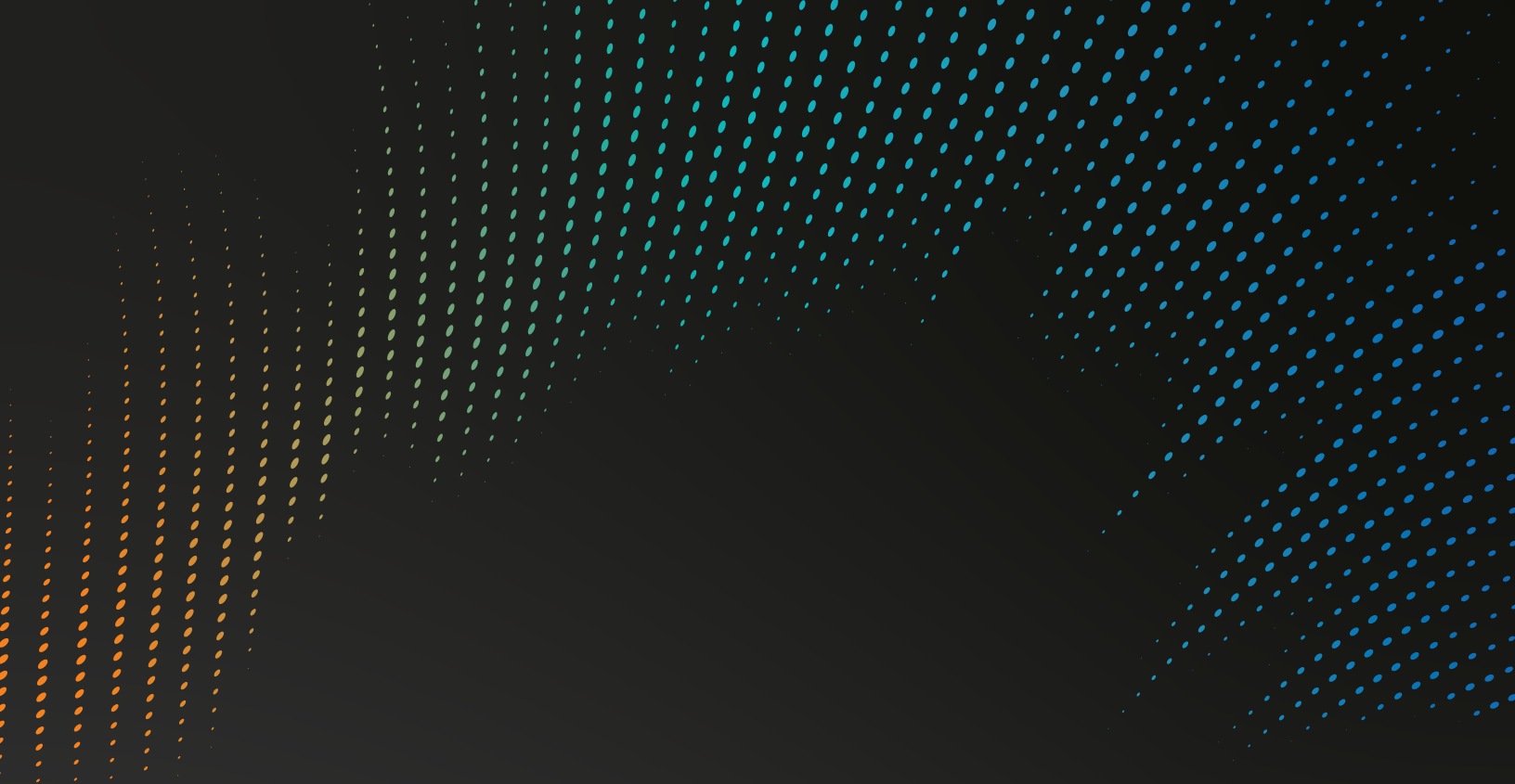




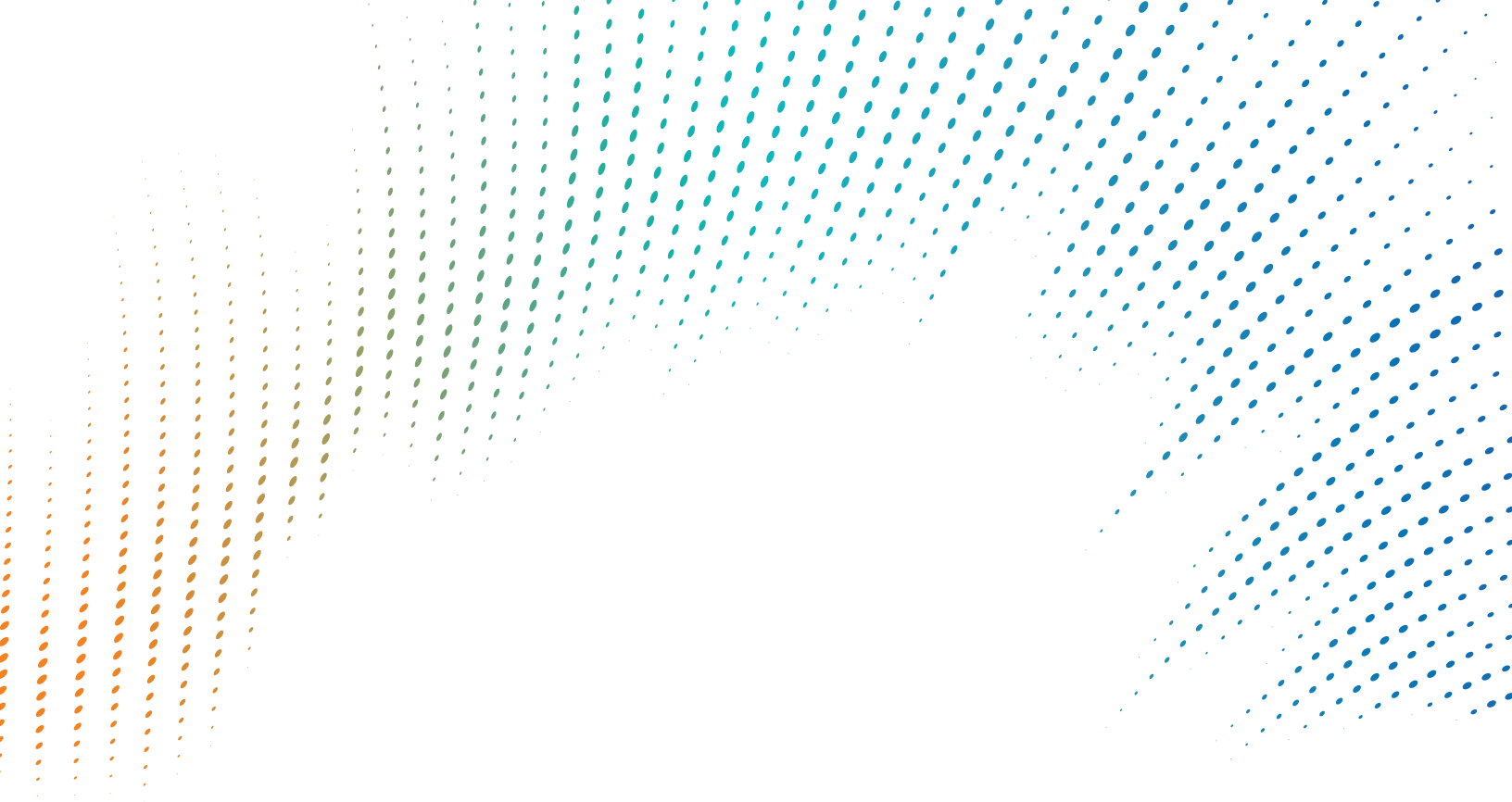
HCL

DEVELOPING AND TESTING IoT
APPLICATIONS



HCL SOFTWARE





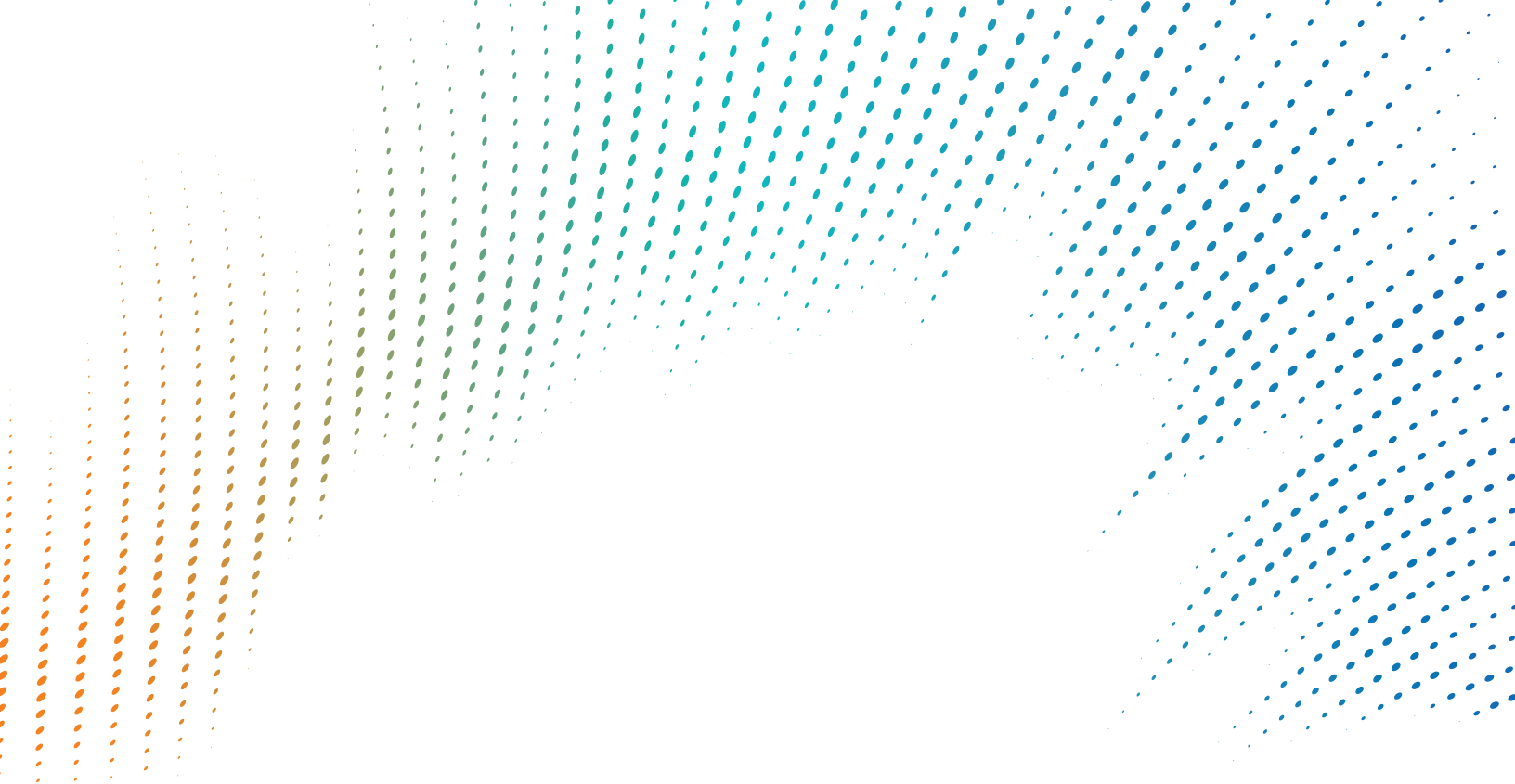
HCL Software is a division of HCL Technologies (HCL) that operates its primary software business.

It develops, markets, sells, and supports more than 20 product families in the areas of DevSecOps, Automation, Digital Solutions, Data Management, Marketing and Commerce and Mainframes.

HCL Software has offices and labs around the world to serve thousands of customers. Its mission is to drive ultimate customer success with their IT investments through relentless innovation of its products.

For more information, visit hcltechsw.com.

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INTERNET OF THINGS SOLUTIONS ARE KNOWN TO SIGNIFICANTLY SIMPLIFY OUR EVERYDAY LIVES.

And, companies building IoT solutions need a structured approach to enhance the development and testing process. By the end of 2019, 57 percent of companies had adopted IoT technologies, and this number is only likely to grow. Experts predict that billions of new smart devices and sensors will be connected to the internet in the coming years.

But this requires an efficient, secure and cost-effective platform to develop, deploy and manage a wide variety of applications.

