Rational® software

Managing Legacy Integration
with IBM Rational Software

Managing Legacy Integration with IBM Rational Software Overview

Most IT organizations have three major imperatives:

1. Help the organization reduce costs
2. Gain and retain customers
3. Increase operational efficiency

Accomplishing these imperatives typically requires seamless access to data and business logic from multiple business systems, which translates into implementing systems integration projects that tie together business processes and enable data access and sharing.

Such projects often involve legacy data and applications , new applications, and both customized and non-customized packaged applications. This complex mix poses numerous challenges for the development team. Legacy systems may be based on technologies, platforms, and business rules that are unfamiliar to the current development team. Moreover, team members may lack the technical skills to address both issues internal to the legacy systems and issues related to integrating those systems with the new application. These challenges magnify intrinsic project risks such as shifting deadlines, cost over-runs, and requirements changes. To reduce those risks, the project team needs a sound environment for managing change and complexity.

That is what IBM Rational's comprehensive, integrated lifecycle development solution provides (see Figure 1). It includes all the tools, best practices, and services teams need to successfully manage complex projects by reducing risk and identifying and resolving potential problems early in the process. The Rational tools guide team members through the entire development process, unify the team, and help ensure that they complete all critical milestones. This paper will help you gain insight and control over legacy integrations. It will illustrate how Rational solutions bring order to complex integration projects, and will highlight case studies of other successful customers.
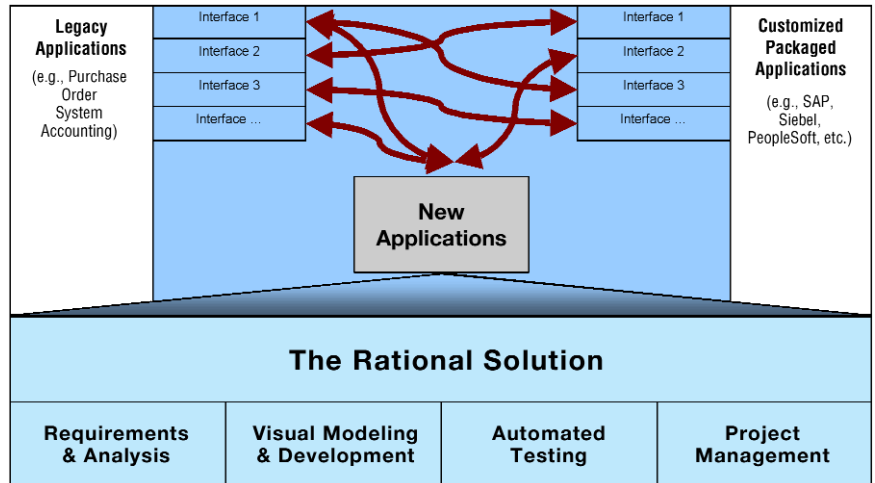
Figure 1: IBM Rational offers a comprehensive solution that simplifies complexity throughout the lifecycle of legacy system integration projects

Business Drivers for Legacy System Integration

Let's begin by looking at some of the business reasons that drive legacy system integration efforts.

- *Changing business needs. Often, new systems to support new business processes deliver maximum value if they integrate with and leverage existing data and business processes.*
- *Acquisition and merger activity. This type of business activity often results in the need to integrate disparate and duplicate systems (e.g., two human resource systems).*
- *Overlapping systems. Some organizations may have unsynchronized systems with duplicate or related data. Integration can consolidate overlapping logic into one system and ensure that both systems will have current, synchronized information.*
- *Need for convenient and secure access to selected customer information. Both internal and external customers and users want all the information they need at their fingertips from within a single user interface. Often, IT is called upon to provide this capability while protecting other, sensitive information within the same application or database. For example, it might be desirable to give account managers access to sales information for their accounts but to restrict access to the rest of the financial information system. Usually, this means IT must integrate a new, user-friendly front-end system with its back-end transactional legacy systems.*

- *Return on investment and cost issues. Integrating systems can be a cost-effective way to achieve new business goals while preserving the organization's investment in existing systems. For example, to transition an existing application to a new platform, you might need to integrate it with other business systems. Likewise, if you're migrating an order processing system off the mainframe, you might need to integrate it with other systems to re-create it. To understand total cost of ownership, it's important to assess the impact of all proposed changes.*

Now that we've seen what drives organizations to initiate legacy system integration projects, let's turn to some of the challenges inherent in these projects.

