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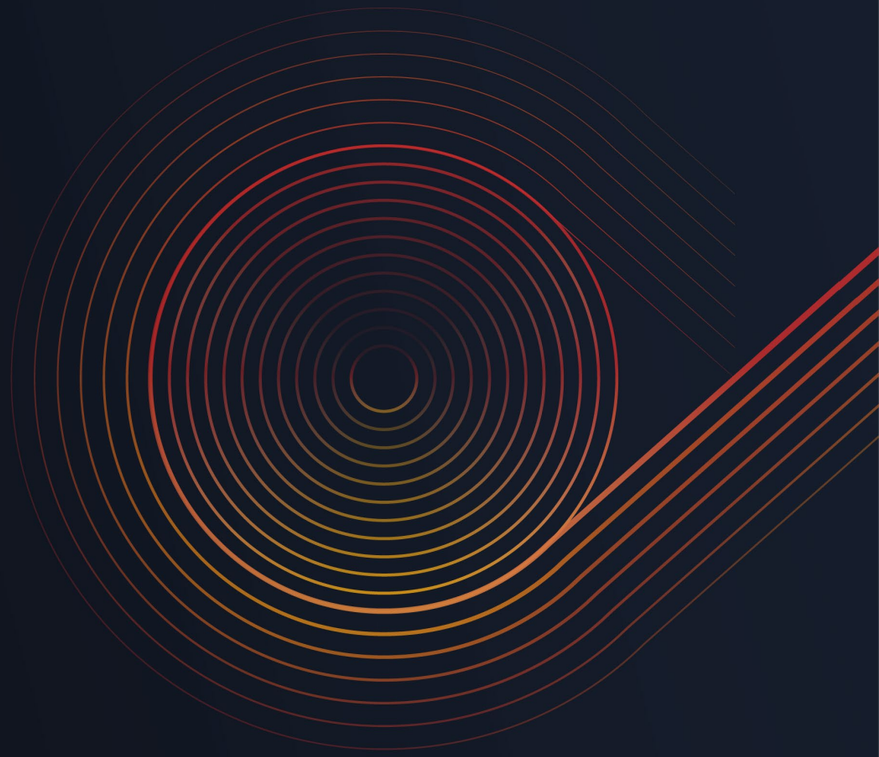
Making sense of chaos

Operational visibility in distributed systems

Arthi Jaganathan
Solutions Architect,
Amazon Web Services



Distributed systems

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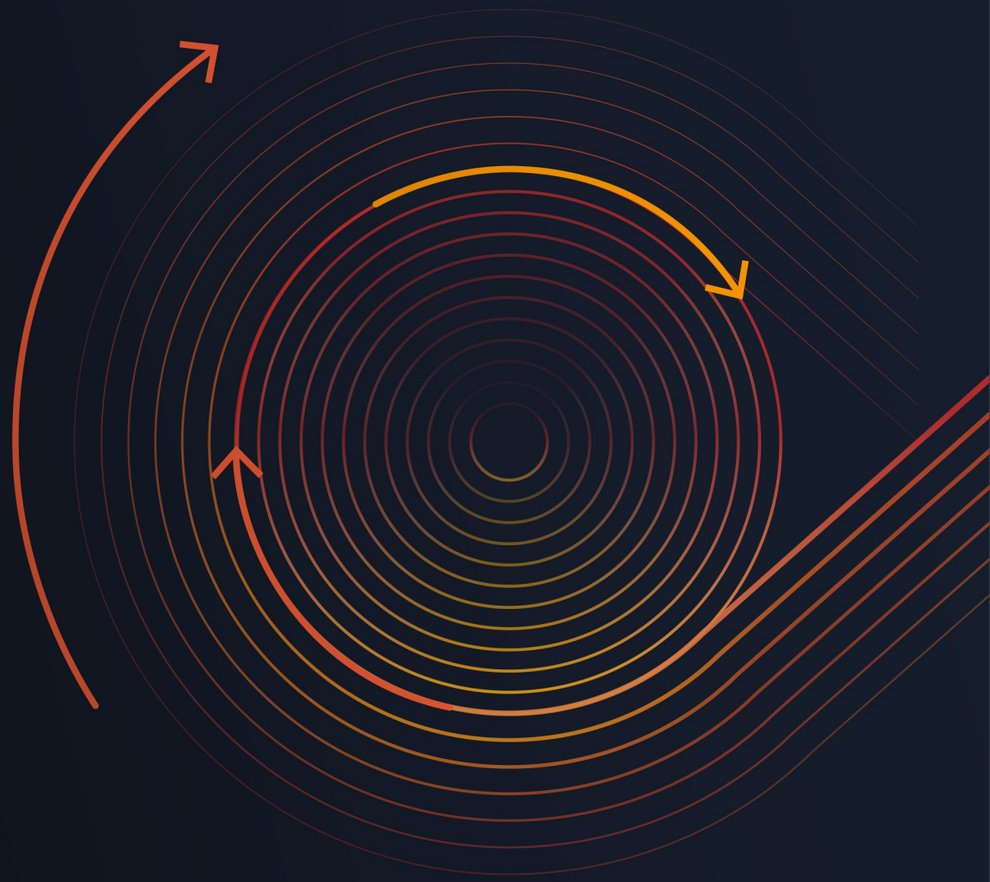
“A distributed system is one in which the failure of a computer you didn’t even know existed can render your own computer unusable.”

