



Solution Snapshot

Mainsoft and the System z
Business Benefits of Porting .NET Apps to the Mainframe

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ABSTRACT

There are two major platforms that today dominate the development of enterprise applications, namely J2EE and Microsoft .NET. Both of these application development environments have attracted large numbers of organizations, and each has its own attractions and limitations. For organizations that have selected Microsoft .NET for application development, the choice of server platform has, until recently, been limited to Microsoft's Windows Server. However, many organizations are now looking to consolidate their server infrastructures to a limited set of platforms, primarily in order to enhance operational security and to minimize the cost of service delivery. The software solutions provided by Mainsoft Corporation now offer enterprise customers the choice of running applications developed using Microsoft .NET on the most secure and highly available server platform available, namely IBM's System z, known to one and all as the mainframe.

Mainsoft's software enables Microsoft .NET applications to run as 100% Java bytecode on a mainframe server. The benefits for organizations deploying applications in this way are many and increasingly desirable. The benefits provided include the ability for experienced .NET developers to continue building and maintaining enterprise applications in the existing environment using the tools with which they are familiar but allowing the organization to deploy said applications in the most robust and secure server platform available, the mainframe. Indeed, with server consolidation a major consideration in many enterprises, Mainsoft's technology offers organizations the option of adding new workloads onto the mainframe thereby enhancing the overall utilization of the platform, and hence optimizing the cost of ownership of both the mainframe and the .NET applications.

In this paper we examine the potential benefits of adopting the Microsoft .NET application development environment coupled with running the applications so developed in Java environments, more particularly those hosted on IBM System z9 mainframe servers. It is essential to recognize that Microsoft ASP.NET applications look the same to users when hosted on a mainframe using the Mainsoft tools as when they are run on Windows servers. As a consequence, the port to the mainframe does not create any additional user training burden yet brings the many advantages of the mainframe to these applications.

Mainsoft and the System z

TABLE OF CONTENTS

The Mainsoft Solution	1
Server Consolidation Benefits	1
Areas of Cost Benefits	2
Strategic Business Benefits	3
What It All Means.....	4
References	5

The Mainsoft Solution

Mainsoft supplies cross-platform software solutions and services to organizations that develop some or all of their business applications on the Microsoft .NET platform and wish to run the compiled code on open Java, J2EE, systems. In this fashion, businesses continue to utilize their established, highly productive .NET developer skills base, which is knowledgeable about their customers' business requirements, and can be highly responsive to them. They can then combine this with the security and cost benefits of running business applications on open J2EE application servers and Linux platforms. The Mainsoft Visual MainWin suite of software and services port applications developed using Microsoft .NET to IBM System z9 mainframe servers. The primary products in the Mainsoft MainWin portfolio include Visual MainWin for J2EE, Enterprise Edition and Visual MainWin for J2EE, Portal Edition. Tools in the Visual MainWin suite are supplied as traditional software solutions for purchase or as porting services delivered on a fixed time/fixed cost basis.

Visual MainWin for J2EE, Enterprise Edition is a cross-platform development tool that ports .NET applications to J2EE. The software integrates into the Microsoft Visual Studio .NET development environment to allow .NET developers familiar with C# and Visual Basic .NET to develop and maintain server and Web applications operating on either Windows or J2EE platforms, even both. The tool can deploy J2EE code that runs natively on IBM WebSphere Application Server, along with other application servers including JBoss and Tomcat.

Visual MainWin for J2EE, Portal Edition extends these capabilities by allowing Microsoft ASP.NET applications to run natively on IBM WebSphere Portal as pure JSR 168 portlets. The software provides a single point of access to both .NET and Java portlets. The use of Portal systems in enterprise application deployment and control is rapidly becoming a major focus for many organizations as they seek to effectively manage corporate access to information systems. It is expected that the deployment of Java portlets hosted on IBM WebSphere Portal running on IBM System z9 Mainframes will expand significantly over the next few years.

It is noteworthy that all code generated by the Mainsoft Visual MainWin for J2EE suite of tools is 100% Java byte code. The J2EE code runs natively in the target Java environment. With .NET developers well established in many enterprises, the ability to deploy applications on alternative Open Java platforms is of great interest. In particular, the J2EE environments available on IBM System z9 servers enjoy extremely high availability and significant security advantages over applications deployed on traditional Microsoft .NET systems.

Mainsoft's Visual MainWin tools provide the base for .NET applications to be deployed in low-risk, low-incremental-cost Java enterprise environments running on IBM System z mainframes. Visual MainWin is an enterprise solution, not simply another cool tool for developers. There is no need for .NET code rewrites. Mainsoft is a pragmatic solution that allows organizations to take what they have and redeploy it in a robust, secure, cost-effective System z9 ecosystem while leaving the source code in its original Microsoft .NET environment. The software has developer plug-ins that fit directly into Microsoft Visual Studio; developer training sessions, forums, and how-to-articles are also available.

