IBM

IBM @server zSeries 990

Highlights

- **Optimized to meet the requirements of today's on demand solutions**

- **Innovative new design can scale over twice the capacity of previous IBM @server™ zSeries™ family**

- **New On/Off Capacity on Demand provides greater flexibility to manage changing workload demands**

- **Ability to scale up physically and scale out virtually lets you integrate multiple workload types**

IBM's server for the on demand world

Customers of every size, and in every industry are looking for ways to make their businesses more resilient in the face of change and uncertainty. They want the ability to react to rapidly changing market conditions, manage risk, outpace their competitors with new capabilities, and deliver clear returns on investments.

Welcome to the on demand era – the next phase of e-business evolution.

To meet the challenges of constant change, companies must go beyond simply integrating processes. They must have the flexibility to provide products and services to customers on demand. But success in this environment takes a new approach to business – and a new kind of IT infrastructure to support it.

With the latest member of the zSeries family, the IBM @server zSeries 990 (z990), IBM delivers enriched functions for the on demand data center. The zSeries is the enterprise class e-business server optimized for integration, transactions and data of the next generation e-business world. In implementing the z/Architecture™ with new technology solutions, the zSeries models are designed to facilitate the IT business transformation and reduce the stress of business-to-business and business-to-customer growth pressure. The zSeries represents an advanced generation of servers that feature enhanced performance, support for zSeries Parallel Sysplex® clustering, improved hardware management controls, and innovative functions to address e-business processing.

The z990 is designed to provide balanced system performance. From processor storage to the system's I/O and network channels, end-to-end bandwidth is provided to deliver data

IBM @server zSeries 990 enterprise server at a glance

Hardware Models						
General Purpose / Coupling Facility / Linux®	A08, B16, C24, D32					

Coupling Links	Links	ISC-3	IC	ICB-2	ICB-3	ICB-4	Max # Links
	z990	32	32	8	16	16	64[1]

Channels	
Minimum	0/0/0/0 (ESCON®/FICON Express™/OSA-Express/HiperSockets™)
Maximum	1024/120/48/16 (ESCON/FICON Express/OSA-Express/HiperSockets)
Increments	4/2/2/1 (ESCON/FICON Express/OSA-Express/HiperSockets)

Cryptographic	
	PCIX Crypto Coprocessor — up to 4 optional (up to 4 cards)
	PCI Crypto Accelerator — up to 12 optional (up to 6 cards)

Processor Memory	Model A08	B16	C24	D32
Minimum	8 GB	8 GB	8 GB	8 GB
Maximum	64 GB	128 GB	192 GB	256 GB

Upgradeability	
	Upgradeable within zSeries 990
	Upgrade from zSeries 900

Physical Configuration	Models A08, 2 frame, minimum[2]	Models D32, 2 frame, maximum[3]
Weight (unpacked)	1174 kg	2007 kg
Footprint	2.49 Sq meters	2.49 Sq. meters
Service Clearance	5.45 Sq meters	5.45 Sq. meters
Input Power	6.74 kVA	21.39 kVA
Heat Output	22.92 KBTU/hr	72.73 KBTU/hr
Air Flow	CFM 1450, m³/m	CFM 3250, m³/m
Height	194.1 cm (76.4 inches)	194.1 cm (76.4 inches)

General	
	Conforms to EIA guidelines for frames

Software		
	z/OS™ LPAR mode:	z/OS 1.2 and subsequent releases
	z/VM™ LPAR mode:	z/VM 3.1 and subsequent releases
	Linux for zSeries LPAR mode:	Red Hat, SuSE, Turbolinux
	OS/390® LPAR mode:	OS/390 2.10
	VSE LPAR mode:	VSE/ESATM 2.5 and subsequent releases
	TPF:	TPF 4.1 (ESA mode only)
	Linux for S/390 LPAR mode:	Red Hat, SuSE, Turbolinux

[1] 32 External and 32 Internal   [2] Model A08 with one I/O Cage and no IBF   [3] Model D32 with three I/O Cages and IBF

where and when it is needed. With a range of four models, the z990 can be configured with over two times the processing power, four times the memory, four times HiperSockets™ and double the number of channels of a current z900 server. Each model adds to the system's total resources – so you'll have the ability to scale up with z/OS™ and handle your most critical business transactions.

Powerful

The zSeries is based on the z/Architecture, which is designed to reduce bottlenecks associated with the lack of addressable memory and automatically directs resources to priority work through Intelligent Resource Director (IRD). The z/Architecture is a 64-bit superset of ESA/390.

