> REDUCING MAINFRAME TOTAL COST OF OWNERSHIP (TCO)

Modernization of mainframe applications and data is essential for integration with other enterprise services, data and processes that drive business value—but it has to be accomplished in a manner that reduces mainframe TCO.

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COST-EFFECTIVE MAINFRAME MODERNIZATION

No one will debate the fact that traditional approaches to mainframe integration are computationally expensive. The burden of legacy integration technologies, whether it be custom coded approaches or proprietary point-to-point adapters, add to an infrastructure that is overly complex, inflexible, difficult to maintain, and inefficient in how it utilizes mainframe capacity. Progress® DataDirect® Shadow® addresses this issue with a responsive mainframe integration platform for reduced complexity, cost and risk, allowing organizations to exploit the latest IBM System z platforms for increased value and operational efficiency.

Shadow offers a unique TCO value proposition for mainframe customers, providing both breadth and depth of support for exploiting the IBM System z Integrated Information Processor (zIIP). The zIIP is unique in that the work it performs is not measured for the purposes of calculating mainframe capacity, and it has no speed restrictions.. Shadow has the ability to offload to the zIIP up to 99% of the mainframe integration processing for the multiple, parallel patterns of integration it supports, including Web services, SQL data access, events, and Web enablement. Its zIIP exploitation supports the broadest range of mainframe data sources, including Adabas, DB2 for z/OS, IMS DB, and VSAM, as well as legacy application environments such as CICS, IDMS, IMS TM and Natural.

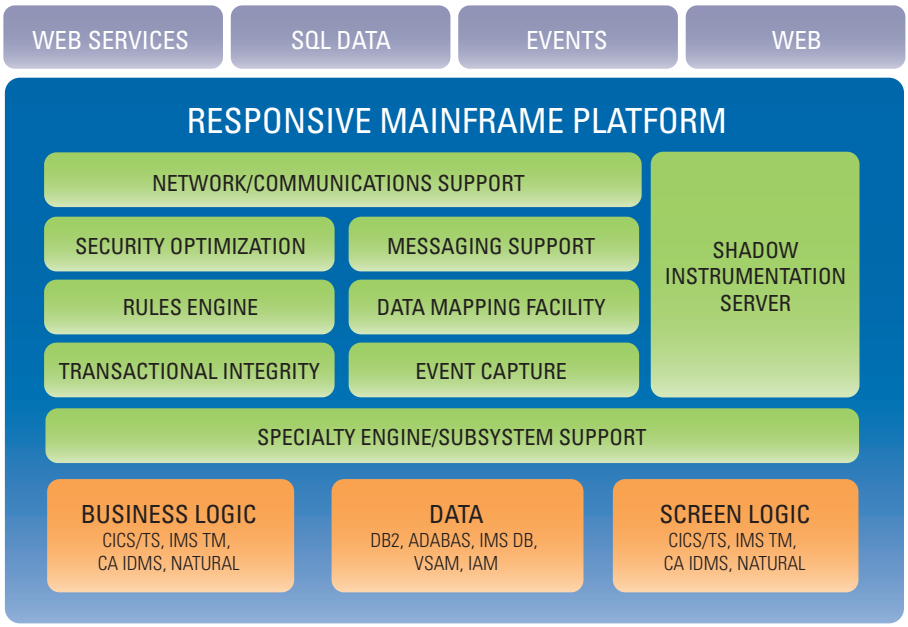


Figure 1:
Shadow integration architecture

The Shadow approach to zIIP exploitation is to enable customers to quickly and efficiently transform their current working mainframe transactions or data queries to allow the new processing done by Shadow to run economically on the zIIP specialty engine—outside the charged capacity of the General Purpose Processor (GPP). Shadow does not cause IBM or other third-party code to become zIIP-enabled. Unlike any other product on the market today, Shadow provides a risk-free, proven method for unlocking the zIIP engine to run additional workloads beyond DB2, in particular, the processing involved with integrating mainframes with service-oriented architectures (SOAs). In the new SOA world, the bulk of this type of processing involves transformation, such as going to-and-from XML, as well as other protocol-related processing.

The ability of Shadow to exploit the zIIP specialty engine provides several benefits to organizations that rely on mainframe technologies. It:

- Reduces workloads on the General Purpose Processor, which delivers increased usable capacity to the organization, ultimately deferring the requirement for hardware/software upgrades and the incremental increases associated with additional ISV licenses charges
- Utilizes the zIIP specialty engine to immediately reduce the monthly license costs for organizations implementing MULC (Measured Usage License Charge) software
- Delivers improved performance and throughput by running software in parallel to production workloads that are running on the General Purpose Processor

UNIQUE APPROACH TO ZIIP EXPLOITATION

In order to appreciate the innovation underlying the zIIP exploitation of Shadow it is helpful to explore the multi-tasking environment of the mainframe in more detail. Mainframe processors are dispatched as threads through Task Control Blocks (TCBs)—but all threads are not created equal. Within z/OS, the Workload Manager (WLM) software prioritizes TCBs. WLM helps administrators control workloads according to such considerations as quality of service (QoS) and service-level agreement (SLA) goals. The z/

OS also uses a lightweight, low-overhead kind of thread called an "enclave Service Request Block (SRB)." The zIIP specialty engine runs certain enclave SRBs that are zIIP-eligible.

