



**Build a flexible infrastructure for  
software and systems delivery**



### **Create requests for proposal tailored to your governance environment needs**

Recognition of the strategic importance of software is radically altering how it is procured, specified, integrated, extended, built and maintained. Software development organizations are becoming accountable for delivering business value in ways they didn't have to before—which isn't easy because development is as much an art as it is a science. Specifically, how can organizations balance the need to control risk and change with the ability to leverage technical talent to realize greater innovation? The answer is effective governance.

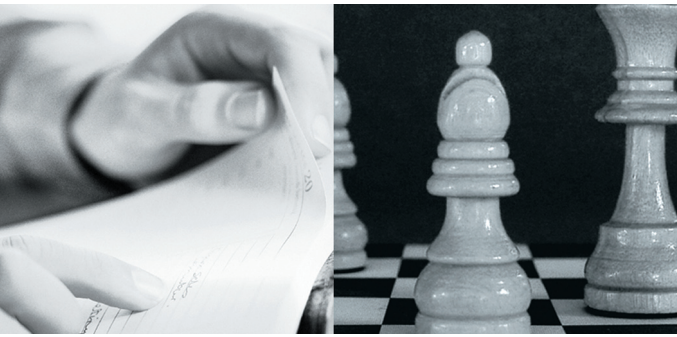
The right infrastructure can provide the visibility and control required for effectively governing the business process of software and systems development. At the same time, it can support the team focus, flexibility and collaboration that is essential for delivering innovative solutions.

Your business is at stake. You need to make sure that your prospective technology vendor meets your requirements. This buyer's guide explores criteria to consider as you create your request for proposal (RFP) and evaluate prospective solutions to improve your development infrastructure and environment. It also shows you how the IBM Rational® Software Development Platform can help meet your organization's requirements.

### **Building your software development environment**

If you are part of a new team or organization, you may have the luxury of starting from a blank slate as you assemble your software development environment. By outfitting your team with a complete environment that installs, works and upgrades together, you can help reduce administrative costs and maximize productivity.

Most organizations, of course, are not starting anew and cannot afford to take a rip-and-replace approach to assembling their development infrastructure. For these teams, a more gradual approach can help resolve urgent problems while continuing to leverage existing infrastructure assets. Analyzing the root cause of persistent software development issues will help you better prioritize your infrastructure investments. Figure 1 suggests a framework for such analysis.



*A crucial step toward becoming an On Demand Business is implementing a development infrastructure that enables you to effectively govern the business process of software and systems solution delivery.*

