



**Rational** software

## **Improve developer productivity with integrated SCM for WebSphere Studio and Eclipse.**

*By Tom Milligan, SCM Technical Marketing Specialist  
Stefan Schurman, Product Manager  
Karen Wade, SCM Product Marketing Manager  
Jon Ward, Market Manager*

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## **Introduction**

Software configuration management (SCM) establishes and maintains the integrity of software products throughout the development life cycle. By protecting and managing business-critical software and assets, SCM enables development teams to produce higher-quality software, faster and with lower cost and risk.

In this paper, you will discover the key reasons why software configuration management is critical for business success. The paper discusses how IBM Rational® ClearCase® Change Management products, including Rational ClearCase and Rational ClearQuest® change management solutions, provide advanced SCM capabilities from within IBM WebSphere® Studio and Eclipse development environments. It explains how these capabilities can enable increased productivity, improved quality and delivery of maximum business value. This paper also presents best practices for using Rational ClearCase and Rational ClearQuest from within WebSphere Studio and Eclipse to enable more efficient development.

## **Why software configuration management?**

Software development is an increasingly complex and dynamic activity. Development frequently occurs in teams that perform concurrent development on the same application, often in geographically distributed locations. Multiple versions of applications need to be supported, and they often must run on different machines and operating systems. Increased economic pressures, increased focus on auditory and regulatory compliance, and increased complexity of development processes and technologies further intensify today's software development challenges.

As a result, many problems can occur during software development.

These include:

- *Bugs that have been corrected reappear.*
- *Previous releases of software are impossible to find or cannot be rebuilt.*
- *Files mysteriously change or disappear altogether.*
- *Work from one developer is replaced (lost) by work from another developer.*
- *Builds that previously worked, suddenly break.*

Time pressures, effective project/process management, and software quality are ongoing development challenges.<sup>1</sup> In addition, release cycle and version management (including the ability to better support multiple releases, distributed teams, and multiple client configurations), the need for tools that run in all environments, and the need for tools that integrate with existing development environments have also emerged as key Web-based application development needs.<sup>2</sup>

How can these problems be reduced – or even eliminated – and the needs of developers met? The answer is SCM. SCM can deliver tangible business value by helping to simplify and manage the software development process. By providing capabilities such as version control, build management, defect and change tracking, release management, and process control, SCM can help deliver:

- *Increased productivity through parallel development and automated processes.*
- *Improved operational efficiency through team collaboration, support for large distributed teams, enhanced reliability and minimized downtime.*
- *Reduced cost through leveraging existing investments and increased software reuse.*
- *Faster time to market through streamlined development and reduced release/build cycle times.*
- *Better software quality by preventing users from making mistakes and having fewer bugs in delivered code.*
- *Improved customer retention through improved customer responsiveness.*
- *Increased ability to meet compliance requirements with a well-defined, repeatable, auditable process.*

Although SCM can bring many business benefits to organizations, not all SCM tools are created equal. The key is to implement SCM tools that can simplify and control change, accelerate productivity, integrate and manage all software assets wherever they are, support the entire virtual development team, easily integrate with existing systems and integrated development environments (IDEs), adapt quickly to customer and business demands, and deliver quick business results.

***“When we introduced WebSphere Studio to our development team they were very excited because now they were able to integrate with Rational ClearCase and have a seamless check-in, check-out process. It really is head and shoulders above our previous process in which some of our artifacts were not in a change control environment and many mistakes were being made because of that. By putting everything into Rational ClearCase and using WebSphere Studio in that development environment, it made everything go a lot smoother.”***

*– The Revere Group*

**Improve productivity and gain long-term value with industry-leading SCM solutions**

Recognized as the industry revenue leader in the SCM tools market,<sup>3</sup> SCM solutions from IBM deliver proven technology to help developers and project managers better manage change and complexity. Going well beyond software revision control and versioning capabilities, Rational ClearCase and Rational ClearQuest provide advanced SCM capabilities that can accelerate productivity and enable businesses to adapt quickly to changing demands. How? Rational ClearCase and Rational ClearQuest provide out-of-the-box SCM process support that:

- *Allows rapid and easy application development.*
- *Supports large, distributed development teams.*
- *Helps users avoid making mistakes.*
- *Enables parallel development.*
- *Provides seamless access to change and defect tracking.*
- *Enables customized reporting.*
- *Scales from small-workgroup to enterprise support.*
- *Integrates easily with existing systems.*

### **Rational ClearCase: So much more than version control**

Rational ClearCase products provide an extensive range of software asset management capabilities. From IBM Rational ClearCase LT, to Rational ClearCase, to IBM Rational ClearCase MultiSite® change management solutions, organizations can choose the Rational ClearCase product that best meets their development needs.

