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Self Adaptation for Security Monitoring in IaaS clouds

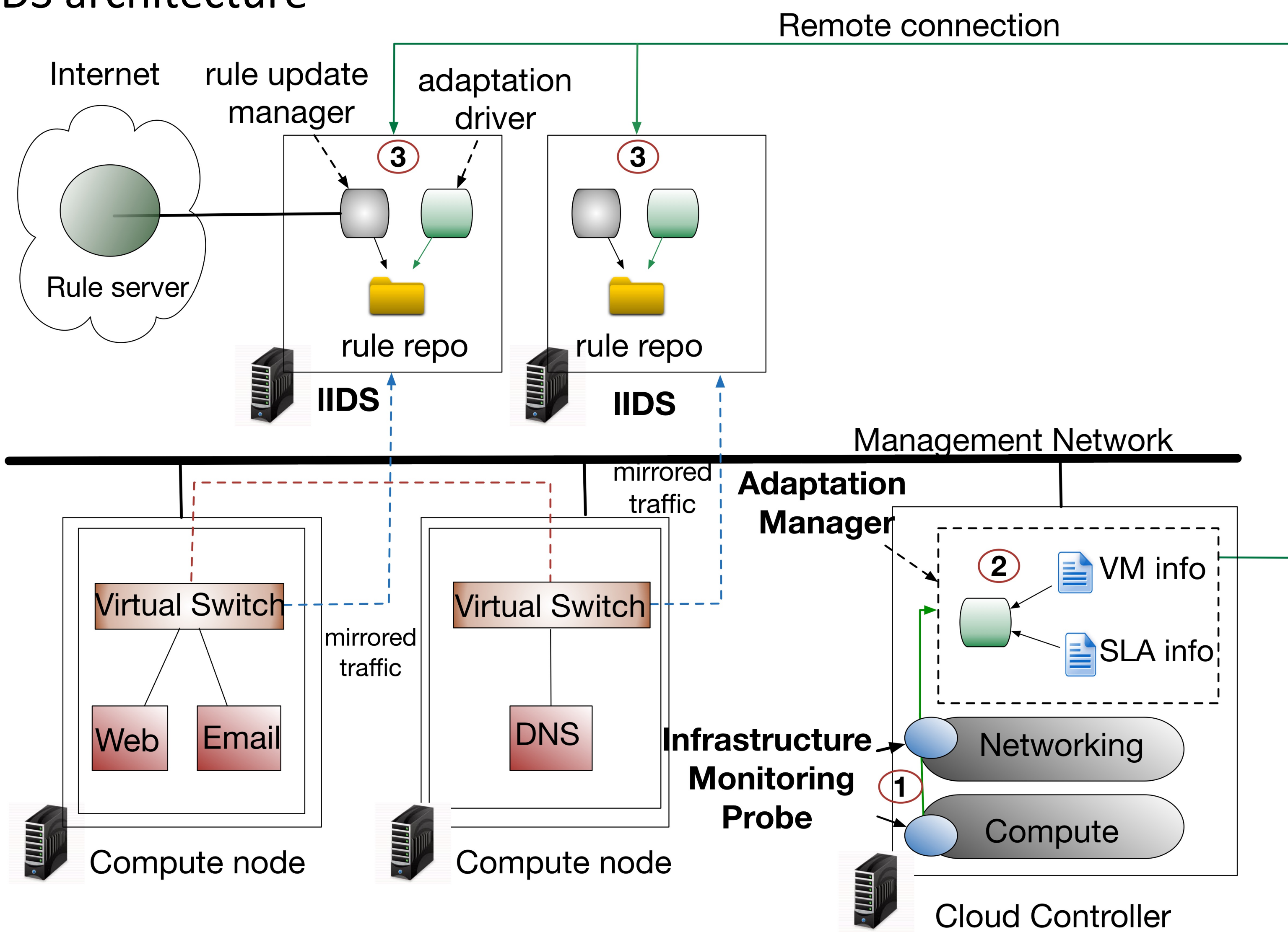
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<p>Context: IaaS cloud environments. Frequent infrastructure-related changes:</p> <ul style="list-style-type: none"> • VM creation, migration, destruction • Service addition or removal <p>Problem: Frequent changes make traditional security monitoring fail</p>	<p>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.</p> <p>[1] S. Roschke et al. Intrusion Detection in the Cloud. In Proc. DASC 2009 [2] C. Mazzariello et al. Integrating a network IDS into an open source Cloud Computing environment. In Proc. IAS 2010 [3] A. Wailly et al. VESPA: multi-layered self-protection for cloud resources. In Proc. ICAC 2012</p>
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Objectives	<p>Self adaptability: react to changes in virtual and physical infrastructures</p>	<p>Customization: allow tenants to request detection of specific types of attacks</p>	<p>Scalability: adapt to traffic load and changes in the size of the infrastructure</p>	<p>Cost minimization: for tenants and the provider</p>
SAIDS Features	<p>Adaptation probes: detect a change and reconfigure the components involved</p>	<p>Customized rules: include IDS rules targeting a tenant's deployed services</p>	<p>New sensor deployment: rebalance traffic analysis when a local intrusion detection sensor is overloaded</p>	<p>Component sharing: tenants may share local IDS sensors</p>

SAIDS architecture



- 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
- 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)
- The adaptation manager adapts the IIDS through remote execution of the adaptation driver

<p>Early evaluation</p> <p>Goals Evaluating the reconfiguration overhead & quality of detection</p> <p>Technologies</p> <ul style="list-style-type: none"> • Cloud deployed with Openstack • Inter VM communication through GRE tunnels on Open vSwitch 	<p>Scenario</p> <ul style="list-style-type: none"> • Load balanced setup representative of a production env. • 3 interconnected VMs: web, mail, DNS services • 2 IIDSs: one per virtual switch <p>Future Work</p> <ul style="list-style-type: none"> • Combine monitoring for provider and tenants • Add other devices: collectors, aggregators • Offer tenants partial control of the framework
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