Development Challenges

As we noted in the descriptions above, a typical integration project might include a variety of system types:

- *New, custom applications. This includes new interfaces to existing legacy applications, and new business applications that must integrate with existing systems.*
- *Packaged Applications. These are purchased applications for CRM (customer relationship management), ERP (enterprise resource planning), supply chain management, accounting, and other business areas. They may either be used "as is" or customized and integrated into the IT/business operations environment.*
- *Legacy Applications. This refers to both new and older systems in the production environment that are being used to run the business. The range of platforms and technologies can be enormous—everything from DB2/COBOL on the mainframe to UNIX/Windows client server applications to Java™ on a Web server.*

In integrating these applications, development teams may face a variety of challenges:

- *Undocumented systems. Often, considerable time and effort are required to harvest and document the "intellectual capital" embodied in legacy systems. The development team may know little about the business processes and technologies the system is based upon, and, as most legacy system development projects did not follow a formal repeatable development process, there is no documentation concerning either the original system requirements or pre- and post-implementation changes. The team can use visual models to capture this valuable information before attempting to make further changes to the system.*
- *Scarce legacy development skills. Developers with skills in legacy technologies are becoming scarcer. Even if the team has a few members with these skills, high demand for their time can negatively impact the project schedule.*
- *Costly choices. Legacy applications can be costly to maintain and use, but it can also be expensive to modernize them. Teams should analyze the cost/benefit ratio and the technical feasibility of modernizing and migrating the applications to newer platforms and technologies, versus adding new interfaces for existing back end processes.*
- *Potentially difficult communication across functional groups. Communication barriers naturally develop when different development groups are responsible for different applications, technologies, or functional areas. Tools and strategies for maintaining effective communication across teams are essential to the success of such an integration project.*

The IBM Rational Solution for Legacy System Integration Projects

Rational offers an integrated lifecycle application solution that helps teams meet these difficult challenges (see Figure 2). It enables team collaboration through a common process and access to current requirements, test plans and results, defects, and program code. By automating the flow of critical project information, it can help each team member leverage the work of other team members throughout the project and improve the team's productivity.

With the Rational solution, you can:

- *Solve the right problem and define the right solution.*
- *Maximize developer productivity.*
- *Test smarter, finish faster.*
- *Use a proven, iterative process.*
- *Manage constant change.*
- *Deliver integrated systems with speed, quality, and predictability.*

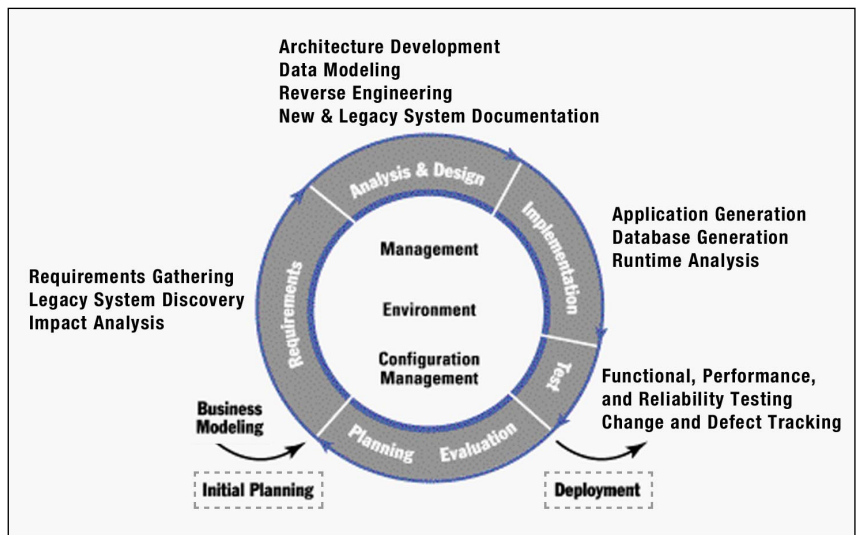We'll examine each of these benefits below.

*Figure 2: The Rational Lifecycle Solution Automates Best Practices Throughout
the System Integration Process*

Solve the Right Problem and Define the Right Solution

Successful legacy system integration projects begin with a clear understanding of the problem to be solved and the solution to be built. With the combination of IBM Rational RequisitePro® and IBM Rational's visual modeling tools, you'll be able to solve the right problem, clearly define the right solution for the team, and document project business and technical needs.