Rational ClearCase LT provides entry-level version control for small to midsize colocated teams. Easy to install and manage, Rational ClearCase LT offers:

- *Powerful version control for files, directories or other assets produced during the development life cycle, with complete, annotated histories of source code, binaries, executables, documentation, test suites, libraries and Web elements.*
- *Snapshot views that give easy access to the right versions of files and directories required to complete a specific task, while shielding team members from potentially destabilizing changes being made by other developers. These views provide easy access to the right versions of assets by loading required versions onto the developer's desktop—a feature ideally suited to disconnected users and early-stage projects that require isolation.*
- *Parallel development support, including automatic branching to enable multiple development teams to work independently from the same code base, and proven diff/merge technology that automatically accepts uncontested changes and highlights conflicting changes for fast resolution.*
- *Web interface for easy access from standard Web browsers virtually anytime, anywhere.*
- *Tight integration with Rational ClearQuest for seamless access to change and defect tracking.*
- *Wide platform support including Linux, Microsoft® Windows® and UNIX® systems.*
- *Easy installation with intuitive startup wizards to automate server setup and built-in TCP/IP networking for simplified administration in heterogeneous environments.*
- *Deep integration with leading IDEs, including WebSphere Studio and Eclipse.*
- *Seamless upgrade to Rational ClearCase and Rational ClearCase MultiSite that enables organizations to grow and meet evolving business needs, without retraining, retooling or migrating data.*

Rational ClearCase provides complete software asset management for midsize to large development teams. It extends the value of Rational ClearCase LT by adding:

- *Flexible workspace management using dynamic or snapshot views. Dynamic views provide global, transparent access to virtually any version of any element and are ideal for an audited build environment or a complex project that requires instantaneous updates to evolving source files.*
- *Advanced build management to automatically produce detailed bill of materials and to re-create any previous build at any time.*
- *Support for multiple repository server deployments for large-scale enterprise teams.*
- *File conversion from other version control and SCM products to speed migration activities.*
- *Mainframe development support, including IBM S/390® and IBM @server® zSeries® platforms running SuSE Linux operating systems.*

And for distributed development environments of any size, Rational ClearCase MultiSite offers:

- *Distributed development support enabling distributed teams on multiple distributed servers to create complex applications in parallel through automatic replication.*
- *Automatic backup and restore to maintain business continuity in case of disaster.*
- *Data integrity by automatically resending information in the event of network failure and recovering repositories in the event of system failure.*
- *Improved performance by transmitting only incremental changes that appear in Rational ClearCase project repositories.*

***“It is no good if you have 200 developers and each time someone wants to rebuild the product, it takes on the order of 36 hours to complete the compile process. With Rational ClearCase, we were able to reduce that time to about 30 minutes.”***

*– Peace Software*

**Rational ClearQuest: Flexible defect and change tracking, virtually anywhere**

Rational ClearQuest provides flexible change and defect tracking. Out-of-the-box, Rational ClearQuest delivers a proven change control process that meets the needs of most organizations. Rational ClearQuest provides comprehensive support for queries with extensive charting and reporting. Distribution, trend and aging charts help you visualize complex change data. Individual team members can also generate to-do lists and run reports using the query wizard.

Behind the scenes, Rational ClearQuest can also be easily customized using simple point-and-click features. Robust, flexible work-flow support includes e-mail notification and submission options, so as change requests are updated, your team members can be informed. You can also define unique work flows for each type of change request.

***“The best thing about Rational ClearQuest is that it is totally customizable. As our organization changes, Rational ClearQuest can change with it.”***

*– ProCard Inc.*

Virtually wherever team members and stakeholders are located, access to Rational ClearQuest is available. Changes to the change request templates or work-flow design are automatically propagated to almost any interface – Windows, Linux, UNIX or the Web. Two options are provided for Web access: a basic submit, single-query Web access mode, which can be made available to an unlimited number of users, and a full-featured Web client.

For distributed development environments, IBM Rational ClearQuest MultiSite extends the value of Rational ClearQuest by offering:

- *Distributed activity management support enabling distributed teams on multiple distributed servers to manage and track activities through automatic replication of schema repositories.*
- *Data integrity by automatically resending information in the event of network failure and recovering repositories in the event of a system failure.*
- *Improved performance by transmitting only incremental changes that appear in Rational ClearQuest repositories.*

***“Rational ClearQuest has allowed us to be extremely successful when it comes to our QA processes. Being able to customize Rational ClearQuest to do more than just tracking defects, we have freed up approximately 20 to 30 people from sitting around a table for an hour and a half, two hours after every release, trying to remember the issues they stumbled across.”***

*– Corporate Express*

### **The power of Unified Change Management**

Both Rational ClearCase and Rational ClearQuest help organizations create sustainable business value by improving their software development capabilities. When used together, these powerful tools simplify and control the change process, and provide a core foundation for effective and efficient software development life-cycle activities.

