S/390 Multiprise 3000 Server

- Technical Overview
- September 1999
- Version 0.1

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Trademarks

S/390

CICS/ESA	IMS	Parallel Sysplex	System/390
CICS	MQSeries	PR/SM	Sysplex Timer
DB2	Mulitiprise	Processor Resource/Systems Management	VM/ESA
Enterprise Storage Server	MVS	QMF	VSE/ESA
ESA/390	Net. Data	RAMAC	VTAM
ESCON	OS/2	S/370	WebShere
IBM	OS/390	S/390	

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Notes:

Performance is in Internal Throughput Rate (ITR) ratio based on measurements and projections using standard IBM benchmarks in a controlled environment. The actual throughput that any user will experience will vary depending upon considerations such as the amount of multiprogramming in the user's job stream, the I/O configuration, the storage configuration, and the workload processed. Therefore, no assurance can be given that an individual user will achieve throughput improvements equivalent to the performance ratios stated here.

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S/390 Multiprise 3000 Server

Agenda

Hardware Overview

Software Support

Software Pricing

Business Value

Technical Description

Solutions Presentation

Extending the S/390 Server Family

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S/390 Multiprise 3000
Features and Functions Overview   (1)

S/390

Three models

G5/G6 Processor Design

Up to a total of 56 ESCON or Parallel Channels

Small size, low power, office environment

Type	Model	Processor	Memory	Upgradeable to:
7060	H30	Sub-Uni	1 GB	H50, H70
7060	H50	Uni	2 GB	H70
7060	H70	2-Way	4 GB	--

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S/390 Multiprise 3000
Features and Functions Overview (2)

S/390

State-of-the-art S/390 CMOS Processor (G5 technology)

Up to 4 Gbytes of Processor Storage

ESCON and/or Parallel Channels (Two channels per Channel Adapter)
- 17.1 MB/s for ESCON
- 4.2 MB/s for Parallel Channels

PR/SM with up to 15 LPARs

High performance, high capacity Internal Disk or External DASD

Flexible Network Connectivity options
- Token Ring
- Ethernet
- WAN connectivity

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Physical Specifications

IBM Multiprise 3000 Server:

- Width: 520 mm (20.0 in)   -   52,0 cm
- Depth: 1110 mm (43.0 in)   -   1,11 m
- Height: 819 mm (31.5 in)   -   81,9 cm
- Weight:
    - Base Frame unit- 100 KG - 220 lb
    - Fully Populated Maximum, 155 KG - 340 lb

Power

- Power requirements are same for base frame and expansion frames
- Input power-1.32 KVA
- Heat output- 1020 Watts (3468 BTU/HR)
- Single phase
- Universal power supply
- No special air conditioning required

Base Frame Unit or Expansion Frame

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S/390 Multiprise 3000
Features and Functions Overview (3)

CMOS Cryptographic Coprocessor (optional)

Single System Parallel Sysplex Test Capability

Integrated Coupling Migration Facility
Internal Coupling Channel Capable

Optional Internal Battery Feature

Single Board Computer (SBC) for Emulated Devices & Support Element

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S/390 Multiprise 3000
Internal Disk – Highlights

High Capacity

- Up to 792 GB RAID-5 DASD
  - Base CPC unit from 72 GB up to 216 GB
  - Each expansion frame from 72 GB up to 288 GB

High Performance

- Disk cache in processor storage
  - In 32 MB increments up to 2 GB
  - Internal Dasd Fast Write using SSA RAID adapter, nonvolatile RAM

Managed by a Serial Storage Architecture (SSA) Subsystem

Outstanding Availability (Spare)

