AWS re:Invent

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Powering observability with Amazon OpenSearch Service

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What is observability?

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“Observability is a measure of how well internal states of a system can be inferred from knowledge of its external outputs”

Wikipedia

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Operational analytics

Operational analytics

- Descriptive analytics <- Observability
- Predictive analytics
- Prescriptive analytics



Improving business performance in terms of internal business efficiency and/or customer experience and value

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OpenSearch is great for operational analytics

- High ingest rates to handle high volume
- Ability to handle variant data structures
- Horizontal and vertical scalability to meet your needs
- Rich ecosystem of tools to help with
  - Ingestion
  - Buffering
  - Data collection
  - Visualization



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What is OpenSearch?

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OpenSearch

- Community-driven, open source, Apache 2.0 licensed
- Derived from Elasticsearch 7.10.2
- Consists of OpenSearch and OpenSearch dashboards
- Relationship to Open Distro for Elasticsearch
- Near real-time analysis and search
- Easy ingestion and visualization
- Variety of applications

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Search and analytics



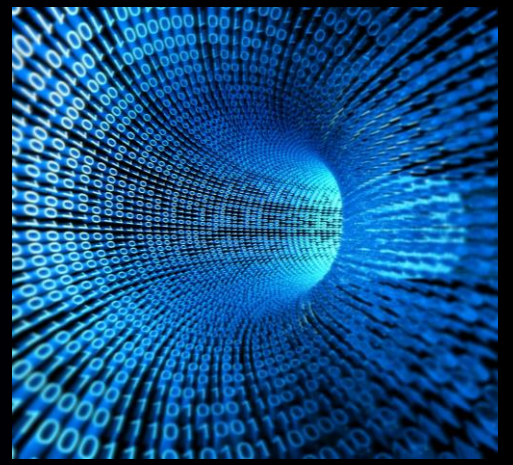
Text search

- Natural language
- Scoring
- Relevance



Similarity search

- Non-textual data
- Vector space



Streaming data

- High volume ingest in near real time



Analytics

- Analysis at scale
- Patterns and trends

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Amazon OpenSearch Service (successor to Amazon ES)



- Amazon OpenSearch Service is a fully managed service that makes it easy to deploy, manage, and scale OpenSearch and OpenSearch dashboards
- Support for 19 versions of Elasticsearch (1.5 to 7.10 versions) and visualization capabilities powered by OpenSearch dashboards and Kibana (1.5 to 7.10 versions)

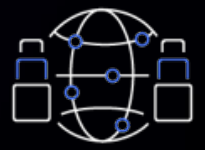
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Benefits of Amazon OpenSearch Service



Fully managed

With APIs and AWS console control, you can deploy your cluster in minutes as a drop-in for an existing cluster



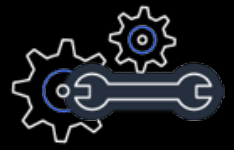
Flexible

Search your data or analyze your logs; supports AWS and open-source ingestion tools



Cost effective

Pay as you go; reduce operational cost; right-size your instance types; use reserved instances



Highly available

Self-healing, 24/7 monitoring, Multi-AZ with a click, automatic backups, AWS support available, metrics in Amazon CloudWatch



Scalable and high performance

One click to scale, apply OpenSearch version upgrades and patches



Secure and compliant

Deploy in VPC; Amazon Cognito login; HIPAA eligible; FISMA, SOC, PCI, FedRamp compliant

