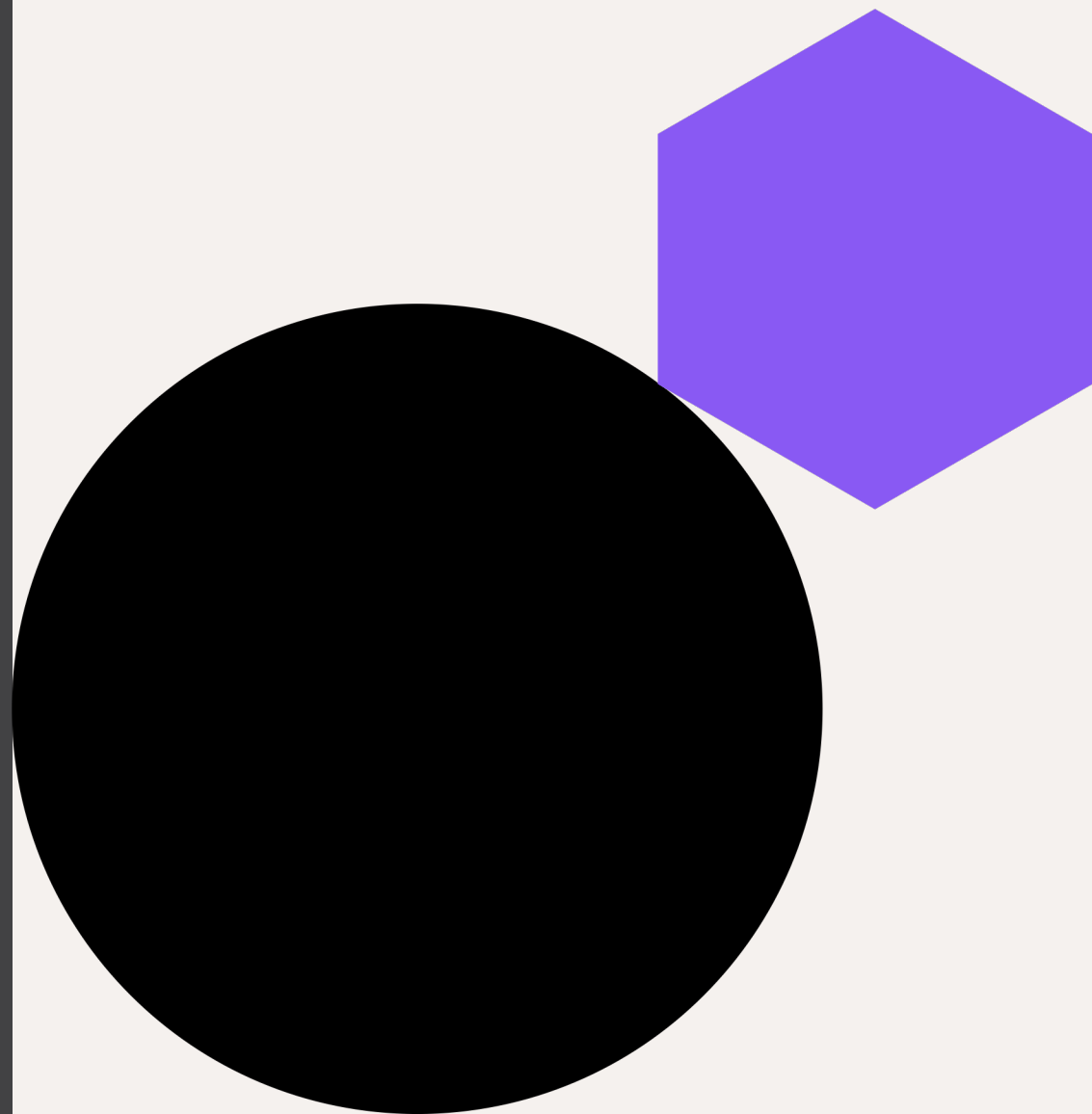




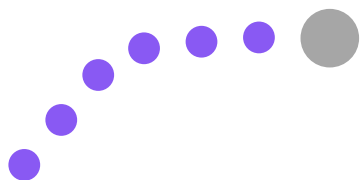
RISC-V with HW/SW co-design and Custom Compute

