

IBM Information Management group achieves on-time delivery while improving quality, productivity and responsiveness.

Overview

■ **Challenge**

An industry leader, the IBM DB2 9 for Linux, UNIX and Windows team sets an aggressive technology delivery schedule. Along with that, the team requires high quality standards, and it leverages collaborative development across multiple sites for its latest DB2 9 release.

■ **Solution**

A high-performance development environment solution comprising IBM Rational ClearCase software for configuration management and IBM Rational ClearQuest software for change management, deployed worldwide as a standardized platform for cross-site development.

■ **Key Benefits**

After adopting IBM Rational ClearCase and IBM Rational ClearQuest software, the DB2 team delivered its next major project release on schedule and exceeded quality targets. While doing so, team members were able to collaborate effectively across multiple laboratories while developing and integrating new features in parallel.

Developed during an extensive, multiyear project, the IBM DB2® 9 solution for Linux®, UNIX® and Microsoft® Windows® platforms is a next-generation hybrid data server with optimized management of both XML and relational data. Led by the IBM Information Management group, the project included not only industry-leading features but also adoption of industry-leading configuration management and development tools.

For 1,000 developers and testers spanning 12 development laboratories in 8 countries, the delivery represented an enormous accomplishment. A key contributor to that success was the team's development strategy, enabled by a newly deployed IBM Rational® solution. Efficient collaboration and a parallel development environment were key contributors to meeting the DB2 9 release date. Experience with traditional source code management techniques had shown those tools to be inadequate when developers across multiple sites were contributing code. Code that was checked out could not be easily shared before it was fully developed or integrated. That would have had an adverse effect on productivity. The team needed the ability to work across multiple

geographic locations in different time zones, leveraging diverse skills and collaborating effectively. Information Management team members wanted a way to work on individual product features in parallel without unnecessary integrations, while ensuring the quality of the code through each step.

"In analyzing the DB2 9 for Linux, UNIX and Windows development environment, our collective experience showed that the opportunity was there to complete the development cycle significantly faster than what one could expect using traditional techniques, and that the code quality would be very high as well. We saw an opportunity for us to have an immediate positive revenue impact to the business by injecting IBM Rational technology to facilitate aggressive development schedules in conjunction with the team's practice of continuous improvement to their development process," says Bob Newman, IBM Software Group senior consultant and a part of the Rational deployment team for the project. "Our goals were simple: we wanted to help release the highest-quality product possible, and we wanted the releases to meet the Information Management group's aggressive schedules."

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Focus on integration

A well-known schedule risk in a traditional development cycle is code integration. During integration, the team must combine individual work, stabilize the code base and progress through the testing phase. To take that risk out of the schedule, the team required more efficient source code management than was possible with the legacy IBM Configuration Management and Version Control (CMVC) system.

Gary Proctor, senior integration manager for the IBM Information Management group, explains, “CMVC supports a traditional approach. Developers tend to check code out and keep it out for a long time. They typically develop their entire feature before checking the code back in to the code stream. It does not facilitate a collaborative approach. During the last couple of months before code freeze, there is an entire process focused on bringing major features in and getting the code ready to go through quality assurance (QA). It can take a long time to stabilize the code because nobody has seen what the other teams are changing prior to integration.”

New strategies avoid traditional bottlenecks

The team began looking for a solid, proven solution that would circumvent the risks associated with such an integration effort, and enable more effective parallel development. Team members wanted a software configuration management system that would simplify development by enabling individuals and groups to work independently on different code branches; collaborate effectively on demand; and merge branches incrementally as the project progressed.

Based on industry-leading best practices and feedback from other development teams, the DB2 team decided to standardize on IBM Rational ClearCase® software for configuration management, along with IBM Rational ClearQuest® software for change management. “ClearCase offered best-of-breed software configuration management capability, and it was clear that we would realize additional benefits from the workflow and change management capabilities of ClearQuest,” says Proctor.

