IBM looks internally to improve development operations with IBM Rational software

Overview

- **The Challenge**

  IBM® -- one of the world's largest and most demanding software development companies with measured revenues of $46 billion in IT services, $31 billion in hardware, $15 billion in software and an overall 2004 revenue stream of $96 billion wanted to unify its business operations and development organizations through a shared process, toolset and vocabulary.

- **The Solution**

  IBM began implementing elements of the IBM Rational® Software Development Platform, targeting their most acute challenges first.

- **The Benefit**

  The IBM Rational Software Development Platform have helped improve IBM's operational efficiencies and productivity, ability to drive business priorities, and mitigate risk across geographically distributed development projects through a collaborative team-based development environment.

Most of IBM's development teams are large, highly distributed and security conscious, and many were looking for ways to improve team communication, productivity and the quality of delivered products. As a result of these goals, IBM found itself facing the same software development challenges as many of their customers. As do its customers, IBM develops in a range of technologies such as C, C++, Java® in the Eclipse framework, and Microsoft® Visual Basic .NET in the Microsoft Visual Studio .NET environment. As IBM development teams continued to grow larger and more geographically distributed, software development became more demanding and complex. As an IT leader, IBM software development teams required a need for better communication through common vocabulary, toolsets, as well as more standardized processes to allow developers to easily pick up their part in the life cycle where the last person left off.

IBM identified many needs that could be immediately addressed by Rational's tools. When the company acquired Rational Software in 2003,

IBM Software Group launched a new internal deployment team and pulled together a migration plan to allow development teams worldwide to use Rational tools. Today, project teams across the major IBM brands use Rational tools to manage their software development process, and the numbers of IBM development teams using Rational have more than doubled from 2003 to 2004. Highlighted below are a few examples of teams within IBM successfully using Rational.

DB2 Universal Database Team: Developing across geographies

The IBM DB2® Universal Database™ (DB2 UDB) team continually works on the next generation to simplify and automate database management. However, with each new complex release the pain of having more than 500 geographically dispersed developers working on one release of code grew sharper. With developers integrating into one mainline stability issues arised -- frequently forcing the team to lock down the mainline to reestablish a more stable level of code, impacting developers' productivity and potentially delaying testers.

The DB2 UDB team has more than 500 developers at eight laboratories worldwide running on IBM Rational ClearCase® and IBM Rational ClearQuest® for a complete software configuration management solution. With Rational ClearCase, they moved to parallel development using project branches while successfully defining criteria for promoting code to the mainline. The flexible control provided in ClearCase combined with Rational ClearQuest's power to provide better insight and predictability of the development process gave the UDB team the ability to stabilize the process. In addition, IBM Rational ClearCase MultiSite enables distributed team members around the world to develop applications in parallel through automatic replication and synchronization of software assets and configurations.

"There's an awful lot of power hidden away in these tools. These developers can now work on demand with software they're building and easily go back through version history to note changes that have been made. Using Rational ClearCase makes it much easier to locate older code," explains Dr. Toby Haynes, a software developer for DB2 UDB. "We have immediate access to all files all of the time, throughout the version history. Ownership of files is easy to find, and developers can quickly implement changes needed to keep projects on track." When a defect is discovered,

developers can find all variants of the code, reproduce older versions that are in production and fix all the applications that have that defect. The team now collaborates in a parallel environment to provide higher quality code and deliver more innovative solutions in database management.

IBM Systems and Technology Group: Common tool set yields consistency

IBM Systems and Technology Group (STG), a team that develops server and storage solutions to meet business requirements and strategic on demand initiatives -- initially rolled out Rational ClearCase, Rational ClearQuest, IBM Rational RequisitePro®, Rational TestManager, Rational ProjectConsole™, and the Rational Unified Process®. "We're getting a lot of power out of using the Rational toolset," says Wayne Carrigan, who works in STG's Application Development Solutions. Soon after implementing Rational tools, STG began reaping the benefits of bringing formerly disconnected development activities into a unified whole with a common toolset, vocabulary and workflow that are shared by all members of the extended software development team.

To begin streamlining processes and toolsets, the team needed a change management solution that could support coordinated software development at multiple locations

worldwide, so they agreed to converge on a dictated common Rational ClearQuest configuration to begin addressing the problems. They achieved success through flexible workflow management of change requests, including defect submissions and enhancement requests. Initially, 300 developers worldwide successfully used Rational ClearQuest to automate and enforce development processes, manage issues in the development process and facilitate communication among all stakeholders across STG. Rational ClearQuest gave the team better insight, predictability and control over its system development process, while quickly providing executives project status and problem-tracking statistics.

As STG rolls out more components of the Rational Software Development Platform to their team, developers will be able to seamlessly work on multiple products efficiently, because everything will be on a standard toolset. They will no longer have to learn multiple products to manage change across the development process, and will be able to easily move between projects. As the teams begin to fully utilize the Rational toolset across its 5,000 globally distributed developers, effectiveness of this large talent pool will increase exponentially. IBM Rational tools will provide a full life cycle solution for STG's analysts, developers and testers, unifying their

cross-functional teams as they support their large system development projects from requirements to release.

