources when necessarv. vScaler was the solution of choice. It enables MSU to spin up virtualized HPC clusters on existing servers, and easily expanding to managed cloud servers. Working with MSU, BIOS-IT selected vScaler OpenStack for a number of reasons: vScaler is a certifi ed OpenStack Powered Platform, ensuring interoperability; it was designed to make spinning up HPC clusters within an OpenStack cloud environment easy. It also enables MSU to manage their local HPC cluster, their remote HPC clusters and the OpenStack cloud itself from the same powerful user interface.



HOSTING & CONNECTIVITY DATACENTRE

BIOS IT have partnered with Tier III Data Centres and world leading connectivity providers to ensure that whatever the requirement we can implement a well -designed solution.

Having multiple partners ensures that we can advise on the best routing, the best cost per watt and ensure that the Service Level Agreement (SLA) meets your operating requirements.

Our data centre solutions providers include Aegis Data, as well as global DC and telecommunication providers.

Boasting ultra-efficient PUEs of 1.2, 100% renewable energy and a minimum of Tier III (n+1) mechanical and electrical infrastructure, our ISO 9001 & ISO 27001 Certified Datacentres offer true enterprise support.

With access to a secure dark fibre network that encompasses London, and through a collaboration of global communication providers, we can provide high performance, end-to-end hosting and networking services. Optional fully Managed Services can be overlaid with any of your hosting and connectivity requirements.

AEGIS DATA

Aegis Data is an award winning colocation provider in the South East of England. To enhance their offering to their Customers. Aegis selected vScaler to provide Infrastructure as a Service (IaaS) with a large scale vScaler implementation. This enables them to offer the latest technology accelerators and CPUs for proof of concepts, including Deep Learning, Rendering, High Performance Computing.

"We are always looking for key strategic partner relationships to enrich and provide additional IT service offerings to complement our high performance colocation (HPC) and connectivity solutions. By partnering with BIOS IT, with their expertise in large scale CPU/ GPU technologies, this now allows Aegis Data to explore and enter new markets and deliver cost effective physical, hybrid and/or total cloud solutions."

Greg McCulloch, CEO of Aegis Data



MANAGED SERVICES

New technologies help drive digital transformation and allows the Business the opportunity to derive more benefit from their IT.

However, resource pressures on multiple fronts including regulatory requirements, security threats & business accountability often means that these cannot be capitalised on.

To enable the business to free up internal resource, BIOS IT offers tailor made managed services packs. Understanding the diverse way in which businesses operate, we take a "only buy what you need" approach from basic administration, to code correction and debugging, allowing total flexibility.

All managed service packs are available on 1,3 or 5-year license agreements with the ability to add additional service packs at any time to expand or extend the service.

Our Bronze level service pack includes base remote monitoring and administration. This is performed via secure remote access and allows BIOS IT engineers to perform and manage standard cluster status checks such as machine operation, interconnect subsystems, storage and application queuing. All relevant notes concerning fixes, changes, up-dates and upgrades are documented, managed and shared via our Managed Technical Operation Centre.

SUPPLEMENTARY PACKAGES

- User code correction and debugging
- End user training and support
- Queuing and scheduling support
- Environment monitoring and responsive action
- Application installation and optimization
- Hardware failure detection and support Initiation



SERVICE PACKS

Mix and match from the various service packs that we offer to create your own Custom service. A vastly efficient and cost-effective way to support your business With domain skilled engineers.

CUSTOM IT CLUSTER DESIGN

Work with our experts to design your cluster. Take advantage of our Labs to test New technologies or mix them. Use your code to verify assumptions made in design, or to validate the choice of technology selection.

APPLICATION OPTIMISATION

Ensure portability of codes between architectures to ensure efficient use of different clusters. Application profiling to identify performance bottlenecks and then tune for performance. Includes recommendation of best practice for job submission scripts for each application.

OFF PREMISE LEASING

Take advantage of an OPEX model to lease the new technology that you require to drive your business forward. This model can give a greater level of flexibility than the standard approach to purchasing IT.

HARDWARE DISPOSAL

We can maximise the return from your redundant product, from recovery of components and value recovery from current technology to cost effective disposal of IT meeting all your WEEE liabilities and providing disposal certification.

DATA MIGRATION

Data Migration is a non-trivial task. All stakeholders are identified and we mitigate risk by operating an ITIL v3 compliant processes and Configuration Management Database (CMDB). End to End transfer assumptions are validated prior to transfer.



On-site, or remote access that enables you to test benchmark validate simulate and certify your solution at BIOS IT Labs.

FIRST TO MARKET

At BIOS IT we are dedicated to providing our clients with first-to-market technologies, along with unrivalled consultancy and expertise that you can trust. We strive to be the first to introduce next generation solutions specializing across low latency, high performance, power efficiency and extreme density. Delivering these disruptive technologies facilitates improved performance for our customers, along with a superior TCO for their businesses.

BIOS IT have always committed to re-investing in our business in terms of research and development, in order to be able to deliver crucial information to our customers that in turn allows their business to grow. We have excellent relationships with some of the world's largest IT manufacturers, and we participate in global events in order to discover and collaborate with bleeding edge hardware and software vendors, ensuring our offerings include the latest and greatest technologies to benefit your business.

BIOSITLABS

With the constant innovations in technology and profusion of options, we understand how daunting the prospect of investing in new, upgraded IT hardware must be especially without the option of viewing or testing your purchase prior to receiving it. This is why we have introduced BIOS IT Labs.

BIOS IT Labs innovates the way customers are enabled to make an informed purchase decision with the ability to try expensive technologies before they buy. We offer both in lab or remote access to new technologies or configurations that are being explored. Further options, such as customisation and branding, can also be developed for clients looking for their own unique range of systems and appliances.

Competitively priced, secure, fully supported and available immediately, BIOS IT is poised and ready to simplify your HPC infrastructure. Contact us to discuss your requirements today.





BIOS IT HAVE A RICH ECOSYSTEM OF TECHNOLOGY PARTNERS



GET IN TOUCH

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