

How energy-efficient is your cloud app?

Mascha Kurpicz, Maxime Colmant, Loïc Huertas, Anita Sobe, Pascal Felber, Romain Rouvoy

▶ **To cite this version:**

Mascha Kurpicz, Maxime Colmant, Loïc Huertas, Anita Sobe, Pascal Felber, et al.. How energy-efficient is your cloud app?. Conférence d'informatique en Parallélisme, Architecture et Système (ComPAS), Apr 2014, Neuchâtel, Switzerland. hal-00974400

HAL Id: hal-00974400
https://inria.hal.science/hal-00974400

Submitted on 6 Apr 2014

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

PARA DIME

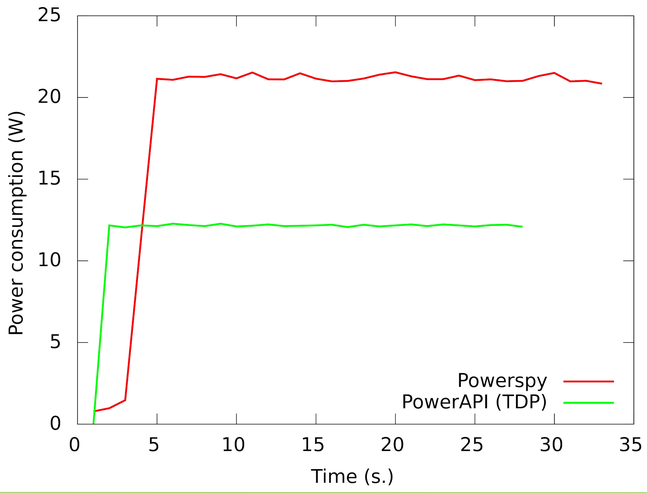
How energy-efficient is your cloud app?

Energy measurements in virtualized environments with PowerAPI

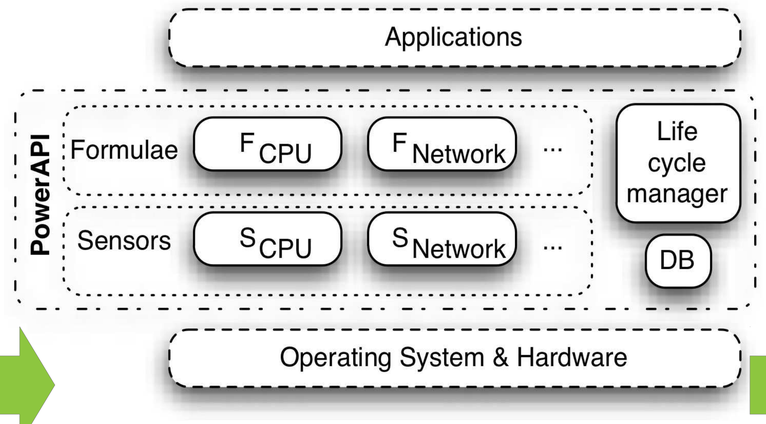
Mascha Kurpicz, Maxime Colmant, Loïc Huertas, Anita Sobe, Pascal Felber, Romain Rouvoy

Context

- Energy-efficiency major concern in data centers
- Existing approaches work for physical servers, not virtualized environments

