Successfully managing geographically distributed development

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Introduction

Mergers and acquisitions, increased demands to improve application time-to-market and the constant need to work more efficiently are forcing companies to both streamline and better integrate their software development activities. Gone are the days when software development was performed by small, focused groups of developers working in a single location. Today, companies large and small are turning to distributed development as a way to be more responsive to customers' demands for high-quality software applications that are delivered when they want and need them.

Yet, while companies are lured by the benefits that distributed development has to offer, many lack the right processes and development infrastructure that can help them realize these benefits. They need solutions that:

- *Enable the development of software virtually anytime, thereby meeting their competitive challenges and reducing costs*
- *Are scalable and flexible enough to handle changes to software development projects, including the introduction of different platforms, processes, tools or team members*
- *Help them maximize the resources and leverage the specialized talent they have throughout the organization*
- *Deliver high levels of security and reliability to protect application integrity, reduce the loss of key assets and maintain control of the development process*

**Requirements for successful geographically
distributed development:**

- Enable software development virtually anytime, anywhere

- Provide scalability and flexibility to handle project and organizational changes

- Maximize existing resources and leverage specialized talent

- Deliver high levels of security and reliability

IBM Rational software configuration management (SCM) products help companies address these concerns by providing solutions that help them better manage their entire software development process—no matter where

that development takes place. IBM® Rational® ClearCase MultiSite® and IBM Rational ClearQuest® MultiSite software support geographically distributed development teams by delivering functionality and reliability that enables them to work in parallel and across disparate sites to accelerate software development.

This paper outlines some key challenges that companies face when moving to a distributed development environment. Real-life customer stories will illustrate how companies have used Rational SCM products to overcome these challenges—while at the same time helping them to lower development costs, increase staff productivity, decrease time-to-market and improve the quality of their products.

Instituting a clearly defined development process

Successfully bringing a product to market requires development teams to work in unison. Unfortunately, in many companies, individual development teams working on specific projects use their own sets of methodologies and tools—a decision that can have a huge effect on a company's ability to complete projects in a timely and efficient manner.

This problem is magnified for developers working at multiple sites because they are often unable to communicate and exchange software components or assets easily, which can increase development costs substantially. In addition, developers moving from one team to another must learn a new way of working, often reducing employee productivity and increasing the time required to complete a project.

By employing a clearly defined, repeatable and consistent development process, companies can identify risks and fix defects early, ensure clearer communication by using a common technical language and standardized procedures, create more accurate project planning and cost estimates, and improve productivity. At the same time, companies need a software development platform that supports the management of the development process throughout the entire application development life cycle—from requirements scoping and development to testing and deployment.

IBM Rational Unified Process® and the IBM Software Development Platform provide both the process and tools that companies need to successfully manage application development. Rational SCM products, a key component of the IBM

Software Development Platform, help deliver advanced change management capabilities that enable companies to effectively manage changes that occur during the development process, minimizing the effect of organizational structure or resource allocation.

Developing applications anytime, anywhere
Increased competitive challenges are forcing companies to find better ways to bring their applications to market faster. Distributed development environments can help companies improve their time-to-market by enabling parallel activities and 24×7 software development. Yet, as multiple development teams are employed, the need to effectively share data and to collaborate among teams increases substantially. In a distributed development environment, this problem can be exacerbated since personnel are working in different locations, in different time zones and in different languages.
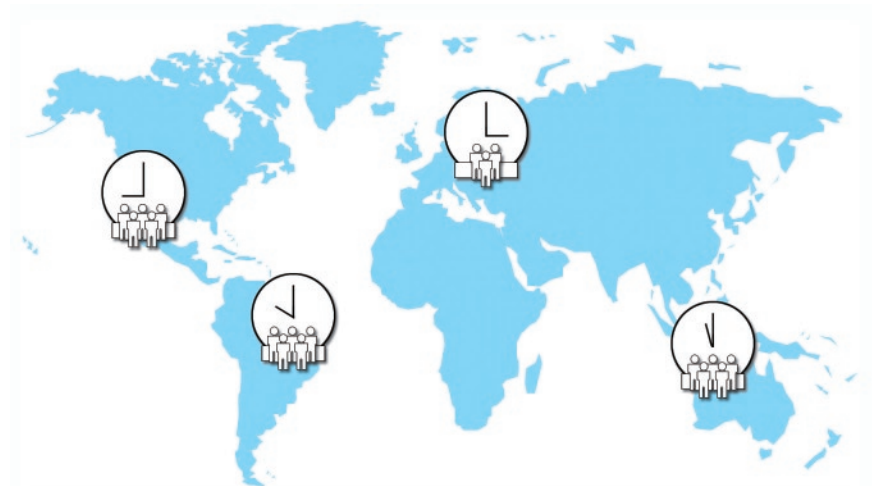

