



Rational software

Leveraging Linux to reduce software development costs.

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Introduction

Organizations are leveraging Linux® technology today to lower their IT infrastructure costs and streamline their business operations. Part of this move to Linux is because companies are realizing the value that automating and integrating the software development environment provides. This white paper discusses how the IBM Software Development Platform, powered by Rational® software from IBM, can help your organization create business value by improving its software development capability.

Why Linux for software development?

The Linux® operating system is a UNIX® system-like operating system developed within the open source community. This community develops, debugs, maintains and enhances Linux. The source created is generally high quality and high performing. Linux offers superior security, reliability and overall uptime – on par with many other UNIX operating systems.

As Linux has become more popular, and its stability and scalability are proven, organizations have turned to this technology to address the increasingly expensive costs of maintaining multiple proprietary operating systems across multiple hardware platforms. Expense that includes the operating system price, operating system maintenance costs, hardware costs, hardware upgrade costs and administration costs. Linux was developed to reduce the total cost of ownership (TCO) by providing capabilities for high-quality services and security at a much lower cost.

Linux and IBM Rational software: A foundation for building business value

Today you can run Linux on platforms ranging from mainframes to pervasive computing devices. And organizations are also creating more Linux technology-based applications. The resulting value to the enterprise is multiplied as you use Linux to run on – meaning deploy your application on Linux technology-based systems, as well as build on – that is, where you can efficiently develop applications based on Linux technology.

Now many organizations face the challenge of having a combination of operating systems, server platforms and mainframe technology. How can you realize the benefits of Linux in your software development environment when you have such a diverse set of applications and platforms to support?

The IBM Software Development Platform

To answer this challenge, you need a consistent software development life-cycle solution that enables you to leverage Linux without disrupting your development teams.

For business and technology leaders recognizing the importance of software development in creating business value, IBM offers a proven foundation: the IBM Software Development Platform. This complete and configurable solution automates software development by integrating disconnected development activities into a unified whole. Its common tool set, vocabulary and workflow are shared by all software development team members (see Figure 1).

The IBM Software Development Platform capabilities span Microsoft® Windows®, UNIX, Linux and mainframe platforms. And it supports a wide spectrum of programming languages, integrated development environments (IDEs), and more than 100 cross-development environments for real-time and embedded-system developers. Combining core products with dozens of complementary and technology-specific extensions, the IBM Software Development Platform allows you to choose the optimal solution for your team and technology environment.

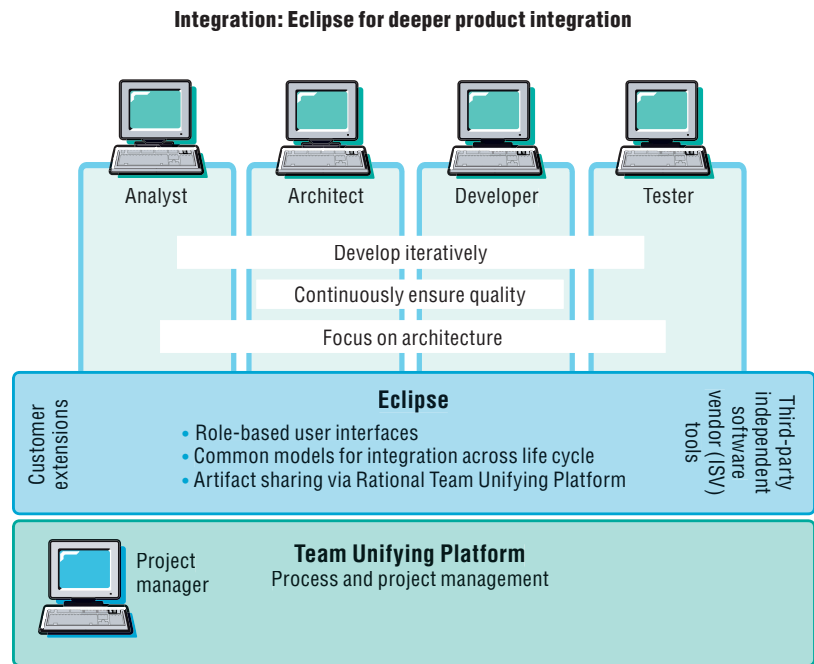


Figure 1. Eclipse enables a vibrant tools and services ecosystem.

