BTech 451 Final Seminar

Parallella Epiphany

Compucon New Zealand

Established in 1992 ...

Registered as

Modern Technology NZ Limited in Auckland

Industry Partner for University of Auckland since 2002

Excels in ...

Providing businesses with workstations and servers

Parallel computing research

The Hardware

Let’s start with the device

The Specs

- Credit card sized
- 16 cores
- Zynq SOC (ARM + FPGA)
- 1 GB SDRAM
- Gigabit Ethernet
- HDMI, USB
- Low Wattage @ 5W

The Board

The Software

What does it run?

Linux Ubuntu

With HDMI

Version 14.04

HDMI enabled

Lacking latest EDSK

Lacking power saving features

Headless

Version 15.04

HDMI disabled

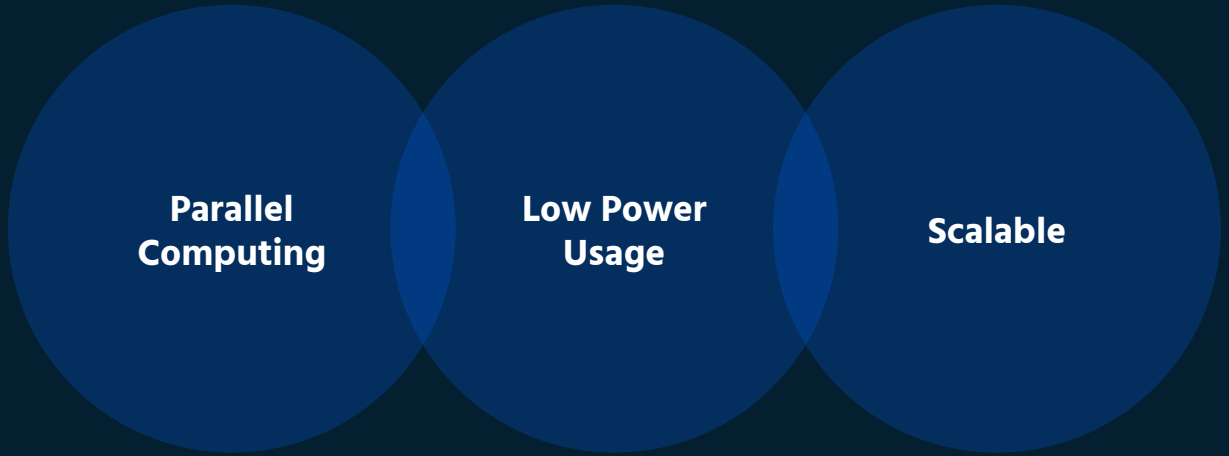
No GUI

Command line only

The Software

What does it run?

Reasons to use the Parallella Epiphany



The Setup

The Performance

Technology & Tests

Epiphany Program Structure

- Two parts
- Host / Kernel
- ARM processor / Epiphany co-processor

Memory

Internal

32 KB each core

Faster

Local access

DMA Engine

Present in each core

Two channels available

Frees up CPU to perform other tasks

External

32 MB shared all cores

Slower

Can be up to 100 times

Memory Transfer Performance

(MBps)	Internal	External	Internal	External
	Read		Write	
Host	16.95	120.13	14.12	99.52
(memcpy) Core	114.85	4.15	478.52	139.02
(DMA) Core	478.52	151.54	1938.79	469.25

COPRTHR & ESDK

COPRTHR

OpenCL implementation

Around 60 times slower vs.

ARM processor (single)

Around 3 times slower vs.

ARM processor (combined)

ESDK

15 times faster in single core

Epiphany BSP

- Developed by CODUIN
- Epiphany Bulk Synchronous Parallel
- Parallel computing model
- SPMD (Single-Program-Multiple-Data)
- Same code, different data for each E-core

Compilation Environment

Ways to build & run applications

Compiling on the Epiphany

Remote Connection

Slow

Network latency

Performance based on the Parallella Epiphany

Cross Compilation

Setup on computer

Install Epiphany SDK

Performance now solely based on computer

Lessons Learnt

What did I learn?

Lessons Learnt

- Little to no documentation
- Some out-of-date or just wrong
- Zynq SOC performance better in certain areas
- Low wattage
- Parallella Cluster can be utilised

THANKS!

Any questions?