

**IBM Rational ClearCase and
IBM Rational ClearQuest**

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Simplifying development through activity-based change management

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By improving your change management capability, software development can become a strategic resource that allows you to respond more quickly to market dynamics and competitive forces.

Introduction

As software applications and the development environments used to build and maintain those applications grow in size and complexity, a process-oriented approach to development becomes essential to optimize team resources and boost team productivity. This approach involves adopting a software development process that is clearly defined, repeatable and consistent, yet adaptable as your development needs evolve. It also involves employing a software development platform that supports agile and iterative development, continuously ensures quality and enables complete application life-cycle management.

The ability to effectively manage and control ongoing change to software development assets is crucial to meeting the needs of ever-changing development environments. As your change management capability improves, software development can become a strategic resource that allows you to respond more quickly to market dynamics and competitive forces.

A proven way to simplify and improve software change management is through *activity-based change management*. Activity-based change management allows you to manage and track individual changes to software assets throughout the application life cycle as higher-level activities, rather than as changes to individual files and directories. Managing activities instead of their related assets within the context of the overall development process provides greater clarity and insight. It streamlines and simplifies the development process, enabling development teams to work together more efficiently.

This paper examines the challenges facing software development teams today as well as the need for process-oriented development. It discusses how activity-based change management connects development activities to the development process to simplify and streamline software development. It will discuss how IBM Rational® ClearCase® and IBM Rational ClearQuest® change management solutions enable activity-based change management to help your business become more productive and more responsive. Finally, we explore how a leader in the automotive tire manufacturing industry is using this solution today and the business value the company derives from it.

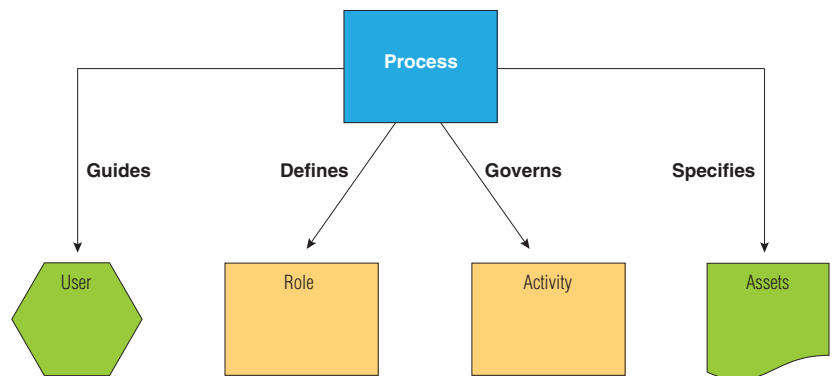
To successfully manage this growing complexity, optimize productivity and deliver high-quality applications, a process-oriented approach to development is needed.

Addressing development challenges today

Time pressures and resource constraints, coupled with a need for effective project management and improved software quality, top the list of development challenges facing today’s businesses. At the same time, software applications and development environments have become increasingly complex, while more and more development teams are now geographically distributed. The ability of extended development teams to collaborate effectively is a significant productivity issue.¹

To successfully manage this growing complexity, optimize productivity and deliver high-quality applications, a process-oriented approach to development is needed. A practical software development process defines the steps required to create software successfully. It guides users, defines their roles, governs development activities and clearly identifies the software assets (such as code, requirements specifications, design models or test plans) involved. Figure 1 illustrates the elements of process-oriented development.

Figure 1: Process-oriented development



A pragmatic and clearly defined development process can help to consistently ensure project success. Process alone, however, is not enough. Software development tools that support, integrate and automate the development process are needed. The ability to effectively manage change and assets across

¹Melissa Webster. “Customer Needs and Strategies: An End-User View of the Collaborative Software Development Market.” IDC. December 2003.

the application life cycle is essential for success. By improving your ability to manage change, you can improve team collaboration and productivity, resulting in faster time-to-market with higher quality software.

Shifting the paradigm

How can you improve your ability to manage and control ongoing change to software development assets? To answer this question, first consider the conventional method of change management.

Activity-based change management offers a more intuitive and effective alternative to tracking software change at the individual file level.

File-based change management can help manage versions of assets as they evolve over time. However, file-based change management does not provide the context—or the reason—for the changes that occur to the assets over the project life cycle. Associating the asset change with the specific activity—such as a defect submission, enhancement request or new requirements—that prompted the change, generally involves a manual process. Manual procedures are by nature time-consuming, inconsistent and error prone, frequently leading to critical changes being left out of a build and resulting in build errors and lost productivity.

With file-based change management, it is often difficult to relate specific files with specific bug fixes or enhancements. Reproducing specific versions of an application or re-creating a defect often becomes a guessing game. The more files involved, the bigger these problems become.

File-based change management also does not easily support componentization and reuse of code and other software assets, because there is no coherent way to organize and manage files as functional, reusable components.

Activity-based change management offers a more intuitive and effective alternative to tracking software change at the individual file level. It also provides a framework that links file changes to the activities that prompted those changes, all within the context of the software development process. Figure 2 illustrates an example of activity-based change management.

