

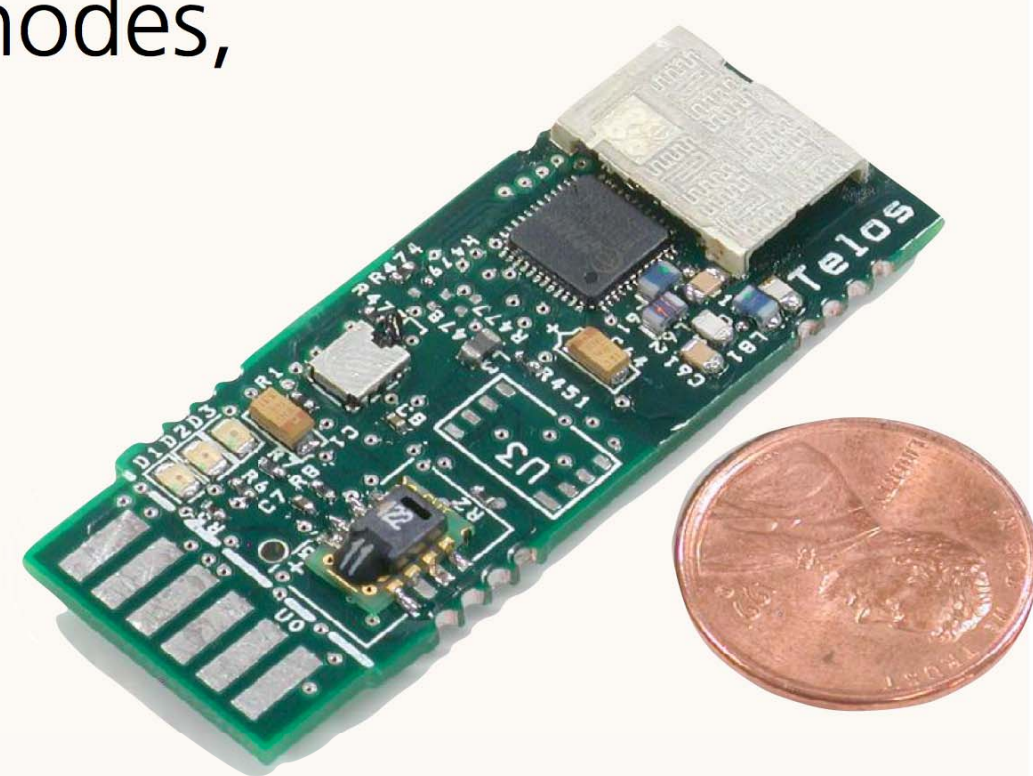
OpenCL as Wireless Sensor Network Programming Abstraction

Wireless Sensor Networks (WSN)

Collection of distributed, battery powered nodes, sensing and forwarding data to a “collect-and-process” sink.

Applied for

Distributed processing across (heterogenous) processors located on sensor nodes and the sink.



Constraints

Collect-only, low-power, low-capability processing units to maximise operating lifetime.

Problems

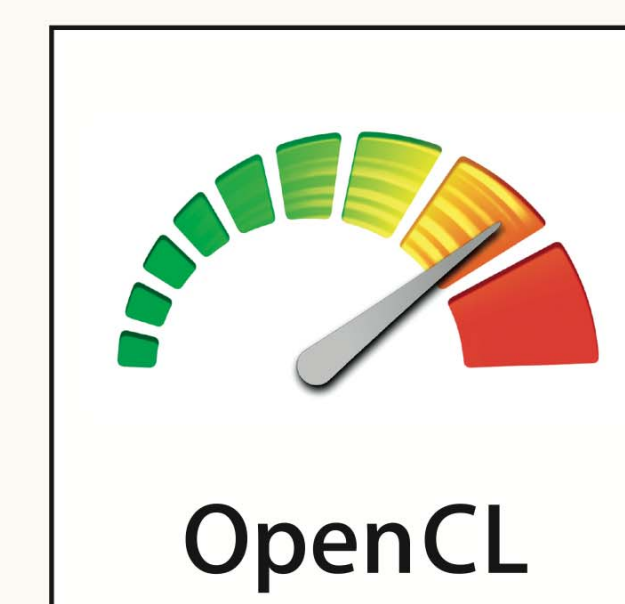
More complex applications require more processing power. Considerable development effort in developing diverse architectures.

Can we build better WSNs?

