# Optimizing CI/CD Pipelines with Shift-Left Observability

*Build Better Software Faster*

INSTANA
an IBM Company

Tom Fisher

# Application Modernization

*Why it's Occurring and is Important*

## Business Agility

Ability to bring new application functionality online in real time

Bring new initiatives on line quickly

Adjust rapidly to changes in the competitive landscape

## Responsiveness

Immediately respond to user concerns

Rapidly diagnose and remediate complex issues

Maintain SLI, SLO, and SLA goals

## Scalability

Scale-up instantly as application demand peaks

Scale-down as application demand ebbs

## Cost Effectiveness

Add and use resource credits based upon application scaling requirements

Reduce or eliminate application downtime by applying on-demand resources

# The Evolution of Application Architectures

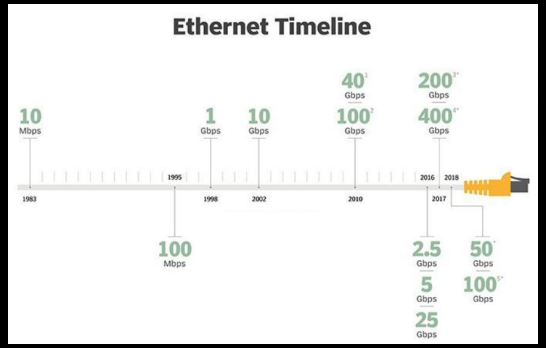
- Monolithic
  - 1948-1997
- SOA
  - 1998-2011
- VMs
  - 1972 – IBM
  - 1999 – VMware
- Microservices
  - 2011-


- Waterfall Design
  - 1970
- Agile
  - 2000

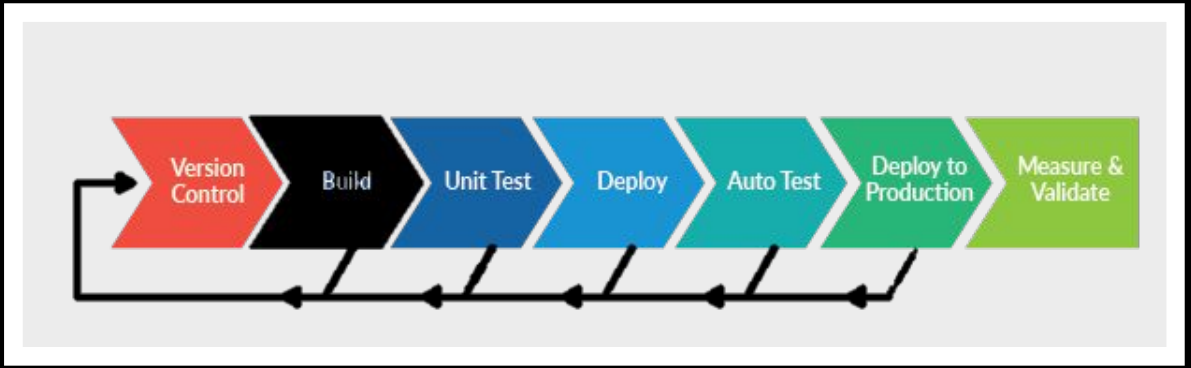
# Why Application Architectures Evolved

- Mobile Internet
- Faster and more reliable backbone networks
  - Highly distributed services became much more viable
- Compiled to JIT VM code
  - Smalltalk ~ 80s
  - First JVM – 1994
- Faster processors, multi-core, denser storage, etc.

| Mobile Network | Average Speed | Peak Speed |
|---|---|---|
| 2G | 0.1Mbps | 0.3Mbps |
| 3G | 3Mbps | 7.2Mbps |
| 3G (HSPA+) | 6Mbps | 42Mbps |
| 4G LTE | 20Mbps | 150Mbps |
| 4G LTE Advanced | 42Mbps | 1Gbps |
| 5G | 500-700Mbps | 10 or 20Gbps |



