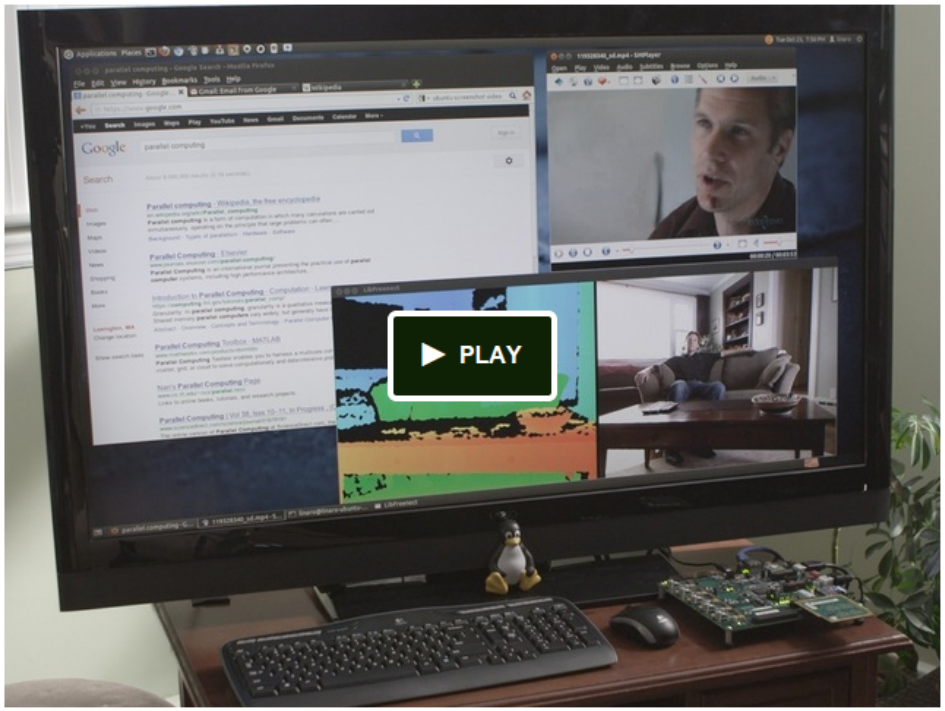
Parallella: A Supercomputer For Everyone

by Adapteva · **You're a backer**

Funded! This project was successfully funded on Oct 28, 2012.



4,965
backers

$898,921
pledged of $750,000 goal

0
seconds to go

Project by
Adapteva
Lexington, MA

First created · **9 backed**
Andreas Olofsson 136 friends
adapteva.com

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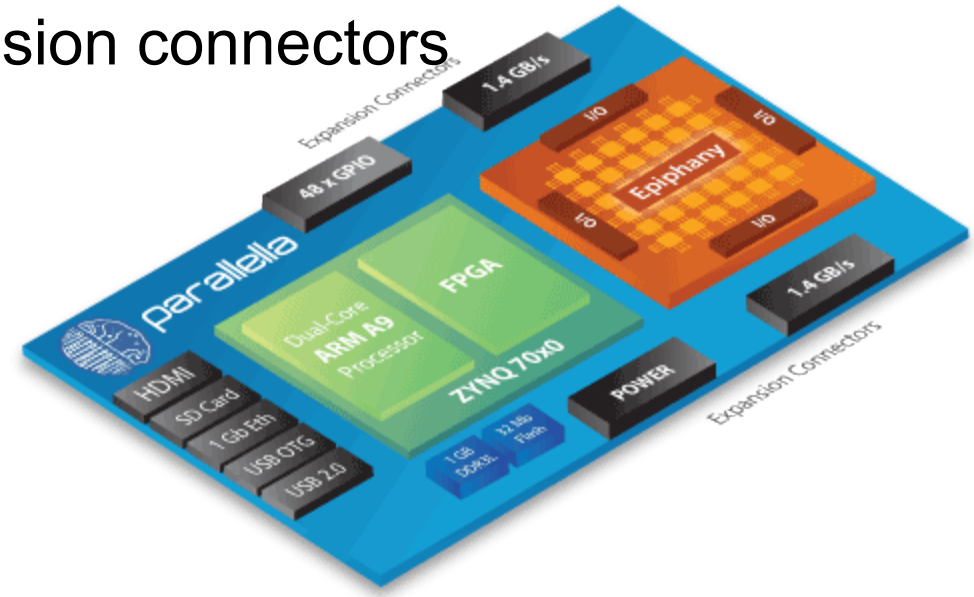
The Parallella project will make parallel computing accessible