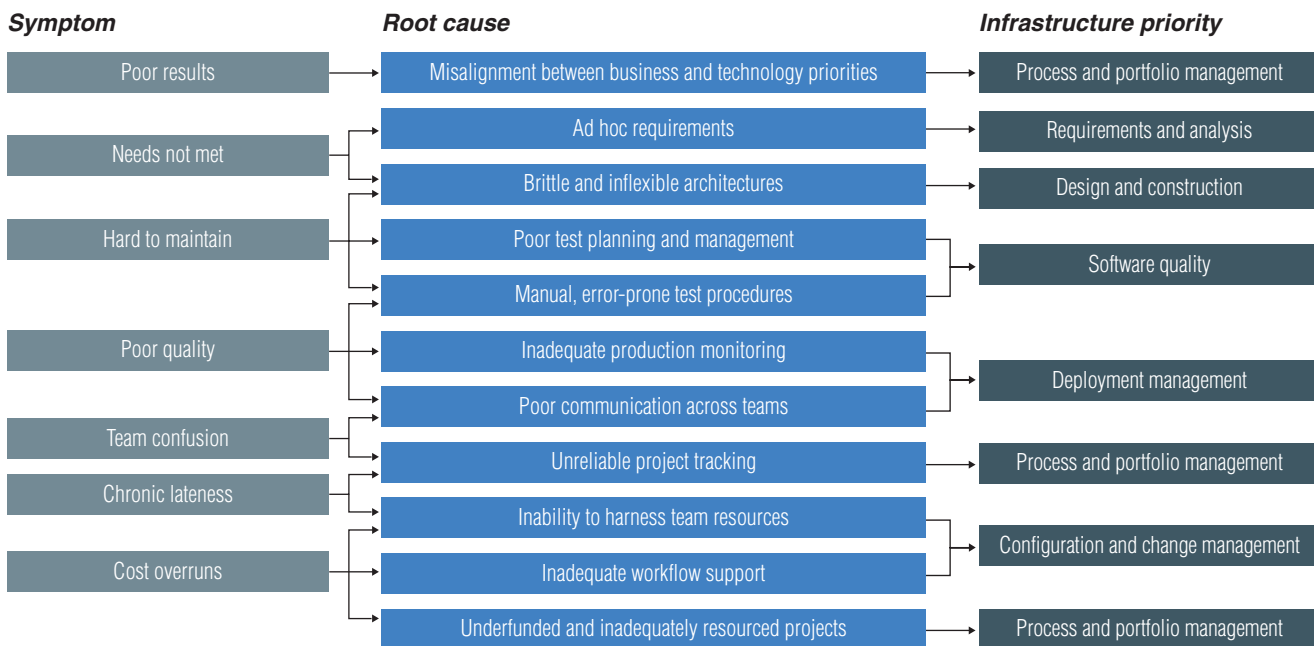


Figure 1. Mapping symptoms to root causes of software development failures

Requirement	IBM response
<p>Make better decisions about project priorities and investments</p>	<ul style="list-style-type: none"> <li>• Extend real-time visibility into project portfolio performance with comprehensive dashboard reporting and drill down</li> <li>• Implement best practices to support governance objectives</li> <li>• Gain insight with both a top-down and bottom-up view of portfolio and project data</li> <li>• Provide integrated requirements management</li> <li>• Provide integrated development analytics</li> <li>• Perform in-depth assessments of your software development capability and environment</li> </ul>
<p>Enhance our business flexibility through migration to a service-oriented architecture (SOA)</p>	<ul style="list-style-type: none"> <li>• Maximize flexibility with an open, extensible and interoperable infrastructure</li> <li>• Help ensure business requirements drive services design and construction</li> <li>• Model and assemble service-oriented applications that automate and integrate business processes</li> <li>• Repurpose existing assets as services to extend their utility</li> </ul>
<p>Reduce the cost of compliance with regulatory mandates</p>	<ul style="list-style-type: none"> <li>• Create a secure and audit-ready development environment that minimizes developer burden</li> <li>• Enforce quality, approval and separation-of-duties controls at key lifecycle checkpoints</li> <li>• Automate the enforcement of any governance framework, including COBIT, ITIL or CMMi</li> <li>• Track and manage compliance requirements from inception through deployment</li> </ul>
<p>Better leverage geographically distributed business and technology resources</p>	<ul style="list-style-type: none"> <li>• Accelerate project success through a collaborative, team-based development environment</li> <li>• Improve team efficiency across cultures and geographies by automating the full lifecycle development process</li> <li>• Gain global visibility through accurate project metrics</li> </ul>
<p>Meet the service and support criteria of an innovative, long-term software development partner and leader in the open computing</p>	<ul style="list-style-type: none"> <li>• Integrated products, best practices and professional services</li> <li>• Support for open standards and open source communities</li> <li>• Support for a wide spectrum of programming languages, operating systems and cross-development environments for real-time and embedded system developers</li> <li>• An extended development ecosystem, including IBM Rational software validated Business Partner solutions</li> <li>• A 20-year history of innovation and investment in software development technology</li> <li>• A track record of industry and revenue leadership</li> <li>• Global sales, service and 24x7 support</li> </ul>

Figure 2. IBM responses to your need for governing development



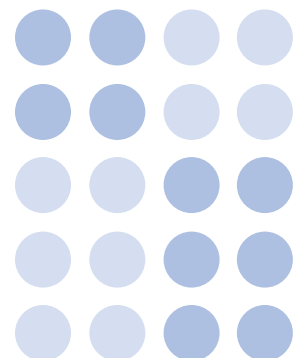
A complete, open and modular infrastructure that embraces industry standards maximizes your long-term flexibility. The IBM Rational Software Development Platform is not a single offering, but a set of products based on open standards. Altogether they enable you to manage the entire software lifecycle and can be adapted to the unique needs of your team and technology environment. You're able to achieve better governance a step at a time by incrementally integrating the platform products into your existing infrastructure as your organization grows and changes.

To save time on key initiatives, IBM also provides solutions specifically designed for geographically distributed development, compliance, systems development and service-oriented architectures (SOAs). These recommended configurations of the IBM Rational Software Development Platform, combined with other key IBM and partner products and services, provide a roadmap for achieving results quickly.

### **Overall software development infrastructure—sample RFP requirements**

How you might describe your business goals to vendors:

- We need to understand the true status of software-related projects anytime and anywhere across our organization.
- We want to coordinate the activities of globally distributed resources.
- We need to address regulatory compliance without undue burden on development teams.
- We need to move to an SOA vased appeal for delivery solutions.
- We need to deliver consistent results from our software investments.
- We need to reduce costs and increase predictability across our IT and technology projects.
- We want to avoid vendor, tool or technology lock-in.
- We want an environment that will support diverse languages, operating systems and deployment platforms.
- We want to adopt proven software development best practices.







## Process and portfolio management

### **Prioritize, plan, manage and measure development projects to deliver business value**

Successful software development requires the collaboration of business, development and operations teams toward a common goal. When projects go astray, it is typically not because any one team is dysfunctional, but because the entire organization is misaligned. Process and portfolio management tools help organizations consistently deliver results that are aligned with business priorities. They help organizations align project priorities with investment decisions, manage resources more effectively and gain real-time visibility into project portfolio performance.

Complete visibility into your software infrastructure requires both a top-down and bottom-up view of portfolio and project data. The top-down view enables you to track performance against financial objectives, resource commitments and skills inventories across a portfolio of projects. The bottom-up view enables you to track project-level activities and results. The greatest benefit for software-intensive projects comes when organizations augment project-level data with specific software development activity and asset information. The result is a 360-degree view into your software development and delivery capability.

### **Building your process and portfolio management capability**

*Keep portfolios and projects aligned with business priorities*

A project portfolio management solution, such as IBM Rational Portfolio Manager software, can help organizations actively manage portfolios and projects from initial opportunity identification through project execution and closure. A comprehensive solution will meet the specific information and reporting needs of executives, and project and program managers. It should allow executives to easily see relative project performance in the context of business priorities and enable program managers to quickly drill down to project details and make “save/kill” decisions when needed.