Unified Change Management (UCM) further accelerates development productivity. UCM is an out-of-the-box activity-based process model that can be turned on or off depending on the specific needs of a software development team. UCM automates the steps required to create and maintain developer work areas, identify change sets associated with a given activity, integrate changes across the project, and create and manage component baselines. By helping to organize, coordinate and prioritize the many development activities, UCM enables:

- *Simplification of key SCM functions and work flows with activity-based management.*
- *Easy configuration of SCM processes for teams of any size.*
- *A complete view of how development activities, which include defects and changes, relate to specific files, versions, baselines or releases.*



Key to UCM is the level of abstraction it offers. With UCM, development teams can track multiple changes as a single, higher-level activity. One logical change can represent many physical changes across multiple files. Project managers can easily see the status of an activity, even when multiple team members are involved. Individual team members can quickly see the relationship of what they are working on to the higher-level activity. This holistic view means that developers and project managers can better understand the impact of proposed changes across the project.

Rational ClearCase and Rational ClearQuest are the foundation technologies for UCM. Through Rational ClearCase and Rational ClearQuest, UCM helps managers prioritize and orchestrate the many development activities that must be performed on hundreds of different software asset versions. It enables developers to get up and running quickly on new projects. It helps teams effectively baseline requirements together with code, models, test assets and more. With UCM, development teams stay focused on developing applications rather than managing infrastructure.

#### **Effective development starts with a reliable IDE**

To meet your business objectives, it is critical to enable diverse development teams across your enterprise to deliver high-quality applications quickly. Developers need a development environment that includes everything to support the entire development life cycle, from development, to integration and test, to ongoing maintenance. Often, there is considerable overlap of activities throughout the development cycle, with a need to go back and reiterate earlier stages a number of times as development progresses.

Comprehensive, integrated tools provide the first step toward facilitating this multistep process. The speed and ease with which development tasks can be performed is a major consideration. The flexibility to support mixed environments – Linux, Windows, UNIX and mainframe – is another. And the ability to enable teams, regardless of geographic location, to work efficiently in parallel must also be weighed.

#### **Eclipse: Flexible open-source technology**

Eclipse is an open, extensible industry-supported platform designed for building diverse applications, such as Web sites, embedded Java™ programs, and C++ programs. Fast becoming a popular framework for cross-platform development, Eclipse offers many benefits to developers, including:

- *Cross-platform support for Linux, Windows, Solaris, IBM AIX® and HP-UX operating environments.*
- *A familiar and intuitive graphical project workspace.*
- *Smooth integration of tools and features through plug-ins.*
- *Support for both GUI- and non-GUI-based application development.*
- *Availability at no charge to developers under an open-source license.*

By providing a common interface, an optimized process that closely parallels how developers work and the ability to support collaborative development with a common user model, the Eclipse platform is designed to enable increased productivity while leveraging existing as well as newly acquired tools.

#### **WebSphere Studio: Extending the value of Eclipse**

WebSphere Studio is a family of integrated development environments that provides a flexible, portal-like integration of multilanguage, multiplatform and multidevice application development tools. It is designed to enable developers to rapidly build, test and deploy dynamic applications. Visual tools, templates and wizards help developers to quickly and easily perform many development tasks, from building dynamic Web sites and Web applications to developing advanced enterprise applications that span disparate platforms.

WebSphere Studio provides a single development environment that can scale to support multiple types of development – Web, business logic, integration and traditional. As a result, all the developers on a team use the same environment – customized to meet their individual development needs – and can easily collaborate as they develop applications.

