

IBM System i development with IBM Rational software products

White paper

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Rational software

Unified application development for IBM System i servers.

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Increasing complexity of IBM System i development

The world of the IBM System i™ platform has changed dramatically. Not long ago, the management of System i source code and resources was relatively simple. The Data Description Specification (DDS) was used for database files, IBM 5250 screen layouts and reports. Developers created code with the Report Program Generator (RPG), Command Language (CL) and Common Business Oriented Language (COBOL) programs, and stored the code in source files in System i libraries on the IBM eServer™ i5 platform. This source code could then be compiled into executable objects or programs and copied or moved into test libraries. Upon completion of integration testing, the new objects were deployed on a production machine or into a production environment. Developers all worked in a single location and walked to teammates' cubicles to coordinate on issues pertaining to the deployment of new or modified applications.

Today, the System i development process is complicated by globalization, the rapid pace of technology innovation and new ways of doing business. Companies must now be able to demonstrate that their computer systems meet the requirements of regulatory bodies and the compliance demands of auditors. And their information technology (IT) and systems organizations must address the technical challenges of integrating new technologies, operating systems and distributed development environments.

This paper discusses how IBM Rational® ClearCase® and IBM Rational ClearQuest® software can help organizations manage System i application development in increasingly complex environments that include:

- *Multiple languages, technologies and even open source or platform-based environments.*
- *Projects that involve in-house, offshore and third-party developers located in various sites around the world.*
- *Compliance with numerous regulatory and industry mandates.*

Managing multiple development environments

Software is no longer written in a single language or even run on a single operating system on a single machine. It can span many technologies throughout the enterprise and often extends to the machines of trading partners and other geographically dispersed users.

IBM Rational ClearCase and IBM Rational ClearQuest software simplify development in such heterogeneous environments with cross-platform support. Rational ClearCase software provides controlled access to software assets through sophisticated version control, automated workspace management, parallel development support, baseline management, and build and release management. Rational ClearQuest software provides process automation, reporting, defect and change tracking, and lifecycle traceability for better control of the software and systems delivery lifecycle. These products have demonstrated clear leadership in software change and configuration management for distributed environments including the UNIX®, Linux®, Microsoft® Windows® and IBM System z™ platforms.

Rational ClearCase functionality can be accessed directly from the IBM WebSphere® Development Studio Client for System i integrated development environment (IDE). It supports IBM i5/OS® languages including RPG, CL, COBOL, C, C++ and Programming Language 1 (PL/1). It also provides support for System i resources such as Web artifacts, Java™, Java Platform, Enterprise Edition (Java EE) and Enterprise Generation Language (EGL). Additionally, Rational ClearCase software manages IBM i5 language-supported operating systems – enabling i5, IBM eServer iSeries™ and IBM AS/400® users to access and control their software assets from within their traditional environments. For example, organizations can integrate and manage RPG or COBOL application code creation with advanced Web or rich client development.

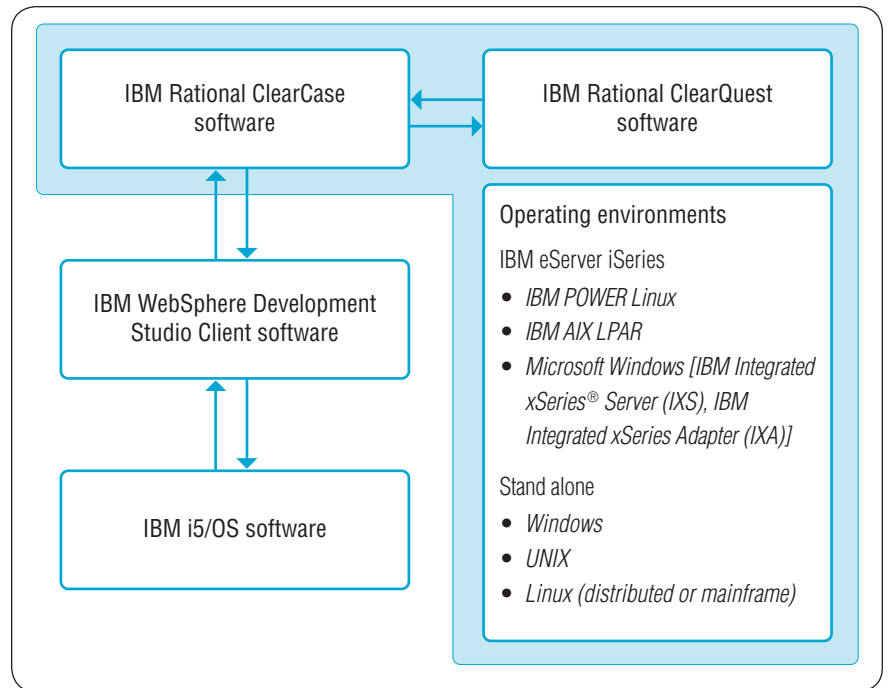


Figure 1: IBM Rational ClearCase and IBM Rational ClearQuest software support both IBM System i and stand-alone platforms.

The Rational ClearCase Versioned Object Base repository and Rational ClearQuest server will run on a System i server in an IBM POWER™ Linux environment or on an IBM AIX® logical partition (LPAR). The configuration can also be run on Intel®, Linux or Microsoft Windows systems on an integrated or attached IBM System x™ server. And to provide organizations further deployment flexibility and platform choice, Rational ClearCase and Rational ClearQuest software can also run on stand-alone servers.

