



Prediction Project

Release draft (084e399)

OPNFV

February 25, 2016

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1 USE CASES AND SCENARIOS

Telecom services often have high available requirements. Failure prediction is one of the importance features for high available requirements. Operator can handle faults in advance based on failure prediction. This project focuses on data collection of failure prediction.

The data collector consists of Ceilometer and Monasca which can be extended to plugin some other open source data collectors, e.g. Zabbix, Nagios, Cacti. Based on real-time analytics techniques and machine learning techniques, the failure predictor analyses the data gathered by the data collector to automatically determine whether a failure will happen. If a failure is judged, then the failure predictor sends failure notifications to the failure management module (e.g. the Doctor module), which could handle these notifications.

1.1 Use case 1

Based on infrastructure metrics, it is possible to predict failure of infrastructure, e.g. Nova, Neutron, MQ.

1.2 Use case 2

Based on metrics of infrastructure and VM inside, it is possible to predict failure of VNF.

2 GAP ANALYSIS IN UPSTREAM PROJECTS

This section presents the findings of gaps on existing VIM platforms. The focus was to identify gaps based on the features and requirements specified in Section 3.3. The analysis work performed resulted in the identification of gaps of which are herein presented.

2.1 2.1 Monasca

Monasca is an open-source monitoring-as-a-service (MONaaS) solution that integrates with OpenStack. Even though it is still in its early days, it is the interest of the community that the platform be multi-tenant, highly scalable, performant and fault-tolerant. Companion with a streaming alarm engine and a notification engine, is a northbound REST API users can use to interact with Monasca. Hundreds of thousands of metrics per second can be processed [8].

2.1.1 2.1.1 Memory usage in HyperV

- Type: ‘missing’
- Description:
 - To-be
 - * Monasca should collect memory usage in HyperV.
 - As-is:
 - * Monasca does not support querying memory usage of HyperV.
 - Gap
 - * Monasca does not support querying memory usage of HyperV.

2.1.2 2.1.2 Memory usage in Libvirt

- Type: ‘missing’
- Description:
 - To-be
 - * Monasca should collect memory usage in Libvirt.
 - As-is:
 - * Monasca does not support querying memory usage of Libvirt.
 - Gap

- * Monasca does not support querying memory usage of Libvirt.

2.2 2.2 Heat

Heat is an orchestration project of openstack. It can be used for deploy application. Its cfn-hup tool can monitor metadata in VM and notify to heat. But this function is poor now, we can extend cfn-hup to collect more information inside VM and make failure prediction.

2.2.1 2.2.1 Cfn-hup

- Type: 'monitoring issue'
- Description:
 - To-be
 - * Cfn-hup is able to collect more metrics than metadata inside VM. These metrics can be used for failure prediction.
 - As-is:
 - * Cfn-hup just can monitor metadata inside VM.
 - Gap
 - * Cfn-hup should monitor more information inside VM.

2.3 2.3 VM Introspection

Virtual machine introspection (VMI) is a mechanism that allows indirect inspection and manipulation of the state of virtual machines. It resulted in a variety of VMI-based applications dealing with security, performance, and debugging in virtual machine environments. Of course, it can be used to collect detail metrics in VM and used for failure prediction.

LibVMI is an open source implementation of VMI supporting commodity hypervisors such as Xen and KVM. LibVMI provides the functionality of mapping raw memory pages of VMs inside the privileged VM and relies on monitoring software to interpret the contents of these mapped pages. For more information, please visit website: <http://libvmi.com/>

2.3.1 2.3.1 VM Introspection

- Type: 'monitoring issue'
- Description:
 - To-be
 - * VMI can be used to collect detail information inside VM for failure prediction.
 - As-is:
 - * VMI can collect some information for security analysis.
 - Gap
 - * Openstack is lack of a module used to collect detail information of VM based on VMI technology.