



On Second THOUGHT

A Case Study for
Reconsidering the
Mainframe

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Horizon Lines LLC, the U.S.' leading ocean carrier, had a problem. A \$2.5 million problem.

That's how much the company was paying annually for mainframe time and administration. Horizon ran critical business functions on about 50 mainframe applications, from order taking and invoicing to tracking cargo containers headed toward their destinations. When the company sold part of its operations and needed to "rightsized" its IT infrastructure, that \$2.5 million expense surfaced to the top. But a concern had been brewing for a while. Horizon's mainframe applications were about 25 years old and increasingly difficult to maintain. Writing new applications for the mainframe was as painful for Horizon's developers as using them was for the company's employees. And with the applications relying on 3,000 batch jobs per day, it was difficult, if not impossible, for Horizon's employees or customers to know exactly where a shipment was at any given moment. This wasn't an esoteric issue; it was a competitive one.

"The mainframe wasn't serving us very well and it wasn't serving our customers very well, either," says **Jeffrey Yeager**, senior manager of applications at Horizon Services Group, a division of Horizon Lines. "We're in a very competitive industry, shipping high-value, time-sensitive goods and our mainframe wasn't providing us with the needed competitive edge. It was time for a change."

Today, a company doesn't have to be a global shipper to face global competition. Global barriers—barriers to education, capital, communications, and manufacturing—have dropped and, with them, have dropped barriers to competition. No matter how successful a company is at taking customer orders, "just" taking orders marks a company as a commodity provider. And the commodity providers will be at an increasing disadvantage as competitors provide highly customized service that addresses customer needs with greater speed and efficiency.

Horizon Lines addressed the mainframe issue when it needed to reduce technology costs. But reducing the cost of the technology wasn't the only consideration for Horizon, nor is it the sole consideration for many other companies in similar circumstances. Additional considerations include the end of a mainframe's useful life, the

impending lack of support for hardware or off-the-shelf software, or a merger or acquisition. And beyond responding to this type of compelling event, companies like Horizon Lines also regard their mainframes with concern when they think about the future: about ensuring innovation, agility, and the cost structure needed to increase global competitiveness.¹

KEY CONCERNS ON THE MAINFRAME

High costs may not be the only reason to reconsider the mainframe, but they're a good place to start. The hardware is expensive both in absolute terms and relative to the high-end Intel-based hardware that now offers comparable performance. For example, if you look at only retail list prices for comparably powered systems, a 15-CPU mainframe might cost \$4.5 million as compared to a 16-CPU Intel x86 system costing \$200,000—and that's before the \$1 million annual cost for mainframe operating system licenses. Of course, extrapolating hardware and license costs for 1,000+ MIPS machine based upon a published average cost per MIP is unrealistic, and no one pays list price. (see Figure 1).

Mainframe hardware and licensing costs have been declining to \$1,000 per MIP or less, with the bare hardware costs declining to a level that some argue is near to that of comparable >>

Figure 1

Costs: Mainframe vs. Windows-based Servers

	WINDOWS-BASED	MAINFRAME
Price per MIP	\$2	\$2,000 ¹
1 Gig RAM	\$500	\$10,000 ³
1.2 Terabyte Disk	\$1,500	\$78,000 ⁴
	INTEL X86 16 WAY	Z990 15 WAY
16 CPU System	\$200,000 ⁵	\$4,482,000 ³
16 CPU OS License	\$ Included	\$1,177,000/yr ²
32 Gig RAM	\$ Included	\$320,000 ³
1.2 Terabyte Disk	\$ Included	\$78,000 ⁴

SOURCES: 1. COMPUTERWORLD, FEBRUARY 14, 2000 (WWW.COMPUTERWORLD.COM/NEWS/2000/STORY/0,11280,41261,00.HTML); 2. Z/JOURNAL , AUGUST/SEPTEMBER, 2003 (WWW.ZJOURNAL.COM/PDF/PHELPS ARTICLE.PDF). 3. IBM PRESS RELEASE, AUGUST 22, 2003 4. MICROSOFT WHITEPAPER, "MAINFRAME LINUX BENCHMARK PROJECT" JULY 2003, WWW.MICROSOFT.COM/WINDOWSSERVERSYSTEM/FACTS/ANALYSES/WINSRVOPMSPX. 5. UNISYS, FUJITSU SALES QUOTES AVE.