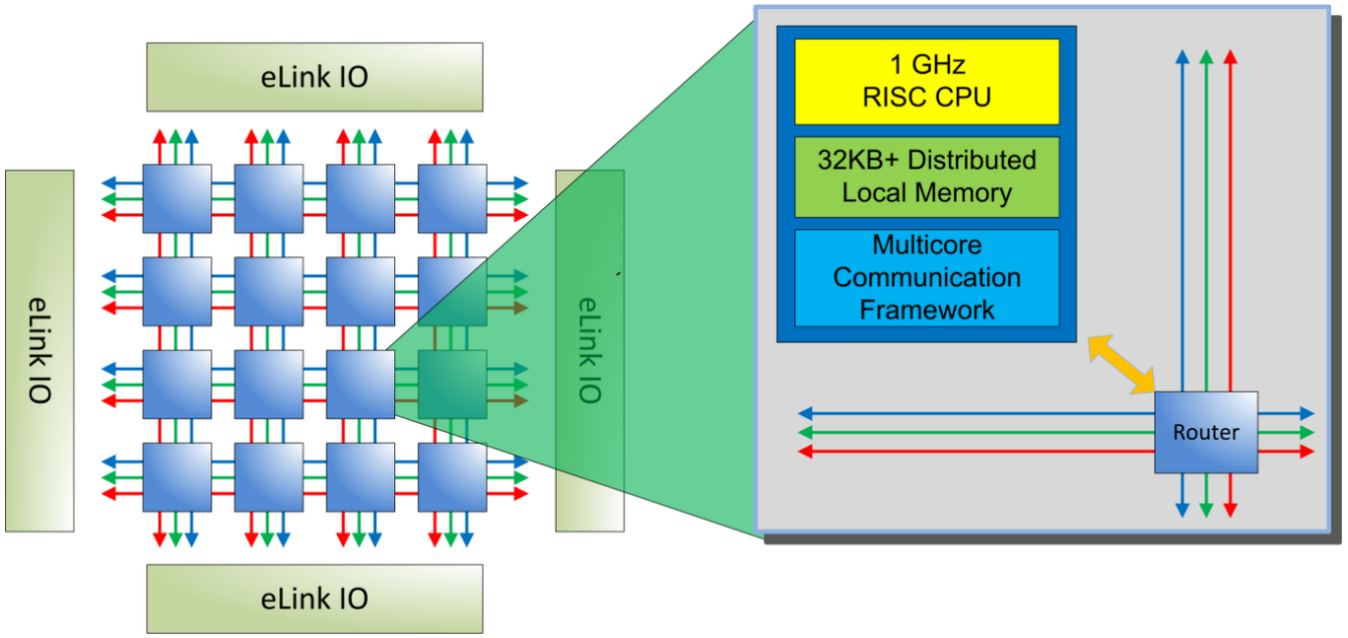
Parallella Computer Specifications

- Zynq-7000 Series Dual-core ARM A9 CPU (Z-7010 or Z-7020)
- 16 or 64-core Epiphany Multicore Accelerator
- 1GB RAM
- MicroSD Card
- 2x USB 2.0
- 4 general purpose expansion connectors
- 10/100/1000 Ethernet
- HDMI port
- Ships with Ubuntu OS
- 3.4″ x 2.15″ form factor