Rational tools for developing on Linux and developing for Linux

Rational software offers a comprehensive solution that lets you leverage Linux to build, integrate, expand, modernize and deploy software. With broad support for all roles and activities in the software life cycle, the IBM Software Development Platform, Rational and IBM WebSphere® products support development on, as well as development for Linux (see Figure 2.)

Linux support from Rational is currently focused in two areas: facilitating the development of Linux applications through comprehensive IDE support; and reducing the TCO for software development infrastructure by providing Linux technology-based platform support for managing software assets.

The IBM Rational product line includes:

- *Requirements and analysis tools.* This product category includes requirements-management tools, business-modeling tools and data-modeling tools.
- *Design and construction tools.* This tool group includes the award-winning IBM WebSphere Studio IDE supporting Linux development. Additional tools include design modeling, component testing and run-time analysis.
- *Software quality tools.* Testing tools enable the running of quality assurance on software products, and testing for code consistency, quality, functionality and performance.
- *Software configuration management (SCM) tools.* These products include change and version control, asset management and defect tracking. Rational SCM Linux support enables developers to work in their preferred IDEs (whether .NET, Java™ 2 Platform, Enterprise Edition [J2EE] or a combination of IDEs) while reducing server-side costs.
- *Process and project management.* Life-cycle management is used to manage the development process, organize requirements and measure development progress.

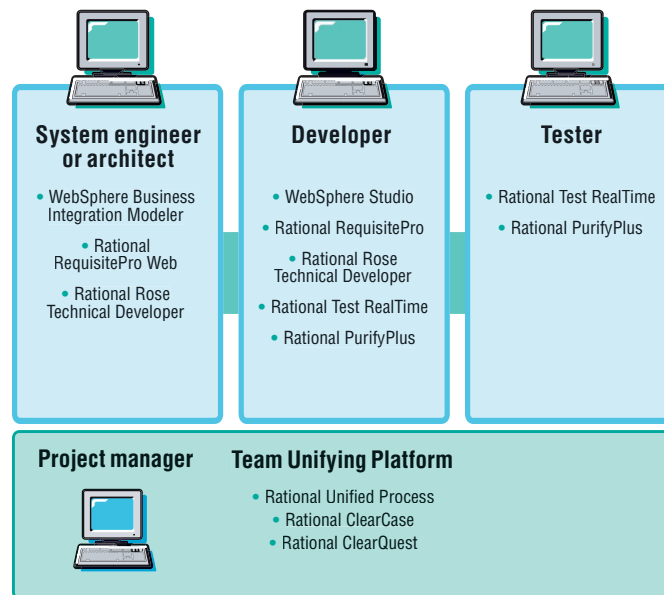


Figure 2. Rational tools allow you to develop on Linux and develop for Linux.



**Credence Systems Corporation:
Changing the future of semiconductor production**

A world leader in the manufacture of automatic test equipment, Credence Systems Corporation addresses a broad spectrum of the semiconductor industry's testing needs by offering a range of systems for the design, validation and test of analog, digital, memory, mixed-signal and wireless semiconductor devices.

Credence uses Rational tools, including Rational ClearCase, Rational ClearQuest and IBM Rational Rose® to support efficient development processes. To supplement IBM Rational Suite® and allow concurrent development among geographically dispersed locations, Credence adopted IBM Rational ClearCase MultiSite® and IBM Rational ClearQuest MultiSite.

The Rational ClearCase MultiSite software replicates and synchronizes the formerly disparate databases, managing distributed assets consistently and securely. Coordination allows users at all sites to view and contribute to a central repository of code. The development environment encompasses Red Hat Linux, Microsoft Windows and Java tools.

With Rational ClearCase MultiSite and Rational ClearQuest MultiSite, Credence has established a control source for project information and a central repository for code, enabling developers to work more collaboratively and productively. The company expects that this transformation will help reduce its TCO as it reduces development, maintenance and support costs and enables Credence to pare down the size of its staff.

