

*The defining standard in enterprise computing*



# IBM S/390 Parallel Enterprise Server – Generation 5 and Generation 6

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## Highlights

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### Powerful servers

*Enterprise Computing is no longer just about batch jobs and transaction processing. It's about doing real business over the Internet, intranets and extranets. It's about turning the supply chain into a value chain with Enterprise Resource Planning solutions. It's about using Business Intelligence applications to help identify customer needs you never knew existed. And it's about helping you handle all this work with an affordable, manageable infrastructure. The IBM S/390® Parallel Enterprise Server™ – Generation 5 and Generation 6 family can handle all these tasks concurrently in a stable, very highly secure environment that can grow easily as your business grows.*

### Cost-effective computing

*Air-cooled CMOS processors consume less energy, require less space and can help reduce maintenance costs compared to bipolar technology — replacing a water-cooled 9021-9X2 with an S/390 G5/G6 enterprise server can reduce your energy bill by up to 95% while increasing capacity significantly, can take 91% less floor space and can reduce maintenance costs from IBM by up to 70%.*

### Virtually unlimited capacity

*The S/390 G5/G6 enterprise server family offers a vast performance range that can meet almost any growth requirements. If you've invested in previous generations of S/390 CMOS servers, easy upgrade paths are available. S/390 G5/G6 servers are a superior choice for S/390 Parallel Sysplex® clustering, with enhancements that provide increased efficiency and performance.*

### New enhancements

- The balanced design of the S/390 G5/G6 server processor clusters contribute to much greater throughput with less variability for different workloads.
- The Capacity Upgrade on Demand feature to increase CPU capacity for new or unexpected workloads has been enhanced by simplifying the process for enabling extra capacity.
- The Capacity BackUp function has been improved to allow customers to activate additional CPU capacity during an emergency e.g. disaster recovery.
- New PCI Cryptographic Coprocessor (PCICC).
- Automatic enablement of Capacity BackUp for Geographically Dispersed Parallel Sysplex™ (GDPS) systems activates spare processor resources non-disruptively upon detection of a site or processor failure.
- S/390 Fibre (Channel) CONnectivity (FICON™) provides a new high-performance I/O channel, optimized for efficiency at high speed. FICON channel capacity for the S/390 G6 Server has been increased providing customers with improved performance and bandwidth over current I/O connectivity options.
- Increased subchannel capability to enable full utilization of the G5/G6 servers power and end to end bandwidth capabilities.



## Direct high speed access to your e-business applications

The Open Systems Adapter-Express (OSA-Express), available on S/390 G5/G6 servers, is an integrated S/390 hardware feature that delivers connectivity for Gigabit Ethernet, Fast Ethernet, and 155 ATM.

The OSA-Express feature provides increased bandwidth to send and

receive volumes of data between S/390 and the network.

The new OSA-Express Fast Ethernet and ATM adapters are capable of exploiting the Queued Direct Input/Output (QDIO) design providing benefits for IP and rivaling any channel attached network device. The Gigabit Ethernet feature provides significantly improved levels of price/performance while outperforming

ESCON® attached networking devices. The Open System Adapter 2 (OSA-2) delivers connectivity for Token-Ring and Fiber Distribution Data Interface (FDDI) Local Area Networks (LANs).

Support also is provided for disk and print serving and data distribution using LANRES. Network file serving is provided using LAN Server (available on OS/390®, MVS/ESA™, VM/ESA® and VSE/ESA™).