¹"RETHINKING REHOSTING" BY LARRY LOZON AND BARBARA ERRICKSON, EDS, MAY 26, 2005, WWW.MAINFRAMEMIGRATION.ORG/SHOWPOST.ASPX?POSTID_549&FM

Windows systems. Nevertheless, the overall price difference remains high and many mainframe customers have trouble justifying the higher price. For example, **Manfred Zillinger**, chief development officer at the ICS unit of European book publisher **Bertelsmann Group**, says, “CPU performance and disk capacity came at a high price. It had already started swallowing up massive resources and upgrading it was not cost-effective over the long term. Our operational costs would have risen dramatically and return on investment for further development would only have been achieved with difficulty.”²

To achieve the agility needed to respond to global competition, companies need an agile environment that mainframes were not designed to deliver. Companies can achieve an agile environment with a service-oriented architecture (SOA) that regards software functionality as loosely coupled components that can be snapped together, taken apart, and reconfigured at will to meet new demands. As well, companies can turn to Web services, which allow disparate systems to interoperate to provide new functionality. SOAs and Web services are being developed for, and pioneered on, the more modular and distributed environments that are now increasingly popular. By contrast, delivering SOAs and Web services in a mainframe environment requires complex add-ons with significant modifications and configuration, and does not change the basic inflexibility of the underlying mainframe environment.

“With mainframes and our front ends, which are not mainframe-based, we have to do a lot of applications development to link the two,” says **Glen MacGregor**, assistant vice president, **Business Systems, Lombard Canada, Ltd.** “We need quite a high level of expertise to get that done.”³

Another concern of mainframe customers is the fact that the mainframe ecosystem is eroding. The competitive forces that once existed among mainframe suppliers have virtually disappeared, essentially leaving IBM as the only vendor.

A single hardware vendor and only a handful of software and services vendors means less opportunity, and therefore less chance for innovation, choice, and support, as well as higher cost and risk. The labor shortage is a particular issue when it comes to finding the mainframe administrators needed to keep these systems going.

Most IT professionals entering the field want to work in technical environments that are both more creative and more professionally rewarding. The State of Washington’s department of licensing, for example, decided it had to take action before retirements deprived it of the longtime staff members who knew how to operate its mainframe.⁴

One of the highly publicized “solutions” to the mainframe dilemma is to recreate COBOL functionality in the Java development language. But as many mainframe customers tell us, this is a medicine fraught with problems. The companies that have stayed with the mainframe despite their increasing concerns have done so out of a desire to preserve their legacy investments in decades of programming skills, debugging, and encapsulated business intelligence. A wholesale migration to Java inevitably loses that legacy—when what some companies want, and should be able to achieve, is a retention of their COBOL assets in a more productive, agile, and lower-cost environment.

EVERYTHING IS MOVING

The combined weight of these concerns is pushing many companies to reconsider their technology environment. And it doesn’t seem to matter what they are running on the mainframe—the broadest range of mainframe-based software assets are finding other, more agile, cost-effective homes.

Commercial off-the-shelf software (so-called COTS packages), such as **SAP Enterprise Resource Planning** software, is one example. In the past few years, the trend has shifted markedly to platform SAP software other than on the mainframe, its traditional home.⁵ Other COTS packages that enable companies to have the same functionality on Windows as on the mainframe, and therefore to migrate from the mainframe, include software from PeopleSoft, Financial Network Services, and Solcorp.

Custom mainframe code is also being rehosted away from the mainframe. Rather than abandoning this code, companies are finding that they can recompile their COBOL code to run in various environments, automatically transforming legacy code to preserve its functionality—and the company’s investment.

Companies like **Micro Focus** and **Fujitsu Software** have COBOL products that have been

2. [2. https://members.microsoft.com/customerevidence/search/evidencedetails.aspx?evidenceid=3042&languageid=1&pft=lodging%2c%20entertainment%2c%20and%20gambing%20industry&taxid=25189](https://members.microsoft.com/customerevidence/search/evidencedetails.aspx?evidenceid=3042&languageid=1&pft=lodging%2c%20entertainment%2c%20and%20gambing%20industry&taxid=25189)
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5. TWO THIRDS OF NEW SAP DEPLOYMENTS ARE ON WINDOWS SERVER AND MORE SAP INSTALLATIONS RUN ON WINDOWS SERVER THAN ALL OTHER PLATFORMS COMBINED, [WWW.MICROSOFT.COM/ALLIANCE.ASPX](http://www.microsoft.com/alliance.aspx).



used in this type of migration.

When companies want to do more than migrate their existing applications and functionality to a new platform—when they want to achieve new functionality that can deliver new and better customer service, for example—they now have that option. They can create new applications more powerful than the ones they left behind on the mainframe, while also being faster and cheaper not only to develop, but also to support on a continuing basis.