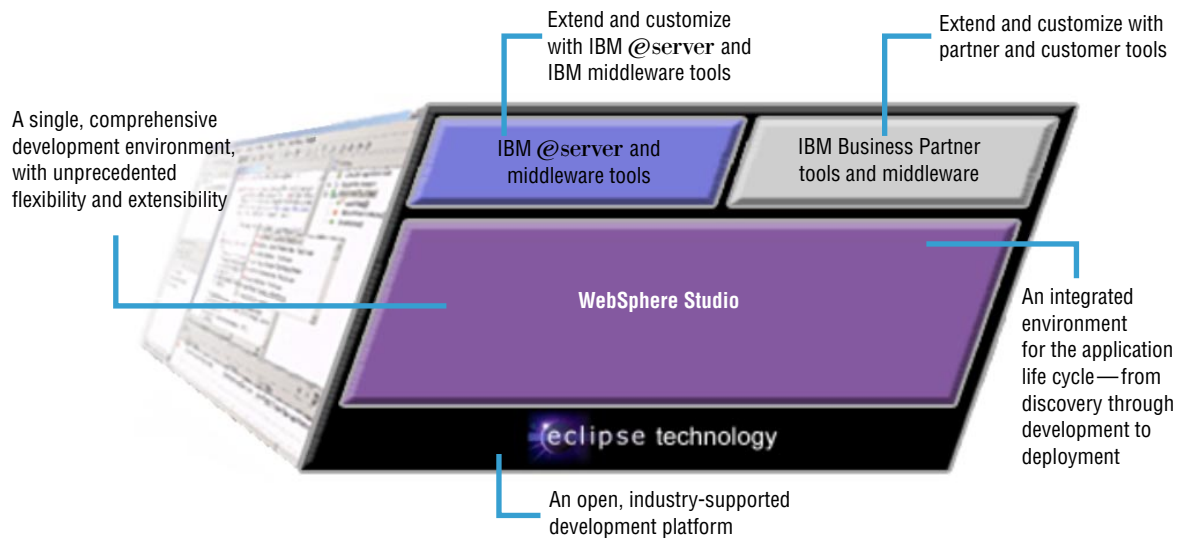


Figure 1. IBM WebSphere Studio

WebSphere Studio is built on Eclipse technology, as shown in Figure 1. It is designed to enable developers to maximize productivity by integrating best-of-breed plug-in tools from IBM, IBM Business Partners and the Eclipse community to customize their development environment to match their roles and needs. For example, a developer working on a project to create a portal-based solution with support for wireless clients could plug in the IBM Portal Toolkit and IBM Everyplace<sup>®</sup> Toolkit for WebSphere Studio to create one IDE in which to build this solution. This integration enables developers to focus on delivering a solution that satisfies its requirements, and not on switching between various development tools.

WebSphere Studio is available in several configurations, each adding important features over and above those provided by Eclipse. WebSphere Studio configurations include:

- *IBM WebSphere Studio Site Developer, an easy-to-use, highly productive development environment with visual rapid application development (RAD) tools for building and maintaining dynamic Web sites, Web services and Java applications.*

- *IBM WebSphere Studio Application Developer, a comprehensive development environment with high-productivity tools for building and maintaining Web services and Java 2 Enterprise Edition (J2EE) applications.*
- *IBM WebSphere Studio Application Developer Integration Edition, a next-generation composite application platform optimized for building service-oriented applications that extend and integrate your existing IT assets.*
- *IBM WebSphere Studio Enterprise Developer, a mixed workload environment for IBM z/OS® development supporting J2EE, COBOL and PL/I.*
- *IBM WebSphere Development Studio Client Advanced Edition for iSeries platform, an IDE for IBM @server iSeries™ server J2EE applications.*

### **World-class SCM seamlessly integrated with WebSphere Studio and Eclipse**

Rational ClearCase and Rational ClearQuest are seamlessly integrated with WebSphere Studio and Eclipse. Rational ClearCase LT is included in several WebSphere Studio products (WebSphere Studio Application Developer, WebSphere Studio Application Developer Integration Edition and WebSphere Studio Enterprise Developer). The integration, however, goes beyond this packaging. The entire WebSphere Studio family, as well as Eclipse, integrates seamlessly with Rational ClearCase LT, Rational ClearCase, Rational ClearCase MultiSite, Rational ClearQuest and Rational ClearQuest MultiSite.

From within WebSphere Studio and Eclipse, Rational ClearCase and Rational ClearQuest functions are exposed through WebSphere Studio views, menus, toolbars and context-sensitive pop-up menus. This allows WebSphere and Eclipse developers to interact with Rational ClearCase and Rational ClearQuest in the same familiar way they interact with their IDEs. It also enables WebSphere Studio and Eclipse developers to efficiently support collaborative development with a common user model.

### **Accessing IBM Rational ClearCase from WebSphere Studio and Eclipse**

From within the WebSphere Studio and Eclipse environments, developers can perform many Rational ClearCase functions. Although these functions are accessed the same way from both WebSphere Studio and Eclipse, the remainder of this discussion is specific to WebSphere Studio only.

First, WebSphere Studio must connect to Rational ClearCase to enable Rational ClearCase operations in the IDE. You can do this by selecting the Connect to Rational ClearCase icon in the WebSphere Studio toolbar, as shown in Figure 2.

