Rational® software

The business value of enterprise modernization with IBM i on Power hardware

Michelle A. Cordes,
Rational Enterprise Modernization
Susan M. Yoskin
Rational Enterprise Modernization

Contents

Introduction

Over the last few years, you might have seen, heard or lived some of the following key facts regarding your 5250 applications and your AS/400®, iSeries®, System i® environment:

- *Millions of lines of RPG and COBOL code are running today's businesses, and more are being added every year. Some of these 5250 applications have been maintained over a period of decades, not just years.*

- *Over time, your organization's significant investments have increased the value of your core applications, which are critical to the success of your business. The applications are at the heart of your organization and enable you to manage and process the majority of your customer, product, supply-chain and critical business data.*

- *The number of developers who maintain your applications is decreasing, and possibly, your developers are spread across multiple locations, cities and in some cases, countries.*

- *Businesses are demanding more and more from IT, so it's often up to smaller development groups to deliver more-agile applications.*

- *Applications must also be delivered under the constraints of increased governmental regulations.*

This white paper outlines IBM's enterprise modernization "philosophy" for Power™ and IBM i. Though it mentions some specific IBM offerings, it is not an in-depth, technical perspective. Our goal is to address enterprise modernization from a business perspective, that is, why should you modernize and why should you use your IBM i Power platform as part of that modernization effort. This paper discusses the platform itself, then moves to software, both tooling and your application code, and discusses your developers and their skills.

What is enterprise modernization?

Traditional 5250 applications are large and sometimes complex solutions, and each addresses a specific business function. However, today's business requirements increasingly involve composite applications that support a business process and include sets of related and integrated services that come from different existing application silos. Although these monolithic applications, along with the information and functions they contain, are invaluable to your business, they often compartmentalize your processes or hide duplicate functions and information. Such inefficiencies can inhibit agility, decrease responsiveness and slow your time to market. Furthermore, this complexity can increase application maintenance expenses, diverting your resources from strategic business initiatives and innovation.

To help make your business more responsive, you need to make your existing applications more flexible, reusable and easy to maintain. However, rewriting them can be expensive, time consuming and risky, with no guarantee that they are any better. And replacing them with packaged solutions can also be problematic because you risk losing the intellectual capital that's buried deep in your systems. Repurposing or modernizing existing 5250 applications is both a financially sound and a time-tested approach to modifying existing assets so they can be included as part of a Web services architecture, such as a service oriented architecture (SOA). By modernizing your applications, you can make them more agile, flexible and robust, increasing your organization's responsiveness to marketplace dynamics and changing business needs.

Additionally, by streamlining application and operational processes, you can free up more resources to focus on developing new business requirements and capabilities. Best of all, modernization can be done in an evolutionary, not a revolutionary, manner that will help to minimize the risks to your organization.

Enterprise modernization—hardware perspective

From a hardware perspective, why should you want to continue to modernize and deploy your applications on the Power platform instead of moving them to multiple distributed servers? "One of the more pressing issues facing data center managers today is power usage. The power requirements for data centers have grown so much that some customers may have to build new facilities because they can't bring enough power into current sites to run their future operations."[1] As stated in The Clipper Group Navigator, "Some enterprises have looked at changing the IT environment, and migrating to a scale-out architecture using a network or grid of x86 servers to simplify the infrastructure. Unfortunately, when deployed with a single application resident, these servers only utilize a fraction of the CPU resources available, in many cases less than 20% of the server compute cycles. This wastes not only valuable IT resources, but natural energy resources as well".[2]

Energy Savings

The power and cooling costs for distributed servers can be significantly higher than those of a consolidated Power server.

Energy costs have escalated significantly in recent years, especially this past year. This has a direct effect on an IT shop's budget, because power and cooling requirements can account for up to 40% of the operational budget. A crisis can develop when you must decide whether to build new facilities to meet new power or cooling needs or stop all new application deployment, a risky business decision at best.

Power Systems are very energy-efficient as is shown in the following comparison to HP and Sun servers based on the competitive benchmarks SPECint_rate2006 and SPECfp_rate2006.

