Optimizing CI/CD Pipelines with Shift-Left Observability

Build Better Software Faster



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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 Immediately respond to user concerns

Responsiveness

Rapidly diagnose and remediate complex issues

Maintain SLI, SLO, and SLA goals

Scale-up instantly as application demand peaks

Scalability

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



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	

0	O Application (4) O Robot-Shop - > O cart HTTP (8) Node.js			
۲	🔄 Stack 😚 Upstream / Downstream 🔂 🔂 KBs Ser	vices (1) 🔻 👫 Analyze C	alis	
0	Applications 🛞 Infrastructure 🚭 Kubernetes			
R	Executed by 1 Docker Container			_
	cart (robot-shop/cart-9d7fbc866-z27rw)	CPU Total Usage 6%	Memory Usage 44.91 MiB	
	Executed by 2 Garden Containers			
M	3aebe4be-ce0b-4294-5f08-ae79	CPU Total Percentage 0%	Memory Usage 100.85 MiB	
Q	31e2427a-a320-4555-796a-59b3	CPU Total Percentage 0%	Memory Usage 107.22 MIB	
	Executed by 3 Node.js Apps			
A	() cart v1.0.0	GC Pause 537µs	RSS 117.32 MiB	
ø	(B) cart v1.0.0	GC Pause Oµs	RSS 117.05 MiB	
â	(B) cart v1.0.0	GC Pause 977µs	RSS 65.62 MiB	_
	Executed by 3 Processes			34:00 11:40 ar 02 Ma
	Pro ander	CPU Usage (User)	Virtual Memory	_
	Infrastructure Issues & Changes	Top Endpoints	Latency	Calls Errone

Context Guide

Dynamic Graph for rapid troubleshooting.

A "GPS" for enterprise applications.

Dynamic Graph

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





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



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

🖧 Shop	😤 Analyze Traces
Summary Dependencies Services Performarce	Error Messages Log Messages Infrastructure
Error Messages	Analyze Messages Q
Error Message	Count 4
Erroneous call without error message	12,443
java.io.IOException: Connection reset by peer	424
[es-node-two][172.31.27.58:9300][indices:data/read/sea	rch] 1
[es-node-one][172.31.27.57:9300][indices:data/read/sea	rch] 1

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

" Traces ↔ Calls	Page Loads	Resources 🔯 HTTP Reque	ests 🗔 JS	Errors	
Shop - Service - Endpoi	nt ~ Type ~ Technolo	gy v 2,000ms < Latency v	Erroneous	Synthetic	More
, application.name equals SI	юр				
Trace.latency > 2000					
Grouped by trace.endpoint.nar Result 1 Group	ne x Change Group				
Group	Count 🕹	Earliest Timestamp		Late	ncy (mea
	27,627	2019-05-21 10:39:24		2,57	5ms
GET /:locale/shop					

Distributed Trace Analytics

Finds EVERY slow request

Analy	ze Trace > Trace GET /es/shop						0	Last 6 hours	Live
-+)	CET /es/shop Trace 12: 001862c000	cfebb9						▲ Download	x
-1		ub Calls O	Errors in Calls		Latency 3.12s		Call Details GET /productsearch HTTP		×
	Timeline				Colorize by Endpoin	Technology	Service To		
	Started: 15:29:20 Oms 624ms OET (rei_thtop OET /rei_thtop	1255	187		2.49	3.126	Caller Details		
	CET /Questions	Endpoint	Calls	Appregated Time 🔶		223	Host (p. 77: 3-51-54-127 ec2.internal: 85 Request Path (productionarch (productionarch) URL http://jo-172-31-36-127 ec2.internal: 85/productionarch		
e	Servee		1	3,118ms	6		Parameters name-demoproduct2025984555 Method GET Status Code		
	G shop Stackoverflow.com	GET /shop GET /questions	1	3,118ms 3,012ms	6		200 - OK Content Length 194		
	G productsearch	GET /productsearch		91ms	6		Callee Details		
	productservice	GET /(repository)/sea		3ms	0)	ip-172-31-16-127.nc2.internal.85 Request Path Joroductsearch Path Template Joroductsearch		
ean)	Calle	Prev	1/2 Next		Automatica Destantin	Technology	Parameters name-demoproduct2025984555 Method		
	Calls	Oma 631		105	Colorize by Endpoint		GET Status Code 200 - OK Header: user-agent		
	GET /es/shap HTTP To @ GET /locale/shap of O shap-fronten		lms 1.25s	187)	2.495	3.12s 3,118ms	Header: user-spect Java/18,12-ritemal Header: accept tentplain, application/son, application/*+json, 1*		
	To the GET /shap HETP	-				3,118ms	Caller Stack Trace		

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

$\leftarrow \ \rightarrow$	C 🔒 den	noeu-instana.instana.io/#/alerts			\$	* 🕕 Update
Q	🖓 Ap	plications			C Aug. 10 Last hour	► Live
q	🖧 Applic	ations G Services A Smart Alerts				
	Global	Application Smart Alerts (0) Application Smart Alerts (5)			Name - F Ascending Search.	Q,
۲	۵	Calls are slower than usual Slow Calls, Latency	Application Smart Alert aggregated	a Robot-Shop		п …
Q	Φ	Erroneous call rate is higher than normal Erroneous Calls, Error Rate	Application Smart Alert aggregated	and Robot-Shop		н
	н	Error rate too high on Loadbalancer Erroneous Calls, Error Rate	Application Smart Alert aggregated	& Robot-Shop Backend		•
ø	Φ	Too many calls logging Error messages: "HikariPool-1 - Connec- tion is not available, request timed out after 5000ms." Error and Warning Logs, Logs Count	Application Smart Alert aggregated	All Service (All Calls)		н, …
	Φ	Too many Errors (HTTP 5XX) HTTP Status Codes, Status Code	Application Smart Alert aggregated	Robot-Shop		н …
					ADD GLOB	AL SMART ALERT

Instana *is* Enterprise Observability



Build Better Software Faster

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



Optimizing CI/CD Pipelines with Shift-Left Observability

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Thank You!

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