Rational for the team: Linux support from desktop to server to mainframe

Rational and Linux provide significant value by lowering expenses and providing more flexibility in the way you choose to manage change and assets in the development process. Rational has broad Linux platform support for SCM solutions from the desktop, to the server, to the mainframe – all with full unified change-management (UCM) support.

You can leverage Linux and the Rational enterprise change-management solution to comprehensively support your workgroups, your projects or your enterprise on servers or mainframes. IBM Rational ClearCase® and IBM Rational ClearQuest® enable engineers to check in and check out team assets, see what activities have been assigned to them and effectively collaborate with the team.

Software configuration management

SCM is key to ensuring that individuals and development teams work productively (see Figure 3.) Software configuration management includes version control, change tracking, workflow support for managing change and full asset management.

Rational SCM capabilities are provided by the Rational ClearCase product family, including Rational ClearCase for software asset management and Rational ClearQuest for defect and change tracking. Rational ClearCase products support teams of any size – from small, collocated teams, to globally distributed teams working in parallel – and are available on Linux, running on diverse platforms from PCs to mainframe computers.

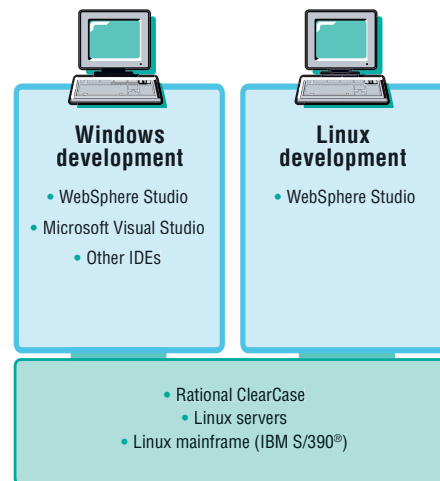


Figure 3. Rational software configuration management helps individuals and development teams work productively.

Change management tools that aren't part of the development team's day-to-day operations are of little practical benefit. That's why IBM Rational SCM products provide virtually seamless integration from within in the development environments your practitioners use every day – including IBM WebSphere Studio, Eclipse and Microsoft Visual Studio .NET.

A key advantage of using Rational on Linux is that it reduces development infrastructure costs, while preserving developer flexibility. Rational SCM products support the diverse platforms, teams and development infrastructures found in most organizations today. To reduce costs, you can easily manage your development assets on Linux, while your development teams continue to use the IDE they prefer. Rational SCM functions can be accessed from within the preferred IDE where developers continue to enjoy transparent access to key project assets and tasks, while actual assets reside on Linux.

As you use Linux to manage your development assets, you also have the flexibility to distribute assets across a range of platforms to take advantage, for example, of available storage capacity. So whether you run Rational SCM products on a mainframe or a server, your development teams continue to have a consistent user experience from whatever IDE they are using.

The IBM Rational approach to managing change unifies both assets and activities – enabling teams to abstract change to get a quick view of how a given change impacts related assets. Teams can quickly see the who-what-when-and-why of a given enhancement or bug fix from a given baseline, to a subsystem, to a component and up to the full applications. The ability to manage assets at a higher level provides greater insight into the stability and structure of your software architecture.

To enable teams to realize the value of activity-based change management, Rational ClearCase products provide an out-of-the-box SCM model using UCM. This capability enables teams to quickly define and deploy best practices in configuration and change management based on years of actual experience harvested from hundreds of projects, both large and small. UCM models describe how the team interacts with the software configuration management system, such as the team's policy on when and how a developer can check in changes. The result is your team can quickly ramp SCM processes and focus on development work instead of development infrastructure.

Steering the course with proven practices

Combine the cost-effectiveness of Linux with the tools that allow you to adapt quickly to changing business needs, and you can realize significant reductions in your organization's TCO.

When Vienna-based Bank Austria Creditanstalt (BA-CA) Leasing was ready to automate its vehicle leasing, it chose tools based on IBM technology.