Rational ClearCase pilot deployment teaches valuable lessons

At the start of the deployment effort for the IBM Rational solution, the team received training and architectural planning support from IBM Rational consultants—in this case, consultants who are part of the IBM internal deployment team. The mentoring and training provided by these consultants helped ensure that the DB2 team would get a strong start with deployment of the new solution, and avoid many of the pitfalls that can be encountered in a tool and process change of this magnitude.

“In addition to the mentoring from the consultants, another one of the success factors for our adoption of IBM Rational ClearCase was starting with a small team to pilot the deployment. Starting there, we gained a firm understanding of the products. We then grew outward, with the pilot team championing and promoting the benefits from firsthand experience,” says Proctor.

A new approach

Moving from a single CMVC code line view in previous releases to a branching strategy supported by the IBM Rational tooling facilitated a new project-wide feature development and integration strategy. Separate development branches were defined based on new feature teams and components, along with QA criteria to be met prior to integration into the main project code line. Teams could collaborate within their workgroups, and through rebasing, merge in changes from other teams’ contributions to stay current across the entire project. When ready to integrate, regression and system stability tests helped ensure that new features did not destabilize the main code line.

“In this scenario, we have several different teams working in the same code line. When somebody checks in code that is going to affect somebody else, the affected developer sees that the next day. He or she can go back to the person who checked the code in and resolve the problem immediately. More eyes and greater visibility mean our code was being reviewed more as it was changed,” says Proctor.

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Compliance with common criteria

Developers must comply with Common Criteria (ISO/IEC 15408) guidelines as part of meeting international standards for computer security. This requires the team to control access to source code and maintain an auditable record of who made what changes, when those changes were made and who approved them.

“To achieve Common Criteria certification, during audits we have to prove that someone other than the person checking in code approved that check-in. We implemented a workflow in ClearQuest to control our check-ins in ClearCase. Before code changes can be made, there must be an entry in ClearQuest. It then goes through an approval process that will either OK or reject the change. Now, it’s easy to show auditors that code changes are tracked, that other people have visibility into changes, and that there is an approval process in place. ClearCase and ClearQuest provided the team with a reliable capability for passing Common Criteria certifications,” says Proctor.

Cross-site and multiplatform support

Leveraging the diverse perspectives and talents of developers across laboratories worldwide, the DB2 9 team is intently focused on helping to ensure reliable access to code changes, defect reports and enhancement requests, regardless of location. This is accomplished with IBM Rational ClearCase MultiSite software, which is designed to automatically replicate and synchronize Rational ClearCase repositories across multiple locations. Team members also use the IBM Rational ClearQuest Web interface to access software change management from anywhere they may be working. “A big part of delivering a quality product on schedule is being able to take advantage of the division of labor across multiple laboratories. With IBM Rational ClearCase, IBM Rational ClearCase MultiSite and IBM Rational ClearQuest, we can build products with contributors from all over the world, and do it successfully,” comments Newman.

At a technical level, it is efficient parallel development from any location that enables on-time delivery of software products. “With a big development effort like DB2 9, we have teams optimizing for different operating system platforms, and teams working on different features and functionality from anywhere in the world. At times, they are all touching the same code at different places. IBM Rational ClearCase made it possible for them to work on the same code line at the same time and to see what other people were doing around them. That visibility made the coordination of our development much easier, and it really increased productivity,” says Proctor. “Being able to access ClearCase directly from the Eclipse development environment also increased productivity.”

Optimizing for target operating systems and hardware architectures is an essential part of the development process. “On the DB2 product, we develop on 16 different platforms,” says Proctor. “We can access IBM Rational ClearCase and IBM Rational ClearQuest capabilities from all of them.”

Streamlining refactoring and building

Performing nightly builds across all supported platforms lets the team identify issues earlier, optimize for each platform and accelerate the pace of development. In one example of the attention to builds, the DB2 9 team identified that refactoring the legacy header file structure would make a significant improvement in build times. Attempting to make those infrastructure changes in parallel with new feature developments would typically be a significant challenge, but that was not the case, thanks to the IBM Rational solution.

