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Anna Giannakou, Louis Rilling, Christine Morin, Jean-Louis Pazat

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Self Adaptation for Security Monitoring in IaaS clouds

Anna Giannakou*, Louis Rilling*, Christine Morin*, Jean-Louis Pazat*
* Inria, °DGA

Context: IaaS cloud environments.
Frequent infrastructure-related changes:
• VM creation, migration, destruction
• Service addition or removal

Problem: Frequent changes make traditional security monitoring fail

**Objectives**

- **Self adaptability:** react to changes in virtual and physical infrastructures
- **Customization:** allow tenants to request detection of specific types of attacks
- **Scalability:** adapt to traffic load and changes in the size of the infrastructure
- **Cost minimization:** for tenants and the provider

**SAIDS Features**

- Adaptation probes: detect a change and reconfigure the components involved
- Customized rules: include IDS rules targeting a tenant’s deployed services
- New sensor deployment: rebalance traffic analysis when a local intrusion detection sensor is overloaded
- Component sharing: tenants may share local IDS sensors

**SAIDS Architecture**

1. Infrastructure monitoring probes notify the adaptation manager that a topology change occurs and relate the necessary information: VM id, VM IP, hostname of physical host
2. Adaptation manager decides which additional rules have to be activated in the local IDS (IIDS) responsible for the new host of the VM.
   - Decision based on:
     - Deployed services (VM info)
     - Specific requests from tenants (SLA info)
3. The adaptation manager adapts the IIDS through remote execution of the adaptation driver

**Early Evaluation**

**Goals**
Evaluating the reconfiguration overhead & quality of detection

**Technologies**
- Cloud deployed with Openstack
- Inter VM communication through GRE tunnels on Open vSwitch

**Scenario**
- Load balanced setup representative of a production env.
- 3 interconnected VMs: web, mail, DNS services
- 2 IIDSs: one per virtual switch

**Future Work**
- Combine monitoring for provider and tenants
- Add other devices: collectors, aggregators
- Offer tenants partial control of the framework

**Related work:** Projects that partially address tenant driven customization and scalability issues [1][2] but fail to adapt to frequent changes. [3] addresses self-adaptation but not multi-tenancy, tenant-driven customization or cost-effectiveness.


**Results**

![Graph showing results]

**Options**