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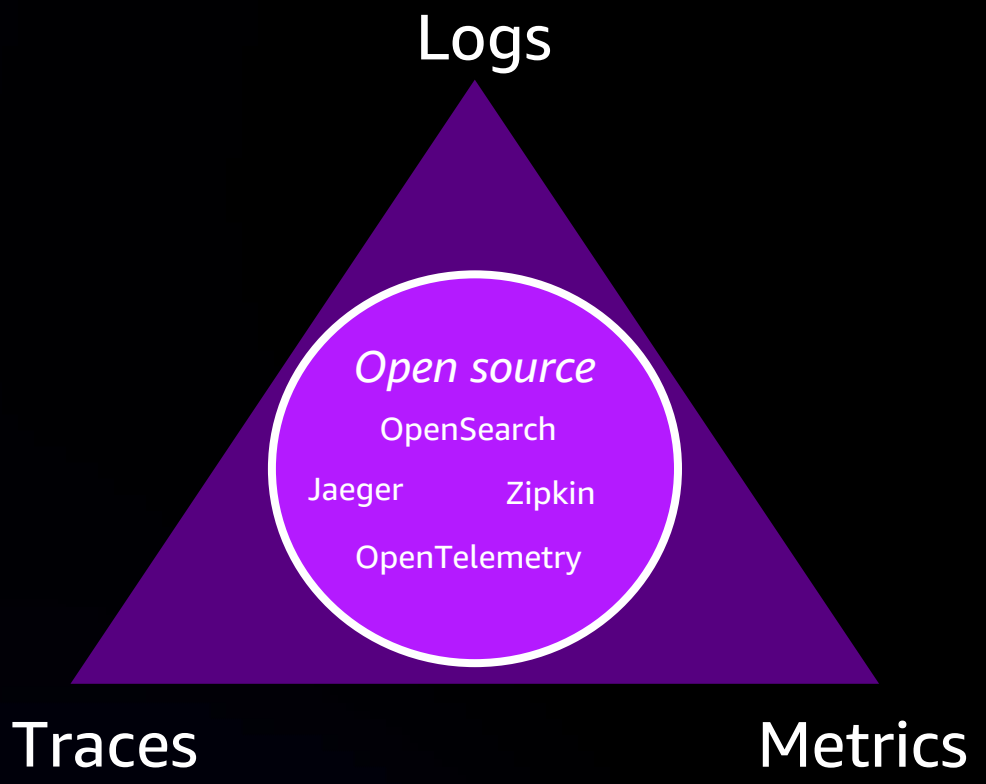
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Operational analytics data