Figure 1: Development team members may be
distributed around the world

Rational ClearCase MultiSite and Rational ClearQuest MultiSite help improve user productivity by enabling team members to leverage development expertise quickly across project portfolios and to share data without disrupting the development process.

Rational ClearCase MultiSite offers a host of features that support the needs of geographically dispersed teams. Rational ClearCase MultiSite helps companies achieve their distributed development goals by leveraging the

capabilities found in IBM Rational ClearCase software asset management software, including version control, build and release management, and parallel development support including automatic branching and merging capabilities that provide an excellent balance between developer isolation and team sharing. Companies can isolate changes in each individual developer's workspace until the development team is ready to prioritize and integrate these changes into new releases. In addition, advanced merging technology allows development teams to identify and resolve change conflicts by clearly highlighting those conflicts to team members.

At the same time, Rational ClearQuest MultiSite extends the power of IBM Rational ClearQuest defect and change tracking software to deliver flexible change control that enables development teams to manage all types of requests, including defect submissions, enhancement requests and documentation changes. Automatic change submissions and e-mail notifications help to ensure that team members are informed of any new change requests or updates to existing change requests. And any changes or updates to the change request templates or change process are automatically replicated, so they are immediately available to team members at each Rational ClearQuest MultiSite client.

In addition, the Rational SCM products deliver Web-based support, which means team members can share software assets and change request information and can access reports from virtually anywhere via a standard Web interface.

Collaborating on projects globally
TTI Telecom International Ltd. delivers integrated and advanced operations support systems (OSS) and business support systems (BSS) to telecom service providers. With approximately 400 software developers located in seven sites around the world, TTI Telecom's continued success depends on the ability to coordinate development activities across multiple locations and time zones.

At one time, the company's distributed development capabilities were sorely lacking. In fact, the company distributed its software to its development sites by using local operating system archive utilities and sending the archives via file transfer processes or express mail. This process created delays in development and increased the time required to complete the work.

Today, TTI Telecom uses a Rational solution featuring Rational ClearCase MultiSite that supports all of its global development efforts. This solution enables the company's developers to better collaborate with each other on projects and has enhanced the quality of its software products by deploying standardized processes, best practices and tools.

TTI Telecom has realized several key benefits:

- *The ability to share code globally helps the company achieve around-the-clock development and results in higher productivity and quicker product time-to-market.*
- *The capability to synchronize distributed repositories every 45 minutes helps to ensure that developers are always working with the latest version of code.*
- *Security of the repository helps to ensure that only authorized personnel can make changes and that it is always clear and auditable exactly who has made those changes.*

Rational products are now key components of TTI Telecom's software development process. According to company officials, the Rational solution has added tremendous value to the company's development process by expediting the availability of software to remote sites, improving communication between team members and accelerating development cycles.

Expanding a solution as your needs grow

A company's application development environment is never stagnant because numerous internal and external factors affect how and where development activities take place. For example, companies involved in an acquisition or merger may inherit multiple development teams that use different tools, processes and platforms. Companies developing applications under tight deadlines may need to add temporary personnel or outsource certain activities. In addition, changes in organizational structure can result in members of one development team moving to another. Therefore, companies need solutions that are flexible and scalable enough to address these workplace changes quickly and cost-effectively.

