**Rational**® software

# IBM Rational software quality solutions.

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*IBM Rational Software*

**ON** **DEMAND BUSINESS**™

## Contents

**Make quality management a first-class citizen in the software development lifecycle**

Developer testing, user testing, outsourced testing, ad hoc testing. However it works in your organization, testing and quality checkpoints play a crucial role in the successful delivery of today's complex, heterogeneous, business-critical software systems. As software development is becoming more sophisticated, companies are discovering that—when they're built with the right people and armed with the right tools and processes—testing teams add tremendous value to solving the complex problem of delivering high-quality enterprise software systems.

This realization comes at a critical time—when IT organizations and development teams are being asked to address a new set of challenges: predicting the ability of software systems to be self-managing and self-healing, rapidly assembling and testing of services-based (SOA) applications, managing projects using distributed or outsource testing providers, and using test and validation processes to support regulatory compliance audits. These are all challenges that even the most savvy IT organizations struggle with. Because of these new demands, the focus on using processes and tools to improve quality, customer satisfaction and company agility has never been more important.

**Start quality initiatives early to avoid costly mistakes**

Injecting quality into a software system at the end of the lifecycle tends to be a losing proposition. By then, architectural flaws, missed requirements and an enormous backlog of defects are too much to recover from without missing that critical window of opportunity to bring new products to market.

*A prudent approach to delivering a high-quality software system includes managing and validating the quality of the application at each stage of the software development lifecycle.*

Implementing a proactive quality program that supports team communication and iterative and early testing will allow you to avoid or detect flaws early in the software lifecycle. Given the escalating cost of fixing a defect as the development lifecycle progresses, it's clear that a prudent approach to delivering a high-quality software system includes managing and validating the quality of the application as early as possible and at each stage of the software development lifecycle.

With a proactive approach, all team members have a common view of business objectives, requirements and key use cases of the software application.

**Use a common team communication platform**
IBM Rational® Software Development Platform provides the hub for all require-ments, defect, change and test management activities. Using this platform, colocated or distributed testing teams can work collaboratively to manage requirements, code, defects, test plans, test cases and change requests. Practitioner tools for test automation are tightly integrated with this platform to ensure that test results and defects arising from test execution cycles are tracked from development through resolution.

*Test teams should monitor engineering progress that affects the test cycle, and software repairs should be prioritized in the context of the business requirements that they affect.*

By tracing test cases to requirements, testers can identify and focus their testing on the most critical capabilities of the software system and can stay current with changing requirements. Additionally, development activities that are initiated from test results, such as defect repairs and enhancement requests, are traceable to test results and requirements. This lifecycle traceability helps to ensure that test teams can monitor the progress of engineering work that impacts the test cycle, and that software repairs can be evaluated in the context of the business requirements that they affect. Integrating workflows and sharing data among analysts, developers and testers are best practices for establishing an early focus on quality and preventing, rather than reacting to, breakdowns in communication.

| Requirement | Change Request | Test Case | Activity | Build |
|---|---|---|---|---|