Server Consolidation Benefits

Many organizations today develop critical business applications using Microsoft's .NET architecture and the Visual Basic development environment. Traditionally such applications have been deployed on arrays of servers running Microsoft Windows Server operating software and the associated suite of support systems. However, to deploy applications supporting large numbers of users generally requires large numbers of servers to deliver the

high availability, security, and adequate response times demanded by business-critical applications. To procure and, more importantly, to maintain such environments requires considerable IT management and administrative effort over the application's lifetime. As a consequence, acquisition costs may seem low compared with other platforms but the total cost of ownership is high. Without adequate system maintenance efforts the high levels of availability and of security demanded by the organization may not be met. For these reasons it is now common for organizations to consolidate their server infrastructure to increase availability and security while minimizing the total cost of applications ownership.¹

It is widely accepted that the benefits achieved through server consolidation include better use of data center floor space and it is simpler to manage a small number of large servers rather than a large number of smaller servers with a subsequent reduction in administrative staff and systems management costs.² It is the opinion of The Sageza Group that managing smaller numbers of large servers can enhance platform security as it is easier to ensure that systems are correctly patched with up-to-date security and system enhancements.

In line with this thinking, many organizations are looking to consolidate their server infrastructures, with a large proportion considering adding new workloads onto existing System z9 Mainframes. Mainframes are regarded as offering the highest levels of mainstream availability and provide the most secure environment available. Indeed the IBM 2005 Annual Report indicates that mainframe MIPs deployed by organizations continues to increase.³

The opportunity for organizations to run .NET applications as Java workloads holds great potential. One advantage of the System z9 platform is that in addition to the very high utilization rates routinely enjoyed, many organizations are now maximizing their System z9 utilization with the use of the IFL and zAAP specialty engines. The introduction of the specialty engines permit applications to run on these new processors without additional IBM operating systems software licenses. The zAAP (System z Application Assist Processors) processor is a specialty engine available on the System z9 to run J2EE workloads while IFL (Integrated Facilities for Linux) hosts Linux applications. These offload engines can host Java workloads securely and very cost-effectively, making them attractive options on which to run .NET applications that are ported using Mainsoft's software and services. At the time of writing IBM reports that over 4,000 IFL engines have been sold while more than 500 zAAP engines have been bought in the first two years of its availability. The vast majority of these specialty engines are already deployed in production environments.

Currently zAAP and IFL engines are available for the z9 EC (Enterprise class) servers at a cost of \$125,000 per engine and \$95,000 for the z9 BC (Business Class) servers per engine. As there are no additional IBM software licenses needed, such engines may offer an attractive way to run Java workloads, including .NET applications migrated using Mainsoft's software and services, on the mainframe. IBM does not impose software charges on zAAP capacity.

Adding new .NET, Web Server, and/or application workloads onto the System z9 incurs low incremental workload for system administrators. Indeed, Mainframes are designed to host multiple workloads and to utilize available systems resources very effectively, without requiring proportionate increases in system administration and management.

It is clear that Mainsoft's software and services can be valuable components in server consolidation projects seeking to migrate workloads to the System z9 platform that may be otherwise unsupported. The use of Mainsoft's tools enhances the ability of organizations to optimize the running of .NET applications on the mainframe.

Areas of Cost Benefits

In this section we highlight where the deployment of .NET applications on System z using Mainsoft's software and services holds the potential for organizations to realize significant

savings in their total cost of operations. The paper will not build any “return on investment” calculations nor attempt to quantify the scale of the economic benefits as these vary greatly from organization to organization. It does, however, identify tangible financial and operational benefits achievable in many real world business scenarios. It must be accepted that in the majority of cases there may be a requirement for additional investment to be undertaken in order to realize the benefits identified.