With a new superscalar microprocessor and the CMOS9S-SOI technology, the z990 is designed to further extend and integrate key platform characteristics such as dynamic flexible partitioning and resource management in mixed and unpredictable workload environments, providing scalability, high availability and Quality of Service to emerging e-business applications such as IBM WebSphere®, Java™ and Linux®.

The z990 provides a significant increase in system scalability and opportunity for server consolidation by providing a multi-book system structure that supports the configuration of one to four books. Each book comprises a MultiChip Module (MCM), memory cards – that can support up to 64 GB of memory per book – and new high performance Self-Timed Interconnects.

To support the highly scalable multi-book system design, the Channel SubSystem (CSS) has been enhanced by introducing multiple Logical Channel SubSystem (LCSS) which provides the capability to install up to 512 channels across three I/O cages. High-speed interconnects for TCP/IP communication, known as HiperSockets, let TCP/IP traffic travel between partitions at memory speed, rather than network speed. High-performance Gigabit Ethernet features for both fiber and copper wiring are one of the first in the industry capable of achieving line speed: one gigabit per second.

Intelligent

Improving capacity, bandwidth and performance is good – but managing these resources to meet your business goals is even better. The z990 can help you save time and money with its self-optimizing and autonomic capabilities.

Intelligent Resource Director (IRD) is a key feature of the z/Architecture. With IRD, resources are directed to the priority work. Together, Parallel Sysplex technology and IRD provide the flexibility and responsiveness to on demand business workloads. These autonomic capabilities help minimize the complexities inherent in broadly distributed IT infrastructures and can help lower your total cost of ownership.

The z990 and z/OS extend the power of Workload Manager from the edge of a network to the heart of data. Business priorities are used for real time prioritization of network and I/O requests when combined with Cisco technology and through the IBM Enterprise Storage Server™. The Sysplex Distributor function of z/OS provides intelligent load balancing

IBM @server zSeries 990 enterprise server features and benefits

z/Architecture	• Intelligent Resource Director • Capacity BackUp • Customer Initiated Upgrades	• Capacity Upgrade on Demand • On/Off Capacity on Demand • QDIO	• Integrated Facility for Linux • HiperSockets

Cluster Systems	• Parallel Sysplex clustering
	  technology
	• Internal Coupling Facility (ICF)
	• Internal Coupling Channel
	• InterSystem Coupling-3 Links
	• Integrated Cluster Bus
		• Sysplex Distributor
		• Geographically Dispersed
		  Parallel Sysplex™
		• Transparent ICF Sparing
		• System-Managed CF
		  Structure Duplexing
			• Shared ICFs and CPs
			• Dynamic CF Dispatching
			• Dynamic ICF Expansion
			• z/VM Virtual Parallel Sysplex

Availability	• Transparent CP Sparing
	• Dynamic memory sparing
	• Partial memory restart
	• Remote operations support
	• N+1 power supply technology
	• Concurrent channel, OSA-E and
	  Coupling Link maintenance
	• Dynamic I/O Reconfiguration
		• System Assist Processor (SAP)
		• Reassignment & Sparing
		• CICS® subsystem storage protect
		• Dual Support Elements
		• Hybrid cooling
		• Concurrent Hardware
		  Management Console (HMC)
		  and Support Element
			• Enhanced Application Preservation
			• CICS subspace group facility
			• Dynamic Channel Path
			  Management
			• Concurrent power and
			  thermal maintenance
			• Concurrent Licensed Internal
			  Code (LIC) maintenance for
			  CP, SAP, SE, PR/SM™, LPAR,
			  channels, HMC

Management	• (SE) maintenance • Internal Battery Feature	• Power/Thermal • ESCON sparing	• Cancel I/O Requests

PR/SM	• Up to 30 LPARs each with 64-bit
	  central memory addressability
		• Enhanced Dynamic Reconfiguration
		  Management	

Performance	• IEEE binary floating point support
	  for advanced Lotus® Domino™
	  and Java™ performance
	• DB2® sort assist
		• Up to 64 GB central memory
		• Hiperbatch™
		• Hardware-assisted data
		  compression
			• Hipersorting
			• Compare-and-move extended
			• Performed Locked Operations
			  for enhanced IP performance

I/O Connectivity	• ESCON half duplex data transfer
	• FICON full duplex data transfer=
	• Full fabric FCP support
		• Multiple Image Facility (MIF)
		• FICON CTC
		• FCP support for SCSI devices
		  by Linux
			• ESCON CTC native and basic mode
			• FICON Bridge
			• Multiple Logical Channel
			  SubSystem