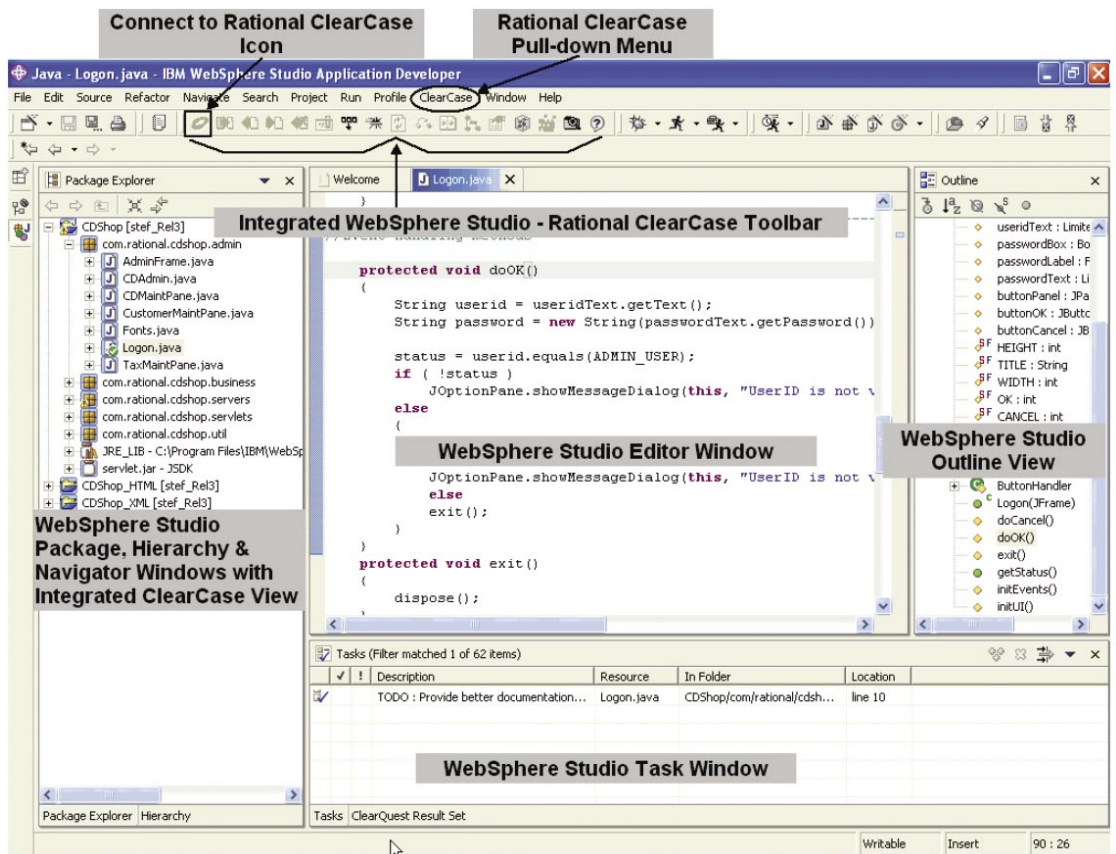


Figure 2. IBM Rational ClearCase access from WebSphere Studio

After WebSphere Studio is connected to Rational ClearCase, you can access Rational ClearCase functions in several ways: through the Rational ClearCase pull-down menu; by selecting a file, right-clicking and selecting Team from the context menu; or by clicking icons on the Rational ClearCase toolbar.

The Rational ClearCase pull-down menu, shown in Figure 2, enables WebSphere Studio users to perform specific Rational ClearCase operations from within the WebSphere Studio workspace. If you are using IBM Rational ClearCase LT, some items on this menu are grayed out. WebSphere Studio users must upgrade to Rational ClearCase to access these functions.

The integrated WebSphere Studio and Rational ClearCase toolbar, also shown in Figure 2, is used to perform frequently used Rational ClearCase functions. Developers can quickly and easily perform Rational ClearCase and UCM functions through a simple mouse click from within the WebSphere Studio workspace.

The WebSphere Studio Team option on the context menu, shown in Figure 3, provides another method of accessing Rational ClearCase functions directly from within WebSphere Studio. Note that many functions, such as source control operations, are available on common project files through the ClearCase pull-down menu, WebSphere Studio and Rational ClearCase toolbar, and Team option on the context menu.