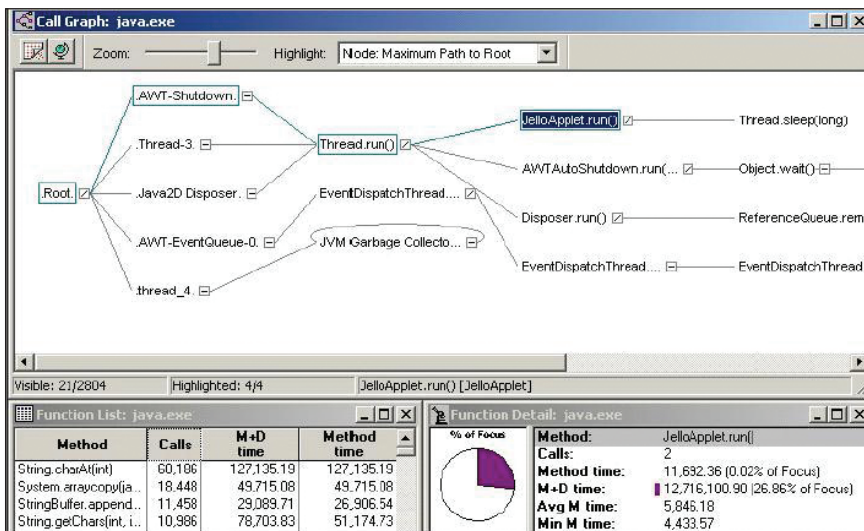*Link test and development artifacts.*

**Ensure high-quality code**

When coding begins, automation tools can help developers continue the lifecycle focus on software quality. Component test and run-time analysis tools help developers write more reliable code, faster. IBM Rational PurifyPlus™ software detects memory corruption and leaks, profiles performance and provides code coverage analysis for Java™, C/C++, Microsoft® Visual Studio and Microsoft Visual Basic .NET (VB.NET) languages, as well as for Visual C/C++ and Visual Basic applications on heterogeneous platforms. By using tools like IBM Rational PurifyPlus software, developers can quickly detect and remove coding defects that can lead to difficult-to-find defects in the lifecycle.

**Highlights**

*Code and unit test tools can help developers ensure the code's quality and reliability.*

For developers who are building embedded and other pervasive computing products, IBM Rational Test RealTime™ software provides a cross-platform component test and run-time analysis solution for Java and C/C++ code development. With Rational Test RealTime software, developers can perform target-based component testing to help ensure the correct operation under a variety of deployment environments.

For development teams building J2EE, Web, Web services and portal applications, integrated capabilities to perform coding standard reviews are part of the IBM Rational Application Developer for WebSphere® offering. This early and continued focus on quality, supported by test automation tools, can weed out performance bottlenecks and coding errors before the effort of trouble-shooting and correcting these problems becomes more costly.

*Automate identification of performance bottlenecks early.*

*Effective management of software quality begins with implementing an enterprise scalable quality management ecosystem.*

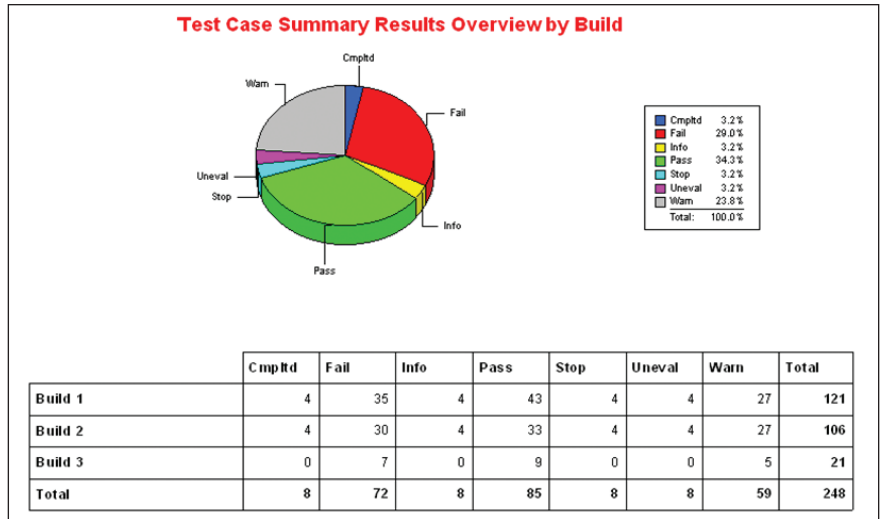**Leverage automation across the entire test and development team**
Effective management of software quality begins with implementing an enterprise scalable quality management ecosystem from which all test planning, test execution, results and defects are managed. IBM Rational ClearQuest software provides an integrated solution for test, change and defect management that offers a single, consolidated view of the entire project's status—including quality metrics. Using this integrated management system, testers can ensure that tests have traceable, auditable relationships between development, test and project artifacts.