*Provide process clarity and role accountability*

The foundation of any development practice is a well-understood software development process. A flexible

process platform—such as the IBM Rational Method Composer platform that includes IBM Rational Unified Process® software—delivers a process framework for defining, delivering and adopting software development best practices. When considering process frameworks, you should choose one that has been field-tested on a wide variety of projects, including enterprise, small, distributed and Web-based projects. A process platform that is configurable to your environment and provides context-sensitive delivery eases enterprise-wide adoption by allowing practitioners to focus on process guidance relevant to their needs.

A comprehensive team platform, such as IBM Rational Team Unifying Platform™ software, is designed to equip your team members with the infrastructure tools, processes and integrations they need to work together more effectively. A comprehensive solution will include integrated support for process guidance, requirements management, software asset management, defect and change tracking, test management and common reporting.

### **Process and portfolio management—sample RFP requirements**

How you might describe your business goals to vendors:

- We need to keep our software portfolio and projects aligned with changing business needs.
- We want to optimize our technology investments within a balanced and prioritized project portfolio.
- We need to build more accountability and greater transparency into our project-funding and project-tracking processes.
- We need to clearly define the “rules of the road” for our development projects, so that team members understand their roles and responsibilities.
- Our estimates of project progress are little more than guesses—we need to more accurately measure true project status.
- We need to get new team members up and running more quickly by providing them with tools, guidance and the project artifacts they require.



Requirement	IBM response
<p>Comprehensive portfolio management capabilities that enable business leaders to align project investments and teams with business goals</p>	<ul style="list-style-type: none"> <li>• Provide a process-based project portfolio management solution that helps:               <ul style="list-style-type: none"> <li>- Executives visualize and balance portfolios and make objective “save/kill” decisions</li> <li>- Project and program managers quickly ramp projects, balance workloads, enhance inventory skills and actively manage risks</li> <li>- Individual contributors communicate, coordinate and collaborate globally</li> </ul> </li> </ul>
<p>A flexible process platform that can be customized to project and practitioner needs</p>	<ul style="list-style-type: none"> <li>• Provide a software development process platform that delivers proven best practices and a configurable architecture</li> <li>• Select only the process components you need for each stage of your project</li> <li>• Exchange best practices with peers and industry leaders in an online community</li> </ul>
<p>A common team infrastructure that automates and accelerates software development</p>	<ul style="list-style-type: none"> <li>• Unify your team by providing common access to development assets, communication alerts and workflow processes</li> <li>• Integrate software asset management, change and defect tracking, test management and reporting</li> <li>• Enable requirements traceability from analysis to testing</li> <li>• Use dashboards to easily monitor trends throughout your project lifecycle</li> <li>• Provide development analytics based on actual results</li> </ul>

**IBM process and portfolio management solutions include the following products**

- IBM Rational Method Composer (includes IBM Rational Unified Process)
- IBM Rational Portfolio Manager
- IBM Rational Team Unifying Platform (includes: IBM Rational RequisitePro®, IBM Rational Method Composer, IBM Rational ClearQuest®, IBM Rational ClearCase® LT, IBM Rational TestManager, IBM Rational ProjectConsole™, IBM Rational SoDA®)

Figure 3. IBM responses to your project and portfolio management requirements



# Requirements and analysis



## **Improve communication of business needs and simplify their translation into technical requirements**

Studies show that most project failures are related to requirements and analysis shortcomings. Sound requirements and analysis practices help reduce project risk, ensure regulatory compliance and keep your project running smoothly.

Integrating requirements and analysis with other tools in your development infrastructure saves time and avoids rework. Within the IBM Rational Software Development Platform, requirements are integrated with defect tracking, design and development and testing tools to jumpstart activities and accelerate results.

## **Building your requirements and analysis capability**

For teams focused on requirements and analysis improvements, a solution such as IBM Rational RequisitePro software is often the best place to begin. A requirements management solution helps teams understand and prioritize user needs, effectively scope projects and make the right trade-off decisions.

### *Link optimized business processes to software application components*

As project requirements take shape, analysts begin to transform them into a design for a new or enhanced system. Analysts use a software modeling solution such as IBM Rational Software Modeler software to document how business processes are performed today and how they can be performed in the future. IBM modeling solutions employ the industry-standard unified modeling language (UML), which provides a critical link between what users need (requirements), how they will interact with the proposed system (use cases) and the application components that implement these needs (application architecture).

A server-based business process modeling and monitoring solution such as IBM WebSphere® Business Modeler and IBM WebSphere Business Monitor software provides a robust framework for analyzing and optimizing business processes.

By monitoring business processes in real time as they are performed in work environments, these solutions can analyze complex flows and uncover bottlenecks with a high degree of precision. Users can analyze the return on investment (ROI) of alternative scenarios and even modify business processes interactively to optimize results.

### *Resolve any data access issues before deployment*

An integral part of any proposed solution is data management—understanding how data will be organized, stored and retrieved throughout the proposed solution. A data modeling solution such as IBM Rational Rose® Data Modeler software allows database designers to create logical and physical views of database schema so that any data access problems can be resolved before deployment.