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Operational analytics data

```
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unicomp6.unicomp.net - - [01/Jul/1995:00:00:06 -0400] "GET /shuttle/countdown/ HTTP/1.0" 200 3985
199.120.110.21 - - [01/Jul/1995:00:00:09 -0400] "GET /shuttle/missions/sts-73/mission-sts-73.html HTTP/1.0" 200 4085
burger.letters.com - - [01/Jul/1995:00:00:11 -0400] "GET /shuttle/countdown/liftoff.html HTTP/1.0" 304 0
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```



Troubleshoot is like finding a “needle in the haystack”

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Example troubleshooting workflow

1. Application monitoring data indicates a high failure rate on checkout transactions
2. Use logs and other data to analyze the customer-facing checkout service to see if root cause can be determined
3. If not, then identify downstream services and escalate to them
4. Repeat steps 2 and 3 until a service team has identified the source of the problem
5. If multiple teams identify issues, then fix all or use best guess to prioritize resolution efforts
6. Validate the fix worked

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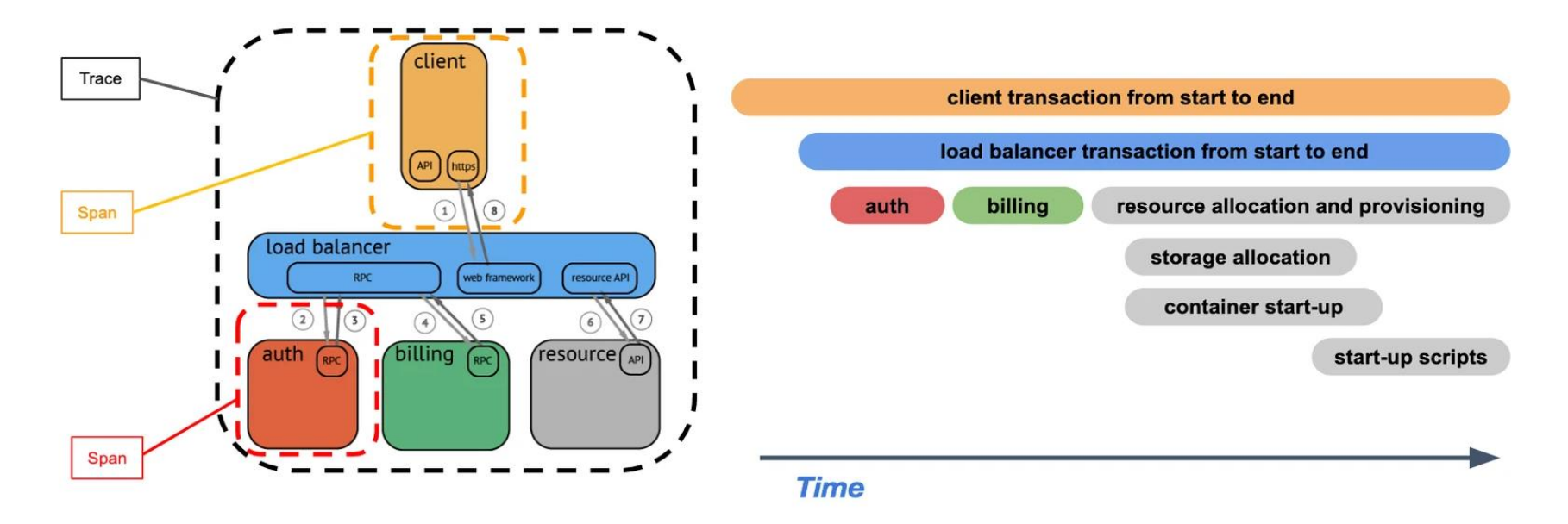
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Trace Analytics

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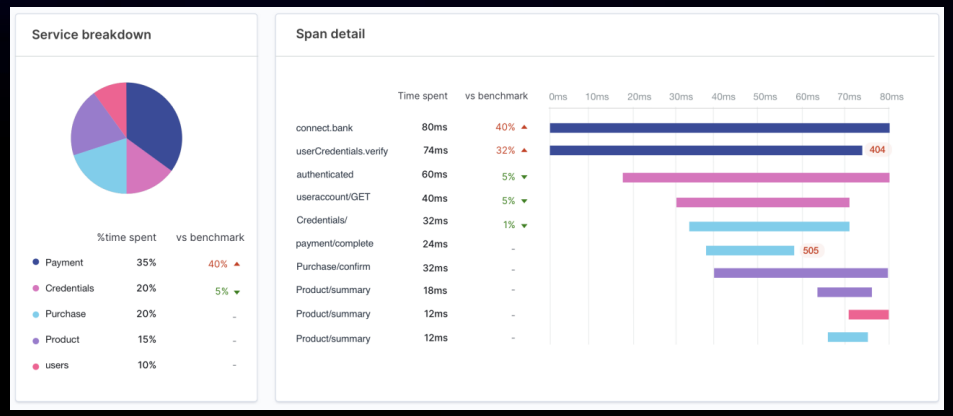
Distributed tracing

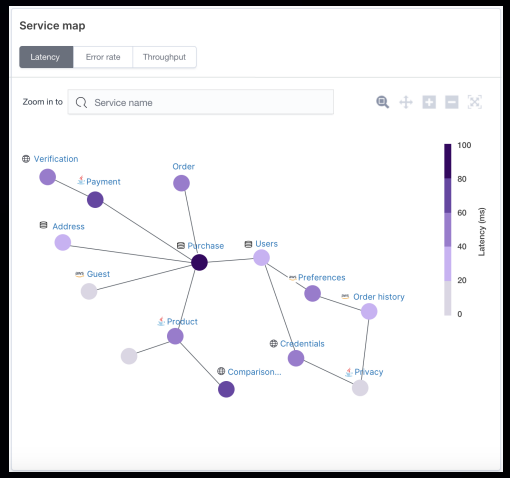
- Distributed tracing refers to methods of observing requests as they propagate through distributed systems
