CASLab GPU
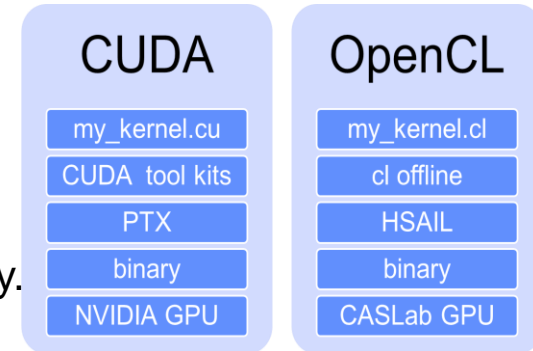
Summary

The CASLab GPU project aims to develop the first SIMT GPGPU for Taiwan. CASLab GPU uses license-free, royalty-free HSAIL ISA specification and supports OpenCL1.2/2.0 APIs for heterogeneous computing. CASLab GPU also supports TensorFlow framework with CUDA-on-CL technology.

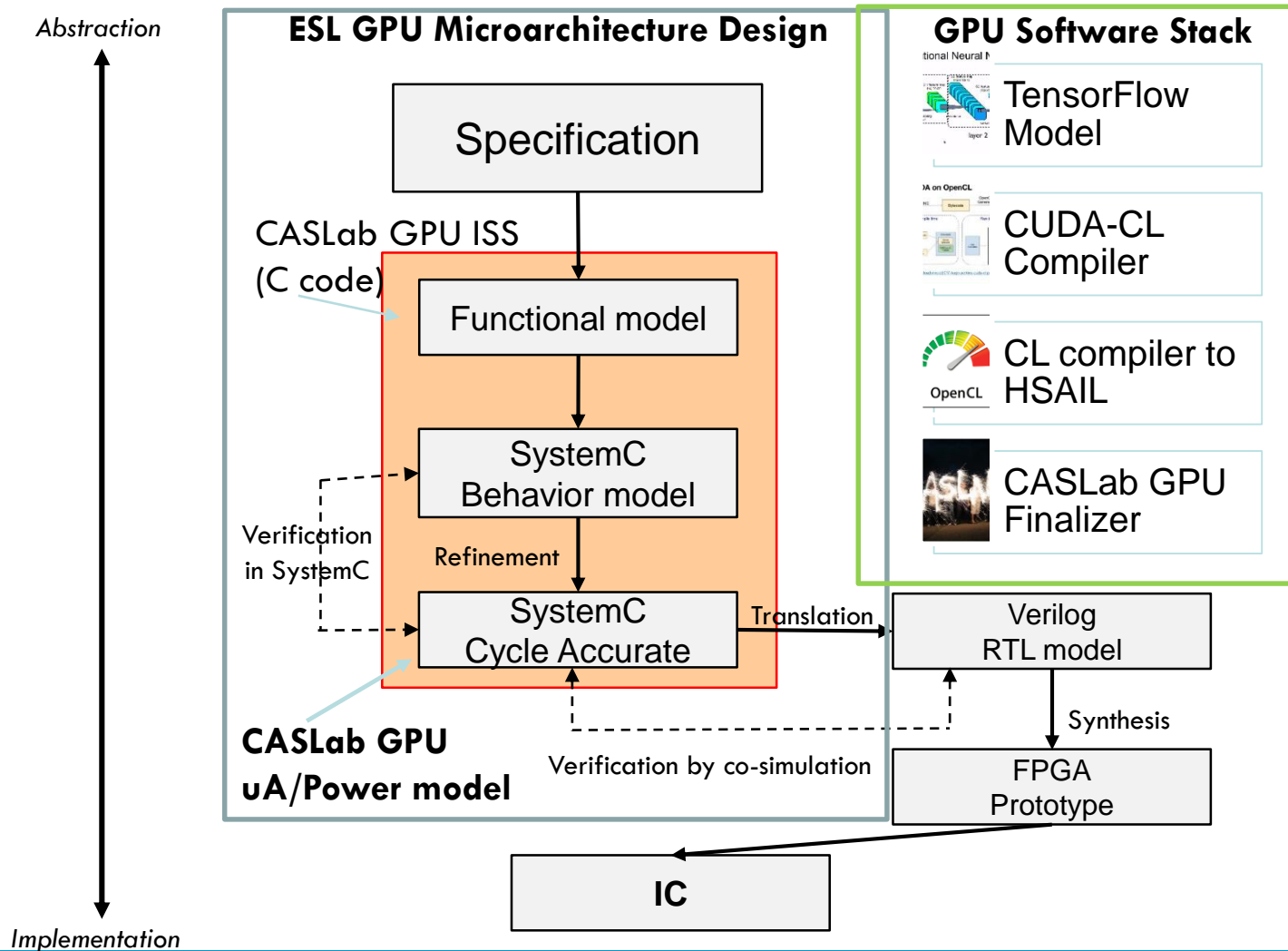| CUDA	OpenCL
my_kernel.cu	my_kernel.cl
CUDA tool kits	cl offline
PTX	HSAIL
binary	binary
NVIDIA GPU	CASLab GPU