“A product that is rushed to market with little time for quality assurance can massively damage the reputation of even well-established organizations.”

STATEFUL. EVENT-DRIVEN. REAL-TIME.

Industries are generating thousands, even millions, of new lines of code in their complex real-time systems via model-based designs.

Additionally, both new and legacy systems require enhancements to capture and react to the plethora of data being created by both people and devices, every second.

In order to gain a competitive advantage, companies need powerful tools to support and scale their embedded and IoT applications with strategic uses of these model-based designs.

Companies that adopt new technologies and are able to react to this data to enhance the customer experience, gain a significant edge on their competitors.

Imagine a refrigerator telling you that you're out of milk. Or, a device that tells your doctor exactly where and when your heart has an irregular heartbeat.

How about a coffee maker that brews you a fresh cup even when you're sleeping in? So, how are developers creating these applications that need to be integrated with both real-time embedded systems, while multi-tasking with external devices?

Embedded systems developers are looking for a developer tool to deliver secure, high-quality production code with quick, agile methodologies allowing them to react to new business requirements while minimizing maintenance cost of long-lived applications running on many different device preferences of their users.

Also, companies strive to implement strict, continuous delivery processes to ensure code integrity and a stable, highly available production deployment of these real-time applications.

MEET HCL RTIST

Introducing HCL RTist, an Eclipse-based modeling and development environment for creating complex, event-driven, real-time applications in C++.

HCL RTist provides software engineers with feature-rich tools for designing, analyzing, building, debugging and deploying real-time applications.

Supporting the Unified Modeling Language (UML) and its real-time profile (UML-RT), RTist allows developers to design their applications at a higher abstraction level than code.

WITH HCL RTIST, YOU CAN:

- Design your real-time applications using state machines, capsules and other powerful UML-RT concepts
- Support collaborative development in both large and small scale agile teams
- Freely mix graphical diagrams with C++ code when developing applications
- Detect and fix problems using high-level model debugging
- Build high-performance libraries and executables from existing models

NodePlus

Another major highlight in HCL RTist 11 is **NodePlus**. With NodePlus you get all the necessary tools for developing Internet of Things (IoT) applications with HCL RTist. You can use it for extending your existing RTist applications with features often needed in IoT applications, such as communication with web servers, emitting MQTT events, accessing databases etc. Even if such things also can be done directly in the RTist application using C++, it is often significantly easier to do it in a language that is more commonly used for web-related tasks.

For example, NodePlus lets you develop using **Node-RED**, which is a popular “low code” tool where graphical flows of interconnected nodes can realize sophisticated functionality without almost writing a single line of code. Thousands of pre-made nodes are available for free on the internet, and you can simply drag-and-drop them into your application to use them.

CAPABILITIES AND BENEFITS



Designs at a Higher Abstraction Level than Code

- Provides UML Real-time models, statecharts, composite structure and other diagrams
- Utilizes a powerful Code Editor built on an Eclipse CDT
- Realizes thread safety using state machines and message-based communication
- Supports industrial-scale applications



Builds Executables Your Way

- Builds applications interactively and from batch builds
- Allows for easy setup of build configurations
- Provides a highly-customizable run-time environment



Debugs at a High-level (Verifies Design and Detects Failures)

- Features interactive model debugging
- Allows for trace management and visualization
- Provides run-time structure monitoring and behavior animation
- Offers combined model and code debugging



Allows for Teamwide Collaboration

- Supports Git and other SCM systems
- Features an interactive and intuitive compare/merge of both model and code
- Provides a powerful command-line interface
- Allows models to be accessed via web browsers and linked to requirements



Analyzes the Application

- Features navigation and search with diagram highlighting
- Supports refactoring of models and code
- Synchronizes code changes back to the model

Try HCL RTist today and develop stateful, event-driven and real-time applications.

Visit hcltechsw.com/RTist for more information.

COMPONENT TESTING AND RUNTIME ANALYSIS

Runtime analysis is critical to improving test efficiency and effectiveness.

However, automating the creation and deployment of component test harnesses, test stubs and test drivers can be easy with the right cross-platform.