Companies also are finding that the mainframe migration issue isn't an either-or proposition. That is, they can have their mainframe and leave it too. Sometimes there are reasons to stage a mainframe migration over time—for example, when a company has used its mainframe both for packaged software that can be migrated relatively quickly and for custom code that may take longer to recreate on the new platform. Also, a company may wish to explore mainframe migration by re-hosting its business logic on a more efficient platform while retaining its database, at least temporarily, on the mainframe. The step-by-step approach can be helpful, for example, when migration advocates within a company have to build political support for a broad migration.

POTENTIAL DESTINATIONS

When a company considers a move away from its mainframe, there are a variety of available alternatives. One choice is to use a larger, more powerful mainframe. Replacing a mainframe with a newer mainframe may solve an immediate problem of unsupported or insufficient hardware, but it merely postpones the larger issues—such as innovation and competitiveness—driving migration away from mainframes.

Other alternatives include IBM WebSphere, Linux on the mainframe, and UNIX.

WebSphere is a set of e-business-based server-side software products that run on a variety of platforms, including Windows, UNIX, Linux, and the mainframe. Companies considering a move to WebSphere need to consider not only the cost of ownership for a specific platform, but also the expense in services that's required to build, integrate, and maintain their environment. A central WebSphere product, the WebSphere Application Server, adds another application execution environment to the

mainframe for Java-based applications.

Adopting WebSphere therefore requires additional administration and management skills, as well as Java programming skills that many companies would have to acquire.

Linux lacks the integrated functionality—such as manageability—that would give it the reliability that customers want in a true enterprise-level computing solution. Companies can get some of that enterprise-level reliability by running Linux in a virtual machine, much like a logical partition, on the mainframe. This can cut costs by consolidating servers and taking advantage of spare computing cycles on the mainframe. But it does nothing to address the underlying concerns about operating on a mainframe—such as limited suppliers and uncertain support—that cause people to consider migrations in the first place.

UNIX is a mature alternative that has enterprise capabilities. Although commercial UNIX can be a viable destination for migration, companies need to consider the costs of migrating to, and then continuing to operate on, UNIX, compared to the alternatives. If they run or want to run COTS software, companies need to consider the availability and cost of that software on UNIX, as well as the timing of software updates compared to their release for other environments.

WINDOWS AS AN ALTERNATIVE

In addition to these choices, companies can consider the Microsoft Windows Server operating system and the broader Microsoft Windows Server System integrated server software.

For Windows to be a viable alternative to the mainframe, it must offer the range of capabilities that companies need as a foundation for innovation: scalability, availability, security, low cost, and manageability. Mainframe customers typically have doubts about how Windows stacks up against the mainframe on these requirements—but customers acknowledge that those >>

BOOKING LOWER COSTS

To share data among Bertelsmann book clubs, European publishing giant **Bertelsmann** relied on mainframe COBOL applications that were expensive to run and upgrade. The publisher's IT team decided to switch to a client/server solution based on the Windows platform. Unlike the mainframe system, which generated costs of approximately **\$138,000** a month, the Windows solution costs only **\$46,000** a month to run. The publisher has already saved operational costs of **\$92,000** a month over a project payback period of 18 months.⁶



6. [HTTP://MEMBERS.MICROSOFT.COM/CUSTOMEREVIDENCE/SEARCH/EVIDENCEDetails.aspx?evidenceid=3042&languageid=1&pft=lodging%20entertainment%20and%20gambling%20industry&taxid=25189](http://members.microsoft.com/customerevidence/search/evidencedetails.aspx?evidenceid=3042&languageid=1&pft=lodging%20entertainment%20and%20gambling%20industry&taxid=25189).

On Second THOUGHT

doubts are put to rest with actual mainframe-to-Windows migration experience.

SCALABILITY

Customers often want highly scalable systems. Many mainframe customers assume that they can only get that scalability on the mainframe, and have not done any explicit comparisons to high-end Windows servers. When customers look at 8, 32, or 64 CPU Windows servers built to deliver high performance, the comparison to the mainframe is revealing. (See Figure 2)

Benchmarks on high-end Windows hardware, such as the Unisys ES7000, show that Windows does indeed scale quickly and to very high numbers. What is particularly revealing about these benchmarks is that Windows holds, on a day-by-day basis, many of the industry-standard records

meet most business needs now being served by the mainframe. Companies moving 1,000 MIPS off a mainframe and onto an 8-CPU ES7000 (or a Fujitsu PrimeQuest or an HP Superdome) can expect much better performance on the Windows platform. Indeed, customers are virtually unanimous in reporting performance increases in the move from the mainframe to Windows. A customer moving 5,000 MIPS off the mainframe has numerous ways to scale the Windows environment to meet its needs: increasing the number of processors; moving from 32-bit to 64-bit; or increasing the number of servers in a distributed architecture.