IBM Rational RequisitePro lets you gather, prioritize, track, manage, and communicate the project's requirements, while enabling you to understand the impact of a proposed change. When the entire team has an understanding of, and access to, up-to-the-minute project requirements, they can remain on the right track to solve the problem, even as requirements evolve.

Based on the requirements, teams can create visual use-case models with either IBM Rational Rose or IBM Rational XDE to gain customer and user agreement on the solution. Both visual modeling tools use the Unified Modeling Language™ (UML™) industry standard notation for model creation. For example, if the requirement is to incorporate "read only" product sales data into each customer account record, then the UML-based use-case model will depict how the system will pull customer sales data from the financial system and populate it into each customer record.

The Rational solution's traceability capability helps teams deliver a high-quality solution that aligns with business requirements. Through tight integration across Rational tools, project requirements are tied to visual models, test cases, defects, and versions of program code. This helps ensure that features will be developed and tested to satisfy all requirements, and that all major defects will be resolved.

**Case Study: Government Tax Agency Uses Rational Solution
to Securely Expose Legacy System Data Over the Internet**

The Organization: Tax organization of a major European country whose purpose is to ensure that all taxpayers understand and receive what they are entitled to, and also understand and pay what they owe.

Business Problem: The organization wanted to replace a paper-based information request process with a "self service" Internet-based process for accessing corporate tax account information. The new system had to expose corporate taxation records, stored in legacy systems, in a secure way over the Internet.

Development Challenge: Business analysts needed to clearly articulate system requirements to the developers.

IBM Rational Solution: The developers gathered requirements from the business analysts and stored them in IBM Rational RequisitePro, then used IBM Rational Rose to create use-case diagrams showing what the system should do. The business analysts were then able to link the visual models to requirements. This tight mapping of models to requirements is called integrated use-case management.

The analyst also hyperlinked samples of interface screens to the models, providing developers with a clear, unambiguous picture of how the system should work. If they needed more detail, developers could easily access associated requirements and hyperlinked screen shots to ensure delivery of the right system the first time.

Maximize Developer Productivity

Rational visual modeling tools help developers build flexible, component-based architectures and enable them to visualize, document, and manage complex systems. They provide a number of capabilities critical to integration projects:

- *Reverse Engineering. Some components of legacy systems can be reverse engineered to provide developers with an in-depth understanding of their architecture. Even when system components cannot be reverse engineered, modeling provides a better understanding of the system and a basis for documenting and communicating changes.*
- *System Design. Models can describe many aspects of an integrated system, including new system functions and how the integration works. They can help define either traditional or Web Services interfaces and specify read, write, edit, and delete privileges, as well as communication flows.*
- *Code Generation. To speed development, IBM Rational visual modeling tools support code generation in a variety of languages, including Java/J2EE, Microsoft® .NET technologies, including languages such as C++ and XML for Web Services. Developers can use these tools' out-of-the box or customs patterns and code templates to speed development and reduce errors. Rational modeling tools also automatically synchronize changes across code and models.*
- *Data Modeling. The IBM Rational visual modeling tools let developers, architects, and data modelers create requirements, database designs requirements and application architectures using a single tool and language. This eliminates tedious manual mapping activities (application logic to data) and communication barriers that can slow project progress and result in errors. From completed data models, IBM Rational visual modeling tools enable the creation of database schema, DDL (data definition language) and creation of classes within the application.*

Case Study: Human Resources Business Solutions Firm Unifies Legacy and New Applications into an Enterprise System

The Organization: One of the top human resources outsourcing companies in the US, offering a suite of innovatively managed business solutions for Human Resources Management Services payroll, tax filing, application outsourcing, time and attendance, benefits administration, and employee assessment.

Business Problem: The organization wanted to unify more than two dozen distributed offices using independent business systems.

Project: Several million dollar effort to create an enterprise application, involving replacement of five legacy systems, integration of several major systems, and consolidation of legacy databases.

Development Challenges: Small, distributed development team had to quickly master a wide range of technologies, including current and legacy databases, keep lines of communication open throughout the process, and achieve successful results.

