

Data center optimization  
with bullion



# Summary

As the living legacy of the organization's IT history, Data Centers bring together different technologies. But the lack of interoperability between them has led to a silo-based structure. IT Departments find themselves with a complex production tool, that is hard to manage and not flexible enough to incorporate the new IT developments that the business requires. So while it ought to be the powerhouse of innovation and the keystone of business performance, the Data Center has actually become a major cost center.

All this means that optimizing the Data Center is a strategic priority. As well as the vital need to control costs, the IT Department faces four major challenges: mastering complexity, ensuring resources flexibility, meeting agreed service levels and maintaining operational efficiency.

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# The data center: cornerstone of business performance

Bullion, Atos high-end x86 server is powerful, reliable and flexible, enabling IT Departments to build an infrastructure that aligns perfectly with the whole organization's targets in terms of performance, agility and cost control.

In an environment where digital technology now plays a predominant role in the activities of enterprises and organizations, the Data Center has to be an efficient tool for business. The effectiveness of sales or marketing initiatives, logistics and customer service processes directly depends on the performance of Data Centers. But these facilities are subject to unprecedented demand in terms of response times, availability, agility and security; all against a backdrop of tight budgets. For IT Departments, Data Center optimization is becoming a strategic issue if they want to unfailingly meet service level agreements (SLAs) and ensure that resources are aligned with customers' needs.

The main difficulty comes from the way that the Data Center is configured: organized into silos around physical servers dedicated to a collection of applications. This leads to pockets of resources, which are hard to share if necessary.

As well as creating inefficiencies, inevitably this also leads to extra costs, because to overcome the risk of not having enough resources, the infrastructure is constantly being over-sized, unless admitting a potential software limitation by the hardware on which it runs.

Virtualization is a mature and effective way of addressing this issue. It allows to share, consolidate and rationalize resources, increasing flexibility while reducing the complexity and costs of your IT infrastructure. Consolidation based on virtualization is the first step on the path to the private Cloud and the Software Defined Data Center (SDDC). Nevertheless, the path to an optimized and modernized Data Center, which constantly remains in step with the expectations of business, is marked by four major challenges: mastering complexity, ensuring resources flexibility, meeting agreed service levels, and maintaining operational efficiency.

## The four challenges of optimization

### Mastering complexity

The proliferation of servers, the diversity of components, the complexity of different networks, the coexistence of different versions of operating systems, middleware and applications... all result in less efficient investments as well as difficult and costly systems administration. When the infrastructure is too complex, it takes longer or even prevents from implementing new applications or business processes and from applying management policies. If you cannot master that complexity, the information system can suffer from a devastating scissor effect, with a real impact on competitiveness: becoming less agile and more costly. The answer? Virtualization, consolidation and standardization of IT environments.

### Resources flexibility

Organizations have limited resources to devote to IT: not just financial resources, but also floor space, energy, staff, skills... But the needs of the business are growing, SLAs are getting tougher and the amount of data to be processed is increasing all the time. Against this backdrop, all resources must be used to their full potential, which means it should be possible to dynamically assign them to different tasks. Nowadays, it's not acceptable to wait weeks for an extra server to be delivered or to halt a critical application so as to reallocate unused resources. Flexible and agile resources are the key to a Data Center that effectively combines reliability and scalability.

### Meeting agreed service levels

It's out of the question for users to suffer at all when there are on-going operations in the Data Center or to see a degradation over time in the performance of their applications. However, critical applications – especially databases – are often very resource hungry. Being able to guarantee their level of performance and availability, no matter what, is essential. If necessary, that should mean devoting unused resources to them or reallocating those used for secondary tasks to support applications essential to the information system.

### Maintaining operational efficiency

The IT infrastructure has to meet service levels at an acceptable cost. But in the Data Center, this cost must take into account energy bills, as well as operation convenience. Depending on the environment, the time it takes to identify and correct a malfunction, to reallocate a virtual machine or to install an update can vary considerably. Reducing the proportion of the budget allocated to production and to tasks with less value – without compromising on quality of service – has become a key issue for IT Departments.

# Bullion reconciles the extremes

Designed to meet the need for Data Center optimization, bullion delivers a unique response to the massive challenges this involves. With its unique features, bullion addresses extreme demands that are often believed to be completely irreconcilable: performance and elasticity, reliability and cost control.

## Outstanding performance...

The introduction of the Intel® Xeon® E7v4 processors is a major leap forward in the x86 world, as Intel® increased the computing power of its processors especially in an OLTP environment. In addition, 24 cores and 48 threads per socket are now available as well as DDR4 memory technology for a massive boost in performance.

Bullion - which is positioned among the best servers in the SPECint benchmark and SPECvirt tests (16 socket bullion) - especially benefits from the contribution of these new processors. Bullion still offers up to 16 processors (compared with eight for the so-called 'glueless' models), i.e. up to 384 cores in a single server. In addition, bullion offers up to 24TB of RAM: enough to satisfy the most demanding applications and overcome the limitations of glueless architectures. The range also includes a model featuring high-frequency processors, optimized for sequential processing (for example, batch jobs).