Those SRB workloads can run without the governing constraints put on the GPP and are free of the associated software charges.

Very few middleware products sold today were written to run in enclave SRB mode. Mainframe middleware is typically TCB-based products that are incapable of exploiting the zIIP. While most workloads running in an enclave SRB are zIIP-eligible, SVC (supervisor calls) can't be executed in an enclave SRB. This makes certain operating system functions such as I/O unavailable while in enclave SRB mode. It is here that Shadow technology is unique to the market. Shadow utilizes a hybrid SRB/TCB architecture that creates a pair of threads—that is, an enclave SRB thread and a TCB thread—with the ability to run most of the code in the enclave SRB to exploit the zIIP, with the execution of the SVC calls switched over to the TCB. With this unique innovation Shadow maximizes zIIP utilization while avoiding any restrictions on what the application can do.

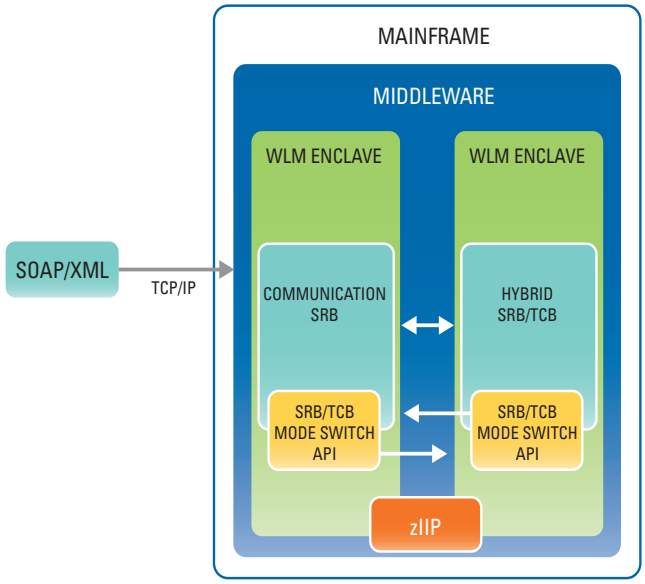


Figure 2:
Shadow runtime utilizing zIIP specialty engine

A look at how Shadow exploits the zIIP engine may help illustrate the benefit of operating in enclave SRB mode. Consider the scenario of processing a mainframe Web service. When a request comes into the mainframe for that Web service, the first step will require translation of the Web service names and operations into WLM service classes. Shadow creates an enclave SRB that is eligible to be executed on the zIIP while also providing the ability to designate the percentage of the integration workload that's off-loaded to the specialty engine. Understanding the nuances of z/OS and WLM operations, Shadow developers took steps to ensure that many workload components of a mainframe Web services were made zIIP-eligible, including much of the XML/SOAP messaging processing, Open Database Connectivity (ODBC)/ Java Database Connectivity (JDBC), ADO.NET processing, TCP/IP processing, tracing, and security. These kinds of CPU-intensive workloads are where

the mainframe platform shines, and they can now enjoy the full unrestricted processing power of the zIIP while eliminating the processing overhead.

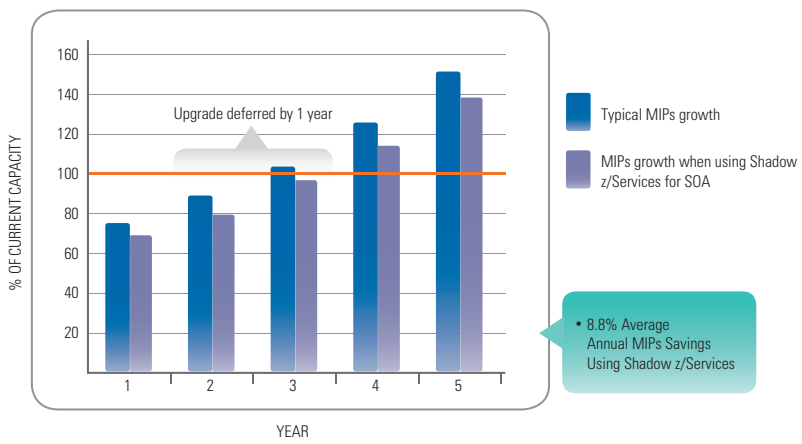
SHADOW ZIIP PERFORMANCE BENCHMARKS

Unlike other products that cannot exploit the zIIP even under narrow circumstances, Shadow enables almost all necessary processing to be migrated from the General Purpose Processor (GPP) to the zIIP.

