Mentor Graphics Enables Internet of Things Embedded Device Connectivity

Enhanced Nucleus RTOS delivers connectivity support and IoT middleware

PR Newswire

SANTA CLARA, Calif., May 6, 2015

SANTA CLARA, Calif., May 6, 2015 /PRNewswire/ -- IoT DEVELOPERS CONFERENCE

NEWS HIGHLIGHTS:

- New release of Nucleus® Real-Time Operating System (RTOS) targets connected embedded devices for high-performance, advanced Internet of Things (IoT) applications.
- The Nucleus RTOS and process model technology enable developers to reconfigure, update, and provision connected embedded devices that utilize cloud-based remote software services.
- Users can dynamically modify application software during system operation throughout the process, keeping the target up-to-date on all changes concurrently.
- Nucleus process model supports ARM Cortex-M based cores with Dynamic Linking and Loading (DLL) capabilities, enabling devices to optimize memory resources.
- Integrated TI WiLink™ and Constrained Application Protocol (CoAP) provide high-performance and efficient connectivity of IoT devices.
- This solution targets connected IoT applications such as portable medical devices, energy management systems, wearables and smart connected devices.
Mentor Graphics Corporation (NASDAQ: MENT) today announced its next release of the Mentor® Embedded Nucleus real time operating system (RTOS) targeting high-performance, next-generation applications for connected embedded devices. The Nucleus RTOS process model for ARM® Cortex®-M based cores is expanded to provide application Dynamic Linking and Loading (DLL) capabilities for devices. Internet of Things (IoT) endpoints based on Cortex-M cores with the Nucleus RTOS and process model technology can now be reconfigured, updated, and/or provisioned using cloud-based services to utilize remote software services. This allows embedded developers to dynamically modify application software during system operation, keeping the target up to date, even in mission-critical environments. The comprehensive, ready-to-use Nucleus RTOS solution provides the IoT middleware, scalable footprint, power management, and security required for today’s IoT connected devices.

The lightweight Nucleus process model takes advantage of the memory protection unit (MPU) of Cortex-M0+, Cortex-M3, and Cortex-M4 cores to create protected regions in memory that can be used for dynamic application loading and unloading at system startup or afterward during run time. This release also includes Constrained Application Protocol (CoAP) with DTLS security support, and support for Texas Instruments (TI) WiLink 8 module solution for Wi-Fi® and Bluetooth® wireless combo connectivity.

**Nucleus Process Model: Dynamic Linking and Loading for IoT devices**

The growth of smart IoT devices with feature-rich applications and the need to interact with cloud-based services are placing new requirements on embedded IoT software developers. Wearables, portable medical devices, energy management systems, and other smart connected devices are routinely based on resource-limited systems using Cortex-M cores. IoT systems have limited memory, so a single monolithic application cannot be loaded at startup with all the software required for the breadth of services. IoT systems with limited memory resources must run applications based on current need, and with the ability to free memory resources when the application is no longer required. Large applications must be parsed into smaller algorithms and loaded sequentially as modules, only when needed to conserve memory resources. The management of software on IoT devices requires the ability to upgrade applications and/or load new modules using cloud-based services. The Nucleus RTOS makes full use of the memory protection unit on Cortex-M cores to provide protected regions that isolate software modules for dynamic linking and loading. With the Nucleus RTOS Process Model, software can be loaded from system memory as needed, or from cloud based services to upgrade a system, provision the device, or provide fee-based software.

**Nucleus RTOS Connectivity: TI WiLink 8 Module Support**

Today’s complex IoT devices combine multiple wireless connections, driving the need for consolidated wireless solutions that support multiple protocols on a single device. Bringing high-performance wireless connectivity to IoT devices, the Nucleus RTOS supports the TI WiLink 8 combo connectivity solution featuring 2.4 and 5GHz dual-band throughput, Wi-Fi 802.11 capabilities, and dual-mode Bluetooth and Bluetooth low energy technology. The enhanced low power features of the WiLink 8 modules are supported with Nucleus RTOS Power Management Framework to optimize power consumption and extend battery life. This pre-integrated solution enables IoT developers to bring to market connected devices with the latest security protocols that support multiple wireless modes in a single chip for medical, industrial and other IoT products.
**Nucleus IoT Middleware: Constrained Application Protocol (CoAP)**

IoT node devices require low-power solutions to interface with cloud-based services supporting the latest IP protocols. The Nucleus RTOS makes use of CoAP to bridge IoT nodes that are power constrained or have limited system resources as yet require cloud access. Utilizing IP standards, the Nucleus RTOS with CoAP provides a RESTful-based framework with DTLS for security and UDP over IP for transport, making it efficient to cloud services.

**Commentary**

"The use of cloud-based services to provision and upgrade software in resource constrained IoT devices using the Nucleus RTOS process model gives developers the ability to effectively use the advanced features of our WiLink 8 combo connectivity solutions," stated Eran Zigman, business line manager, wireless connectivity solutions, TI." Dynamic linking and loading enables the efficient use of memory resources and opens the door for embedded IoT developers to add a breadth of features to create the next-generation of connected devices."

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**About Mentor Embedded**

The Mentor Graphics® Embedded Systems Division enables embedded development for a variety of applications including automotive, industrial, smart energy, medical devices, and consumer electronics. Embedded developers can create systems with the latest processors and micro-controllers with commercially supported and customizable Linux-based solutions including the industry-leading Sourcery™ CodeBench and Mentor Embedded Linux products. For real-time systems, developers can take advantage of the small-foot-print and low-power-capable Nucleus RTOS. For more information, visit www.mentor.com/embedded

**About Mentor Graphics**

Mentor Graphics Corporation is a world leader in electronic hardware and software design solutions, providing products, consulting services and award-winning support for the world's most successful electronic, semiconductor and systems companies. Established in 1981, the company reported revenues in the last fiscal year in excess of $1.24 billion. Corporate headquarters are located at 8005 S.W. Boeckman Road, Wilsonville, Oregon 97070-7777. World Wide Web site: http://www.mentor.com/.

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