For those with doubts about whether Windows can scale to the levels they need, we recommend doing a proof of concept (POC) to compare the performance of their application on the two platforms.

Figure 2

ISV	BENCHMARK	THROUGHPUT
SAP	3-tier	26,000 SDs
	APO	586,319 combos/hr
	Business Warehouse	66.9M rows/hr
		13.8M rows/hr
PEOPLESOFT	CRM	154.6K query steps/hr
	GL Edit and Post	25,200 users
SIEBEL	In-a-Box PSPP	8.9M journal lines/hr
	3-Tier Call Center	5,000 users
TPC	TPC-H	30,000 users
	TPC-C	4,774 queries/hr on a 300Gb db
INFORMATION BUILDERS	WebFOCUS	252,920 tpmC
		2,500 concurrent users

SOURCE: UNISYS ES7000 BENCHMARKS

for computing performance, and does so more often than the mainframe.

While it's good to know that Windows can deliver this type of performance, these levels are typically higher than most enterprises need because most deployed mainframes provide less than 1,000 millions of instructions per second (MIPS).⁷ A more appropriate comparison comes from the recent MicroFocus/EDS benchmark, which shows that an eight-processor Windows machine rates at 1,715 MIPS.⁸ By providing more computing power than at least 80 percent of currently deployed mainframes, the \$200,000 Windows box mentioned earlier does, in fact,

AVAILABILITY

Availability is the second major requirement that mainframe users need in a move to Windows. Many mainframe to Windows analyses compare a well-tuned mainframe datacenter to a Windows environment without similar controls and standards. If you treat a Windows server like a mainframe, it delivers comparable high availability. Vendors like Unisys make refrigerator-sized Windows boxes that look, feel and smell like a mainframe—and that can provide similar uptimes. In a study done by Unisys, for example, 78 percent of its high-end Windows machines delivered 100 percent uptime for a year and the unplanned downtime per year for that set of machines was less than 22 minutes. (See Figure 3) A more visible example of the reliability and availability of the Windows environment, though not a direct mainframe comparison, comes from our own public Web presence. The microsoft.com and MSN.com Web sites are amongst the most heavily visited sites on the Internet: they are running on Windows Server, and they have some of the highest uptimes of any Web site on the Internet today.

We hear similar reports from other companies. For example, **Air Products**, a \$7.4 billion gas and chemical supplier, moved its SAP R/3 deployment from the mainframe to Windows. After one year of operation, the company saw 99.995 percent availability, with the system hitting a perfect 100 percent availability in 10 out of 13

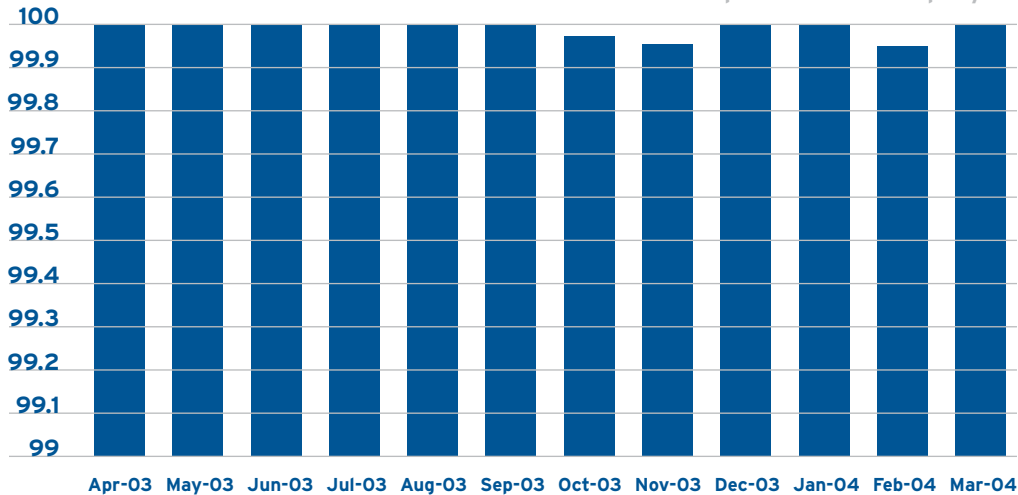
7. C.F. THE IDC WORLDWIDE SERVER DEPLOYMENTS AND SERVER SHIPMENTS DATA, CITED IN [HTTP://DOWNLOAD.MICROSOFT.COM/DOWNLOAD/9/8/F/98F3FE47-DFC3-4E74-92A3-088782200FE7/TW005026_WINHEC05.PPT#287,6](http://download.microsoft.com/download/9/8/F/98F3FE47-DFC3-4E74-92A3-088782200FE7/TW005026_WINHEC05.PPT#287,6), MAINFRAME MARKET SIZE.