## S/390 G5/G6 enterprise server — Features

Advanced	Capacity Upgrade on Demand Capacity BackUp Open Systems Adapter 2 (OSA-2) OSA Express Express GbE	Dual CMOS Cryptographic Coprocessors PCI Cryptographic Coprocessor FICON channel 100 MB/sec full-duplex S/390 architecture
Clustered systems	Parallel Sysplex clustering technology Sysplex Timer® Integrated Coupling Migration Facility (ICMF) Resource Sharing Coupling Facility Control Code Coupling Links (HiPerLinks) Internal Coupling (IC) Channel Geographically Dispersed Parallel Sysplex	Integrated Cluster Bus (ICB) Internal Coupling Facility (ICF) Shared ICFs and CPs Dynamic ICF Expansion Transparent ICF Sparing Dynamic CF Dispatching Enhanced Parallel Sysplex Clock Functions VM/ESA Virtual Parallel Sysplex
Availability	Dual Instruction/Execution unit for each Central Processor Transparent CP Sparing System Assist Processor Sparing System Assist Processor Reassignment Enhanced Application Preservation Spare memory chips Dynamic memory sparing Partial memory restart CICS® subsystem storage protect CICS subspace group facility Remote operations support Alternate service elements Capacity backup upgrade	N+1 power supply technology N+1 cooling Concurrent power and thermal maintenance Concurrent channel, OSA-2 and coupling link maintenance Concurrent Hardware Management Console (HMC) and Support Element (SE) maintenance Concurrent Licensed Internal Code (LIC) maintenance for CP, SAP, PR/SM™, LPAR, ICMF, channels, HMC, SE, Power/Thermal Dynamic I/O Reconfiguration Management (DRM) Internal Battery Feature Independent dual utility power feeds Cancel I/O requests Console integration
PR/SM	Up to 15 LPARs Multiple 2 GB central storage LPARs	Automatic Reconfiguration Facility (ARF) Enhanced Dynamic Reconfiguration Management
Performance	IEEE binary floating point support for advanced Domino™ and Java™ performance Up to 32 GB memory allocated between central and expanded storage Check sum assist Data spaces Hipersorting Immediate-and-relative instruction Compare-and-move extended Called space identification	Hiperbatch™ Scalar square root functions Asynchronous page out facility Performed Locked Operation for enhanced IP performance DB2® sort assist SIE assist Hardware-assisted data compression Move page Dedicated move page processor Fast Sync data mover facility
ESCON	ESCON 17 MB/sec channel Multiple Image Facility (MIF)	ESCON CTC native and basic mode
FICON	FICON 100 MB/sec channel	Multiple Image Facility (MIF)
NETWORKING	OSA-Express – Gigabit Ethernet (1 Gbps) – Fast Ethernet (10/100 Mbps) – 155 ATM (155 Mbps)	OSA-2 – Token-Ring (4/16 Mbps) – FDDI (100 Mbps) Multiple Image Facility (MIF)

## S/390 G5/G6 enterprise servers at a glance

<b>Hardware models and number of processors</b>	9672 G5	<i>IBM S/390 Architecture</i>					
		RA6 (1-way)	R16 (1-way)	RB6 (2-way)	R26 (2-way)	RC6 (3-way)	RD6 (4-way)
		R36 (3-way)	R46 (4-way)	R56 (5-way)	R66 (6-way)	R76 (7-way)	R86 (8-way)
		R96 (9-way)	RX6 (10-way)	Y36 (3-way)	Y46 (4-way)		
		Y56 (5-way)	Y66 (6-way)	Y76 (7-way)	Y86 (8-way)		
		Y96 (9-way)	YX6 (10-way)				
	9672 G6	X17 (1-way)	X27 (2-way)	X37 (3-way)	X47 (4-way)	X57 (5-way)	X67 (6-way)
		X77 (7-way)	X87 (8-way)	X97 (9-way)	XX7 (10-way)	XY7 (11-way)	XZ7 (12-way)
		Z17 (1-way)	Z27 (2-way)	Z37 (3-way)	Z47 (4-way)	Z57 (5-way)	Z67 (6-way)
		Z77 (7-way)	Z87 (8-way)	Z97 (9-way)	ZX7 (10-way)	ZY7 (11-way)	ZZ7 (12-way)
<b>Coupling facility</b>	9672 Model R06 ICF	1 – 10 ICFs Up to 3/7/9 (RA6 - RD6 / R36 - Y96 / X17 - XY7 and Z17 - ZY7)					
<b>Channels</b>	Minimum	3 or 4/4/0/3 (Parallel/ESCON/FICON/Total)					
	Maximum	96/256/36*/256 (Parallel/ESCON/FICON/Total)					
	Increments	3 or 4/4/1 (Parallel/ESCON/FICON)					
	General	Channel maximums can be decreased by the use of OSAs and/or coupling links					
<b>Cryptographic</b>	— CMOS Cryptographic Coprocessor	2 - standard					
	— PCI Cryptographic Coprocessor	up to 8 - optional					
<b>Processor storage</b>	Minimum	1 GB					
	Maximum	Up to 32 GB					
	General	Central and expanded storage are user-definable					
	Exceptions	RA6, RB6, R26, RC6, RD6 models maximum 12 GB R36 - RX6 models minimum 2 GB Y76, Y86, Y96, YX6 models minimum 8 GB Y36-Y66, Xn7, Zn7 models minimum 5 GB					
<b>G5 upgradability</b>	Upgradable from R3, G3 and G4 models Upgradable within G5 family						
<b>G6 upgradability</b>	Upgradable from G3, G4 and G5 models Upgradable within G6 family						
<b>R06 upgradability</b>	Upgradable from 9674 C04 and C05 models Upgradable within R06 models Upgradable to G5 RA6-YX6 models Upgradable to G6 X37-ZZ7 models						
<b>Maximum coupling connections</b>	HiPerLinks	32 (Any G5 or G6)					
	IC	32 (RA6 - ZZ7) (Not on R06)					
	ICB	6/18/24/18 (RA6 - RD6/R36 - YX6/R06/X17 - ZZ7)					
<b>Physical configuration</b>	1 Frame	Minimum	Weight (unpacked): 612 kg (1346 lbs) Footprint: 1.0 Sq meters (10.4 Sq feet) Service clearance 2.5 Sq meters (27.4 Sq feet) Input power: 0.6 kVA Heat output: 2.0 KBTU/hr				
	2 Frame	Maximum	Weight (unpacked): 938 kg (2057 lbs) Footprint: 1.8 Sq meters (19.7 Sq feet) Service clearance: 4.8 q meters (51.9 Sq feet) Input power: 5.5 kVA Heat output: 18.8 KBTU/hr				
<b>General</b>	Conforms to EIA guidelines for frames Employs standard 24-inch cage enclosures						
<b>Software</b>	<i>OS/390 and MVS basic and LPAR mode</i>						
	OS/390	All OS/390 releases					
	MVS™	MVS/ESA SP V5R2 and subsequent releases MVS/ESA SP V5R1 ICF/MVS 2.1					
	<i>VM basic and LPAR mode</i>						
	VM	All VM/ESA V2 and subsequent releases					
	<i>VSE basic and LPAR mode</i>						
	VSE VSE/ESA	VSE/ESA V2R1 and subsequent releases V1R4 (ESA mode only)					
TPF	TPFV4R1						