Author : Julian HU

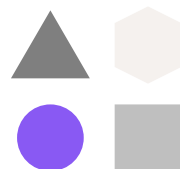
RISC-V Summit China 2023



→ Challenge in the market



No more “free improvements” with end of Moore’s law



Need to optimize processing to the application

→ Custom Compute



Difficult and risky to do by hand

- Usually takes too long
- Usually is not optimal
- Requires large teams

→ Benefits of Custom Compute

Improve performance

- Use older nodes
- Push boundaries

Improve efficiency

- Reduce power
- Reduce area
 - For example, remove companion DSP, compress code

Differentiate

- Beat the competition
- Protect against copy
 - Your custom processor is unique

→ Leaders use Custom Compute

If you do it by hand

- Very long and difficult
 - Understand the application needs
 - Design a processor
 - Verify the processor
- Expensive
 - Need to iterate
 - Custom ISA
 - Custom SDK (compiler, debugger, ...)
 - Custom model
- Need large dedicated teams

At Codasip we make it with :

- Automation
- Ready-to-modify IP

→ Custom compute enabled by two components



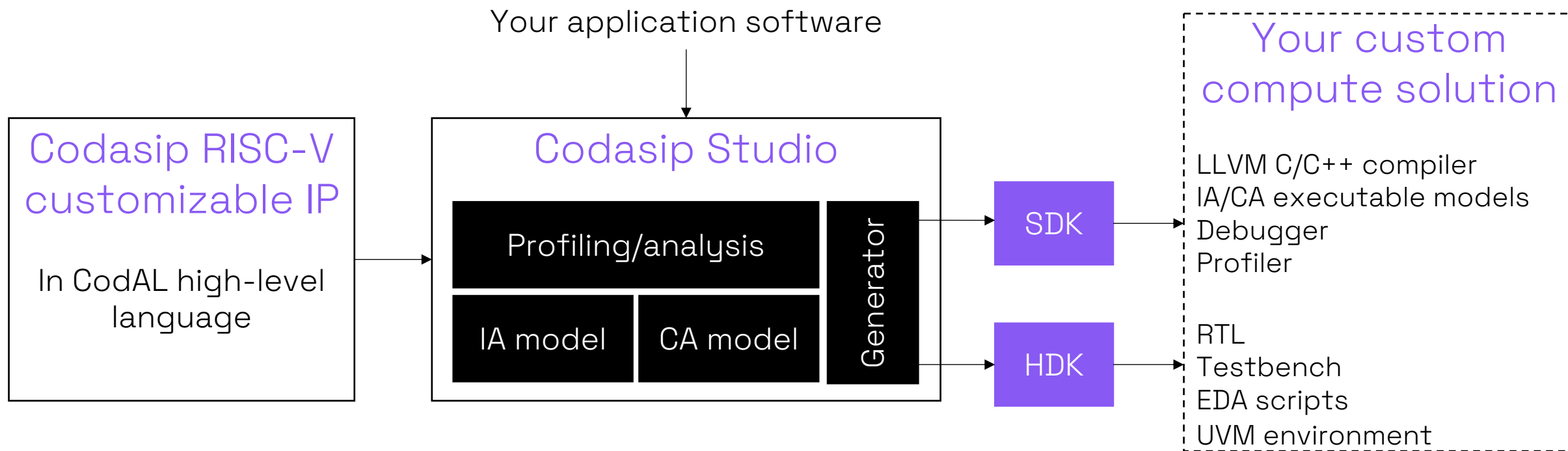
Design automation tools

- Design automation tool
- Fast architectural iteration loop
 - Profiling & optimization
 - Co-simulation
 - Results analysis
- Using **CodAL** high-level language
- Generating custom RTL and SDK

