Spirals in the clouds

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within UMR 8022 CNRS/Lille1/Lille 3/Inria LIFL
Spirals in a nutshell

Self-adaptation for distributed services and large software systems

2 scientific foundations
- middleware
- software engineering

2 research objectives
- self-healing
- self-optimization

2 target environments
- mobile computing
- cloud computing
Members (26)

Permanent Members (6)

• Lionel Seinturier, PR1, Lille1 & IUF – Scientific Leader
• Romain Rouvoy, MCF, Lille1 Self-adaptation
• Laurence Duchien, PREx, Lille1 Software engineering
• Philippe Merle, CR1, Inria Middleware
• Martin Monperrus, MCF, Lille1 Automatic software repair
• Walter Rudametkin, MCF, Lille1 Resilience

Post-docs (3)
PhD Students (13)
Research Engineers (4)
No “one-fits-all” Cloud Environment
Which Cloud Environment?

There must be a better way of choosing cloud providers!
Spirals and multi-cloud computing

- **Hiding heterogeneity** of cloud environments
  - **soCloud**: A distributed multi-clouds PaaS

- **Exhibiting variability** of cloud environments
  - **SALOON**: An SPL-based approach for multi-clouds

- **Hybrid approach**
  - **ICT PaaSage**
soCloud: A distributed multi-clouds PaaS
soCloud: A distributed multi-clouds PaaS

@elasticity = "scaling out when timePeriod == 1min and responseTime > 4s and incomingRequests > 1000"
@vm = "large -> Ubuntu"
@closer = "Stockage"

@elasticity = "scaling in when totalCost (computeCost, 24 h) > 200"
@replication = "3"
@location = "Singapour"

@replication = "2"
@database = "MySQL"
@location = "France"

Légende soCloud:

SCA contribution
Annotation
soCloud: A distributed multi-clouds PaaS

Métier

Présentation

Stockage

P @ elasticity = "scaling out when timePeriod == 1 min and responseTime > 4 s and incomingRequests > 1000"
@vm = "large -> Ubuntu"
@closer = "Stockage"

@replication = "2"
@databas e = "MySQL"
@location = "France"

Légende soCloud:
Placement SCA contribution Annotation

Node Node Node Node Node

Spirals in the clouds
soCloud: Hiding heterogeneity of 10 cloud environments
SALOON: An SPL-based Platform for Selecting and Configuring Cloud Environments

Domain Expert defines

Developer Requirements Specification

1

Variability Model A

2

Feature Selection

Domain Expert defines

3

Product configuration

Configuration Analysis

4

Composition

Software Product Line A

5

Cloud A

Developer execution

Cloud i

SPL i

execution

Cloud N

SPL N
Spirals in the clouds

• 3 completed results
  • soCloud [Paraiso’14], [CLOUD’12], [Computing’14]
  • SALOON [Quinton’14], [SPLC’13], [CLOUD’14], [SPLC’14], [SPE’15]
  • APISENSE [Haderer’14] - Crowdsensing from mobiles to clouds

• 3 funded projects in progress
  • ICT PaaSage
  • PIA Datalyse - Big Data
  • Windows Azure for Research Award

• 3 perspectives
  • Estimating energy consumption in distributed virtual environments (e.g., KVM, OpenStack) with PowerAPI
  • Spontaneous Elasticity of Service and Infrastructure in Cloud Computing » - PhD in progress

  OCClware
References

- **soCloud** : une plateforme multi-nuages distribuée pour la conception, le déploiement et l'exécution d'applications distribuées à large échelle. F. Paraiso. *PhD Thesis*, University Lille 1, Jun 2014.