- A trace tells the story of a transaction or workflow as it propagates through a system

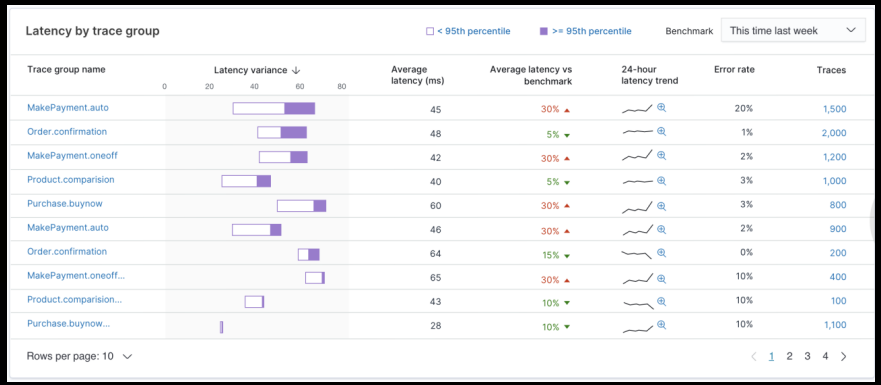


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Trace Analytics feature







Trace-Span details

- Single request performance
- Diagnose root cause

Service maps

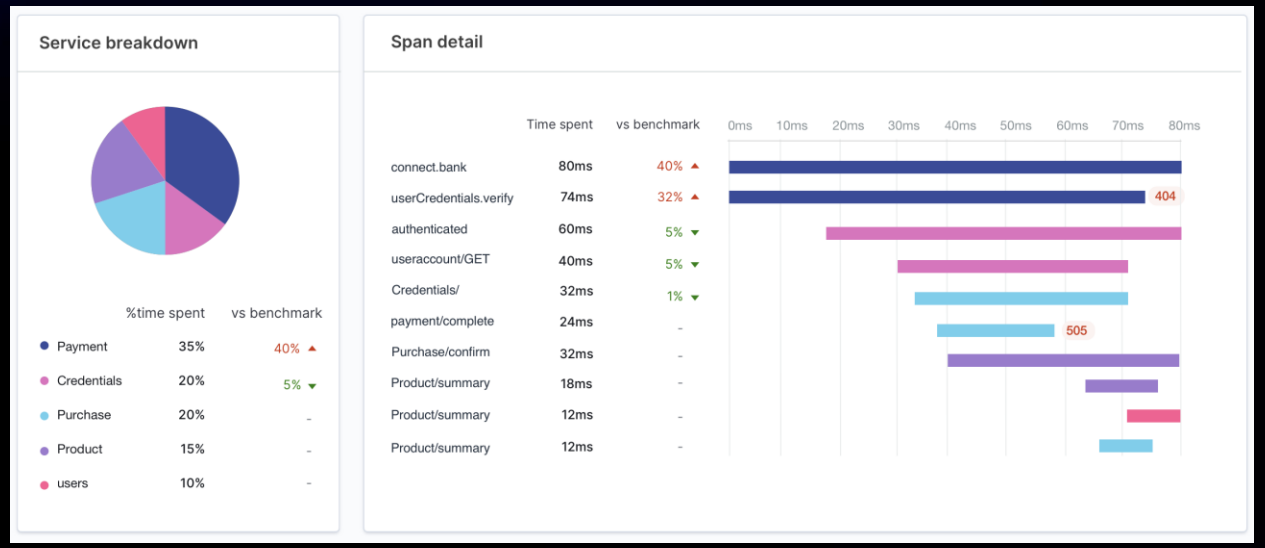
- End-to-end view
- Isolate issues to services

Trace groups

- Monitor performance
- Identify issues early

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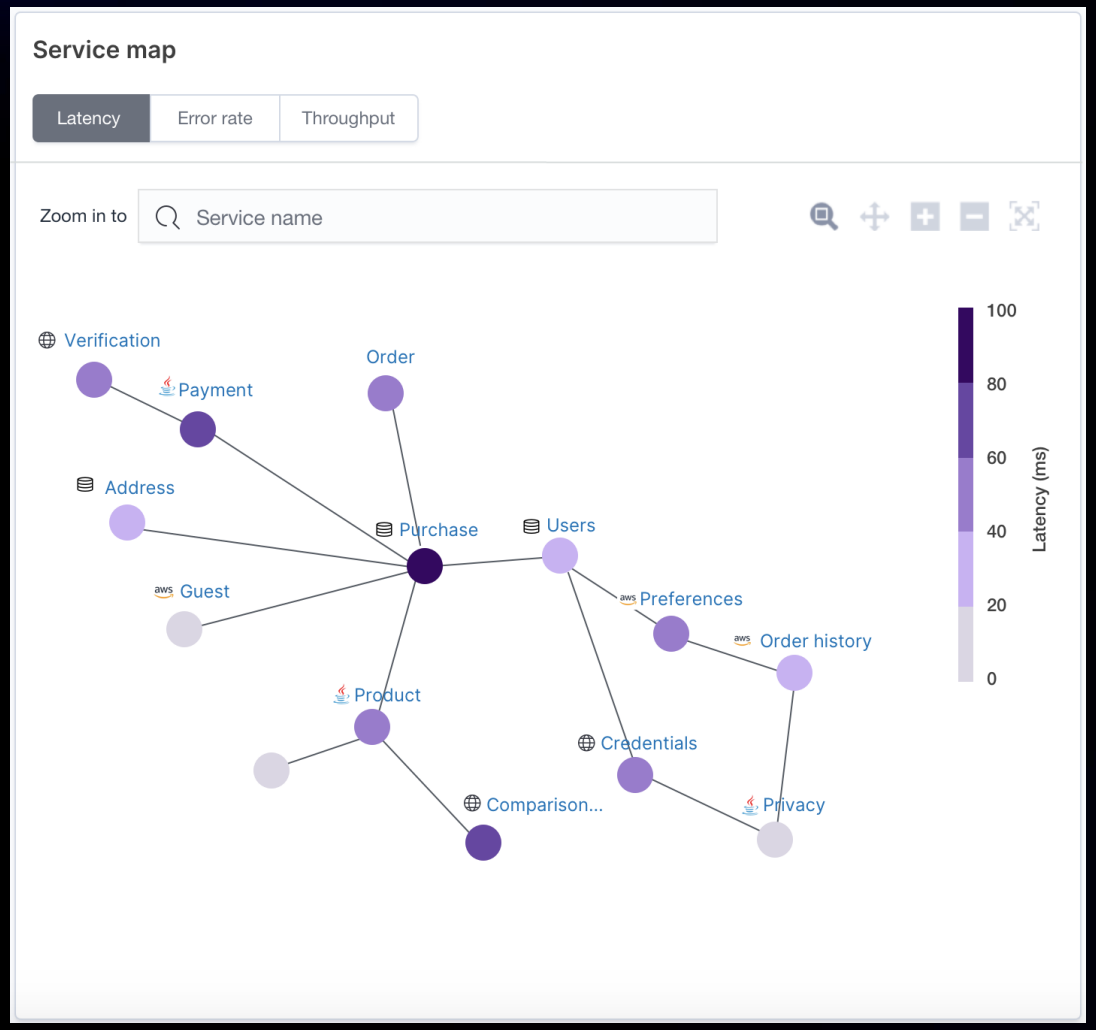
Span details



- Single request response details across microservices – latency, errors on each span
- Service time summary
- Support for OpenTelemetry and OpenTracing specification
- Jaeger, Zipkin, X-Ray (lambda), and OpenTelemetry SDKs

