

A RENEWED ERA

THE RELIABLE, AVAILABLE, SCALABLE MAINFRAME

JULY 26, 2005

A RENEWED ERA

In a networked, On Demand world, the big performance gains come from greater collaboration between the individual parts of the network. These gains arise as companies collaborate better across traditional boundaries inside the firm, and externally with their business partners and customers. IBM calls the systems environment that supports this business behavior collaborative processing.

From its inception more than 40 years ago, IBM's mainframe was designed as a shared computing environment. The result: successive generations of mainframe technology have evolved ever more sophisticated solutions to problems that arise in a shared and open environment. These strengths are becoming more valuable as IT systems become more shared and more open.

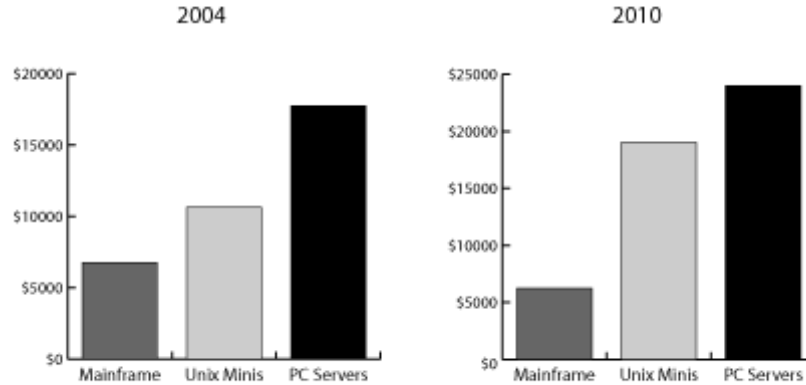
Two achievements stand out. The first is security. Shared and open systems can be less secure. Some approaches to systems security rely on patching complex, bug-ridden and ever-changing operating systems. Because the mainframe has operated in a shared environment from the start, IBM has engineered layer upon layer of security into its underlying technology, from the way the mainframe partitions memory to how it classifies and encrypts data and manages system access. The mainframe's latest generation of security technology makes the IBM System z9™ the most secure enterprise-computing engine in the world.

The second achievement is resource management, which is critical to the mainframe's legendary control and resilience. Shared systems environments need more sophisticated ways of managing and allocating shared computing resources. The IBM System z9™ will run five worldclass operating systems (including Linux), allowing secure data transport between 35 different computing platforms. These platforms will support the virtualization of thousands of applications (including Java-based applications) at the same time.

These two strengths – security and resource management - are what give the mainframe its compelling economics.



**INDUSTRY ESTIMATES FOR MAINFRAME COMPARATIVE COSTS,
TOTAL COST PER USER OVER FIVE YEARS**



Source: Dinosaur Myth, Arcati Research Note, 2004
 Note: Figures include hardware, software and maintenance costs

As collaborative processing puts greater strains on corporate systems and the way companies manage them, the mainframe's economics are likely to improve further. In a study commissioned by IBM, Arcati Research calculates that, per user (and over five years), Unix servers cost 58% more to run than mainframes, and PC servers cost 163% more to run. By 2010, calculates Arcati Research, Unix servers will cost more than three times as much to run as mainframes, and PC servers nearly four times as much to run.

AT THE HEART OF MODERN COMPUTING

These economics make the mainframe increasingly attractive as a standalone engine. But IBM believes that the mainframe will play a bigger and more important role in modern IT systems, as the needs of the collaborative-processing environment become more demanding. This role will be to manage security and systems resources across the entire corporate IT network. In this way, the mainframe will provide the essential, central point of control.

In preparation for this role, IBM has invested heavily in improving the performance of its mainframe technology. The IBM System z9™ is the result of a three-year investment involving 5,000 IBM engineers, software developers and security experts from around the world. This investment has yielded impressive results. The IBM System z9™'s 54-way CPU will be able to process 1 billion transactions per day, which is more than double the performance of its predecessor, the market-beating z990. Moreover, reliability improvements in the IBM System z9™'s design means less customer planned downtime.