Networking	• OSA-Express (Gigabit Ethernet, 1000BASE-T Ethernet, Token-Ring • HiperSockets		

Security	• Open Architecture Distributed
	  Transaction Enablement
	• AES Encryption support
		• Crypto SSL support for Linux
		• LPAR isolation certified E4 by U.S.
		  Government
			• Tamper-proof Cryptographic
			  support FIPS
			• 140-2 Level 4 certified
			• CP Assist

of TCP/IP traffic across a Parallel Sysplex cluster. Dynamic Virtual Internet Protocol Addressing (VIPA) support extends the workload distribution and availability features of Parallel Sysplex technology to the TCP/IP network.

Autonomic

The zSeries is designed to deliver the highest level of application availability required in today's on demand environment. It offers high reliability and is endowed with self-healing, self-managing features so your system can constantly fine-tune itself to help provide the near-flawless level of performance required for on demand business. Fault avoidance and tolerance design features minimize business disruptions, as well as permit concurrent maintenance and repairs.

The IBM @server Capacity Upgrade on Demand allows for the nondisruptive addition of one or more Central Processors (CPs), Internal Coupling Facilities (ICFs) and/or Integrated Facility for Linux (IFLs) to increase your server resources when you need them without incurring downtime.

The IBM @server On/Off Capacity on Demand capability of the z990 provides even greater flexibility by allowing you to turn on additional, temporary system resources at busy times of the year and then turn them back off when they're no longer needed. This gives you exceptional control over costs while you meet your dynamic capacity needs.

The z990 processors can provide reserved emergency backup CPU capacity through its Capacity BackUp feature. This feature gives extra capacity to your operation in emergency situations where you have lost capacity in another part of your establishment and need to recover capacity on a designated z990 system.

Safe and Secure

In the on demand era, security is more critical than ever. IBM's crypto PCICA adapter – introduced with the IBM @server zSeries 900 (z900) – is designed to support the increased number of LPARs available on the z990. In addition to the PCICA, a new crypto adapter (PCIXCC) is being added to replace the CMOS Cryptographic Coprocessor and the PCICC adapter. The PCIXCC adapter is a breakthrough concept which supports high security-demanding applications requiring a FIPS 140-2 Level 4 certified crypto module, and also serves as an execution environment for customer written programs and a high-performance path for Public Key / SSL operations.

The PCIXCC is programmable, so customers can extend the capability of the CCA application program that performs within the PCIXCC to support new applications.

The zSeries cryptography is further advanced with the introduction of the Cryptographic Assist Architecture implemented on every z990 processor (CPU). With unprecedented scalability and data rates the z990 processor provides a set of symmetric cryptographic functions, synchronously executed, which enormously enhance the performance of the en/decrypt function of SSL, VPN (Virtual Private Network) and data storing applications which do not require FIPS 140-2 Level 4 security.

An open, flexible server

The z990 offers the flexibility to manage numerous operating systems on a single server, including z/OS, OS/390, z/VM, VM/ESA, TPF and Linux for zSeries and Linux for S/390®.

While zSeries servers support a number of different operating systems, their most advanced features are optimized for z/OS. z/OS is the foundation for the future of zSeries, an integral part of the z/Architecture designed and developed to quickly respond to the demanding quality of service

requirements for the business on demand environment. z/OS – coupled with the multi-book design of the z990 – easily allows you to physically scale up to the amount of server capacity you need. It is designed to deliver the highest qualities of service for enterprise transactions and data, and extends these qualities to new applications using the latest software technologies. It provides a highly secure, scalable, high-performance base on which to deploy Internet and Java-enabled applications, providing a comprehensive and diverse application execution environment.

z/VM uses virtualization technology as a foundation to offer Virtual Machine (VM) capabilities on a mainframe. It allows you to virtualize processor, communications, storage and I/O resources to help avoid the overhead of planning, purchasing and installing new hardware to support additional workloads. An ideal platform for consolidating servers, z/VM enables you to run hundreds of Linux images simultaneously – helping to reduce both cost and complexity – while benefiting from the reliability and availability of the z990.

The z990 provides important improvements to the QDIO architecture to help improve performance and may help reduce the overhead of Linux and other guests running under z/VM V4.

z/VM V4.4 allows IPLing from Small Computer System Interface (SCSI) disks attached to FCP channels for Linux and other guest operating systems that contain required support when z/VM is running on a z990, z900, or z800 server equipped with the list-directed IPL function.

