Green Computing: Managing Power Consumption in Parallel Applications

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Theses - 05/12/2019


Google
Google Search
I'm Feeling Lucky


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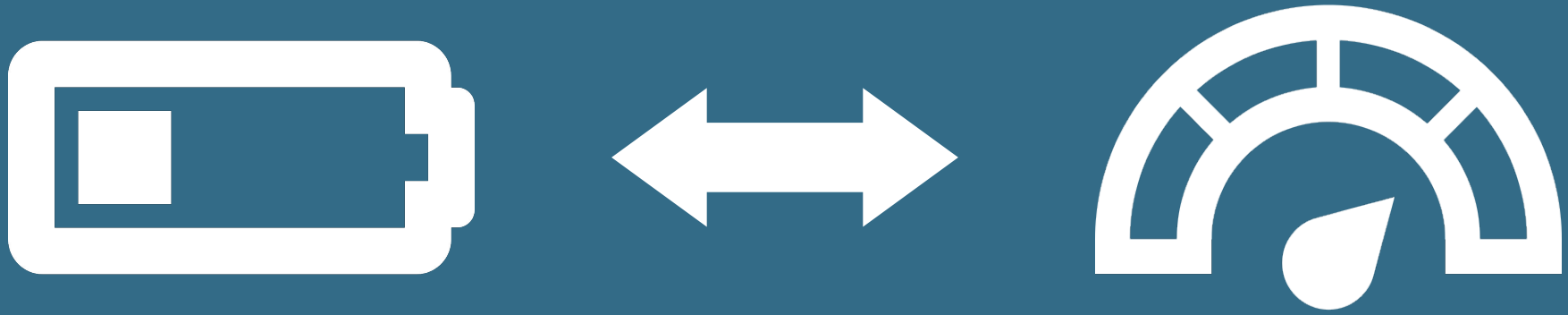
Google | google.com/datacenters

2016: 3% of the global electricity
(more than Italy or United Kingdom)

Cost of the **energy** overcomes cost of the hardware



Trade power for performance (and viceversa)

Different **algorithms** (heuristics, machine learning, etc...)

Applications

Application Interaction
https://github.com/DanieleDeSensi/riff

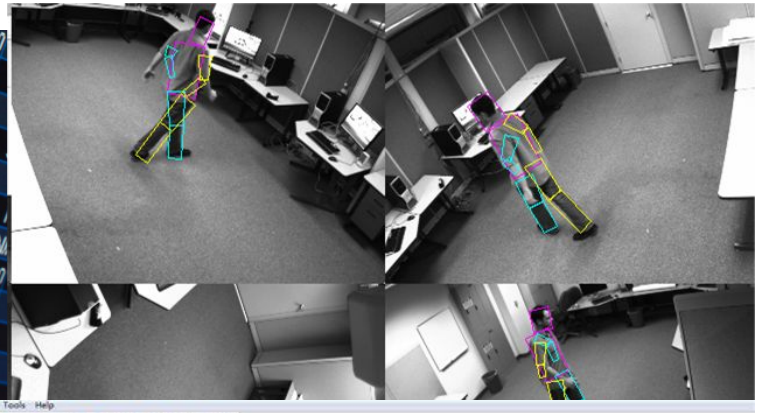
Self-Adaptive and Power-Aware Runtime
https://github.com/DanieleDeSensi/nornir

Hardware Interaction
https://github.com/DanieleDeSensi/mammut



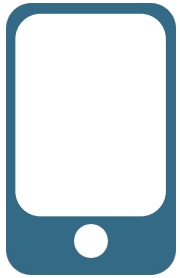
...

