Traceability and Transparency

Diagnosing Distributed Systems in 2022

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Tobi

Principal Cloud Architect

Social Coding Ambassador

Alin

Senior Key Expert

Platform Architect

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Why do I need this?

And what is even going on?

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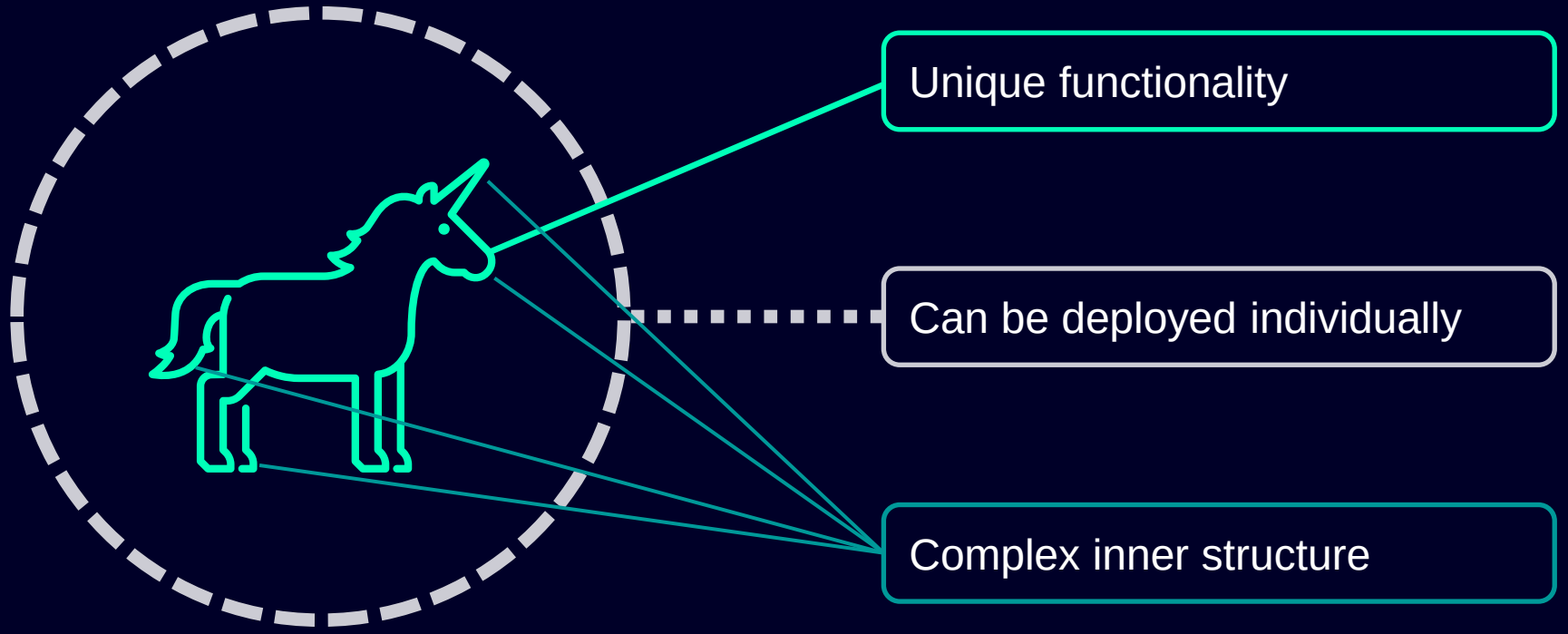
The elusive service



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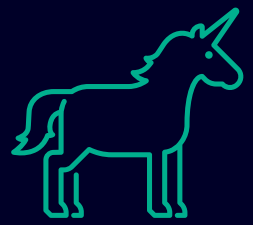
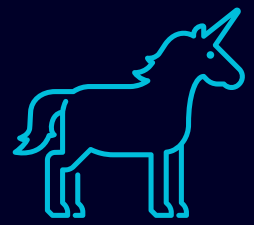
The elusive service forest?

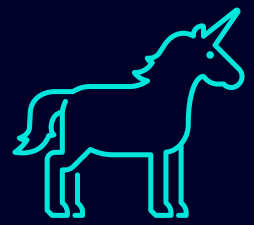


Shop

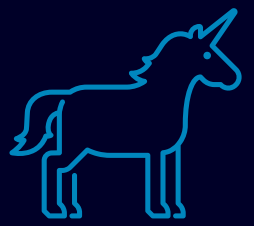
Gateway



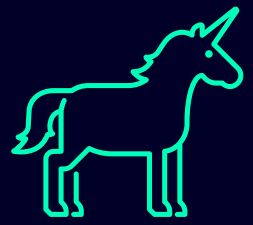
Identity



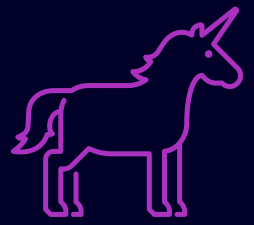
Inventory



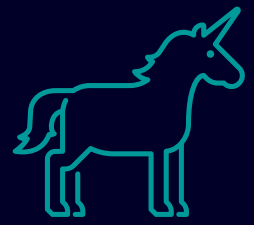
Storage



Shopping Cart



Billing



Purchase

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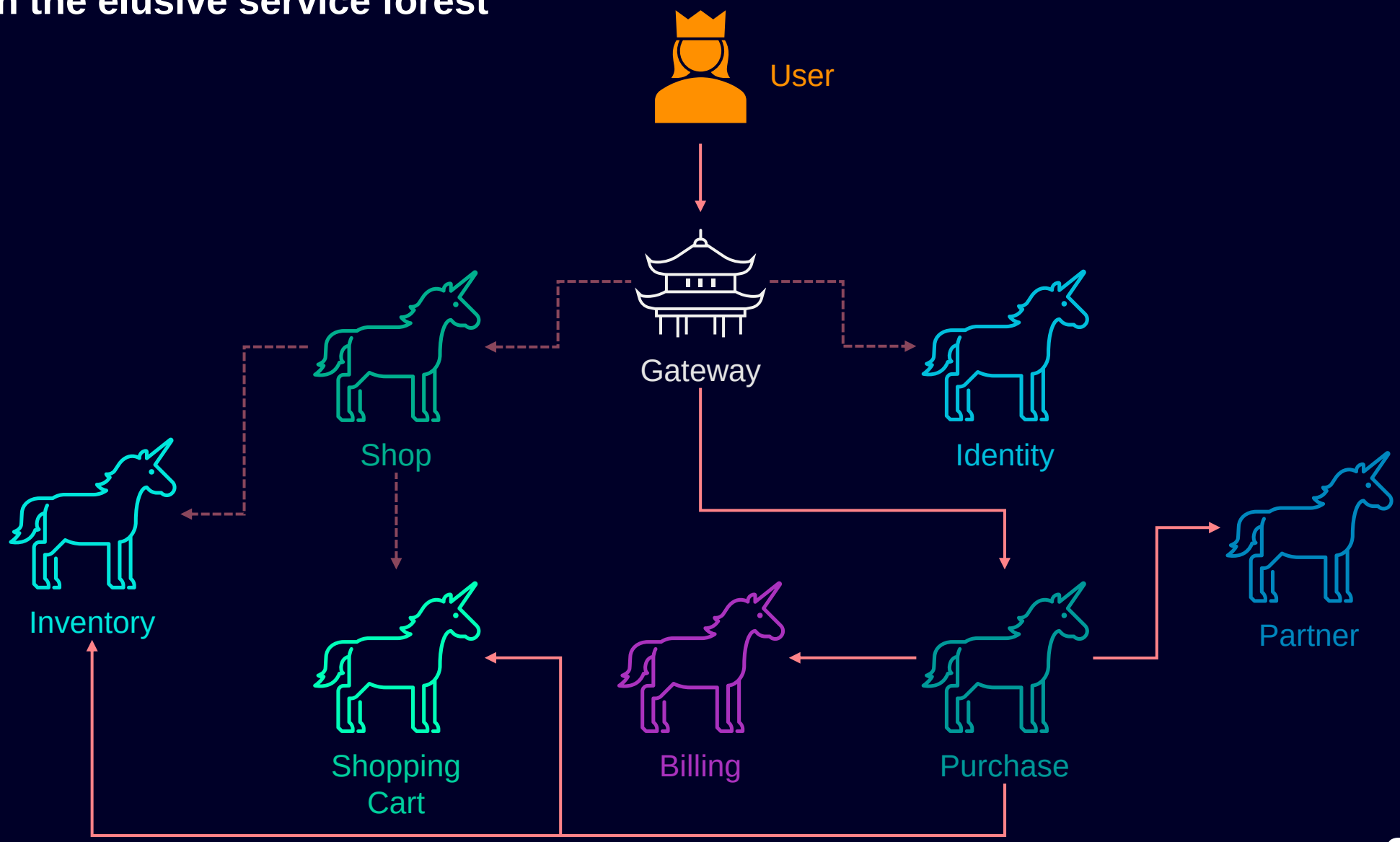
Chatter in the elusive service forest