Leslie Lamport

American computer scientist



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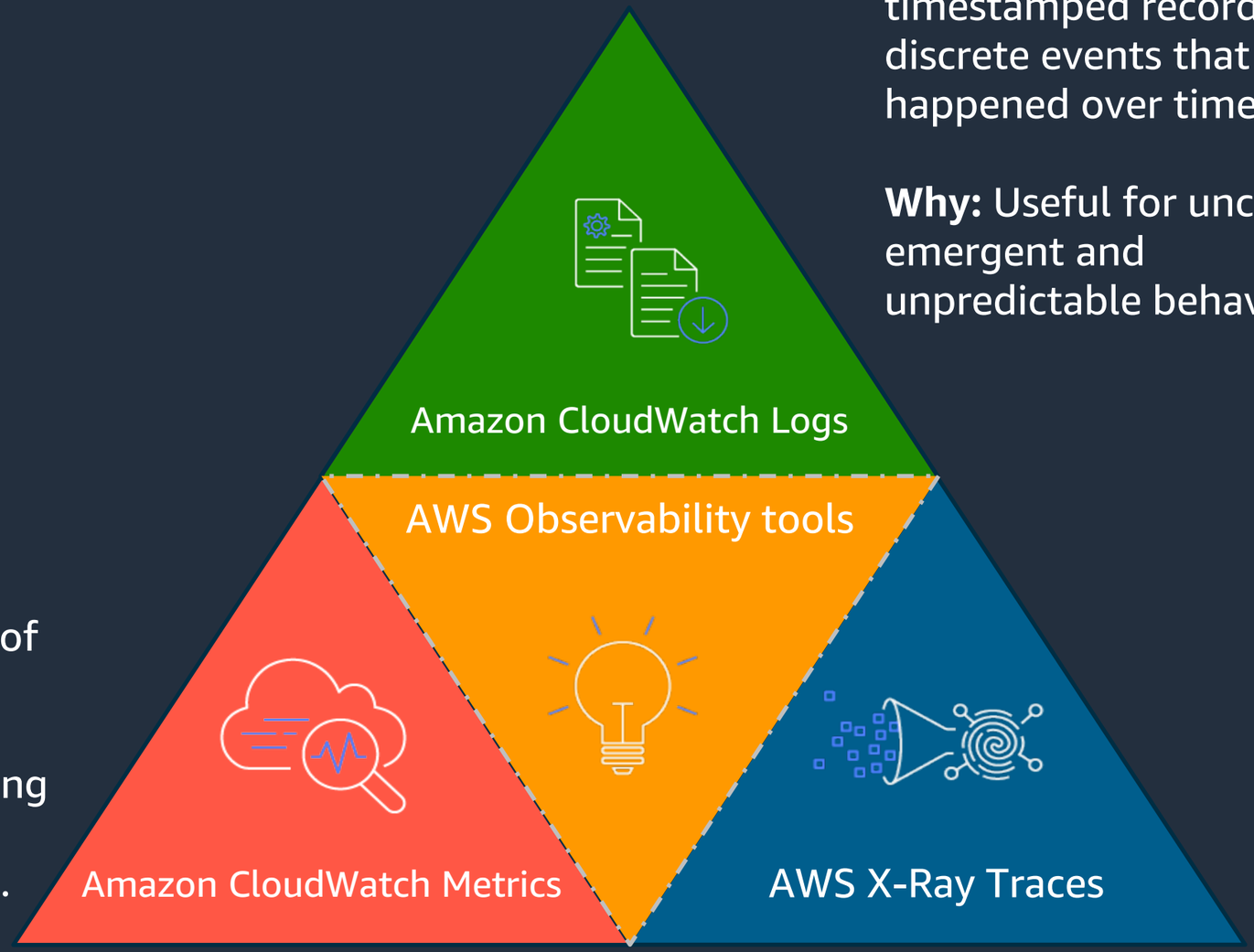
Challenges with distributed systems

- Many permutations of failures
- UNKNOWN network operations
- Distributed bugs often latent
- Distributed bugs spread epidemically

Observability tools

What: Immutable, timestamped record of discrete events that happened over time.

Why: Useful for uncovering emergent and unpredictable behavior.



What: Numeric representation of data measured over intervals of time.

Why: Useful for identifying trends, mathematically modeling and prediction.

What: Representation of a series of related distributed events that encode the end-to-end request flow through a distributed system.

Why: Provides visibility into both the path traversed by a request as well as the structure of a request.

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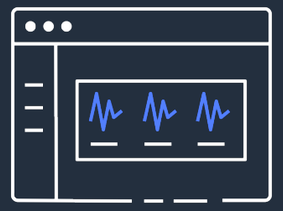
Observability in practice

Collect



Monitor

Act

Analyze

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Collect

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What to measure?

Business Insight!

Customer Sentiment
SLAs

Business-Level Metrics

Page Load Time
Job Run Length

System-Level Telemetry

CPU Wait %
Disk Queue Depth

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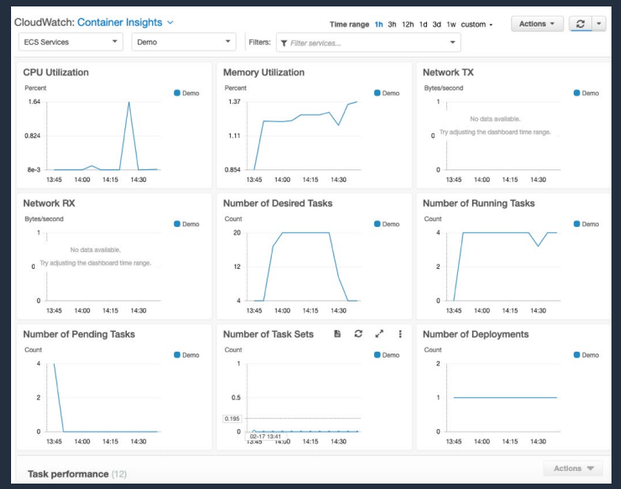
Capturing metrics

System telemetry

Amazon CloudWatch Metrics

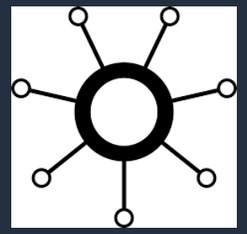


Amazon CloudWatch Container Insights

Application telemetry

Embedded Metric Format

Metrics Filters



CollectD & StatsD

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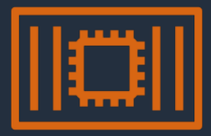
Log collection

