Resource consumption analysis

For applicative languages

Jérémie Salvucci

PhD advisor : Emmanuel Chailloux

APR / LIP6

Context

What kind of resource ?

- Time (Worst Case Execution Time);
- Memory (sized types, amortized analysis);
- Energy (Energy types);
- Network (DPI. . .)

Objective

Guarantee a safe upper bound of used memory at runtime.
Interests

- Put a runtime system on an embedded device;
- Detect overlapping between stack space and heap space;
- Meliorate Garbage Collection configuration...

How ?

Several possible approaches

- Abstract interpretation;
- Control flow analysis;
- Type and effect systems. . .

What about Garbage Collection and shape analysis ?

Should the analysis depend on a specific memory management system ?

A bit of details. . .

Current goal : avoid troubles with shape analysis.

How ?

- Measure functions;
- Compile time Garbage Collection;
- Type and effect system.

This is not a definitive solution. . . .

Michael Cohen, Haitao Steve Zhu, Emgin Ezgi Senem, and Yu David Liu.
Energy types.
SIGPLAN Not., 47(10):831–850, October 2012.

Steffen Jost.
Automated Amortised Analysis.
PhD thesis, Faculty of Mathematics, Computer Science and Statistics, LMU Munich, Germany, September 2010.

Pedro Vasconcelos.
Automated Amortised Analysis.
PhD thesis, University of St Andrews, 2008.

Wilhelm.
The worst-case execution-time problemoverview of methods and survey of tools.
ACM Trans. Embed. Comput. Syst., 7(3):36:1–36:53, May 2008.