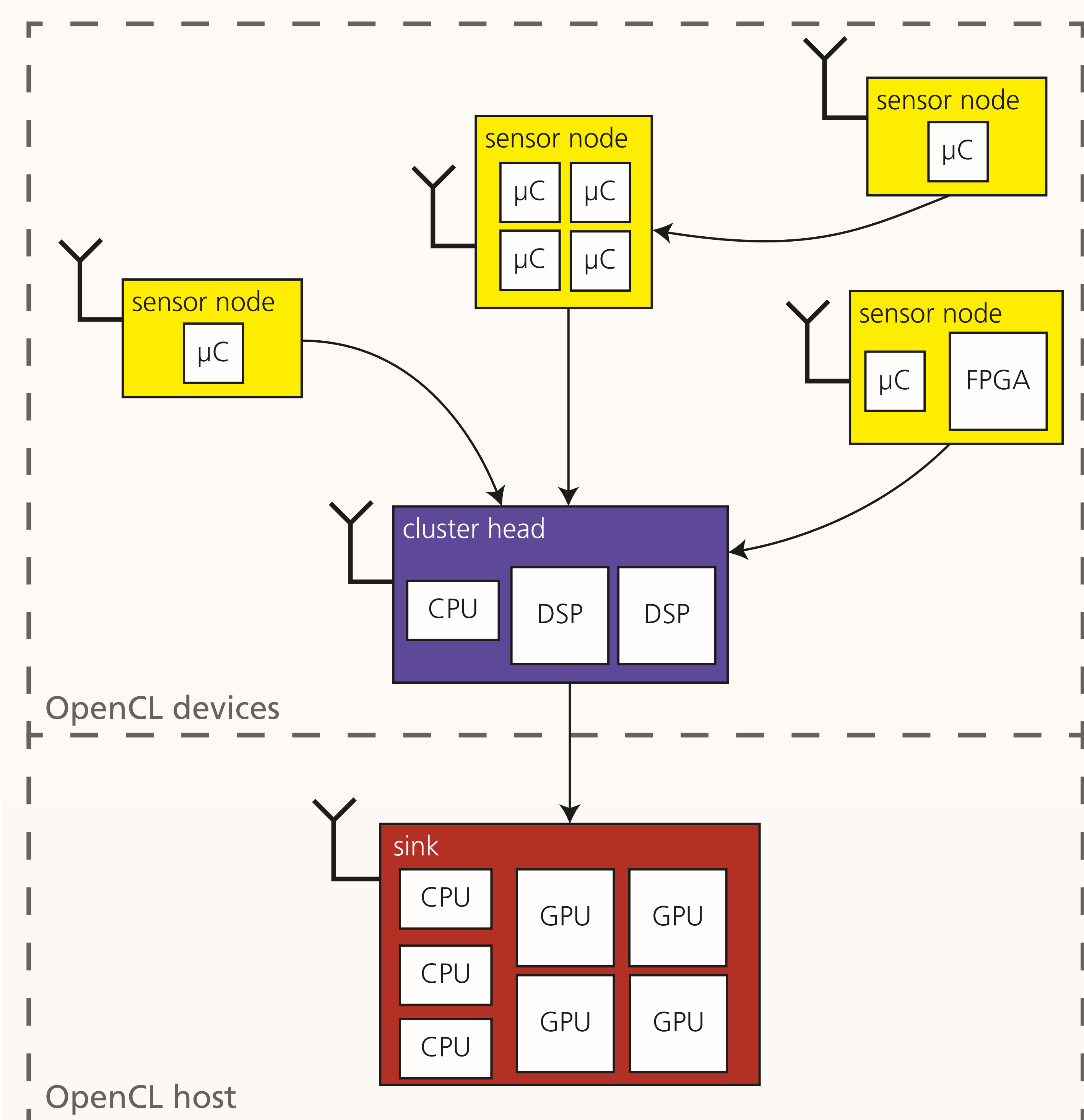
- Building more powerful and heterogeneous sensor nodes adds more processing power to the nodes
- Processing becomes truly distributed
- Heterogeneous sensor nodes
- Programming becomes distributed

How can we program these new generation WSNs?

Use a high level abstraction!



Proposed Architecture



Potential Applications

Structural Health Monitoring

Monitoring bridges for imminent failure.

Wildlife Monitoring

Estimating bird population based on audio analysis.

Advantages

Portability

Write once, run everywhere.

Abstraction

Focus on application instead of messing around with the low-level stack.

Unified View

One application, with kernels distributed over the nodes.

Open Issues

Distributed Environment

Communication links are low data rate, high latency and possibly lossy.

Resource Constrained Processors

More powerful, but still a challenge for the OpenCL embedded profile.

Interacting with underlying framework

For controlling the sensor node hardware.