AWS log collectors

CloudWatch Logs Agent for Amazon EC2



FireLens for containers

Open source log collectors

Logstash

Fluentd

Graylog

… many more

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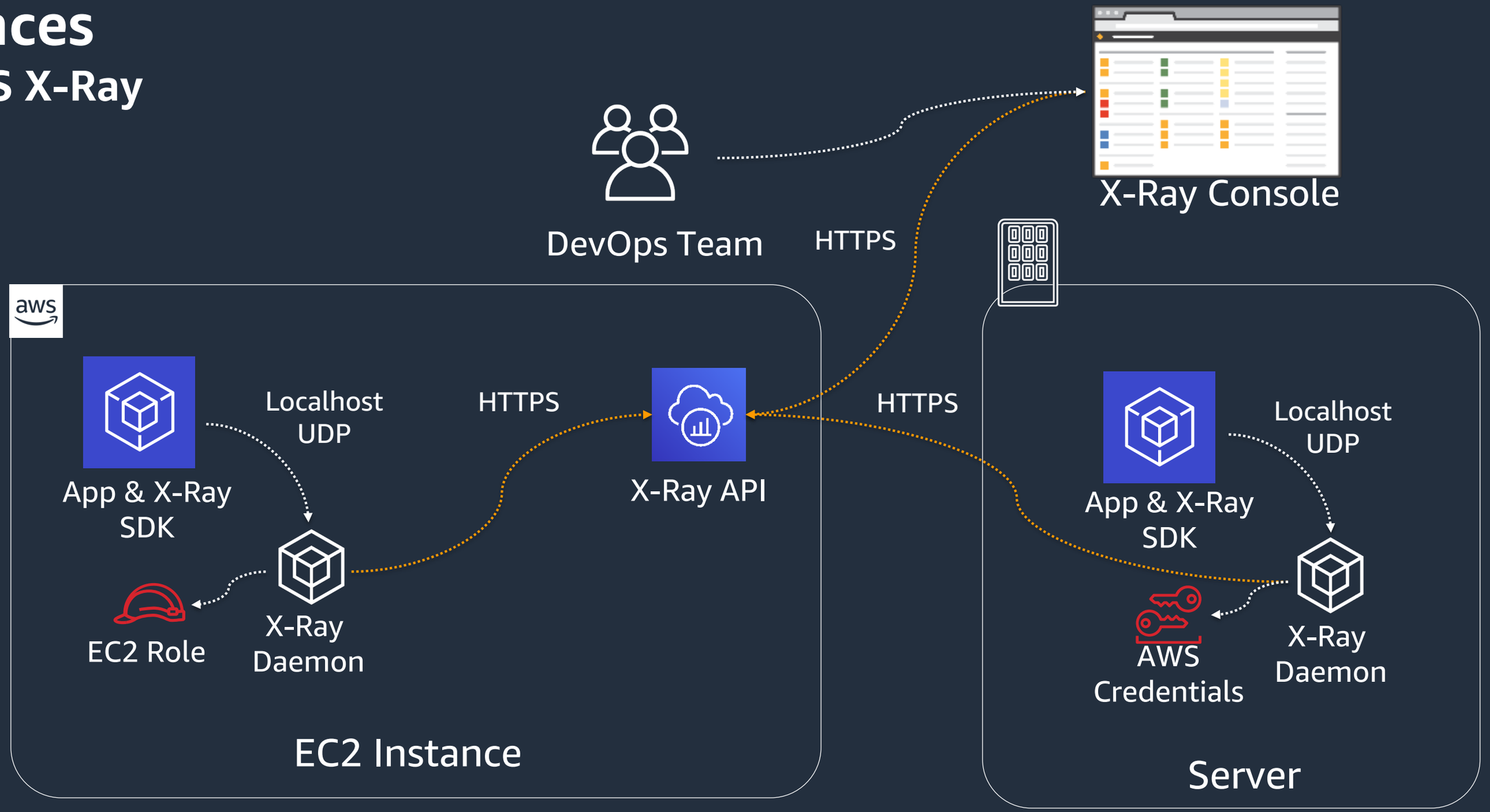
Traces
AWS X-Ray



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Monitor

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blog.tacertain.com/p-four-nines/

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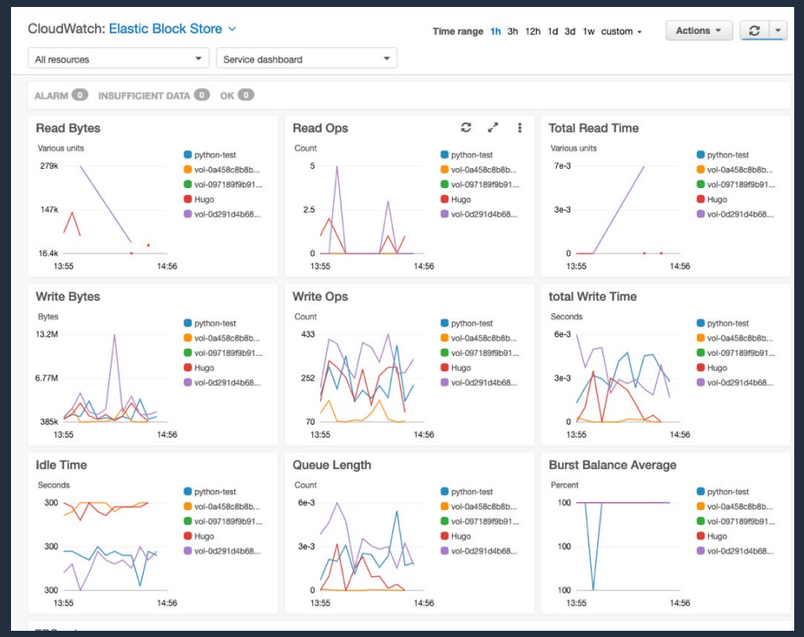
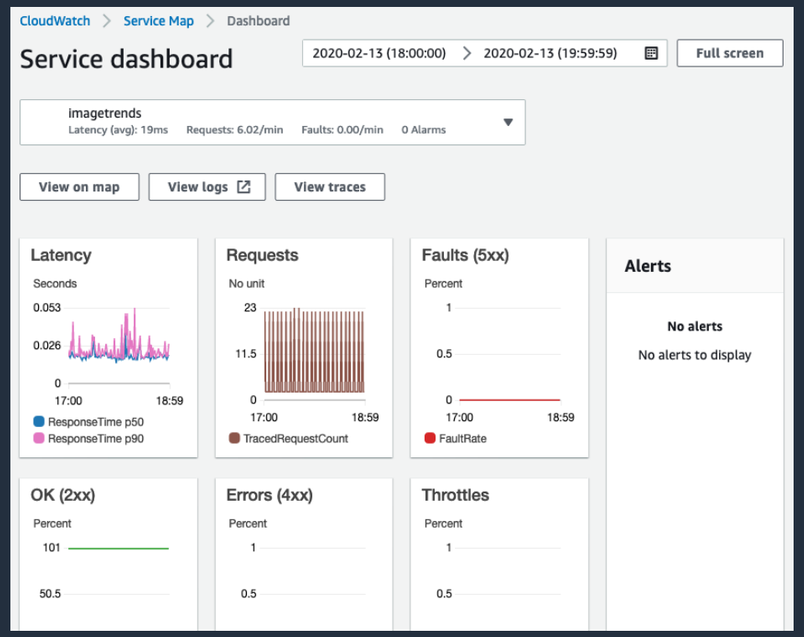
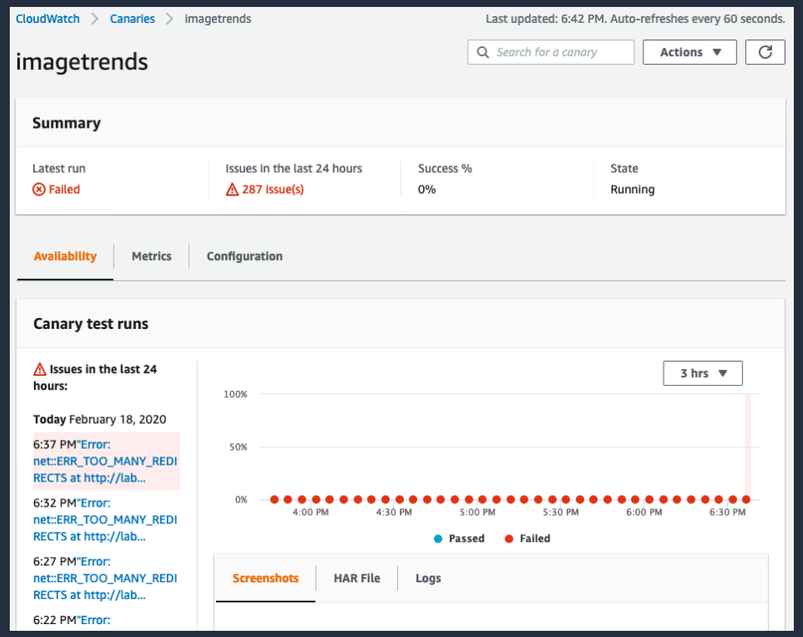
Monitoring tools



