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WHITE PAPER

BS2000/OSD

S165 and S200 Business Servers for the Data Center

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Pages 8

Introduction

High availability and performance:
Two indispensable requirements for safeguarding IT operations

In any IT infrastructure, high availability and performance must be guaranteed at all times, principally through effective interaction of processes, technologies and people. At the same time, users of IT services demand maximum availability, and that means above all sufficient stability, performance and scalability. Availability, in particular, represents one of the most important criteria, since all business-critical procedures and processes of an organization are totally reliant on the operational integrity of the IT backbone. The foremost prerequisite for ensuring maximum efficiency and reliability is to reduce IT complexity.

Particularly with regard to the growing spread of service-oriented architectures (SOA), the new S165 and S200 business servers are the first-choice solutions when it comes to meeting increased IT requirements.

Most in the spotlight are the demands that a service-oriented architecture, with its large volumes of automated transactions and increased expectations, places on data security.

The business servers of the S class are ideally equipped to meet precisely these requirements. The S165 and S200 make sure that all vital processes in the organization remain up-and-running – with even greater stability, reliability and speed.

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IT consolidation – reducing costs, increasing flexibility and gaining new agility

Apart from the requirement to ensure the mainframe virtues of high availability and performance on all platforms, the demands placed on IT – as a basis for supporting business processes – have also fundamentally changed. The reasons are to be found in the growing dependence of organizations on their IT infrastructure, extremely rapid technological changes in the marketplace, and the increasing challenges facing the organizations themselves in terms of their competitiveness.

The solution to this problem is called IT consolidation – simplifying the IT to improve adaptability while maintaining consistent service levels and simultaneously achieving cost savings.

Consolidating internal applications and procedures (EAI) in this way, as well as connecting business partners on a central integration platform, substantially lowers the costs of hardware and software support and the overhead involved in building up and maintaining the relevant know-how.

For when a central integration infrastructure is deployed, instead of struggling with an unmanageable diversity of systems, only a few centralized applications are required. The advantages speak for themselves:

- High degree of process transparency as a basis for informed management decisions resulting from end-to-end business processes
- Fast process handling and low manual overhead thanks to a high degree of automation
- Low administrative overhead, since both in-house applications and customer and supplier relationships are mapped and managed on a consolidated platform
- Unified view of information and processes through centralized monitoring

Investing in the future

Despite tight budgets, many IT managers today are faced with the difficult task of building and operating an IT infrastructure that provides high availability and security and at the same time is capable of keeping pace with new technologies. This infrastructure must support not only a large number of different and constantly changing workloads, but also the most diverse storage products and software solutions. Investing in BS2000/OSD servers is therefore a logical step in mastering this difficult challenge.

As well as being highly cost-effective, servers of the S series also provide the performance and flexibility necessary to be armed for the challenges facing enterprise-wide consolidation and the steadily growing performance demands of the future.

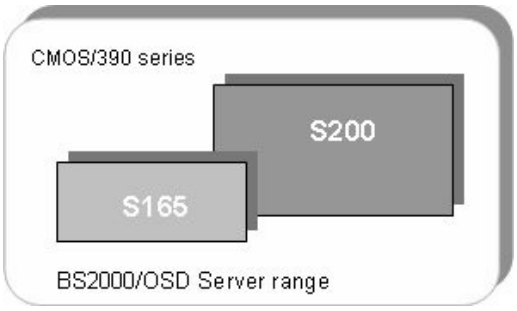
The new high-end models of the S165 and S200 series handle OLTP applications for tens of thousands of users and can be used as central database and application servers for organizations across virtually all sectors of industry. The S165 and S200 servers also represent the growth alternatives for every high-end user in the BS2000/OSD environment.

Positioned at the pinnacle of the most technologically advanced architectures in the enterprise sector, the BS2000/OSD servers of the S series provide tailor-made solutions and almost infinite growth potential.

The current S165 and S200 servers cater in full measure for the trend toward recentralization and the associated demand for ever greater computing power. For example, growth by a factor of 360 between the smallest BS2000/OSD server up to the largest S200 configuration level is no problem at all. The very finely scalable models of the S series cover the performance range from 160 RPF to 4,300 RPF, thereby further extending the previous performance limit in the high-end sector.

