MULTI-CLOUD VISIBILITY AND OPERATIONS WITH APPFORMIX ANALYTICS

Travis Newhouse
Chief Architect, AppFormix
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“INTENT-DRIVEN CLOUD”
DYNAMIC ENVIRONMENTS OF HETEROGENEOUS HARDWARE & SOFTWARE COMPONENTS

- Large # of heterogeneous, fragile & interconnected hardware and software components → make it a challenge to run cloud at scale
- Components come and go dynamically in software-defined, cloud-native environments

HUGE AMOUNTS OF MONITORING DATA FROM MULTIPLE SOURCES

- Multiple data sources generate large amount of data
- Real-time management and monitoring of large & disparate data sets requires complex data / storage management tools

NO OUT-OF-THE BOX SOLUTION

- Legacy tools were not built for cloud-native environments, and to correlate across layers of the physical and virtual infrastructure
- Open-source based tools require significant customization

CLOUD OPERATIONS CHALLENGES

Visibility and Analysis
Problem: Monitoring technologies are SLOW! INEFFICIENT! INEFFECTIVE!

Inefficient Request-Response

Central database for storing & analyzing metrics

The monitoring infrastructure is more complex than the infrastructure that is being monitored

Consumed by humans for after-the-fact analysis

Your OpenStack/Kubernetes management is running blind too slow to influence orchestration

Need real time

Signals

6 minutes
APPFORMIX — DISTRIBUTED STREAM ANALYSIS & OPTIMIZATION
Fast! Efficient! Responsive!

ACTIONABLE SLA MONITORING
- Notifications to external orchestration systems
- Enhanced, state-based scheduling according to resource management SLA

CONTINUOUS ANALYSIS OF METRICS
- Analyze more metrics
- Faster prediction of failures

SOLUTION SCALES WITH YOUR INFRASTRUCTURE
- Distributed stream-based analysis
- No central choke-point!

Real Time

Compute & Storage Infrastructure
Distributed Data Platform
Data Streams
Signals
AppFormix Platform

Resource Orchestration
Capacity Planning
Reporting & Alarming
Data Lake (NoSQL)
APPFORMiX ARCHITECTURE

Central policy management and data model

Automatic import of data model using platform adapters

VM
AGENT
Host

AGENT

Host or Network Device

JTI / OpenConfig / gRPC
SNMP / IPMI / REST

Push notifications to external systems as JSON over HTTP(S)

Orchestration & Automation

ITSM Systems: ServiceNow, PagerDuty, …

Rest API

Insight

Policy

Events

Notifications
VISIBILITY
Stream-based analysis for responsive SLA monitoring and fault detection

Machine learning for adaptive monitoring

Reactive and proactive orchestration to improve efficiency and service availability

Data-driven capacity management

Single operations platform to monitor all layers of the infrastructure
VISIBILITY – EXTENSIBLE MONITORING

VNF monitoring via extensible plugins
metrics analyzed by AppFormix for alarms and SLAs

“Smart Agent”
Physical Layer, Host OS, Virtual Layer, Containers, Apps

Agentless
Physical and Cloud Infrastructure Monitoring

Device / Service

Source of Host / VM / Container

JTIl / gRPC / OpenConfig

SNMP / IPMI / REST

VNF

VM Container VNF

Host

VNF plugin

AGENT
• Defines a monitoring rule for a single metric over a set of entities
• User-defined interval with per-second granularity
• Agent evaluates alarm using streaming analytics as metrics are collected
• May be configured for various system and workload entities
  • Service (OpenStack services, Contrail, Ceph, ScaleIO, VMware services, etc.)
  • Instance (Virtual Machine, container)
  • Host
  • Network device
• Powerful controls to configure streaming analysis.
• Detect fine-grained spikes that may be hidden in per-minute averages.
ALARMS – DISTRIBUTED ANALYSIS

AppFormix Platform

VM1 VM9 VM3
Host
Agent

VM4 VM8 VM5
Host
Agent

VM2 VM6 VM7
Host
Agent

Policy: cpu.usage of green VMs

REST API

NOTIFICATION
- JSON over HTTP
- PagerDuty, ServiceNow, Slack, …
# STATIC & ADAPTIVE THRESHOLDS

Machine Learning for Adaptive Baseline

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<tr>
<th>STATIC THRESHOLD</th>
<th>DYNAMIC ADAPTIVE THRESHOLD</th>
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<tr>
<td>User-provided threshold</td>
<td>Threshold determined by machine-learning and continuously updated</td>
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<tr>
<td>Best for well-understood performance profiles with absolute or constant boundaries</td>
<td>User-provided sensitivity above or below learned threshold</td>
</tr>
<tr>
<td>Examples: packet drops, interface flaps, CPU temperature, disk usage</td>
<td>Moving average can detect sudden changes</td>
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<td>Per-hour baseline for time-varying workloads</td>
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SLA POLICY

- Combine multiple Alarms to define performance bounds for a set of entities: hosts, instances, services
- AppFormix continuously monitors whether entities are compliant with the SLA
- Multiple SLA types may be defined: Health, Risk, Scheduling
- Notification when SLA state changes for an entity
- SLA state can be checked at any time in Dashboard or REST API
AUTOMATION & ORCHESTRATION
STATE-DRIVEN AUTOMATION

• User may configure external notification for SLA violation or Alarm
• Prevent service disruption based on adaptive learning, by automatically executing a mitigation action
• Example: Auto-scale VNF based on load of existing VNF instances
STATE-DRIVEN ORCHESTRATION

• Proactively ensure real-time, optimal overall system and workload performance
• Improve scheduler by considering real-time state of the NFVi
• Example: Influence placement based on real-time resource management SLA
DEMO USE CASES

• Visualization across layers of the infrastructure
• View resource capacity for new or expanding services
• Maximize infrastructure ROI using reports and chargeback
• Improve service availability and performance with actionable insights
• Improve reliability with state-driven workload placement
# APPFORMIX
Operations tools for the DevOps Era

## IT AUTOMATION

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<th>OPERATIONS ANALYTICS</th>
<th>STATE-DRIVEN ORCHESTRATION</th>
<th>DATA-DRIVEN CAPACITY PLANNING</th>
<th>ROLE-BASED MONITORING &amp;ALARMS</th>
<th>BILLING &amp; REPORTING</th>
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<tr>
<td>Stream Analysis for real-time risk analysis</td>
<td>Prevent Service Disruptions</td>
<td>Enhance reliability and improve your cloud ROI</td>
<td>Empower your users with Role Based GUIs and APIs</td>
<td>Showback and Chargeback</td>
</tr>
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## PHYSICAL AND SOFTWARE DEFINED INFRASTRUCTURE

- **vmware**
- **openstack™**
- **kubernetes**
- **Amazon Web Services**
- **Microsoft Azure**