The Rational ClearQuest software provides global project coordination capabilities to help leverage globally distributed talent and simplify the complexities of managing distributed testing and development projects. You'll also have unparalleled flexibility to customize the forms, fields and workflow used to manage and capture data for testing projects. IBM Rational ClearQuest software provides extensive workflow customization capabilities to define and enforce how test cases move through the lifecycle, the data that is required as test cases are captured, and the approval process and sign-offs that are necessary to meet your quality policies. Electronic signature support and a full audit trail of test changes help ensure your preparedness for process audits.

In today's world of complex applications, development teams often find they need a diverse set of quality automation tools to meet all of their needs. The Rational ClearQuest solution provides an extensible quality management ecosystem that integrates with Rational, open-source and third-party test tools to offer a common platform from which a variety of practitioner automation tools can be managed. Leveraging an open quality management system can lower the cost of test lab management and simplify the management of tools from multiple vendors.
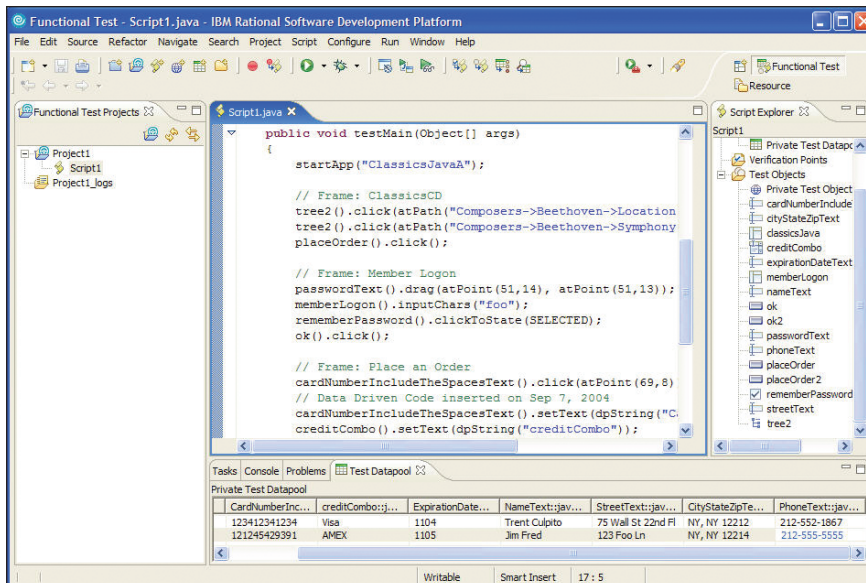
**Test Case Summary Results Overview by Build**

| | Cmpltd | Fail | Info | Pass | Stop | Uneval | Warn | Total |
|---|---|---|---|---|---|---|---|---|
| Build 1 | 4 | 35 | 4 | 43 | 4 | 4 | 27 | 121 |
| Build 2 | 4 | 30 | 4 | 33 | 4 | 4 | 27 | 106 |
| Build 3 | 0 | 7 | 0 | 9 | 0 | 0 | 5 | 21 |
| Total | 8 | 72 | 8 | 85 | 8 | 8 | 59 | 248 |

*Comprehensive test analysis reports*

*An open quality management system can lower the cost of test lab management and simplify the management of tools from multiple vendors.*

**Improve test efficiency and accuracy through automation tools**

After gaining control of quality management, most testing teams tackle automation of test execution and results analysis. The benefits of test automation are shortened test cycles, improved quality through broader and deeper test coverage, and more accurate, reliable and reproducible tests. The IBM Rational Functional Tester Plus solution provides teams with a test automation toolkit to test a variety of heterogeneous applications. Included in the Rational Functional Tester Plus package are IBM Rational Functional Tester and IBM Rational Robot software.

