The Open Source Observability Playbook

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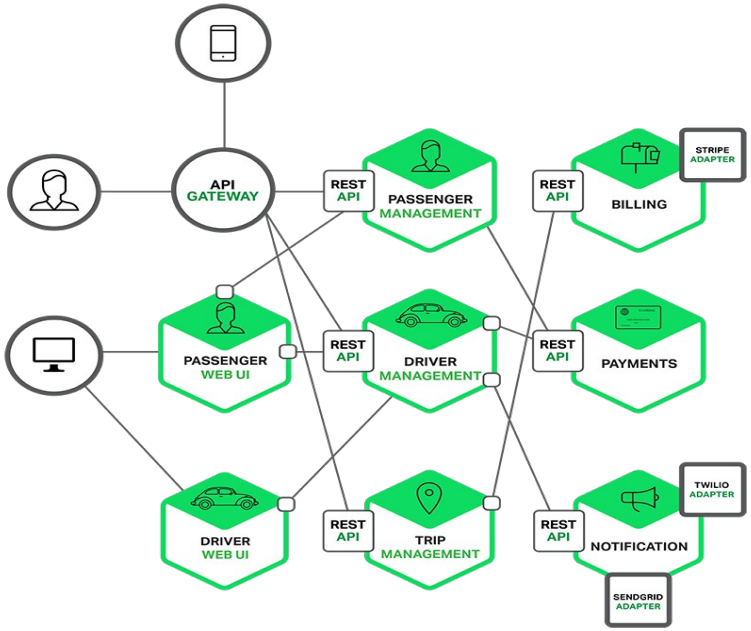
What We'll Discuss Today

Old-School Observability methods

How to achieve observability

Logging, monitoring best practices

Open-source monitoring landscape



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Why Monitoring?

Make sure our business works

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What Should We Monitor?

4 golden signals from SRE book *by Google*:

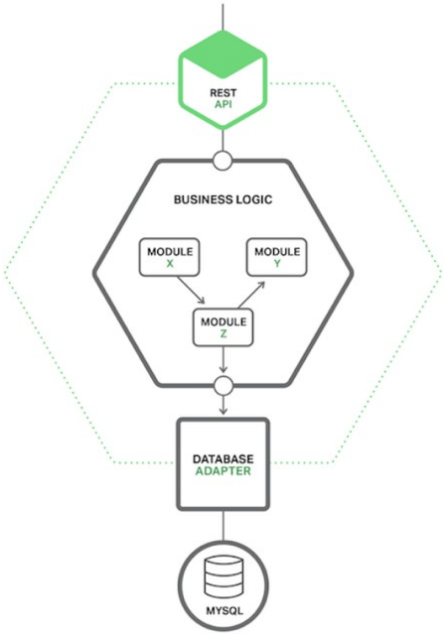
Latency
Traffic
Errors
Saturation

Old-School Monitoring

Agent based

Collects only host data

Collects only metrics



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Old-School Troubleshooting

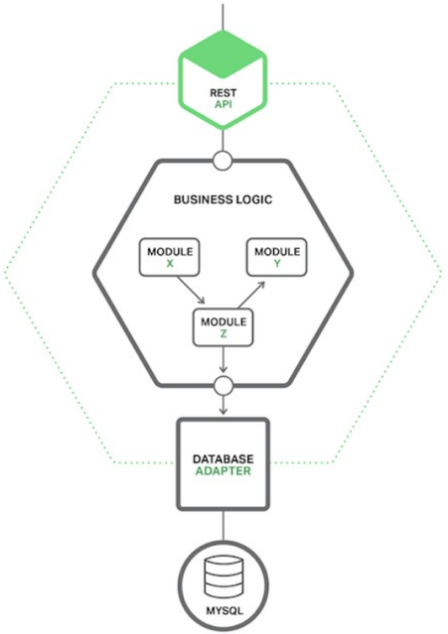
We need more debug data → logs

Old-School Logging

Agent based

Dumps locally or remotely

Collects only logged data



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Fast Forward into the Future

