Platforms (and Usability)

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Fast Start Workshop - FCCM 2016

Our Motivation

Platforms for low power signal processing

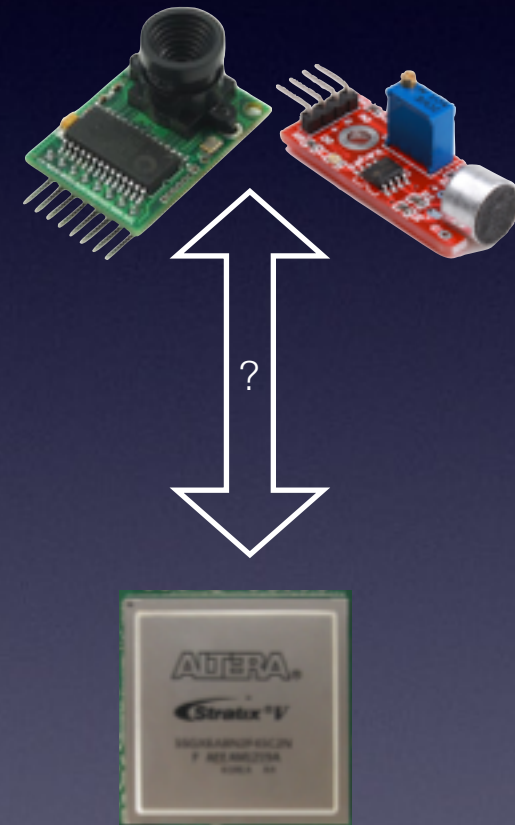Underwater Acoustic Monitoring

Aerial Signal Processing