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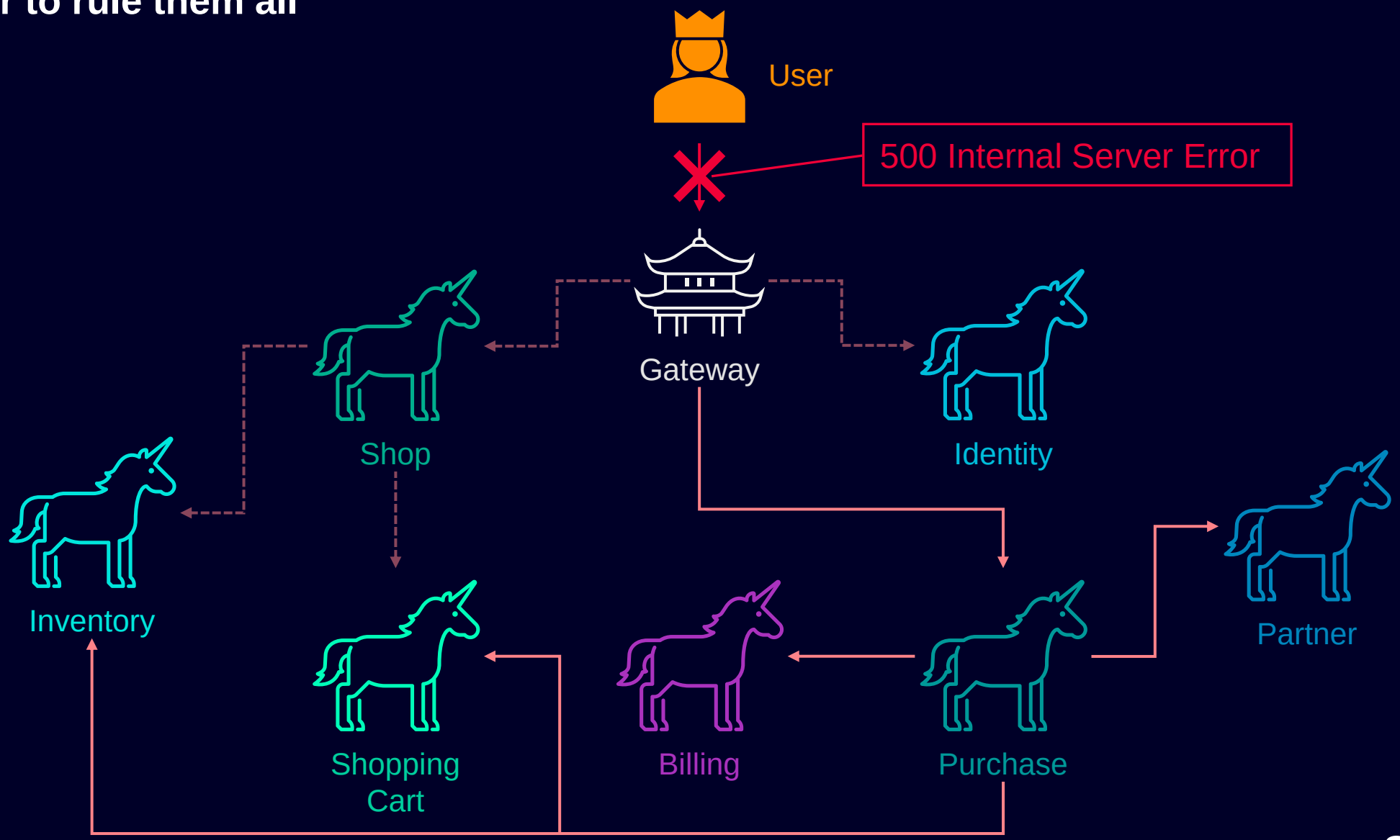
One error to rule them all



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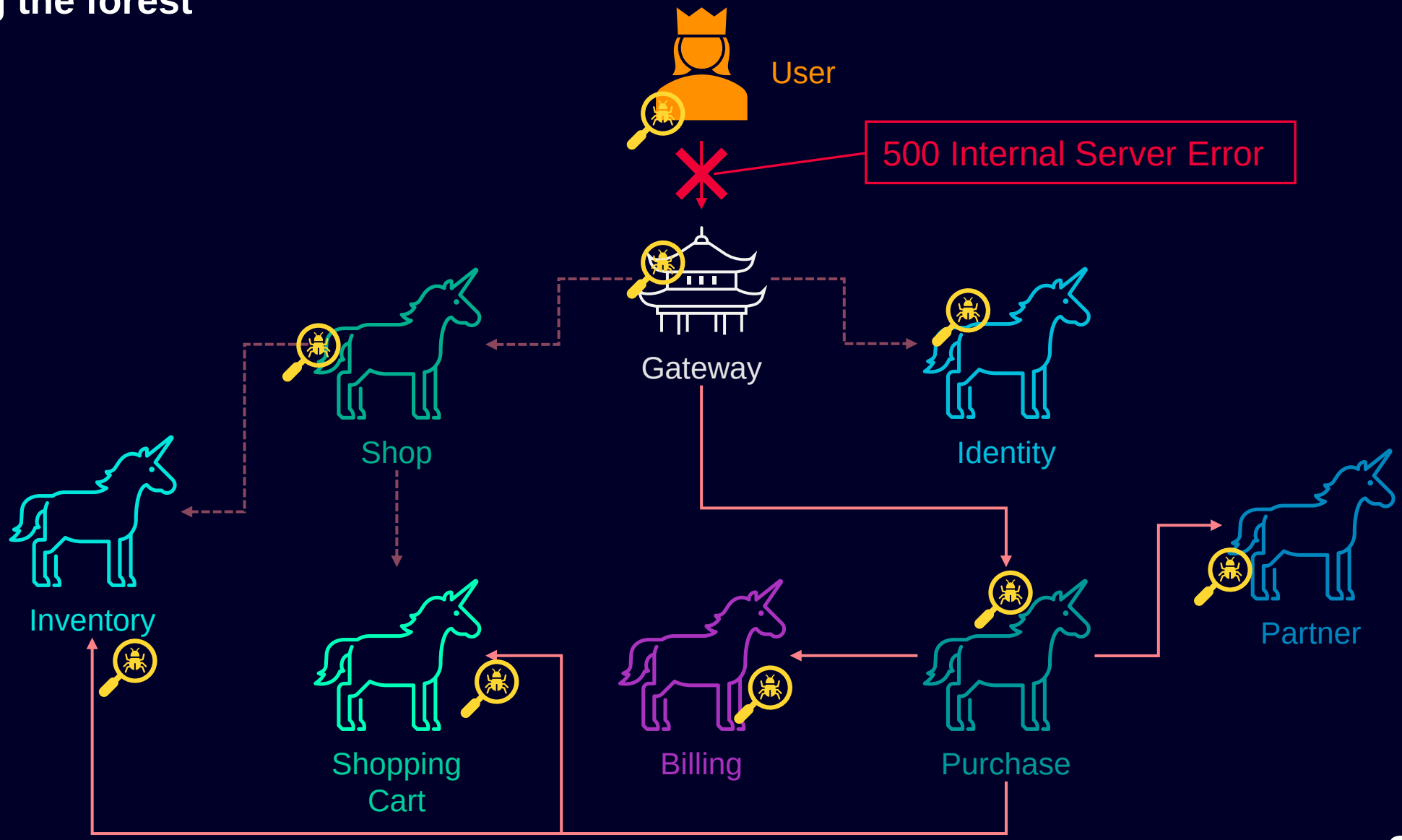
Combing the forest



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Don’t panic!

Some simple solutions to improve your life or what we currently do in MindSphere AWS

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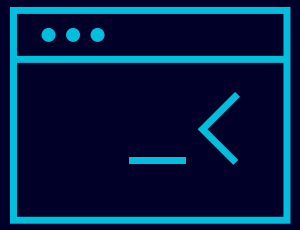
Operational basics

Frontend

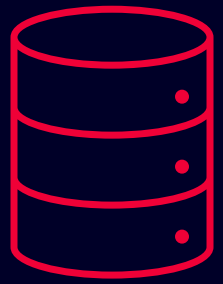
Backend



- Can be containerized
- Deployment and updating is rather simple
- Most probably stateless
- We like this, this is nice

Easy to self operate

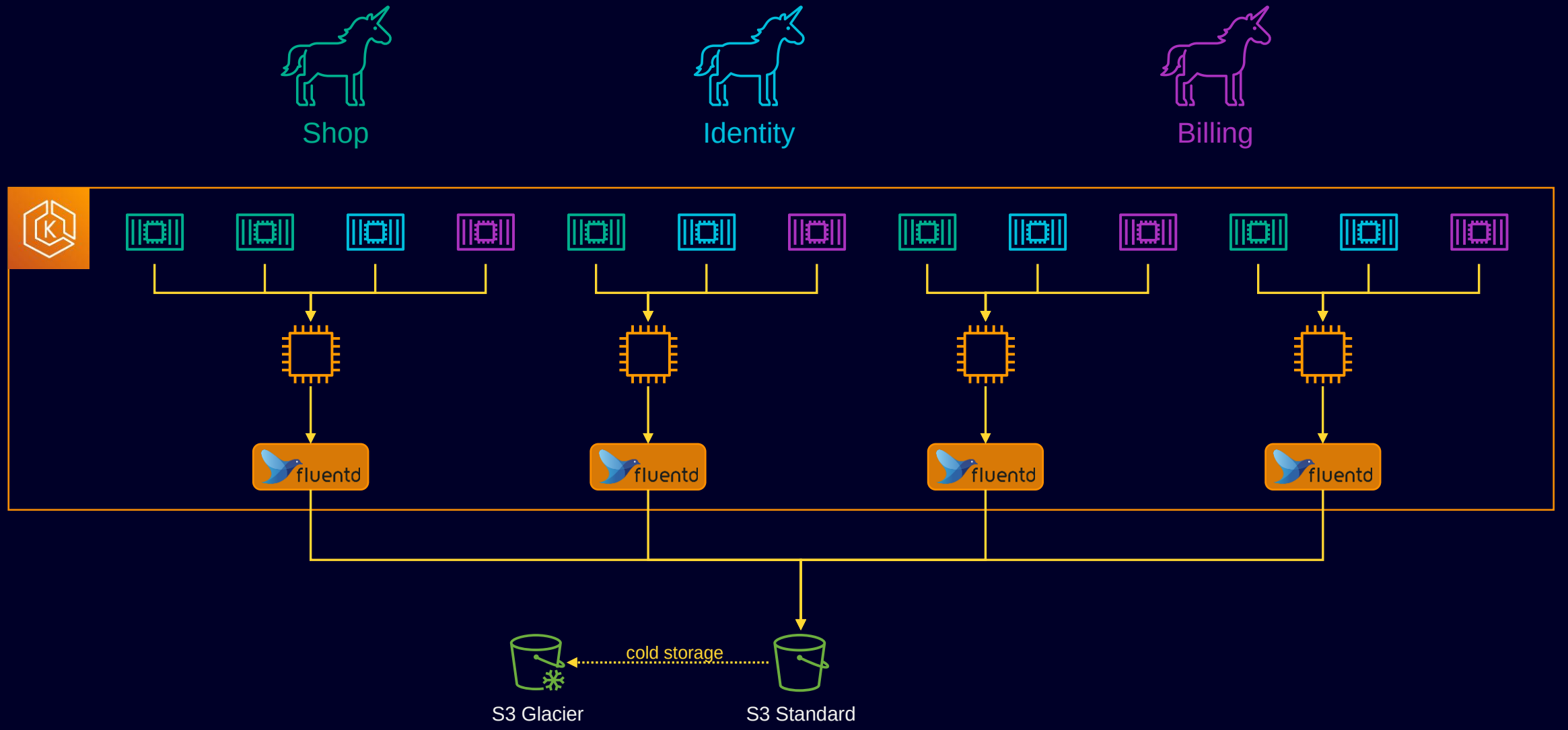
Storage



- Redundancy is complicated
- Lifecycle operations are difficult
- Basically, the devil