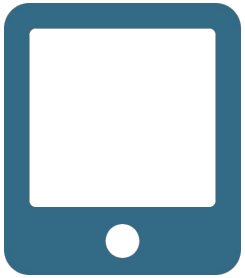
USE CASES




Monitor
Monitor Dashboard
Layered Summary
Application
Net/Transport
Physical
Top MAC Hosts
Top IP Hosts
Monitor Utilization Trend
Graph - Packet Size Distribution

THESIS #1 - MOBILE APPLICATIONS





Batch vs **interactive** applications

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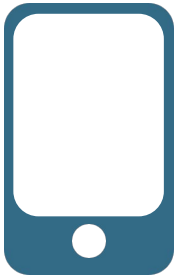

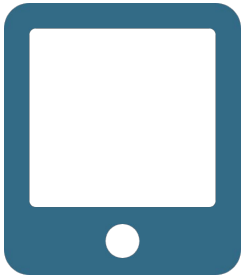

Batch vs **interactive** applications

Heterogeneous hardware

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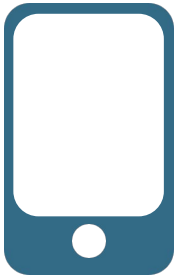
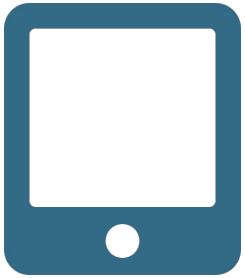


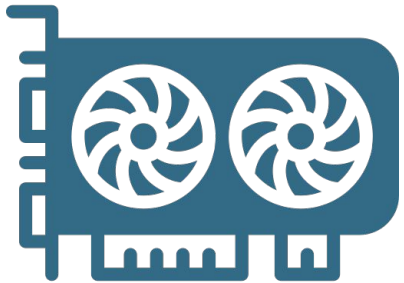


Batch vs **interactive** applications

Heterogeneous hardware

Validation on **hardware** used by Samsung devices

THESIS #2 - GPUs



Analysis on how to **tune** power/performance

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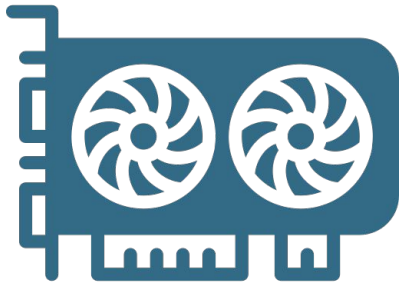

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Widely used for training **Deep Neural Networks**

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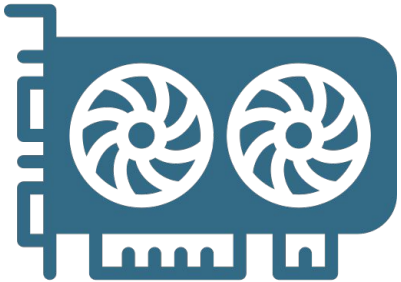
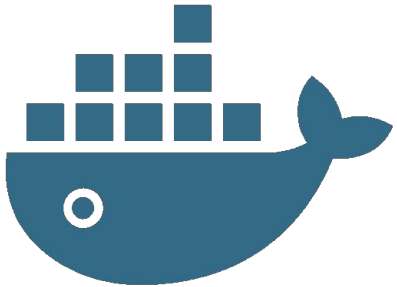


Analysis on how to **tune** power/performance

Widely used for training **Deep Neural Networks**

Key technology in top **supercomputers**

THESIS #3 - CONTAINERS



Naturally allows **resources control**

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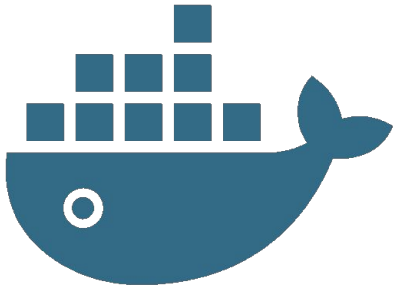

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Coordination of different instances

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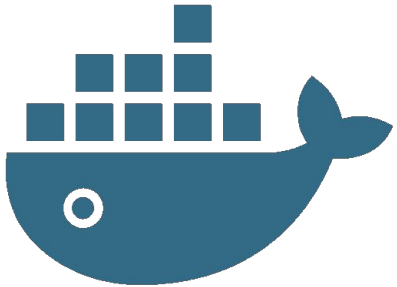

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Coordination of different instances

Multi-Agent Reinforcement Learning

REFERENCES

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