

Model-driven solutions for timing analysis and validation



Highlights

- Enables architectural, functional, behavioral and timing models to be built in parallel
 - Helps detect functional, timing and performance issues early in design phases to avoid cost-intensive redesigns
 - Streamlines the development process by integrating workflows
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Using IBM and INCHRON software

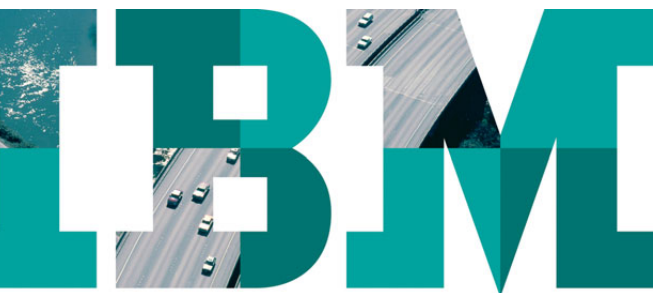
New automobile technologies—such as predictive collision avoidance, adaptive cruise control and intelligent navigation—are systems composed of many smaller systems that rely on each other to function properly. Automotive manufacturers must be able to simulate interactions among vehicle systems to validate the functionality, performance and safety of those composed systems. And automotive suppliers must be able to test (sub-)systems and demonstrate the correct implementation of specified functional and nonfunctional requirements.

IBM and IBM Business Partner INCHRON™ have teamed up to help you address the complexities of electric and electronic (E/E) development with a comprehensive model- and simulation-based approach to systems engineering.

The IBM Rational® software platform for automotive systems provides integrated support throughout the E/E systems and embedded software development life cycle. With industry-leading capabilities, Rational software can help you define, specify, model, implement, test and integrate in-vehicle E/E systems and software.

INCHRON software enables you to focus on dynamic behavior, improving your ability to design robust and reliable software and hardware architectures. As a result, you can do the following:

- Gain a better understanding of the timing effects of design decisions earlier in the development process
- Determine the feasibility of integrating new functionality
- Find the root causes of errors seen in the dynamic behavior of the real system
- Analyze the robustness of the system under average and extreme load conditions



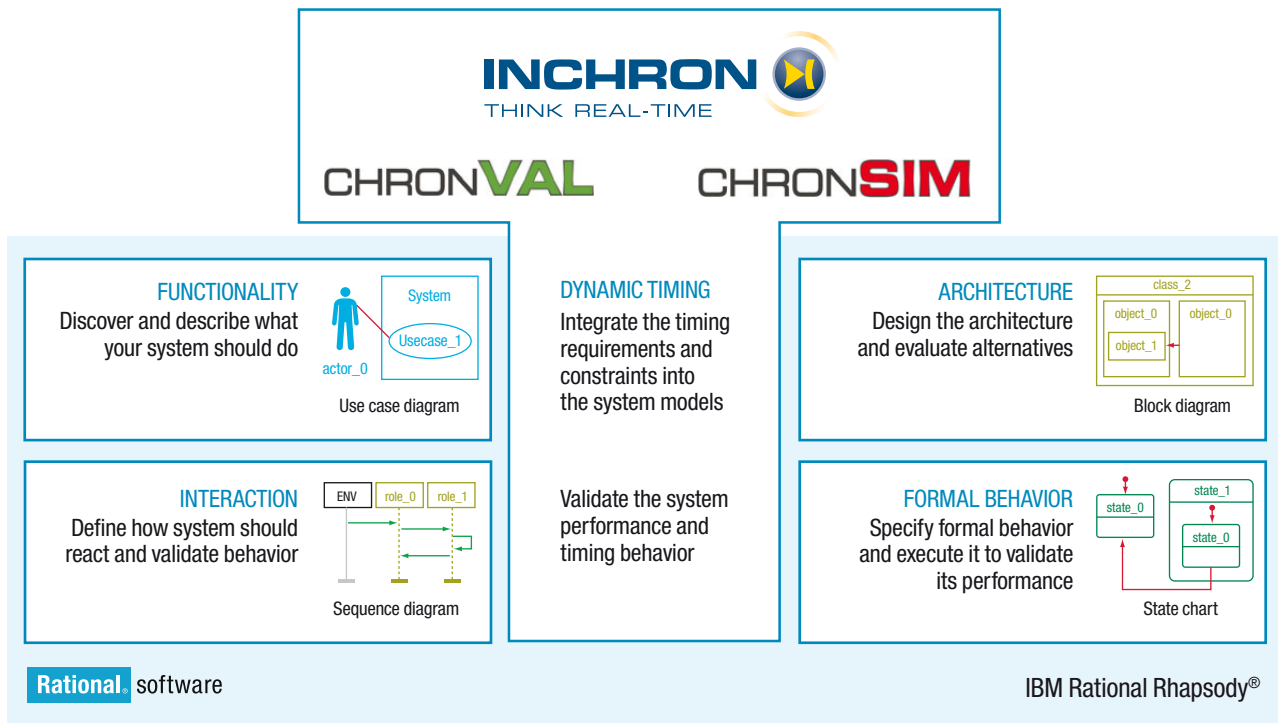


Figure 1: IBM Rational software integrated with INCHRON tools offers an inclusive modeling, simulation and validation solution for automotive E/E systems development.

