Towards Software Resource Efficiency Benchmarking
Or: How to Get to a Resource Efficiency Classification of Software?

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https://se.informatik.uni-wuerzburg.de
Motivation

➢ More services are placed in the cloud
➢ Datacenters are increasing in number and size
➢ Prediction: Data centers need more than 1PWh annually by 2030 [1]
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Motivation

➢ Cloud data centers can be made more efficient
  • Intelligently placing or consolidating services
  • Minimize resources through auto-scaling while satisfying performance demand

➢ Hardware can be made more efficient
  • DVFS
  • Different C-States

➢ Software controls the hardware and different, but functionally identical software can have a different energy efficiency while the performance does not change\(^2\)

Large impact of implementation
Performance and efficiency: not the same!
Problem

➢ Not much consideration for energy efficiency in software development [3]
  ▪ Knowledge gap: How to achieve better energy efficiency [4]
  ▪ Incentive gap: Why should I bother?

➢ Hardware benchmarks: incentivized development of efficient products
  ▪ SPECpower_ssj 2008
  ▪ SERT® 2 suite
Towards Software Resource Efficiency Benchmarking

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Contribution

➢ Our vision:
  ▪ Software Efficiency Benchmark
  ▪ Assess resource demands
  ▪ Comparison of resource usage of standard application types
    ▪ ERP, CRM, …
  ▪ Resource efficiency entails energy efficiency

➢ Easy-to-use means to describe and assess the resource demand of software
  ▪ Resource-efficiency metric for classification of and comparison between the resource efficiency of software

Make resource usage transparent  Enable comparability  Incentivize resource efficient implementation  Spark competition
TOWARDS SOFTWARE RESOURCE EFFICIENCY BENCHMARKING
Challenges

- How to describe the resource demand?
- How to specify & standardize workloads?
- How can we make results comparable?
- How to achieve awareness and acceptance?
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Possible Incentives to Increase Awareness and Acceptance?

- Awareness and acceptance of stakeholders
  - socio-technical problem
- Adapt approaches from similar incentive-based mechanisms
  - Labels: Energy Star, Blauer Engel
  - SPECpower_ssj 2008
- Propose our ideas, input and output format
- Get Feedback
  - Publications, questionnaires, workshops
  - Scientific community
  - Software developers
  - End-users
Vision: Resource efficiency benchmark for software
- Enable comparability
- Increase awareness
- Spark competition

Incentivize resource efficiency as a non-functional requirement

Next steps
- Present work-in-progress at scientific conferences
- Get feedback
- Implement prototype
Thank You!

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