IBM System z9™ Metrics i

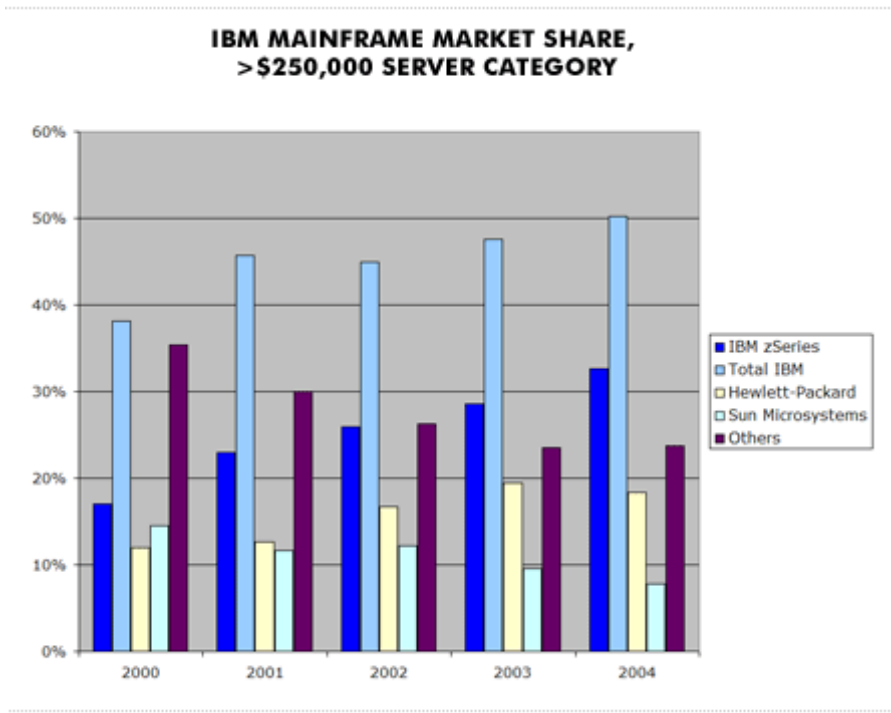
z9	z990 (T-Rex)
54-way CPU	32-way CPU
17,800 MIPS	9,060 MIPS
1 billion transactions per day	450m transactions per day
6,000 SSL handshakes per second per card	2,000 SSL handshakes per second per card
512 GB memory	256 GB memory

Source: IBM

IBM has also begun to extend these unmatched security and resource-management capabilities outwards, into other parts of corporate IT systems. With the z9™, IBM is unveiling a breakthrough version of its flagship operating system, z/OS version 1.7 which for the first time will allow clients to encrypt mainframe archival data onto tape or disk storage so that data can be managed more securely.

RESULTS

IBM's zSeries servers have achieved several consecutive years of market-share gains. According to IDC, IBM's zSeries servers in 2004 gained 4.1 points year-over-year in factory revenue share in the greater-than \$250,000 server category, while both Sun and HP declined during the same time period. IBM zSeries servers won nearly one third of the overall market in 2004.



Source: IDC Worldwide Quarterly Server Tracker, May 2005.



Following the introduction of the z990, IBM zSeries posted several quarters of double-digit revenue growth. The mainframe's embrace of Linux continues to open the platform and drive costs lower. About one in five mainframes that IBM ships runs Linux. About 260 ISVs sell more than 700 Linux applications on IBM zSeries servers. In 2004, IBM signed 50 new ISV partners, along with 150 new applications, to the mainframe platform, bringing the total to more than 1,200 ISVs for the zSeries. In 2005, IBM announced new software for Linux for zSeries (Red Hat), security (Vanguard), Foxfire email (Scalix), data extraction and loading (Informatica), social enterprise solutions (Cúram Software) and middleware (Websphere, Rational, Tivoli).

Recognizing the strategic importance of IBM's mainframe technology and the robustness of its prospects, on July 14th IBM announced that 150 colleges and universities worldwide have joined its eServer zSeries Academic Initiative. This initiative is aimed at training a new generation of mainframe experts as older ones retire. IBM has pledged to work with schools to reach a target of 20,000 mainframe-literate IT professionals in the marketplace by 2010.

As corporate IT systems become more shared and more open, demand for a central point of control to handle the vital security and resource-management needs of a collaborative-processing environment will inevitably increase. The mainframe's unique ability to perform these tasks secures its position at the heart of modern enterprise computing. The IBM System z9™, a landmark in computing technology with security, virtualization and collaborative processing capabilities, may well act as the hub of a new era of collaborative computing.

¹ New on System z9 is the ability to configure Crypto Express2 PCI-X adapters as accelerators. When both PCI-X adapters are configured as accelerators, the Crypto Express2 feature can perform up to 6000 SSL handshakes per second. This represents, approximately, a 3X performance improvement compared to the PCICA feature or the current Crypto Express2 feature on z990, on a per card basis. The SSL rate was achieved with a System z9 with four processors and two Crypto Express2 cards (one feature, both configured as accelerators),¹ z/OS V1R7 with Cryptographic Support for z/OS V1R6/V1R7 Web deliverable, and ICSF FMID HCR7730. Since the performance enhancements are implemented in Licensed Internal Code, current Crypto Express2 features carried forward from z990 to System z9 can take advantage of increased SSL performance and the new configuration capability. These measurements are examples of the maximum transactions per second achieved in a laboratory environment with no other processing occurring and do not represent actual field measurements. Details are available upon request.