Cloud native preferred

Log storage



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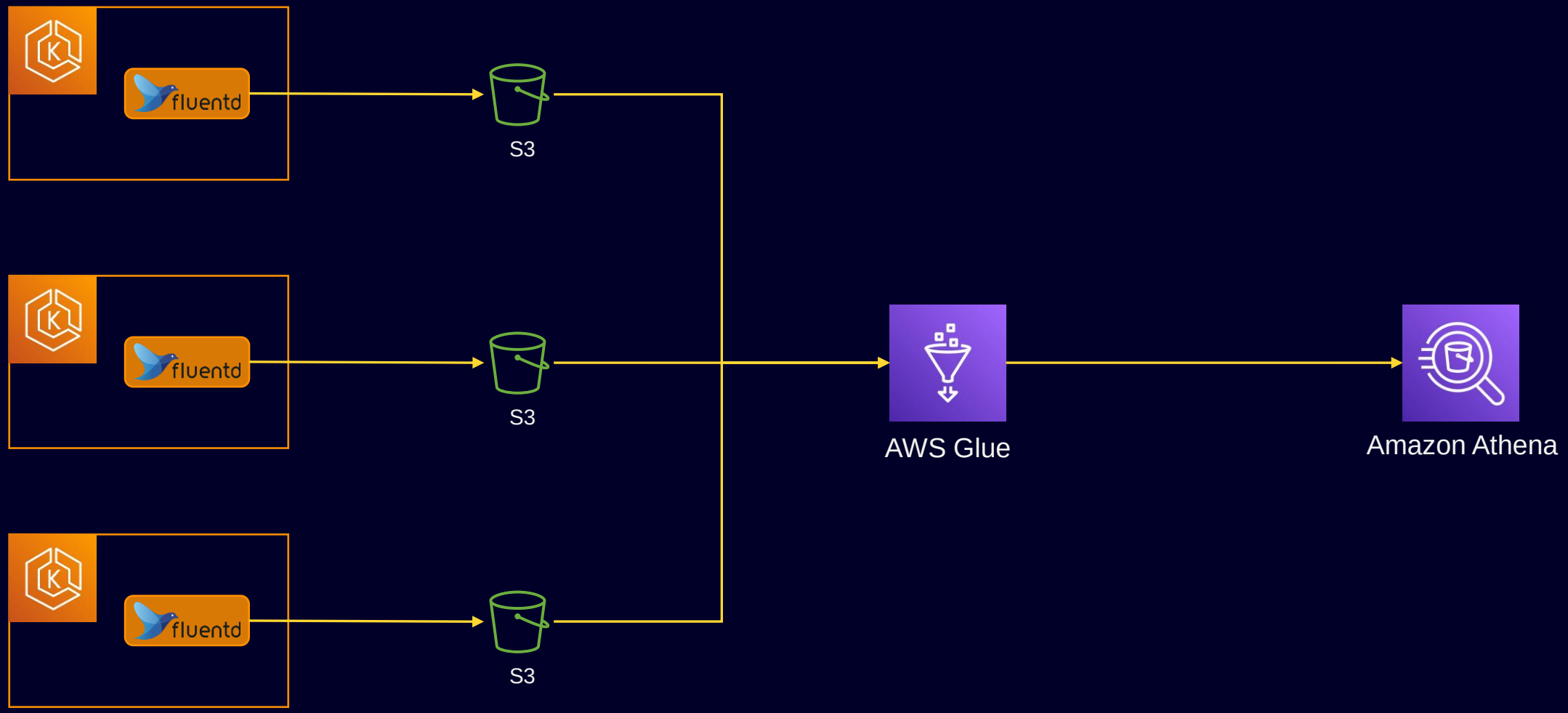
Log queries



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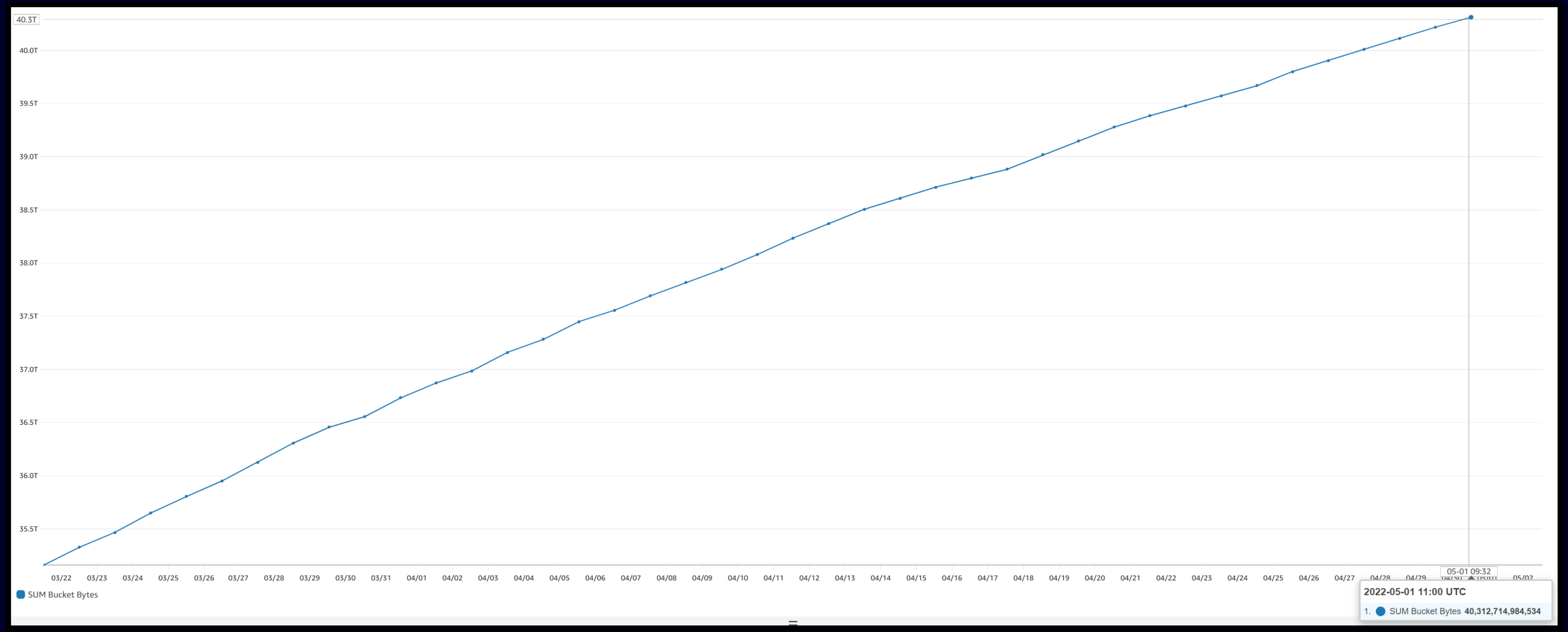
Easy to manage, eats data like no other



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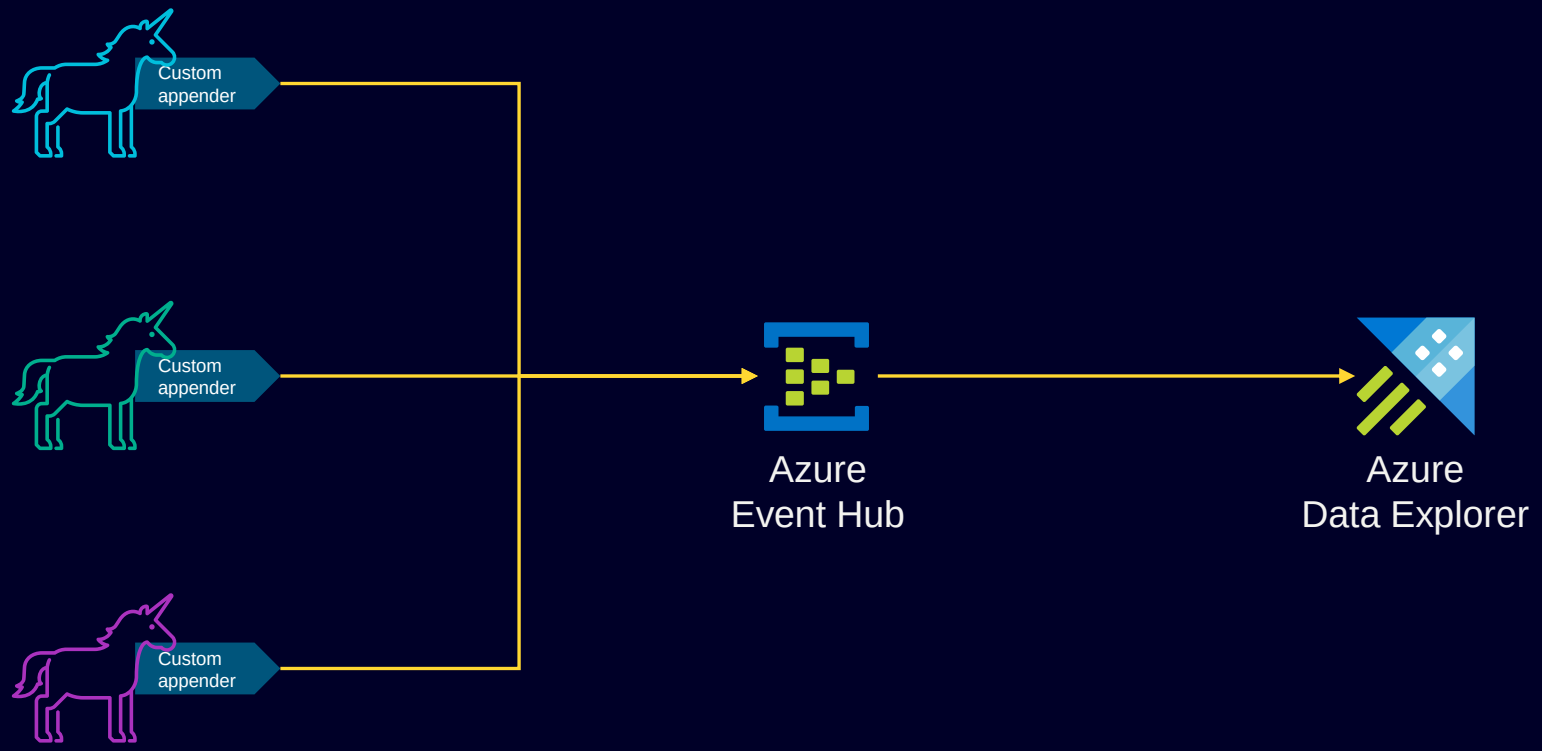
Azure solution (demonstrate multi cloud)