Meet HCL OneTest Embedded

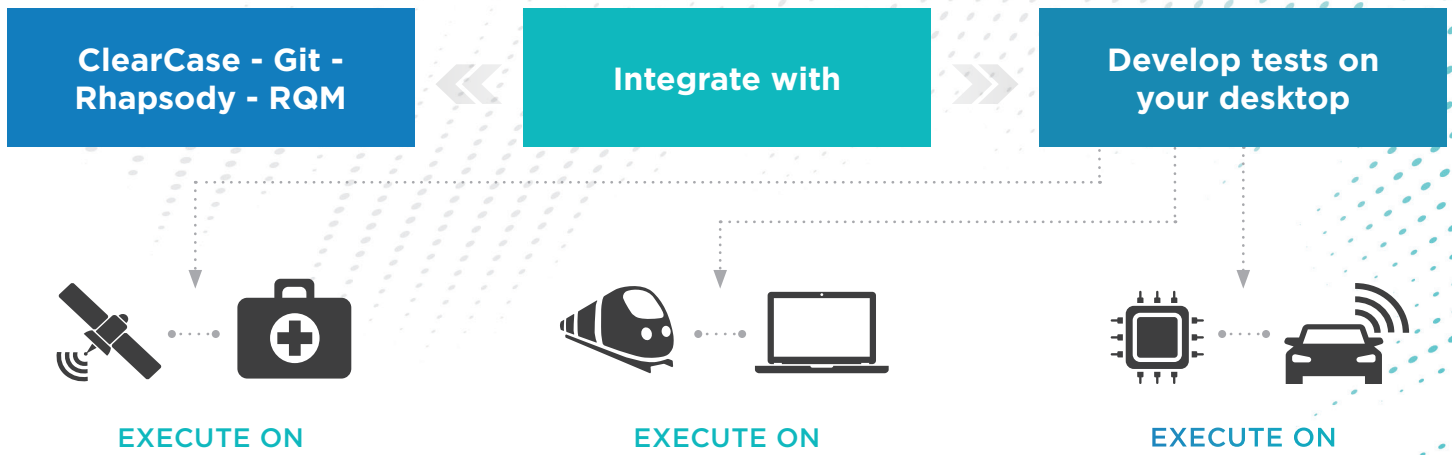
With a single click from any development environment, testers can profile memory and performance, analyze code coverage and visualize program execution behavior.

Additionally, HCL OneTest Embedded helps teams be more proactive in debugging and in fixing code before it breaks.

HIGHLIGHTS:

- Automates component testing and runtime analysis for host and target from a single testing environment
- Profiles memory and performance, analyzes code coverage, and visually illustrates runtime tracing
- Easily adapts host-based tests to different targets without rewriting test procedures
- Tests and analyzes directly on target. Supports all common platforms — from 8-bit microchips to a 64-BIT RTOS
- Provides detailed code coverage information required for safety and mission-critical certification
- Provides code coverage and runtime tracing on-the-fly reports
- Provides Qualification Kits for certification processes on request
- Verifies coding rules based on MISRA standards





Test. Analyze. Resolve.

The best time to find and fix bugs is during development.

HCL OneTest Embedded focuses on developer testing – the kind only code authors can perform effectively. Additionally, they can easily test written components, and analyze the reliability and performance of applications as they run on host development systems.

Additionally, detailed test and runtime analysis reports are hyperlinked to the relevant source code.

HCL OneTest Embedded combines component testing and runtime analysis into a single, integrated developer-centric testing solution.

HCL OneTest Embedded's graphical user interface links runtime analysis results (code coverage on the left, runtime analysis on the right) directly to a source code, enabling code repairs without ever having to leave the tool.



SUPPORTED PLATFORMS

PROGRAMMING LANGUAGES	POPULAR TARGETS, OTHERS ON DEMAND
C++ C	Renesas, WindRiver, Lauterbach, Texas Instruments
Ada (component Testing and Code Coverage)	STMicroARM series — ARM Cortex — Aduino — Rasberry — Windows — Linux — Solaris — Aix — x86 / x64 — GNU toolchains — NXP/FreeScale — ColdFire — Power Architectures — HighTec Tricore
INDUSTRY	STANDARDS
Aeronautical	DO178B/C, DO-330
Automotive	MISRA 2004, 2012 and ISO-26262
Defense	Def Stan 00-55
Medical / Industrial	IEC 62304
Rail	EN 50128



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