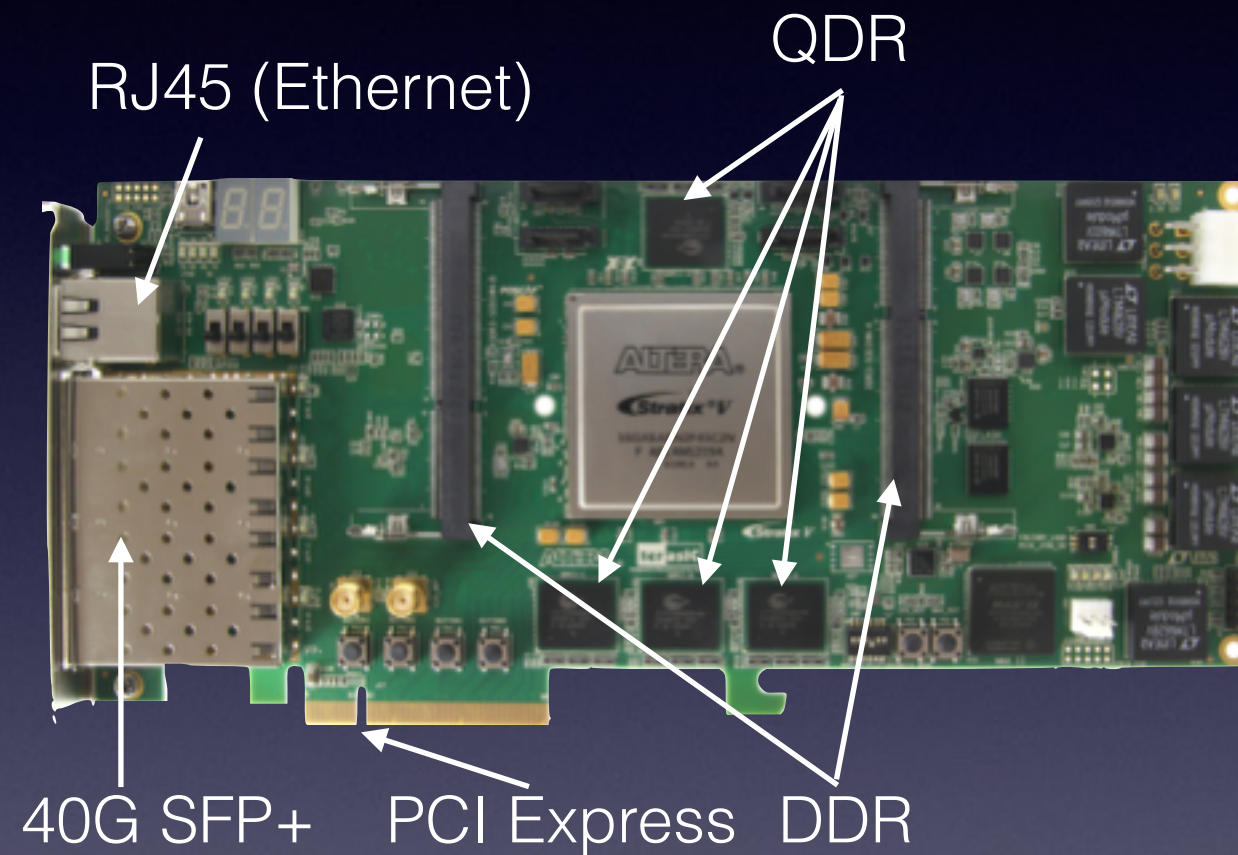Terrestrial Video Processing

Our Challenges

- Simplicity

- Reusability

- Composability

Why is this so hard? Does it have to be?
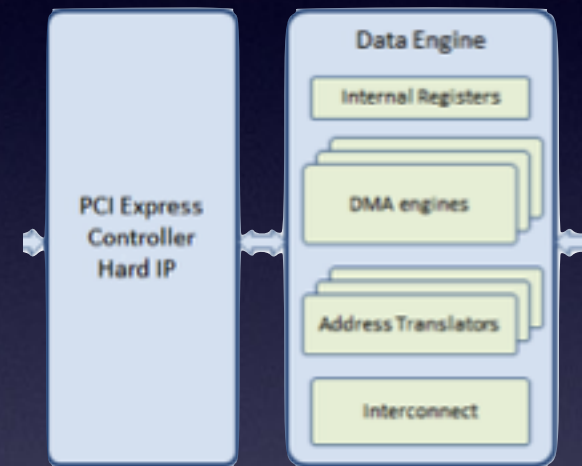
Composability

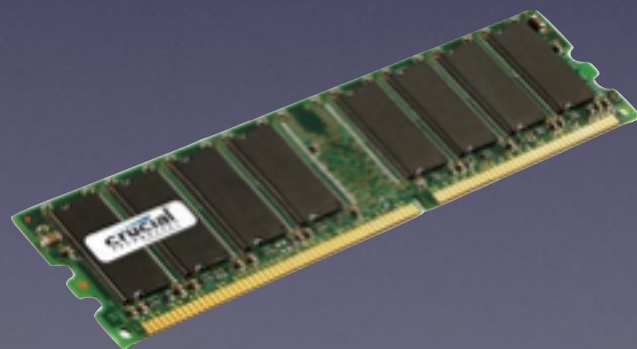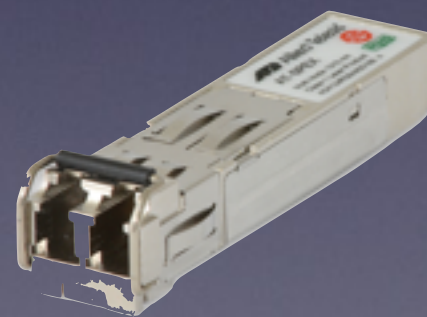# Why is Composability Hard?