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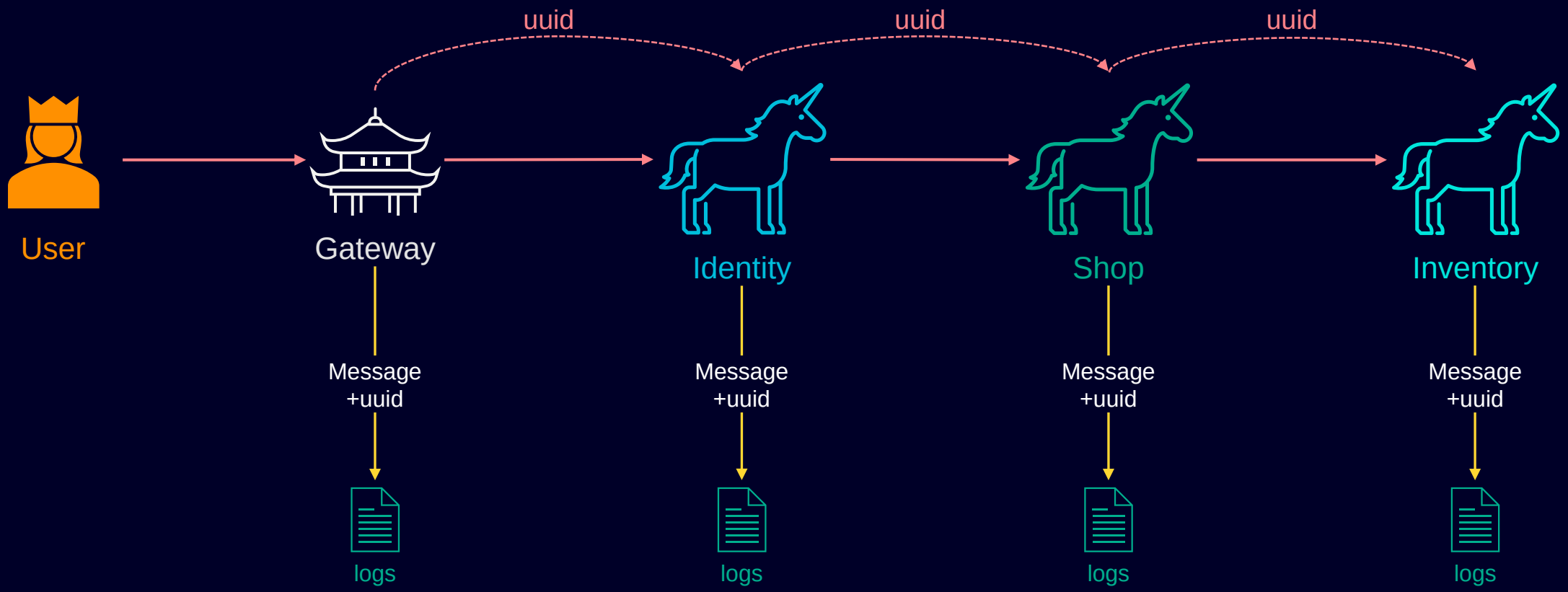
Correlation ids



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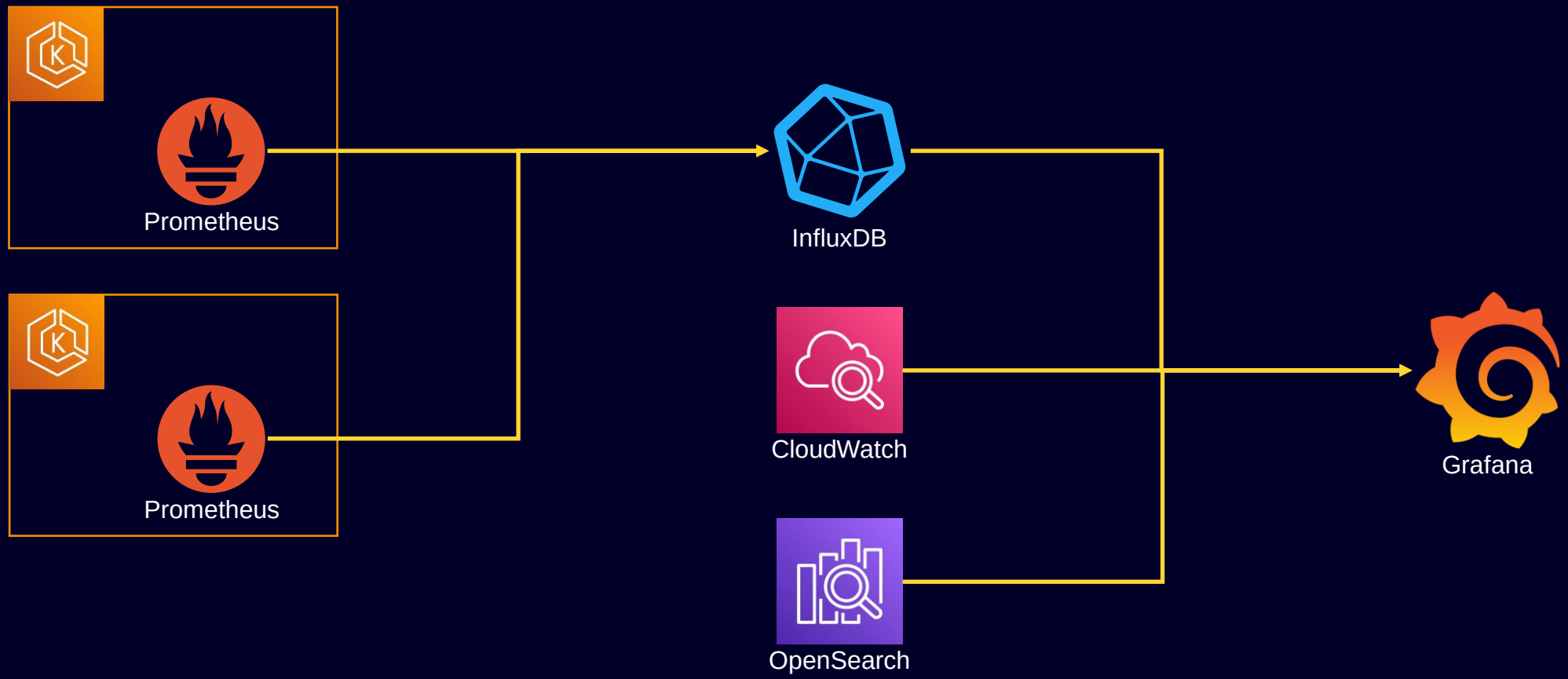
Monitoring



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Building to scale

100+ services	1075 users	22k metrics	99.99% availability
50+ dev teams	1051 dashboards	1800 alert rules	1.860M/min InfluxDB datapoints

What we have and what we are still looking for

OSS solutions

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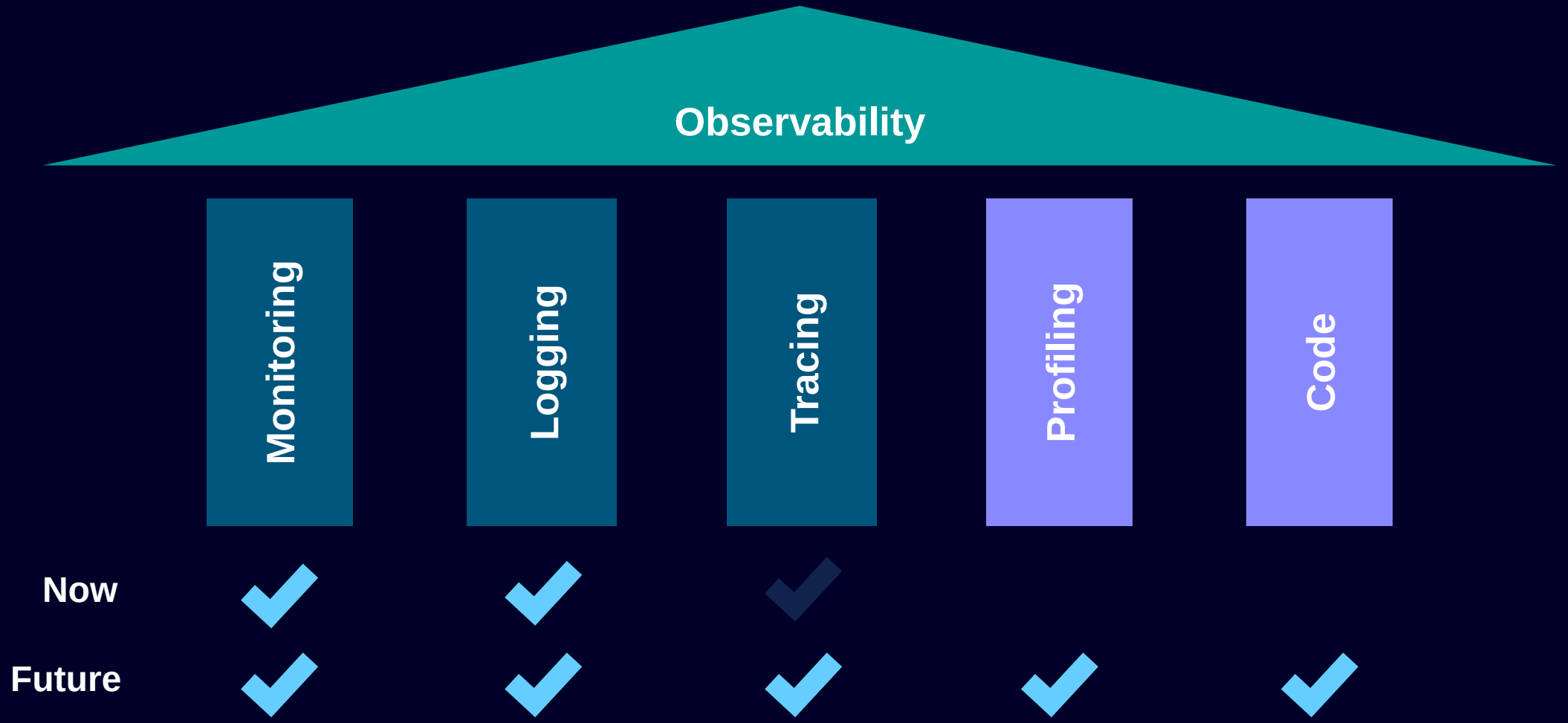
Diagnosis and observability go hand-in-hand



