



IBM's 'new' mainframe

by Mark Lillycrop

IBM is investing considerable resources in the 'new mainframe', repositioning its top-end zSeries range of processors as both a consolidation platform for distributed Linux systems, and a very high availability solution for new e-business applications. While the company still has a number of significant challenges to overcome in 'selling' the unique strengths of the platform to a market that sees Unix and Windows-based technologies as the status quo, the zSeries is certainly looking very attractive from both a technical and 'total cost of ownership' perspective.

Mention IMS, CICS or VSAM at a convention of Windows enthusiasts and you will probably be confronted by blank stares. To a generation of IT specialists schooled in the intricacies of NT and Unix, the terminology of the mainframe world has gradually slipped into obscurity. Much of the software beneath the covers of the IBM mainframe has been in place for well over 30 years, and still supports a huge proportion of the world's mission-critical business applications. But for the last ten years or so, these products have rarely grabbed the industry's attention. Quite the contrary: for the most part, they have been branded as 'legacy systems', berated for their complex cost structure, and consigned to the darkest recesses of the data centre to carry out their formidable tasks well away from the limelight.

So what went wrong for the mainframe? Well, the client/server 'revolution' of the early 1990s is well documented. Disenchanted with the level of service from central IT departments, many business managers decided to opt for departmental solutions based initially on Unix and later on NT. At the same time, IT managers began to look at the claimed cost benefits of 'downsized' solutions - and, while relatively few serious mainframe users actually moved away from the central host, new applications began to spring up on decentralized servers. As the SME market burgeoned in the late 1990s, it was NT and Unix that attracted most of the growth, and hence the attention of an army of independent software developers. A gulf appeared between the



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mainframe and distributed servers, and years of marketing neglect did little to re-establish the balance between host-based and client/server solutions.

If all this seems like a history lesson, that's really part of the problem. Many enterprises now support an environment where core business-critical resources are supported on the mainframe, and have been fine-tuned on that platform for a considerable number of years; while newer development on the edge of the network belongs to Unix and NT/W2K. And for younger entrants to the industry, there is a perception that the mainframe's unique architectural strengths are somehow outweighed by its age and the complexity of its cost structure.

Going full circle

If anything is likely to change this perception, it's the dramatic increase in the need for scalability and system resilience, created by the growth in e-commerce and Internet-centred commercial activity. Like so many industries, IT strategies tend to turn full circle: after years of client/server and distributed models, we are now returning to the point where centralized management of corporate data and processing power is not just technically feasible but very desirable.

In the wake of the explosive growth of e-commerce activity over the last few years, CIOs are now trying to rein in and manage these disparate systems more effectively, while looking for ways to cut costs in response to the economic downturn. There is a renewed interest in consolidating applications onto larger servers, both to save money and to streamline the IT management infrastructure. And with huge improvements in the availability and cost of networking bandwidth, a highly centralized environment is once again very practical, with distributed server power drawn back into the data centre.

But even if centralized management makes sense in principle, should 'centralized' mean 'mainframe-based'? For many very large organizations, the terms are more or less synonymous; but IBM and its ISV partners still face a number of challenges in establishing the mainframe in this crucial role in smaller and newer companies. Most importantly, they need to address:

1. the breadth of applications available on the mainframe and
2. its cost, or more accurately its 'perceived value', to the



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customer compared with other platforms, an issue that has been widely misunderstood in recent years.

Basically, we need a new value proposition for IT's most powerful and mature technology, and this explains much of what IBM is currently doing on the zSeries platform. But before looking at the technology itself, let's consider the cost issue mentioned above.

Mainframes and TCO

Comparing the cost of the mainframe with that of other systems has always been an 'apples and oranges' proposition. To understand why, we need to consider what a mainframe really is.

Architecturally, the mainframe is designed to:

- run multiple types of application simultaneously;
- run these applications in software or hardware-based partitions to ensure their integrity and security; and
- support hundreds of even thousands of end users at the same time.

Because of the way it supports flexible workloads, allocating resources as required, the mainframe achieves very much higher utilization rates (the amount of time that a given system's processing power is being usefully employed) than distributed servers, sometimes double those of a comparable Unix system. It can also handle batch processing extremely efficiently - an essential characteristic as the window available for overnight processing in most organizations continues to shrink. The mainframe is also heavily data-oriented, reflecting the demands of the commercial environment for which it has been optimized. It excels at performing relatively simple operations on vast amounts of data, quite the opposite of the Unix platform, which is very well designed more numeric-intensive workloads.