AWS CloudWatch Dashboard



AWS CloudWatch ServiceLens



AWS CloudWatch Synthetics

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Act

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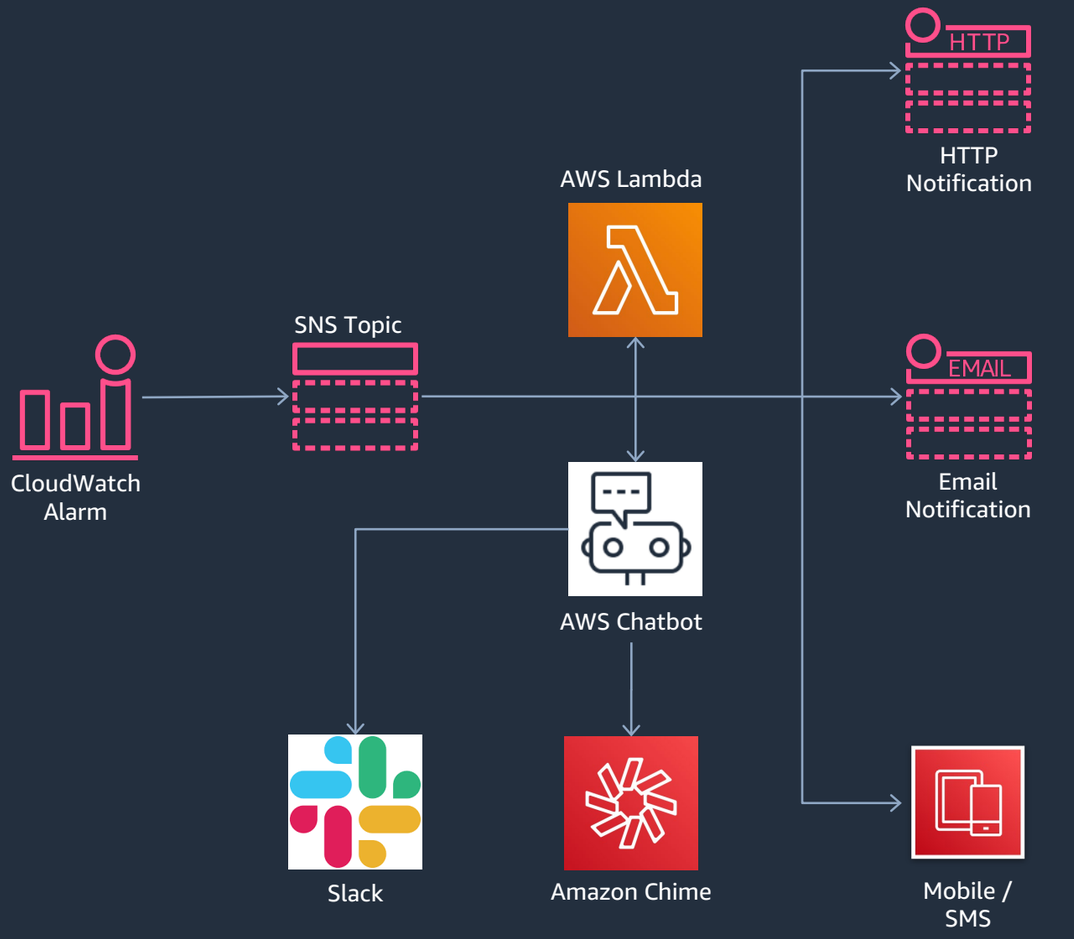
Automation

- Perform auto-scaling
- Invoke disaster recovery
- Notify users through email, SMS,
- Invoke other services such as AWS Lambda
- Call HTTP endpoints
- Use AWS Chatbot to notify users on Slack, Amazon Chime
- Respond to security events



