SAMMClouds: Secure and Adaptive Management of Multi-Clouds

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Motivations

- The Cloud Computing vision
  - Many customers → few providers
  - Elasticity: scale-up, pay-per-use
  - Virtualization (IaaS)

- Large Data Centers (>10^5 VMs, PB of data)

- Challenges:
  - Monitoring (collect & extract info about DC)
  - Management (reduce energy consumption)
  - Guarantee security
Scalable Monitoring

- IaaS Cloud: VMs as black boxes → **Scalable Monitoring**

- Leverage information on VM with *similar behavior*

- Statistical description of VM behavior:
  - Correlation-based, Histograms, Mixture of Gaussian, ...
  - Comparison of multiple similarity metrics
Green Management

- Fit VMs on Physical servers (match requirements for CPU, memory, …; multiple time slots)
- Multi-dimensional bin-packing → **Scalable Placement**
Green Management

- Detailed energy models for VMs placement
- Details on servers
  - DVFS-based models for CPU
- Details on Data Center
  - Software-defined network (SDDC)
  - Network-related energy
  - Migration of VMs
Research Results

• Scalable Monitoring
  - 3 papers (2 Journals)
  - *IEEE Trans. Cloud Comp*

• Green Management
  - 8 papers (4 Journals)
  - *IEEE Trans. Cloud Comp*

• Security
  - 1 paper

• Overview:
  - 12 papers (6 Journals)
  - 1 post-doc grant

• Collaborations:
  - 2 International:
    - J. Abawajy, S. Abolfazli
  - 2 National:
    - Sapienza, Tor Vergata
Further Development

• Follow-up project:
  – $S^2C$: Secure and Software-Defined Cloud
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• Ongoing collaborations:
  – L. Chiaraviglio (Univ. of Rome “Tor Vergata”)
  – M. Shojafar (CNIT)
  – D. Ardagna (Politecnico Milano)
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More info:

http://web.ing.unimo.it/sammclouds/sammclouds.html

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