Rational SCM products help deliver the flexibility and scalability that companies need to support projects of virtually any size across multiple locations and platforms. These products provide developers direct access to assets and changes from within leading integrated development environments (IDEs) such as IBM WebSphere® Studio, Microsoft® Visual Studio® .NET, and

the open source Eclipse framework. This enables developers to perform SCM functions without leaving their preferred work environments, thereby helping to reduce costs and also the need for training or purchasing new equipment.

Rational SCM products support a wide range of operating systems including Linux®, Microsoft Windows® and UNIX® as well as the IBM @server zSeries® systems. They also are integrated with IBM Rational development tools, Microsoft Project and other third-party products to provide full life-cycle change support.

Supporting a changing workplace
Cisco Systems, Inc. is a worldwide leader in networking for the Internet. Over the years, Cisco has grown through acquisitions that have resulted in the company employing thousands of engineers working at more than 30 development sites around the globe. Because Cisco develops such a large number of products and has many development teams located in multiple sites, it was essential that the company deploy a scalable solution that could match its needs as it grew in size and scope.

Cisco uses Rational ClearCase MultiSite, enabling diverse development teams to work collaboratively across the development life cycle. Today, Rational ClearCase MultiSite is used by more than 6,800 engineers located across 31 sites. Cisco also uses the Rational solution for more than 4,000 engineers accessing repositories on more than 60 servers worldwide to develop its largest software product, Cisco IOS, which is used for network infrastructure management. As the product grows and evolves, Cisco can easily segment its application development into more easily managed pieces. This solution enables multiple teams to work in parallel on portions of the 25 million lines of code—all while managing activities from a central location.

Cisco achieves several key benefits from the Rational solution:

- *Synchronization of 10 repositories to more than 60 different servers every 30 minutes enables developers to work locally with updated software 24 hours a day, 7 days a week.*
- *Support for multivendor client interfaces and servers helps to reduce operational costs by eliminating the need to purchase new hardware.*
- *Graphical merge capabilities allow Cisco to migrate replicated code from branches on one site to another site.*

Cisco also has been able to leverage its distributed development capability to quickly transition the development teams of newly acquired companies into the Cisco development infrastructure. This capability helps reduce redundant efforts, increase quality across its products and enable Cisco to quickly leverage new software technologies across its software portfolio and deliver on aggressive time-to-market goals.

Maximizing existing resources and talent

Every member of a development team has a set of skills and knowledge that can benefit other members of the team. However, in a distributed development environment, those resources are spread across large geographic areas, making it difficult for the global team to tap into those skills and knowledge on a regular basis.

Rational SCM products help alleviate this problem by enabling development teams to share data and the knowledge of domain experts, wherever they are located. These products allow companies to tap into these resource pools, shifting particular development tasks to personnel that are best able to handle them.
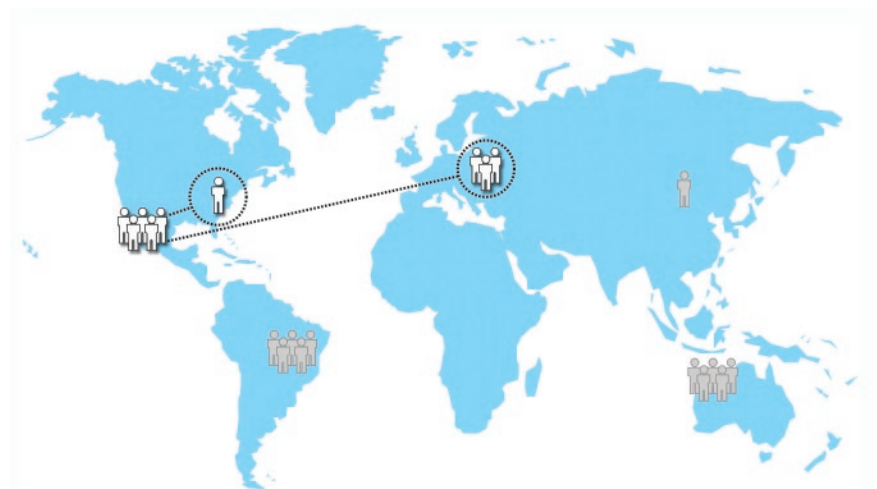

Figure 2: Rational SCM products enable development teams to access resources that are not locally available

At the same time, these products provide private developer workspaces and public integration areas that enable developers to work independently and as team members. The products also deliver automatic coordination of each

developer's assets with those of the rest of the team, giving developers the ability to work simultaneously on multiple releases.