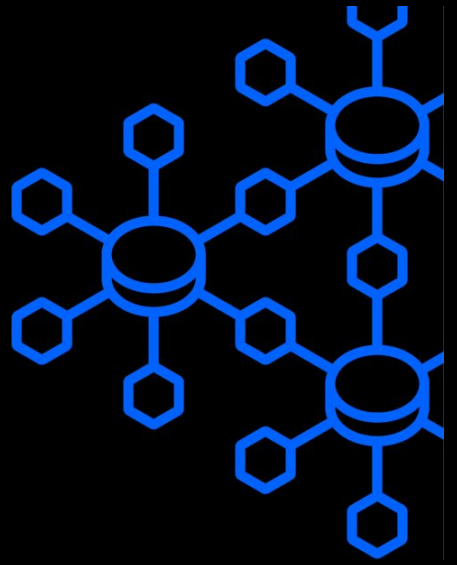
# The CI/CD Pipeline




## CI/CD Tools

Enable automation and monitoring for apps dev, integration and testing to deployment

# Enterprise Observability and the CI/CD Pipeline



## Observability's Role in CI/CD Pipeline Optimization

Discover and address 'unknown unknowns'

*Issues you don't know exist*

Catch and resolve issues early in development

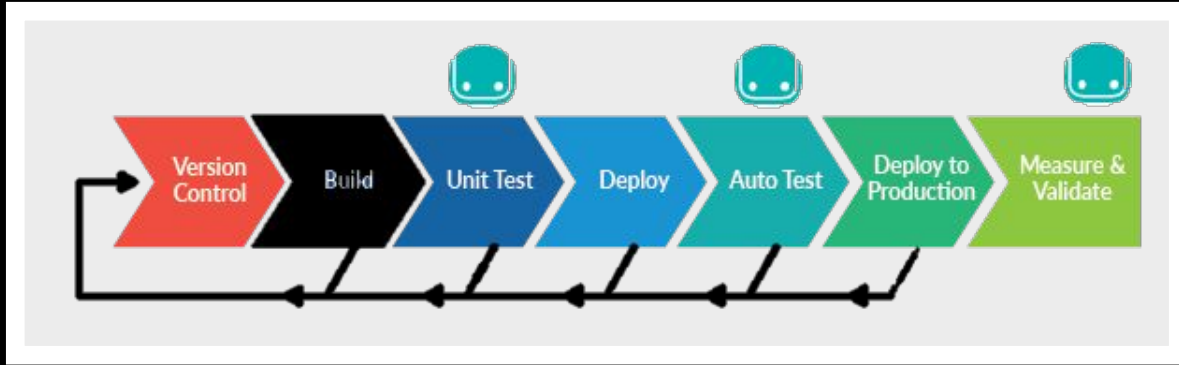
Automatically scale observability

Enable automated remediation and self-diagnosing application infrastructure

# Shift-Left Observability

**For Building Better Software Faster by**

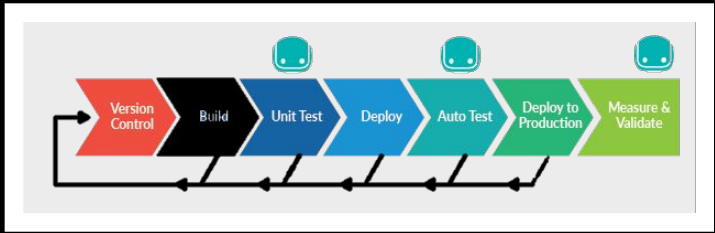
***Optimizing* Unit Test and Auto Test**