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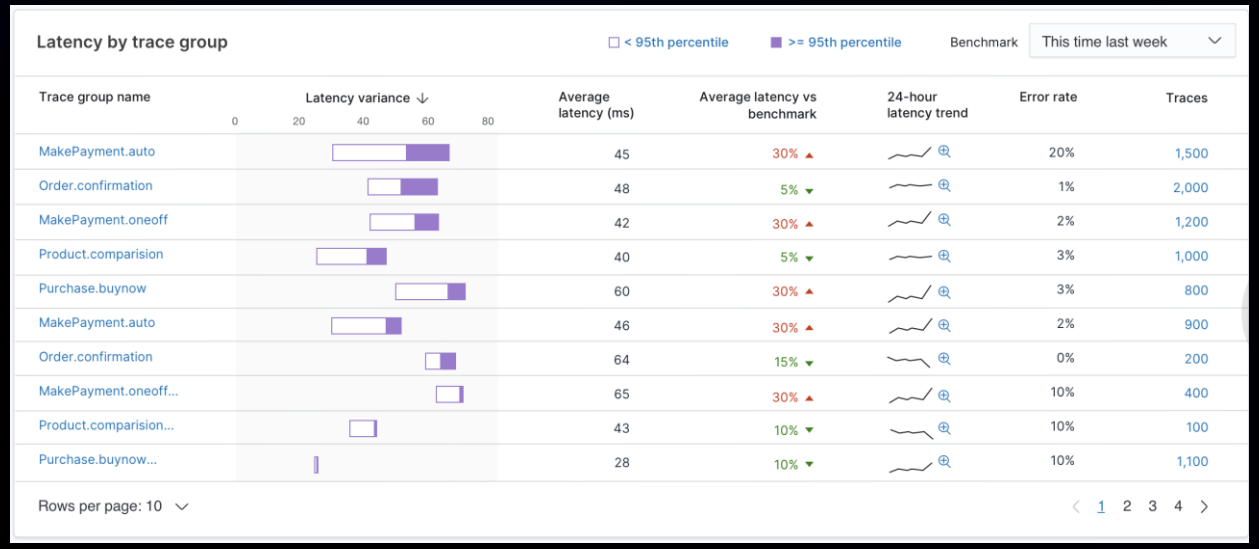
Service map



- End-to-end view of application environment
- Aggregates all distributed traces
- Isolate service hotspots based on latency, errors, and throughput from trace data

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Trace groups



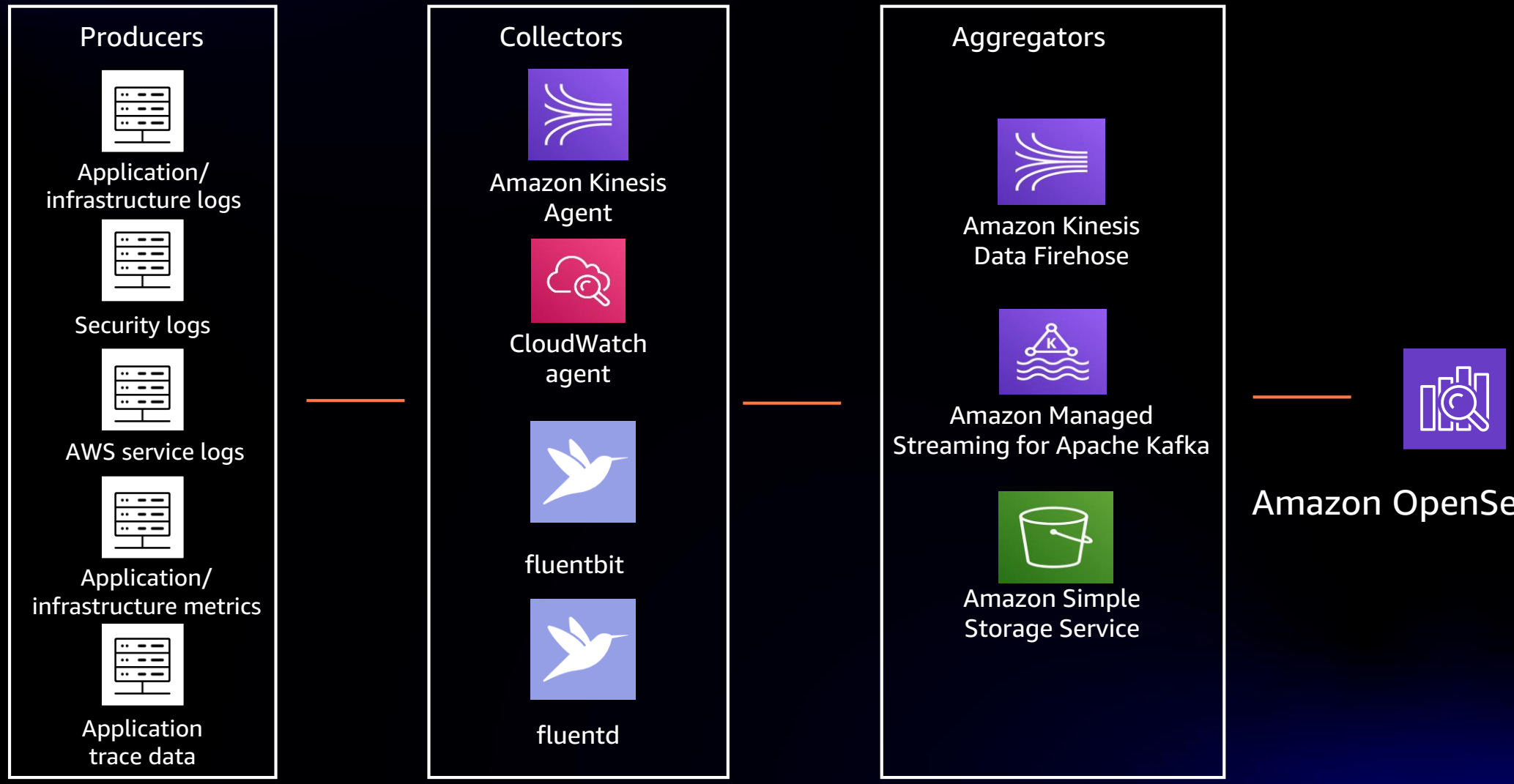
- Aggregate similar traces into a trace group
- Based on service and operation name
- e.g., login traces, checkout traces
- Monitor performance and error rates on trace groups
- Spot anomalies using statistical analysis – P90/P95 latency, error rate trends, etc.

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Trace Analytics data flow

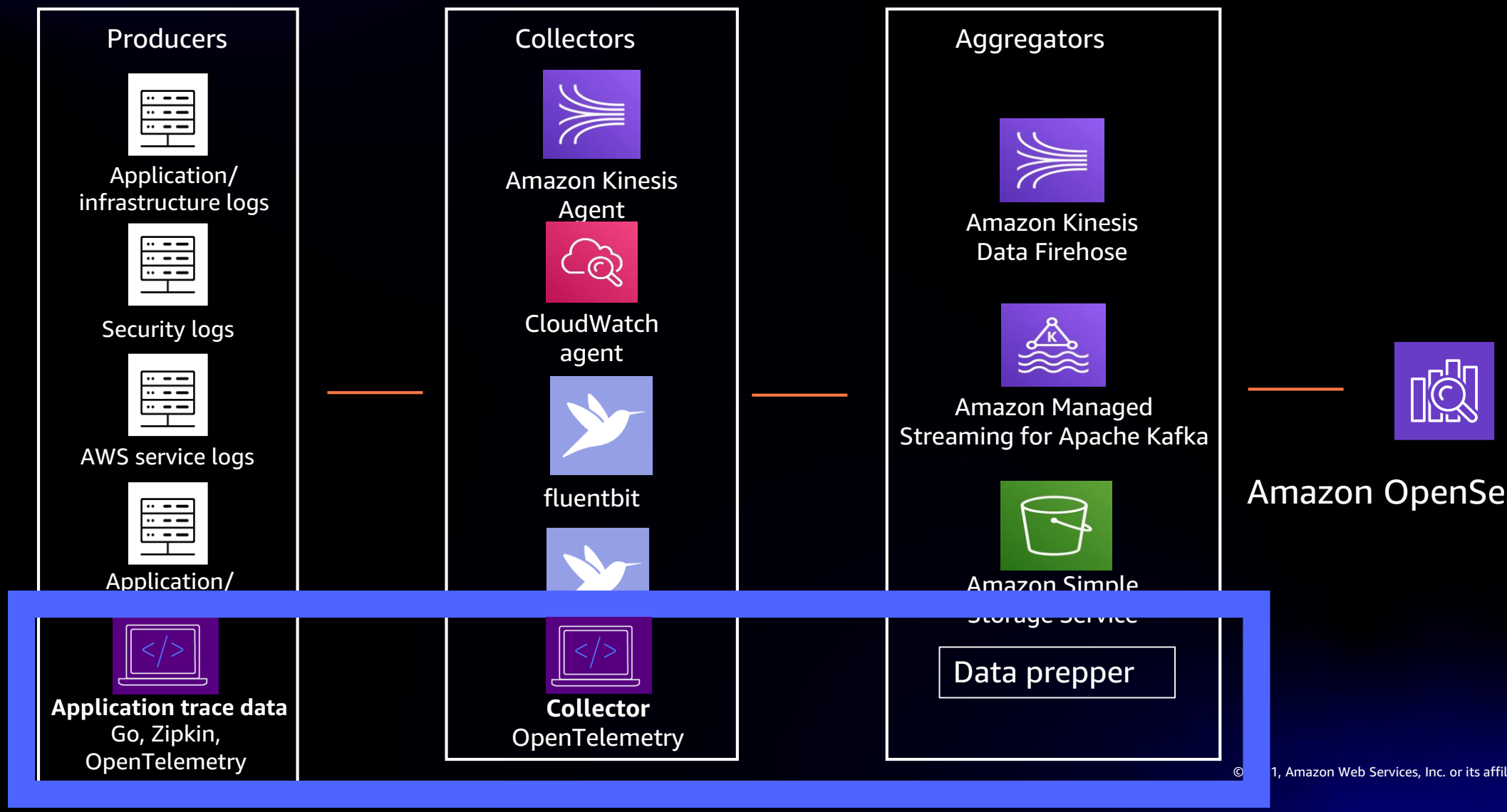
