ECO₂Clouds

ATOS, *Spain*

Atos is an international company focused on Services for Information Technologies (IT) and currently with headquarters located in Paris, with presence in 42 countries.

University of Manchester, *UK*

The University of Manchester (UNIMAN) is the largest campus based university in UK with close links to industry.

HLRS, *Germany*

The High Performance Computing Centre is a research and service institution affiliated to the University of Stuttgart. It has been the first national supercomputing centre in Germany offering services to academic users and industry.

EPCC, *UK*

EPCC is the University of Edinburgh's High-Performance and Novel Computing Centre. EPCC provides a wide variety of services to academia and industry

Politecnico di Milano, *Italy*

Politecnico di Milano is a State University in Italy, established in 1863, ranked as one of the most outstanding European universities

Inria, *France*

Inria is the only public research body fully dedicated to computational sciences. Inria collaborates with the main players in public and private research in France and abroad.

European Commission — Seventh Framework Programme

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ECO₂Clouds

Advancing ecological awareness in the Cloud

Identifying good practices to improve energy efficiency of Cloud data centers
*
Developing techniques and mechanisms for CO₂ aware application deployment on Cloud

Measure

Create

Test on Fire
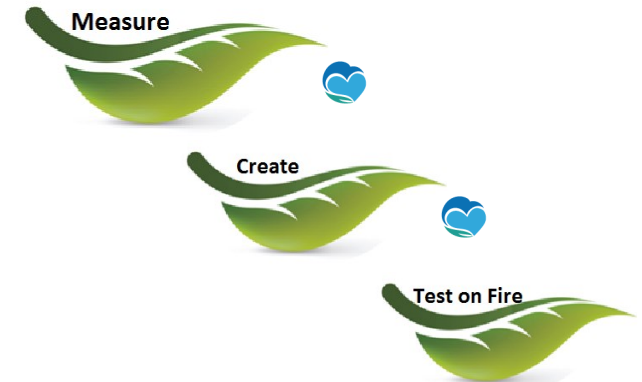
ECO₂Clouds

Duration: October 2012 - September 2014
FP7-318048

European Commission

ECO$_2$Clouds

Vision

Ecological implications of Cloud IT infrastructure are creating a critical gap in the current state of the art in research and business.

The ECO$_2$Clouds project investigates strategies that can both ensure effective application deployment on the Cloud infrastructure and reduce energy consumption and CO$_2$ emissions.

The need for novel deployment strategies becomes more evident when an application spans multiple Clouds, since Cloud providers operate under different regulatory frameworks and cost structures in relation to environmental policies and energy value chains.

ECO$_2$Clouds will complement existing multi-Cloud facility provided by the FP7 BonFIRE (Building Service Testbeds on Future Internet Research and Experimentation) project, which will be extended to provide real time information about energy usage at different levels.

This will be complemented by innovative deployment optimization and runtime adaptation techniques and algorithms thus facilitating optimal energy consumption across different facilities in the Cloud infrastructure.

Objectives

- Develop key metrics to express energy consumption and CO$_2$ footprint of Cloud facilities and applications for quantification of their environmental impact.

- Create optimization and deployment model to generate configurations which reduce the environmental impact when the workload is mapped to infrastructure at Cloud site, host and VM level.

- Propose and design innovative application deployment strategies for sustainable federated Cloud sourcing while supporting adaptation mechanisms that can perform changes to running applications based on energy consumption.

- Validate the effectiveness of the proposed optimization and adaptation process through challenging application case studies.
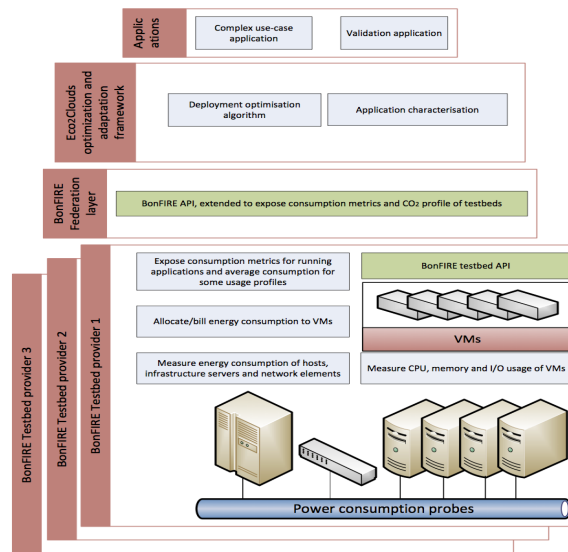

Expected outcomes of ECO2Clouds

Strategies for Energy Efficient and CO$_2$ Aware Application

Optimization of energy consumption in the Cloud Infrastructure

- Eco-metrics to expose the energy consumption and CO$_2$ footprint of applications and Cloud infrastructure at site, host and VM level

- Quantification of energy consumption at application and different levels of Cloud infrastructure

- Intelligent Scheduling techniques for CO$_2$ aware application deployment in a multi-site Cloud environment.
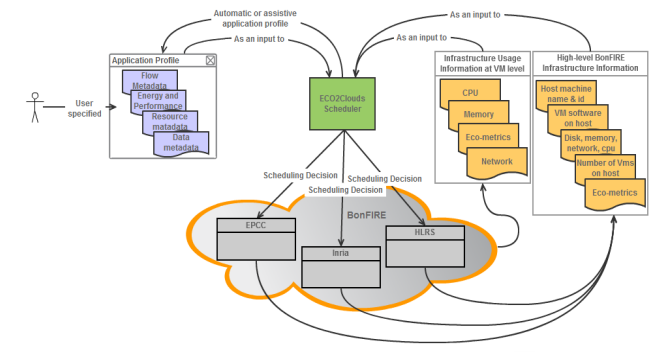
- Optimization techniques for energy efficient resource utilization in a multi-site Cloud environment

- Runtime adaptation techniques to ensure efficient resource utilization and minimum CO$_2$ footprint of applications throughout their deployment on the Cloud.