## ...and unrivalled elasticity

Scaling from 2 CPU/48GB RAM up to 16 CPU/24TB RAM, bullion is the only x86 server capable of delivering a reliable, flexible and cost-effective response to all types of data processing. Adding more computing power is now just a formality, thanks to the latest generation of the Bull Coherence Switch (BCS) - for simple interconnection of up to 16 processors - and the Connecting Box, a column that allows you to connect different modules easily and without cables.

## The bullion approach to elasticity

- ▶ Adjust resources to match needs
- ▶ Add resources on the fly
- ▶ Reallocate resources

Static partitioning enables to change configurations and reallocate resources. For example, an eight-socket server can be reconfigured into four dual-socket servers using the configuration menu. By its nature, bullion is already 'Software Defined Hardware'.

RAM blades also allow memory hot-plug in Linux environment. This means you always have a suitable configuration and can spread your investment. With bullion, there's nothing to fear and no need to take precautions: no matter how your memory requirements change, you will always be able to adjust capacity quickly and easily. I/O elements can also be added in the form of blades, based on standardized components to minimize costs and ensure greater compatibility. Administration and maintenance are simplified with this blade system, patented by Bull.

With bullion, your resources can change dynamically in line with your business and your needs.

All you have to do is to:

- ▶ Add memory blades to enlarge your memory footprint
- ▶ Add I/O blades to boost exchange performance
- ▶ Add complete modules to increase system performance.

## Mainframe class reliability...

In critical environments, bullion offers unique levels of reliability and availability, along with early warning features that anticipate potential breakdowns. In addition to the RAS features already existing such as Run Sure® technology a raft of methods to protect the RAM and the platform, the Intel® Xeon® E7v4 processors provide extended RAS features as well as Power & Thermal capabilities. Combined with a wide range of diagnostic resources, this allows to anticipate problems and react appropriately. Several thousand control points per rack have been added up to continuously monitor all key server components such as drives, fans and power supplies so as to reduce failures and the risk of system shutdowns.

A whole series of innovations have been included, for nearly 100% memory reliability. For example, hot-plug RAM blades based on standard memory components are patented elements inherited from Bull. Depending on the hypervisor or OS being used, adding a new blade may even correspond to memory hot-plug at system level. Bullion also has memory protection and migration features (RAS) implemented by Bull.

For example, the Machine Check Architecture (MCA) Recovery Execution Path prevents a server crash in case of a fatal memory error, limiting the impact just to the virtual machine using the faulty block. In the same way, if several consecutive errors are detected on a memory card (even if there is a correction on the fly), bullion will automatically migrate it to enable the faulty blade to be replaced, and the hypervisor and OS will be advised not to use the corresponding address ranges anymore.

Bullion is designed for **mission critical applications** & high density virtualization.

## ...at optimum cost

The x86 platform, and the use of blades based on standard memory components, delivers a clear price advantage compared with legacy environments. But this is not the only consideration. Indeed, bullion can facilitate significant direct and indirect savings throughout its lifecycle.

Thanks to expertise inherited from Bull in designing efficient platforms, bullion offers **outstanding energy efficiency**. An active-passive power supply cuts power consumption, and coupled with a patented Ultra Capacity Module (UCM) allows the passive power supply to start up without a break. Better still, with its specific power supply solution, the server is protected against micro-outages, which further increases its availability. Of course, all power supplies are 80+ Platinum level certified.

The ability to change memory or I/O blades is not just a plus when it comes to elasticity, it also simplifies maintenance and **boosts productivity** in the Data Center. More generally, everything has been done to streamline operations. The components most susceptible to failure - including power components, fans and disks - are easily replaceable by the customer (Customer Replaceable Units). The integration into monitoring hypervisors (such as vCops) enables to predict the failure of a component

Bullion's lower power consumption means smaller electricity bill and **contributes to the organization's CSR targets**.

through the software layer. Indicators are transmitted for more effective monitoring and proactive analysis, which results in easier administration as well as simpler and more streamlined maintenance.

Another area where savings can be made is on **license fees**. The Intel® Xeon® E7v4 processors have more cores per socket, so fewer CPUs are required for the same number of VMs (compared to Intel® Xeon® processor E5 family servers). Each core is also more powerful than the previous generation, which means fewer cores for the same power: so it costs less for applications that are billed per core. And static partitioning allows to 'isolate' processors or cores, if the licensing model requires it, while maintaining a consistent platform.

Bullion customers typically achieve **savings of 30% to 50%** on license costs.

