



CARP

CORRECT AND EFFICIENT ACCELERATOR PROGRAMMING



Accelerators

Many cores on a single chip



GPUs, e.g. from NVIDIA, AMD, ARM, offer **high performance per unit power**
Can beat CPU performance by **orders of magnitude** (**execution time** and **energy consumption**)

The Challenge

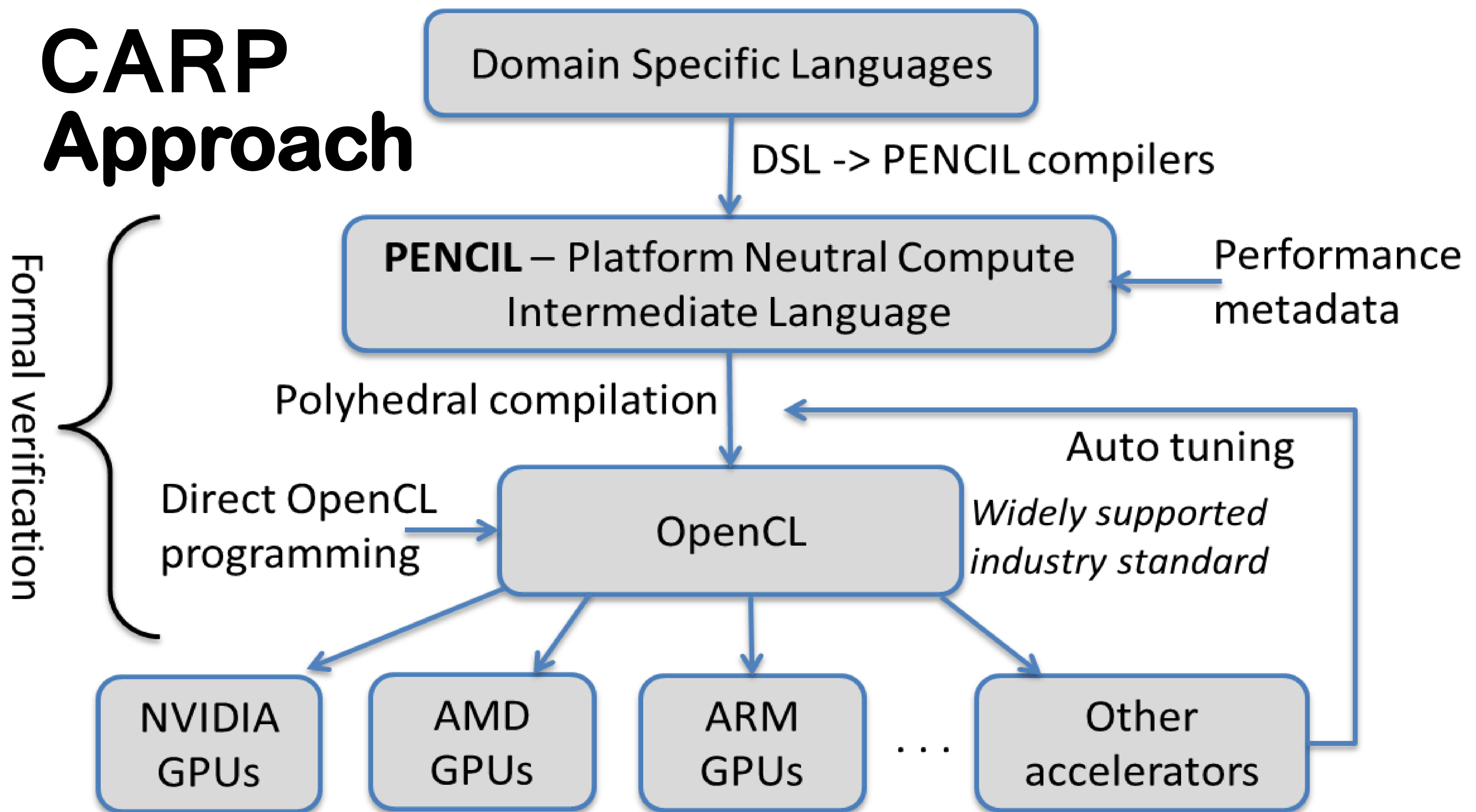
Accelerator programming is hard!