RISC-V Processor IPs

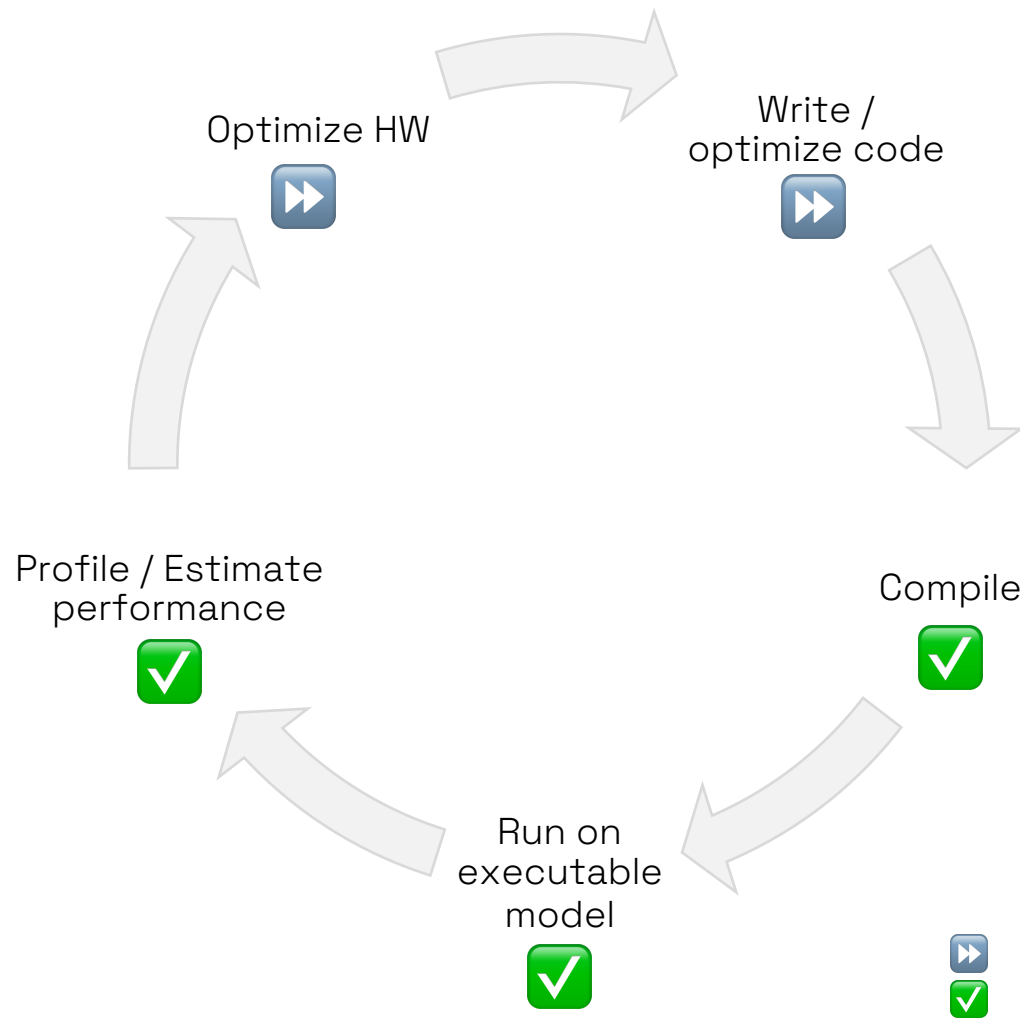
- Production-ready processors
- Written in **CodAL**
- Designed for customization
- Fully RISC-V compliant
- Best-in-class verification
- Also available as ready-to-use RTL

→ IP & tools combination





- Start with a standard core
 - Embedded and application cores
 - High quality, production-ready
 - Fully RISC-V compliant
- Differentiate with Codasip Studio
 - Configure / Modify
 - Using CodAL architecture description language

