Master Thesis – Minimal Impact Software Trace for Programs on the Ericsson Many-Core Architecture

Background
The Ericsson Many-Core Architecture (EMCA) manifests itself as a growing number of ASICs optimized for different stages in the radio software chain. The software is normally programmed as a mix of C (DSP-C) and high-level descriptions of how to make things run in parallel. It is a highly complex target not unlike the Sony PS3 Cell-processor or graphics accelerator circuits. Bugs are bound to emerge and to be able to troubleshoot them it is important that observability features are built into the product from start.

On EMCA there is both hardware and software based trace. Hardware trace exposes a very low impact mechanism the programmer can use to emit rather simple events. Software trace is more versatile and can be compared to printf():s placed arbitrarily in the code. Software tracepoints are rather expensive to handle (store and/or transmit), therefore it is possible to turn these on and off. As a result, software tracepoints are turned off most of the time. Even so, the query “Should I trace or not” costs too many cycles and limits how many tracepoints can be put in the code.

Thesis Description
The goal of the thesis project is to implement and evaluate a faster way to query if tracepoints are on by pushing the decision to DSP core program load-time instead of run-time.

The cores on the EMCA have a small memory which is dedicated for program code. The memory is so small that not all of the application fits, therefore program code has to be swapped in and out of the cores during run-time. When program code is loaded from the larger memory on to the core, it would be possible to patch the conditional tracepoints according to a global configuration. This would greatly speed up the trace query since the expensive part of the query is the latency to the global configuration. In this thesis project you will implement a mechanism that enables program load patching.

Qualifications
The project is aimed at students in computer science, computer engineering or similar. Experience with Linux and C is preferable.

Extent
1-2 students, 30hp each

Contact Persons
Jonas Svanberg
+46 10 711 57 11
jonas.svanberg@ericsson.com
Location
Ericsson AB Mjärdevi, Linköping

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Contact Persons
Jonas Svanberg
+46 10 711 57 11
jonas.svanberg@ericsson.com