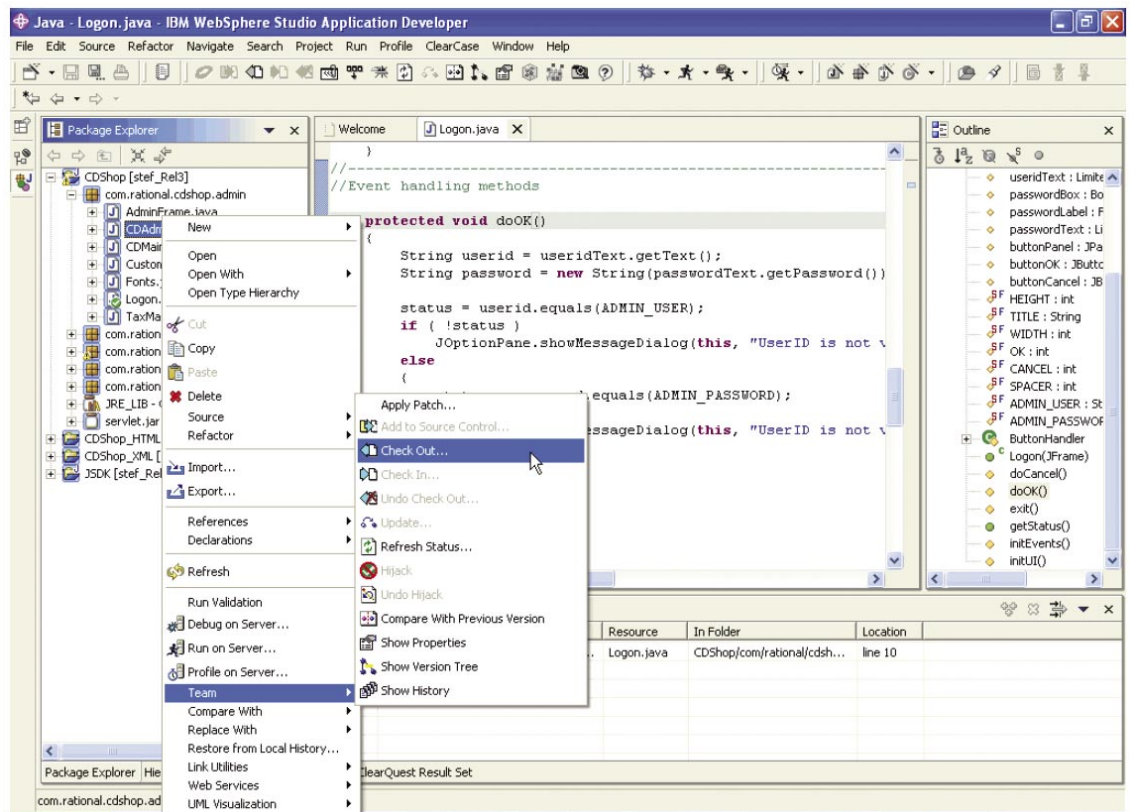


Figure 3. IBM Rational ClearCase access from the Context menu

Table 1 provides an overview of Rational ClearCase functions that you can perform from within the WebSphere Studio user interface. Specific information about each function is available via Rational ClearCase online help within the WebSphere Studio user interface.

IBM Rational ClearCase menu options	Team context menu options	IBM Rational ClearCase toolbar icons
Connect to Rational ClearCase	Add to Source Control	Connect to Rational ClearCase
Set Current Activity	Check Out	Add to Source Control
Deliver Stream	Check In	Check Out
Rebase Stream	Undo Check Out	Check In
Update View	Update	Undo Check Out
ClearCase Build *	Refresh Status	Set Current Activity
Run ClearCase Explorer	Hijack	Deliver Stream
Find Checkouts	Undo Hijack	Rebase Stream
Find Resources to Add To	Compare With Previous Version	Refresh Status
Source Control	Show Properties	Update
Run Merge Manager	Show Version Tree	Compare With Previous Version
Create New View	Show History	Show Version Tree
Edit View Properties		Show Properties
Start/Stop View *		Update View
Mount/Unmount VOB *		ClearCase Build *
ClearCase Help		Run ClearCase Explorer
		ClearCase Help

\* Available with Rational ClearCase only

Table 1. IBM Rational ClearCase functions in WebSphere Studio

**Accessing IBM Rational ClearQuest from WebSphere Studio and Eclipse**

To access Rational ClearQuest functionality from within WebSphere Studio or Eclipse, users must first add the IBM Rational ClearQuest Result Set view to a WebSphere Studio or Eclipse perspective. Rational ClearQuest capabilities can easily be added to any WebSphere Studio perspective by selecting Window > Show View... > Other, and then by selecting Rational > ClearQuest Result Set view, as shown in Figure 4.