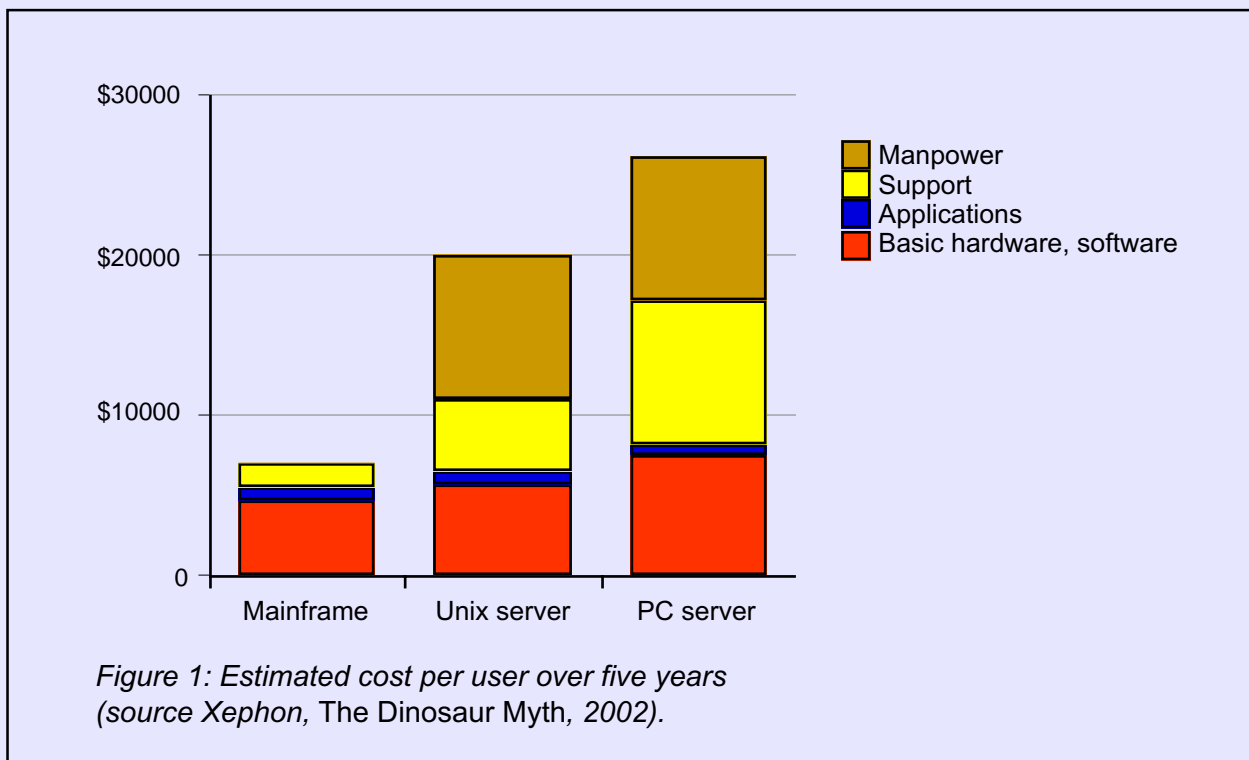
So a direct MIPS (Millions of Instructions per Second) comparison between mainframe, Unix, and PC servers is meaningless, a fact highlighted in Xephon's *Dinosaur Myth* report (first published in 1992, and updated recently for the benefit of those who were still at school when the first edition came out!) The *Dinosaur Myth* argues that a more useful comparison between systems - though still not perfect - is the total cost per user over a reasonable period (5 years, in the case of the Xephon calculations). With cost-per-user as its yardstick, Xephon compares mainframe, Unix and PC



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servers in terms of basic hardware and operating software, applications, and support. This last element is perhaps the most critical - the number of people needed to run and support mainframe systems continues to decline through improved automation and streamlined systems management, while PC support is often handled by office personnel, damaging productivity, and creating costs that are only now being accurately assessed.