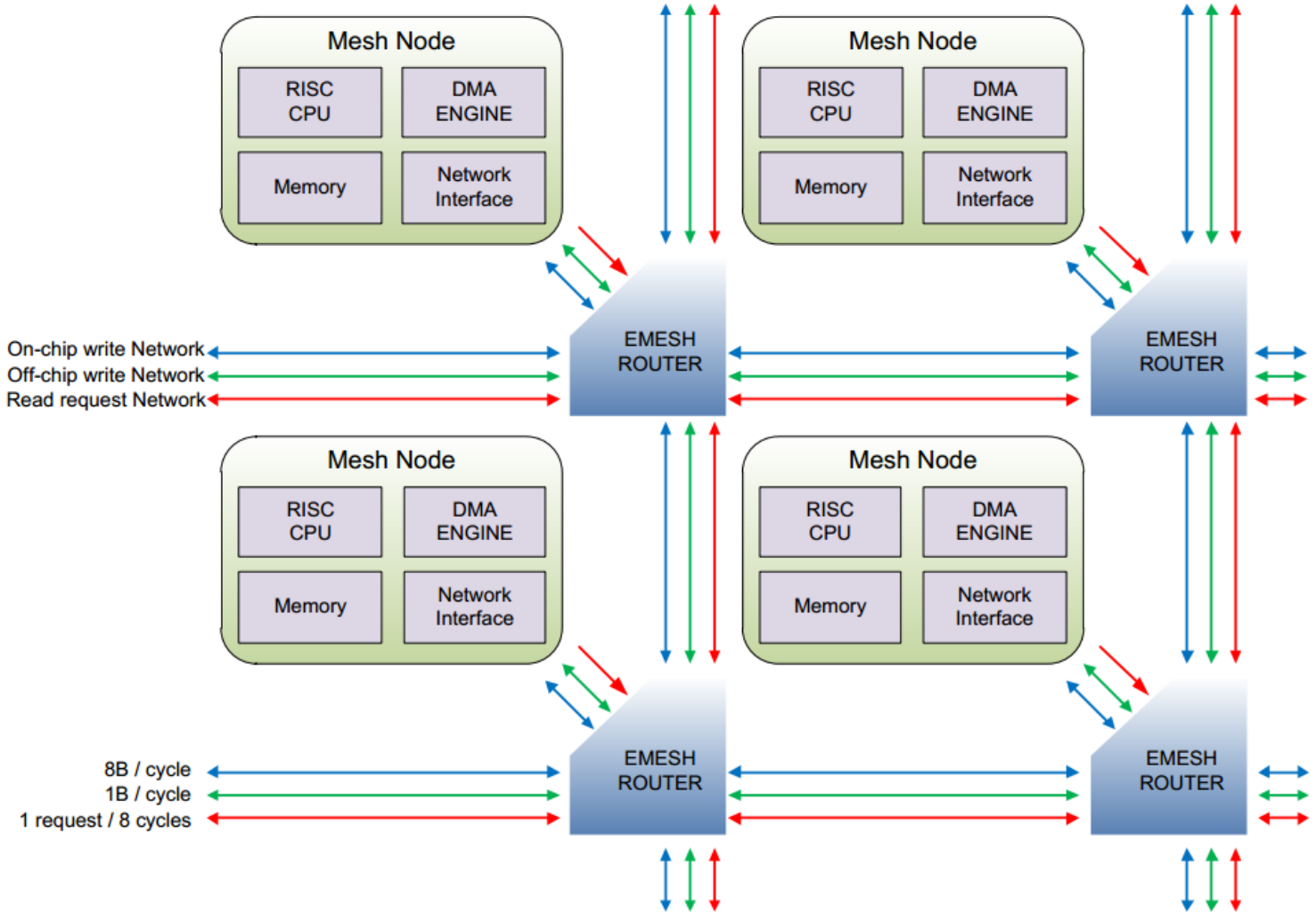


Epiphany Architecture

- A **superscalar, floating-point RISC CPU** in each mesh node that can execute **two floating point** operations and a **64-bit memory load** operation on **every clock cycle**.
- Local memory (32 KB) in each mesh node that provides **32 Bytes/cycle of sustained bandwidth** and is part of a distributed, **shared memory system**.
- Multicore communication infrastructure in each node that includes a network interface, a multi-channel DMA engine, multicore address decoder, and network-monitor.
- A 2D mesh network that supports on-chip node-to-node **communication latencies in nanoseconds, with zero startup overhead**.