Build better systems with a model-driven approach to engineering

Automotive systems engineering practices today are often based on mainly textual specification documents that outline how external stimuli should affect system behavior—a cause-and-effect approach. A vehicle is a system of smaller systems that can be broken down into smaller subsystems. This approach generates a large pyramid of hierarchically linked specifications with thousands of pages. It's nearly impossible to

check for consistency across that amount of written text or analyze the effect of a change. A better approach is required to manage the complexity of E/E development.

A model-driven approach allows you to visually describe static structures and dynamic interactions of systems and system components. Furthermore, models can define system behavior and system functionalities, allowing you to experiment in the early development phases and to verify and validate design decisions through model execution.

The IBM Rational and INCHRON solution allows you to add timing, performance and behavior analysis capabilities to the models. You can then simulate, analyze and test the dynamic, real-time behavior of individual subsystems as well as complex interacting systems. As a result, you can better identify and prevent performance bottlenecks, improve system response times, decrease messaging delays, and discover unwanted system interferences.

Manage complexity by improving collaboration and standardization

System development, which may once have occurred within a single office, now often takes place across a team of engineers who work in different locations within different engineering domains or for different companies. Effective collaboration is needed across the supply chain so the team knows the effect of one system component on all of the other components.

The IBM and INCHRON solution allows teams to visually share technical requirements and scenarios that can be difficult to verbalize, including requirements and scenarios related to timing and performance. As a result, the team can better collaborate and understand the overall system, helping to accelerate system development.

Moreover, the joint solution supports several description languages, allowing teams to express system characteristics using abstraction, modularization and hierarchization. Through abstraction, models can even help protect intellectual property by describing the system without including source code. Models can be freely shared and discussed openly with

suppliers and other third parties. The solution's supported languages and exchange formats include those of the AUTomotive Open System ARchitecture (AUTOSAR) development partnership, thereby enabling users to leverage the benefits of this standard.

Support cost-cutting efforts while accelerating the development process

Often the target hardware is not available until the end of the hardware development and test process, forcing you to integrate software and hardware late. It is only after the integration that you can actually execute dynamic system behavior and test for defects. Having to validate performance late in the life cycle makes debugging more time-consuming, costly and difficult to address—and increases the probability of unplanned but expensive redesigns.

The IBM and INCHRON solution can help you design, test and validate systems and predict the real-time behavior of complex functions—well before software and hardware integration. Leveraging models, the solution enables you to test various design alternatives and carry out testing from the beginning of the development process. By virtually integrating the modeled software and hardware, you can find out whether the E/E system and its electronic control units (ECUs) will perform correctly, on time and to specification.

Together, IBM and INCHRON are able to support a model- and simulation-based approach for automotive systems and software development. Their joint solution can help you build better systems, cut costs while accelerating the development process and better manage complexity.

INCHRON at a glance

INCHRON GmbH offers design and test solutions for real-time critical software in embedded systems. Founded in 2003 as an Erlangen University spin-off company, INCHRON calls on



more than 10 years of experience and profound know-how

in analyzing and developing real-time, critical embedded software. In 2005, INCHRON successfully launched its real-time INCHRON chronSIM™ simulator to the marketplace. The INCHRON chronVAL™ validation software helps protect against worst-case scenarios. The distinct combination of simulation and validation gives keen insight into the real-time behavior of interconnected embedded systems.

Rational software at a glance

The Rational software portfolio includes tools that can help you manage the vehicle development life cycle—including defining and managing requirements, modeling E/E systems and ECU 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 software 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 how IBM Rational software and INCHRON tools are designed to help you develop safer, more-innovative systems and vehicles faster and more cost-effectively, contact your IBM sales representative or IBM Business Partner, or visit:

- www.inchron.com
- ibm.com/software/rational

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INCHRON GmbH is an industry-leading technology company that enables its customers to develop their embedded systems in a shorter timeframe and at a lower cost while simultaneously achieving a higher standard of quality. INCHRON's patented intellectual property is supplemented by talented and committed leadership and technical teams. www.inchron.com

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