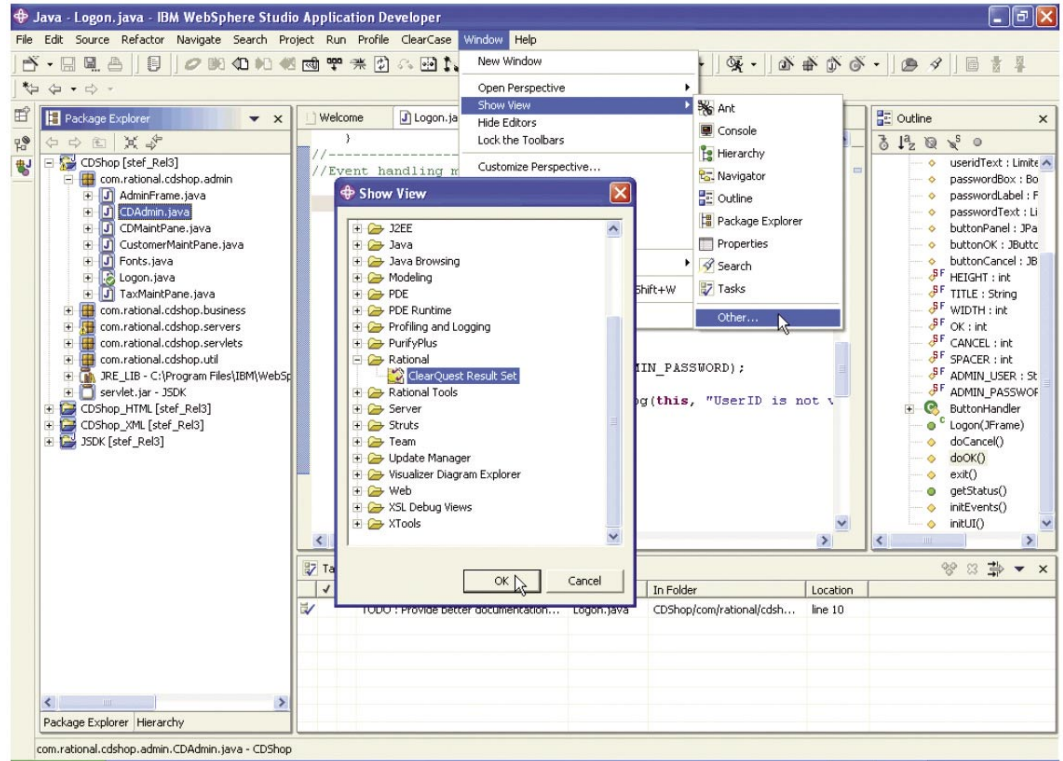


Figure 4. Adding the IBM Rational ClearQuest Result Set view to the Java perspective

It's just that easy. As soon as the ClearQuest Result Set view has been added to a perspective, WebSphere Studio users can perform the following Rational ClearQuest functions:

- *Log on to any Rational ClearQuest user database.*
- *Select and run any public or private queries from the Rational ClearQuest database.*
- *View the query results directly in the ClearQuest Result Set view.*
- *View the record details for an item in the query results.*
- *Submit new defects directly from the ClearQuest Result Set view.*
- *Run recently used queries.*
- *Refresh query results from the ClearQuest database.*
- *Launch the Rational ClearQuest application.*



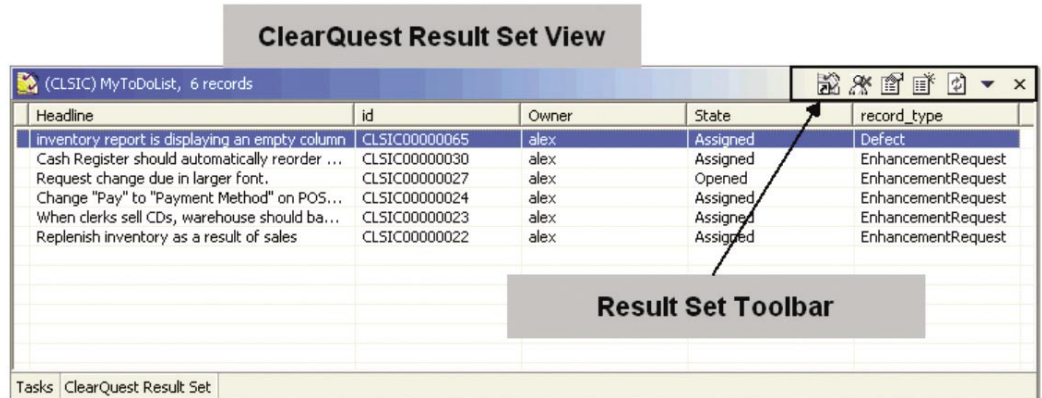


Figure 5. IBM Rational ClearQuest Result Set view

WebSphere Studio and Eclipse users also have access to other Rational ClearQuest functions by launching the Rational ClearQuest application from the Result Set toolbar, shown in Figure 5.