IBM Rational Solution: The team gathered and managed requirements in IBM Rational RequisitePro and created corresponding use cases in IBM Rational Rose. They also used Rose to understand and model complex parent-child data "layers" in the legacy systems and enable these layers for reuse. From application and data visual models, the team generated about 90 percent (750,000 lines) of the application and database code and shaved months off the development schedule.

They used IBM Rational ClearQuest, a defect and change-tracking tool, to keep the channels of communication open across the distributed development team so that everyone was aware of change requests. Using the Rational solution enabled a small team of sixteen people to successfully complete this large enterprise application project on time and within budget.

Architected Rapid Application Development Approach to Legacy Integration

Architected Rapid Application Development (ARAD) combines the power of visual modeling and automated construction. It enables you to rapidly build high-quality systems that scale and adhere to industry enterprise architectural standards. By using an approach where existing resources can quickly be deployed to new technologies, organizations can keep the process moving forward. An ARAD approach provides the ability to build new applications that leverage existing systems and architectures.

IBM Rational Rapid Developer supports a variety of integration techniques. Different organizations certainly have different integration requirements, so the recommended integration technique will vary in many cases. Factors such as type of database, method of access, performance requirements, allowable code changes, and invasiveness all need to be assessed to determine the best solution. Rapid Developer integrates with IBM Rational Rose and IBM Rational XDE which both provide architectural and application modeling capabilities in the Unified Modeling Language (UML) allowing the overall architecture to drive new development and integration.

Test Smarter, Finish Faster

Although most organizations want testing efforts to be as thorough as possible, they encounter hindrances along the way: manual test procedures that rely heavily on custom coding; developers who cannot reproduce defects or locate problematic code; requirements changes that impact test scripts; GUI changes that render test scripts outdated; and limited time to complete testing.

IBM Rational testing solution automates functional, load, and reliability testing of complex applications and architectures and ensures communication and collaboration across the entire team. Test scripts built with Rational's testing solution are robust enough to stand up to changing GUIs, evolving requirements, and different execution environments. Unlike other testing products, IBM Rational's solution provides:

- *Test process guidance and support for iterative development.*
- *Faster, automated test script development.*
- *Traceability between requirements, tests, defects, models, and software asset versions.*
- *Centralized control and management of test activities.*
- *Easy and reliable communication of defects to the entire team.*
- *The ability to pinpoint defect locations for developers.*
- *Team access to testing assets and quality status information.*
- *Insight into memory errors, performance bottlenecks and code coverage oversights.*
- *Ability to troubleshoot runtime and performance problems.*

Case Study: Major Financial Institution Unifies Data Access for Clients and Tests Thoroughly on a Tight Schedule

The Organization: One of the world's leading financial management and advisory companies, with offices in thirty-seven countries and total client assets of approximately $1.3 trillion. This organization is a leading global underwriter of debt and equity securities and a strategic advisor to corporations, governments, institutions, and individuals worldwide.

Business Problem: The company wanted to unify its online trading systems to deliver information from multiple systems via a single interface. The unified system needed to serve all clients in a particular region, including direct investors, and financial advisors.

Development Challenges: Unify the code base and provide data access to multiple systems by invoking business logic appropriate to different types of users. Support thorough regression testing of new releases despite a tight rollout schedule.

IBM Rational Solution: The development team used IBM Rational's testing solution to automate regression testing of at least 130,000 verification points before the rollout of each release. These regression test points were based on requirements, which were managed in IBM Rational RequisitePro and used for test planning, associating defects with requirements, and ensuring that all requirements were tested. Through IBM Rational's automated testing capabilities, the team was able to complete thorough system testing on a tight schedule.

Use a Proven Iterative Process

The IBM Rational software development solution includes the IBM Rational Unified Process® (RUP®), a Web-enabled set of software engineering practices that streamline team development activities. RUP's industry-proven best practices incorporate lessons learned from hundreds of industry leaders and thousands of projects.

Process guidance helps create a common understanding of all tasks and responsibilities, so that each team member understands his contribution to the project. It supports team members with plug-in content, tool mentors, and customized help as they learn new tools and technologies.

As an industry-wide process platform, the IBM Rational Unified Process enables you to easily choose the set of process components that are right for your specific project needs. RUP Plug-Ins are available for development on J2EE™and other popular platforms. Through the IBM Rational Developer Network℠, Rational's online forum for the worldwide community of development professionals who use Rational tools, you can easily contribute and share plug-ins.