Highend Systems Energy Efficiency

System	SPECint_rate2006 Performance per WATT	SPECfp_rate2006 Performance per WATT
IBM Power 595	0.073	0.075
HP Integrity Superdome	0.068	0.061
Sun SPARC Enterprise M9000	0.051	0.045

Midrange Systems Energy Efficiency

System	SPECint_rate2006 Performance per WATT	SPECfp_rate2006 Performance per WATT
IBM Power 570	0.149	0.108
HP Integrity rx8640	0.077	0.069
Sun SPARC Enterprise M8000	0.061	0.055

Midrange Systems Energy Efficiency

System	SPECint_rate2006 Performance per WATT	SPECfp_rate2006 Performance per WATT
IBM Power 560 Express	0.151	0.110
HP Integrity rx7640	0.094	0.085
Sun SPARC Enterprise M5000	0.071	0.060

Entry Systems Energy Efficiency

System	SPECint_rate2006 Performance per WATT	SPECfp_rate2006 Performance per WATT
IBM Power 550 Express	0.151	0.127
HP Integrity rx6600	0.064	0.045
Sun SPARC Enterprise M4000	0.057	0.048

As this data shows, using CPU throughput benchmarks from SPEC.org, Power Systems are more energy-efficient than the HP and Sun systems at each system level. For example, the new 32-core Power 570 and 16-core Power 560 Express are each more than twice as efficient as their Sun counterparts.

In addition to being able to handle more work per watt, IBM has built in new power saving features. With the new Power Systems, IBM's EnergyScale™ technology will provide features such as power tending, power saving, and thermal measurement. These features, enabled via Active Energy Manager under the IBM Systems Director console, allow you to measure the energy usage of the system and direct policies toward the energy-efficient operation of the server.

Power Systems can also be placed in racks with a Rear Door Heat Exchanger. The IBM Rear Door Heat Exchanger is designed to remove heat generated from the back of your computer systems before it enters the room. The efficient IBM Rear Door Heat Exchanger, which takes heat from the rack with water, can substantially reduce the heat load coming from any IBM enterprise rack.

Personnel costs

The Power server requires less energy than the distributed platforms required to support the equivalent application workload.

The increased rate of failure of distributed systems can increase the overall number of system administrators required to handle these failing systems, as well as the routine administrative tasks. This is in stark contrast to the fairly constant number of administrative or systems-based personnel associated with an IBM i 5250 environment on Power Systems. IBM has engineered

autonomic capabilities such as self-healing, self-managing, self-protecting, and the newer technologies such as CPU sparing, node deconfiguration and fault masking into the Power systems, with the philosophy of being able to keep running despite problems. When new workloads are added to a distributed environment, this can mean additional systems, and thus additional personnel, unlike a Power environment, where new workloads can mean the addition of a new subsystem or logical partition (LPAR) or two, but not additional personnel to maintain them.

Not only are fewer personnel required compared to sprawling distributed platforms, there are also lower personnel requirements compared to the AS/400 platform from years past. The addition of these autonomic capabilities has resulted in a reduction in IBM i staffing levels (operators and system programmers) per CPW over the last several years. And if there is one thing that an IT manager knows, it's that while the cost per hardware CPW has been going down, personnel costs have been going up in recent years.

CIOs are seeing green

According to a recent article in *Manufacturing Business Technology*, the adoption of eco-friendly computing is emerging as a priority for CIOs.[4] Independent market analyst Datamonitor found that 75 percent of those surveyed considered eco-friendly IT as an important part of their IT strategy. This leads Datamonitor to predict an increase in both CIO interest and vendor offerings to fill the green IT market.[5] This change comes about because of the constant budget challenges that CIOs face.

The energy-efficient Power server meets one of the first requirements of an eco-friendly environment. It consumes significantly less energy than the number of distributed systems required to support the equivalent application workload. The smaller physical footprint also provides a smaller carbon footprint, the goal of any eco-conscious person or company.

The built-in security of Power servers with IBM i and the virtualization capabilities offer additional reasons for running today's applications on this platform.

Software savings

A different type of green that makes CIOs happy is the "green" of cost savings, in particular, software cost savings, from upgrading to a newer IBM Power server. Many independent software vendors (ISVs) as well as IBM license their software based on the number of processors. IBM's newer Power servers have more CPW per processor than their predecessors. As a result, organizations can run their existing 5250 applications on upgraded hardware and actually save money. Purchasing the latest hardware can actually help decrease software costs, offsetting software upgrades.