Software Group Componentization Team: Rational tools enable software asset reuse for faster time to market

A key part of IBM's software strategy is to build component-based software modules that can be quickly assembled into a myriad of marketplace offerings. "Such an approach brings development efficiencies and promises higher quality initial offerings," says Patrick Gibney, Director, IBM Software Group Componentization. "It also helps achieve quicker time to market . . . and is a fundamental underpinning of our strategy." Specifically, software componentization is the movement of IBM software development from a monolithic, product-oriented development model to one based on the concept of software offerings composed from the sharing of reusable software components.

"This team had a big goal -- to document and model a very large architecture. The ability to have the documentation as part of the model itself was crucial," says Mike Gering, a senior software engineer with SWG Componentization. "We couldn't have kept it all in synch using two different tools to model and document." As part of its tools for success in transforming Software Group to a component-based development model, the SWG

Componentization team uses IBM Rational XDE™ with Java and IBM Rational SoDA®. "Based on what we needed to do, there was no way we could have done it without Rational XDE and Rational SoDa," says Gering.

Having team members located across the United States added to the challenge. But Rational XDE enabled them to conduct online meetings and collaborate in a workgroup environment, so they could quickly generate ideas into their model format. The team also used a common tool and UML framework, making communication consistent across all locations.

As they efficiently made changes to the architectural document, team members used Rational SoDA's integration with Rational XDE to generate documents about their efforts, resulting in a document in excess of 200 pages. This document is now being used to move IBM toward its Software Group goal of becoming a component-based development model.

Tivoli Performance Team: Bringing higher quality to customers with Rational

Keeping Tivoli® products running smoothly -- that's the job of the Tivoli Performance team, which, with the help of Rational Functional Tester -- ensures against problems such as poor response time, excessive CPU usage and throughput bottlenecks.

One example of the successful use of this tool is with a flagship Tivoli product, Tivoli Business System Manager (TBSM). The Tivoli team is using Rational Functional Tester to optimize the features in TBSM and assure that features that are most important to customers have the best possible performance.

TBSM has a GUI interface and a Java and Web console. Before Rational Functional Tester, the team relied on manual testing techniques. With this process, the large memory footprint for each virtual tester, combined with the number of machines used to drive the test, made startup awkward and time-consuming. In manual test scenarios, up to 15 people worked together to exercise the consoles under test. That consumed precious resources, and both repeatable test execution and results were impossible to achieve consistently.

Now the team uses Rational Functional Tester, and one person with one workstation is able to run test cases using up to100 machines. That same person also can monitor metrics such as response time, CPU utilization and memory usage. "The nice thing is that unlike people, Rational Functional Tester never gets tired, says Carol Ames, a Performance Analyst for TBSM. "You can run it the whole weekend, overnight and even on holidays and get repeatable results. This has been wonderful for performance testing."

Rational Functional Tester provides even novice testers with automated capabilities, making training of new team members quick and easy. It has even proven highly adaptable to working with the complex GUI Java and Web console interfaces, which can be a struggle with other automated testing solutions.

Developers working with the performance team are impressed with the accuracy of Rational Functional Tester, and the benefits from the repeatability in test results have been profound. Performance analysts also pass on much more information to the developers than ever before, enabling them to fix problems rather than ship them. With Rational Functional Tester, the Tivoli Performance team has improved product reliability through the reduction of performance-related defects and has optimized the performance of key features in the product. They also improved statistical significance and repeatability results.

"We're able to get a much more accurate picture of what's going to happen in a customer environment," explains Ames. In one case, performance analyst Xuemei Wu developed a set of scripts that simulated a very complex customer environment. This allowed the Tivoli Performance team to interface with the account team and give them concrete information to help convince the customer to make necessary

changes in their configuration. "Using Rational Functional Tester allowed me to easily simulate the activities of several different users, and mix and match those activities to both simulate the customer environment as well as explore "what if" scenarios that might occur in the customer environment." says Wu.

The Tivoli Performance team is successfully using Rational Functional Tester to bring a higher quality product to its customers. Although Rational Functional Tester is designed primarily as a functional testing tool, the Tivoli team has demonstrated its extensibility. The advanced automated testing tool helped recover valuable human resources to focus more on the important analysis and advanced testing that needed to be done, rather than spending hours manually plodding through test cases. Their repeatability and accuracy has dramatically improved, which has effectively led them to a more successful product delivery.

IBM and Rational tools:
A strategic success
As demonstrated, the implementation of Rational tools have benefited IBM development teams in a variety of ways:

- *Improve operational efficiency* by automating and integrating software development and effectively managing software components which reduces costs and enables

software reuse, while delivering higher quality applications faster

- *Drive business priorities* and mitigate risk with new and existing software investments across geographically distributed development projects through a collaborative team-based development environment

- *Improve productivity* by reducing chaos and risk so development teams can focus on building high-quality, innovative technology, faster and more cost consciously

- *Build better software* and software dependent systems by providing proven best practices and automated tools and infrastructure

Success stories like those above continue to come in for IBM and IBM's customers, and as IBM continues to reap the benefits each day from incorporating Rational tools into its on demand world, IBM will continue to maintain its position as the largest IT services provider.

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