Applications

CASLab GPU targets at Edge Learning/ Inference Applications.
CASLab GPU IP with configurable SIMT Core design tailors directly to computing need of on-device learning and inference.
CASLab GPU2.0 supports RISC-V MMU for shared virtual address space access in SoC implementation.
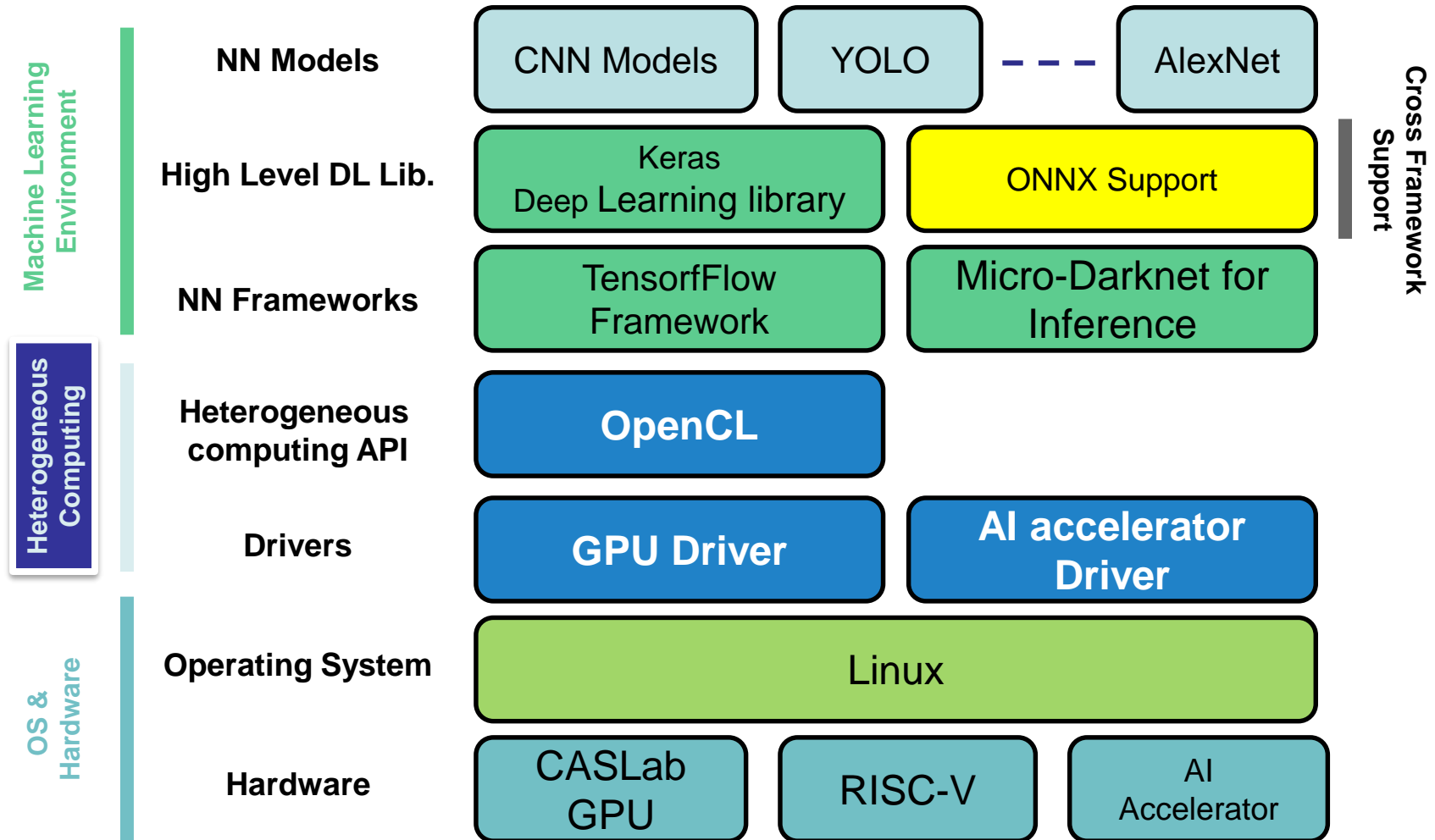
Advantages