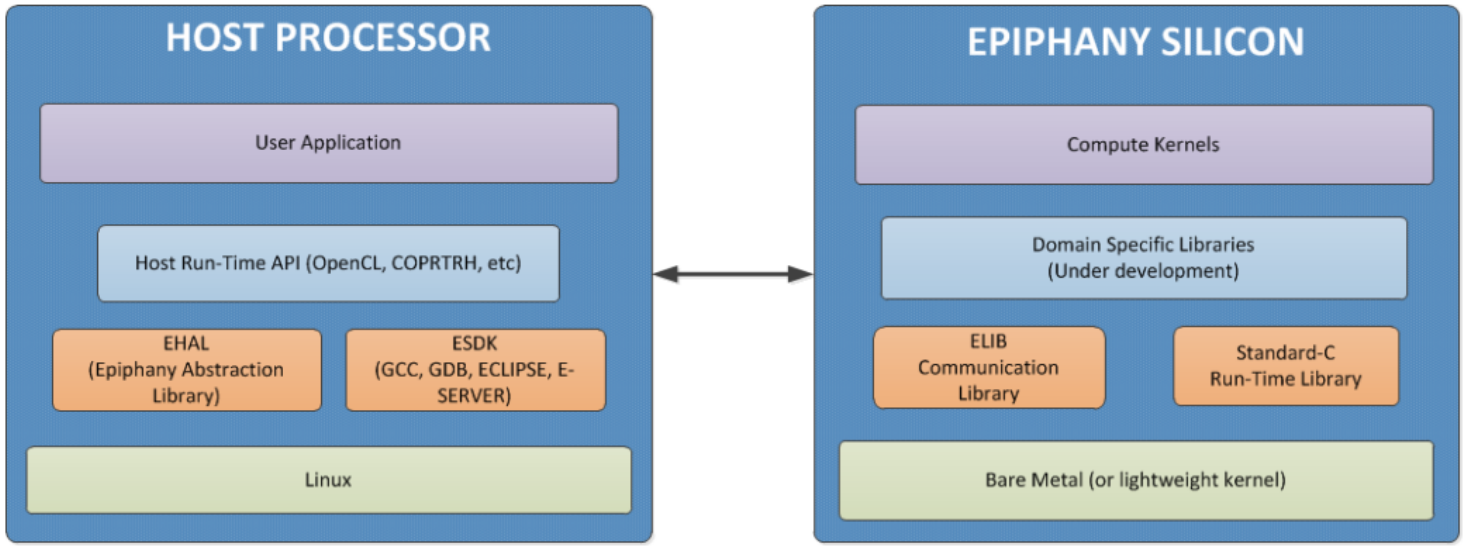


eMesh™ Network-On-Chip Overview



Epiphany Software Development Stack

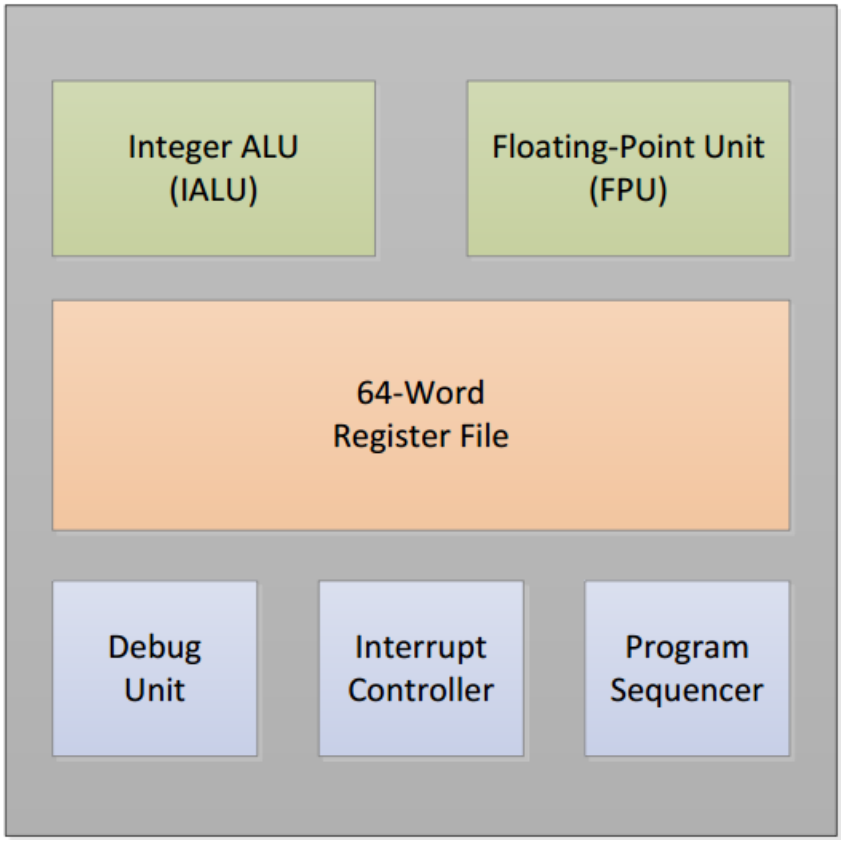
- ANSI-C/C++ GCC compiler
- OpenCL SDK
- Multicore GDB debugger
- Eclipse based multicore IDE
- Runtime library
- Fast functional single core simulator