The vast majority of software projects requires integration with existing systems. Thorough asset analysis is a prerequisite to legacy transformation and asset reuse. An asset analysis solution such as IBM WebSphere Studio Asset Analyzer software helps teams document their existing systems architecture and understand the impact of a proposed change in heterogeneous environments.

## **Requirements and analysis—sample RFP requirements**

How you might describe your business goals to vendors:

- Business demands consistently outpace available resources—we need to develop a better way to capture, manage and prioritize business needs.
- We have to ensure regulatory compliance across the board—without adding more head count.
- Some of our legacy systems are poorly documented or architected—we need to find a better way to leverage and extend these systems as our enterprise architecture evolves.
- We want to reduce the cost of doing business by analyzing and optimizing our business processes.
- When a priority request comes in, we need to be able to act quickly—without destabilizing projects in process.





Requirement	IBM response
<p>Team-based requirements management accessible to all stakeholders</p>	<ul style="list-style-type: none"> <li>• Provide business and technology users with a requirements management system optimized for their needs</li> <li>• Support a broad range of databases, with scalability to support future growth</li> <li>• Link requirements with architectural models, enhancement requests and test cases to drive business needs throughout project activities</li> <li>• Enable team members to create, view and modify requirements over the Web</li> </ul>
<p>Business-process modeling capabilities to help analyze and iteratively improve business processes</p>	<ul style="list-style-type: none"> <li>• Capture business process data in real time to create an accurate picture of processes and costs</li> <li>• Simulate alternative scenarios to uncover weaknesses and highlight improvements</li> <li>• Export business process models to jumpstart application design and development</li> </ul>
<p>Software modeling solutions to help design more robust components that are easier to maintain and reuse</p>	<ul style="list-style-type: none"> <li>• Embrace UML 2.0 modeling techniques to visually explore user interactions and application architecture</li> <li>• Use a proven process to design components directly from use cases</li> <li>• Easily package, browse and import assets to enable reuse</li> </ul>
<p>Asset analysis capabilities to help us better analyze and utilize assets within legacy systems and packaged applications</p>	<ul style="list-style-type: none"> <li>• Analyze the effect of a proposed software change on your enterprise information system</li> <li>• Understand application linkages so analysts can plan, size, schedule and trace changes to systems</li> <li>• Easily extract code for transformation into components or Web services</li> </ul>

**IBM requirements and analysis solutions include the following products**

- IBM Rational RequisitePro
- IBM Rational Software Modeler
- IBM Rational Rose Data Modeler
- IBM WebSphere Business Modeler
- IBM WebSphere Business Monitor
- IBM WebSphere Studio Asset Analyzer

Figure 4. IBM responses to your project requirements and analysis requirements



# Change and configuration management



## **Control risk and change throughout the software lifecycle**

Software change and configuration management products give you the power and flexibility to effectively manage your software lifecycle. They help you automate and control development processes, coordinate changes to software development assets, prioritize and track defects and change requests, and work more collaboratively in team-based environments.

Configuration management software helps manage changes to individual files and groups of files or configurations. It provides information on what changes were made, when they were made and by whom. Change management software helps manage the process by which changes are made. It identifies why a change was needed, who requested it and how close it is to being resolved. When used together, these products deliver the foundation for a compliant development infrastructure that:

- Provides better visibility into projects.
- Improves individual and team productivity.
- Enhances team communication and coordination.

A key distinction among the different change and configuration management products is whether they manage change at the asset or activity level. An asset-based approach organizes information at the file level, enabling quick answers to questions such as, “What changes were made to file X?” An activity-based approach associates a set of versioned assets with named activities, such as “ISO 9000 compliance.” This enables fast answers to questions such as, “What changes need to be migrated to Release B in order to ensure ISO 9000 compliance?” Supporting both approaches provides the greatest insight and clarity into evolving software systems.



*Change and configuration management products give you the power and flexibility to effectively control risk and change across your software lifecycle.*

Requirement	IBM response
Comprehensive version control to ensure the security and integrity of software assets	<ul style="list-style-type: none"> <li>• Provide version control for all file system objects, including source code, visual models, binaries, Web artifacts and test suites</li> <li>• Automatically track directory name changes, moves and deletes</li> <li>• Enable parallel development with advanced differencing and merging capabilities</li> </ul>
Efficient work environment management that provides consistent access to work environments	<ul style="list-style-type: none"> <li>• Provide rich functionality from your IDE</li> <li>• Enable dynamic views with transparent access to file versions</li> <li>• Support flexible snapshot views for quick and easy remote and disconnected access</li> <li>• Generate personal to-do lists to prioritize individual workloads</li> </ul>
Accurate build management and secure release management to help ensure easy re-creation of any current or previous software version	<ul style="list-style-type: none"> <li>• Support make-compatible building tools that read existing Microsoft® Windows® and UNIX® makefiles</li> <li>• Support cross-platform environments with a remote build capability</li> <li>• Create a detailed bill of materials that guarantees build reproducibility and support auditability</li> <li>• Optimize resources and save time by supporting distributed and parallel building with load balancing</li> </ul>
Flexible process and workflow support to streamline development and automate organizational procedures	<ul style="list-style-type: none"> <li>• Provide an out-of-the-box development process that teams can easily customize to meet their needs</li> <li>• Support geographically distributed teams</li> <li>• Enforce IT controls at key lifecycle checkpoints</li> <li>• Validate approvals with e-signature authentication</li> <li>• Enable project leaders to design a custom workflow for each change request type</li> <li>• Support automated asset management routines that monitor changes and notify team members of events</li> </ul>
Anytime, anywhere access with centralized reporting and management across heterogeneous software development environments	<ul style="list-style-type: none"> <li>• Provide universal access through local, remote (WAN) and Web clients</li> <li>• Unify teams distributed across Windows, Linux®, UNIX and IBM z/OS® environments</li> <li>• Provide comprehensive queries, charting and reporting capabilities</li> <li>• Visualize change-related data through distribution, trend and aging charts</li> </ul>