Meeting computer center requirements

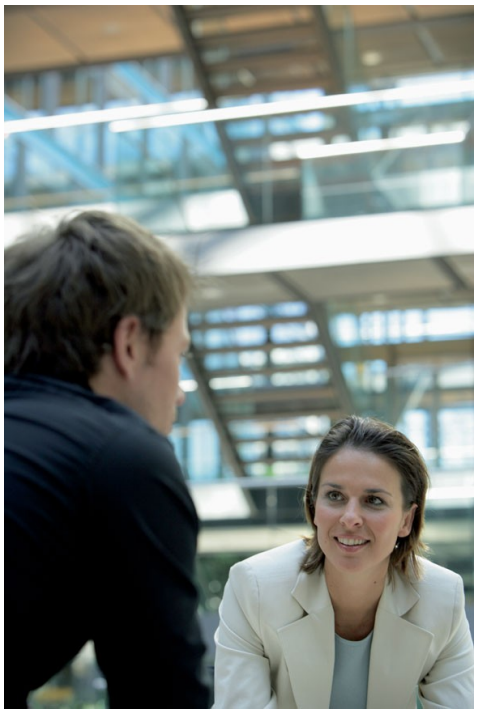
The S165 and S200 business servers combine the traditional strengths of an open mainframe with future-oriented technologies to meet the high demands of a modern computer center.



They provide:

- Parallel support for tens of thousands of users in a secure runtime environment
- Management and processing of even the largest datasets
- Fully automatic operation plus high levels of flexibility
- Centralized storage for data from different clients and servers in the company
- Implementation of secure, high performance transaction solutions for e-business

This ensures the new S165 and S200 business servers deliver the maximum technical performance and, as experience has shown, provide the necessary investment protection – both today and in the future.



IT consolidation ...

... less is often more

In today's conditions, historically evolved IT infrastructures often demand a high level of administrative overhead and in most cases no longer achieve the standards expected of them. In order to escape the continuous investment spiral in IT as far as possible and nonetheless achieve maximum availability of your business-critical processes, it is now more imperative than ever to optimize the use of existing resources as well as new ones.

Consolidation of the server estate across the organization is the logical consequence.

Shouldn't we be asking the question why running many servers swallows up more and more money? Was any thought given to how installation site costs, costs for infrastructures such as air conditioning systems and power supplies, costs for building new data centers and the associated IT relocations, hardware maintenance costs, and, of course, the extra overhead in the areas of administration and management, can be reduced?

In this scenario, less is often more when it comes to reducing complexity and costs, harmonizing heterogeneous system environments and optimizing resources.

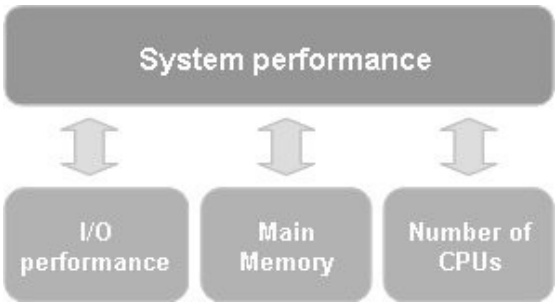
Analyses by independent institutes have also repeatedly confirmed the low TCO (Total Cost of Ownership) of mainframes in large application projects. With the new BS2000/OSD business servers, central functions such as administration, resource management, and backup/restore are implemented efficiently and economically.

Scalability: the trump card of multiprocessor systems

Because performance requirements grow quickly in commercial data processing, the S165 and S200 servers are ideal. The successive expandability of the systems used is also especially important. The S165 and S200 servers can be upgraded in three ways:

- number of processors,
- main memory size and
- I/O bandwidth.

With the new high-end servers of the S series, the system can be extended on site in any direction.

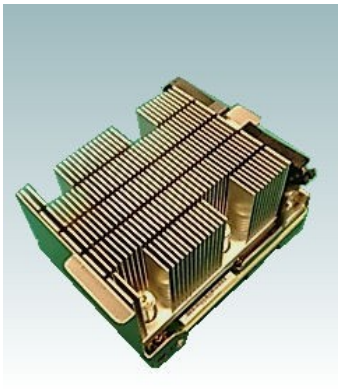


The VM2000 virtual system concept opens up an additional dimension of scalability to BS2000/OSD users. VM2000 permits flexible, load-based division of a server into multiple parallel systems. These are completely independent of one another and can also be operated with different operating system versions. The advantage compared to the use of multiple servers is obvious: cost-effective use of hardware resources and optimal deployment of applications and personnel.