- ◆ *Cost/user/year statistics.* Research has indicated that when organizations calculate the costs of IT systems in terms of users supported per year, mainframe-hosted solutions can be up to 40% less expensive than large numbers of PC server systems. Costs measured include hardware and operating system, application software, middleware, and staff management costs. Measuring slow response times, the cost per user per year on the mainframe was calculated to be \$6,750 while for PC Servers the equivalent costs were estimated at \$17,750. ⁴
- ◆ *Cost savings of mainframe-based .NET infrastructure.* The TCO of even a very well administered Windows environment is usually accepted to be high when compared with mainframe systems. In distributed .NET environments, staff levels rise with workload; on System z9 platforms workloads may grow without the need for additional staff. ⁵
- ◆ *Cost of unplanned downtime.* Mainframe platforms offer much higher availability than Windows servers. The MTBF for a System z9 server currently runs in excess of thirty years. For distributed servers this drops to around ten years. However, as many hundreds of distributed servers may be required to host the equivalent workload, server failure is an expected scenario with all of the costs associated with diagnosis, repair, and unplanned application down time. Our experience has shown that such conditions typically result in large costs being associated with the need to have excess capacity available at all times to ensure adequate service delivery.
- ◆ *Cost of Energy, Cooling, and System Utilization.* System z9 mainframes routinely operate with utilization loads of greater than 80%, whereas many studies over recent years show that Windows systems typically achieve between 5 – 25%. This difference can translate into significant additional Intel server capacity being deployed to meet similar workloads. The incremental cost of energy to operate such platforms and to cool the data center is considerable, and it is not expected to drop in the near future. Indeed, customers have stated publicly that they managed to save up to 80% of their power costs by consolidating distributed server environments onto the IBM System z9 architecture. ⁶
- ◆ *Security and Business/Brand risk.* System z9 Mainframes provide a more secure operating environment than even the best managed Windows servers coming as they do with a host of designed security features built in. In fact, the security of the System z9 platform has been recognized by a wide range of industry-recognized independent certification, including Evaluation Assurance Level 5 (EAL) in various areas. ⁷ With a long history of managing security, IBM continues to invest in additional security-related capabilities for the System z9 including centralized key management and built-in cryptography engines. The risk and therefore cost to businesses of critical data being compromised is enormous, in terms of financial impact and potential brand damage.

Strategic Business Benefits

In our opinion, there are a number of strategic business benefits achievable by running .NET applications on an IBM System z9 mainframe by using Mainsoft’s Visual MainWin tools. Some of these will result in visible financial payback while others will deliver other business advantages. The core benefits that may be realized utilizing Mainsoft’s software and services follow from running business applications on the secure and very highly available mainframe

platform. We believe that for .NET applications that would otherwise be deployed on large numbers of Windows servers, the advantages of porting to the mainframe are compelling.

The high availability enjoyed by mainframe applications ensures that organizations are well positioned to build resilient IT services to support essential business processes. These benefits can also translate into excellent risk mitigation as critical systems will be available when the business requires them. In addition, the highly secure nature of the IBM System z9 platform provides an elevated level of protection that can ensure business systems are secured effectively, a major benefit to organizations that wish to defend their brands and market appreciation. Mainsoft's applications and services allow organizations to port their .NET applications to run as J2EE programs on the mainframe, thereby benefiting from the very high availability for which the platform is justifiably recognized.

There are also ample opportunities for saving money by utilizing the mainframe to deliver .NET applications. Many businesses are today seeking to rationalize and simplify their IT infrastructure through server consolidation. Migrating Microsoft .NET applications onto a server that already enjoys high utilization rates with low management overhead represents another opportunity to simplify the IT infrastructure.

Running .NET applications natively on the mainframe has at least two further benefits. The J2EE environment is non-proprietary and as such can be hosted on many server platforms, of which the mainframe is but one. It is noteworthy that the Mainsoft solutions permit Microsoft code to be recompiled to run on every J2EE platform, including UNIX and Linux systems in addition to the mainframe. This offers customers great deployment flexibility. The second benefit is that IBM System z9 servers have always made use of virtualization schemes which, combined with the platform's extremely robust management tools, makes it possible to allocate physical resources (CPU cycles, memory, and I/O) in a highly flexible manner. Thus, as demand for access to .NET applications on the mainframe increases, it is a simple matter to allocate resources to ensure consistent application service quality. Equally, as demand lessens, resources can be de-allocated and made available for other business applications. This allows IT to align the consumption of resources quickly in the face of variable business requirements and ensure that businesses use IT to its maximum benefit.

What It All Means

Organizations that are running IBM System z mainframes have a significant investment in Microsoft .NET applications and are looking to consolidate their server infrastructure are well advised to consider the potential of Mainsoft's .NET to J2EE cross-platform solutions. There are many potential benefits, in both technical and business terms, to hosting Microsoft .NET applications on the System z9 platform. Of these, simplicity of management, low total cost of operations, security, and high availability are among the most visible, and these are high-priority issues for all organizations. However, in the longer term, it is the very flexibility supplied by running .NET business applications on the mainframe that could deliver the greatest advantages. Increasingly organizations are faced with rapidly varying demands from their internal customers, external customers, and business partners for secure access to services, and the System z9 platform running Microsoft .NET applications is well positioned to handle these issues. Furthermore, as the mainframe platform continues to grow in power and its ability to host multiple workloads expands, there is clear opportunity for Mainsoft's Visual MainWin .NET – J2EE solutions to play a major role in server consolidation efforts.

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