Master Thesis—Call Hierarchy Grapher and Deadlock Finder

Background
5G Mobile Telecommunication systems are by nature massively parallel, and our test tools need to match this. One way of realizing this is by using a Functional programming language where the immutability of data helps avoid many of the issues traditionally associated with Parallel Programming. This way, the need for locks and risk of classic data races is virtually eliminated. It is however not completely immune to problems, and inter-process communication can still result in two or more processes ending up waiting for each other in a Deadlock scenario, where they will not process an incoming request before having gotten a reply. In this case we use Ericsson's Open Source but purpose-built programming language, Erlang.

We now want to investigate how tooling can help us identify potentially problematic areas and be applied as part of automatic code review.

Thesis Description
The following steps are envisioned as part of the thesis work:

- Investigate ways to gather and represent response-request interactions between processes using common patterns.
- Investigate how to automatically find potential deadlocks and supplement with user-defined rules for what processes are allowed to do.
- Implement a simple Erlang application to demonstrate the concept.

The thesis will be concluded with a result presentation for Ericsson.

Qualifications
This project aims at students in computer science, computer engineering or similar.

Extent
1-2 students, 30hp each

Location
Ericsson AB Mjärdevi, Linköping

Preferred Starting Date
Spring 2023

Keywords
Mobile Telecommunication, Functional Programming, Parallel Programming, Graph Theory

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