The result is the ability to conserve GPP MIPS by migrating Web services or data-related processing to the zIIP, where it typically can be processed faster and at lower cost. Therefore, the more zIIP exploitation you have, the better your throughput and the lower your mainframe software costs. Shadow is extremely effective in its utilization of the zIIP specialty engines, qualifying an average of 90% of Shadow-related Web services processing for mainframe applications represented as business logic (BLI), mainframe screen-based applications (SLI) and data queries interfaced via a SOAP interface (DLI), thus ensuring the improved throughput and lower total cost of ownership necessary for your organization to cost-effectively integrate your mainframe into an SOA.

For integration with mainframe business logic, the benefits are even better as 99.8% of the processing performed by Shadow is zIIP-qualified. The use of "zIIP-qualified" is what we consider the most accurate measurement for gauging the effectiveness of zIIP specialty engine utilization. The result is the ability to conserve GPP MIPS by migrating SOA processing to the zIIP, where it typically can be processed faster and at lower cost.

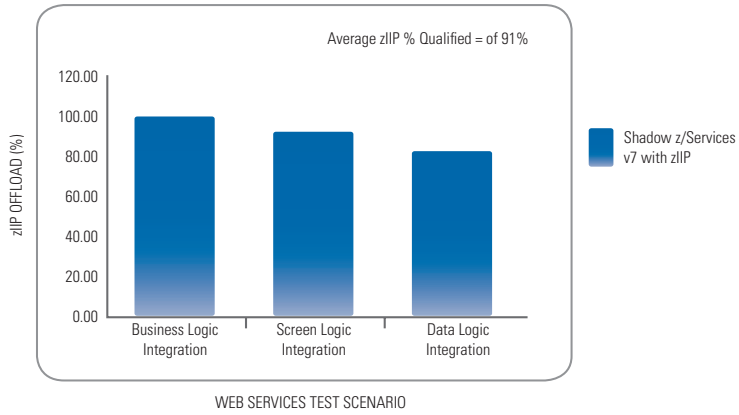
MAINFRAME PROCESSING SAVINGS



SAVING CAPACITY AND DELAYING A MAINFRAME UPGRADE

The reality of adding hardware to increase processing capacity has its limits. Organizations that have taken this approach must deal with the additional costs to maintain data centers, specifically, power usage, floor space and labor costs. These issues are fueling the market demand for virtualization and consolidation, two areas that are mainframe strengths. However, moving SOA processing to the mainframe has its costs too: the most significant being the increase in licensing and maintenance fees for mainframe software. Most mainframe software fees are tied to the capacity of the mainframe, which is typically measured in MIPS. As the volume of Web services on the mainframe grows so does the increase in CPU consumption, and, therefore, the capacity of the mainframe must be managed to balance the additional processing needs with that of the IT budget.

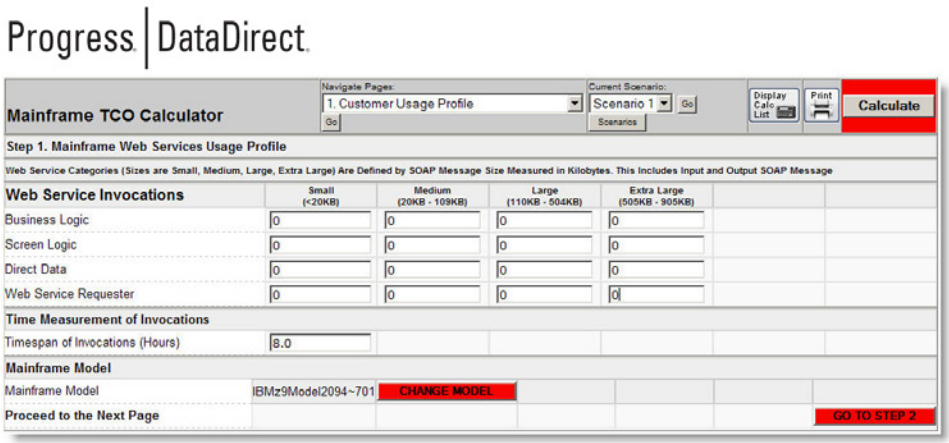
SHADOW z/SERVICES v7 zIIP EXPLOITATION



As an example, assume a 20% Compound Annual Growth Rate (CAGR) for MIPS, current capacity utilization rate of 66%, and an average incremental SOA load of 10%. With traditional solutions, your organization will require a capacity upgrade in year 2 in order to avoid capacity constraints starting in year 3. Using Shadow and assuming an 80% offload rate, you can delay that upgrade until the end of year 3, a full year later. In addition, the total MIPS required are on average 8.8% less due to the efficiencies of Shadow. Considering that the fully loaded costs of each MIP can run

into thousands of dollars, the savings provided by Shadow are significant and provide a measurable way to reduce the total cost of ownership for mainframe integration processing.