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Analyze

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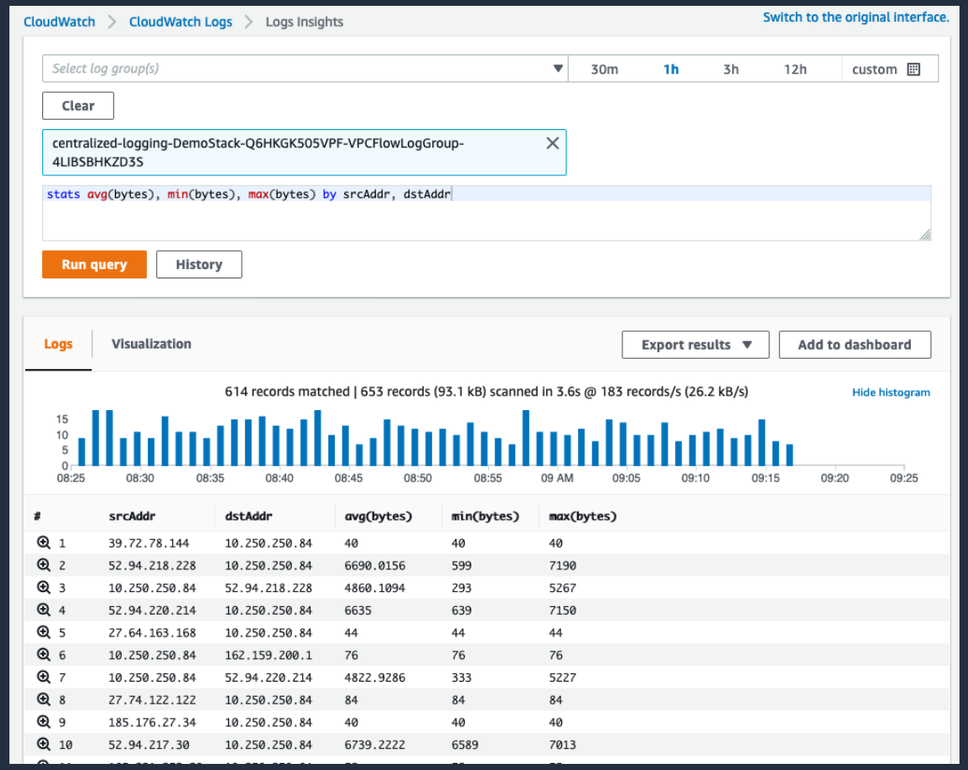
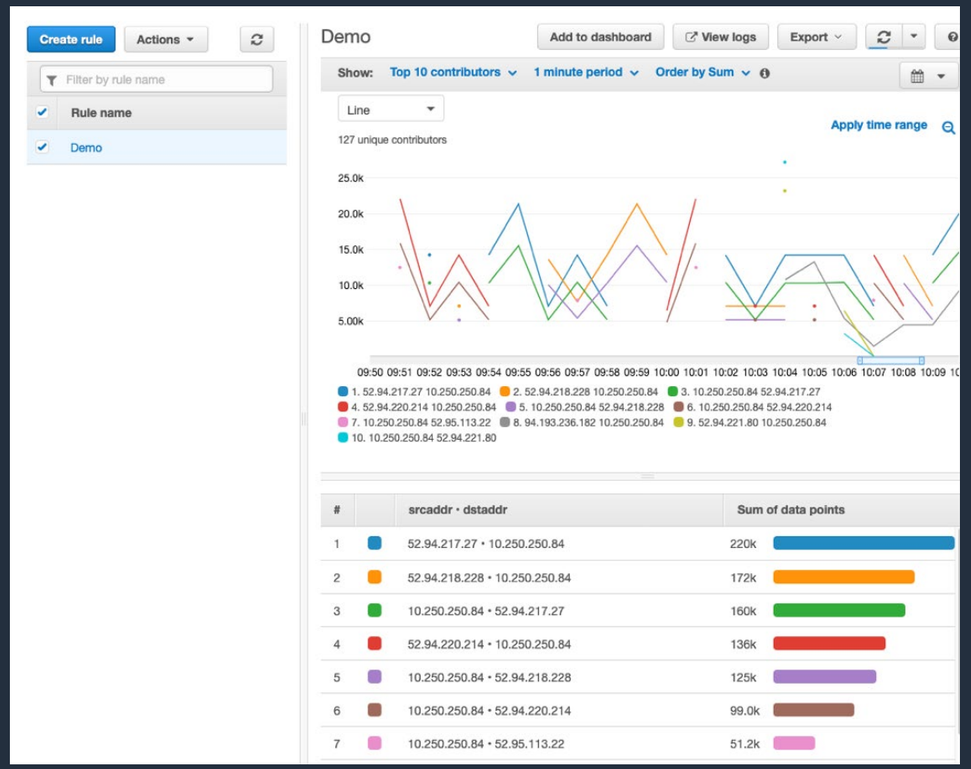
Log analytics



AWS CloudWatch Logs Insights



AWS CloudWatch Contributor Insights

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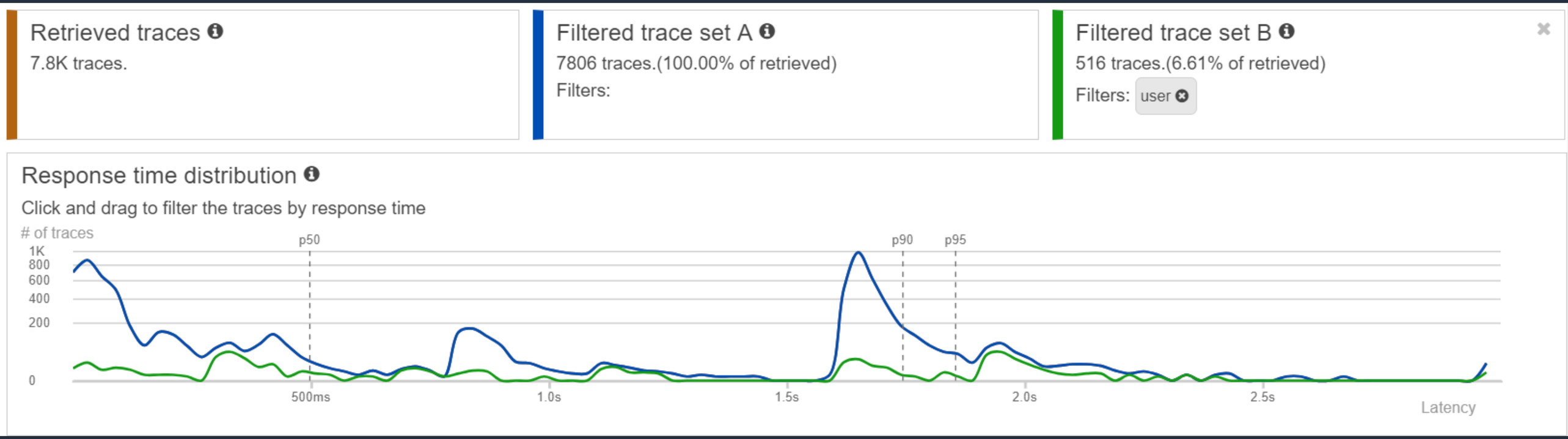
AWS X-Ray analytics



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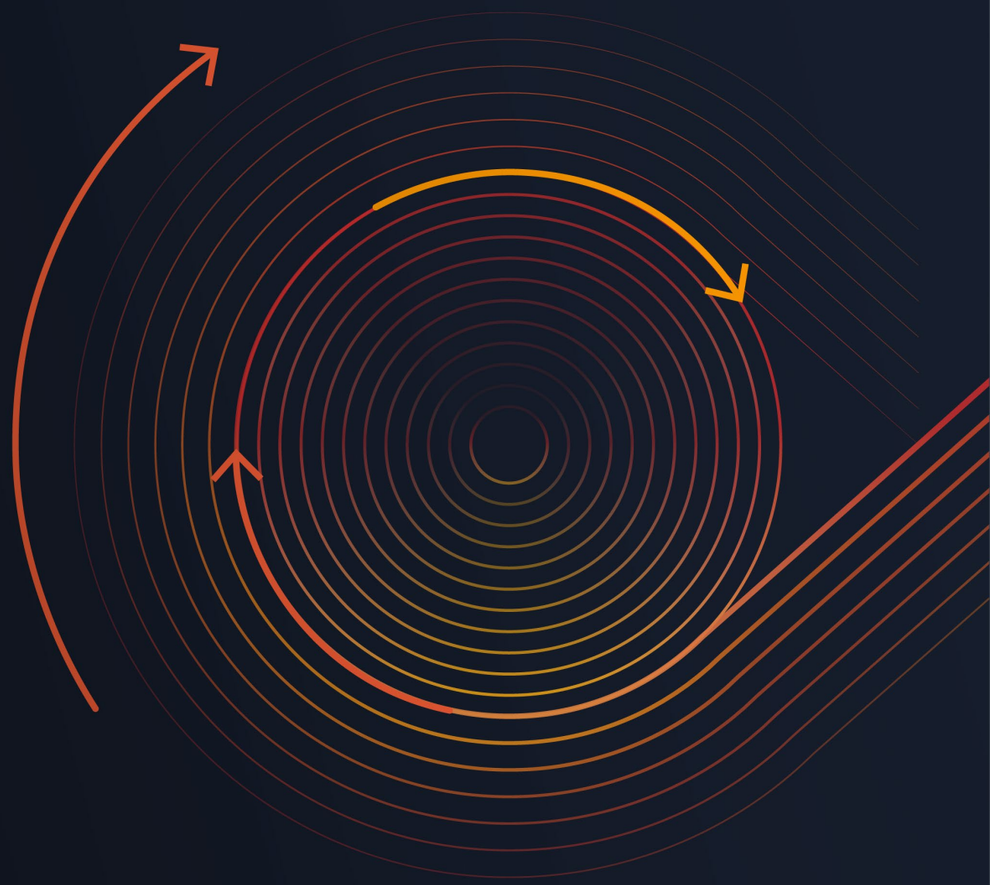
Demo