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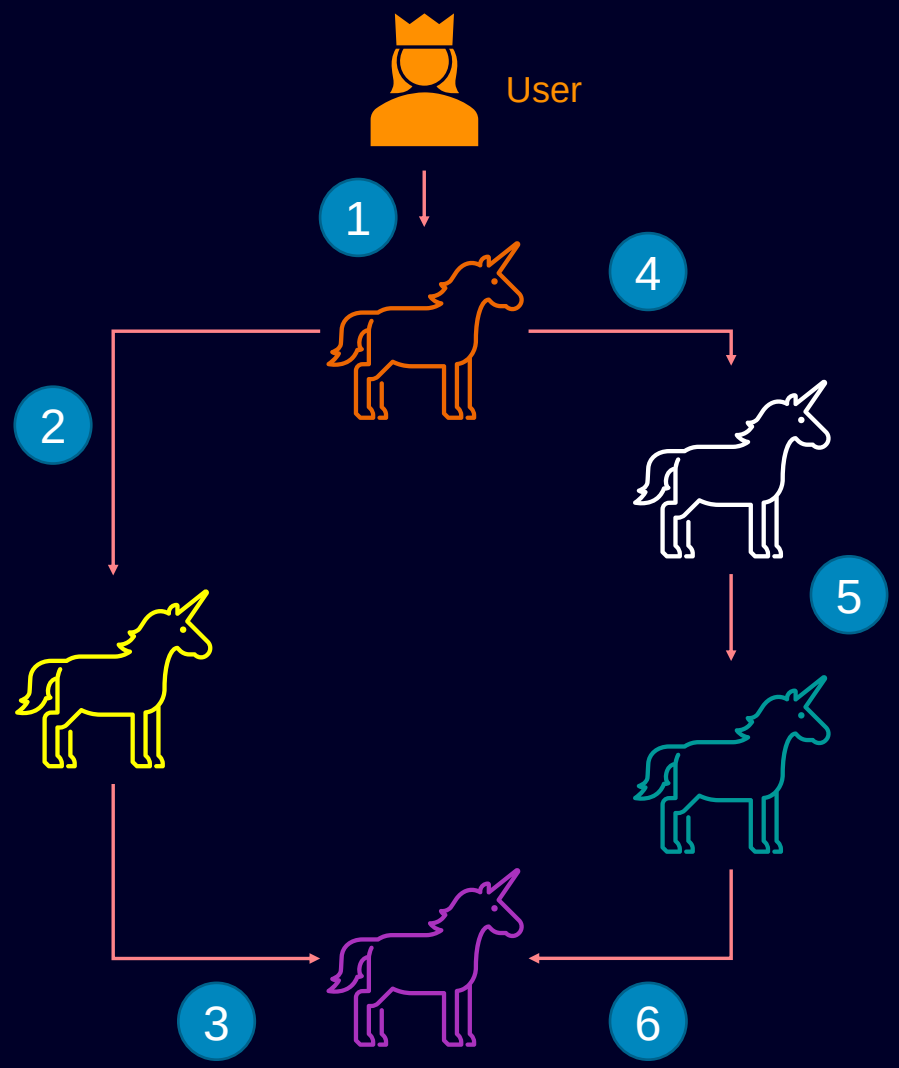
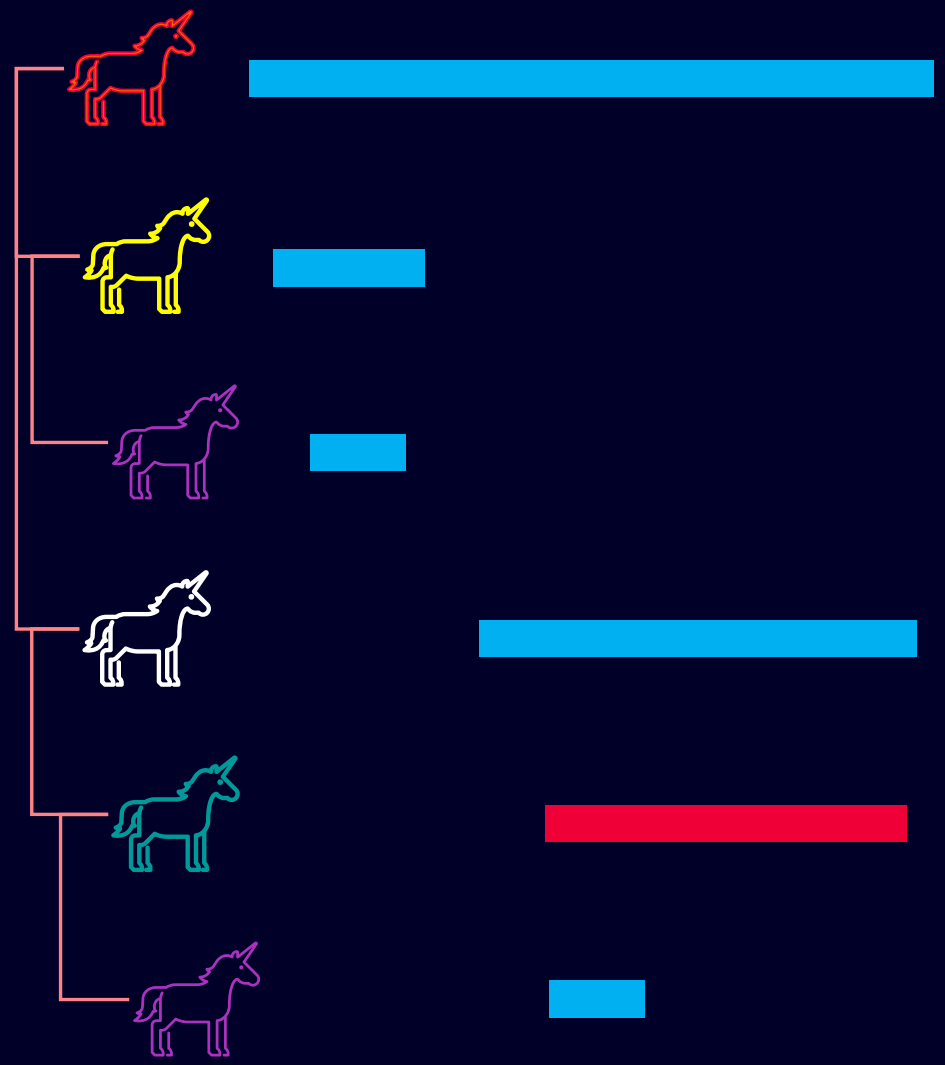
(Distributed) Tracing, more than correlation



1 Trace
6 Spans



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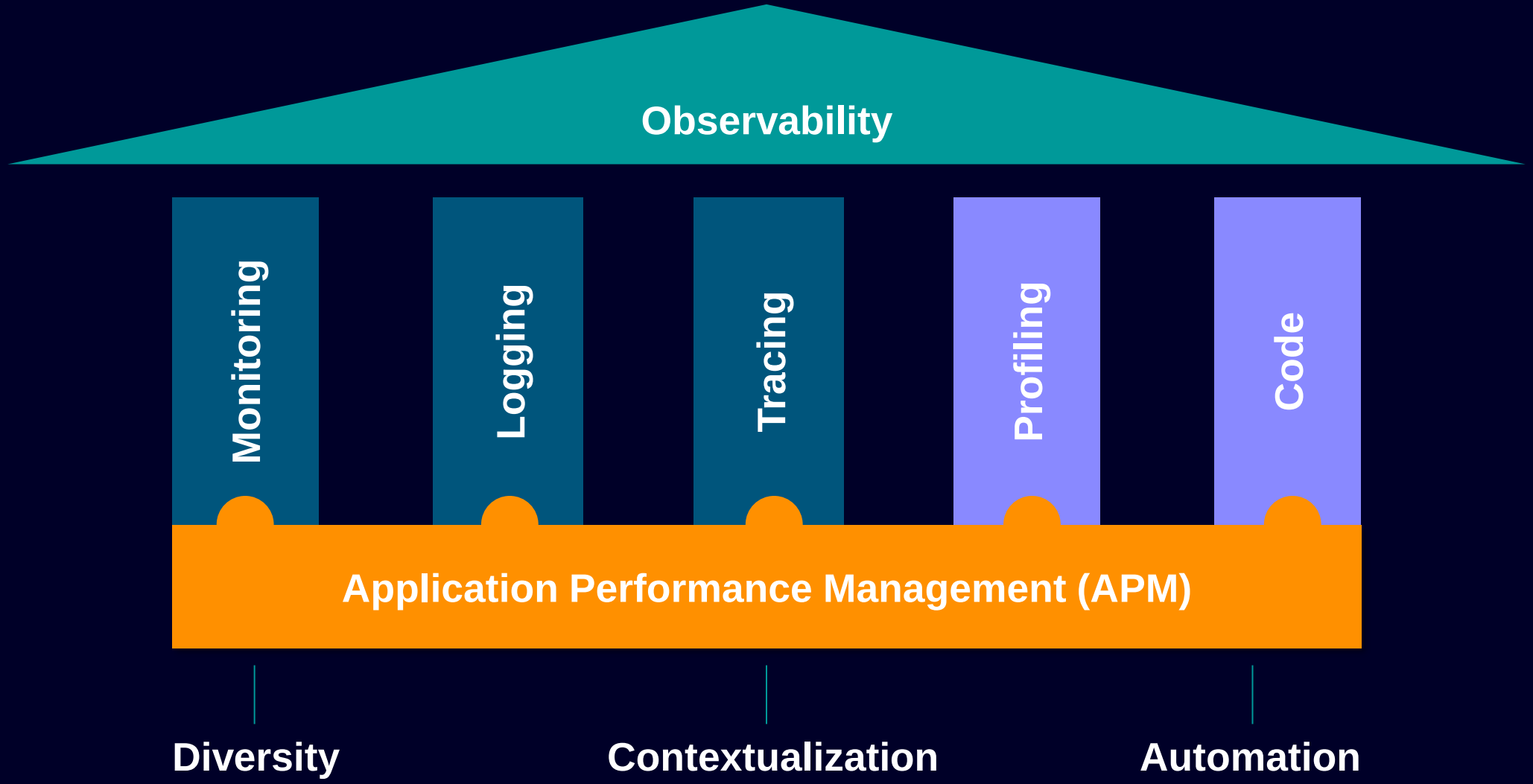
One tool to rule them all: no more context switch