Automatic replication features found in Rational ClearCase MultiSite allow every development site to have fast access to code and other software assets. Developers can work locally on their own servers and yet take advantage of changes made by other developers, whether they are in the next office or halfway around the world.

Utilizing pockets of development expertise
MetaSolv Software, a global leader in service fulfillment software solutions for communications service providers, currently has 250 software developers located in four sites around the world. For MetaSolv Software, moving to a distributed development environment was due in part to the company's desire to better leverage the pockets of development expertise throughout the company.

Using Rational ClearCase MultiSite and Rational ClearQuest MultiSite, MetaSolv Software has deployed a common software development process that crosses geographic borders and enables new development team members to get up to speed quickly on their projects. The company also can easily shift resources from one project to another as business needs evolve. For example, it can take advantage of specialized talent, such as architectural experts, anytime, anywhere across multiple projects without confusion or overhead.

Key features of the Rational solution have helped MetaSolv Software meets its goals:

- *Out-of-the-box functionality enabled the company to quickly and easily implement the solution around the world.*
- *Branching and automatic merging features allow team members to isolate changes to code and integrate those changes into the most current version as appropriate.*
- *Integrated, automatic reporting capabilities provide comprehensive real-time metrics for management to use in analyzing and tracking the status of each project and making business decisions.*
- *A Web-based interface enables team members to gain access to queries, change requests and reports—resulting in an automated process that is dramatically faster than the previous manual process.*

MetaSolv Software has gained greater cost-effectiveness and productivity by deploying a common process for its software development. According to company management, Rational products have also enabled their software development teams to spend less time fixing defects and more time enhancing products, resulting in higher quality products and increased customer satisfaction.

Ensuring data integrity and security

Successful companies know that the quality of a final product depends on their ability to maintain the integrity and security of their strategic software assets. Companies using a distributed development environment have discovered that to deliver higher quality software, they must be willing to deploy standard processes, best practices and tools that place data integrity and security at the top of their "must have" list.

Rational SCM products are designed to deliver high levels of development uptime in a world where security and reliability are gaining importance. For example, if the link between two or more sites goes down, development teams at each site can continue working on their local copies as if nothing has happened. Then once the links are available, the product automatically resends information and recovers repositories in the event of a network or system failure. A convenient and automatic backup and restore capability also helps maintain business continuity in case of a disaster.

Rational SCM products help companies avoid the loss of key assets and utilize rules that enforce access controls. Rational SCM products feature a controlled repository for storing all assets of the development life cycle including requirements, source code, libraries, compilers, visual models, design notes, documentation, binaries, Web artifacts, test suites and databases. Only authorized personnel can access the repository, which prevents changes by unauthorized users.

Summary

As competitive pressures mount, new demands are placed on companies to develop quality applications quickly and efficiently. To meet these demands, many companies are deploying distributed development environments that facilitate a 24×7 development cycle. Yet, as development teams become more geographically dispersed, concerns may arise around how to deploy a consistent development process and effectively manage and control that development process in a way that ensures that new applications meet the highest quality standards.

Rational SCM products address these concerns by helping to deliver the advanced features and functionality that are needed to support global, enterprise-level parallel development efforts. These SCM products enable development teams around the world to capture, control and more securely manage software changes and assets.

By using Rational ClearCase MultiSite and Rational ClearQuest MultiSite, companies can lower development costs, improve staff productivity, accelerate project delivery times and enhance the quality of their finished products.

For more information

To learn more about how IBM Rational ClearCase MultiSite and IBM Rational ClearQuest MultiSite can help successfully manage geographically distributed development, visit:

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

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