JStorm Based Network Analytics Platform

Alibaba Cloud Senior Technical Manager, Biao Lyu
Overview of Alibaba Cloud

18 Regions

150+ Products

1 Million+ Customers
Comprehensive Networking Product Family

12 products for 5 scenarios

Self-Defined Cloud Networking Environment
- VPC

Internet Access
- SLB
- NAT Gateway
- EIP

Saving BGP Cost
- Shared Flow Package
- Shared Bandwidth Package

Building Hybrid Cloud
- Express Connect
- Cloud Hosting
- VPN Gateway
- Smart Access Gateway

Global Connection
- Cloud Enterprise Network
- Global Acceleration

From Data Center to Global Connection, for every enterprise networking scenarios
Networking is getting complicated

- 25G
- 10W+ NIC
- 400G DCI
- Underlay
- VxLAN
- 5G
- 400G DCI
- SD-WAN
- vCPE
- NFV
- Segment Routing
- NSH
- Overlay
- vRouter
- SDN
- IoT
- Virtual Private Cloud
- Hybrid Cloud
- Neutron
- RDMA
- Neutron
- Large Scale
- High Throughput
- Low Latency
- Rich Features

Large Scale
High Throughput
Low Latency
Rich Features
Challenges from Growing Scale

<table>
<thead>
<tr>
<th>Tenants</th>
<th>Servers</th>
<th>VMs</th>
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</thead>
<tbody>
<tr>
<td>1,000,000,000</td>
<td>1,000,000,000</td>
<td>10,000,000,000,000</td>
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- Random Failures
- Daily Maintenance
- Multi-Dimension Profiling
What we want to achieve

Network as a Service

- Minimum Impact
  Network Update

- Precise Diagnose
  Network Issue

- Realtime Monitor
  Network Failure

- Deep Understanding
  Network Business
Automation to Intelligence

Network

Tool

Script

Controller

Automation

Network Update

Disaster Recovery

Data

Policy

Config

Network Diagnose

Network Profiling

Network Monitor

Intelligence
QiTian - JStorm Based Network Analytic Platform

Flow

API

WEB

Robot

Output

Analytic Result

Real-Time Analytic

Basic

Monitor

Diagnose

Scheduling

Profiling

DB

ETL

Math

Policy

Event

Notification

Packet

Route

Connectivity

LB

Recovery

User/Device

JStorm

Config

Network Devices

Business Services

Data Source

flow, metric, log, topology, device status, etc

product, customer, instance, etc
QiTian - Data Sources & Types

**Log Streaming**
- DB Streaming
- message Streaming

**Operation Services**
- operation, infrastructure
- Streaming Log

**Security**
- access, ddos, waf
- Streaming Log

**Overlay Network Device**
- Gateway
- Host VSwitch
- vBorder Device

**Underlay Network Device**
- Router
- Switch

**SDN Controller**
- operation log, topology
- Streaming Log, DB, message

**Business Services**
- customer, product, instance, income/cost
- Streaming Log, DB

**Flow, metric, device status, access log, etc**
- Streaming Log
QiTian - High Performance Network Analytics

Network Devices
- Telemetry
  - 100 Million Records/min

Stream Dispatch
- Local-Shuffling
  - 100 Million Records/min

Streams
- Local-Shuffling
  - 100 Million Records/min

Local Data Merge
- Fields-Grouping
  - 1 Million Records/min

ETL
- Fields-Grouping
  - 1 Million Records/min per Stream
<table>
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<tr>
<th>Metrics</th>
<th>TPS</th>
<th>Data</th>
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<td>500+ Metrics</td>
<td>2,000,000 Tuples/Sec</td>
<td>100T/Day</td>
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QiTian - High Performance Network Analytics
QiTian - Real-Time Network Monitor

Major Network Issue Detection

90%

metric vibration

abnormal event statistics

predicted interval
QiTian - Streaming Based Network Diagnose

Packet Analytic Config

Network Devices

Packets

Packets Steam Processing

Packet Sort

Route Calculation

Latency Calculation

Loss Rate Calculation

Packets Collection Spout

Packets Processing Bolt

Result

flow route

device latency

device loss rate
QiTian - Streaming Based Network Diagnose

Package Analyze Config

Flow Route

Packet Analyze

Packet Loss/Latency Diagnose
QiTian - Intelligent Network Traffic Scheduling

Network Devices

Reliability Stream Processing

Network Metric

Traffic Scheduling Stream Processing

- Topology Analyze
- Load Calculation
- Cluster Selection
- Device Selection

- Scheduling-Aware Event Spout

Traffic Schedule Config
QiTian - Multi-Dimension Network Profiling

Business Services
- DB
- msg

Business Data Stream Processing
- Biz Data Stream
- Biz Data Spout

Telemetry Data Spout

Rich ETL Steam Processing
- Biz Data Bolt Group 1
  - In Memory ETL
- Biz Data Bolt Group 2
  - In Memory ETL
- Biz Data Bolt Group 2
  - In Memory ETL

Batch Processing
- Traffic Pattern
- Business Cost
- User Profiling

Rich Meta Data
- customer, instance, cluster
QiTian - Multi-Dimension Network Profiling

Income Analyze by Industries

Customer Resource Layout

BGP Cost
What's Next

Deployment
real-time network deployment policy

Elastic
real-time network expansion policy

Monitor
new detection policy based on machine-learning integrated
Thanks