***And of Course, for Production***

# Optimizing the CI/CD Pipeline

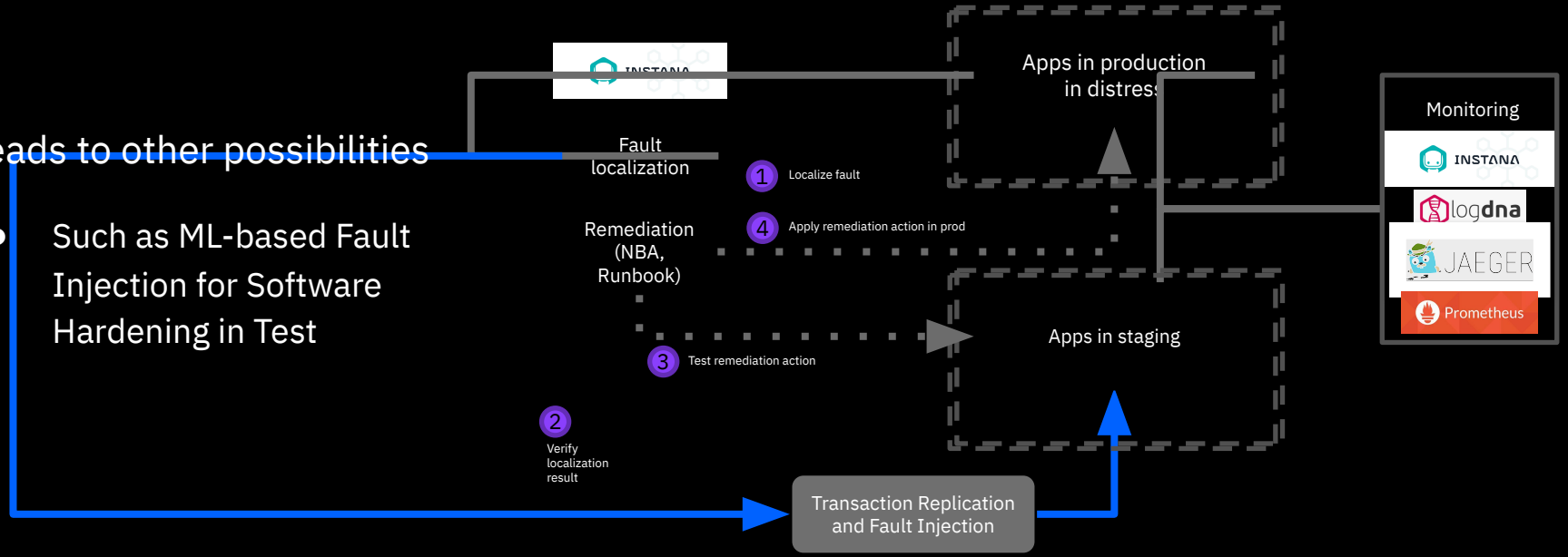
- Unit Test Values
  - Automated Profiling provides code level details for triage



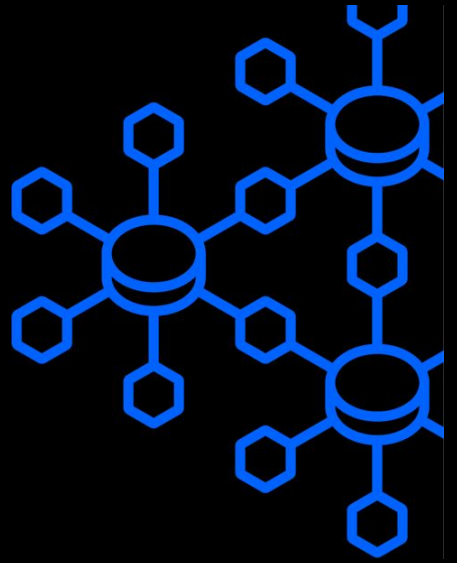

- Auto Test (and Production) Values
  - Automation
    - Discovers/maps apps, services, infrastructures, events, and dependencies
  - Context
    - Ingests all observability metrics, traces each request, profiles every process and updates dependency maps in real time
  - Intelligent Action
    - Machine Learning Analytics for optimizing application performance

# Enterprise Observability in the CI/CD Pipeline

- Leads to other possibilities
  - Such as ML-based Fault Injection for Software Hardening in Test