8. MAINFRAME MIGRATION: SCALABILITY OF MICRO FOCUS ENTERPRISE SERVER AND MICROSOFT WINDOWS SERVER 2003; WINHEC 2005 VERSION - APRIL 20, 2005, [HTTP://WWW.MICROSOFT.COM/WINDOWSSERVERSYSTEM/MAINFRAME/PAPERS.MSPX](http://www.microsoft.com/windowsserversystem/mainframe/papers.msp).



Figure 3

Unisys ES7000 and Microsoft Windows Datacenter
MONTHLY TOTAL AVAILABILITY: 99.996%
Less than 22 minutes of unplanned downtime per year



Source: www.unisys.com/products/es7000_servers/availability/study.htm.

months. **The United States Department of Agriculture** likewise migrated its PeopleSoft deployment from the mainframe to Windows and saw 24/7 uptime. Windows servers can deliver massive throughput at a high level of availability on commodity hardware.

SECURITY

Security is a third criterion for mainframe users contemplating a Windows migration. Companies may think that some operating systems or environments are inherently more secure than others. But security is, in large part, a matter of the best practices that you use. If you are not careful in this regard, you'll be vulnerable no matter what environment you use. On the other hand, customers who are concerned about security will want an environment that performs well on generally accepted security tests such as those of the Common Criteria (CC) Board, or those formerly administered directly by the **U.S. National Institute of Standards and Technology**.

How does Windows Server do on these tests? You can see the results on the NIST site at http://niap.nist.gov/cc-scheme/vpl/vpl_type.html#operating system. Windows 2000 Server achieved a CC rating of EAL4—covering the design, test, and review of the system for security engineering. It achieved this rating for the overall operating system and for each of its components. In contrast, as of October 2005, IMBS's

z/OS is noticeably absent from the results, though IBM's AIX and i5/OS are both shown as achieving EAL level 4. Being concerned about security, you may take comfort from being able to use the Windows environment, with its broad EAL level 4 certification. Windows Server 2003 is currently being evaluated for EAL 4 by the Common Criteria Board, as is WebSphere on z/OS v6.0.

LOW COST

Earlier, the discussion of mainframe costs included a comparison to Windows hardware, which can cost as little as 5 percent of a similarly powered mainframe. It's important to understand why Windows hardware is available at such a low cost and what that means for an enterprise contemplating a migration.

Mainframe-class Windows computers are available from numerous manufacturers, including Fujitsu, Hitachi, Hewlett-Packard, IBM, NEC, Toshiba, and Unisys. It's the presence of so many manufacturers competing in this market space—in contrast to the diminishing mainframe market mentioned earlier—that ensures that Windows hardware prices will likely stay low for the foreseeable future.

Greater competition and lower prices for the Windows environment, compared to the mainframe, bring a related advantage to Windows users: greater choice. This is >>

On Second THOUGHT

no accident. Windows was always intended to be used on many different hardware platforms, in contrast to almost any other proprietary system software, which restricts customer choice to co-branded hardware and, to some extent, co-branded application software. For example, choose z/OS and you're essentially limited to IBM hardware. The contrast is even starker with ISV software. Choose z/OS and you're limited to fewer than about 100 commercially available software packages and applications. Choose Windows and you have well more than 100,000 available applications.

Studies by **Bearing Point**, **IDC**, **Meta Group**, and **Giga Research** have shown that Windows is up to 30 percent less costly to operate than Linux on the mainframe.⁹ Additionally, an independent total cost of ownership study from the **Yankee Group** says that Windows is less expensive to own and operate than Linux. The deciding factors are the comparatively simple administration, lower software distribution costs, the competitive market in application software, and the availability of trained staff at reasonable cost.¹⁰

MANAGEABILITY

In a sense, we've already addressed the last major migration criterion: manageability. Windows is more cost effective and has equal or greater uptime than the mainframe, which is a pretty good de facto definition of manageability. Many people

are accustomed to thinking of the mainframe as an environment or ecosystem with specialized third-party products for systems management—but of Windows as a single server product.

In fact, Windows Server is part of the rich Microsoft Windows Server System, with Software Update Services, Systems Management Server, Microsoft Operations Manager, Host Integration Server, and more. Used together, these products enable a high level of manageability with fewer personnel than are required for the mainframe environment. For example, the Euronext trading exchange moved six applications from a mainframe to Windows—cutting required management staff by more than 80 percent, from 30 dedicated mainframe technicians to six Windows technicians who now have the time to support other tasks.¹¹

SAVINGS FROM MIGRATION

Migrating from the mainframe to Windows offers many potential sources of savings. Companies considering a migration need to understand what these various types of savings can mean for them in their own environments.