*Powerful test automation development environment*

*Testers and developers can leverage industry-standard languages to build powerful, customized, automated tests.*

IBM Rational Functional Tester software is a test automation tool that can be used to develop sophisticated tests to validate the functionality and use cases of Java, Web, Microsoft .NET, IBM 3270, IBM 5250, VT100 and Siebel software applications. Testers and developers alike can leverage the Rational Functional Tester software's use of industry-standard languages — Java and VB.NET — and integration with Eclipse and Microsoft Visual Studio .NET to build powerful, customized, automated tests. Through integration with the Rational ClearQuest quality management system, testers and developers can centralize test execution and results analysis of both automated and manual tests and better ensure the traceability of test results to upstream requirements and downstream defects.
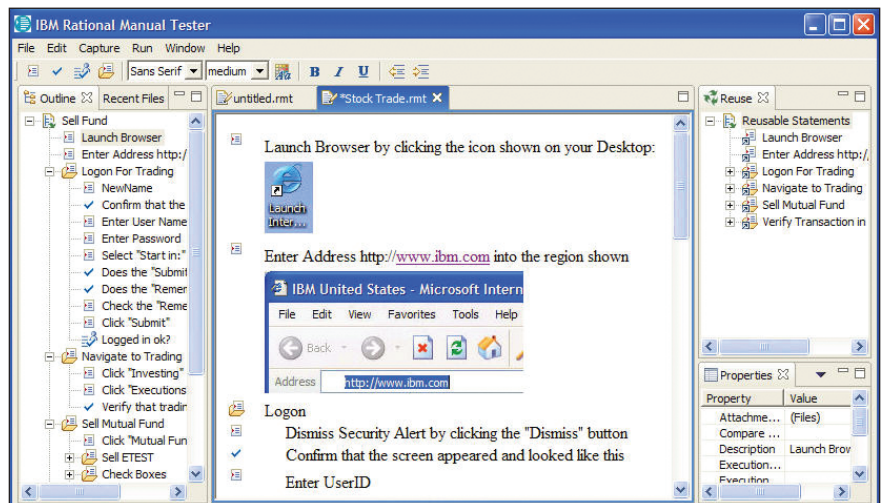
*Developers can employ automation and off-hours cycles to test an application's stability and functionality.*

To help ensure that your investment in test automation is protected and that changes to tests are tracked, the Rational Functional Tester solution includes IBM Rational ClearCase® LT software for version control of automated tests.

The Rational Functional Tester software is not just for testers. Developers can leverage the capabilities of the Rational Functional Tester application to develop and execute a suite of automated tests that validates each software build before it moves on to full system testing. For increased automation, test execution can be tied to the build process. This allows developers to leverage automation and off-hours cycles to test an application's stability and func-tionality. Automating build validation testing can help eliminate the wasted hours that result from deploying faulty builds into the test lab or system test environment.



*Automating manual tests*

*Automation best practices such as modularity and reusability make the transition from manual to automated testing easier.*
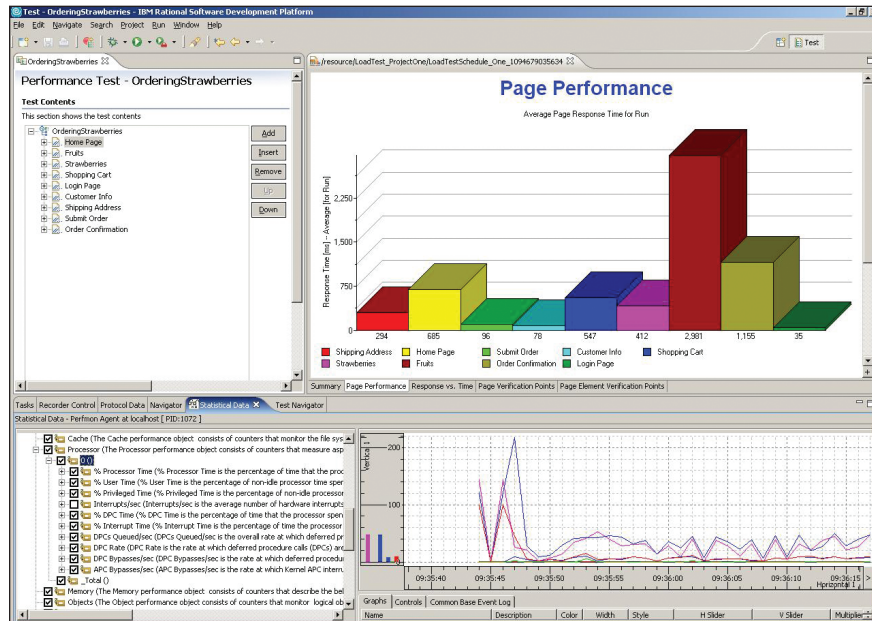
IBM Rational Robot software, also a component of the Rational Functional Tester Plus solution, provides test automation for applications created with Microsoft Visual Basic, C/C++, Oracle Forms, Borland Delphi and Sybase PowerBuilder applications.