BA-CA Leasing created a highly responsive technology platform and online solution that allows up to 1000 concurrent users to complete transactions in real time. The bank's IT team designed, developed and implemented its online calculator application in about six months. They selected IBM WebSphere software for an open standards, Java technology-based solution. The application resides on a hardware foundation of three IBM @server® iSeries™ systems, and three IBM @server xSeries® systems running Red Hat Linux.

"We have in-house expertise with Linux. And, given the fact that Linux has proven to be very reliable and inexpensive, we wanted to try it out for our online vehicle-leasing application," says Georg Nechvatal, software engineer and analyst. "Linux on the xSeries system works perfectly for us, enabling us to be responsive to our customers' needs for a convenient leasing process while reducing our total cost of ownership."

The BA-CA Leasing and IBM team used IBM WebSphere Studio Application Developer to create the Java servlets that provide the business logic. And, by using the RUP development platform, the team was able to adapt quickly to changing business needs by delivering code in smaller, more concise iterations. "As the project progressed, the developers were able to mitigate risk, reduce complexity in the design phase and ultimately increase productivity while reaching key project milestones," says Nechvatal.

Process and project management

Project failures can often be traced to a lack of a shared understanding of terminology, processes and goals. Whether you are developing large systems, integrating legacy applications or developing new software, a consistent process provides a common vocabulary and clear definitions of responsibilities. IBM Rational Unified Process® (IBM RUP®) is a software-development process platform based on proven best practices that are configurable to your projects' needs. RUP emphasizes the development of models – semantically rich representations of the software system under development. Because RUP enables you to link tools for application modeling, testing, development and monitoring, you can write business applications more quickly and cost-effectively. The comprehensive IT methods, and planning and estimation tools of IBM Rational Summit Ascendant™ complement the proven RUP guidance for developing quality software.

During project life cycles, continuous improvement and repeatable successes are possible only with the tools that automate the development processes. IBM Rational Team Unifying Platform is designed to equip your teams with the development infrastructure tools they need to work together more effectively, while providing managers and stakeholders with access to up-to-date project status information. A core part of every IBM Rational Suite, Rational Team Unifying Platform provides your team with common access to development assets, communication alerts and workflow processes, as well as visual modeling, code-generation and run-time analysis capabilities.

Requirements and analysis

Requirements and analysis has an impact on the entire team – project managers, analysts, developers and testers. Robust requirements and analysis practices help reduce project risk and keep your project running smoothly. Offerings such as IBM Rational RequisitePro® Web client¹ and IBM Rational Rose can help you understand and define your business problem; capture and manage evolving requirements; model business or system requirements; define your database architecture; and incorporate stakeholder feedback throughout your project life cycle.

If you want to leverage just a tier modeling product to help analyze your requirements, you can leverage IBM Rational Rose® for Linux to do use-case analysis. Use cases can be utilized to fully define and validate the requirements of your system. Then the use cases can be transformed and realized to the design and implementation models. These models can provide more effective communication throughout the whole development organization, especially among groups like the architects, designers and coders – saving time and money by helping to reduce translation errors and misinterpretation.

Design and construction

IBM uses the Eclipse Platform as a basis for an entire family of end-to-end IBM application development tools – the WebSphere Studio family of products. These products benefit from integrated quality-assurance testing, as well as IBM product support. They use the same interfaces and build upon the technology shared with the Eclipse Platform. In April 2004, IBM WebSphere Studio won the Best Linux Developer Tool award from the Linux User & Developer Awards 2004.²

Software developers typically need an integrated development environment. The WebSphere Studio family of products provides a number of capabilities for organizations that want to develop software in Java, COBOL, PL/I and other languages. If your organization is developing Java and J2EE applications, you can leverage IBM WebSphere Studio Site Developer and IBM WebSphere Studio Application Developer. If you're developing applications for pervasive computing devices, you can leverage IBM WebSphere Studio Device Developer. And if you're still using COBOL or PL/I applications, you can leverage IBM WebSphere Studio Enterprise Developer.

