Solutions for product line engineering

IBM joins forces with BigLever Software

IBM

Smarter products are some of the building blocks of a smarter planet. With increasingly sophisticated instrumentation, smarter products can connect and communicate with each other and other devices in many ways to develop a wide variety of systems that respond intelligently to user needs.

Whether they manufacture military aircraft, recreational vehicles, medical devices or other smart products, many businesses see the key to product success as the infusion of new ideas into how products are brought to the marketplace.

Companies are rapidly responding to customer needs and marketplace trends by offering variations of products to better serve their customers and grow their revenue. By modifying key product features and functions, companies can move beyond the design and development of a single product to that of a product line, which is a portfolio of similar products with variations in features and functions.

While this flexibility can provide improved economies of scale and profitability, it can also introduce new levels of complexity and potential inefficiencies in the product development lifecycle. Today's products contain hardware, electrical and software components that are often built in parallel, so changes that occur within one discipline often have cascading effects on the other disciplines. Add the exponential challenges associated with developing a comprehensive product line and it becomes clear that companies need to look at new ways of gaining efficiencies.

Product line engineering for supporting delivery objectives

Product line engineering (PLE)—or more precisely, systems and software product line engineering and delivery—is a new engineering discipline that enables organizations to design, develop, deliver and evolve an entire product line portfolio through each stage of the development lifecycle. By facilitating higher degrees of efficiency, PLE helps companies—in practically every industry and across nearly every business model—realize significant increases in productivity, quality and product line scalability while reducing operating costs and time to market.

In response to growing marketplace demand, IBM and BigLever Software™ teamed to provide a comprehensive product line engineering solution. It integrates industry-leading IBM Rational® development software into the BigLever Gears™ SPL Lifecycle Framework™, an industry standard in PLE.

Rational software provides products, services and best practices for integrated systems engineering, requirements management and embedded software development to help companies build systems and products that address their business objectives and customers' needs. BigLever provides industry-standard technology, new generation methods, and proven expertise for systems and software product line engineering. The SPL Lifecycle Framework enables development organizations to engineer a product line portfolio as a single production system rather than a multitude of products. Together, IBM and BigLever developed, delivered and evolved a comprehensive product line lifecycle management solution for systems engineering, requirements management and software delivery.

IBM Rational and BigLever PLE solution highlights

The IBM and BigLever solution is designed to:

- **Provide an innovative and pragmatic solution for systems and software product line engineering, design and delivery.**
- **Increase the scope of product diversity and scale of different products that can be effectively delivered in a product line.**
- **Boost productivity and efficiency.**
- **Decrease per-product development cost, potentially resulting in higher profit margins.**
- **Reduce time to market for new and updated products.**
- **Increase agility to react to new opportunities and changing marketplace conditions.**
- **Improve product quality by reducing defect density and improving risk management.**

IBM and BigLever PLE solution overview

The IBM and BigLever solution includes the essential elements you need to develop, deploy and evolve your product line portfolio across virtually every stage of the development and delivery lifecycle.

IBM Rational Software Platform for Systems

The IBM Rational Software Platform for Systems delivers collaborative tools for portfolio management, requirements definition and management, model-driven development (MDD), software configuration and change management, software build management, and quality management—throughout the product development lifecycle. It allows customers to transition to an open-standards-based development environment with support for Open Services for Lifecycle Collaboration (OSLC)-based interfaces.

Key products include:

- **IBM Rational Focal Point™** software, which provides marketplace- and business-driven product, product line and portfolio management, helping executives and business teams make the right investment and development decisions to deliver business, customer and marketplace value.
- **IBM Rational DOORS®** software, which manages system and software requirements and helps users confidently track conformance to requirements and compliance to regulations.
- **IBM Rational Rhapsody®** software, which graphically explores requirements and builds out the behavior and functionality of systems and software.
- The **IBM Rational Team Concert™** platform and the **Rational configuration and change management** suite of products, which provide a central communication point and workflow support to help diverse, distributed delivery teams from across the lifecycle to efficiently work together continually and iteratively.
- **IBM Rational Quality Manager** software, which establishes a collaborative, customizable quality management hub that can unite teams and provide an enforceable process workflow.
- **IBM Rational Publishing Engine** software, which helps automate the generation of documents for ad hoc use, formal reviews, contractual obligations or regulatory compliance.

BigLever Gears SPL Lifecycle Framework

The BigLever Gears SPL Lifecycle Framework supports the integration of new or existing tools, assets and processes across each stage of the systems and software development lifecycle.