Manage Constant Change

IBM Rational's software configuration management (SCM) solution can help legacy system integration teams meet the challenges of managing change on large, enterprise projects. IBM Rational® ClearCase® is a robust software artifact management tool that accelerates the change process for software teams of all sizes. It scales from small project workgroups to the global enterprise. IBM Rational ClearQuest® is Rational's defect and change tracking tool that captures and manages all types of change requests throughout the development lifecycle. In combination, these tools provide a robust SCM solution that:

- *Provides effortless code sharing to speed team development.*
- *Tracks defects and enhancement requests, assigns work activities, and reports on project status.*
- *Automates many of the error-prone tasks associated with software development.*

Case Study: Major Health Insurer Captures Legacy System Data with IBM Rational Solution

The Organization: An association of forty-three locally operated health insurance organizations in the US. One in four Americans carries this type of health insurance, which has been providing top-quality, affordable coverage for more than seventy years.

Business Problem: The organization needs to harvest the intellectual capital contained within its legacy systems so that they can be leveraged and modernized by future developers. Many of the developers on staff who understand these systems' technologies and business rules are nearing retirement.

IBM Rational Solution: The development team is using IBM Rational RequisitePro and IBM Rational Rose to discover legacy system requirements and use cases, and to promote use cases as part of the development organization's process. Requirements traceability helps ensure that any new system development stays aligned with requirements. The use cases make the intellectual capital understandable and leverageable, which will help developers move forward on current and future legacy system integration and modernization projects.

Deliver Integrated Systems with Speed, Quality, and Predictability

There's no question that integrating new applications with legacy systems is a crucial technology strategy that provides business value to many companies, but it's also undeniable that integration-tasked development teams face tough challenges: They must cope with system complexity and unfamiliar legacy technology while trying to satisfy demands to deliver the solution within a short time frame and tight budget.

IBM Rational Software's integrated lifecycle solution (see Figure 3) frees your team from some of these pressures. The Rational toolset helps you clearly define the requirements and the solution, flexibly model the architecture for both legacy systems and new applications, generate code, and do thorough system testing. Rational's project management tools, iterative process, and powerful SCM solution supports your team throughout the project lifecycle and help you achieve a predictable outcome.

Additionally, IBM Rational Services offers another tier of support. IBM Rational software development Services is an important part of a complete development solution consisting of tools, services and best practices. Rational's broad service offering can address your immediate project needs and help your organization achieve a lasting competitive advantage.
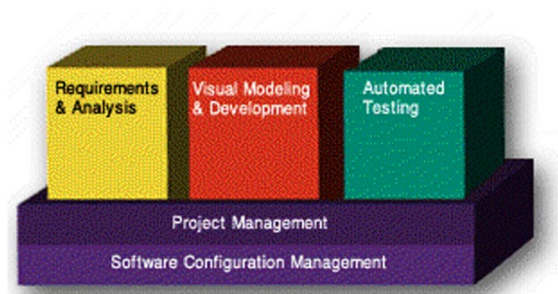

Figure 3: The IBM Rational Solution for Software Development Leverages Best Practices, Tools, and Services to Help Simplify Complex Application Integration Projects

References

Refer to the following resources to learn more about how the Rational solution can help you complete legacy system integration projects with speed, quality, and predictability.

Rational Solutions for Business Application Development—This Web page discusses how Rational tools help in business application integration projects, including legacy systems.

"**Achieving ROI with Rational Solutions**" IDC White paper —Learn about the ROI benefits of the Rational integrated lifecycle development solution.

Rational Product Information Web Page—Use this as your starting point for learning more about all of the Rational tools discussed in this white paper.

Rational Web Services Page—Find out how Rational tools can help you build Web Services applications.

"**Using RUP to Evolve a Legacy System**"--This Rational Edge article explains a process for modeling and modifying a legacy system.

Rational Success Stories: Accounts of how major companies used the Rational Solution for their enterprise projects. Visit the *Rational Customer Success Story Web Page* often for the latest stories.

"**Ceridian Brings Enterprise Project in Under Budget and Ahead of Schedule with Rational Tools**" –

"**Merrill Lynch Bullish on Rational Unified Process for Next-Generation Online Brokerage Solutions**"

Rational Services—Rational offers a wide variety of training and professional services to help you and your team. From assessment programs to QuickStart implementations to online training modules, Rational offers the services you need.