Larry Lozon and **Barbara Erickson** of **EDS** point out that a workload analysis is necessary to determine the appropriate size and characteristics of the new platform, which in turn will determine the estimated costs, and cost savings.¹²

Hardware constitutes about 10 percent to 20 percent of overall solution cost. With the mainframe to Windows hardware differential so large, Lozon and Erickson estimate that hardware savings in a typical migration will translate into savings of up to 10 percent of total solution costs.

As most executives with technology experience know, support costs typically outweigh hardware costs. Lozon and Erickson estimate these costs at 30 percent to 40 percent of overall solution costs, or two to four times as much as hardware. They point out that the portion of support costs saved in a migration to Windows depends on the type of migration. Re-hosting mainframe application code on Windows will reduce the hardware aspects of support, but still entail much of the support that the organization needed for the original application on the mainframe. The savings in this case may be ten percent of total support, or three percent to four percent of total solution costs.



WHEN THE RUBBER HITS THE ROAD

Over the course of a decade, Cooper Tire & Rubber Company saw product life cycles in its industry shrink from 10 years to as few as three. That made it increasingly important for the company to cut its two-year time-to-market. To increase market share and profitability, the company set a six month time-to-market goal. It consolidated server platforms by moving from mainframe and UNIX systems and proprietary software to a solution based on the Windows Server platform with Web services as an integration technology. That solution is on track to deliver the faster time-to-market that Cooper Tire sought, which will enable the company to net an estimated **\$1.6 million** in additional revenues over three years. The company expects to reduce costs by **\$1.3 million** over that time—for a three-year net benefit of **\$2.9 million**.¹³

9. "INTRODUCTION TO THE MICROSOFT ENTERPRISE PLATFORM FOR MAINFRAME PROFESSIONALS," CHAPTER 1, PAGE 4. WWW.MICROSOFT.COM/TECHNET/ITSOLUTIONS/CITS/INTEROPMIGRATION/MAINFRAME/MSPEP.MSDX 10. "INTRODUCTION TO THE MICROSOFT ENTERPRISE PLATFORM FOR MAINFRAME PROFESSIONALS," CHAPTER 1, PAGE 5. WWW.MICROSOFT.COM/TECHNET/ITSOLUTIONS/CITS/INTEROPMIGRATION/MAINFRAME/MSPEP.MSDX 11. [HTTP://WWW.MAINFRAMEMIGRATION.ORG/SHOWPOST.ASPX?POSTID=550&FM=12](http://WWW.MAINFRAMEMIGRATION.ORG/SHOWPOST.ASPX?POSTID=550&FM=12) 12. "RETHINKING REHOSTING" BY LARRY LOZON AND BARBARA ERRICKSON, EDS, MAY 26, 2005, [HTTP://WWW.MAINFRAMEMIGRATION.ORG/SHOWPOST.ASPX?POSTID=549&FM=13](http://WWW.MAINFRAMEMIGRATION.ORG/SHOWPOST.ASPX?POSTID=549&FM=13) 13. [HTTPS://MEMBERS.MICROSOFT.COM/CUSTOMEREVIDENCE/SEARCH/EVIDENCEDetails.ASPX?EVIDENCEID=1978&LANGUAGEID=1&PFT=WORK%20MANAGEMENT&TAXID=25573](https://MEMBERS.MICROSOFT.COM/CUSTOMEREVIDENCE/SEARCH/EVIDENCEDetails.ASPX?EVIDENCEID=1978&LANGUAGEID=1&PFT=WORK%20MANAGEMENT&TAXID=25573)



Migrating to a Windows version of a COTS package such as SAP, or recreating an application using .NET technology, yields the greatest savings in overall support, up to 40 percent of total support, or 12 percent to 16 percent of total solution costs. And, as noted earlier, some customers see reductions in support costs that are even more significant.

The biggest portion of solution cost comes from software, which can be 40 percent to 60 percent of total costs on the mainframe, according to Lozon and Errickson. Software charges are largely based on machine size, and rise in direct proportion to an increase in MIPS. Modernizing the right applications can greatly reduce these costs and have a compelling impact on overall solution costs. Many of the factors already mentioned come into play again here. A software vendor can provide exact licensing costs for a Windows version of a COTS package, which will be significantly less than on the mainframe.