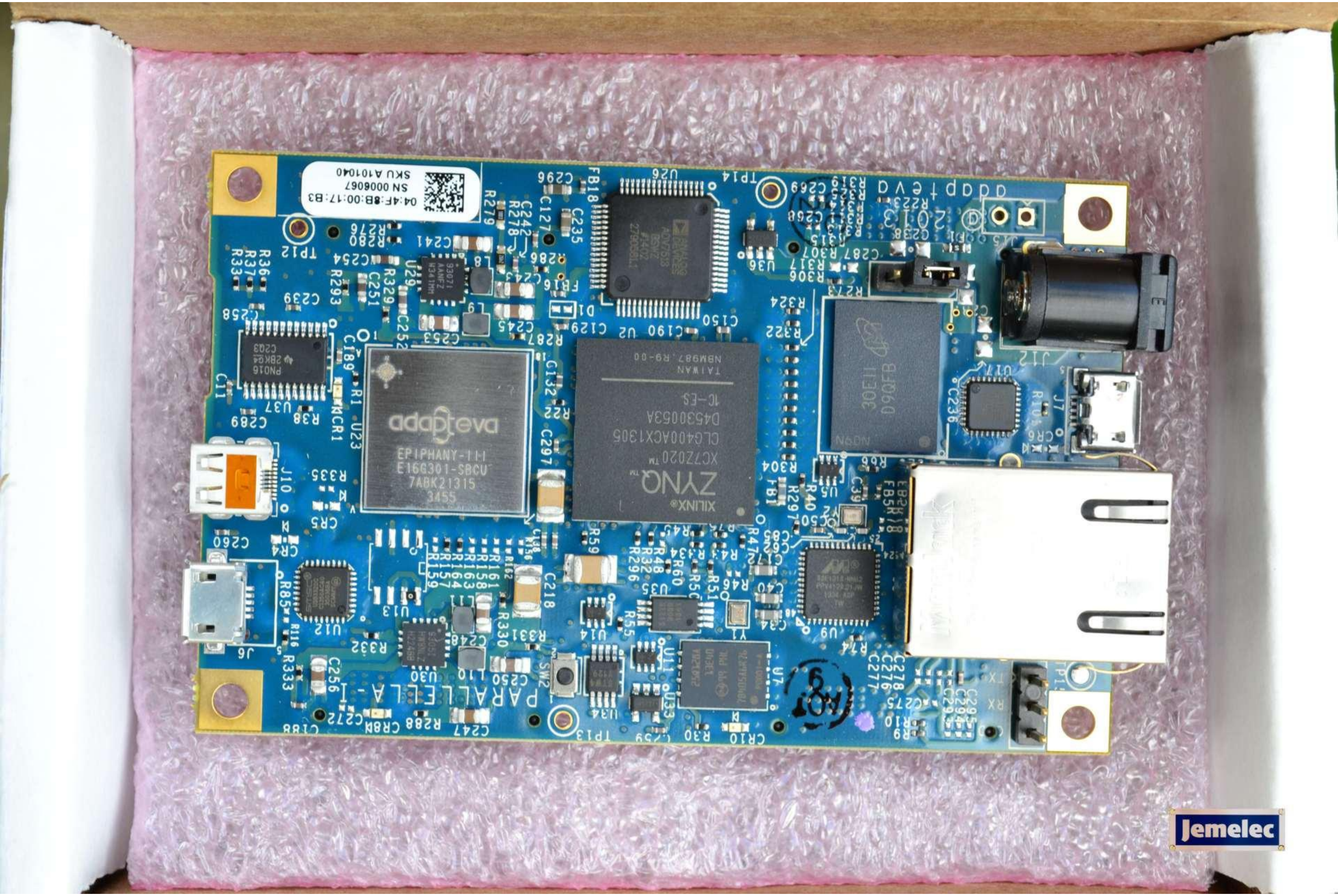
eCore CPU Overview

Data Types

- Byte: 8 bits
- Half-Word: 16 bits (must be aligned on 2 byte boundary in memory)
- Word: 32 bits (must be aligned on 4 byte boundary in memory)
- Double: 64 bits (must be aligned on 8 byte boundary in memory)