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Data flow



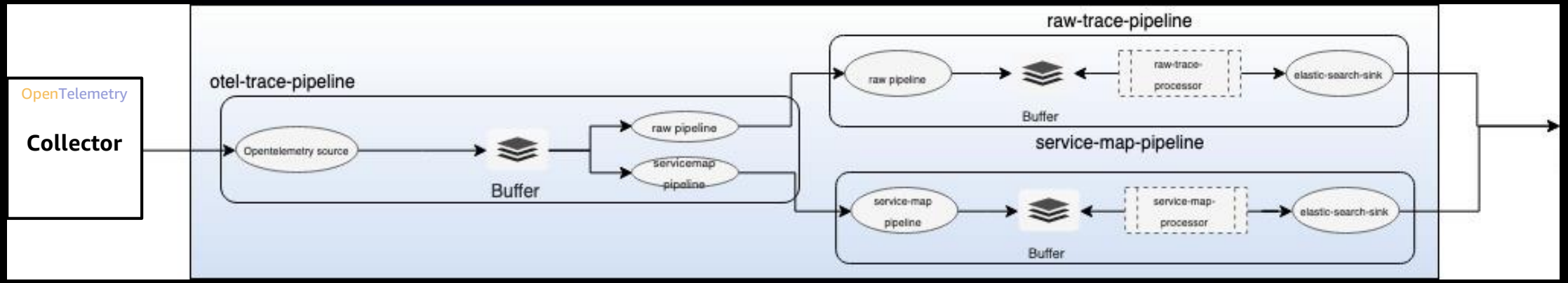
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Data flow – What's new



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Data prepper – Trace Analytics data pipeline



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OpenTelemetry

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AWS Distro for OpenTelemetry

A secure, production-ready open-source distribution supported by AWS

- Upstream-first distro of the popular CNCF project
- Certified by AWS for security and predictability
- Backed by AWS support
- One-click deploy and configure from AWS container and AWS Lambda consoles
- Exporters for AWS monitoring solutions including CloudWatch, X-Ray, Amazon OpenSearch Service, and AWS Partner solutions



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Resources

1. “What’s new” blog post
   https://aws.amazon.com/about-aws/whats-new/2021/02/amazon-elasticsearch-service-adds-trace-analysis-new-feature-distributed-tracing/

2. “Getting Started” blog post
   https://aws.amazon.com/blogs/big-data/getting-started-with-trace-analytics-in-amazon-elasticsearch-service/

3. Trace Analytics FAQ
   https://aws.amazon.com/elasticsearch-service/faqs/?nc=sn&loc=6

4. Documentation
   https://docs.aws.amazon.com/elasticsearch-service/latest/developerguide/trace-analytics.html

5. Feature requests, bugs, discussion forum:
   https://discuss.opendistrocommunity.dev/c/trace-analytics/49

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