Difficult to achieve **portability** and **correctness** in low level languages like CUDA and OpenCL

Problems:

- High cost** of software development
- Optimisation** for *diverse* platforms
- Maintenance** of *multiple* sources
- Correctness** across *all* platforms

CARP Approach



CARP Vision

Attack accelerator programming from **top down**:

Higher-level programming model and optimising compilers

and **bottom up**:

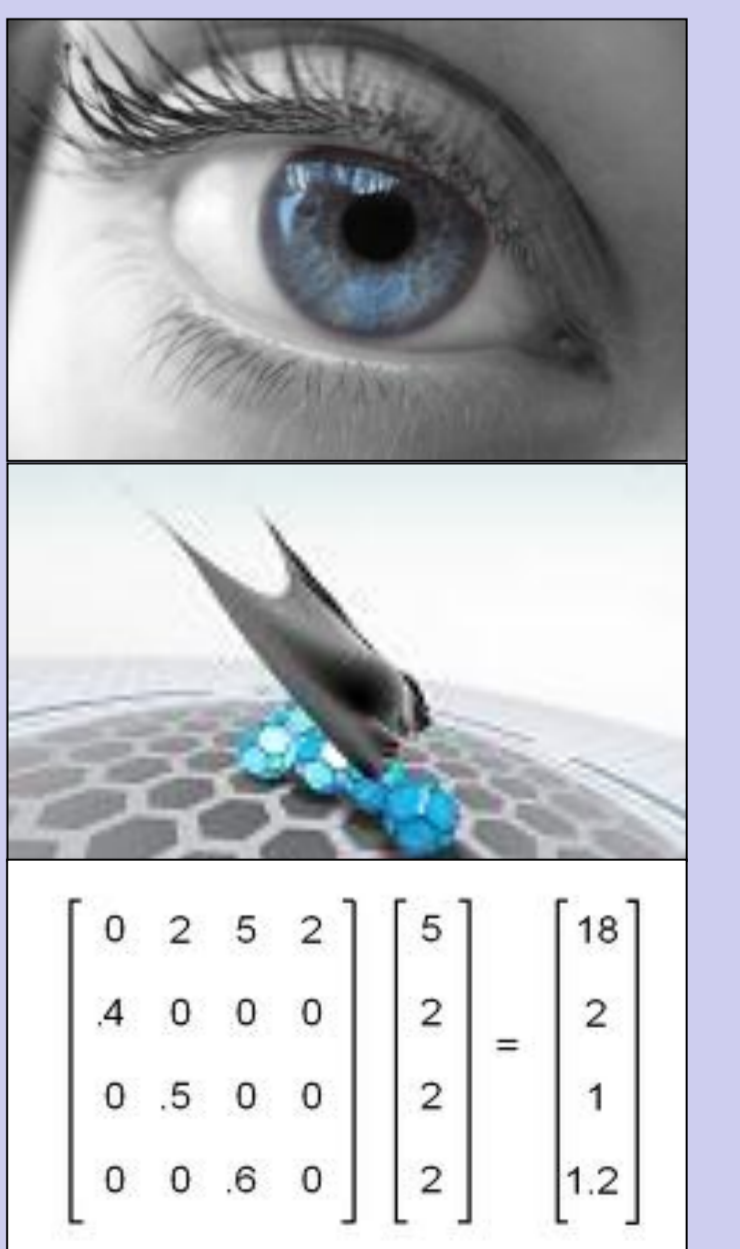
Formal verification techniques for low-level code

Demonstration

Real time eye tracking: GPU-accelerated across multiple platforms

Accelerator benchmarks: Verification used to identify defects

Linear algebra libraries: Portable performance



Expected Impacts

Software development productivity: order of magnitude improvement

Generated vs. hand-optimised code: competitive performance

Fast, reliable and energy efficient computer systems

Find out more: www.carpproject.eu

Project no: 287767
Started: December 2011
Duration: 3 years

