Using Distributed Tracing to Resolve Performance Issues in Apache Ignite

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GridGain
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Agenda

- GridGain & Ignite Overview
- Why Tracing?
- Tracing in GridGain & Ignite
- Control Center Overview
- Demo: TX Troubleshooting
- Q&A
Ignite & GridGain In-Memory Computing Platform

Application Layer

- Web-Scale Apps
- IoT
- Mobile Apps
- Social Media

Machine and Deep Learning

- Key-Value
- SQL
- Transactions
- Messaging
- Streaming
- Events

Compute Grid

Service Grid

In-Memory Data Store

Data Layer

- RDBMS
- GridGain
- NoSQL
- Hadoop

Connectors (Kafka, GoldenGate, Hadoop)

Rolling Upgrades

Data Center Replication

Segmentation Protection

Security & Auditing

Monitoring & Management

Network Backups

Point-In-Time Recovery

Heterogeneous Recovery
Why is Tracing Important?

- Monitor execution of running application
- Useful for analyzing and debugging distributed systems
- Accelerates root cause analysis
What is OpenCensus?

- Open source set of libraries to collection application metrics and distributed traces.
- Instrumented for many popular languages
  - Java
  - Go
  - Node.js
  - C#
  - C++
  - Ruby
  - Python
  - PHP
- Can extend to your custom code
- Supported by many monitor tools through custom Exporters
Anatomy of a Trace

- API Name
- Node
- Start Time & Duration
- Status
- API Specific Tags
- Logs

Instrumented APIs

- Transactions
- Discovery
- Exchange
- Communication
- Cache Write
- Cache Read
Enabling Tracing in GridGain

- GridGain 8.7.x or Ignite 2.9
- ignite-opencensus in libs/
- Enable span collection from control.sh --tracing configuration
- scope – specifies API (TX, DISCOVERY, EXCHANGE, COMMUNICATION, CACHE)
- sampling-rate – Between 0 & 1
- Add tracingSpi to config

```java
<bean class="org.apache.ignite.spi.tracing.opencensus.OpenCensusTracingSpi"/>
```
GridGain Control Center Overview

- Comprehensive Cluster Management and Developer Tool for GridGain and Apache Ignite
- Supported Products
  - Built for GridGain 8.7+ and Apache Ignite 2.8+
  - Apache Ignite requires Control Center Agent install
Modern Interface with Drag & Drop Flexibility
Active Tracing & Root Cause Analysis

Easily Track API Call Execution
- Identify all response times for API calls
- Single view of stack traces and logs from all nodes
- Follow execution across the cluster
- Combine with application traces
- Open Census compliant

Setup:
- Copy `ignite-opencensus` from `/libs/optional` to `/libs/`
- Add Tracing to Cluster Configuration

```xml
<bean class="org.apache.ignite.spi.tracing.opencensus.OpenCensusTracingSpi"/>
```
Customizable, Intuitive Dashboard

Easy to Use with Visual Cues
- Visualize cluster status and manage behavior

Highly Flexible
- Drag and drop panes to view metrics of interest
- Tracks over 200 cluster metrics
  - Open Census compliant
User-Defined Production Alerts

Quickly Identify and Resolve Issues with Configurable Alerts

- Create custom active alerts on any metric
- Monitor cluster, node, and cache events
- Configure flexible notifications
  - Email and SMS
Query Development Tools

Accelerate Query Development
• Fine tune for optimal performance

Develop and Run SQL Scripts
• Introspect SQL execution
• Analyze performance of long running queries and query history
• Display all clusters, caches, and schemas in real-time
Monitor Rolling Upgrades & Cluster Rebalancing

Monitor Rolling Upgrades
• View cluster upgrade progress
• GridGain Enterprise and Ultimate Editions only

Monitor Data Rebalancing
• Visualize data resilience processes
• Identify and isolate problematic nodes
Disaster Recovery & Backup Management

Easy Configuration of Backups
• Fully managed backups and comprehensive data recovery tools
• GridGain Ultimate Edition only

Comprehensive Backup Monitoring and Management
• Create full and incremental backups
• Validate backup integrity
• Recover state from a specific point in time
• Automate backup creation lifecycle
Getting Started with Ignite & Gridgain

Apache Ignite
• Download Agent
  - Maven
  - Gridgain.com
• Extract To /libs
• Start Cluster
• Add Cluster ID to Control Center

GridGain
• Copy Agent from /libs/ optional to /libs
• Start Cluster
• Add Cluster ID to Control Center
Demo

- Local GridGain Community Edition Cluster
- Client performs simple transaction
- Local Control Center
## Control Center Options

<table>
<thead>
<tr>
<th>Version</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td><strong>Online Version</strong></td>
<td>Limited functionality</td>
</tr>
<tr>
<td></td>
<td>Available for free</td>
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<td></td>
<td><a href="https://control.gridgain.com">https://control.gridgain.com</a></td>
</tr>
<tr>
<td><strong>Developer Version</strong></td>
<td>Full functionality up to 2 nodes and 36 cores</td>
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<tr>
<td></td>
<td>Available for free download</td>
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<tr>
<td></td>
<td>Installable on-premises</td>
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<tr>
<td><strong>Commercial Version</strong></td>
<td>Full functionality for any size cluster</td>
</tr>
<tr>
<td></td>
<td>Installable on-premises</td>
</tr>
<tr>
<td></td>
<td>Price based on nodes in your cluster(s)</td>
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Q&A
GridGain Resources

GridGain Control Center
• Visit https://control.gridgain.com

Webinars
• Visit https://www.gridgain.com/resources/webinars

Developer Portal
• Visit https://www.gridgain.com/developer

Documentation
• Visit https://www.gridgain.com/docs/control-center/latest/overview

Free 30-Day Ultimate, Enterprise or Professional Edition Trial
• Visit https://www.gridgain.com/resources/download
Thank you

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