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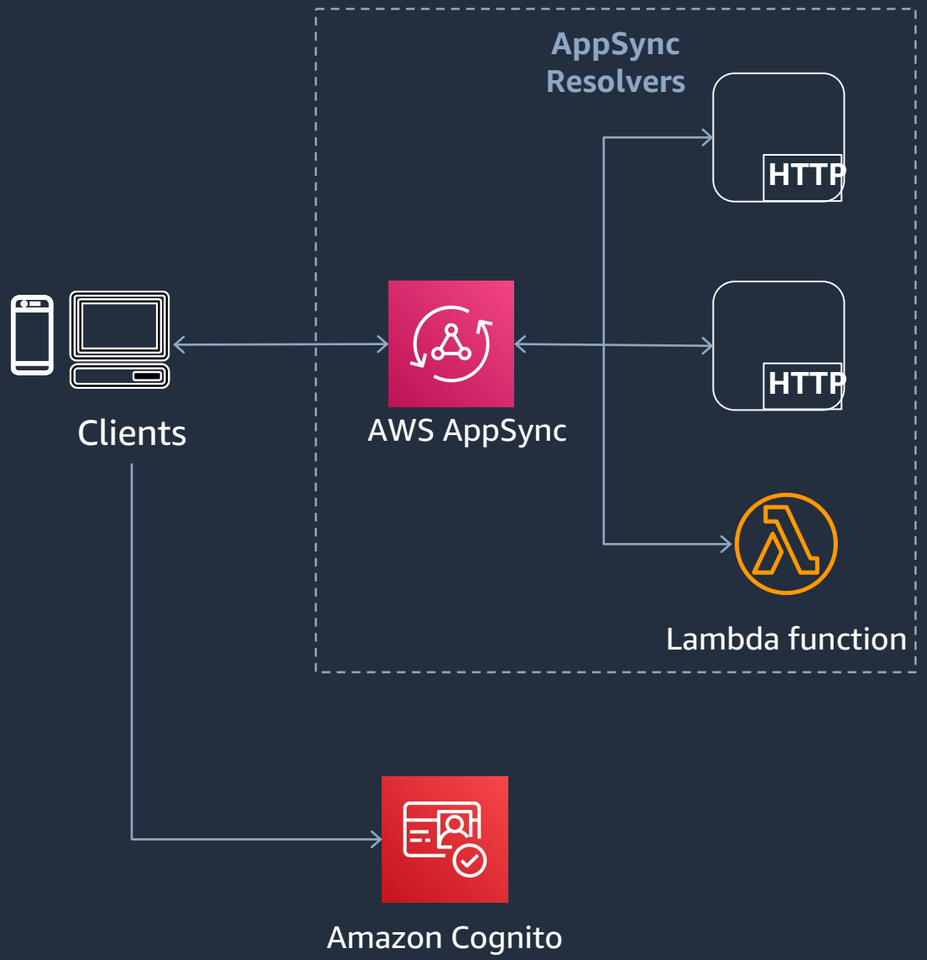
Demo architecture



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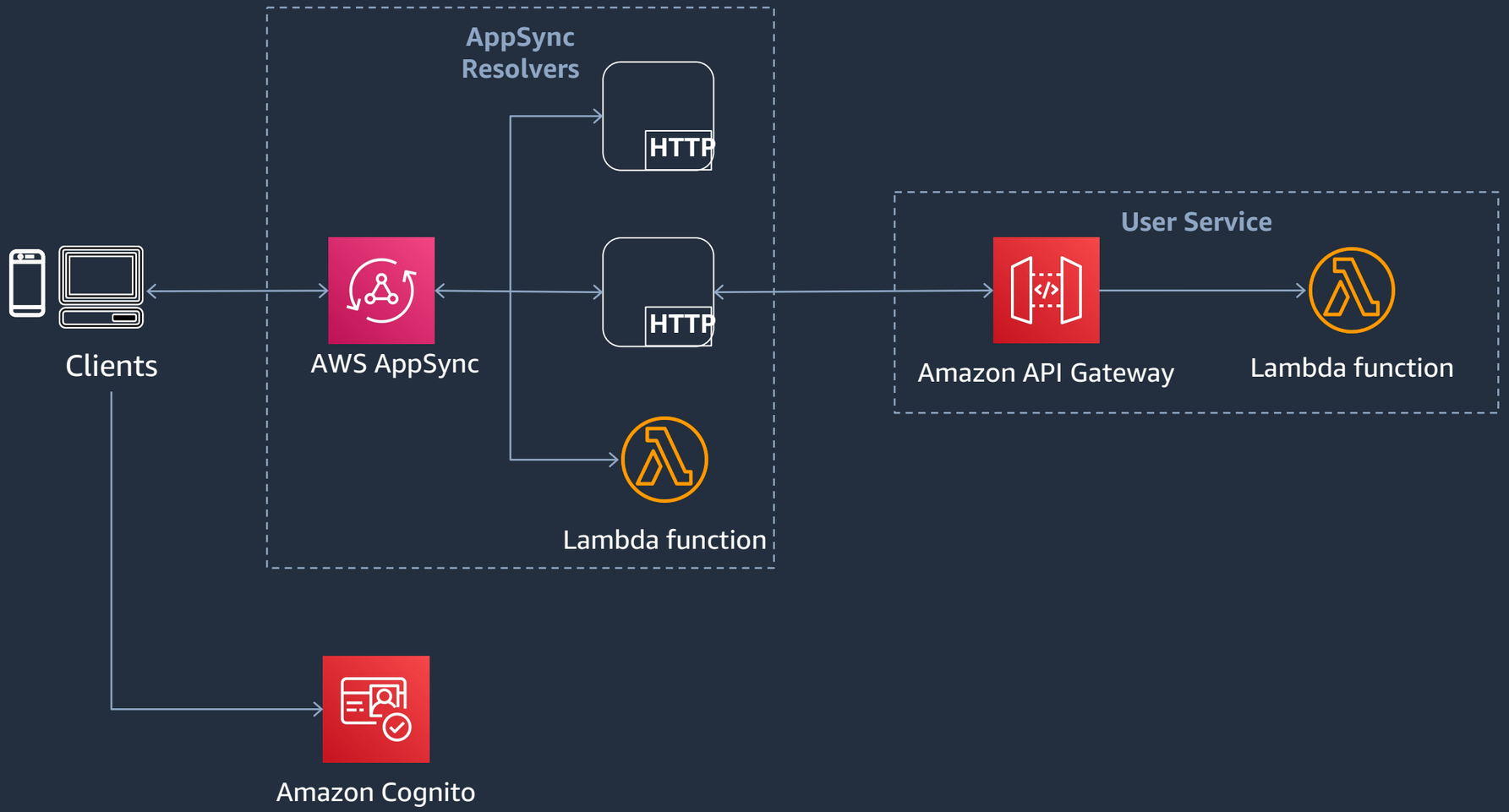
Demo architecture



