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Subject Area	Embedded Software Engineering
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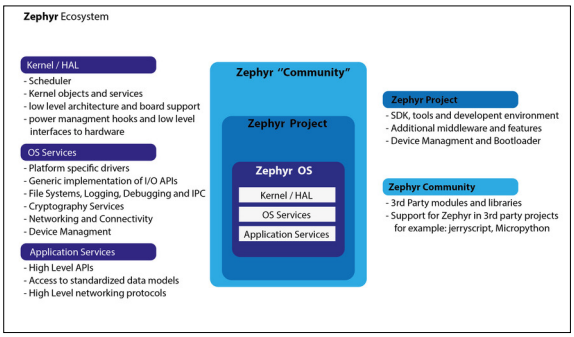
Zephyr - Open Source Embedded Platform

Zephyr Logo
zephyrproject.org/

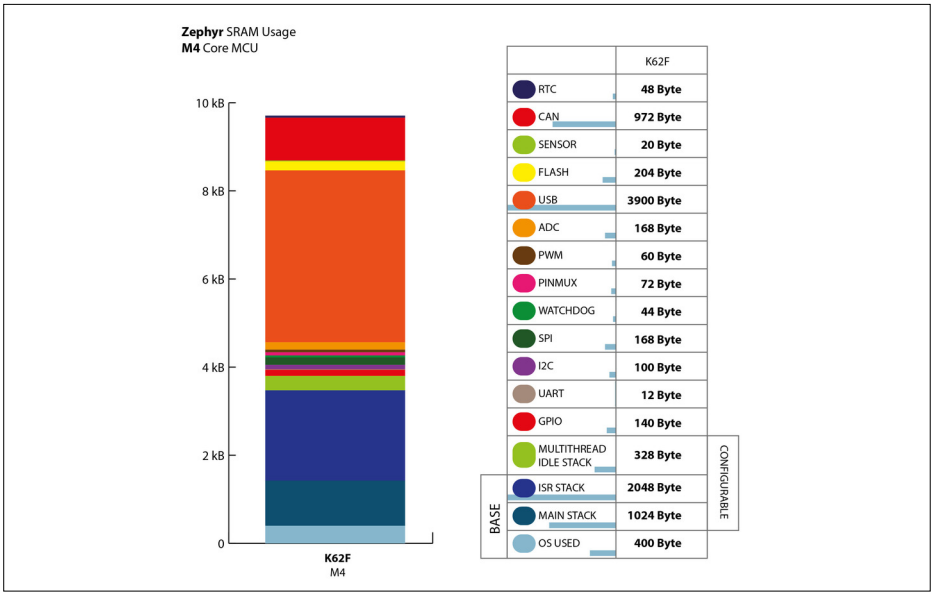


Zephyr Ecosystem Illustration
youtube.com/user/TheLinuxFoundation

Introduction: Zephyr is a lightweight real-time operating system for resource-constrained devices. It enables cross-platform application development for connected embedded devices with multiple architectures. The Zephyr project is developed as open source. It was interesting for the industry partner to find out whether the system in its current state is suitable for use in the IoT embedded environment. In this thesis the scalability, power consumption, developer friendliness, scheduler performance and the general development and support level are investigated.

Approach: Several tests were carried out to check the suitability of the real-time operating system for microcontrollers of different sizes.
The code size of the kernel in flash memory and SRAM per module was evaluated. These modules include Ethernet, USB, CAN, SPI, PWM and RTT. To investigate the developer friendliness of the project, a new sensor driver was implemented in the Zephyr operating system. The performance of the scheduler algorithm was also tested. The power consumption on a board with different load was measured. During the preparation and test phase, the quality of documentation and support was analyzed.

Conclusion: With regard to the required Flash memory and SRAM, the Zephyr meets the requirements for scalability down to Cortex M0 boards with very limited resources. In a Cortex M4 environment, the scheduler generated a relatively low CPU overhead of 2% for cooperative and 4% for preemptive scheduling with about 1600 context switches per second. The driver for a temperature and humidity sensor was successfully implemented. During the implementation, the need for support became apparent. Support from the Zephyr community is reliable and fast. The easiest way to get support from the community is to join a Slack group with over 1500 members. Since NXP is a founding member of Zephyr, it is sobering to be referred to the Zephyr homepage for Zephyr-specific questions.



Zephyr SRAM Results for FRDM-K64F
Own presentment