Taking all these elements into account, Xephon suggests, a more realistic cost comparison is as shown in Figure 1. This shows the mainframe up in a much more favourable light than popular opinion would have us believe. But while the *Dinosaur Myth* makes an extremely valuable point - why larger users should not move away from the mainframe platform - this is perhaps no longer the main bone of contention. Applications already running on mainframes are, for the most part, staying put. What the report does not really address are the issues that have become a lot more important today: why these enterprises should undertake *new* development on the zSeries and not elsewhere, or why small-to-medium sized organizations that do not already have a background in OS/390 and COBOL should choose the mainframe over more application-rich platforms. To answer these questions, we need to look closely at the 'new mainframe'.





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The four Zs: z800, zELC, z/OS.e, and zLinux

IBM's strategy over the last few years has been to attract software developers to the zSeries platform, while simplifying and rationalizing costs, particularly at the entry-level where it wants to attract new customers and prevent defections by smaller, slow-growth mainframe users (mostly using VM and VSE or older versions of OS/390). This strategy is also intended to help the company shift more low-end mainframe systems through the channels rather than direct to customers.

The most significant changes have been at the operating system level, with the introduction of zELC and z/OS.e plus a number of Linux options; and at the hardware level with the z800 range, a low-end (from 8 to 32 GB of memory) and generally more easily managed version of the z900 systems.

The z800 was announced early in 2002, initially as a cost-effective replacement for older S/390 systems (9672 and Multiprise systems), providing features such as full 64-bit support, HiperSockets, OSA-Express, and full Parallel Sysplex (clustering) functionality – all of which had previously been unavailable to smaller sites.

Quite apart from the wide range of features, the z800 has also proved to be a very flexible platform in software terms, and allows customers considerably more freedom to run a mixture of traditional and 'new' application workloads than in the past, when small test workloads often resulted in stiff financial penalties. zELC (the Entry Licence Charge) is a model-based scheme and the main pricing vehicle for z/OS and middleware on the z800, offering a fixed monthly charge for compliant products. z/OS.e is a special version of z/OS; priced per engine and brought in at an exceptionally low price-point (officially averaging between US \$1,000 and \$1,200 per month per z800 engine), it is aimed specifically at new, e-business type applications. To preserve its traditional revenue base, IBM has made z/OS.e available only to new middleware and apps – you can't run CICS, IMS, FORTRAN, or COBOL. For users who need to run both traditional and new workloads, zELC and z/OS.e can be employed rather neatly in tandem within the same box, each running inside a 'logical' model.

The other string to IBM's software bow is, of course, Linux, and the zSeries has embraced the Open Source operating system more enthusiastically than any other IBM platform. As usual with



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IBM's vast and varied customer base, one Linux product does not fit all, and the last couple of years have seen numerous alternatives tumble onto the mainframe market. Along with the mainstream 64-bit z/OS and 31-bit OS/390 versions of Linux, we have seen the more tightly packaged z800 implementations, based on the IFL (Integrated Facility for Linux). There is even a Linux-only model, the OLF, for users who specifically want the architectural benefits of zSeries in a pure Linux environment.

IBM has invested a small (well, not so small) fortune in Linux in recent years; apart from the burgeoning market for the software, it does present IBM with some unique opportunities, particularly on the mainframe platform:

- the Open Source software provides a common code base which will allow greater portability between IBM's diverse hardware ranges;
- the huge and growing Linux portfolio addresses the criticism that the zSeries lacks packaged applications;
- with the proliferation of Linux products on Web servers and other distributed e-business-related systems, the zSeries has been reborn as a consolidation offering for customers looking to save money and re-gain control of their IT infrastructure.

IBM's trump card for Linux consolidation is zVM, the mainframe 'hypervisor' which first emerged in the late 1960s as a host environment for other operating systems, but which has never been successfully emulated on any other platform. VM was given a new lease of life when Linux was first implemented on the S/390 architecture around two years ago, and Linux applications on the zSeries have always been able to run in their own logical partition or as multiple images under VM. VM's great attraction is its vast appetite for these images: technical consultant David Boyce has enjoyed some prominence as a test pilot for the system, driving zVM up to a theoretical 99,999 Linux images! Certainly 100s of images are technically quite feasible, though most users of Linux under zVM are running no more than a few tens of images. Nevertheless, with VM's very mature management tools and its reputation for resilience, it allows the zSeries to offer an unparalleled base for consolidated Linux systems as well as an exceptional cost of ownership proposition.