Excellent Environmentals

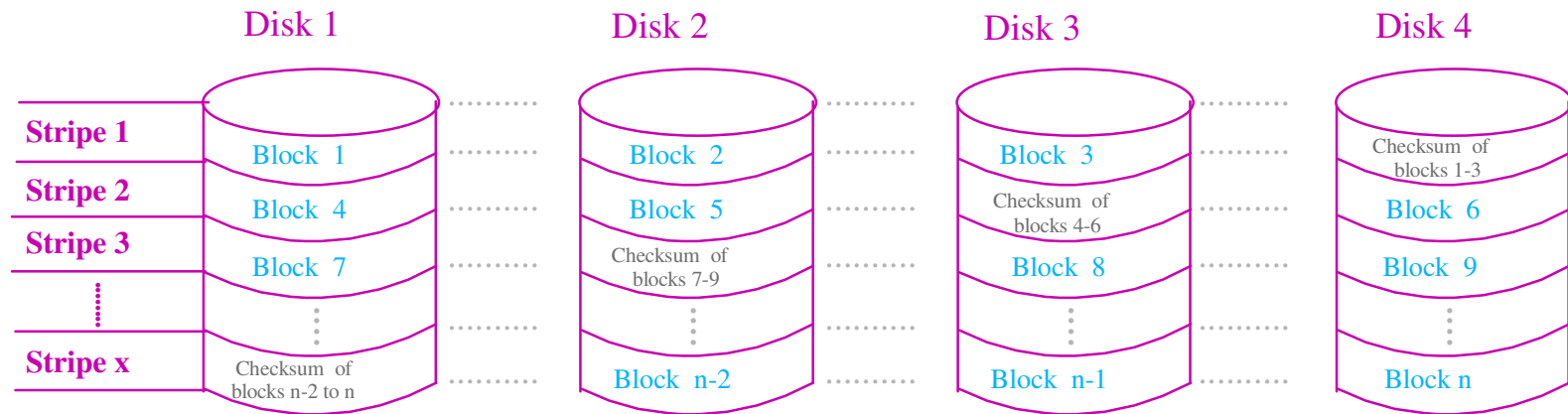IBM   The magic box is an IBM *e* business server.

RAID-5 Overview

RAID-5 provides a high level of reliability and availability of data

The capacity of one drive per array is used for the parity data

Provides data protection if a single physical disk in the array fails
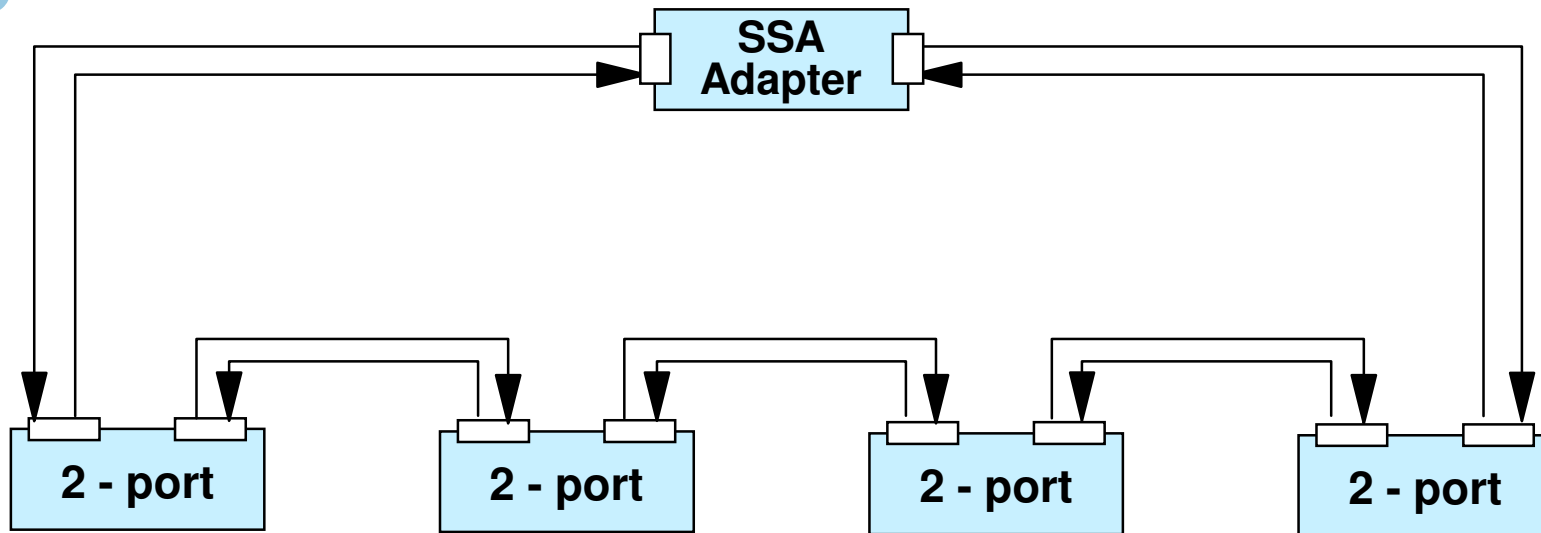
- Access to all the data stored on the array is still available
- The failed disk can be replaced while the array is in use
- System operation continues while data is automatically rebuilt on hot spare

