EMBEDDED COMPUTING CONFERENCE

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Presentation

Title: FreeRTOS Reusable Embedded Software Component

Target Audience:

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Abstract: FreeRTOS (www.freertos.org) is a widely used LGPL open source operating system. Its micro kernel architecture it is suitable especially for real-time embedded systems with limited resources. In the traditional way a port of the RTOS is used and then integrated into with the application code to be developed. This approach requires knowledge of the RTOS port specifics, and is time consuming as the integration needs to be adapted to the application needs. In this paper we present a novel approach to package an RTOS like FreeRTOS as a reusable embedded component. This allows for easier and faster deployment and faster real-time embedded application integration and development of the application software.

In a research project we transformed an available FreeRTOS port for a 32bit processor into an embedded component. Additionally we added multiple additional ports of the RTOS to the component to make it a multi-architecture port. The embedded components are implemented in a high level language using special directives, methods, properties, events and an inheritance scheme on top of a Hardware Abstraction Layer (HAL). This makes it portable across multiple architectures. The component can be configured using a graphical user interface (GUI) representation. This makes it attractive to be integrated into an Integrated Development Environment (IDE). As such, the concept has been implemented in the open source Eclipse (www.eclipse.org) framework. Under eclipse, the FreeRTOS component can be added and configured for a real-time embedded application together with other embedded components. Additional user code can be added through the normal eclipse managed make system. A special code generator is used to generate source from the embedded components, which is added to the project and compiled into the application binary.

We present our findings and results using the FreeRTOS embedded component, as well possible future evolution of this technology. The concept of using embedded software component already has been used in multiple research and commercial projects, including classroom teaching material. For the future we expect further savings in the development cycle with integration different productivity tools under the eclipse framework.