Since most testing teams employ a combination of manual and automated testing techniques, the Rational Functional Tester package also includes IBM Rational Manual Tester software, a solution for documenting detailed, manual tests and improving manual testing accuracy and speed by automating the most error-prone tasks. The Rational Manual Tester software also helps teams with the transition from manual to automated testing by promoting automation best practices such as test modularity and reusability.

Business analysts and subject-matter experts (SMEs) who perform application testing can also leverage Rational Manual Tester software to improve and integrate their testing with the broader testing efforts across the development team.

## Validate scalability and conformance to service-level agreements



*Isolating scalability problems before you go live*

*A difficult yet critical task in the testing process is ensuring that a software application can scale and perform to meet SLAs.*

Ensuring that a software application can scale and perform to meet service-level agreements (SLAs) and user expectations is one of the most difficult yet critical tasks in the testing process. A software application that meets all its functional requirements but not the end user's responsiveness expectations will ultimately be a failed software development project. IBM Rational Performance Tester software provides a solution to perform load and scalability tests on J2EE, Portal, Web, Siebel and SAP applications and their infrastructures.

The Rational Performance Tester software is a highly scalable and easy-to-use solution for the development, execution and analysis of performance and scalability tests. J2EE transaction-breakdown capabilities and remote system

resource monitoring allow testers to pinpoint the source of performance bottlenecks. Through integration with IBM Tivoli® composite application management solutions, performance data from a production environment can be captured and delivered to the developer's desktop, creating a closed-loop performance-problem isolation and repair process. Through integration with IBM Tivoli monitoring solutions, teams can capture extended system resource data for more granular problem isolation.

Rational Performance Tester software can also help you to realize a better return on your hardware investments by executing predeployment capacity planning tests to size the server resources needed to achieve the desired performance and throughput.

### Integrate packaged application testing into your process

*Many core business systems combine new development systems, legacy back-office systems and integrated packaged applications.*

Many core business systems are a combination of new development systems, legacy back-office systems and integrated packaged applications. To help ensure that you have support for test management and test automation of heterogeneous application environments, Rational software functional and performance testing automation tools support Siebel and SAP solutions. IBM Rational Functional Tester for Siebel Test Automation and IBM Rational Performance Tester for Siebel Test Automation software extend the capabilities of the Rational Functional Tester and Rational Performance Tester solutions to Siebel 7.7 and 7.8 applications. Using these extensions, your Siebel implementation teams can validate the business use cases of core and customized Siebel implementations, and ensure that the systems will scale and perform to meet end users' needs. For customers implementing SAP applications, IBM Rational Performance Tester for SAP Solutions software supports performance and scalability testing of SAP 4.6 and 4.7 solutions.

*Many companies rely on an integrated set of mainframe and distributed platforms to run mission-critical software applications.*

Both the Siebel and SAP performance testing solutions can help improve application quality, increase the return on investment in your IT infrastructure through capacity planning tests, and reduce the cost of scalability testing with reusable test scenarios that can emulate a large population of users. And because these solutions are integrated with the Rational ClearQuest quality management system, your teams can manage packaged application testing with the same level of requirements-to-test traceability, auditability and attention to quality metrics with other software development projects.

**Integrate mainframe application testing into your process**

Many companies rely on an integrated set of mainframe and distributed platforms to run mission-critical software applications. If that sounds like your organization, you can benefit from Rational solutions to test mainframe-based software applications. IBM Rational Functional Tester Extension for Terminal-Based Applications software brings all of the power of the Rational Functional Tester solution to test the use cases of 3270, 5250 and VT100 platform-based applications. For customers who are deploying workload-intensive Web-based applications, IBM Rational Performance Tester for z/OS® software provides the ability to use IBM System z™ hardware as a high-scalability load-generation agent for Web-application testing.