Other reasons to move applications to or keep them on a Power server

In addition to the energy and financial reasons already mentioned, there are more reasons to use the Power platform for your business critical applications.

Security

The security-rich holistic design of IBM i can mitigate the risk of security breaches and help to protect your organization's brand image. Originally designed to be shared by multiple users, Power servers with IBM i have security built into nearly every level of the computer, from the processor level, to the operating system to the application level. This design helps protect your applications from malware, viruses and threats from insiders.

The Power with IBM i security features can help you to meet regulatory reporting needs with confidence. These features include encryption solutions to help secure data from theft or compromise, access control management and extensive auditing features, with the simplicity of centralized management.

Virtualization

Virtualization has become the buzzword for businesses wanting to lower their total cost of ownership and improve reliability and flexibility. In simple terms, virtualization offers a way to help consolidate a large number of individual small machines on one larger server, easing manageability and more efficiently using system resources by allowing them to be prioritized and allocated to the workloads that need them most at any given time. Thus, you can reduce the need to over-provision for individual workload spikes.

Partitioning and virtualization are complementary technologies that are most effective when combined, but it is still important to understand the distinction between the two. *Partitioning* provides the ability to divide physical system resources into a number of distinct, isolated "servers" that operate independently from each other. In general, there is a one-to-one relationship between a physical resource and the logical partition it is assigned to, creating the equivalent of a "box within a box." All the physical pieces behave and perform exactly as they do if partitioning were not present. *Virtualization* takes this concept one step further in that it provides the ability to simulate the availability of hardware that might not be present in sufficient amount—or at all! Virtualization uses the available physical resources as a shared pool to emulate missing physical resources. Virtualization is capable of very fine control over how and to what extent a physical resource is used by a specific virtual machine or server.

Virtualization technologies can ultimately help:

- *Improve security and operational resiliency.*
- *Protect sensitive data.*
- *Accelerate time to market.*
- *Deploy new capabilities.*
- *Reduce "islands of information."*

Through Power with IBM i virtualization technology, rapid server deployment and provisioning can help enable new virtual servers in real time, supporting multiple diverse workloads in a protected and isolated environment. During spikes in demand, the platform's ability to quickly redistribute system resources can make the difference between flawless execution and the cost of slow response times or system crashes.

Enterprise modernization—software perspective

Now let's look at enterprise modernization from a software or application perspective. IBM enterprise modernization solutions[6] are designed to address today's critical enterprise modernization issues of maintenance costs, using existing assets, architectural complexity, siloed teams, cross-platform support and skills. (See Figure 1.) With decades of leadership in enterprise modernization, IBM is well positioned to provide the capabilities that your organization requires to cost-effectively and incrementally evolve your core systems toward modern architectures and technologies. IBM enterprise modernization solutions can help your organization adapt business processes quickly and flexibly by reusing existing applications and data. Developers can unite and use their skills in disparate programming languages and work within a single, integrated development environment. This environment helps to form the foundation for your enterprise modernization initiatives.
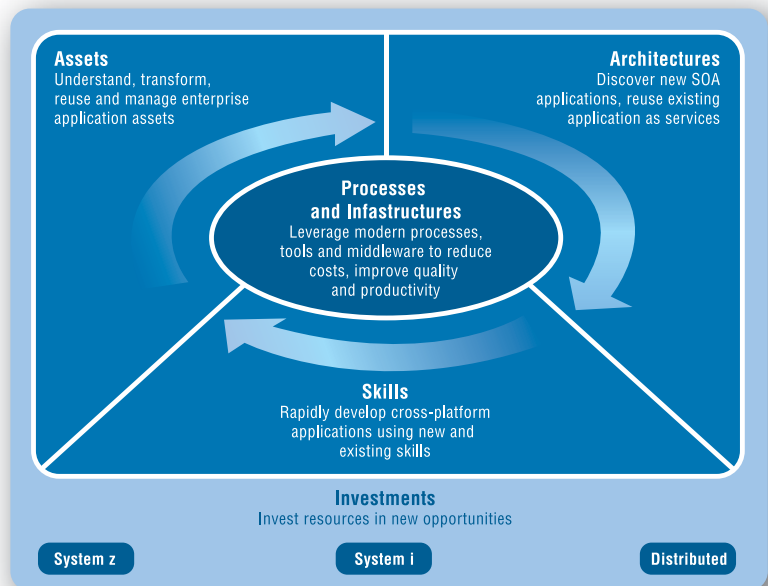