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OSS building blocks for observability

Data Collection + Application Performance Management (APM)

OSS : OpenTelemetry

Elastic APM, Grafana Tempo, …

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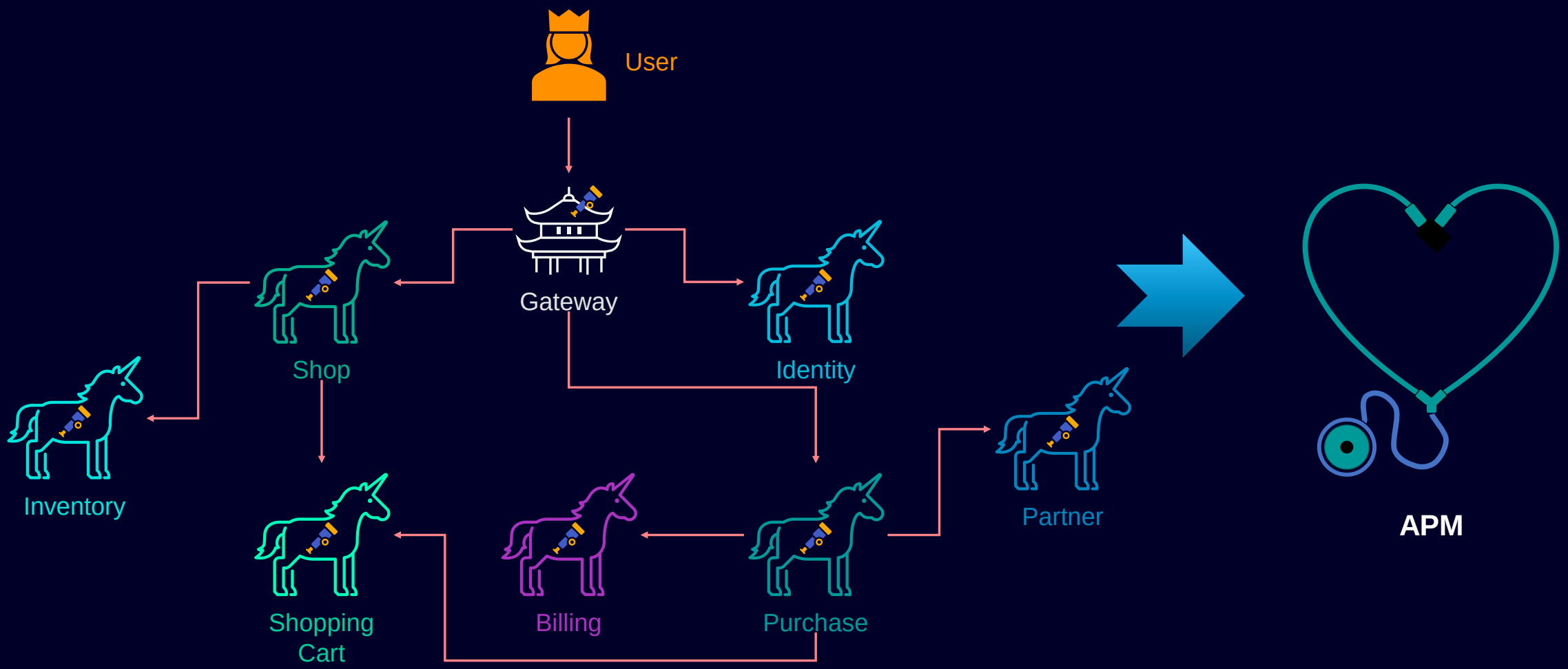
Vision



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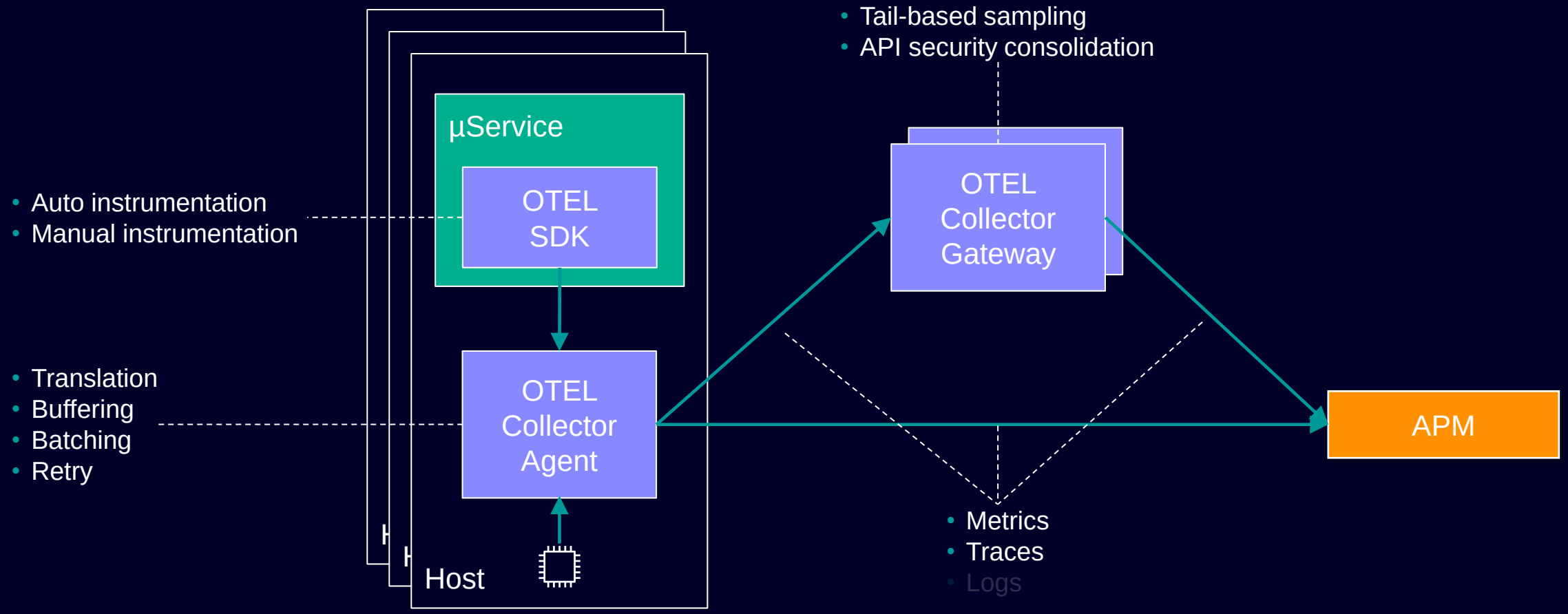
OpenTelemetry reference architecture



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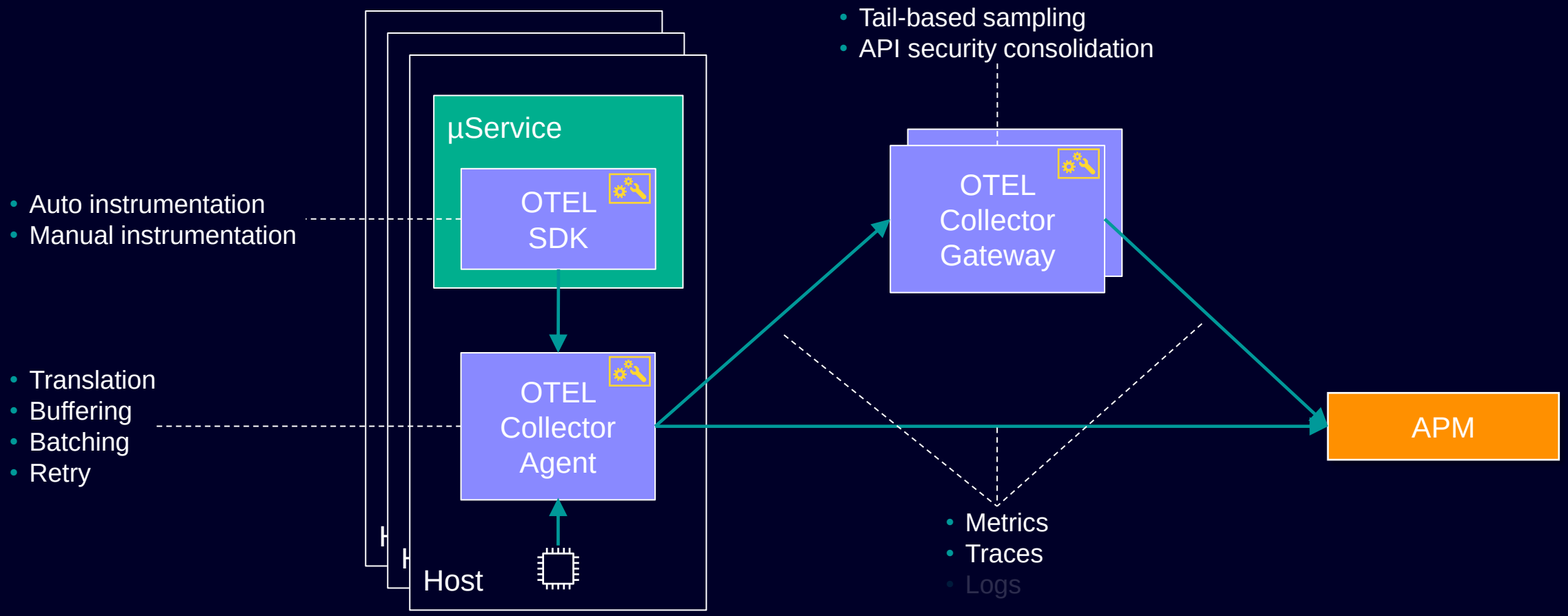
Lots of extension points exist