# Automation

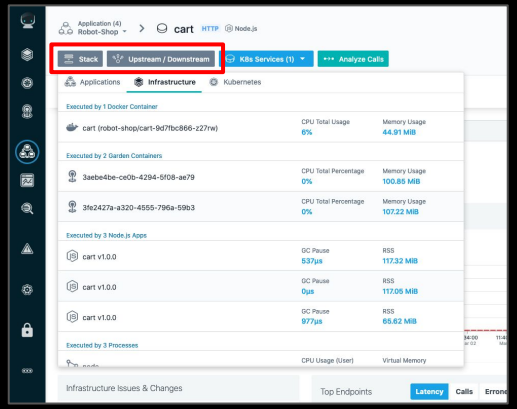


# Automatic Profiling

- Automatic and continuous code level profiling
  - JVM, PHP, NodeJS, etc. tracers
- Profiler Sensor from the Agent
  - Always on, but not profiling all the time

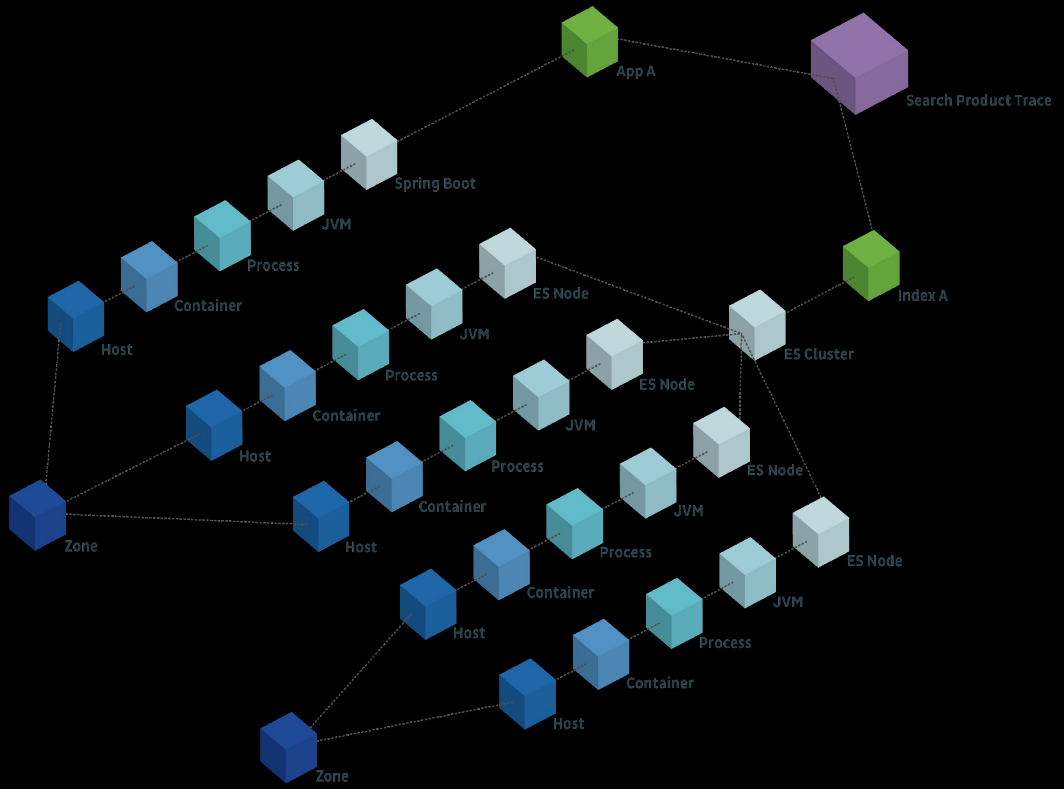
# Enterprise Observability Automation

| | |
|---|---|
| **Immediate** | |
| **Exact** | |
| **Effortless** | |




# Dynamic Graph

Continuously updated, full stack, internal data model of application structure and dependencies

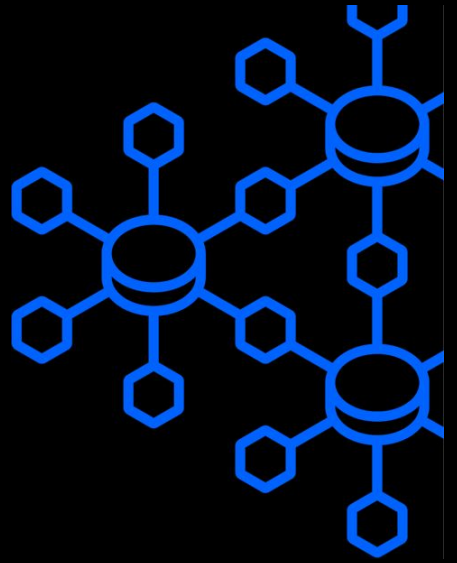



# Context Guide

Dynamic Graph for rapid troubleshooting.

