

# Abstract Constraint Reasoning

## Seminar PCOG

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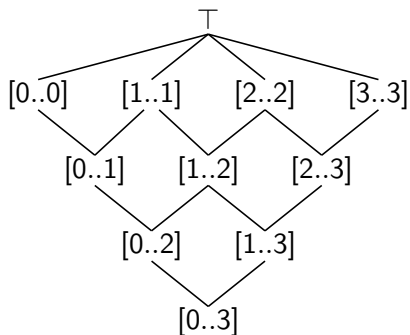
University of Luxembourg

14th December 2020



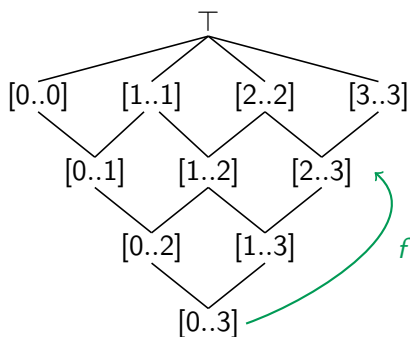
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## Background



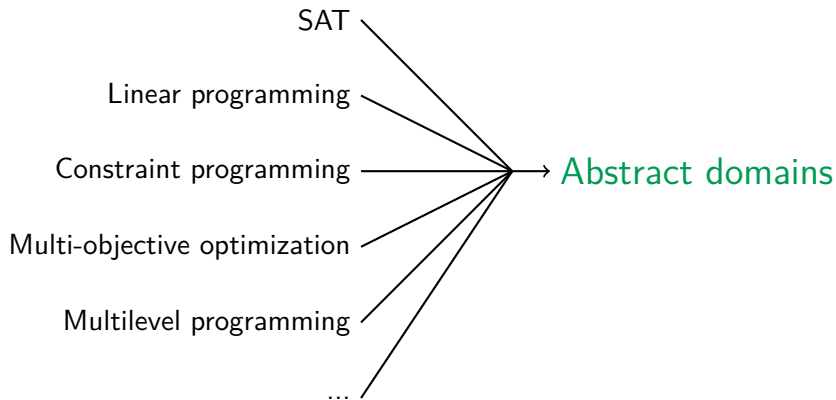
- ▶ Data structures = lattices

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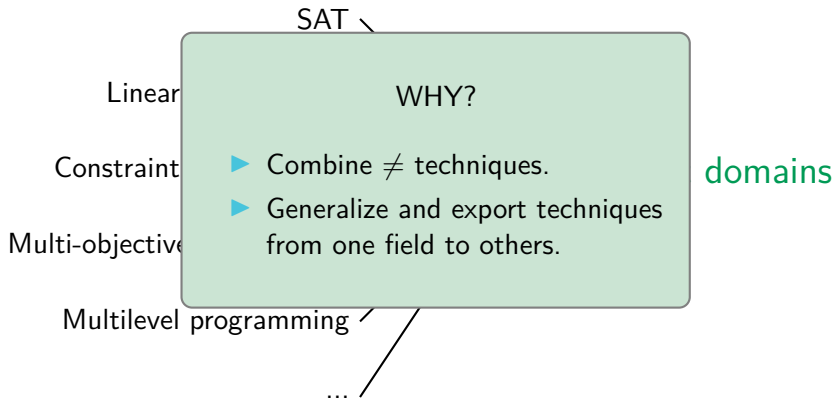


- ▶ Data structures = lattices
- ▶ Algorithms = extensive functions
- ▶ Example:  $f(x) = x \sqcup [2..\infty]$  models the constraint  $x \geq 2$ .
- ▶ Lattice + Extensive function = Abstract domains

# Abstract constraint reasoning



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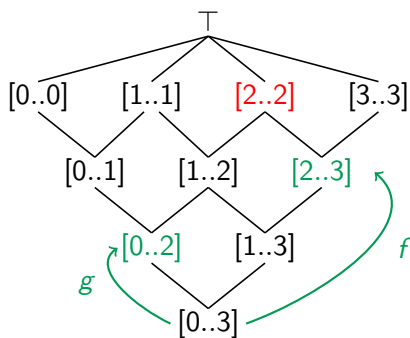
## My research in 2020

- ▶ *Modular Constraint Solver Cooperation via Abstract Interpretation*, w/ E. Monfroy and C. Truchet in Theory and Practice of Logic Programming, 2020.
- ▶ *FNR proposal: A Concurrent Model of Computation for Trustworthy GPU Programming* w/ F. Pinel et P. Bouvry.
- ▶ *Abstract constraint programming*, w/ A. Jung, K. Ueda and P. Van Roy (draft).

## Expected activities in 2021

- ▶ Submit again the proposal to FNR.
  - ▶ Design a programming language to program sound parallel combination of abstract domains.
- ▶ Distributed algorithm for SAT solving with Christian Franck.
- ▶ Take the responsibility of Programming Fundamental 2 (BICS) with Mathi.

## Key idea of the FNR proposal



- ▶  $f(x) = x \sqcup [2..\infty]$  models the constraint  $x \geq 2$ .
- ▶  $g(x) = x \sqcup [-\infty..2]$  models the constraint  $x \leq 2$ .
- ▶ Parallel execution:  $f \parallel g = [2..2]$