Figure 5. IBM responses to your configuration and change management requirements

### **Building your change and configuration management capability**

Change and configuration management products deliver a comprehensive solution for collaborative team environments. Where you should start depends on the functionality most critical to your team.

Teams whose most pressing and urgent problems are associated with managing hundreds or thousands of change requests—across multiple projects, versions and platforms—should start with a change management solution, such as IBM Rational ClearQuest software.

Teams that are challenged by inadequate team coordination, an inability to speed projects through development or inadequate asset security should consider a configuration management solution, such as IBM Rational ClearCase software. A comprehensive solution will help your team organize software assets, manage multiple work environments and tasks, pursue multiple development streams in parallel, reproduce specific releases from the past and enforce site-specific policies.

### **Change and configuration management—sample RFP requirements**

How you might describe your business goals to vendors:

- We need to effectively manage risk by improving accountability of the development process.
- We need to improve the predictability and quality of our software across the board.
- We need to better support project teams that combine onsite, remote, full-time, part-time and virtual team members located around the world.
- We need to protect ourselves from the possibility of a manmade or natural disaster by ensuring that our assets are secure and reproducible.
- We have a poor track record for on-time delivery due to lengthy code freezes and difficult code integrations.
- We need the ability to audit our software process and assets to know who changed what and when.

### **IBM change and configuration management solutions include the following products**

- IBM Rational ClearCase family
- IBM Rational ClearQuest family
- IBM Software Configuration and Library Manager Advanced Edition for z/OS





# Design and construction



## **Improve the productivity of code-centric, model-driven and rapid application development**

Software architects and developers rely on design and construction tools to rapidly transform business requirements into applications and reusable components that can be tested, validated and deployed. Design and construction products fall into two categories: enterprise IT tools and systems development tools.

Enterprise IT tools enable corporate and Web developers to rapidly develop and deploy business applications to enterprise IT environments. Compelling advances in enterprise IT technologies use the Java™ language and the Eclipse open source platform to accelerate project completion. Based on open standards, the Java language offers unparalleled portability across execution environments, operating systems and pervasive devices. Written in the Java language, the Eclipse open source platform is a multivendor supported environment for building interoperable software development tools. Tools based on the Eclipse platform, such as the IBM Rational Application Developer for WebSphere Software tool, allow organizations to adapt and extend their development environment with custom and third-party plug-ins.

While enterprise IT developers create applications that run and manage internal business processes, systems developers create applications that operate, control or manage external systems. Currently, IBM Rational Systems Developer and IBM Rational Technical Developer software are available to support the most complex systems development requirements. These design and construction tools support teams that are developing event-driven, concurrent and distributed software applications that can be deployed to multiple target environments.

## **IBM design and construction solutions include the following products**

- IBM Rational Systems Developer
- IBM Rational Software Architect
- IBM Rational Software Modeler
- IBM Rational Rose Technical Developer
- IBM Rational Web Developer for WebSphere Software
- IBM Rational Application Developer for WebSphere Software
- IBM WebSphere Studio Device Developer
- IBM Rational Rose XDE family
- IBM Rational Data and Application Modeling Bundle
- IBM Rational Professional Bundle



Requirement	IBM response
<p>Advanced design and construction capabilities to help architects and senior developers create well-architected applications</p>	<ul style="list-style-type: none"> <li>• Leverage an open and extensible modeling platform on both Microsoft Windows and Linux platforms</li> <li>• Exploit the latest advances in UML 2.0 modeling language technology</li> <li>• Review the structure of your applications to correct potential problems</li> <li>• Work more productively in both code-centric and model-centric workflows</li> <li>• Integrate team management functions throughout the lifecycle</li> </ul>
<p>Rapid application development support for Web, Web services developers and developers with limited Java knowledge</p>	<ul style="list-style-type: none"> <li>• Build dynamic Web user interfaces with zero coding</li> <li>• Write business logic using fourth-generation language (4GL) skills</li> <li>• Improve code quality with built-in unit test environment</li> <li>• Optimize deployment to WebSphere environments while supporting multivendor run times</li> </ul>
<p>Rapid application development support for experienced Java developers building Web, Web services, Java, J2EE and portal-based applications</p>	<ul style="list-style-type: none"> <li>• Rapidly build portlets using JavaServer Faces (JSF) or Struts frameworks, complete with customized page layout and visual themes and skins</li> <li>• Integrate Business Objects Crystal Reports into your Web applications</li> <li>• Improve code quality with built-in code and run-time analysis</li> <li>• Protect development assets with built-in version control</li> </ul>
<p>Advanced support for developers who build, test and deploy real-time and embedded applications, such as wireless and pervasive devices</p>	<ul style="list-style-type: none"> <li>• Optimize the development and deployment of event-driven, concurrent and distributed applications</li> <li>• Provide fully automated design-to-code generation in Java, C/C++ and CORBA</li> <li>• Enable run-time model execution, fully executable code generation and visual debugging</li> <li>• Automatically build drivers, stubs, test harnesses and working test scripts</li> <li>• Provide a platform for deploying high-value data services on mobile devices</li> <li>• Deploy to multiple platforms and configurations and millions of devices</li> </ul>