CASLab GPU ISA: open standard ISA, open source license AMD CLOC compiler
CASLab GPU Software Ecosystem: open, royalty-free standards, OpenCL™ (Open Computing Language), TensorFlow, and CASLab GDB for GPU debugger.
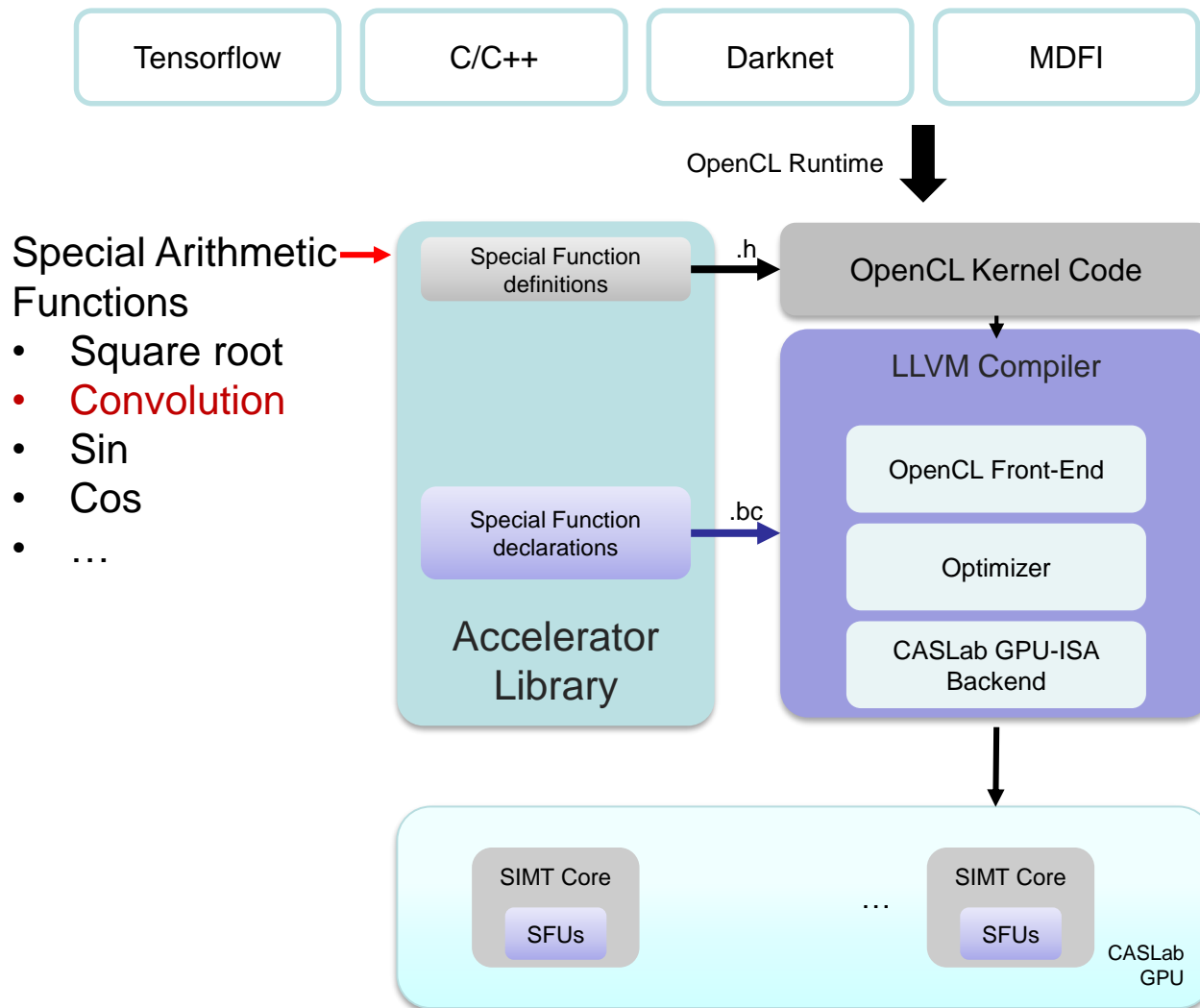
Highlight

CASLab GPU is developed in ESL full system design methodology, considering power model, micro-architecture, and software stack.

The CASLab GPU Framework

Integrate AI accelerator with CASLab GPU

Tensorflow C/C++ Darknet MDFI

OpenCL Runtime

Special Arithmetic Functions
- Square root
- Convolution
- Sin
- Cos
- …

Accelerator Library

Special Function definitions

Special Function declarations

.h

.bc

OpenCL Kernel Code

LLVM Compiler
- OpenCL Front-End
- Optimizer
- CASLab GPU-ISA Backend

SIMT Core
SFUs

…

SIMT Core
SFUs

CASLab GPU

Project Milestone

2019	2020	2021	2022

Accelerator hardware

Accelerator tool chain

Inference accelerator

GPU accelerator system support
LLVM compiler

CASLab GPU full system design verification