The new S165 and S200 servers: high availability and scalability – made to measure

In the high-end computing sector, the BS2000/OSD servers of the S class provide a sophisticated and mature platform for management of the largest sets of data. In terms of security, maximum availability, ease of operation and automation, it is a platform which has excelled in many business-critical application scenarios.

To further extend these proven features and satisfy the associated demand for ever greater computing power, Fujitsu is providing two new server lines delivering significantly higher processor performance for the upper end of the BS2000/OSD performance range.



The BS2000/OSD servers feature a host of components which are either already present redundantly or can optionally be configured with redundancy. An unplanned system outage due to a defective CPU, I/O processor or memory can be avoided if suitable redundancy is provided. This is handled by mechanisms for automatic fault detection and auto-reconfiguration of the system.

Scheduled system interrupts, as required, for example, to carry out hardware maintenance, can also often be avoided thanks to redundancies, because various components can be replaced individually during online operation. These include power supplies, fans, and channel modules. Firmware updates, e.g. to the service processor, can also be carried out with no interruption to operation.

S165 highlights

- Newly developed processor based on 90nm technology
- 1 to 3 processors
- Monoprocessor performance of 350 RPF
- Standard hot-spare processor
- Finely scalable in performance and connectivity
- Main memory up to 64 GB [1]
- Global storage up to 128 GB
- Up to 128 I/O channels
- Capacity on demand
- Fibre Channel technology

The models of the new S165 series provide as much processing power as a true high-end server. With three central processors (CPUs) in the maximum configuration, the S165 is positioned below the S200 flagship model. The large performance bandwidth covered by the nine models of the series means a suitable system is available to match any requirements. BS2000 customers choose precisely the performance they need.

The S165 series delivers first-class performance figures and is upgradeable to max. three central processors.

The 1-way processor system can be upgraded in finely scalable steps to a 2-way processor system to meet performance and availability requirements. You can make another performance leap to the 3-way processor system with the S165-30D. Upgrading to the more powerful models is carried out in the field and so can be accomplished with little overhead.

Model	Number of CPUs	Performance factor	RPF
S165-1RB	1	1	160
S165-10A	1	1.4	225
S165-10B	1	1.7	270
S165-10C	1	1.9	310
S165-10D	1	2.2	350
S165-20A	2	2.5	400
S165-20B	2	3.1	490
S165-20D	2	4.0	640
S165-30D	3	5.7	910

[1] The S165 business server is ready to support a main memory size of max. 64 GB.