Figure 6. IBM responses to your software design and construction requirements

### **Building your design and construction capability**

An optimal enterprise IT infrastructure supports the heterogeneous set of development tools, languages and platforms your enterprise uses today, while providing an on-ramp to newer technologies that can dramatically reduce software costs.

#### *Support a full range of development tools*

For enterprise IT architects and senior developers responsible for specifying and maintaining software architecture, a visual design and development tool such as IBM Rational Software Architect software unifies the many activities required to design, validate and communicate application architectures to quickly translate these designs into Java or C++ components.

Enterprise IT developers who build Web and business applications rely on a comprehensive integrated development environment (IDE) to build and deploy software. For software developers who are new to Java or who do not need full Java 2 Platform, Enterprise Edition (J2EE) programming model support, the IBM Rational Web Developer for WebSphere Software tool combines a visual, rapid application development environment with comprehensive unit testing and debugging support. The IBM Rational Application Developer for WebSphere Software tool provides additional features to improve productivity when building enterprise J2EE applications and Web portals. Both products are optimized for WebSphere software and provide capabilities for deployment

to other technology platforms. IBM WebSphere Studio Device Developer software enables developers to extend business applications to wireless devices such as cell phones and personal digital assistants (PDAs).

For real-time and embedded applications, solutions such as IBM Rational Rose Technical Developer and IBM Rational Systems Developer software meet the unique needs of highly technical systems development teams. These solutions support multiple development languages, advanced run-time model execution and streamlined deployment to hundreds of cross-platform environments.

### **Design and construction—sample RFP requirements**

How you might describe your business goals to vendors:

- We want to enhance business flexibility by migrating to a service-oriented architecture.
- We want to take advantage of the Java platform, but lack skilled Java developers.
- We need to dramatically reduce the cost of building software—while supporting the same number of projects.
- We would like to extend our applications to wireless and pervasive devices.
- We want to adopt a more rigorous approach to designing and developing software without locking into proprietary technology.







# Software quality

## Focus on quality at every stage of software and systems

### solution delivery

An organizational commitment to quality speeds development, reduces costs and allows new features to be added with greater ease. Organizations that build in quality from the beginning are able to look forward, innovate and pursue new opportunities.

A mature software quality practice empowers organizations to deliver the right amount of functionality, reliability, scalability, maintainability and any other capability required to ensure success. It involves an iterative process and a set of tools to help team members automate error-prone aspects of their work, freeing them to focus on creativity and value. And it enables the testing team to more easily find remaining quality issues.

### Building your software quality capability

#### *Begin addressing quality issues early in the development lifecycle*

Finding and fixing errors earlier in the development lifecycle can help eliminate performance bottlenecks and coding errors before deployment, after which troubleshooting and correcting such problems becomes more costly. Run-time analysis capabilities allow developers to pinpoint memory leaks, find and fix application performance bottlenecks and visualize the execution flow of code and application threads. Structural analysis functionality enables architects to detect, build and maintain an inventory of design patterns and anti-patterns in order to visualize parent/child relationships and validate the architectural integrity of components and systems. Code review features scan code to validate compliance with prespecified rules, such as naming conventions or J2EE best practices. And component test capabilities generate unit test stubs, test data and a test harness to speed validation of Web services and Java code. All of these features are available in IBM Rational Application Developer and the IBM Rational Software Architect products. In addition, IBM Rational PurifyPlus™ software enables run-time analysis for users of alternative IDEs and languages.

### IBM software quality solutions include the following products

- IBM Rational PurifyPlus family
- IBM Rational Functional Tester family
- IBM Rational Performance Tester family
- IBM Rational Manual Tester
- IBM Rational Robot
- IBM Rational Test RealTime™

