

## **F-OMP: A Feedback monitoring infrastructure for OpenMP on embedded systems**

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### **Abstract:**

Embedded systems normally execute applications with both functional and non-functional constraints. Underlying HW/SW can be very complex and heterogeneous. To deal with the tricky work of developing a system, satisfying required constraints, different techniques can be adopted. The use of OpenMP is one of them: it supports the designer on the parallelization of applications written in C/C++ and Fortran code. OpenMP allows an implicit parallelization so, controlling all the factors involved in the performance, such as memory accesses, cache behaviour and thread mutual exclusions can be a tricky task. In this context, F-OMP proposes a monitoring infrastructure able to provide feedback about the use of OpenMP in an embedded platform, developed on FPGA. Specifically, it organizes data collected at runtime considering metrics (estimated speed-up, load balancing and false sharing), providing feedback to the designer, without inserting software overhead. A first implementation of F-OMP is done on Zynq7000 SoC, with dual-core ARM processor as master processing element and four-cores Leon3 SMP an isle of computational elements. Such an isle executes a Linux operating system, where the support for executing OpenMP applications has been provided, and it executes two OpenMP benchmarks with data provided by the master processing element. The F-OMP system has been inserted in the platform, providing the metrics listed above. During the demonstration, how to configure F-OMP and how to manage its results, applying its feedbacks to the use of OpenMP clauses, will be presented.

Youtube link: <https://youtu.be/p3o4WXic7Xk>