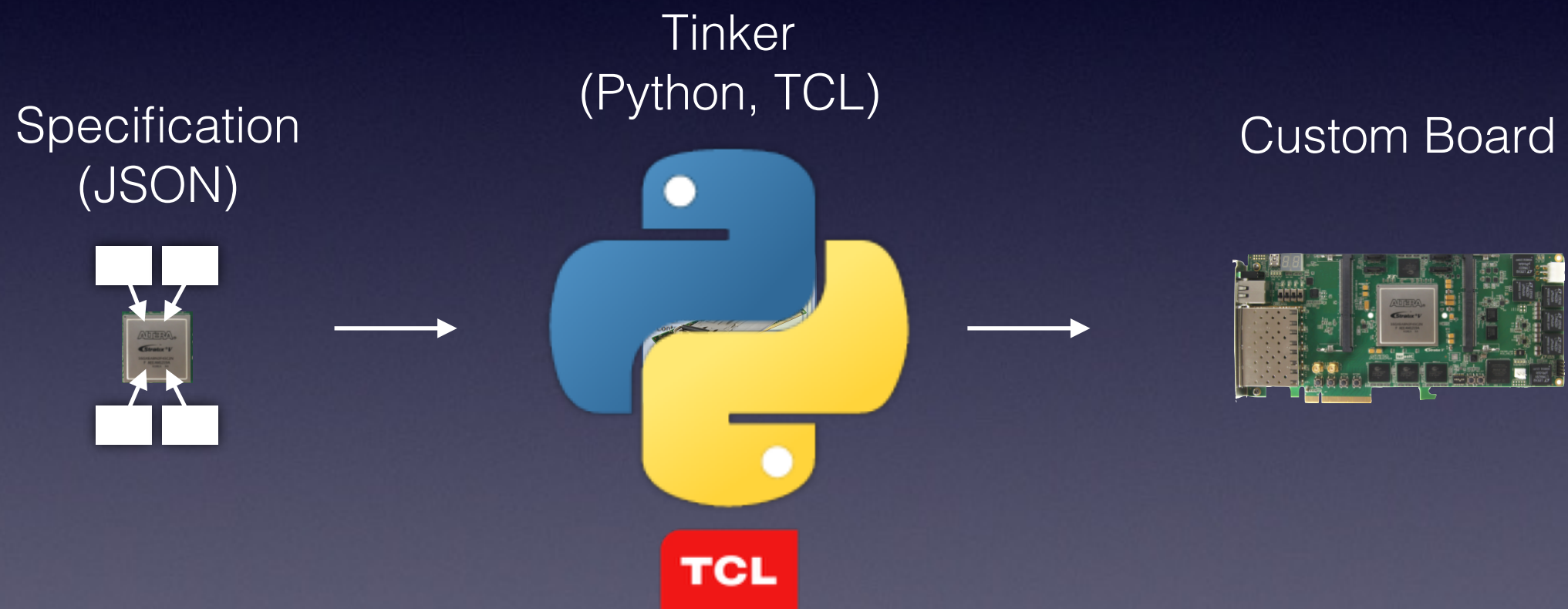User Guide

Quartus/QSys

PCIe DMA

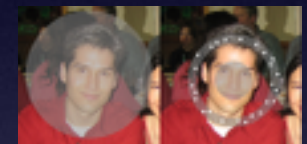Memory Specification

Communication Protocol

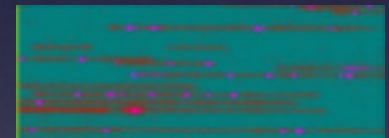# Tinker - A Board Generator for OpenCL

Specification (JSON) → Tinker (Python, TCL) → Custom Board

Simplicity and Reusability

Computer Vision

Bioinformatics

Computation

$$\underset{\mathbf{x} \geq \mathbf{0}}{\arg\min} \; \frac{1}{2}\mathbf{x}^{\mathsf{T}}\mathbf{Q}\mathbf{x} + \mathbf{c}^{\mathsf{T}}\mathbf{x}$$

What does simplicity Take?

Development Board

PCIe Packet Format

PCIe DMA

Kernel Drivers
4 KLOC (RIFFA 2.2.1)

Hardware
24 KLOC (RIFFA 2.2.1)