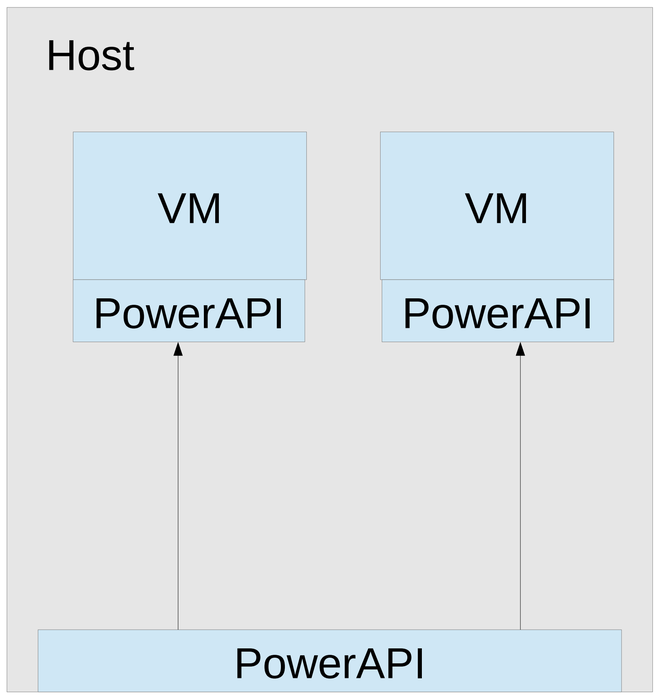


PowerAPI



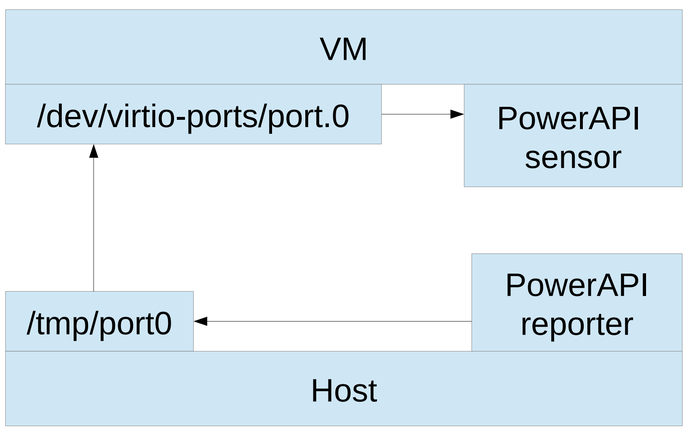
- Scala-based (Akka)
- Process-level
- Modular, asynchronous event-driven architecture

Idea



Methods

Communication with VirtioSerial



Formula in the host

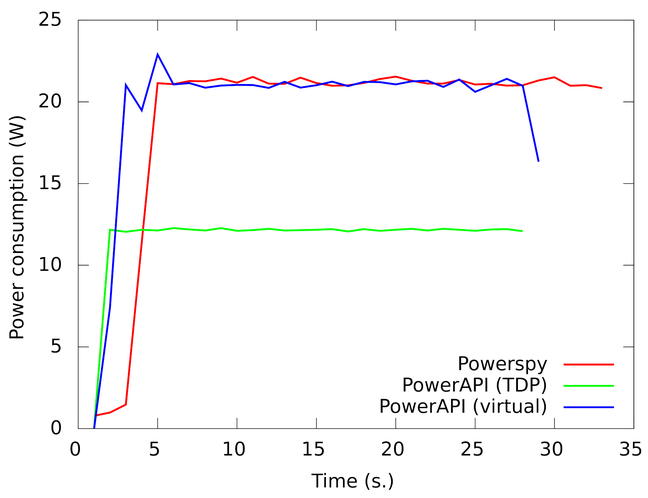
- CPU power consumption not linear to utilization
  - Hyper-threading
  - Turbo-boost
  - DVFS
- Hardware specific
- Determine the formula by polynomial regression with the help of a power meter

Formula in the VM

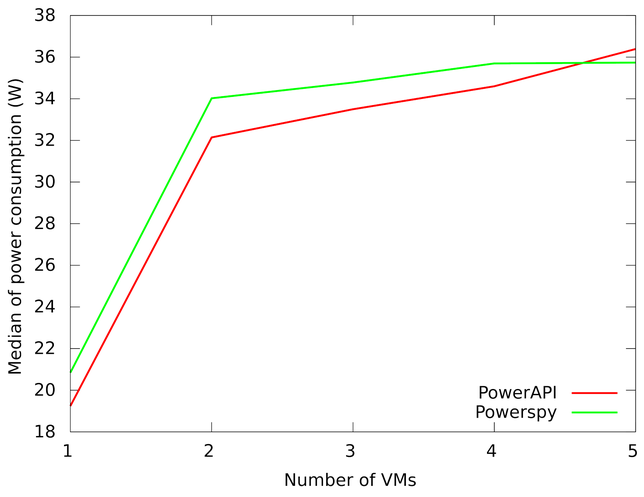
$$P(App) = \frac{P(VM) * U(App)}{U(all\,VM)}$$

- Host reports power of the VM
- VM computes process-level power

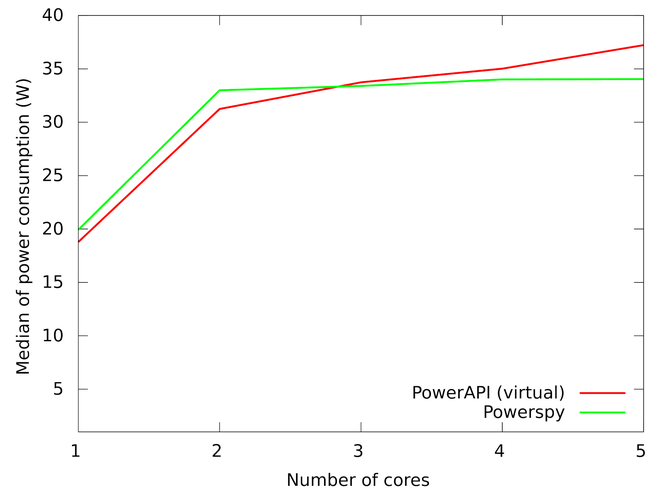
Evaluation



1 VM, 2 cores, load on 1 core



1-5 VMs, 1 core each, load on 1 core



1 VM, 1-5 cores, load on all cores available to the VM

Conclusion

Provide tool to estimate process-level power consumption in virtualized environments

Measurements are first step towards energy-efficient data centers

UNIVERSITÉ DE NEUCHÂTEL

Institut d'informatique
Université de Neuchâtel

informatiques mathématiques