Example of RAID-5 implementation on a 4 Hard Disk Drive system:

	Disk 1	Disk 2	Disk 3	Disk 4
Stripe 1	Block 1	Block 2	Block 3	Checksum of blocks 1-3
Stripe 2	Block 4	Block 5	Checksum of blocks 4-6	Block 6
Stripe 3	Block 7	Checksum of blocks 7-9	Block 8	Block 9
Stripe x	Checksum of blocks n-2 to n	Block n-2	Block n-1	Block n

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Serial Storage Architecture (SSA)

S/390

| | **SSA Adapter** | |

| 2 - port | 2 - port | 2 - port | 2 - port |

SSA disk drives are cabled in a loop configuration

- 2 data paths to each HDD, each full duplex
- SSA subsystem can support 4 concurrent data transfers
- Continues operating when a cable or device has failed
  - no single point of failure in SSA loop

SSA subsystem recognizes a component failure

- Auto selection of alternate path in event of failure
- Automatic loop rebuild after repair

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S/390 View of the Optional Internal Disk Subsystem

S/390

Control Unit Function handled by System Assist Processor (SAP)

- Provides 3990-2 emulation
- Read cache in S/390 memory

SSA adapters control Internal Disk Subsystem

- Nonvolatile cache on each SSA RAID adapter enables FAST WRITE function (No need of IBF)
- Transparent to S/390 operating system

Supports many DASD formats

- 3380-E, 3380-J, 3380-K, 3390-1, -2 and -3 and -9

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IBM S/390 Multiprise 3000
Software Support

OS/390

- OS/390 V2R7 and subsequent releases
  - OS/390 V2R4, V2R5, V2R6

VM/ESA

- VM/ESA V2R4 and subsequent releases
  - VM/ESA V2R2, V2R3

VSE/ESA

- VSE/ESA V2R4 and subsequent releases
  - VSE/ESA V2R2, V2R3

S/370 mode is not supported

Note: Service may be required for Multiprise 3000 support, Internal Disk and Emulated I/O.

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S/390 Multiprise 3000
Growth Opportunity License Charge

The latest in a line of growth offerings :

- ▶ **Parallel Sysplex License Charge**

  Band A - B - C - D

  4   45   175   315

  - ▶ **New Application License Charge**

    - ▶ **Growth Opportunity License Charge**

      Multiprise 3000

Reducing the cost of Incremental Growth

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S/390 Multiprise 3000

Migration Examples   (1)

S/390

Existing Environment	New Environment	
VSE executing CICS work utilizing a 9221-211	H30 executing **ALL** of the existing work	**PLUS** up to 60 Baan Reference Users
VM work utilizing a 2003-215	H50 executing **ALL** of the existing work	**PLUS** up to 640 Lotus active users
OS/390 executing IMS work utilizing an 9672-R52	H70 executing **ALL** of the existing work	**PLUS** up to 270 SAP stress test users

Based upon measurements and modeling

No software changes

VSE/ESA and VM/ESA work are represented through coexistence on OS/390 LPAR

For additional migration scenarios and assistance with capacity planning for users please contact your IBM representative or go to http://www.ibm.com/s390/multiprise3000/

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S/390 Multiprise 3000

Migration Examples (2)

S/390

	Multiprise 3000			Multiprise 204	Multiprise 257
	H30	H50	H70		
SAP SD DB	160	300	565	23	408
Lotus Notes Bench	590	1.100	2.000	82	1.496
Baan Host Mode (BRU)	98	181	331	13	246
SpecWeb96 conn/s	1.212	2.248	4.080	169	3.057
IMS/DLI trans/s	70	131	239	10	171
CICS/DB2 trans/s	30	57	104	4	70

Values are Estimates

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MULTIple Workloads For The EnterPRISE 3000

S/390

And the magic is....