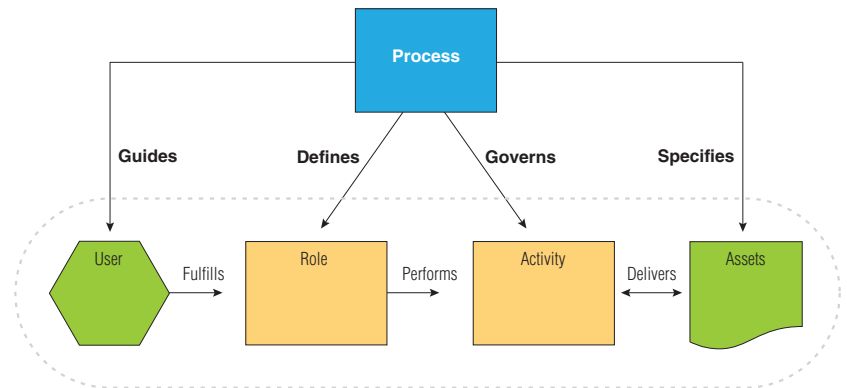


Figure 2: Activity-based change management

By linking individual asset changes to the activities they relate to, you raise the level of abstraction. The resulting holistic view simplifies and accelerates the development process:

- *Developers can ensure they are working on the right versions of the right files.*
- *Build engineers can ascertain that the right files are incorporated into the build.*
- *Testers can easily confirm that the right functionality and builds are tested.*
- *QA engineers can quickly see and validate what has changed between builds.*
- *Project managers can more easily track and assess the project status.*

Activity-based change management does more than track changes at a higher level of abstraction. It also connects change management to the overall software development process through workflow.

Workflow is an approach to managing the flow of processes more effectively within an organization. Within the context of software development, workflow defines specific tasks and procedures and routes the right information to the right people at the right time.

With activity-based change management, all change requests—defect reports, requests for enhancement, new requirements—are viewed as activities, which are coordinated by associated workflows as defined by the process. This process enables development teams to not only work more efficiently at a higher level

The Fast Track

***Step 1: Adopt a clearly-defined
process***

***Step 2: Employ effective change
management tools***

of abstraction, but also manage the process via the workflow that embodies it. The result is that the extended team can communicate and collaborate more effectively while being more aware of the activities of other team members.

The fast track to activity-based change management

The first step toward the utilization of activity-based change management is to adopt a clearly defined and repeatable development process that will help ensure predictability and consistency across projects. This can be done in stages, and refined and extended as needed. The IBM Rational Unified Process® platform provides a flexible software development process that delivers customizable and consistent process guidance to the entire development team.

The second step is to employ effective change management tools that can manage and track changes to software assets as activities, while automating and controlling the development process through workflows. IBM Rational ClearCase and IBM Rational ClearQuest are comprehensive, flexible and scalable change management tools well suited to meet this need. As part of the IBM Rational Team Unifying Platform™ suite, a set of integrated tools that span the full application development life cycle from requirements through testing, these two products are excellent for collaborative team environments and distributed groups.

IBM Rational ClearCase provides a wide range of software asset management capabilities including:

- *Powerful version control*
- *Transparent access to software assets*
- *Flexible workspace management*
- *Parallel development support*
- *Advanced build and release management*

IBM Rational ClearQuest provides flexible defect- and change-tracking capabilities across the development life cycle, such as:

- *Robust, flexible workflow support, including e-mail submission and notification options*
- *Comprehensive support for queries with extensive charting and reporting*
- *Integration with Rational requirements management and test management tools for end-to-end change tracking*

Both Rational ClearCase and Rational ClearQuest provide a Web interface for easy access from standard Web browsers virtually anywhere, any time. They also are integrated with the full spectrum of popular integrated development environments (IDEs), including the Rational Developer product family, Microsoft® Visual Studio®.NET and the open source Eclipse framework. This enables developers to interact with their software configuration management tools in the familiar, convenient context of their preferred development environment.

When used together, Rational ClearCase and Rational ClearQuest help deliver a solid foundation that can substantially simplify and accelerate software development.

While Rational ClearCase and Rational ClearQuest individually provide superior change management capabilities, when used together they help deliver a solid foundation that can substantially simplify and accelerate software development. To further accelerate project start-up and user adoption, the Unified Change Management capability in Rational ClearCase and Rational ClearQuest can enable activity-based change management out-of-the-box.

Promoting software reuse through components

Components are functionally related groups of files that can be reused by multiple applications, like the set of files that implement a printer driver or provide access to a database. By organizing files into these modular building blocks, it becomes easier to manage and track changes to the individual files that comprise these building blocks.

Rational ClearCase can help define and manage software components. By managing change at the component level, Rational change management products provide a strong foundation for code reuse, improved software quality and shorter development cycles. This built-in ability to organize and manage individual files and software assets as components makes it much faster and

simpler to create, re-create and manage software baselines while reducing build and integration problems.

Simplifying development through activities

Activities involve making changes to files and other software assets to accomplish a specific task, such as fixing a software bug or implementing a new requirement. Activities may involve multiple files and multiple components.