A “GPS” for enterprise applications.

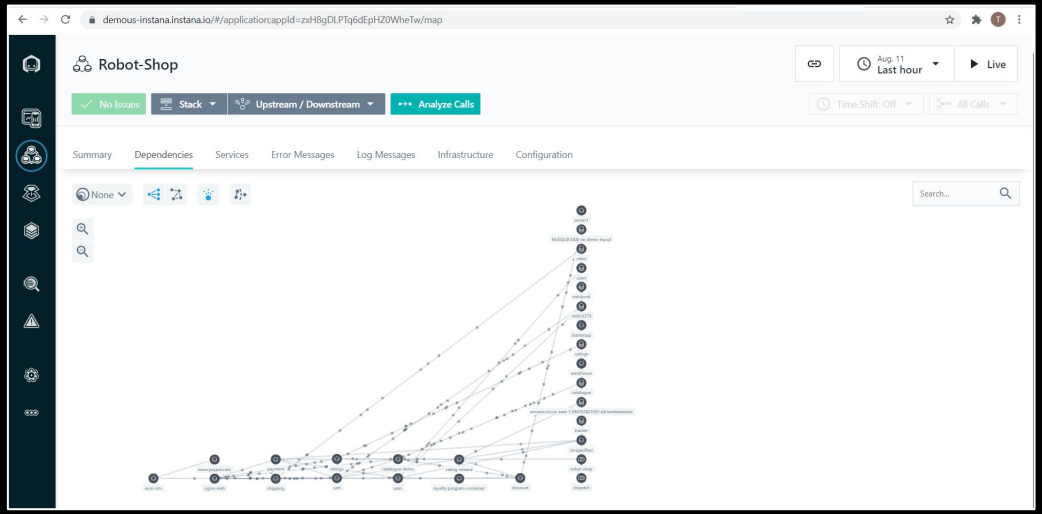
# Context



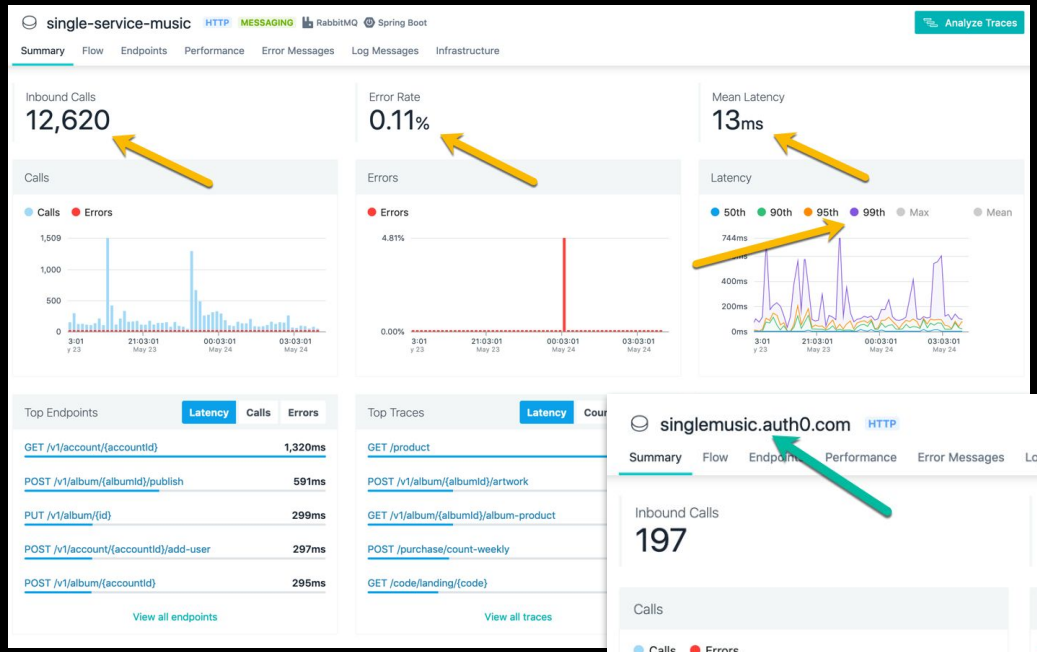
# Application Dependency Maps

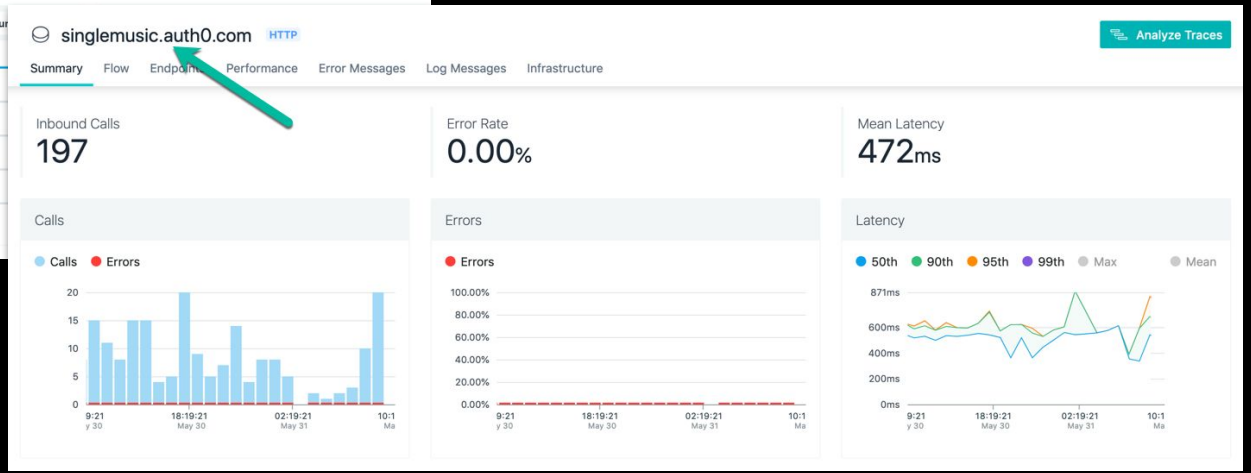
**For Each Application**

- Application service dependencies
- Calls between services
- Application architecture layout view
- Dashboards, flows, calls and issues service views