With this industry-standard framework, you can efficiently expand your product lines with a common set of product line concepts and constructs for tools and assets, including:

- A feature model that can uniformly express the product line feature diversity for the assets in each stage of the system and software development lifecycle.
- A single variation point mechanism that can be uniformly applied to tools and their associated assets in each stage of the system and software development lifecycle.
- An automated product configurator that, with the push of a single button, can automatically assemble and configure assets from each stage of the lifecycle to produce the products in a product line.

BigLever Gears SPL Lifecycle Framework integrations with IBM Rational tools

The following BigLever integrations allow for the consistent application of the SPL Lifecycle Framework with Rational tools:

- The **IBM Rational DOORS/BigLever Software Gears Bridge** solution enhances the requirements engineering process in a way that enables users to capitalize on commonality and variation in product line requirements. It also improves the management of the multiproduct systems and software development requirements, which drive the features of a product line.
- The **IBM Rational Rhapsody/BigLever Software Gears Bridge** solution uses PLE capabilities to extend the comprehension and communication benefits of MDD and capitalize on product line commonality and variation.
- The **BigLever Software Gears Universal Configuration Management Bridge** solution integrates Rational configuration management software—including IBM Rational ClearCase®, IBM Rational Synergy and IBM Rational Team Concert software—into the framework. This bridge solution is designed to seamlessly integrate time-based configuration management with feature-based variation management for PLE assets within the SPL Lifecycle Framework while significantly reducing configuration complexity.
- The **IBM Rational Quality Manager/BigLever Software Gears Bridge** solution provides integrated quality assurance and PLE technologies, helping you define test case diversity based on product line features and manage test plans as first-class product line assets in the PLE development lifecycle. Rational Quality Manager software also links to Rational DOORS software, providing traceability of requirements to the specific test cases.

Other methodology integrations into the framework include Rational Publishing Engine and Rational Focal Point software.

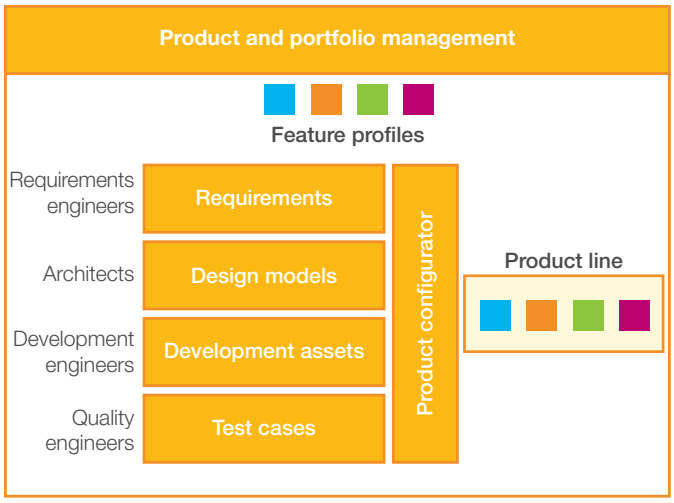

Figure 1: With a PLE approach, development organizations can integrate tools, assets and processes across the lifecycle—from requirements to design, development and testing. They can create a single production system for automatically producing all the products in a product line portfolio.

Capabilities and strategic benefits of the IBM and BigLever product line engineering approach

- Capture inputs from customers, analysts, marketplace research and internal stakeholders and then evaluate and prioritize those that will provide the most value to the business
- Leverage portfolio features as the common point of communication among product marketing, business executives and engineering managers to significantly improve communication and alignment
- Add a new product to the portfolio, without changing systems or software assets, by simply creating a new feature profile to drive the automated software production line
- Update or extend the portfolio with a new feature using delta engineering—for example, extend a product line to support a new feature, either as a common feature for all products in the product line or as a varying feature option available in a subset of products
- Profitably deliver a deeper portfolio of products that may include small, niche, one-off or low-margin opportunities

BigLever Software at a glance

BigLever Software is a leading provider of systems and software product line development framework, tools and services. Its patented Gears solution provides an innovative yet pragmatic product line engineering approach that dramatically simplifies the creation, evolution and maintenance of systems and software for a product line portfolio. With Gears software, organizations can reduce development costs and bring new product line features and products to the marketplace faster, enabling businesses to more reliably target and hit strategic marketplace windows.

Rational software at a glance

The Rational software portfolio includes tools that can help you manage the development lifecycle—including defining and managing requirements, modeling systems and software, software configuration and change management, software build management, and quality management. You can benefit from the wide range of software and systems development capabilities available through the Rational portfolio as well as from the support of the Rational software professional services team and the IBM Global Services organization.

For more information

To learn more about product line engineering and the IBM and BigLever PLE solution, contact your IBM sales representative or visit:

- **ibm.com**/software/rational/systems/ple
- **ibm.com**/software/rational/offerings/biglever
- www.biglever.com

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