Development costs to move custom applications to Windows will vary depending upon how much is migrating and how thoroughly it is migrating. Re-hosting COBOL code will take less development time than recreating functionality in .NET technology—but will require more ongoing support. A smaller short-term investment may be appropriate if a company has to prove the validity of the migration for internal, political reasons, while a larger short-term investment will yield greater returns over time. The other question to consider is how much of a custom solution is being moved to Windows and how much will remain on the mainframe and interoperate with it via Microsoft Host Integration Server, Web services, or another integration technology.

There are other tradeoffs to consider. The Windows graphical interface is generally considered an advantage over the “green screen” of the mainframe because it is more intuitive, and thus faster and easier to use. That also helps to keep training costs low. However, if a company doesn’t want to invest in the modest amount of training needed to get its employees up and running on a migrated application, it doesn’t have to: Windows applications can be written to completely mimic the mainframe, giving users the same screens to which they are accustomed, while achieving the other cost savings associated with the migration.

Figure 4

POTENTIAL SAVINGS FROM MIGRATION	
Development	30-50%
Maintenance	50-65%
New applications implementation	40-50%
Redundant applications	50%
End-user productivity	10-20%

SOURCE: GARTNER GROUP 2004 CITED IN LOZON AND ERRICKSON,

Implementing these savings in hardware, support, and software can have a significant overall impact on a company’s IT expenditures and its return on those expenditures. Fixed costs to support infrastructure and legacy systems generally consume 70 percent to 80 percent of a company’s total IT expense, leaving few funds for the high-value investment in new systems that can produce the greatest return. Implementing a migration from the mainframe to Windows not only has the potential to reduce costs between 30 percent and 65 percent, but also frees funds so a company can redirect the bulk of its IT spending to value-enabling IT that drives higher revenues and profits.¹⁴ (See Figure 4)

MIGRATION MISCONCEPTIONS

Any enterprise preparing to implement a migration from mainframe to Windows needs to be aware of potential misconceptions that, if left unchecked, can harm the process:¹⁵

MYTH #1:

A migration is exclusively a technological exercise.

The initial and, in many ways, most crucial planning for a migration isn’t technologically oriented—it’s business oriented. The technology “merely” implements actions taken to support business needs. This means that migration planning requires the active engagement of management, users, and customers. If the migration is positioned as an exclusively technological exercise, it is unlikely to receive the required attention from management, employees, and customers, and it will be at serious risk for failure.

MYTH #2:

Old skills will be devalued.

Confronting this misconception is one of the most important success factors in gaining support for migration. The technical skills and management disciplines that maintain the mainframe (for example, the knowledge of the business and its supporting applications) >>

14. IBID.

15. INTRODUCTION TO THE MICROSOFT ENTERPRISE PLATFORM FOR PROFESSIONALS, OCTOBER 21, 2004, (WWW.MICROSOFT.COM/TECHNET/ITSOLUTIONS/CITS/INTEROPMIGRATION/MAINFRAME/MSEPM_P_8.MSPX)

are also required in the Windows environment. New skills will be learned, but they will not be radically new and will reward those who learn them with a more satisfying workplace experience and higher-valued professional skill set.

Myth #3:
Programmers will be forced to learn new languages.

If a company decides to recreate its mainframe applications in the .NET Framework then, yes, programmers will need to learn the Framework and one of the development systems, such as Microsoft Visual C# .NET. But in many cases, the approach to migrating an application will be code conversion, which entails the more modest process of re-hosting, rather than rewriting, the mainframe code. In these cases, programmers will recompile application source code using a new version of the original programming language that can execute in the new environment. The programmers can work in a familiar language such as COBOL, and perhaps even in the context of a familiar application.

MYTH #4:
Large custom applications are impossible to migrate.

While this is true if you rely on purely manual examination of the millions of line of COBOL code, the use of automated analysis and conversion tools makes the task feasible. Some of the applications cited in this article had millions of lines of code, where a purely manual process of migration would have been impossible. In fact, many migrations require only a small percentage of code to be changed manually, with the bulk of the applications being left intact in the Windows environment.

PRINCIPLES FOR SUCCESS

Just as it's important for a company to dispel these misconceptions before moving forward with a migration from mainframe to Windows, it's also important to keep in mind the following principles, which can improve the success of a migration process.¹⁶

PRINCIPLE #1:
Sponsorship

Without sponsorship, no migration initiative will survive the challenges that all major programs of change are likely to encounter. It's usually not

sufficient for the CIO alone to sponsor a migration. The most effective sponsorship comes from the business management or a major consumer of the existing information technology services; ideally, even a small group of key business executives should be involved. A sponsorship team allows the work of sponsorship to be shared, and avoids the perception that the migration is being driven by the ideas of a single individual.