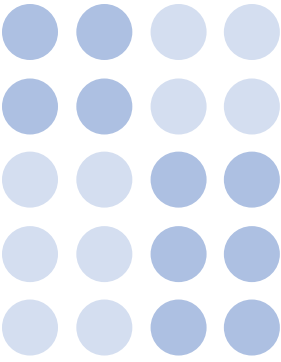




Requirement	IBM response
Comprehensive developer testing and debug optimization capabilities	<ul style="list-style-type: none"> <li>• Empower developers to detect memory leaks, profile application performance, visualize execution flows and analyze code coverage</li> <li>• Enable data collection and test execution on both local and remote machines, including multiple operating systems, such as Windows, Linux and UNIX software</li> <li>• Analyze code to validate against industry and corporate best practices</li> </ul>
Functional testing support for practitioners of all skill levels	<ul style="list-style-type: none"> <li>• Record test scripts resilient to user interface changes</li> <li>• Customize tests using choice of Java or Microsoft Visual Basic .NET software</li> <li>• Automate process for enabling data-driven testing</li> <li>• Provide built-in test script versioning</li> <li>• Test application configurations across multiple test lab machines</li> <li>• Provide automated functional and regression testing for Siebel 7.7 applications</li> <li>• Enable testing of IBM 3270 (IBM @server® zSeries® server) and IBM 5250 (IBM @server iSeries™ server) terminal-based applications</li> </ul>
Performance testing capabilities to validate performance and determine system capacity	<ul style="list-style-type: none"> <li>• Provide code-free test for the novice and customization options for the expert</li> <li>• Support large, multiuser tests with custom code insertion, automated data correlation and data generation</li> <li>• Simplify user profiling and test definition</li> <li>• Provide real-time reporting with server resource data correlation</li> <li>• Provide root cause analysis of performance bottlenecks</li> <li>• Provide load and performance testing of Siebel 7.7 applications and SAP solutions</li> <li>• Enable the use of zSeries hardware as a load generation platform</li> </ul>
Management of manual testing activities in distributed team environments	<ul style="list-style-type: none"> <li>• Clearly define test steps with rich test editor</li> <li>• Reduce maintenance costs by sharing test step blocks across tests</li> <li>• Customize to fit personal team vocabulary and processes</li> <li>• Import from multiple preexisting manual test sources</li> </ul>
Comprehensive support for testing real-time and embedded software	<ul style="list-style-type: none"> <li>• Automate test creation, execution and analysis for C/C++, Java and Ada</li> <li>• Pinpoint memory leaks and performance bottlenecks, measure code coverage and visualize execution flow</li> <li>• Execute tests on and collect data directly from the embedded target</li> </ul>
Team-based test management for managing test projects	<ul style="list-style-type: none"> <li>• Establish and manage traceability</li> <li>• Manage development and test artifacts</li> <li>• Create custom reports with a flexible reporting engine</li> </ul>

Figure 7. IBM responses to your software quality requirements





### *Improve quality and scalability of critical business applications*

Comprehensive testing capabilities empower operations teams to effectively resolve production problems in complex, multitiered application environments. A platform like the IBM Rational Team Unifying Platform environment integrates all the testing activities for an application with centralized test management, defect tracking and version control.

Test step reuse improves the speed, breadth of coverage and reliability of manual testing efforts. A test authoring and execution solution such as IBM Rational Manual Tester software helps promote test step reuse to reduce the impact of software changes on testers and business analysts.

Functional testing solutions, such as IBM Rational Functional Tester plus IBM Rational Robot software, increase tester efficiency by simplifying the creation, maintenance and analysis of automated functional and regression test scripts. And performance testing creation, execution and analysis solutions such as IBM Rational Performance Tester software team to validate system reliability, determine maximum system capacity and identify and resolve any system bottlenecks.

Embedded and real-time testing solutions such as IBM Rational Test RealTime software help teams overcome the technical challenges associated with validating real-time, event-driven and multithreaded application processes running on multiple target environments.

### **Software quality—sample RFP requirements**

How you might describe your business goals to vendors:

- We need to solve quality problems before they affect business performance.
- We need to improve code quality from the beginning—without adding more development resources.
- We want to improve coordination across our distributed test and development teams.
- Our test activities are ad hoc and haphazard—we need to improve coverage and reuse assets.
- We need to improve the responsiveness of our Web-based applications in multiple load scenarios.
- We need to more consistently validate compliance with regulatory requirements.



# Deployment management

## **Provision, configure, tune and troubleshoot applications to ensure expected business results**

Deployment management solutions provide a managed approach to planning and executing migrations to your production environment. This eases the implementation of coordinated changes to business processes and systems, and helps ensure optimal performance and availability.

Complex operating environments—often combining packaged applications, in-house applications and partner and supplier integrations—typically access multiple tiers of server, network and database resources. While component-based and service-oriented architectures enhance software reuse, they also exponentially increase the number of points of potential failure. As a result, even systems that have been thoroughly tested in the lab can fail to meet user needs in production environments. All too often, business performance suffers as cross-functional teams struggle to find and fix the root cause of the problem.

A closed-loop development cycle provides development, operations and network management teams with a consistent set of correlated data that pinpoints application problems and facilitates their rapid repair and redeployment. By replacing subjective finger-pointing with objective information, the closed-loop process enhances cross-functional communications and improves the quality and availability of deployed applications.

## **Building your deployment management capability**

The ideal deployment management solution maximizes production uptime by supporting the closed-loop cycle spanning development and operations teams. It should also work with existing operating systems, servers, middleware, development tools, storage and networking devices.

### *Monitor performance of applications and systems across a multiplatform environment*

A heterogeneous monitoring solution automatically monitors applications and essential system resources across your multiplatform environment to detect potential problems and

automate recovery from critical situations. For example, IBM Tivoli® Composite Application Manager for Response Time Transactions software monitors transactions across multiple tiers in your architecture and can pinpoint exactly where a bottleneck is occurring. And for SOA-based development projects, IBM Tivoli Composite Application Manager for SOA software can monitor, manage and control the Web services layer of IT architectures while drilling down to the application or resource layer to identify the source of bottlenecks or failures.