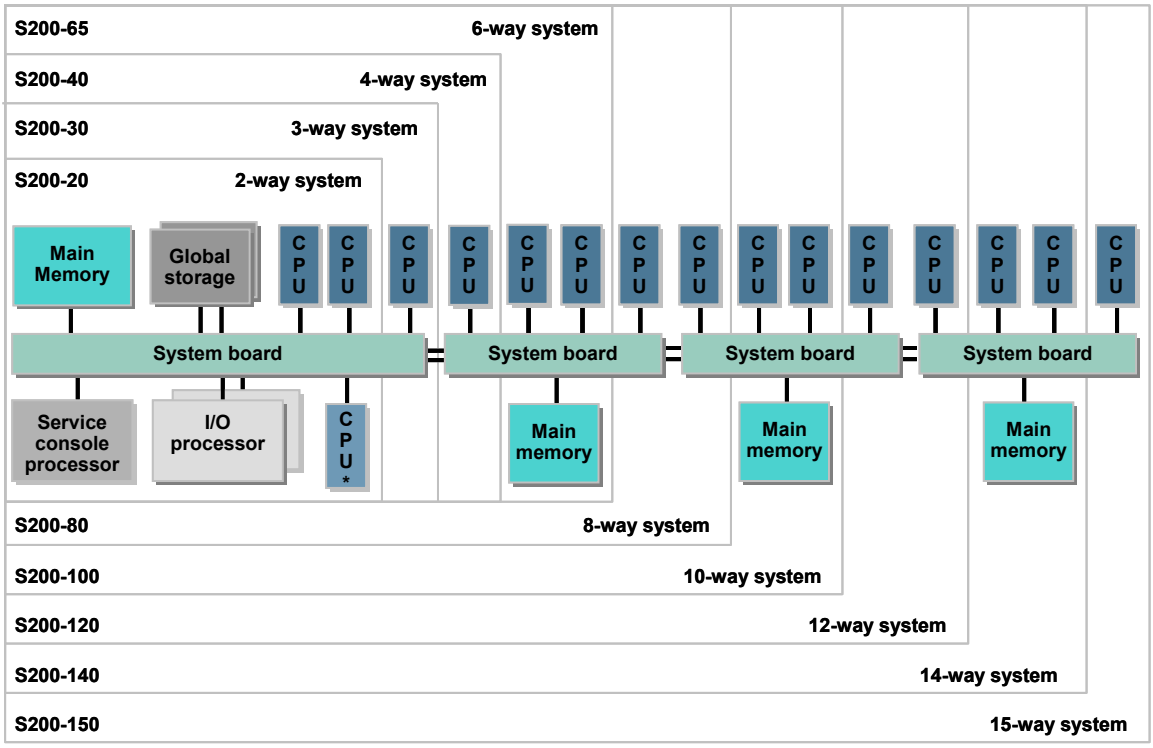
S200 highlights

- Newly developed processor based on 90nm technology
- 2 to 15 processors
- Monoprocessor performance of 480 RPF
- Standard hot-spare processor
- Finely scalable in performance and connectivity
- Main memory up to 256 GB [2]
- Global storage up to 128 GB
- Up to 256 I/O channels
- Capacity on Demand
- Fibre Channel technology

Model	Number of CPUs	Performance-factor	RPF
S200-20	2	1	860
S200-30	3	1.4	1170
S200-40	4	1.8	1520
S200-65	6	2.4	2050
S200-80	8	3.0	2600
S200-100	10	3.6	3100
S200-120	12	4.2	3600
S200-140	14	4.8	4100
S200-150	15	5.0	4300

The performance of a system is essentially determined by two parameters: processor power and available main memory. In both respects the S200 stands for unmatched industry-leading values.

Even the S200 entry-level model weighs in with two processors and can be expanded into a 15-way system to meet performance and availability requirements. A crucial advantage of multiprocessor systems is increased availability: Given suitable, redundant configuration of the hardware, a hardware component failure prompts the system to reconfigure itself automatically without any interruption to live operation.



Business Server S200 - structure

* Spare CPU fitted in every model

[2] The S200 business server is ready to support a main memory size of max. 256 GB.

Maximum availability for system and applications

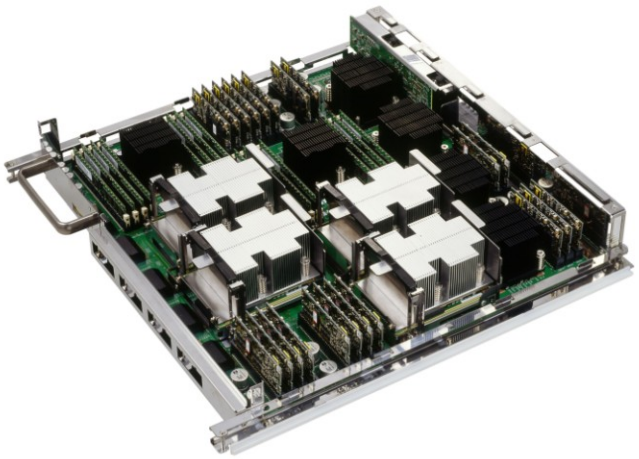
Round-the-clock availability of systems and applications is a matter of survival for many organizations today. For this reason all the models of the S series – from the smallest S165 model to the largest S200 model– are equipped with a hot-spare processor. Normally this processor is not active, but it springs into action as soon as an active processor fails. That means: full system performance at all times.

The spare processor is attached dynamically, thus ensuring smooth operation with no interruption and no loss in performance. The same goes for failure of any channel interfaces. These are ideal prerequisites for uninterrupted, 24-hour operation.

