

# A Domain-Extensible Compiler to Optimize for Evolving Algorithms and Hardware

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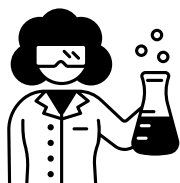
## Software must be optimized for evolving algorithms and hardware



We desire massive computing power, but physical resources are limited.



domain scientist



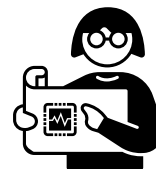
We need new **algorithms!**

performance engineer



We need new software **optimizations!**

hardware architect



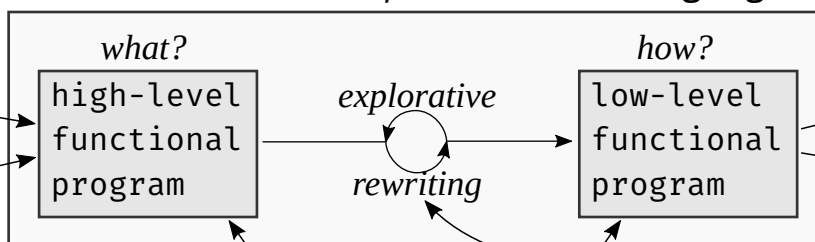
We need new **hardware!**

## We propose a rewrite-based domain-extensible compiler design

domain-specific languages



*RISE & SHINE* compiler 🌐 rise-lang.org



hardware targets



**extensible:** data-parallel patterns | rewrite rules

## Which rewrite rule should be applied when, and where?

Fully automated search?



This is fully **automated!** 🌱

The search takes forever .. 🚫

Why is the performance so bad in this case? 🚫

I wish I could have control over the optimizations! 🚫

Manually written recipe?



Follow these steps to tile and vectorize the program: [...]

I have full **control!** 🌱

This was more difficult to write than I expected! 🚫

How can I generalize this recipe to other cases? 🚫



Guided search!



The program should be tiled and vectorized.

I can combine **control and automation!** 🌱 🌱