→ Hardware and software co-optimization accelerated through automation

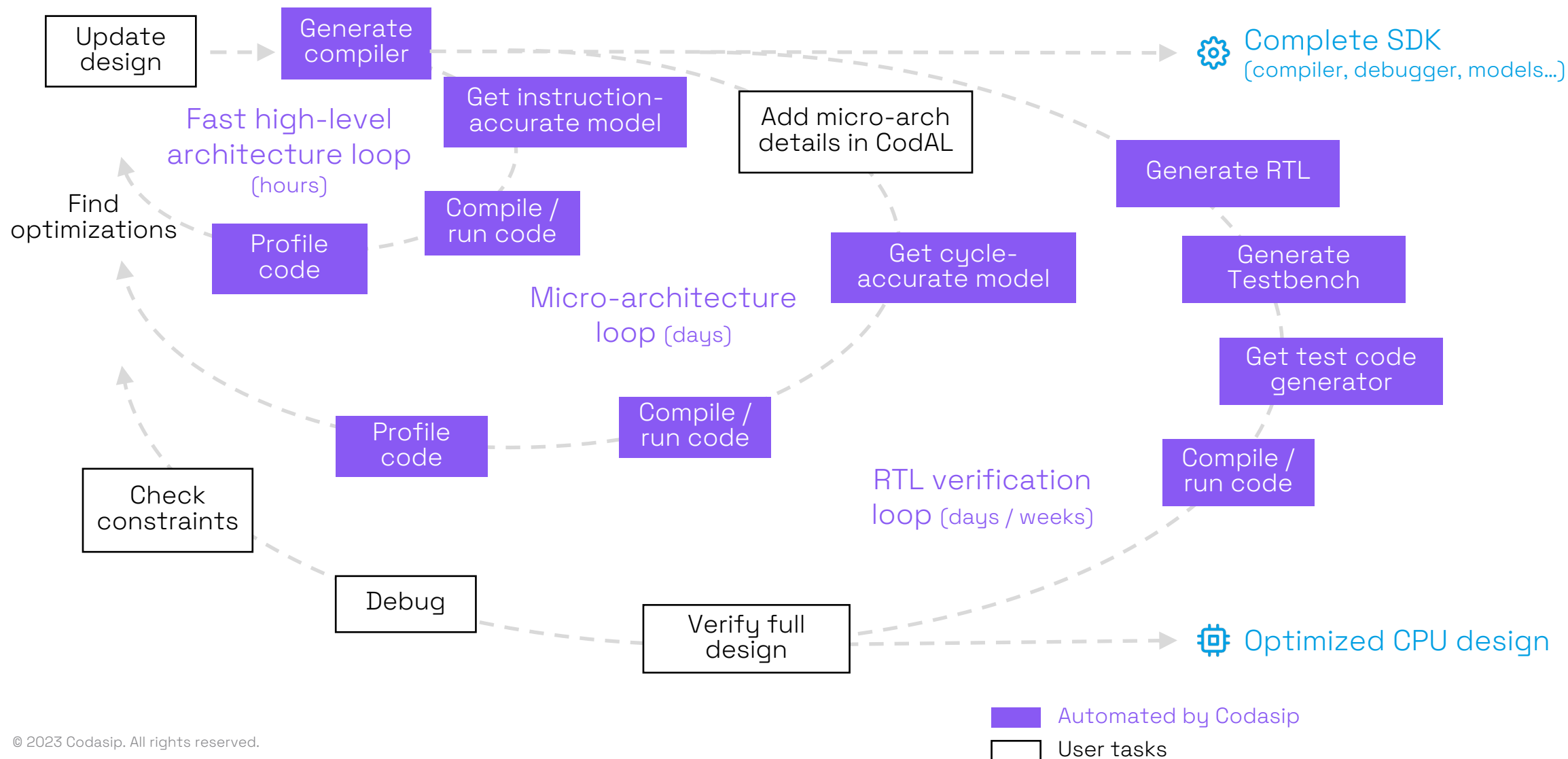


- Iterate to find optimal hardware
- Very long loop by hand
- Codasip provides **automation**
 - Very fast HW description
 - No need to change code
 - Automatic compiler generation
 - Automatic model generation
 - SW Profiling

 Accelerate process with Codasip automation
 Operation done with Codasip tools

→ Get optimal results, fast.

With an automated, iterative design process



→ Custom Compute is the best way forward now



- Silicon process technology progress (Moore's Law) has slowed down
- Differentiation is vital

Custom compute brings

10x ... 100x

efficiency improvement from HW / SW co-optimization



↘
Thank you!

↘
Architect
your
ambition