Linux has become increasingly prominent on the zSeries over



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the last two years: IBM is offering Linux to its mainframe customers not as an add-on but as a strategic direction, making the software as accessible as possible to existing low-end S/390 customers who might otherwise move to other platforms to find a broader range of applications. Many z800 systems are now being configured with z/OS in one LPAR, for traditional workloads, and VM in another, hosting an array of Linux apps, the two partitions interoperating via Hipersockets. Only time will tell how the balance between these two environments will change in the next few years, but it's a pretty good bet that most *new* mainframe development will be Linux-based within five years.

One of the problems that have confronted customers and ISVs trying to develop or test small-scale Linux apps on the zSeries has been the relatively high entry level for such projects. Even the low end of the z800 range has proved costly for small test-bed projects, a serious deterrent to software companies and to the smaller S/390 users who are most vulnerable to unnecessarily high software costs. One interesting recent announcement was the 2066-0E1 at the bottom end of the general purpose z800 range. This comes in at just 40 MIPS, and, though priced at a similar level to the existing low-end 80 MIPS 0A1, includes an IFL which provides excellent capacity for users aiming at Linux development. Unusually it is available as a downgrade for 0A1 users too, showing a strong commitment to realistic pricing in this part of the market.

So the technology is clearly in place, and IBM has positioned z/OS, z/OS.e and Linux on the mainframe in a way that should encourage strong growth across the board while fending off competitors who have an eye on the less committed mainframe customers. After two years, though, we still need to see more evidence of the 'bet your business' applications on Linux that will reinforce the position of the zSeries in this sector. Many enterprises continue to use Linux for messaging, mail and Web infrastructure purposes, but are reluctant to scale up into business-critical data centre areas. Some are waiting for tangible proof of the system's scalability and resilience in such a role, and for business drivers that will make the move preferable in the long-term. The scalability and resilience are certainly coming, and the next few months are likely to see IBM, Red Hat, and the UnitedLinux community supporting some high-profile strategic migrations to Linux. One reason for this is the growing support for the philosophical values of Open Source - something that is now much in evidence among some governments, especially in Europe



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– who see Linux as the best way to retain control over their corporate information systems and manage their costs most effectively. A far cry from the proprietary IBM of 20 years ago!

Remaining challenges

For all its technical strengths, the zSeries does still have some obstacles to overcome. Open as it might be at the operating system level, it is still susceptible to 'monopoly' allegations following the collapse of the software-compatible mainframe market once dominated by Amdahl/Fujitsu and Hitachi (which now acts as a manufacturer for IBM). This is more an issue for the heavily entrenched high-end mainframe customers, many of whom have nowhere else to go - though most users at this level are masters of negotiation! Lower down the scale, competition from enterprise-level Unix systems prevents IBM from exploiting its dominant position, and this competitive pressure can only increase as the influence of Linux grows. (There are also a small number of z/OS emulation offerings based on Intel technology, which are worth watching.) But zSeries, like the iSeries (AS/400), remains a platform without direct competition, and IBM will need to remain constantly vigilant if it is to avoid the kind of accusations that have blighted Microsoft in recent months.

The other big remaining issue is the conflict between IBM and ISV pricing schemes. Some software developers have followed IBM's lead in bringing software licence costs into direct line with usage; others have devised new schemes or have resolutely refused to change the models they have been following for years, understandably trying to protect their on-going revenue stream. This puts IBM in an interesting position: traditionally it has left many areas of the mainframe system software and middleware market uncovered, leaving a very lucrative niche for ISVs. However, with its determination to change market perceptions of the zSeries and drive down associated costs at the lower end of the range, IBM is becoming more aggressive in 'plugging the software gaps', moving aggressively into areas such as performance management which it had previously left to third parties. There is a strong message coming across that ISVs will either have to fall in line on pricing or be forced out altogether.



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Bottom line

With very aggressive pricing reductions, particularly for entry-level customers, and a unique perspective on the burgeoning Linux marketplace, IBM is presenting a new value proposition for the mainframe. It now remains to win back mind-share in the marketplace, and to dispel some of the pricing myths that have haunted the platform for so long. The coming months should see some real bet-your-business activity for the 'new' mainframe.

Mark Lillycrop is Chief Analyst of Arcati Ltd and an Associate of Valley View Ventures, Inc. For further information on this paper or Arcati services, visit www.arcati.com or e-mail mark@arcati.com.