Extra Function
at no extra cost

Extra Capacity
at no extra cost

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Base Frame Plus
First Expansion Frame
(Expands I/O and DASD)

Base Frame Unit

Base Frame Plus
First Expansion Frame
Plus 2nd Expansion Frame
(Expands DASD)

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S/390 Multiprise 3000 Physical Packaging

Up to 3 Frames

Base Frame

- S/390 processor and memory
- Up to 24 ESCON or Parallel channels
- Up to 216 GB usable internal disk
- Single Board Computer (I/O & Service processor)
- Emulated I/O system
- Industry Standard Adapters — LAN/WAN
- 4mm DAT and CD-ROM

First Expansion Frame

- Up to 32 ESCON and Parallel channels
- Up to 288 GB usable internal disk

Second Expansion Frame

- Up to 288 GB usable internal disk

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System Assist Processor (SAP)

S/390

- ▸ **Dedicated Processor on PMI card**

- ▸ **Provides control unit and channel function for Internal Disk**

- ▸ **Performs I/O for external devices**

- ▸ **Handles all I/O requests**

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Emulated Devices (1)

S/390

- ▶ **Multiprise 3000 Server emulates certain S/390 devices**

- ▶ **Uses low cost PCI, ISA or SCSI hardware devices**

- ▶ **Uses sophisticated software emulation programs**

- ▶ **Emulation complements Multiprise 3000 channel attachment capabilities**

- ▶ **Gives customers increased flexibility**

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Emulated Devices (2)

▶ **Devices and functions that can be emulated are:**

ECKD /CKD & FBA DASD

Communications Controllers - Local and WAN

Display Controllers

Local Non-SNA 3174 display controller and attached display

CHANNEL ATTACHED 3174 NOT REQUIRED !

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Emulated Devices (3)

▶ **Devices and functions that can be emulated are:**

Tape Devices

Printers

Read only Optical Media Attach

Card Readers

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Cryptographic Coprocessor

- CMOS Cryptographic Coprocessor

- Triple DES (TDES)

- Double-Key MAC Support (ANSI X9.19)

- Secure Electronic Transaction (SET)

- Visa/MasterCard Card Verification (CVV/CVC) support

- Optional Trusted Key Entry (TKE) Workstation

- Highest Government Physical Security Certification, FIPS 140-1, level 4

- Enhanced availability

- Improved encryption/decryption strengths and performance

- Enhanced security for message authentication

- Added security, flexibility and efficiency for Public/Private Keys

- Facilitates e-business

*Cryptographic Coprocessor
World's Best Security*

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Reliability, Availability, and Serviceability and S/390 Advanced Functions

S/390

- Reliability
  - High-reliability technology components
  - Parts integration to reduce the number of parts in machine

- Serviceability
  - Automatic error detection and fault isolation concurrent with system operation
  - Automatic remote support capability
  - High degree of concurrent maintenance capability in hardware and code
  - N+1 power status indicator

- Availability
  - Advanced Functions IEEE Floating Point
  - Hardware Assisted Data Compression
  - Fault Tolerant Design
  - Error Correction Code (ECC)
  - Dynamic Memory sparing
  - LPAR Dynamic Storage Reconfiguration (DSR)
  - Enhanced LPAR Dynamic Storage Reconfiguration
  - Subsystem Storage Protect
  - SSA RAID-5 Integrated DASD with concurrent maintenance
  - Predictive Failure Analysis
  - Concurrent Hardware Maintenance
  - Concurrent Licensed Internal Code (LIC) Patch
  - N+1 Power and cooling

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Network Connectivity

End user connectivity is accomplished in a variety of ways, using common industry standards and traditional S/390 methods.

End users can connect using TCP/IP and SNA through the following means:

- Over Local Area Network (LAN)
- Remotely over a Wide Area Network (WAN)
- Traditional channel attached devices such as a 3172, 37X5

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LAN/WAN Connectivity Using Emulation

LAN connectivity may be achieved through 3172 device emulation

- Token-Ring or Ethernet Adapters

WAN connectivity may be achieved using two specific Industry Standard Adapter (ISA) adapters

- Wide Area Connector (WAC) Adapter
  - Maximum 3 per system (RS232-19.2kb / V.35-45kb / X.21-T1)

- MultiPort model 2 (MPM2) Adapter
  - Maximum 2 per system (RS232-38.4kb / 8 lines/adapter)

- Providing:
  - External Communications Adapter (XCA emulation)
  - Integrated Communication Adapter (ICA emulation) functions
    Only VM/ESA and VSE/ESA support ICAs

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WAN Emulation Functions - WAC and MPM2 Adapters Summary

| Facility / protocol	ISA Adapter type	S/390 Operating System	Emulating	Adapters / lines
BSC (RS232, V.35, X.21)	WAC	VM/ESA, VSE/ESA	ICA	3 / 6 2 / 4
SDLC (RS232, V.35, X.21)	WAC	VM/ESA, VSE/ESA	ICA	3 / 6 2 / 4
SDLC (RS232, V.35, X.21)	WAC	OS/390, VM/ESA, VSE/ESA	3172 SDLC XCA	3 / 6 2 / 4
SDLC (RS232, 38.4 Kb)	MultiPort / Model 2	OS/390, VM/ESA, VSE/ESA	3172 SDLC XCA	1 / 8 2 / 16