Proctor explains, “IBM Rational ClearCase made what could be a daunting task easy. We simply created a new branch and started to make the changes. When we were ready to bring a component in with that new header file structure, we just merged it back in. We did all the work in parallel, without shutting down production in any way. We dramatically improved our build time, cutting it in half through efficient organization of the header files. With IBM Rational ClearCase, we do a build every night, and we do it for all platforms.”

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“If you are interested in a particular defect, component or area, you can subscribe to it and the [Rational ClearQuest] system will notify you immediately when a change is made. You do not have to worry about a developer forgetting to send you an e-mail. For a globally distributed team, that is an important capability.”

*—Gary Proctor, senior integration manager,
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Automating the development workflow

In addition to helping DB2 team members track and monitor defect reports, IBM Rational ClearQuest enabled them to automate and enforce a development workflow. That ultimately made it easier to plan work and stay up to date with important development milestones. Proctor explains, “We use IBM Rational ClearQuest extensively to automate our workflow. We have multiple states that a defect progresses through on the path to resolution. The key benefit of monitoring, tracking and controlling changes in this way is visibility. Teams can see tasks coming two and three queues ahead of them, and that helps them plan for a busy week, for example.”

The team also relied on automatic e-mail rules in IBM Rational ClearQuest to notify developers and project managers of important state changes. For example, if a developer in India makes a change to a file, an e-mail rule can notify a colleague in the United States to examine the change and integrate supporting features. “It is an almost instantaneous notification. If you are interested in a particular defect, component or area, you can subscribe to it and the system will notify you immediately when a change is made. You do not have to worry about a developer forgetting to send you an e-mail. For a globally distributed team, that is an important capability,” comments Proctor.

The team uses IBM Rational ClearCase to manage more than just source code. Team members also manage documentation with it. Translated message files and test-ware assets are managed with it too. Likewise, IBM Rational ClearQuest is used to automate workflows outside of the typical source code software development environment.

Fewer administrative resources required

With the legacy tooling, development teams relied heavily on an infrastructure support team to build and maintain tools in support of development activities. IBM Rational ClearCase and IBM Rational ClearQuest changed that reliance. Proctor explains, “To support the development team through the latest DB2 release, the legacy tools solution would have required 20 builders and toolsmiths with their primary responsibility being infrastructure development tools. In contrast, we can manage the IBM Rational ClearCase and IBM Rational ClearQuest solution with only about 8 people for our development team of 1,000. We are able to apply more resources to other areas, focusing on developer productivity instead of

committing them to source control or version tracking.”

Tangible and intangible benefits

The DB2 9 team has achieved significant time savings and quality milestones since deploying the IBM Rational ClearCase and IBM Rational ClearQuest solutions. “When you have a team of 1,000 developers, improving efficiency delivers business value to the organization. In terms of productivity, it enables a flexible and responsive team. With the help of IBM Rational ClearCase and IBM Rational ClearQuest, schedule efficiency is maximized, the code quality is the highest possible, and we made it possible for the development teams to commit more energy to new development and less to integration efforts. When you add it all up, the savings are staggering,” says Newman.

And Proctor agrees, “When we had our team meeting to determine that DB2 9 was ready to move into beta testing a month early, the QA director said the code was in the best condition they had ever seen, as measured by test pass rates, for that point in development.”

In addition to these measurable gains, there were intangible improvements too. Proctor concludes, “It is clear that our migration to IBM Rational ClearCase and IBM Rational ClearQuest is more than an improvement in efficiency. It really represents a transformation with compelling results. We have shortened development cycles, improved integrated code quality, improved software service efficiency and facilitated distributed development across multiple laboratories worldwide in a parallel development model. This has resulted in substantial gains in agility and client responsiveness.”

For more information

To learn more about the IBM Rational ClearCase and IBM Rational ClearQuest solutions, contact your IBM representative, or visit:

ibm.com/software/rational

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