# Golden Signals for All Services

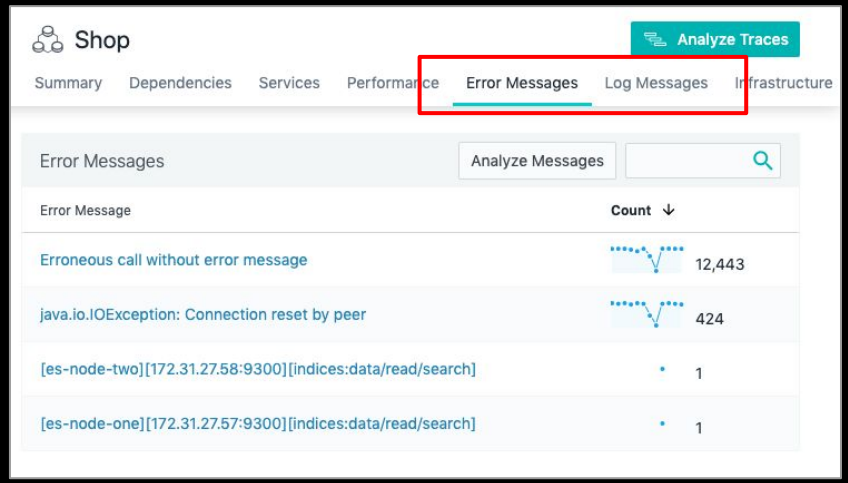


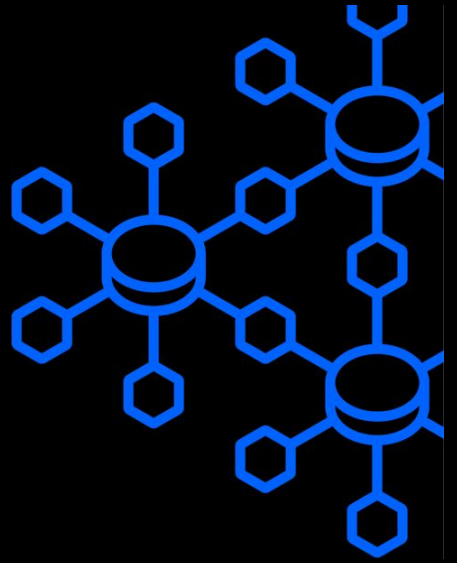

- Application Perspectives
  - Latency
  - Traffic
  - Errors
  - Saturation

# Error and Log Messages

- Error messages
  - Service errors that happen during code execution
- Log Messages
  - Collected from a log message with severity WARN or higher



# Intelligent Action

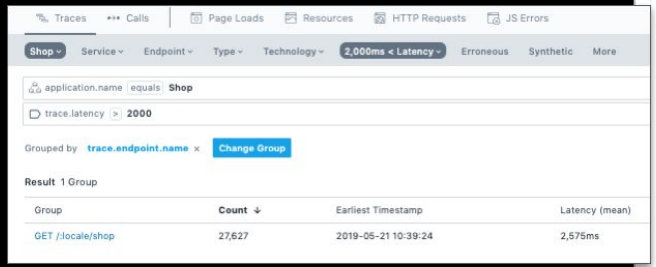


# Machine Learning


- Signals Instana trains on
  - Call Rate (sudden drops)
  - Error Rate (sudden increase)
  - Latency (sudden increase)
- Signals tracked from a variety of sources
  - Traces
    - Endpoint, services, app perspectives
  - Metrics

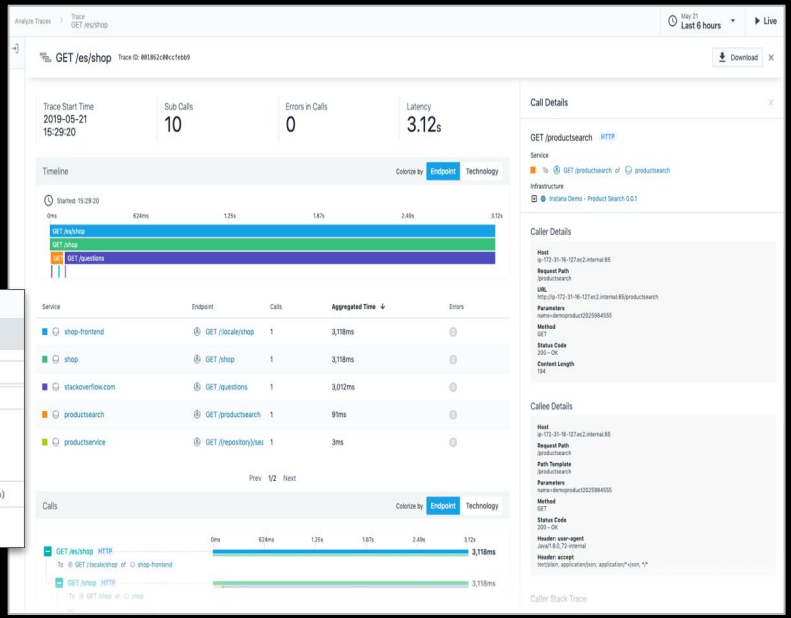
# Unbounded Analytics

- Unbounded Analytics focuses on
  - Distributed Traces
  - Logs
  - End User Monitoring