Rational ClearCase and Rational ClearQuest can help define and manage changes to software assets as activities by associating specific files with activities. Developers can then perform operations directly on the activities. This process reduces build and integration errors caused by developers forgetting which files they modified when delivering their changes. It also helps to ensure that testing is performed against the same versions being integrated.

By enabling this activity-centric approach, project leaders, developers, testers and customer support personnel can communicate with each other more effectively. Project managers can more easily manage and track the status of proposed changes and can better understand the impact of proposed changes to a project or program.

Managing the development process through workflow

Whether managing components or activities, Rational ClearCase and Rational ClearQuest provide customizable, automated workflow that consistently enforces the development process and helps to ensure the extended development team is tied into that process. From submitting change requests to assigning those requests to resolving and verifying changes, you have full control over how each change is managed and implemented. Figure 3 shows a change request workflow.

For example, when a bug report is submitted, it can be tracked automatically as an activity. The project manager also is notified automatically of the defect submission and assigns the activity to a developer. Developers can quickly locate the bug report for additional information for re-creating the problem, make changes to files or other software assets and then associate those files with the activity. When the new code is ready to be tested, testers are notified.

They can automatically access the exact set of files they need to build the appropriate software version and then validate the defect repair against the bug report. Project management information, such as the status of the activity, the person assigned to it and how much effort is needed to implement the change can be easily tracked and reported.

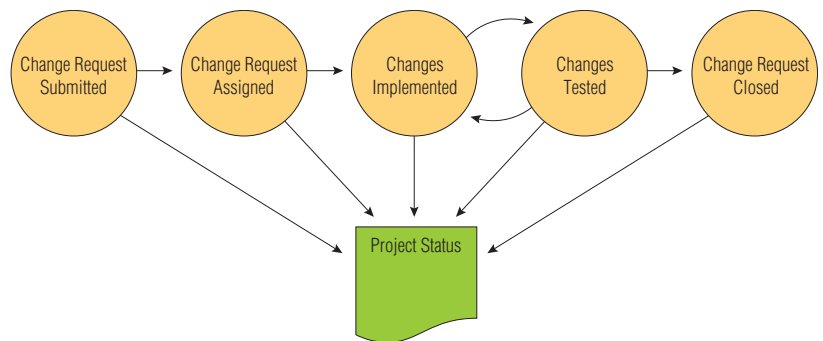


Figure 3: Example of a change request workflow

By managing change through high-level objects such as components and activities, and by managing the change process through workflows, Rational ClearCase and Rational ClearQuest can help in several areas:

- *Streamline code reviews and testing efforts*
- *Reduce build and integration problems*
- *Automate the development process*
- *Promote software reuse*
- *Facilitate reporting*
- *Simplify project management*

Solving real-world development challenges: a manufacturing example

A world leader in tire manufacturing for the automotive industry was facing a serious business challenge. The company needed to update its e-commerce order-entry application to better support the needs of its customers (car dealers and truck fleets). Because of the urgency of this business need, very little time was available to develop and implement 500,000 lines of code.

The key roadblocks to meeting this business need were the software development process and software change-management tools. With its existing processes and tools, the team could not adequately manage and track software changes. They used primarily manual processes involving spreadsheets to manage and track information, which was both time-consuming and error-prone.

In addition, the team relied primarily on a manual version control system. As a result, it was difficult to re-create software configurations to reproduce errors or test defect repairs. Their inability to effectively manage change to software assets led to problems when new configurations were deployed, particularly when multiple files or changes were involved, because these changes could not be tracked as a set.

They chose to implement a reliable, consistent, yet flexible software development process supported by IBM Rational ClearCase and IBM Rational ClearQuest. This solution enabled them to manage and control change to software assets at the activity level. As a result, this manufacturer is realizing the following benefits:

- *The right versions of the right files are incorporated into software configurations.*
- *Software configurations can be easily re-created to reproduce errors and test defect repairs.*
- *Integration steps now happen much more smoothly and quickly.*
- *It is faster and easier to identify and validate changes to software.*
- *Coordination and collaboration is improved with e-mail-based notification workflows that keep the team informed of changes in activity status.*
- *Project status is easily monitored and assessed.*

With activity-based change management enabled by Rational ClearCase and Rational ClearQuest, this manufacturer now has a more efficient and less costly software development environment, which enables the company to meet its aggressive time-to-market goals.

Summary

As software applications and the software development process become increasingly complex and ever more critical to business success, it becomes important to optimize your software development process and put appropriate tools in place to support and automate that process. The ability to efficiently manage and control changes to software assets is central to this goal.

IBM Rational ClearCase and IBM Rational ClearQuest provide fully integrated activity-based change management capabilities. This more holistic approach to change management simplifies key software development tasks, automates manual integration steps and improves both individual and team productivity. The result is higher quality software delivered in less time and at lower cost.

For more information

To learn more about how IBM Rational ClearCase and IBM Rational ClearQuest can help simplify software development and improve productivity, visit:

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

For more information about IBM Rational Unified Process and IBM Rational Team Unifying Platform, visit:

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



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