- Open Source: software and hardware
  - https://github.com/parallella
  - https://github.com/parallella/parallella-hw (!)
- Inexpensive: starting at $99
- High performance: up to 45 GHz performance
- Low Power: less than 5 Watts typical
- Easy to use: C, C++, OpenCL, Python, etc.
- Configurable: incorporates FPGA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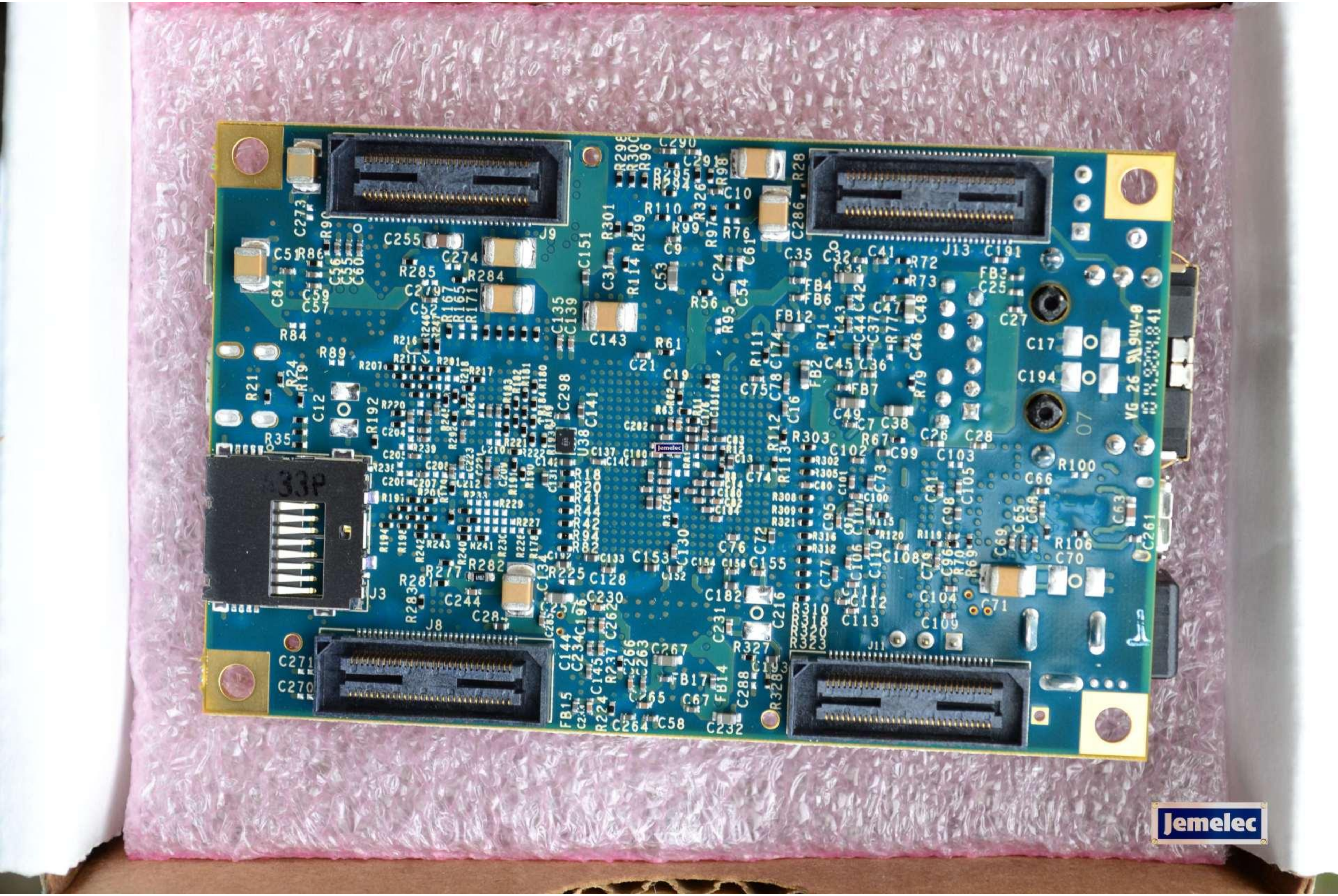

18 months later… with extra heatsink, but still requires some airflow :-)