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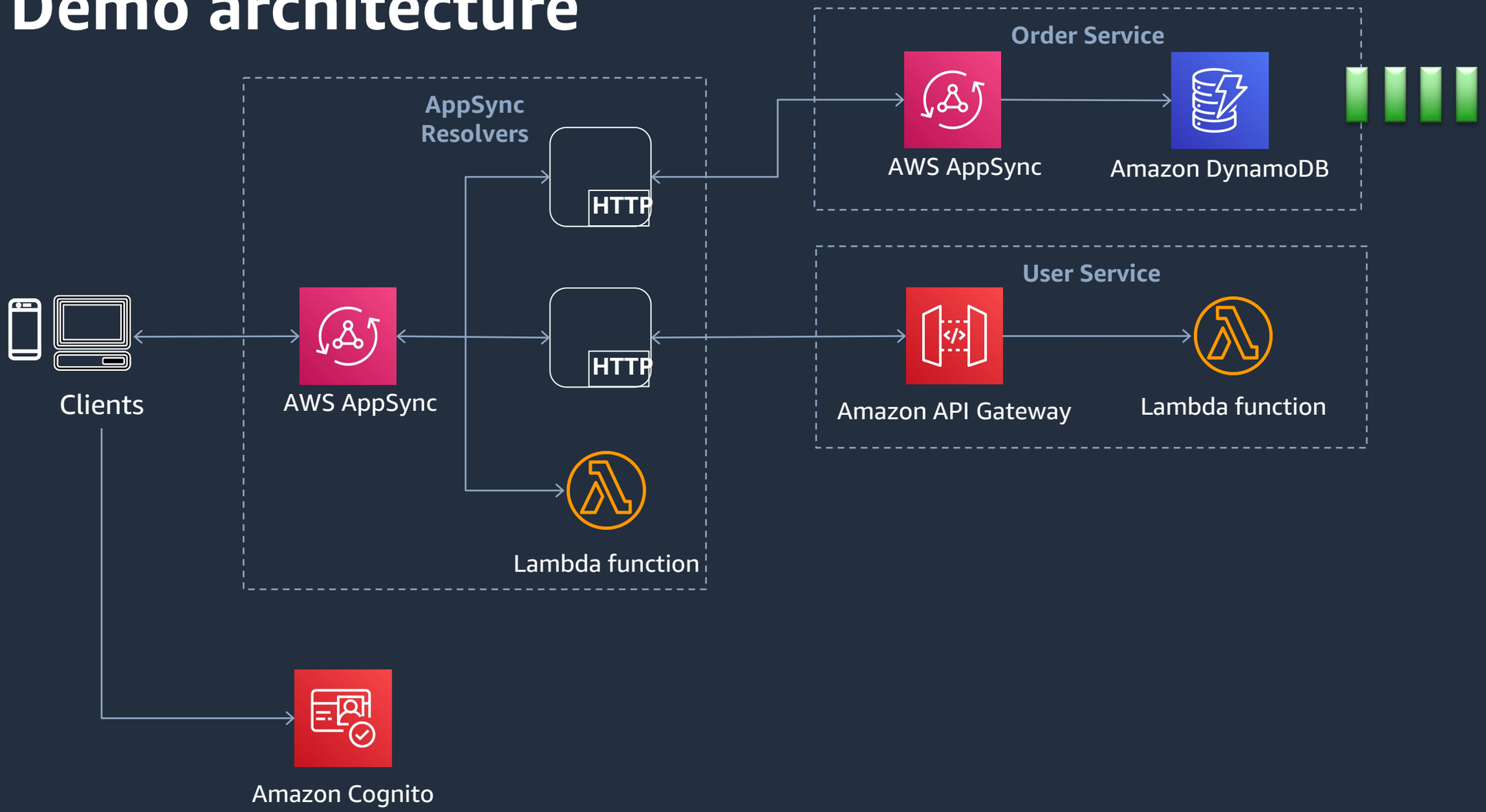
Demo architecture