Assets
Understand, transform, reuse and manage enterprise application assets

Architectures
Discover new SOA applications, reuse existing application as services

Processes and Infastructures
Leverage modern processes, tools and middleware to reduce costs, improve quality and productivity

Skills
Rapidly develop cross-platform applications using new and existing skills

Investments
Invest resources in new opportunities

System z   System i   Distributed

Figure 1. IBM enterprise modernization solutions are designed to address an enterprise's critical modernization issues.

Any successful modernization effort, whether for SOA or to improve application maintenance, requires insight into existing applications.

Asset modernization: Extending the value of existing enterprise assets

Successful modernization initiatives require deep insight into targeted applications. Asset discovery and transformation tools can help your development teams generate detailed reports and graphics that enable rich understanding of existing applications. With this knowledge, developers can quickly identify the business rules embedded in core business processes, and they can restructure code, remove dead code and create reusable components that can be enabled as services within an SOA. In addition, asset modernization tools can help you:

- *Manage and govern the design, development and consumption of software assets and services.*
- *Eliminate the need to research, catalog and assemble the information for each service request.*
- *Identify assets that could be affected by proposed changes.*
- *Reduce the cost of ongoing application maintenance.*
- *Shorten the learning curve for new developers.*
- *Improve the productivity of existing IT staff.*

Asset modernization tools can help companies analyze their business software and identify components that can be reused. Component identification within their applications provides an organization the ability to modernize incrementally to minimize risk and costs. According to Jeffery Poulin and Brent Carlson, the industry-average cost to develop new software is approximately US$100 per line. "This means that every 1,000 lines of reused code yields a Development Cost Avoidance of $80,000!" This certainly makes the case for reusing existing code in any modernization effort.[7]

Architecture modernization can help integrate the core green-screen applications with Web applications that users are demanding today.

Support the lifecycle of assets

When you begin the process of creating reusable assets, it is also important to properly manage and govern your services. By establishing a comprehensive picture of your software assets, you can improve asset reuse, which in turn can help you quickly deliver innovative IT solutions and help you control costs, reduce application backlogs and improve business flexibility and responsiveness. X-Analysis from Databorough can help improve productivity and software delivery through asset reuse by enabling you to create, modify, govern and locate any type of development asset, including SOA and systems development assets. IBM WebSphere® Service Registry and Repository provides better management and governance of your deployed services, providing tangible business value from your SOA implementation.

Architecture modernization: Driving innovation with technology advancements

Your modernization initiative must also address the complex dimensions of architecture. Fragmented business processes, workflows, data and tightly coupled application architectures reduce your flexibility and agility. To transform your core systems into flexible applications and services while avoiding costly and high-risk rip-and-replace approaches, you can work with what you already have. Architecture modernization can help you reduce time to market, improve business alignment for growth, cut costs and limit business risk. Design and construction tools from IBM are designed to:

- *Speed the efficiency of IBM i development, Web development and integrated mixed-workload development.*
- *Break skills silos by simplifying and accelerating cross-platform development.*
- *Increase productivity and reduce training costs by extending 5250 applications to modern user interfaces.*
- *Accelerate the adoption of SOA by rendering existing IT assets as service components, which encourages reuse and efficiency.*
- *Create enterprise data standards, verify compliance and generate compliant models.*

Speed maintenance of your traditional applications

As you transition to a more modern look and feel, it's important to maintain your traditional applications even as your developers begin doing more Web-based development. IBM Rational® Developer for i for SOA Construction includes capabilities that help improve the speed and efficiency of development projects, including RPG and COBOL development, Web development, integrated SOA-based composite development, C, C++, and EGL. Optimized for WebSphere and IBM i environments, Rational Developer for i for SOA Construction:

- *Runs on the Eclipse open source platform so developers can adapt, extend and customize their integrated development environment (IDE).*
- *Supports creation of services deployable to the IBM WebSphere Application Server and IBM DB2® stored-procedure environments.*