# Towards the data center of the future

## Denser servers... and fewer of them

Most of the time, in virtualized environments, processors are running under moderate workloads, but memory limits the number of virtual machines that can run simultaneously. Bullion is pushing the boundaries of total memory capacity, by multiplying it by two compared to Intel® Xeon® processor E5 family servers. Bullion server equipped with Intel® Xeon® E7 processors can have up to 24 memory modules (DIMM) per CPU compared to only 12 memory modules per CPU for the servers equipped with Intel® Xeon® E5 processors. Double density memory means you can operate up to twice more virtual machines with the same number of servers. By enabling more efficient consolidation, bullion helps organizations reduce server sprawl, decrease platform heterogeneity and achieve real savings: all targets that IT departments are trying to meet and which can be implemented as part of Data Center optimization.

## The converged infrastructures option

Bullion is the cornerstone of the converged infrastructure offerings developed by Bull. These turnkey solutions include servers, storage and networks. Converged infrastructures offer many advantages: they are pre-validated, integrated systems with many configuration options, that have been pre-tested and offer unified system administration. The main benefits of converged infrastructures are lower risk and complexity and extremely fast implementation. The entire infrastructure benefits from a single point of support and maintenance, with end-to-end services. In VMware environment, this now even includes the possibility to manage your VM and your bullion server from a single point integrated in vCenter.

## The core platform for the Data Center of the future

These days it's increasingly hard to justify high IT costs if there is no resulting significant boost to agility and performance. Improving SLAs and increasing operational efficiency is the way to go. Bullion is a reliable server, based on standardized components and offering unrivalled elasticity in the x86 world. By facilitating consolidation – with its resulting efficiency improvements, lower levels of complexity and cost savings – bullion is the ideal core platform for the Data Center of the future. Whether your plan is to move towards a 'Software Defined Data Center' and/or a private Cloud, with bullion, the foundations have already been laid.



# Atos: working alongside you

Depending on what's needed, Atos offers a wide range of services to support its customers all the way, on their path to the Cloud or SDDC.

## A network of partners

Atos has developed long-standing relationships with numerous partners, including major players in the Cloud and SDDC. High-level partnerships have been established and Atos is recognized by its peers for its expertise and added value. For example, one ISV has used bullion to push its hypervisor to the limits in its R&D labs, where some of the many features included in bullion have been tested and integrated.

## Recognized expertise

Atos offers consulting and expert support to help organizations define a path to the Cloud. Specialists also accompany the implementation of bullion, to help customers make the most of its many benefits. Finally, where needed, Atos provides a complete range of Data Center optimization and operation services.

## Atos Service Assurance

To guarantee service levels and ensure that they continually adapt to the needs of the business, Atos Service Assurance supports operational activities with end-to-end unified monitoring services and proactive support, based on a dedicated structure and industrial-scale services centers. Atos offers a catalogue of packaged and modular services, structured around four areas: end-to-end monitoring of IT services, Data Center Infrastructure Management (DCIM), Capacity Management, and High Availability.

## Welcome to our Demo Centers

If you want to form an opinion about a particular solution, nothing beats seeing it in action. Atos' Business Technology & Innovation Centers (BTIC) and Competency Centers provide a welcoming environment where customers and experts can meet and exchange ideas. As well as bullion servers, the Competency Center plays host to hardware from various suppliers. Every year, these centers welcome thousands of visitors, whether for technology briefings, 'Proofs of Concept' or benchmarking exercises.



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# About Atos & Bull

Atos SE (Societas Europaea) is a leader in digital transformation with circa 100,000 employees in 72 countries and pro forma annual revenue of circa € 12 billion. Serving a global client base, the Group is the European leader in Big Data, Cybersecurity, Digital Workplace and provides Cloud services, Infrastructure & Data Management, Business & Platform solutions, as well as transactional services through Worldline, the European leader in the payment industry. With its cutting edge technologies, digital expertise and industry knowledge, the Group supports the digital transformation of its clients across different business sectors: Defense, Financial Services, Health, Manufacturing, Media, Utilities, Public sector, Retail, Telecommunications, and Transportation. The Group is the Worldwide Information Technology Partner for the Olympic & Paralympic Games and is listed on the Euronext Paris market. Atos operates under the brands Atos, Atos Consulting, Atos Worldgrid, Bull, Canopy, Unify and Worldline.

For more information, [visit atos.net](http://www.atos.net)

## Bull, the Atos technologies for the digital transformation

Bull is the Atos brand for its technology products and software, which are today distributed in over 50 countries worldwide. With a rich heritage of over 80 years of technological innovation, 2000 patents and a 700 strong R&D team supported by the Atos Scientific Community, it offers products and value-added software to assist clients in their digital transformation, specifically in the areas of Big Data and Cybersecurity.

Bull is the European leader in HPC and its products include bullx, the energy-efficient supercomputer; bullion, one of the most powerful x86 servers in the world developed to meet the challenges of Big Data; Evidian, the software security solutions for identity and access management; Trustway, the hardware security module and Hoox, the ultra-secure smartphone. Bull is part of Atos.

For more information, [visit bull.com](http://www.bull.com)