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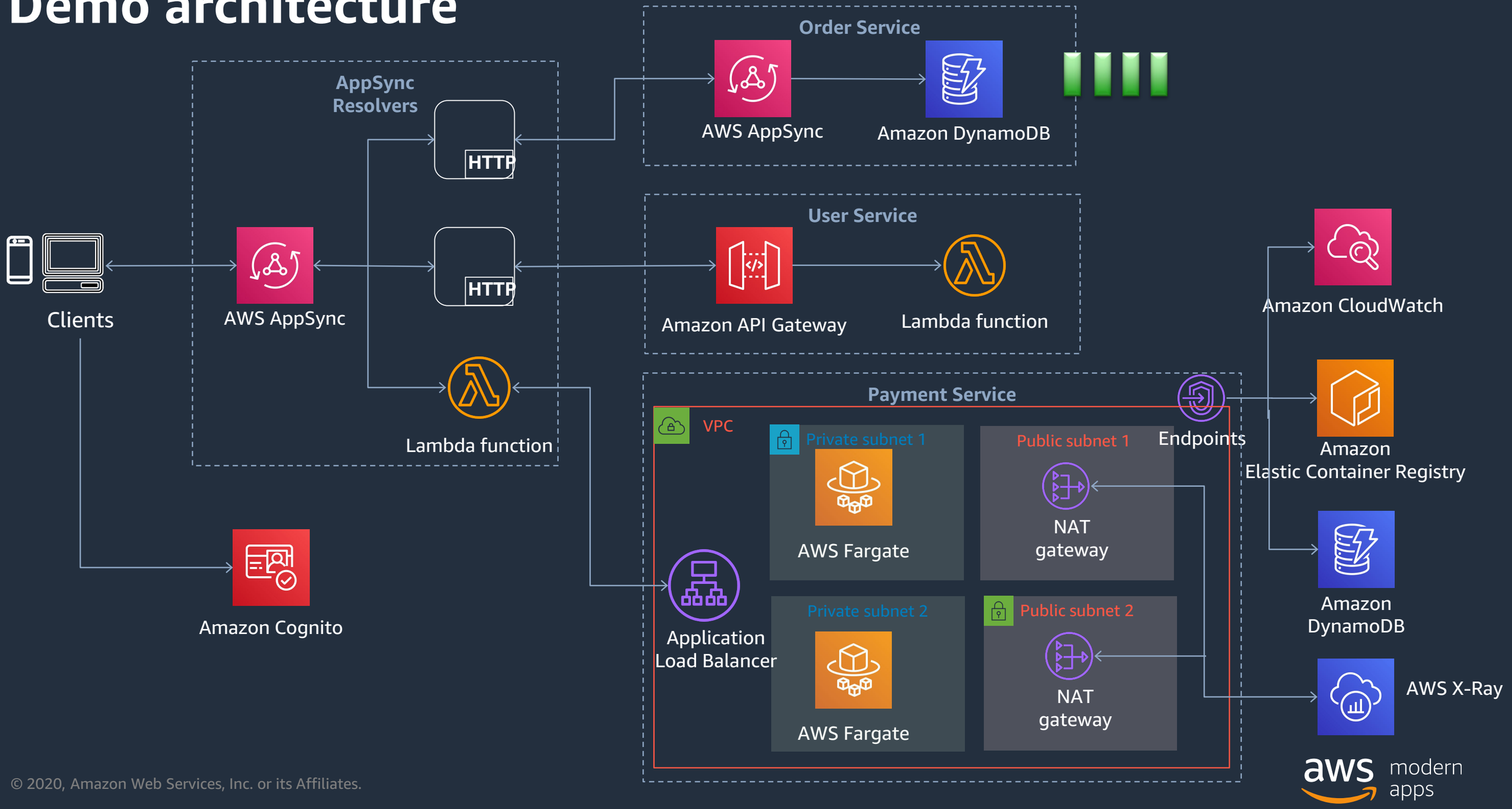
Demo architecture



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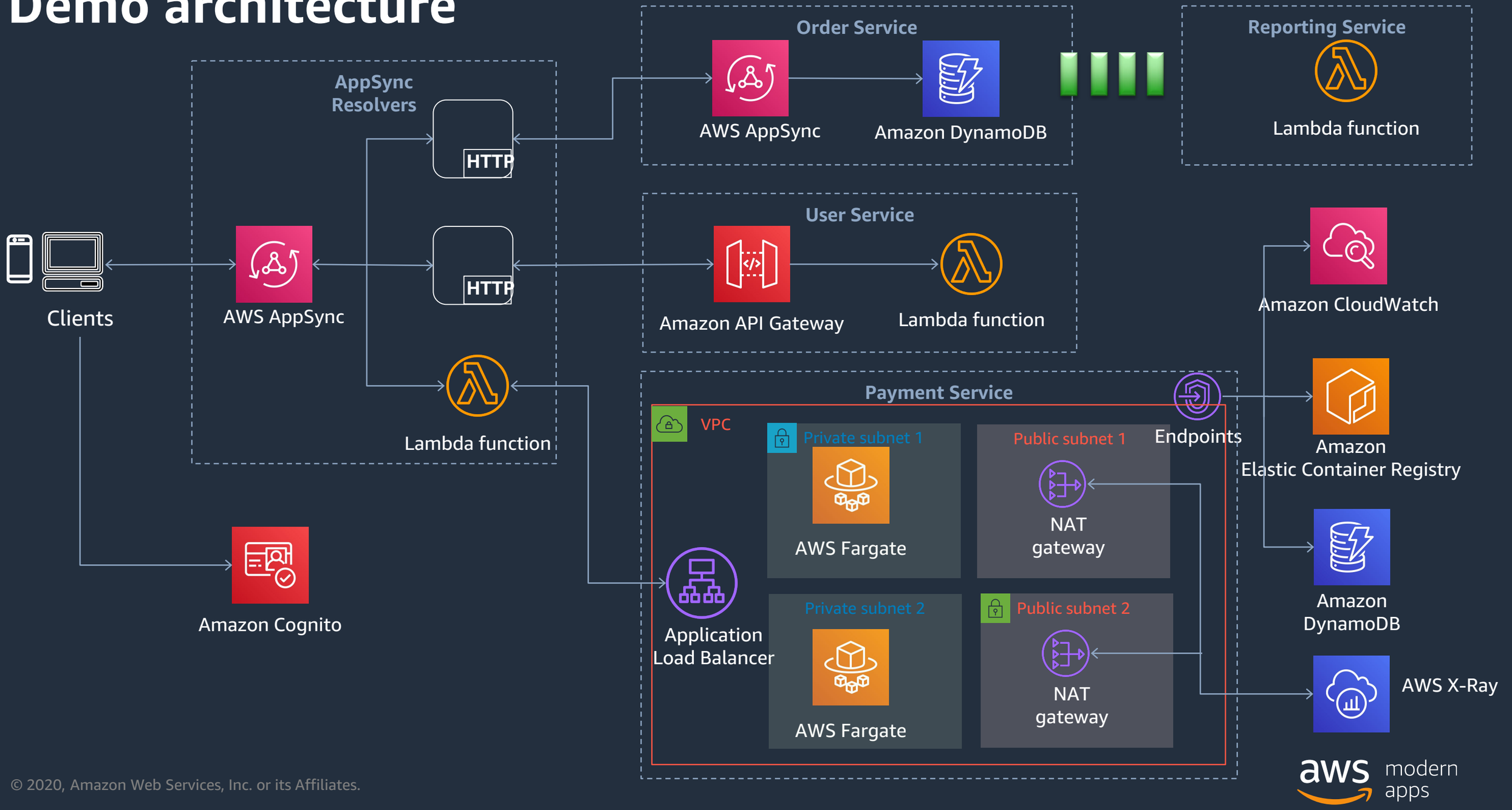
Demo architecture



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What I’m going to show you how to do

1. Collect metrics from logs
   (CloudWatch Logs Embedded Metric Format and Logs Insights)
2. Receive an alarm with dynamic thresholds
   (CloudWatch Anomaly Detection)
3. Visualize service performance
   (CloudWatch ServiceLens)
4. Analyze traces and to pinpoint root cause
   (X-Ray Analytics and CloudWatch Logs Insights)

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[1] 451 Research, *Demystifying Cloud Transformation: Where Enterprises Should Start,* September 2019.

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Thank you!