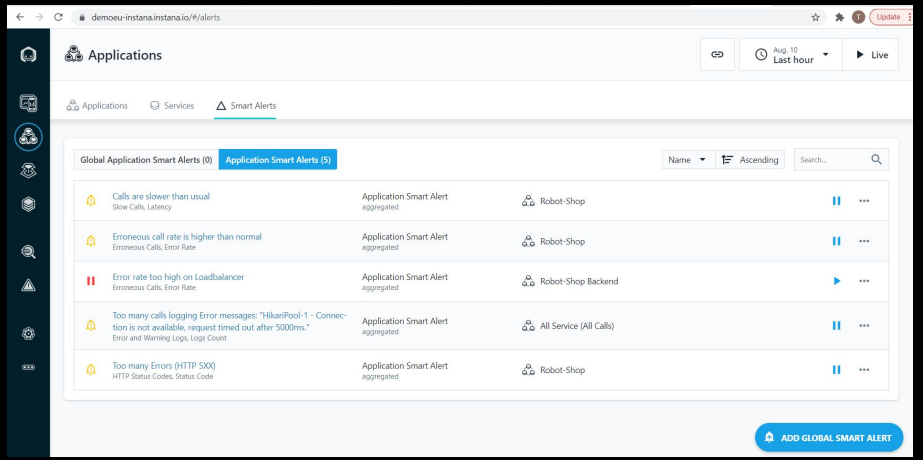

**Distributed Trace Analytics**

Finds EVERY slow request

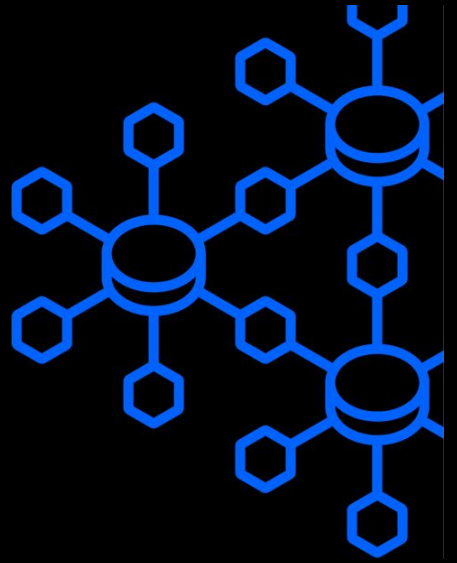


# Smart Alerts

- Use Case Based Alerting
  - Alert suggestions and recommendations
    - Performance, Availability, Errors, Bugs
  - Automated and manageable alerts
    - Customizable Scenarios, Real Time visualization, Seasonality
  - Arbitrary filtering
    - Scope limitations, Traffic narrowing



# Instana
# *is*
# Enterprise Observability



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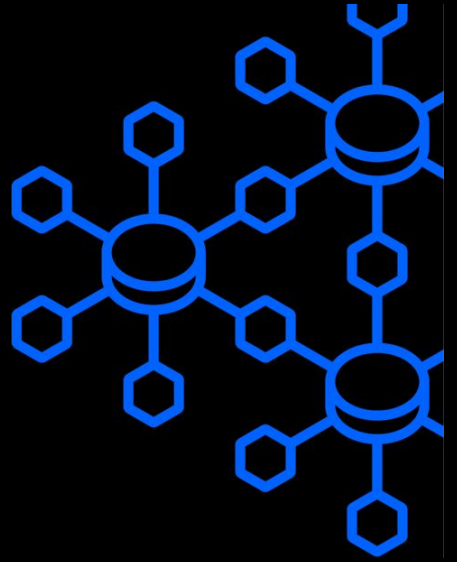
# Instana Values for Key Stakeholders

- Developers
  - Test new code functionality before committing
- DevOps
  - Enable smooth CI/CD pipeline integration
- SREs
  - Ensure pre and in-production reliability and availability
- Ops
  - Continuously monitor and respond to potential problems and alerts generated by Machine Learning and AIOps



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# Thank You!