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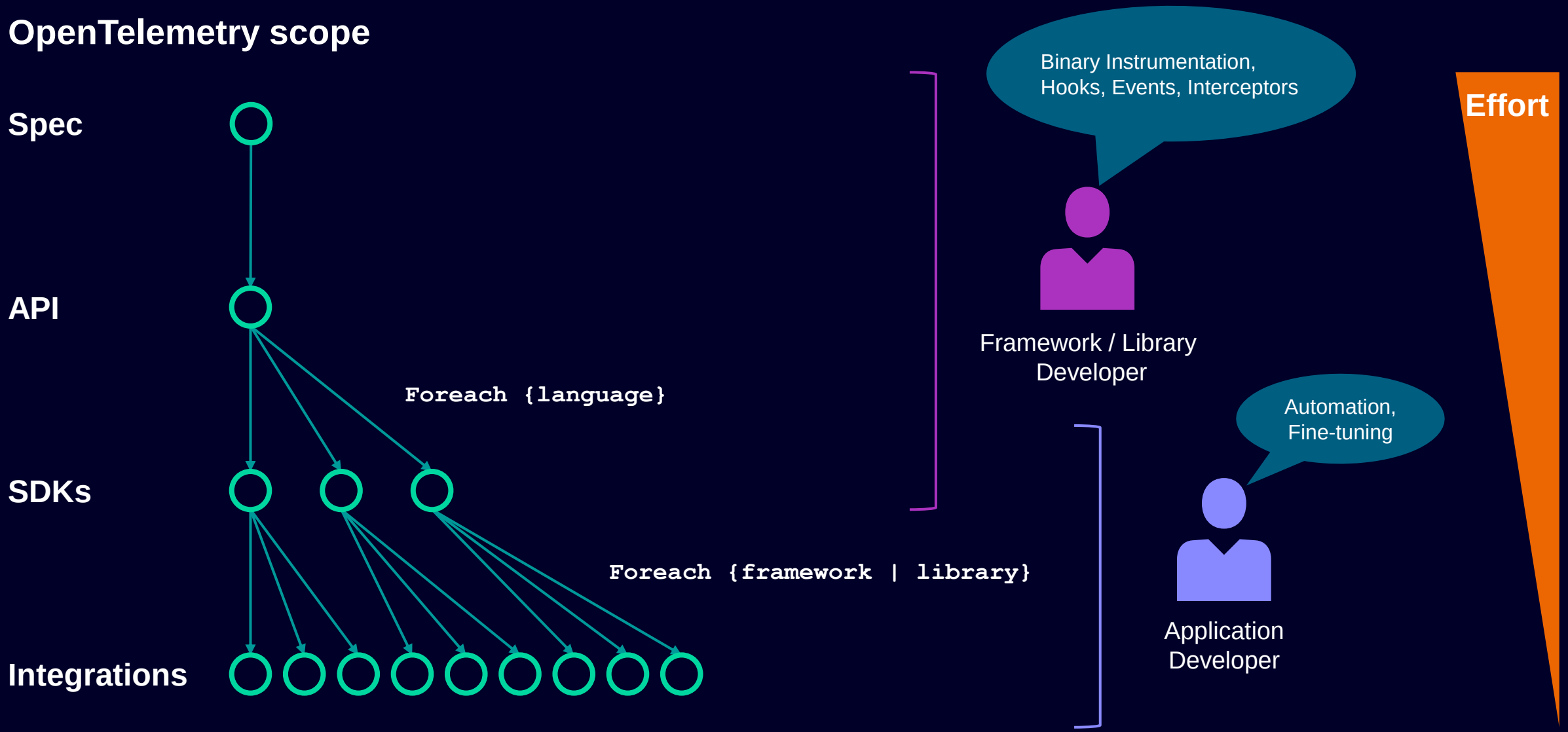
OpenTelemetry scope



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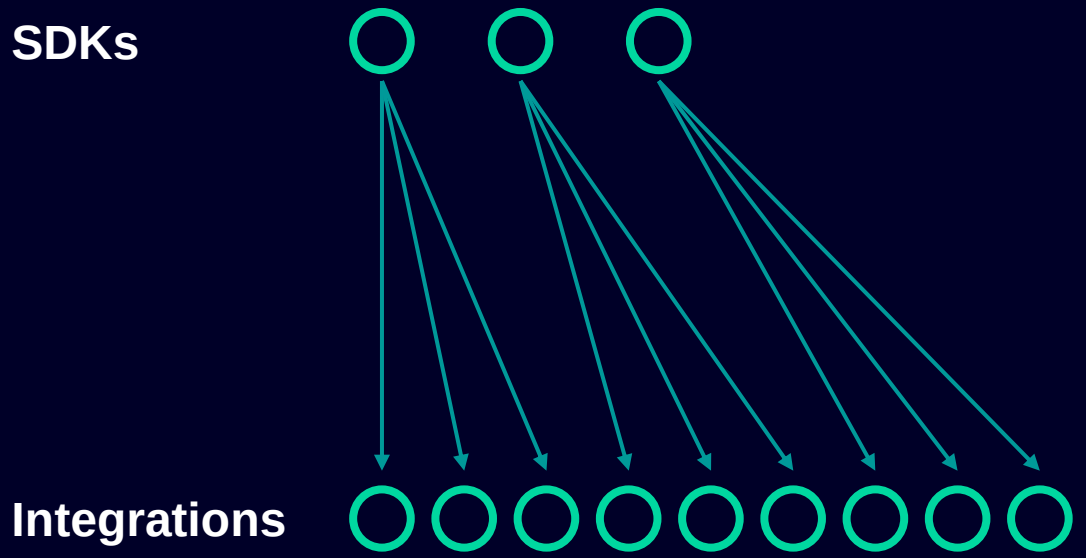
OpenTelemetry scope

C++, .NET, Erlang/Elixir,
Go, Java, JavaScript, PHP,
Python, Ruby, Rust, Swift

Akka Actors, Akka HTTP, Apache Axis2, Apache Camel, Apache CXF JAX-RS, Apache CXF JAX-RS Client, Apache CXF JAX-WS, Apache Dubbo, Apache HttpAsyncClient, Apache HttpClient, Apache Kafka Producer/Consumer, Apache Kafka Streams API, Apache MyFaces, Apache RocketMQ, Apache Struts, Apache Tapestry, Apache Wicket, Armeria, AsyncHttpClient, AWS Lambda, AWS SDK, Azure Core, Cassandra Driver, Couchbase Client, Dropwizard Views, Eclipse Grizzly, Eclipse Jersey, Eclipse Jetty HTTP Client, Eclipse Metro, Eclipse Mojarra, Elasticsearch API, Elasticsearch REST Client, Finatra, Geode Client, Google HTTP Client, Grails, GraphQL, gRPC, Guava ListenableFuture, GWT, Hibernate, HttpURLConnection, Hystrix, Java Executors, Java Http Client, java.util.logging, JAX-RS, JAX-RS Client, JAX-WS, JDBC, Jedis, JMS, JSP, Kotlin Coroutines, Kubernetes Client, Lettuce, Log4j 1, Log4j 2, Logback, Micrometer, MongoDB Driver, Netty, OkHttp, Play, Play WS, Quartz, RabbitMQ Client, Ratpack, Reactor, Reactor Netty, Rediscala, Redisson, RESTEasy, Restlet, RMI, RxJava, Scala ForkJoinPool, Servlet, Spark Web Framework, Spring Batch, Spring Data, Spring Integration, Spring Kafka, Spring RabbitMQ, Spring Scheduling, Spring Web MVC, Spring Web Services, Spring WebFlux, Spymemcached, Twilio, Undertow, Vaadin, Vert.x Web, Vert.x HttpClient, Vert.x Kafka Client, Vert.x RxJava2



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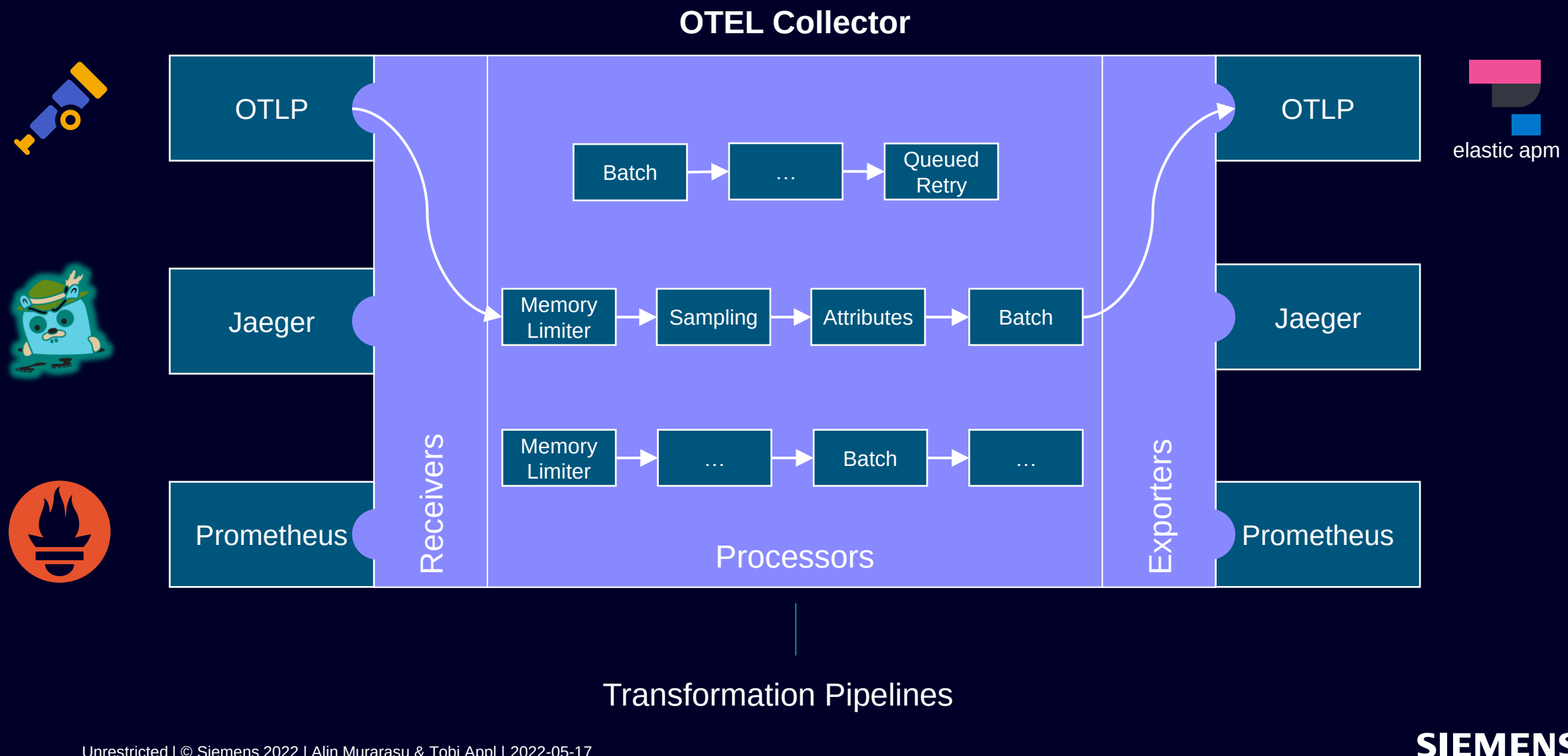
Zooming-in on the collector