Linux and zSeries make a great team. The Linux open standards-based platform supports rapid application portability which can be adapted to suit changing business needs. zSeries enables massive scalability within a single server. Linux and z/VM take advantage of the zSeries capacity by allowing you to run hundreds of virtual blade servers simultaneously – so you can scale out virtually for high utilization and low cost of ownership. New zSeries Grid Computing support leverages Linux on zSeries and z/VM to provide on demand Grid node capacity to meet changing needs. Linux for zSeries supports the 64-bit architecture and can utilize the 16 HiperSockets available on the z990.

Linux also benefits from the zSeries support of FCP channels, switches and FCP/SCSI devices with full fabric connectivity. This expanded attachability means you have more choices for new storage solutions, or may have the ability to use existing storage devices to leverage your current investments and help lower the cost of ownership for your Linux implementation.

World-class servers

The IBM brand is about uncompromising flexibility in selecting, building and deploying the applications your business needs. Toward that end, IBM offers the industry's broadest range of platforms and operating systems. IBM is committed to industry-standard, cross-platform technologies — such as Java, XML, HTML, SOAP and UDDI — that are at the heart of a flexible e-business on demand™ infrastructure. Support for these standards in our key middleware — including DB2 Universal Database™, WebSphere Application Server and MQSeries® — means you won't be locked in to a single platform as your business grows. As a result, you should always have the flexibility to deploy applications in a cost-effective way.

Paying for what you use

The z990 and z/OS can be a powerful combination in helping to reduce computing costs by leveraging Workload License Charges (WLC). WLC aligns software charges with the utilization of an LPAR or LPARs where a software product executes. WLC also supports granular software growth, allows customers to manage their software costs and separates installed hardware capacity from software charges.

IBM Global Financing, a leading provider of IT financing services, offers TOTAL Solution Financing – an innovative, tailored approach to financing that makes acquiring your IBM @server zSeries 990 fast, easy and affordable. All your hardware, software and services can be included in a single contract with a single application and single monthly payment to simplify your administration and accounting. By spreading your total cost of acquisition over the term of the financing, you turn large upfront expenses into regular monthly payments. This flexibility allows you to overcome current budget restrictions, better manage your expenses, avoid technology obsolescence and eliminate hardware disposal issues.

Smoothing the path

The systems management functions and features of the z990 provide incredibly robust control and automation as well as exceptional serviceability and availability. For example, IRD extends the classic strengths of I/O priority queuing by prioritizing requests across the channels of the z990 to move to the workloads which require additional connectivity via Dynamic Channel Path Management. It dynamically balances CPU resources across LPARs according to business goals.

z/OS can act as a server gateway in Tivoli® enterprise-based management of the whole IT environment. Tivoli Enterprise for OS/390 and its applications can be order as part of the z/OS ServerPac.

z/OS installation is simpler, faster and less demanding on system programming skills and times. The ServerPac for z/OS offers the option of full system replacement and upgrading software in the same package. Other customized offerings (i.e. SystemPac®) assist in further reducing the workload associated with installing z/OS, CICS, IMS™ and DB2.

In addition, z/OS provides an entirely new approach for installing and configuring products: a managed system infrastructure. This approach goes a step beyond Web-based wizards by furnishing a step-by-step installation guide and automated system updates. For example, Managed Systems Infrastructure for Setup can establish a Parallel Sysplex cluster quickly and easily by transparently creating the policies, parmlib specifications and initialization parameters necessary to configure a basic Parallel Sysplex environment.

"The New Frontier"

What does the on demand era mean for your business? It means being able to sense and respond to change. It means managing risk while lowering costs. It means greater control and transparency with less complicated management. Success in the on demand environment will allow you to focus on your core competencies by being resilient to the ups and downs of the global market.

So how do you get there? While the term "mainframe" conjures images of large multi-national corporations, the incredible scalability of the z990 can

bring on demand benefits to compa-
nies both large and small. Its multi-
book design can help you tailor the
right sized system for needs and the
On/Off Capacity on Demand feature
can give you greater control of your IT
costs.

IBM's z990 can help almost any size
company in any industry become
more responsive, variable, focused
and resilient – the key components
of an on demand business. With
its balanced design that is designed
to ensure high levels of utilization,
its ability to automatically allocate
resources where and when they're
needed according to business priori-
ties, its flexibility to adapt to change
and its incredible reliability, the z990
is the data center for the on demand
business world.

For more information
For more information about the
IBM @server zSeries 990, contact
your IBM marketing representative
or IBM Business Partner or visit
the following IBM Web site:
ibm.com/eserver/zseries

IBM ®