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Tape Options on Multiprise 3000

For backup and normal S/390 Tape usage

- Tape drives may be channel attached via ESCON or parallel channels
- IBM 3490 Model F01 Desktop unit may be attached via differential SCSI adapter feature of server
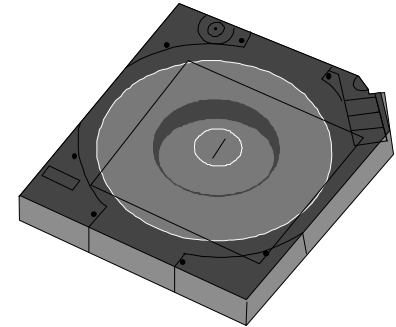
For service requirements and small software delivery needs from IBM

- Integrated 4mm Digital Audio Tape (DAT) drive
  - Emulates 3480 or 3420 on 4mm DAT cartridges

Emulated 3422 tape on CD-ROM

- Data on CD-ROM in Optical Media Attach/2 format read from CD-ROM using S/390 tape I/O. VM/ESA may be installed using this method
- Corrective and preventive service for VM/ESA can also be delivered on CD-ROM instead of tape

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S/390 Multiprise 3000 Server

Positioning

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Processor Comparisons

	Integrated Server	9672 G5, G6	Multiprise 2000	Multiprise 3000
PU	P390E	G5/G6 design	G3 design	G5 design
CP/SAP	1+0	1+1 to 12+2	1+1 to 5+1	1+1, 2+1
LPAR	N/A	15 partitions	10 Partitions	15 Partitions
Crypto Chips	N/A	2	1, 2 Optional	1 Optional
RAM Memory	256 MB	1-32 GB	128 MB-4 GB	1 GB, 2 GB, 4 GB

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DASD Comparisons

	Integrated Server	9672 G5 & G6	Multiprise 2000	Multiprise 3000
Internal Disk	Emulated I/O	N/A	DASD Processor & Cache	DASD Processor & Cache
Speed	7.2K RPM	N/A	7.2K RPM	10K RPM
Architecture	SSA RAID-5	N/A	SCSI RAID-1	SSA RAID-5
Drive size	18 GB	N/A	9 GB/18 GB	18 GB
Total Maximum	255 GB	N/A	588 GB	792 GB

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Connectivity Comparisons

	Integrated Server	9672 G5/6	Multiprise 2000	Multiprise 3000
ESCON	2	256	128	56
Parallel	4	96	96	56
FICON	N/A	24	N/A	N/A
Max Channels	4	256	128	56
OSA	N/A	12+12*	4-6	N/A
PCI	8	N/A	N/A	8
Sysplex	N/A	Full Function	ICMF only	IC, ICMF only

* 12 OSA-2 and 12 OSA Express

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S/390 Multiprise 3000 Server

e-Business

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What is e-business?

a. Web-enabling core business processes?

b. Transforming the way you do business?

c. Combining Web technology with existing enterprise applications and data?

d. All of the above

Answer: All of the above

e-business Transaction Processing is what happens when you bring all these elements together to implement enhanced Customer Relationship, Supply Chain Management and Electronic Commerce Solutions in order to get the desired return on investment.

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IBM e-business Start Now Program?

A complete marketing program built around cross-platform e-business solution offerings

- e-commerce
- Web self-service
- Collaborative computing
- Others to come

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S/390 Multiprise 3000 sample VM and VSE available solutions

Plugging VSE/ESA into the Net

- New CICS Transaction Server with web enablement tools
- MQSeries Server V2
- Business Intelligence capabilities with DB2 V6, QMF for Windows and DB2Forms

Utilities functions of VM/ESA

- Superior flexibility as a hypervisor for VSE/ESA and OS/390
- Parallel Sysplex Test Guest Support
- Distributed storage management with ADSM V3
- Print Server Consolidation with VM/ESA and TCP/IP
- Business Intelligence capabilities with DB2 V6, QMF for Windows and DB2Forms

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S/390 Multiprise 3000
Business Intelligence

S/390

Data Warehousing

On Line Analytic Processing

Data Marts

Data Mining

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S/390: The Fastest Path to Enterprise e-business Transaction Processing

S/390

ITG Report, 1998*:

Existing Clients

"For organizations that employ mainframe-based servers the transition from basic Web applications to business-critical, company-wide intranets and large-scale electronic commerce systems will be faster, easier and less expensive. No useful purpose is served by adding unnecessary technological complexity to the process."