Simplicity and Reusability

RIFFA

Computer Vision

Bioinformatics

Computation

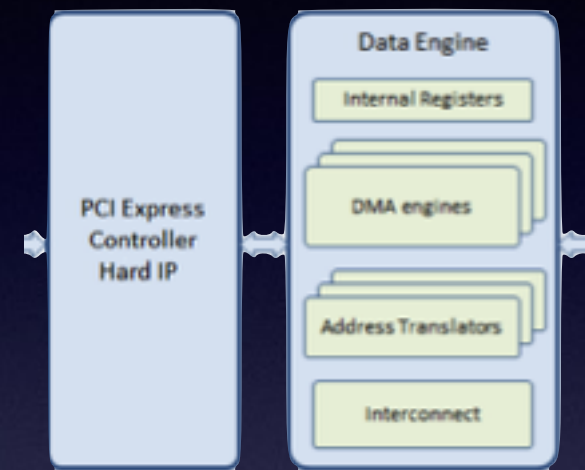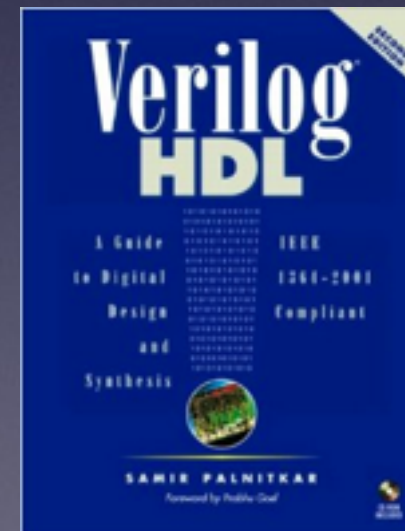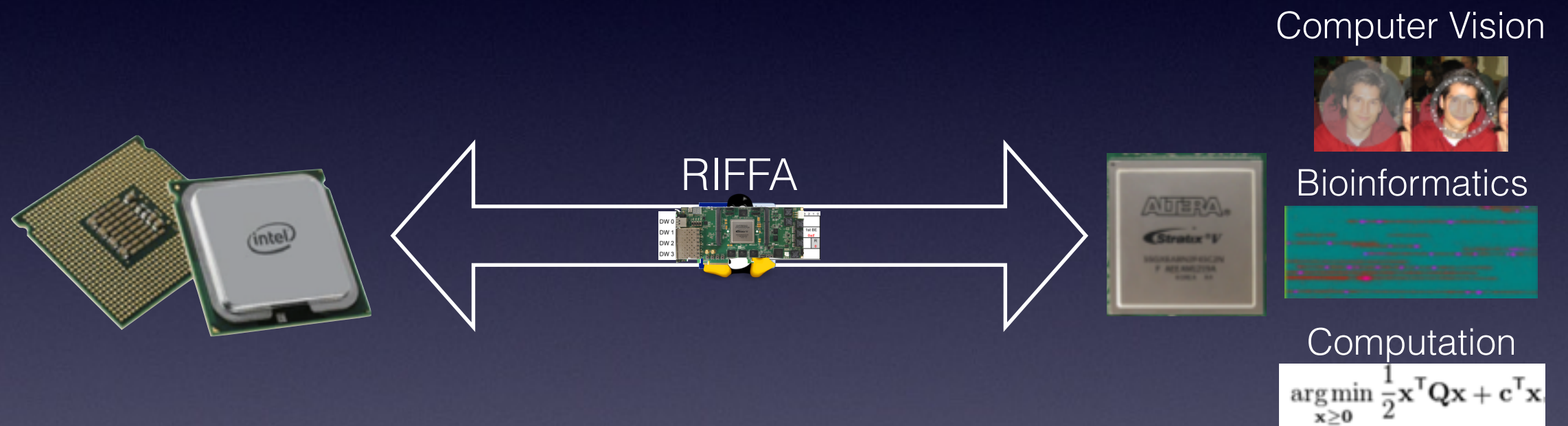$$\arg\min_{\mathbf{x}\geq 0} \frac{1}{2}\mathbf{x}^\mathsf{T}\mathbf{Q}\mathbf{x} + \mathbf{c}^\mathsf{T}\mathbf{x}$$

Reusable Integration Interface for FPGA Accelerators

riffa.ucsd.edu OR github.com/drichmond/riffa

Our Contributions

- Applications

- Users

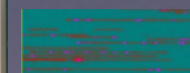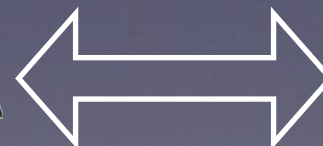- Tools

Tinker

RIFFA