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

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
18 months later... with extra heatsink, but still requires some airflow :-(