### Best practices

Having a good tool is one thing; using it effectively is another. Six areas of best practices are identified for using Rational ClearCase and Rational ClearQuest with WebSphere Studio or Eclipse. These best practices have been gleaned from vast experience working with these products, and can help you to enable more efficient development.

#### ***Isolate subsystems or architectural layers into separate components***

A component-based architecture helps to promote software reuse and sharing among applications. In a Java or J2EE application, a good candidate for a component is any logical grouping of files that need to be versioned and released independently, or are shared by multiple applications. For example, a WebSphere Studio project that produces a Java archive (JAR) file that shared among many applications may be a good candidate for a component. With UCM, these components can be baselined independently and shared among multiple UCM projects.

***Only version control necessary files***

Source files are generally versioned and shared with other project team members, while build files are typically private and not shared. Users must ensure that the right files are versioned, that is, a user may not want to version and share build files and build settings, but may wish to version and share source files. WebSphere Studio provides an option for ignoring specific file types that you do not wish to add to source control. The Rational ClearCase integration adds a default list of file types to this list of Ignored Resources. Refer to the WebSphere Studio help on Ignored Resources for more information.

***Use a separate WebSphere Studio workspace for each ClearCase view***

Often, developers work with multiple Rational ClearCase views of the same WebSphere Studio project, and these views must be accessible from the WebSphere Studio workspace. It is recommended that you associate one Rational ClearCase view with a unique WebSphere Studio workspace. For example, if you want to work in a parallel-development environment where you have a development View A for bug fixes to release A, and another development View B for release B, you would have two different WebSphere Studio workspaces: one for View A and one for View B. This makes it easier to switch among different versions of the same WebSphere Studio project by simply opening another workspace associated with the necessary Rational ClearCase view.

***Create a standardized development environment***

It is important that all project team members share a common development environment to ensure consistency and reduce integration problems typically related to inconsistent build settings or other configuration problems. One way to help avoid these problems is by sharing common configuration information with simple projects. Simple projects can be used to store common project artifacts, such as getting-started instructions, build instructions and guidelines for team preference settings. Doing so can save developers time by providing consistent workspace, build settings and other environment settings.

***Use Team Project Sets to define consistent lineups of WebSphere Studio projects***

Team Project Sets specify a list of WebSphere Studio projects that are under version control, which can then be quickly imported all at once. This saves time for developers, because they do not have to import individual projects and they are also free from having to understand project dependencies.

***Add third-party libraries to source control***

To help eliminate dependencies on local build environments, as well as incompatibilities between JAR versions, third-party JAR libraries should be placed under version control. WebSphere Studio projects can then reference these third-party libraries as external JARs. This can also allow team members to have a common class path, because the JAR files are stored in a single, common location under version control.

**Summary**

Software developers face significant challenges, including increasing software complexity, increasing development environment complexity, mounting pressure on time to market and higher expectations about software quality. Software configuration management can help reduce or eliminate these challenges.

IBM Rational ClearCase and IBM Rational ClearQuest are proven SCM solutions that manage change and complexity. Going well beyond version control, they provide advanced capabilities that enable parallel development, promote reuse, support large distributed teams, reduce build/release cycle times, minimize downtime and reduce risk.

Rational ClearCase and Rational ClearQuest are seamlessly integrated with IBM WebSphere Studio and Eclipse. This deep integration enables a wide array of SCM operations to be performed directly from within the WebSphere Studio and Eclipse environments. By combining two of the most popular Java and J2EE IDEs with industry-leading SCM solutions, IBM delivers everything that developers need to work effectively in a team environment, all without having to leave their IDE. The result can be dramatically increased productivity, improved quality and maximum business value.

**For more information**

Rational ClearCase and Rational ClearQuest plug-ins for WebSphere Studio and Eclipse are available for download at:

**ibm.com**/developerworks/rational/

To learn how IBM Rational ClearCase and IBM Rational ClearQuest can manage change and complexity for you, visit:

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



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Somers, NY 10589  
U.S.A.

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<sup>1</sup> Melissa Webster, "An End-User View of the Collaborative Software Development Market", IDC, December 2003.

<sup>2</sup> "Needs of Commercial Developers serving Medium Businesses", Qualitative Research Conducted for IBM, Doxus, January 2004.

<sup>3</sup> Richard V. Heiman, "Worldwide Software Configuration Management Tools Competitive Analysis, 2003; 2002 Shares and Current Outlook", IDC, June 2003.