Customer Information

Billing

Inventory

Logistics

Human Resources

Browsers

Notes Clients
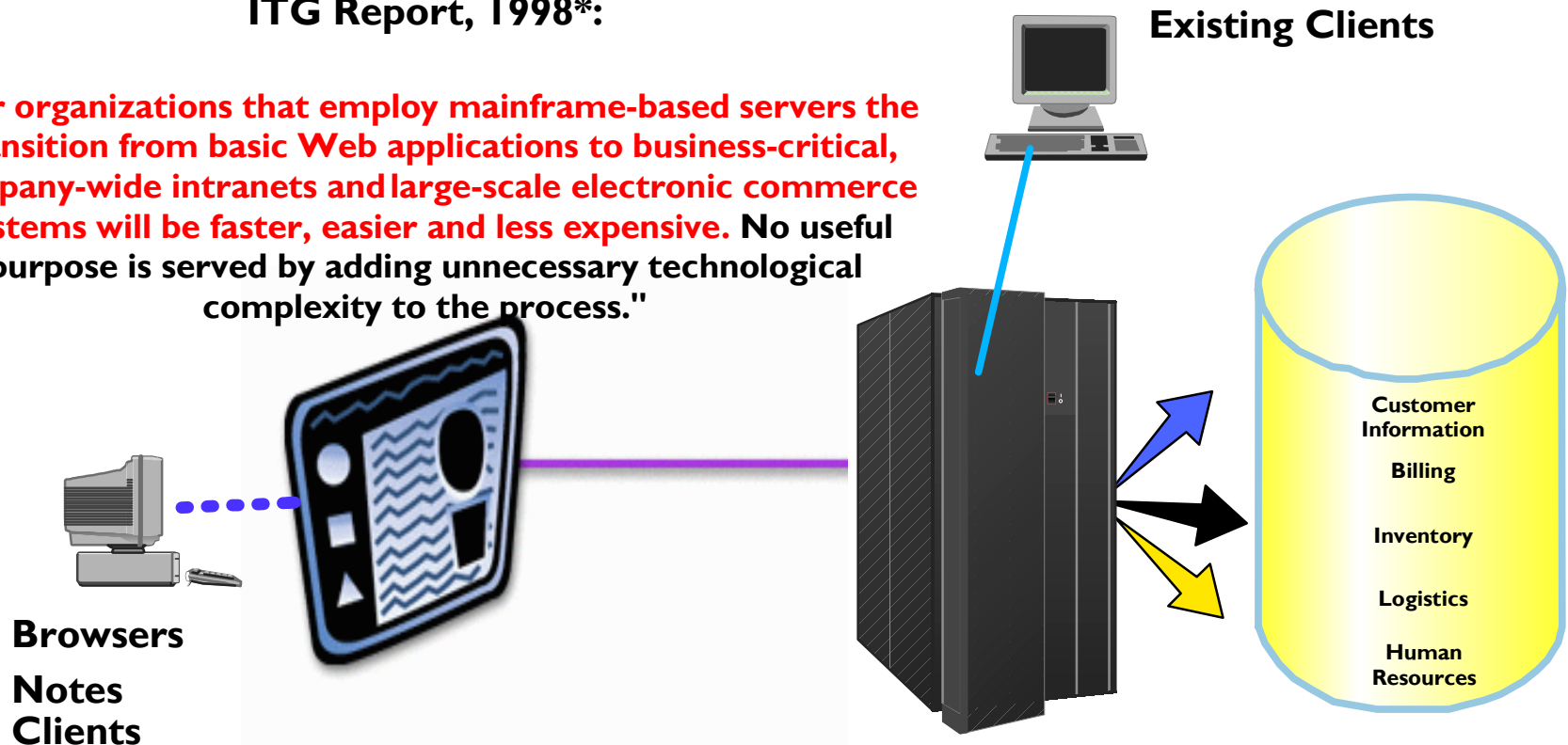
"Lower costs are reported by a majority of organizations who have deployed web servers on mainframes."

"Economies of scale mean total cost savings from 1.3 to 6.4 times less than equivalent NT and UNIX installations."

*ITG Report 1998: Enterprise Solutions for Web Servers: Cost/benefit case for large-scale IT deployment.

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