High-tech components

- System board for accommodating the central processors (CPUs), the system controller, the memory controller and the main memory
- CPUs are manufactured in state-of-the-art 90nm CMOS technology and feature a 6MB cache
- The main memory chips are implemented in advanced CMOS technology using 1-Gbit, 2-Gbit or 4-Gbit DDR2 SDRAM DIMMs

DDR2: Double Data Rate-2
SDRAM: Synchronous Dynamic Random Access Memory
DIMM: Dual Inline Memory Module

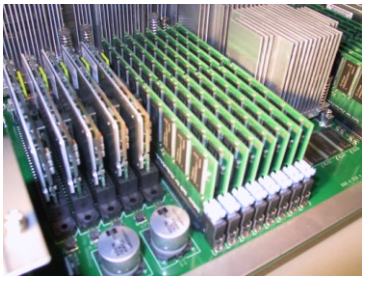


Modular concept for large applications

The increasing trend toward recentralization is driving a constant demand for greater and greater server performance, with the focus on higher processor speed. The enormous increases in performance are based on smaller and smaller geometries in the processor chips, as well as higher clock rates.

The tighter packing density on the highly integrated processor chips and the large 6MB cache per CPU shortens processing times even further, thus boosting the performance of the processors.

Ever-shrinking feature sizes not only save space, but, more importantly, also reduce the power draw and waste heat from the systems.



Along with processor performance, the size of the main memory plays an important role in assessing system performance. With a maximum capacity of 256 GB, the system is equal to any demands. Extremely fast, synchronized chips provide the highest levels of data throughput. The intelligent cache architecture ensures optimal utilization of processor performance. Even extensive batch jobs at the end of the quarter or year are no longer viewed as an impediment to “normal” online operations.

Large, monolithic programs run faster on models with few but more powerful individual processors. Thus, the switch from a 2-, 3- or 4-way processor to a new S model with the same performance can result in substantial performance improvements and greater availability.

You can be sure you’ll always have enough performance when you need it

The cost-effectiveness of the BS2000/OSD servers is continuously improved by new usage models. Since the required system load in many applications varies between a constant basic load and a temporary peak load, flexible usage models are offered. For instance, Capacity on Demand (CoD) can provide additional CPU performance to cover temporary peak loads during ongoing operation. At the end of the high-load phase it can be switched off again.

The costs for the additional increase in performance are billed only for the agreed period of usage.

Global Storage – at home in high-performance operation

Continuous IT availability has become a key success factor for companies. Because of their high resistance to failure, BS2000/OSD servers provide an excellent basis for high-availability applications.

The HIPLEX (Highly Integrated System Complex) concept opens up another dimension in terms of high availability. Several systems mutually monitor each other and serve as backups for any system that fails. The redundant components enable the servers to achieve failure protection up to 99.999%, which corresponds to unplanned downtime of only five minutes a year.

That feat is currently achieved by practically no other system. With relatively little effort, the HIPLEX concept provides scalability and redundancy to increase performance and availability for BS2000/OSD users.

The key success factor in the Data Center

Security and speed are the salient features of Global Storage, which serves as an optional battery-backed storage upgrade or as a shared data storage facility in the server cluster. It is connected to the new business servers as a maximum 128 GB semi-conductor memory.

BS2000/OSD shows its strengths especially in the high-performance area, with

- Transaction operation for very large user and data volumes
- Guaranteed data consistency
- HIPLEX and high-performance connection of a mass memory semiconductor

The GS – a mass memory semiconductor with battery-backed data storage – permits exceptionally fast, synchronized access to frequently required data stored on disk. Access speed is increased by a factor of 100 compared to hard disks. Its memory capacity of 128 GB not only expands the main memory, but in a homogeneous HIPLEX system also receives the shared data.

Thus, up to four S-model business servers can be connected as needed into a highly integrated system complex whose overall performance can be increased by about a factor of four.

S165 and S200 business servers – investment protection included

Consistent scalability, economic and secure system administration, and extensive automation of computer center operations are crucial advantages of BS2000/OSD hardware and software. This is why it is advisable to concentrate business-critical applications on the BS2000/OSD platform.

Like all BS2000/OSD business servers, the new S165 and S200 servers also protect and preserve your investments in software, hardware, and in employee training.

Existing BS2000/OSD applications can run unchanged, existing peripherals can be used without restrictions, and ease of use also matches the accustomed high standard.

Highest data throughput to the peripherals as well

The S165 and S200 servers are equipped with a particularly flexible and powerful input/output system. Up to four I/O processors can be configured. Each I/O system operates as an autonomous system and meets all the requirements for operating different Type 2 channel interfaces with parallel fiber optic connection technology and Types S and FC in serial, leading-edge fiber optic connection technology simultaneously.

