A Erlang GPU Computing Cluster

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Background

The worlds first GPU enabled FAWN
(A Fast Array of Wimpy Nodes)

- This has been done before
  - but not with GPU computing on small nodes
- Inspired by the low power usage
  - and the attractive flops/dollar ratio
- Cheap hardware (500USD per node)
- Both GPU and CPU under 100Watts!
- GPU performance has doubled every 6 months since 1990s
- CPU performance doubles every 18 months (Moore’s law)

Key Parts

- Open Source project technology
  - Erlang
  - OpenCL
- Apple Mac mini's with Snow Leopard 10.6

Erlang

- Declarative
- Concurrency
- Soft real-time
- **Robustness**
- **Distribution**
- Hot code loading
- External interfaces
- Portability
- SMP Support

Functional programming language, high abstraction level, pattern matching and concise readable programs

Either transparent or explicit concurrency, light-weight processes and highly scalable

Response times in the order of milliseconds per-process garbage collection

Simple and consistent error recovery, supervision hierarchies and "Program for the correct case"

Explicit or transparent distribution
Network-aware runtime system

Easily change code in a running system. Enables non-stop operation Simplifies testing

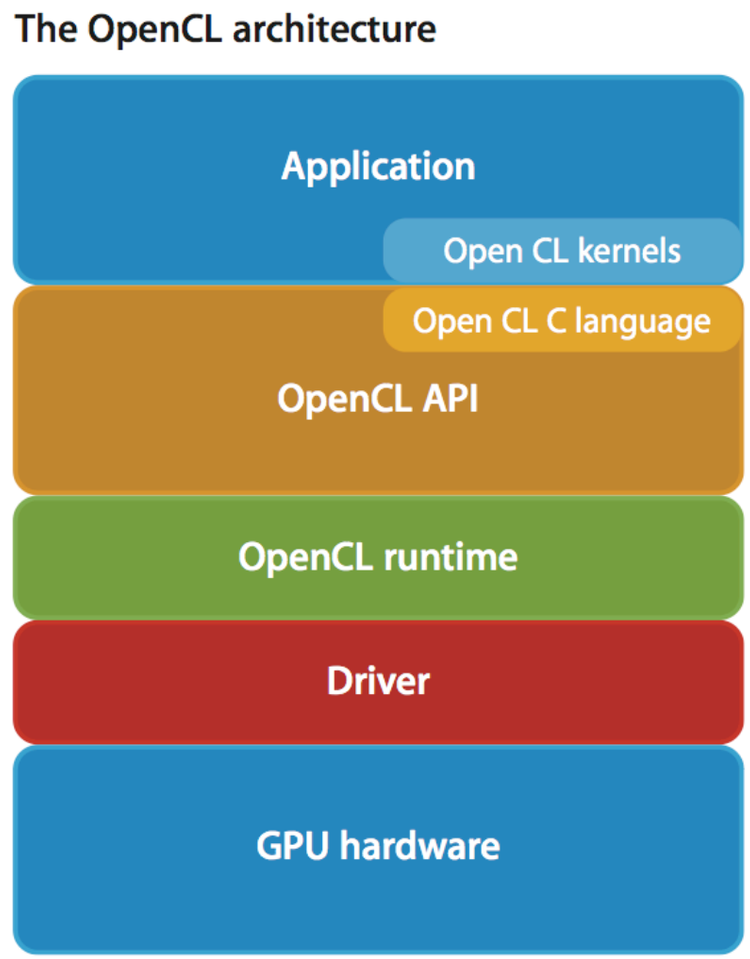
"Ports" to the outside world behave as Erlang processes

Erlang runs on any UNIX, Windows, Vx Works, ...Supports heterogeneous networks

Symmetric multiprocessing support. Takes full advantage of multiple CPU architectures.

OpenCL

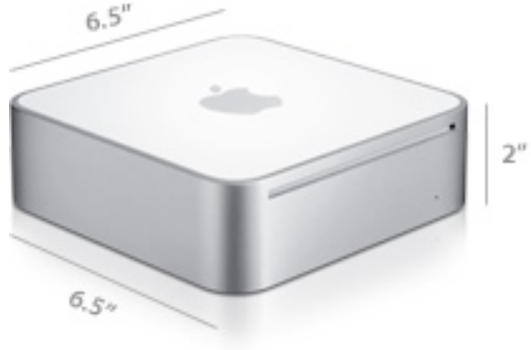
- The open standard for parallel programming of heterogeneous systems
- Great GPU hardware support for leading vendors
- External C program for computing



Layered Architecture

- 1.) coordination
  - add/remove nodes
  - cpu or gpu related task?
- 2.) Transport
  - local disk
  - NFS
  - infiniband
- 3.) Computing
  - segmentation
  - start/stop

Platform



- Apple Mac mini & Snow Leopard
- Less than 100Watts of power
- Fast CPU: 2Ghz Intel Core 2 Duo
- Fast GPU: NVIDIA 9400M
- Bundled support for OpenCL
- Suggestions for other hardware platforms?
- **Project will be given Mac mini hardware or similar**

Vision

- Think hundreds, thousands could be stacked together

Erlang Training & Consulting

The one stop shop for all your Erlang needs

- Founded in 1999
- Offices in the UK, Sweden and Poland
- Clients on Six continents
- System development experience in
  - telecom, banking, e-commerce, track and trace, voice over IP, etc
- Research in collaboration with leading Universities
- We do:
  - in-house system development
  - on site consultancy
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  - Erlang based Recruitment
  - professional training at all levels

Streamfile

Tomorrows digital courier systems today

- The Streamfile platform
  - Nothern Europe's largest uploader portal
  - Scalability - written in Erlang
  - Encryption - your files are disk encrypted by our system
  - Sender owns all keys
  - Supported FTP - use your old FTP workflows
  - Integratable within your domain name
  - iPhone support