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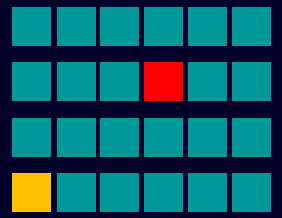
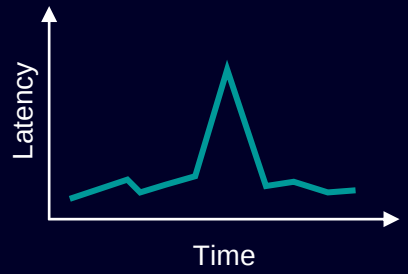
Application Performance Management (APM) key features

Component Map



Infrastructure Monitoring



Application Monitoring

End-to-end Tracing & Profiling

```
{"Time": "2022-05-17 15:00", "Level":
"Info", "Message": "APM talk starts"}
{"Time": "2022-05-17 15:34", "Level":
"Info", "Message": "APM talk ends"}
{"Time": "2022-05-17 15:35", "Level":
"Info", "Message": "APM Q&A starts"}
{"Time": "2022-05-17 15:44", "Level":
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```
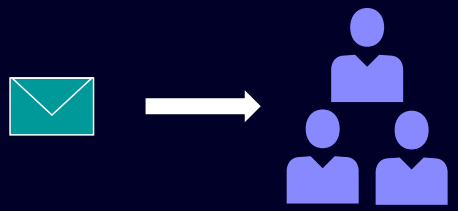
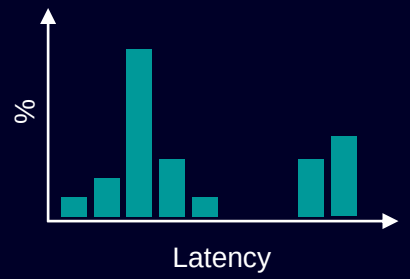

Log Query

```
from flask import Flask
app = Flask(__name__)
@app.route('/')
def index():
  return 'Open Source@Siemens '22'
app.run(host='0.0.0.0', port=8081)
```

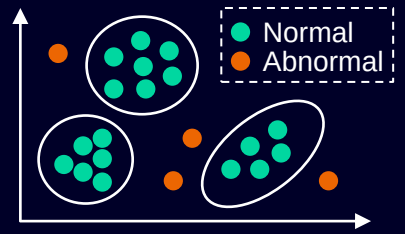
Access to Code



Alerting



Basic Analytics



Advanced Analytics

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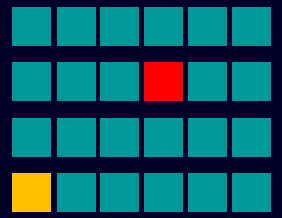
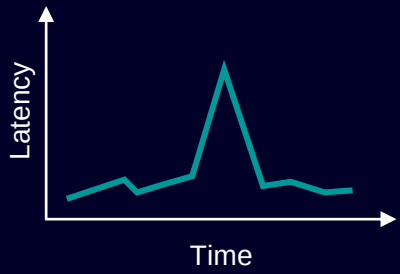
OSS APM coverage

Component Map



Infrastructure Monitoring



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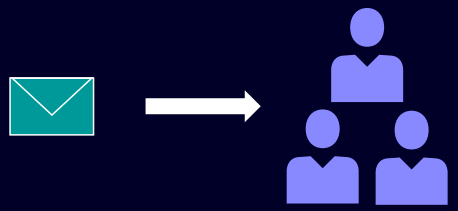

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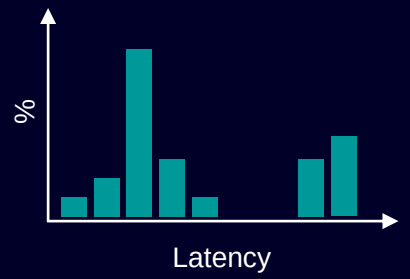

Basic Analytics

Advanced Analytics

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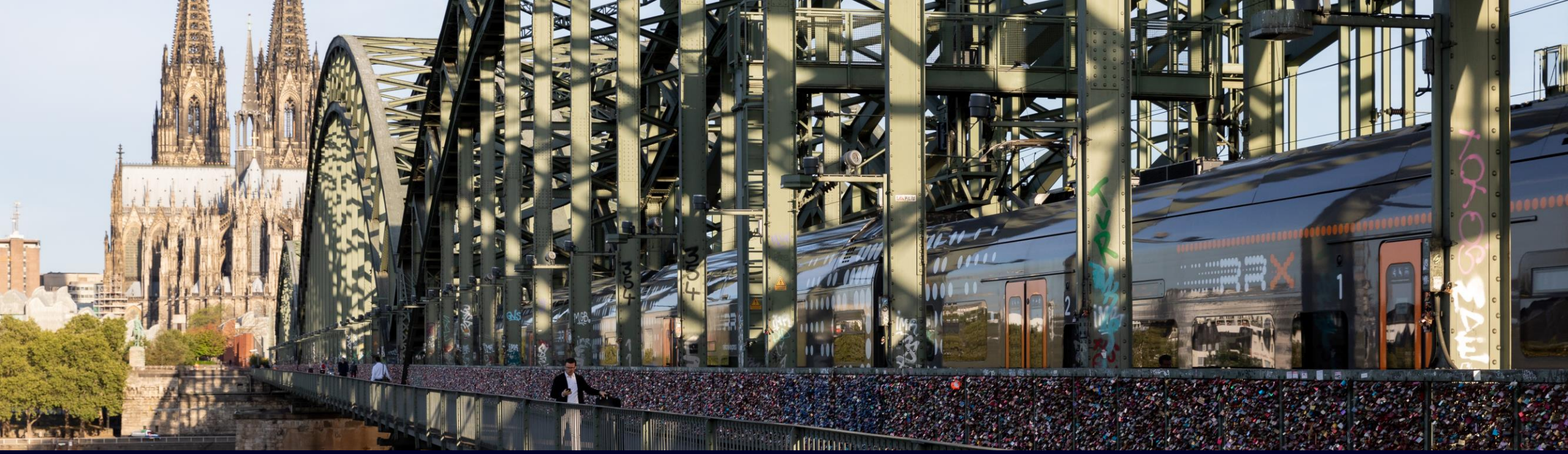

Questions and answers

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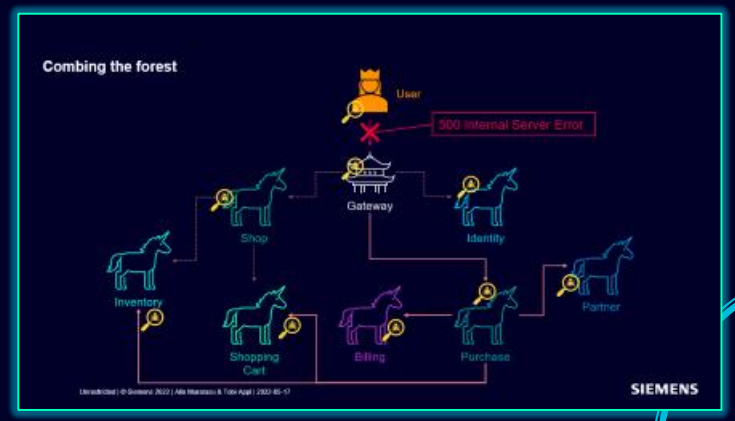
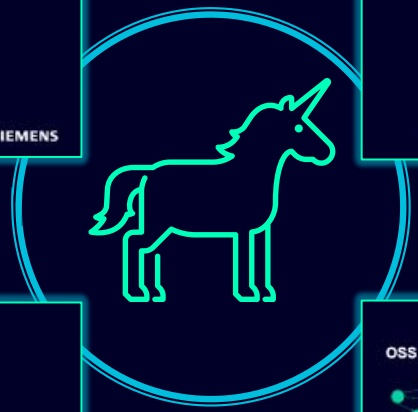
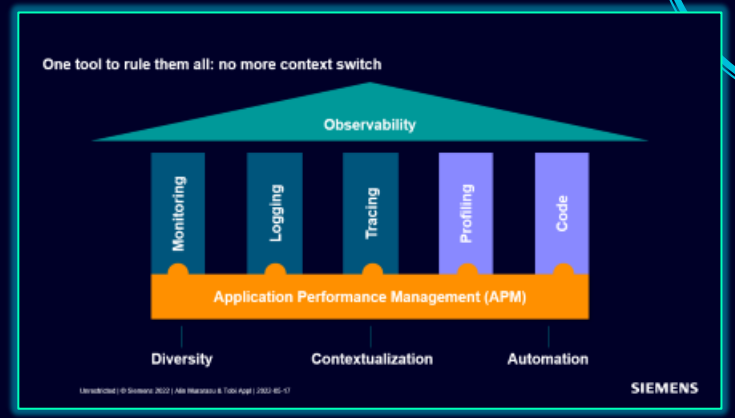
Reminder: Key Points







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Contact

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