The IBM Rational Rose family of products supports visual modeling and C, C++, Java and Ada language support. Rational Rose for Linux is tailored to the architect and developer community for model-centric development. IBM Rational Rose RealTime supports users that want to execute on a particular UML and move to a full, model-driven development approach. Rational Rose RealTime supports modeling for device-level and system-level development. Both of these approaches are fully supported on Linux, on the host and on the target side. With model-driven development, your development organization can improve its effectiveness and productivity by 50 to 80 percent by leveraging code generation and automated testing facilities provided by Rational Rose RealTime.

Testing

Rational Test RealTime offers run-time analysis, as well as unit integration and system-level testing. It allows you to test and debug both host and target, and to coordinate the two environments. When your hardware is unavailable, you can simulate on the host and test for generic bugs. When the target is available, you can execute the same test directly on the operational platform. Then, IBM Rational PurifyPlus™ provides run-time analysis and comprises memory leak and corruption detection, also known as memory profiling. It tests application-performance profiling and code coverage and offers all of the run-time analysis capabilities to assess your application. You can leverage IBM Rational Functional Tester, formerly known as IBM Rational XDE™ Tester, to build functional testing scripts on Windows and run these scripts on Linux systems.

Because testing practices in many organizations are still a very manual process, organizations are left with allocating huge chunks of their budgets, both time and money, to testing. With Rational Test RealTime or Rational Functional Tester, development teams can now automate many of the time-consuming and tedious activities, allowing them to do more testing in less time.

Services

Choosing software from IBM means you have access to the vast resources available through the global team at IBM Software Services and a network of qualified IBM Business Partners – all ready to help you quickly maximize software capabilities and help speed return on your IBM software investments. Through expert consultation, in-depth understanding of IBM software technologies, custom application development, real-world experience and knowledge transfer, IBM can help you turn your IT investments into quantifiable business value.

IBM Software Services can provide support as your organization makes the transition – incrementally or all at once – to the Linux environment. Besides services, IBM offers a variety of Linux Porting Centers and Linux Technology Centers worldwide that can help your business port its applications and migrate from UNIX or Windows to the Linux operating system. These leading-edge services and solutions are available whenever and wherever you need them.

Rational Services: Part of the team for management-consulting and systems-integration firms

Seeking competitive advantage in the interenterprise collaboration market, NerveWire needed an integrated set of development tools backed by professional services and a proven process. Because NerveWire knew that the right training at the right time can ensure long-range benefits and a lower TCO, the firm engaged IBM Rational Services.

Based in Newton, Massachusetts, NerveWire helps Global 2000 clients to integrate information, technology, processes and people inside its business, as well as with its customers and suppliers. According to NerveWire's technical architect Melissa Marquis, a secret to the company's short time to market is the skillful application of Rational tools and Rational services.

"NerveWire realized early on that we wanted a repeatable process. We use Rational's training to keep us updated on changes in the industry, like UML 2.0. We attend Rational University courses – and we have Rational consultants come to our office to conduct training workshops with us," says Marquis. "[Rational] worked side-by-side with our colleagues. [Rational was] practically part of the project team for the first three months and significantly expedited the completion of the project. If we had done some of these things wrong or if we had to spend time training people on the semantics of the tool instead of focusing on the technical details it would have been a disaster."

Linux and IBM Rational software—creating value for your organization

The IBM Software Development Platform, powered by Rational software, helps teams like yours maximize output with fewer resources, develop high-quality software that meets the needs of end users – and meet these goals within a predictable schedule and budget. RUP can help your organization understand how to work effectively as a team – to build, deploy and manage your software successfully. From analysis and requirements gathering to testing and deployment, Rational software supports all aspects of the software development life cycle on Linux, while creating real business value.

Contact IBM Rational at 1 800 728-1212 or send an e-mail to ratinfo@us.ibm.com and learn how you can leverage the power and cost-effectiveness of Linux and Rational to help lower your organization's TCO.

For more information

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¹ Some Microsoft components are required for use with Rational RequisitePro from a team perspective; it is not a stand-alone Linux-supported application. But it can be used in heterogeneous environments where projects have both Microsoft Windows and Linux clients.

² www.linuxuser.co.uk/expo/index.php?option=content&task=blogsection&id=8&Itemid=87