Easily extend your applications to the Web with reduced cost and risk

Making your existing 5250 applications available through the Web can help extend their value while increasing efficiency and promoting asset reuse. With IBM Rational Host Access Transformation Services (HATS) for 5250, you can create Web applications (including portlets, rich client applications and applications targeted for browsers on mobile devices) that provide a standard and easy-to-use graphical user interface (GUI) for your 5250 applications running on the Power platform. You can also use Rational HATS for 5250 to

create Web services that provide standard programming interfaces to business logic and transactions contained within legacy applications. Rational HATS for 5250 is also designed to:

- *Help improve the workflow and navigation of your 5250 applications, without access or modifications to the application source code.*
- *Transform green-screen components in real time.*
- *Enable you to add lists, hot links, tables, buttons, valid-value lists, tabbed folders, graphs, and other elements such as logos, graphics and backgrounds.*
- *Help you create programmed navigation through multiple terminal screens to improve the productivity and usability of your 5250 applications.*
- *Help you create Web services from existing applications, so you can reuse those services as building blocks within your SOA solutions.*

Skills modernization: Using and modernizing existing and new skills

Your traditional IT professionals have decades of experience and RPG and COBOL knowledge. The question is, how do you use this experience to improve your current core business applications and take advantage of the new architectures and technologies that are available on these platforms? IBM offers several tools that support higher development productivity through the powerful, platform-neutral, business-oriented Enterprise Generation Language (EGL). Because it's platform independent, EGL enables developers to build cross-platform applications and automatically generate and deploy native Java™ and COBOL code that's optimized for the target platform. EGL hides the details of the target execution platform and associated middleware,

Rich Internet Applications (RIAs) are applications offered through a browser, but behave like a desktop application. RIAs are easy to maintain because new versions are made available by simply refreshing the browser page, and no installation is required. However, Web 2.0 and RIAs are hard to build because developers have to learn many different technologies, such as XML, Ajax, SOAP and so on. Rich Web support in IBM EGL was specifically developed to help developers easily create these highly responsive, rich Web applications without having to understand new technologies.

enabling developers to focus on the business problem rather than on the underlying implementation technologies. Even developers with little or no experience with Java and Web technologies can use EGL to create enterprise-class services and applications quickly and easily.

IBM skills modernization tools can help your company:

- *Use new technologies and innovation without retraining your existing staff.*
- *Assign new employees to any project, no matter what the target platform is.*
- *Speed the efficiency of 5250 development, Web development and integrated composite application development.*

Using EGL, a major advancement in business languages

Because larger enterprises can have numerous development platforms and skill sets, a platform-neutral development approach can help eliminate skills silos and create a unified pool of business-oriented developers who can be freely shifted across projects according to business demands. IBM Rational Business Developer can help you build such an environment by enabling your developers to focus on the business logic rather than the platform or complex runtime technologies on which the solution will be deployed. The application is based on EGL, an end-to-end rapid development approach that provides:

- *Higher development productivity through a powerful, platform-neutral, business-oriented specification and a wealth of rapid development tools and wizards.*
- *Simplified SOA support and tools to help quickly define, test and deploy services to a variety of platforms, including automated services generated from models.*
- *An easy-to-learn language that enables developers with general programming skills to be more productive in the delivery of robust modern applications. EGL is part of several IBM IDEs including Rational Business Developer and Rational Developer for i for SOA Construction.*

Process and infrastructure modernization: Improving team collaboration and responsiveness

Organizations have traditionally managed 5250 development separately from other platform development. However, this separation can not only hinder collaboration and productivity across the software life cycle, but also lead to errors that result in application failure or downtime. IBM tools for process, quality, and change and release management help automate and enforce development processes and enhance collaboration and productivity across multiple operating platforms throughout the application life cycle. These tools help you:

- *Enforce software governance policies and procedures across functionally diverse and geographically distributed teams.*
- *Ensure that business goals and requirements drive downstream design, development and testing.*
- *Lower costs by eliminating duplicate tools and processes.*
- *Realize improved end-to-end communication and traceability across the life cycle.*
- *Verify software builds and document the exact software versions that are deployed.*
- *Manage quality across the software-delivery life cycle.*
- *Strategically integrate application security throughout the software-development life cycle.*