*Replace ad hoc or unstructured processes with a streamlined and self-documenting software development lifecycle by adopting a business-driven approach to regulatory compliance management.*

**Use testing rigor to help comply with regulatory requirements**

Meeting regulatory requirements is more than a legal obligation—it is an opportunity to improve your organization's software development transparency, oversight and results. By adopting a business-driven approach to regulatory compliance management, your team will replace ad hoc or unstructured processes with a streamlined and self-documenting software development lifecycle. By using Rational ClearQuest software as the central hub for requirements, test, change and defect management, your team will be better able to demonstrate traceability between tests and regulatory requirements, provide detailed reports on the steps taken to validate requirements, and use e-signature support to help substantiate that automated processes and controls are operating as specified. For additional value, your team can use Rational Manual Tester software to document and execute structured tests against non-software business and IT controls.

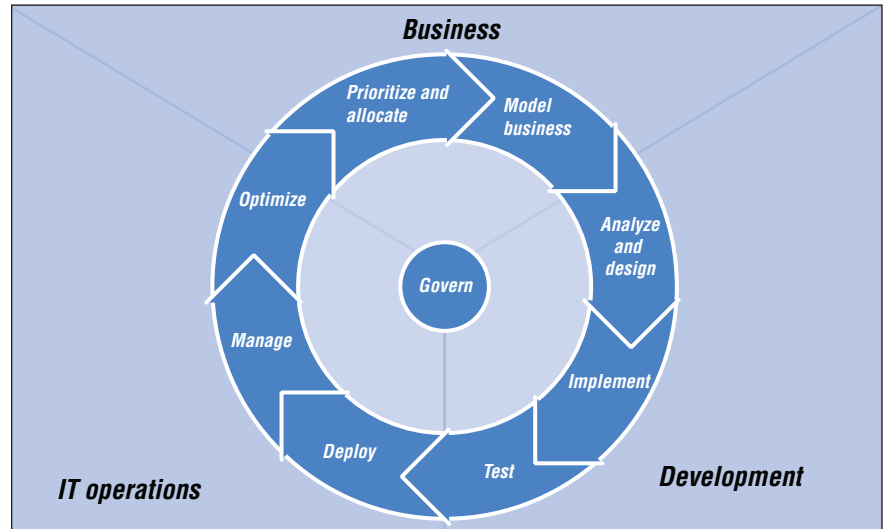**Treat outsource testing service providers as an extension of your team**

Almost all IT organizations will rely on some outsourcing to meet their business objectives. Whether your goal is to speed development, lower costs, increase innovation or simply take advantage of the talent you need, regardless of where it is found, successful outsourcing requires careful communication of the vision of your application, automated enforcement of your quality standards and quality management oversight processes in order to be successful. Rational solutions for quality management and test automation can provide a standardized platform of tools to enforce your quality processes, develop sharable test assets and enable your management team to stay apprised of the return on investment of outsource testing projects.

**Make IT lifecycle management a core competency**



*Aligning business, IT operations and development*

*Building quality management as a core competency can make a measurable impact on the success of application deployments.*

Establishing test excellence as a core competency in your development team can make a measurable impact on the success of application deployments. Whether your software applications drive revenue, provide the face to your customers, open new markets or support core business functions, how well your software systems meet your business goals can be directly attributed to your ability to implement processes and tools to support high-quality development. The key is for organizations to adopt a more holistic approach—an approach that takes a top-down, end-to-end view of the IT lifecycle. Ongoing optimization efforts must be coupled with a new perspective that breaks down the silos on either side of the operations and development divide. Tools, metrics and processes must be normalized across the organization to ensure that all real and virtual lines of business are equally measured and equally accountable for the success or failure of the business. The full lifecycle of quality Rational solutions, coupled with development and IBM Tivoli application management tools, can be the catalyst for the changes needed to truly optimize the effectiveness of your IT organization.

For more information on any one of the products mentioned in this paper, go to:

**ibm.com**/software/rational/offerings/testing

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