The enhanced WebSphere Development Studio Client for System i plug-in for Rational ClearCase software provides the ability to check out i5/OS source code and other assets from a Rational ClearCase repository; work with the objects on a Windows workstation in the WebSphere software; and deploy the objects to an i5/OS system via the WebSphere Remote System Explorer plug-in. Such an implementation offers a robust range of features and benefits.

Concurrent development

The Rational ClearCase application also provides support for concurrent development. This capability is particularly useful when an immediate problem or emergency-fix situation arises that requires access to resources that are checked out by a System i developer. This same developer, or another practitioner, can check out the program source to a different project or activity to make the necessary code adjustments. Once the fix is complete, the change can be integrated into pending code development using the Rational ClearCase diff/merge functionality.

This diff/merge facility does much more than the simple compare function offered by competitive software. It automates the operation and can handle the merging of multiple versions of the same source file.

While concurrent development is often discouraged in a System i organization, it does occur; and the ability to manage it effectively is a critical success factor for the organization overall.

Asset protection

Rational ClearCase software enables organizations to protect their software assets throughout the entire development lifecycle. It provides superior source management for i5/OS languages and other assets. It also provides support for Java technology and other, less traditional i5/OS resources such as Personal Home Page (PHP) scripts, Net.Data macros, HTML files and resources found in System i environments that require Web and/or Java EE development.

Basically, Rational ClearCase software provides a comprehensive management solution for System i servers. When developers check out programs or other objects and begin to work within Rational ClearCase controlled processes, they can save their work to the ClearCase Versioned Object Base repository. This means that little if any work is lost if a disk crash occurs or a developer accidentally deletes or otherwise corrupts work in progress. Developers simply restore from the last saved version of their work.

Unlike other vendors' software change management products for System i servers, IBM Rational ClearCase software stores only the changes made to a source file. Each time the developer saves a file, the changes are associated with a version, so it's possible to roll back to any stable state during the project lifecycle.

Saving DDS, RPG, CL, COBOL or other i5/OS source to a repository is a new concept for many System i developers, but it provides a superior layer of protection and security. While the i5/OS operating system has integrated security, it is still dependent on the level of authority granted to developers. If, for example, developers are granted global authority in the test environment, i5/OS security is effectively turned off. Because Rational ClearCase software provides its own authorization, the organization gains an added layer of protection for its software assets. To meet compliance management requirements, the organization can prove that only authorized developers are able to access and modify code and that all changes are made via the ClearCase software—without exception.

Managing distributed development teams

Many companies encourage developers to work from home. Others have engaged offshore development partners and work with developers scattered around the world. Some companies engage developers in three different time zones to enable 24-hour development.

Rational ClearCase and Rational ClearQuest software support multiple approaches to distributed development. Remote access to a centralized repository is provided through wide area network (WAN) access and Web clients. A single client can access data on more than one server, so developers are able to construct workspaces from repositories in multiple locations.

In addition, both the Rational ClearCase and the Rational ClearQuest products offer options to enable automatic replication and synchronization of repositories among distributed sites. Transmission of only incremental changes reduces network traffic and improves performance. Teams of developers can work together and independently. The organization can store copies of its development assets on a local server and automatically replicate and synchronize with servers throughout the network.

Managing compliance

Regulatory requirements and industry mandates are significantly affecting how organizations develop and modify the applications they use to run their businesses. Companies need to deploy software development infrastructures that deliver the security, traceability and repeatability required to show that their software development architectures and processes are audit ready and tamper resistant.

Process enforcement

Rational ClearQuest software enables organizations to implement consistent, repeatable, enforceable processes. Workflows are provided out of the box and can be easily customized to meet specific needs. Automated e-mail notifications inform team members and management of changes or updates. And approval and notification workflows can be established for closure.

Lifecycle traceability

Integrated with requirements, development, build, test and deployment tools, Rational ClearQuest software provides full lifecycle traceability and comprehensive audit trails. The Rational ClearQuest application logs who changed what, when and why. Changes to activities are tracked in the history of the activity. In addition, electronic signatures verify the identities of individuals performing specific actions, which is essential in establishing approvals. With automated documentation of transactions across the lifecycle, organizations can quickly trace the origin and detail of all activities, and verify authorizations and sign-offs.

Rational ClearCase software records operations against all objects stored in its repositories. The history browser shows a record of development tasks, and automated history reports contain changes made to folders and files. Rational ClearCase software also provides a build audit capability that enables companies to create a record of files that were used to build an application and the specific version of code deployed to production.



Access control

Rational ClearCase software helps organizations ensure that only authorized individuals have access to information. Companies can control access through operating system authentication mechanisms or through industry standard directory servers that use Lightweight Directory Access Protocol (LDAP) technology. User- and group-based permissions limit access to files and directories. In addition, user-based locks are available on Rational ClearCase objects (branches, labels, elements and metadata), enabling programmatic authorization based on the action being taken.

Rational ClearQuest software performs user authentication through the Rational ClearQuest directory of users or through industry standard directory servers using LDAP technology. Support for Secure Sockets Layer (SSL) encryption helps ensure that communication between Rational ClearQuest software and the LDAP technology is secure. Organizations can also extend access control for key security checkpoints through scripting.

Conclusion

Together, Rational ClearCase and Rational ClearQuest software offer superior control of the System i application development lifecycle. The products help improve productivity by automating manual processes with simple tools that seamlessly integrate into an organization's procedures and processes. And by supporting multiple languages, platforms and distributed environments – and by making compliance management easier – the Rational products unify and simplify application development on the System i platform.

For more information

To learn more about how IBM Rational ClearCase and IBM Rational ClearQuest software can be used by developers working in the IBM System i environment, visit:

ibm.com/software/rational/offerings/scm.html

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