\* 24 for G5

Automated file backup and restore for client data on workstations can be achieved with products such as ADSM.

Connection to the Internet/intranet is now much easier and more secure with WebSphere™ Application Server for OS/390 and with gateways from CICS, DB2, IMS™ and MQSeries® products.

### **Industrial strength security for your e-business applications**

IBM is a leader in the industry with its high-availability CMOS Cryptographic Coprocessors that help bring greater security to e-business. This feature has earned the highest certification for commercial security ever awarded by the U.S. government known as the Federal Information Processing Standard (FIPS) 140 - 1 level 4. The existing cryptographic function has been enhanced with the addition of an optional PCI Cryptographic Coprocessor (PCICC).

The combination of the standard CMOS Cryptographic Coprocessor and the optional PCICC feature enables applications to invoke industry-standard cryptographic services — such as CDMF, DES and Triple DES or RSA — to help protect personal identification numbers, message authentication codes, data, passwords, digital signatures and applications requiring public key technology.

The S/390 G5/G6 servers are enabled to take advantage of User Defined Extensions (UDX), a facility allowing creation of customized application-specific cryptographic functions.

### **Increased productivity and availability**

Application availability is probably the most critical element of any processing platform for enterprise computing. The new S/390 G5/G6 enterprise server processors deliver extremely high availability in a single footprint. Responsiveness to users is increased with S/390 G5/G6 server family's balanced design, faster channels and processors.

High availability is realized through very high component reliability and design features that help provide fault avoidance and tolerance as well as permitting concurrent maintenance and repair. CP/SAP sparing, the internal battery feature, Capacity BackUp, Capacity BackUp/SAP recovery, enhanced LPAR, dynamic storage reconfiguration, partial memory restart and dynamic memory

sparing are examples of the built-in functions that help to reduce planned and unplanned outages. S/390 G5/G6 enterprise servers are a superior choice for providing 99.999% availability with Parallel Sysplex clustering technology. Parallel Sysplex clustering offers many benefits in the processing environment, including the ability to configure at a reasonable cost by exploiting S/390 Resource Sharing of physical resources such as disk, tapes, consoles, etc. while enhancing the flexibility, performance and simplified systems management of the information technology organization to respond to changing business requirements. The S/390 G5/G6 servers add a number of enhancements, including Internal Coupling (IC) channels and an Integrated Cluster Bus (ICB) that further enhance the efficiency of a Parallel Sysplex cluster.

S/390 G5/G6 enterprise servers are supported by many different operating systems, including OS/390, VM, VSE and TPF. Using VM, you can now serve data to customers via Internet protocols to create enhanced support for client/server systems. Using VSE, you can help protect your investment in people and skills and allow for the future growth of your business through easy migration within the S/390 family.

### **To Learn More**

Visit the S/390 World Wide Web site at <http://www.s390.ibm.com> or call IBM DIRECT at 1 800 IBM-CALL in the U.S. and Canada.

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