As mentioned above, a migration is only partly a technological undertaking; in reality, it should be considered a business transformation—and a potentially complex and difficult one at that. Without steadfast support from the core business leadership, it's unlikely to succeed.

Sponsorship alone isn't enough. Helping non-technical decision makers understand the many issues driving a migration may require extensive preparation and effort, but is necessary because no matter how senior the sponsorship is within the organization, challenges will be made to the idea of migration. If the sponsor can only respond to those challenges by deferring to the IT group, the migration is at risk. Like all transformations, migrations threaten many established interests, both internal and among vendors and partners. Thus, there will be no shortage of troops ready to defend the maintenance of the status quo.

PRINCIPLE #2:
Business Case and Clear Benefits

For the same reasons that informed senior sponsorship is needed, companies need a business case for the migration that the sponsors can support and defend. Business cases should be tailored to conform to the standards of the organization, but an important part of any business case is the benefit to be gained. Benefits such as "better competitiveness" may be adequate in some organizations, but are difficult to defend, and are useless for guiding the migration. Benefits must be stated clearly and need to be specific, believable, compelling, and measurable.

The defined business benefits are the first in a series of deliverables that should guide all decisions. Business benefits must not be defined just for the sake of checking off an item on a project plan and then forgotten. This is a key element in succeeding at a transformational change such as migration. Companies must have well-defined and mutually agreed upon benefits that are being sought, and must use them to guide decisions,

16. INTRODUCTION TO THE MICROSOFT ENTERPRISE PLATFORM FOR PROFESSIONALS, OCTOBER 21, 2004, WWW.MICROSOFT.COM/TECHNET/ITSOLUTIONS/CITS/INTEROPMIGRATION/MAINFRAME/MSEPMP_8.MSPX.



and refer to them when making the inevitable compromises and tradeoffs that occur during the project.

PRINCIPLE #3: **Business-Driven Capabilities**

Companies must also establish a set of business-driven capabilities as requirements for the migration. They are business-driven in the sense that they are required for the benefits to be realized. For example, the capability to process 100,000 customer orders per hour is a business-driven performance specification that has direct influence on numerous technical design decisions. This principle maintains a direct correlation between the benefits that the sponsor is counting on and the design decisions made. It makes the migration not only more straightforward but also protects the business case it was initially founded on.

These requirements may be implicit if a single existing application is to be migrated. But because business change is frequently a driver of migrations, even apparently well-established requirements need to be made explicit.

PRINCIPLE #4: **Precise Scope**

Scope creep is a phenomenon familiar both to those who deliver IT solutions and to those who sponsor and pay for them. Its root cause is an imprecise upfront understanding of the business problem being addressed. Defining the scope of a migration might seem to be a comparatively simple process, especially if the object of migration is a single existing application. Unfortunately, many factors can change the original intended scope:

- Available budget can constrain the scope to what may be less than optimal.
- Inter-application dependencies can force the scope to grow to accommodate interfaces and even other application subsystems.
- Stakeholder expectations can cause the scope to grow if some stakeholders have a perception that they are not receiving sufficient benefits for their support and active contribution. In addition, when planning a large project such as a migration, some stakeholders may become interested only as an opportunity to address outstanding requirements that do not directly support the migration itself.

Although the scope may evolve from the migration's inception, an organization should not select a migration strategy without a well defined scope.

PUTTING THEORY INTO PRACTICE

The steps for a company interested in a migration from a mainframe to a Windows Server solution should begin with the following:

- Engaging a consulting or services partner to conduct assessment and discovery/analysis of software on the mainframe. For companies whose mainframe is managed and hosted by this partner, the process can be very straightforward and quick. Such an assessment creates a picture of the relationships among applications and other software assets. It describes the impact of moving portions of this software off the mainframe and helps lead to the development of return on investment projections and potential project goals.

- Conducting a POC at the customer's site or at a fully equipped facility. The POC generally involves selecting a portion of the company's mainframe code and data, migrating it to the Windows environment, and comparing the features, functionality, and performance.

- Developing a migration roadmap and project plan for the migration.

What can happen when a company puts these ideas to work in migrating from the mainframe to Windows?

Horizon Lines, the global shipper with the outdated and inefficient mainframe solution, moved 50 mainframe applications to a solution based on Windows Server System and the .NET Framework. Today, developer productivity is up 500 percent, enabling faster software updates and the creation of new applications that developers didn't have time for previously. Employees and customers make better business decisions based on real-time data access, while the costs to service those customers are down and the TCO is down 85 percent, saving the company its \$2.5 million per year mainframe tab.

What about the impact of a mainframe migration to your organization? If you haven't yet considered the potential gains of a migration to Windows, perhaps it's time that you did. [\[S\]](#)

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