Govern change and release processes

Solutions for change and release management can help boost productivity, improve visibility into projects and processes, unite distributed teams, and provide audit trails and traceability across the software-development life cycle for fast delivery of high-quality software. Tools such as IBM Rational Team Concert for i® software, with its native support for the IBM i operating system, can drive software innovation through collaboration, transforming how people, especially those involved in native RPG and COBOL application development as well as application modernization efforts, work together to develop and deliver software in an increasingly agile manner. IBM Rational Team Concert for i connects dispersed development teams to increase individual and team productivity, compress development cycles, and deliver high-quality software fast. Rational Team Concert for i delivers essential software version control, workspace management, and parallel development support to individuals and teams. Enforcement of agreed-upon standards can help ensure higher-quality results. Because not all organizations are the same, rules are configurable, and can be defined or refined as needed, enabling continuous improvement.

Development investment modernization: Enabling business flexibility

Modernizing how you invest your development dollars is the final key to enterprise modernization. Investment modernization includes moving investments to key platforms, architectures, and applications that can return maximum ROI. Organizations that continue to rely on inefficient existing applications and non-relational databases are finding that their ongoing

maintenance costs are skyrocketing. To avoid this scenario, you need to make the transition to open, modular and proven software-development platforms that span the entire software-delivery life cycle.

Application development offerings from IBM can help you:

- *Devote resources to new development rather than to maintenance or to supporting the operating infrastructure.*
- *Move to the latest modern architectures and use the capabilities of the IBM Rational Software Delivery Platform.*
- *Make incremental improvements within the context of a long-term strategic modernization plan.*

Skills improvement

The IBM Academic Initiative is training thousands of students to help meet the industry need for RPG and COBOL skills.

Although RPG and COBOL were among the languages taught to students in the early 1980s, that later changed to languages such as Basic, C/C++ and Java, among others. CIOs and others are now wondering where they are going to get the skills they require to maintain and enhance their extensive 5250 core applications as their development staff ages and retires. IBM has several programs designed to help address these issues. One, the Academic Initiative, is a program where IBM has committed to training 20,000 students by 2010 for both mainframe and IBM i environments. Working with more than 1,000 universities around the world, the Academic Initiative has educated over 10,000 students so far, and these numbers are growing.

Summary

Power Servers with IBM i not only run your business in a secure, dependable, and flexible way, but can also offer a lower TCO. These are just a few of the reasons to make your Power server the centerpiece of your application modernization efforts. To summarize:

- *Power Servers with IBM i are dependable, secure, and available. They historically have fewer minutes of downtime per year than other midrange platforms. You are likely to upgrade your system well before it fails.*
- *Power Servers are expandable because you can add capacity and software updates without a reboot; adaptable because they respond automatically to spikes in workload demands; flexible because they align processing priorities with business priorities; and scalable because they can run multiple virtual servers concurrently.*
- *Customers see significant business advantages through ease of management, high utilization, availability, security and software pricing that can often offer the lowest TCO. Customers have also learned that Power Systems running multiple workloads with maximum utilization are the most cost-efficient platform.*
- *IBM offers development tooling for the full application life cycle to make your cross-platform development efforts more efficient and more productive.*

IBM is committed to the Power Server and IBM i and expanding education worldwide.

For more information

To learn more about the IBM enterprise modernization solutions for IBM i, please contact your IBM marketing representative or IBM Business Partner, or visit the following Web site:

ibm.com/software/info/developer/solutions/em/systems/i/index.jsp

[1] Move up to IBM Power Systems
http://www-03.ibm.com/systems/migratetoibm/power/efficiency.html

[2] IBM i-Using a Common Platform to Reduce TCO with Higher Performance and Lower Energy Consumption October 29, 2008. The Clipper Group Navigator

[3] Move up to IBM Power Systems
http://www-03.ibm.com/systems/migratetoibm/power/efficiency.html

[4] Datamonitor reports: Green IT hits the CIO radar. http://www.mbtmag.com/article/CA6550525.html. 14 April 2008

[5] Trends to Watch: Green IT. 2008

[6] IBM enterprise modernization solutions
http://www-306.ibm.com/software/info/developer/solutions/em/systems/i/index.jsp

[7] The business case for software reuse, Computerworld.
http://www.computerworld.com/developmenttopics/development/story/0,10801,89602,00.html?SKC=development-89602.
2 February 2004

Recyclable, please recycle

RAW14105-USEN-00