### *Automate software distribution and inventory management*

Server and device management projects, such as IBM Tivoli Configuration Manager software, enable the rapid and efficient deployment of complex, mission-critical applications to multiple locations from a central point. After deployment, an inventory module can automatically scan for and collect hardware and software configuration information from computer systems across an enterprise and verify that users are using approved system configurations.

### *Automate software and server provisioning and configuration*

IBM Tivoli Provisioning Manager software automates the time-consuming and error-prone provisioning and configuration of servers, operating systems, middleware, applications, storage and network devices. This automation tool is integrated with IBM Rational software configuration and test management tools to enable the automated assembly and breakdown of a test environment—mirroring the production environment—then deploying and provisioning the latest code.

## **IBM deployment management solutions include the following products**

- IBM Tivoli Monitoring
- IBM Tivoli Configuration Manager
- IBM Tivoli Provisioning Manager
- IBM Tivoli Composite Application Manager for Response Time Tracking
- IBM Tivoli Composite Application Manager for WebSphere
- IBM Tivoli Composite Application Manager for SOA

**Deployment management—sample RFP requirements**

How you might describe your business goals to vendors:

- We want to help our IT operations staff anticipate and prevent problems.
- We want to minimize labor costs associated with manual provisioning and inventory management activities—IT staff should spend as little time as possible on administrative processes.
- We need to document oversight over all changes to production applications—the who, what, where and when of all application changes.
- We want to automate the provisioning of the test lab to help ensure that all systems are running the right versions of software required for testing.
- When IT systems do not perform as expected, we need to pinpoint and resolve the problem as quickly as possible to minimize business impact.

*Deployment management solutions provide a managed approach to planning and executing migrations to your production environment.*

Requirement	IBM Response
Advanced monitoring capabilities that help us anticipate potential problems and diagnose problems	<ul style="list-style-type: none"> <li>• Provide a centralized view of heterogeneous environments</li> <li>• Monitor essential system resources and detect bottlenecks and potential problems</li> <li>• Automatically recover from critical situations, such as system crashes</li> <li>• Recognize and automate the repair of transaction performance problems</li> </ul>
Central management and reporting of configuration activities	<ul style="list-style-type: none"> <li>• Automatically identify the hardware and software in your environment</li> <li>• Manage distributed servers, host servers, workstations and mobile clients</li> <li>• Remotely deploy, update, track and manage IT assets</li> <li>• Provide customizable reporting and charting</li> </ul>
Centralized provisioning of a complete application environment	<ul style="list-style-type: none"> <li>• Automate the provisioning of a complete operating environment, including operating systems, servers, middleware, applications, power supplies, storage and networking devices</li> <li>• Capture best practices with a graphical interface for creating and editing workflows</li> <li>• Use your existing hardware, software and network devices</li> </ul>
Flexibility to manage heterogeneous environments and scale to support future growth	<ul style="list-style-type: none"> <li>• Manage a heterogeneous environment with one solution</li> <li>• Scale to enterprise computing environments</li> <li>• Choose your database for storing inventory, event and software distribution data</li> <li>• Minimize network bandwidth with compression and checkpoint/restart capabilities</li> </ul>

Figure 8. IBM responses to your deployment management requirements



## For more information

To learn more, contact your local IBM representative or visit our Web site.

Developers, visit:

[ibm.com/developerworks/platform](http://ibm.com/developerworks/platform)

IT managers and executives, visit:

[ibm.com/software/developmentplatform](http://ibm.com/software/developmentplatform)



© Copyright IBM Corporation 2006

IBM Corporation  
Software Group  
Route 100  
Somers, NY 10589  
U.S.A.

Produced in the United States of America  
04-06  
All Rights Reserved

ClearCase, ClearQuest, @server, IBM, the IBM logo, iSeries, the On Demand Business logo, ProjectConsole, PurifyPlus, Rational, Rational Rose, Rational Test RealTime, Rational Unified Process, RequisitePro, SoDA, Team Unifying Platform, Tivoli, Tivoli Enterprise Console, WebSphere, z/OS and zSeries are trademarks or registered trademarks of International Business Machines Corporation in the United States, other countries or both.

Microsoft and Windows are trademarks of Microsoft Corporation in the United States, other countries or both.

Java and all Java-based trademarks are trademarks of Sun Microsystems, Inc. in the United States, other countries or both.

UNIX is a trademark of The Open Group in the United States, other countries or both.

Linux is a trademark of Linus Torvalds in the United States, other countries or both.

Other company, product and service names may be trademarks or service marks of others.

References in this publication to IBM products or services do not imply that IBM intends to make them available in all countries in which IBM operates.

The information contained in this documentation is provided for informational purposes only. While efforts were made to verify the completeness and accuracy of the information contained in this documentation, it is provided "as is" without warranty of any kind, express or implied. In addition, this information is based on IBM's current product plans and strategy, which are subject to change by IBM without notice. IBM shall not be responsible for any damages arising out of the use of, or otherwise related to, this documentation or any other documentation. Nothing contained in this documentation is intended to, nor shall have the effect of, creating any warranties or representations from IBM (or its suppliers or licensors), or altering the terms and conditions of the applicable license agreement governing the use of IBM software.