Using Shadow not only helps achieve your mainframe integration goals with scalable, efficient SOA enablement or data access; it also helps your organization achieve a lower total cost of ownership by conserving the MIPS on your mainframe's General Purpose Processor, which in turn helps slow your rate of MIPS growth. This helps your organization avoid or defer a potentially costly mainframe capacity upgrade.



CALCULATING MAINFRAME TCO FOR INTEGRATION

Depending on the volume of integration processing that is diverted from the General Purpose Processor capacity, savings can be substantial when using IBM specialty engines in combination with Progress DataDirect Shadow. The capacity savings associated with utilization of the zIIP specialty engine can be quantified using the Progress DataDirect Shadow TCO Calculator.

The Shadow TCO Calculator is a sophisticated, user-friendly tool for analyzing and modeling the impact of Web services/SOA-related processing on mainframe MIPS capacity. Working closely with Progress DataDirect, users provide information such as the mainframe model in use, quantity of Web services invocations or SQL queries (type and size), and time span, and a detailed report is then calculated and assembled providing the potential

saving in MIPS dollars and MIPS capacity when a zIIP specialty engine is used in combination with the Shadow mainframe integration software.

A HOLISTIC APPROACH YIELDS BIGGER DIVIDENDS

The use of specialty engines to lower mainframe TCO continues to expand. Some middleware vendors leverage specialty engines to reassign some portion of XML processing via IBM's z/OS XML System Services (z/OS XML)—a system-level XML parser with superb performance characteristics that's integrated with the base z/OS operating system. Shadow utilizes this capability as well, but has taken a more holistic approach. Through the use of z/OS XML other mainframe middleware vendors are capable of exploiting specialty engines, but their approach is limited in its capacity to do so and omits a considerable portion of the processing involved in XML integration. z/OS XML parses inbound XML into a tokenized format. However, this format is unusable by the back-end; it must undergo further conversion to whatever format is acceptable there—potentially intensive processing that's left to the GPP and is subject to software usage fees. In addition, the outbound XML (substantially larger than the inbound) also can't be reassigned to the zIIP.

The manner in which Shadow was architected is fundamentally different. With a zIIP-enabled, responsive mainframe architecture, Shadow accomplishes up to 99% of the XML processing on the zIIP using hybrid threading models that dynamically switch from SRB mode to TCB mode for optimized performance and zIIP access. Unlike competing products that can't exploit the zIIP, or that do so under constrained circumstances, this hybrid model of integration stream can enable almost all necessary processing—such as XML un-marshaling and marshaling, security processing, and development-related processing—to be migrated from the GPP to the zIIP, where it's processed faster and at a lower cost.

The optimal design approach for utilizing mainframe specialty engines builds exploitation capabilities into the foundational architecture of the middleware. When the underlying codebase of the middleware is designed to autonomically react to the presence of a specialty engine, the capacity offload benefits are holistic across all integration methods, applications and databases on the mainframe.

SUMMARY

Mainframe infrastructures of today bear little resemblance to the rigid, monolithic systems of the past. Industry standards and integration tools have matured to provide increased flexibility and intuitive integrated development environments to simplify re-using legacy data sources in new application development initiatives. As this report has shown, utilizing zIIP specialty engines as part of your SOA enablement strategy can significantly lower mainframe TCO. However, without software to exploit the zIIP across multiple data and applications environments for Web services, SOA or data connectivity, its true potential cannot be realized. Progress DataDirect Shadow is a single, unified platform, built exclusively for integration with IBM System z mainframes. It uses patent-pending technology to deliver broad exploitation of zIIP engines, enabling customers to deliver business systems that involve the System z platform in a timely manner and with a material reduction in overall TCO. Progress DataDirect Shadow provides a new benchmark in mainframe integration, one that not only allows the mainframe to be a full participant within an SOA, but extends the value of the platform to business by enabling it take on new workloads with dramatically reduced costs.

Regardless of the size, scope and maturity of your mainframe integration requirements Progress Software is ready to help you realize the full potential of your IBM System z platform.

PROGRESS SOFTWARE

Progress Software Corporation (NASDAQ: PRGS) is a global software company that enables enterprises to be operationally responsive to changing conditions and customer interactions as they occur. Our goal is to enable our customers to capitalize on new opportunities, drive greater efficiencies, and reduce risk. Progress offers a comprehensive portfolio of best-in-class infrastructure software spanning event-driven visibility and real-time response, open integration, data access and integration, and application development and management—all supporting on-premises and SaaS/cloud deployments. Progress maximizes the benefits of operational responsiveness while minimizing IT complexity and total cost of ownership.

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