System Monitoring Framework for Shasta

CUG 2019
TOPICS

• Overview of the system monitoring framework
• Subsystems contributing metrics
• Correlating data with visualization tools
• Summary
• Q&A
Overview
SYSTEM MONITORING FRAMEWORK

• What is the System Monitoring Framework?
  • A tightly integrated framework for collecting and persisting metrics and logs
  • Consolidates telemetry data from multiple subsystems
    - Switch fabric
    - Network
    - Job Management
    - Storage
    - Power
    - User Applications
    - Compute
  • Integrated alarm and notification framework with threshold engine
  • Standard visualization tools for graphing metrics and searching logs
  • RESTful API for integration into customers monitoring solutions
  • Integrated with the diagnosability and serviceability solutions
ARCHITECTURE AND DATA SOURCES

Data Sources
- Job Events
- Mountain/River Cabinet
  - Redfish endpoints
- Cray ClusterStor
  - C-stream API
  - Syslog NG
- Service or Compute node
  - LDMS Collector
  - LDMS Aggregator Level 1 … level n-1
  - Syslog

Data Integration & Infrastructure
- Data Persistence
  - PostgreSQL
  - Monasca
  - Kafka
  - Job Event Persister
  - Monasca Persister
  - LDMS aggregator Level N

User Interface & Access
- REST Proxy
- Mail
- Config CLI
- Kibana
- View for ClusterStor (Optional)
- Grafana
- Telemetry API

System Management Services

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Data Sources
SUBSYSTEMS CONTRIBUTING METRICS

- Shasta hardware
- ClusterStor storage
- Compute nodes
- Network and fabric
- Logs
HARDWARE MANAGEMENT METRICS

• Collect metrics from
  • Chassis controllers
  • Node controllers
  • Blade switch controllers
  • PDUs
  • TOR switches

• Collected using industry standard redfish API
CLUSTERSTOR STORAGE METRICS

• Metrics collected
  • Lustre performance
    • Metadata, OST
    • I/O read/write
  • Lustre jobstats
  • Logs and events
• Collection rate: 15 to 30 seconds
• Calculated into delta rates and persisted
• Enables trend analysis
COMPUTE NODE METRICS VIA LDMS
COMPUTE NODE METRICS

- Six main categories: I/O, System, CPU, Swap, Processes & Memory
- Total of 13 metrics sampled at 10 second interval
NETWORK/FABRIC METRICS

• Metrics are collected to enable monitoring and diagnosis of performance and congestion of the fabric
• These metrics will include:
  • Critical asynchronous link events and port state changes
    • e.g. used for diagnosis of link/cable issues
  • Running state data based on a configured set of standard SNMP MIBs
    • RFCs 1213, 2819, 2863, 3635, 4188, 4293
    • Data periodically posted, period is configurable
  • Types of bandwidth and congestion metrics collected
    • Packets/bytes in/out
    • Unicast/Multicast/Broadcast
    • Drops/errors
    • Pause Frames in/out
      • e.g. excessive transmit pause frames used to identify error at endpoint device
• All telemetry data includes locality of metric
  • Provides ability for focused query/heat map generation on specific area of the fabric
Log Aggregation
Integration with 3rd Party Monitoring System
TELEMETRY API

Data Sources
- Compute
- Network
- Jobs
- Power
- Storage

Kafka

Telemetry API
1
2
N

Kafka Clients

API Clients
1
2
N

Customer

Shasta Monitoring Framework
USE CASE DEMO
SUMMARY

• The System Monitoring Framework aggregates metrics into a single framework
• Telemetry collected includes:
  - Shasta hardware
  - VMStats from compute nodes
  - Storage lustre and job metrics
  - Network and fabric metrics
  - Logs
• Tools are provided to enable trend analysis, searching, and correlating of data
• A REST API is provided to allow streaming of telemetry off the kafka bus into customer monitoring solutions
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QUESTIONS?