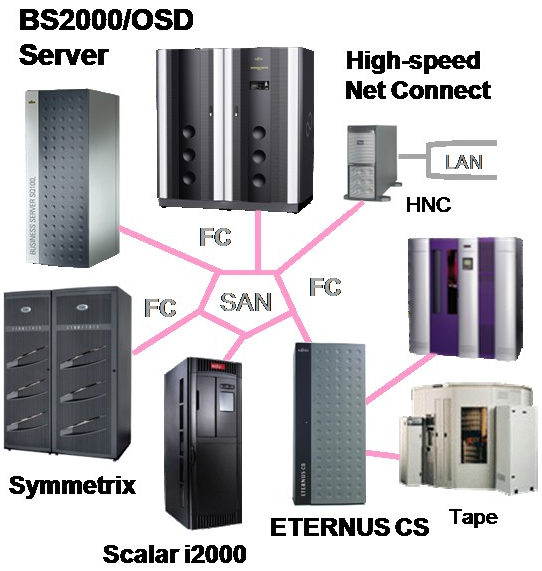
With each connection in Type FC mode, the transmission rate rises to a maximum of 100 MB/s full-duplex (i.e. simultaneously in both directions). The channels can be configured to meet individual requirements.

With fiber technology and additional network components, it is possible to bridge great distances at speeds of up to 100 MB/s.

High-end SAN connectivity with Fibre Channel technology

The trend toward server and enterprise storage consolidation requires cross-platform use of memory subsystems via SANs (storage area networks).

It is therefore necessary to support current and future technological options as well as open standard interfaces simultaneously. With the new S165 and S200 Business Servers, Fujitsu provides the Fibre Channel open interface standard for mainframes, in addition to the proven Type 2 and Type S channel interfaces (ESCON).



Fibre Channel connects the S servers directly to SAN storage facilities and networks. The FC technology thus permits intelligent implementation and optimal utilization of modern peripheral concepts based on the Storage Area Network model. The advantages are the ability to overcome great distances, a high level of data security, high throughput rates, and standardization of procurement and operations.

Integration into historically evolved environments, with all market-relevant, standardized network types and transport protocols, has significantly improved. With the introduction of High-speed Net Connect HNC-IV, a high-performance network connection for BS2000/OSD systems with FC interface is now available. The speed of all communication links to other computer systems, to dedicated LAN environments or to the internet has increased 4-5 times, greatly simplifying the connection to high-speed networks.

Open to new applications

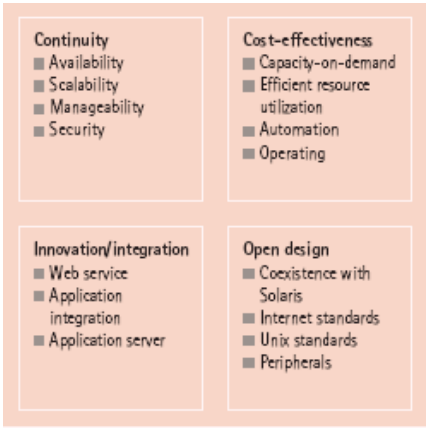
The proven BS2000/OSD operating system is optimized for high load operation in a computer center. The long-term commitment of Fujitsu to Open Server Dimension (OSD) guarantees that your investments will retain their value in the future.

As certified in the Fujitsu openNetworking concept, the BS2000/OSD servers support all protocols and interfaces for connection to the internet.

With the widely used Apache web server and a complete Java infrastructure for cross-enterprise applications, BS2000/OSD is extremely well prepared for potential new uses and application architectures.

The advantages of BS2000/OSD servers

- Investment protection thanks to compatible, long-term support for customer applications
- Unrivaled reliability and availability for all business-critical data and processes
- Seamless integration of existing applications into web-enabled systems
- Maximum scalability of all system lines
  - flexibility, performance, main memory, I/O bandwidth
- Capacity on Demand for covering peak loads
- Outstanding security management
- Low TCO and TCU based on sophisticated integration and automation technology
- Use of high-end technology
  - channel technology for storage area networks (SAN) and communication
  - availability (Spare CPU)
- Global Storage – the performance option



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