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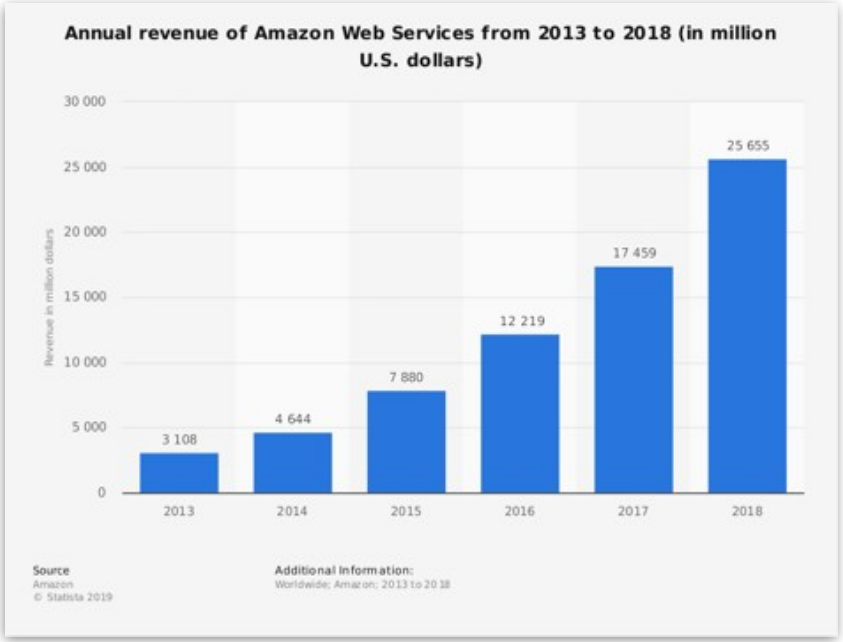
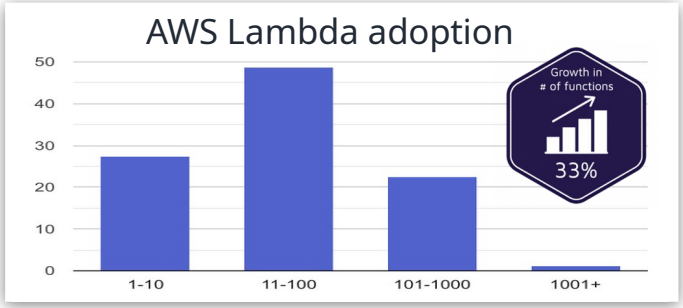
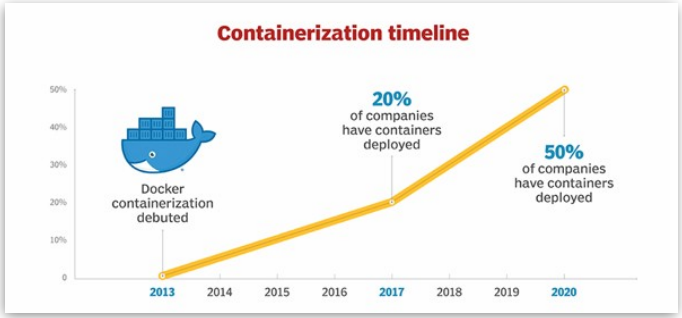
New Era for Applications: Cloud + Microservices







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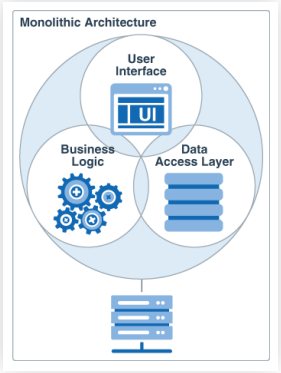
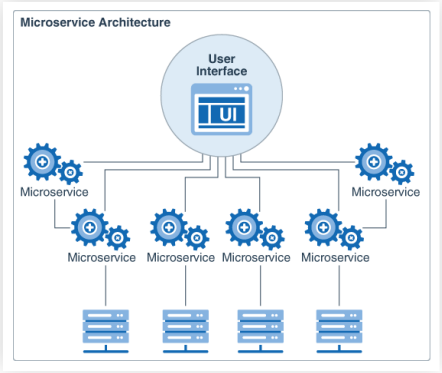
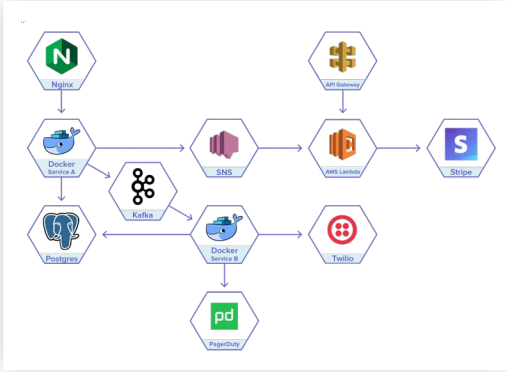
The Rise of Microservices in the Cloud







Host-based Monolithic → Host-based Distributed → Abstracted-host Highly Distributed

Extremely hard to monitor and troubleshoot

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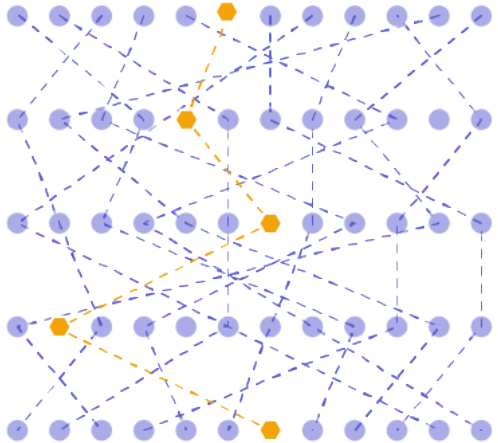
Challenges for Engineering and DevOps

- **Troubleshooting**
  Are basic logs and metrics the right tool for highly distributed applications?
- **Monitoring**
  “Is my application working properly”?
- **Development**
  I’m not sure what’s currently running in production. How can I build new services?



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The Three Pillars of Observability

Combining metrics, logs, and traces for observability is the **only** way to understand complex environments

Metrics tell us the “what”

Logs tell us the “why”

Traces tell us the “where”

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Logging Best Practices

Print out JSONed logs with metadata
(service name, stage, etc.)

Automate the process of logging

Index the fields you're are using

Logging Best Practices - Setup

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Logging Best Practices

Demo

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Monitoring Best Practices

Aggregate all metrics into a unified dashboard

Define your critical metrics (thresholds)

Use custom business metrics

Monitoring Best Practices

Monitor application metrics:

Avg. duration of calls to an HTTP API

Minimum number of calls to a message queue

Number of 500/400 errors

Monitoring Best Practices

Demo

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Something Is Still Missing

How do we correlate between metrics and logs

How do we correlate between data in different services

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Distributed Tracing DIY

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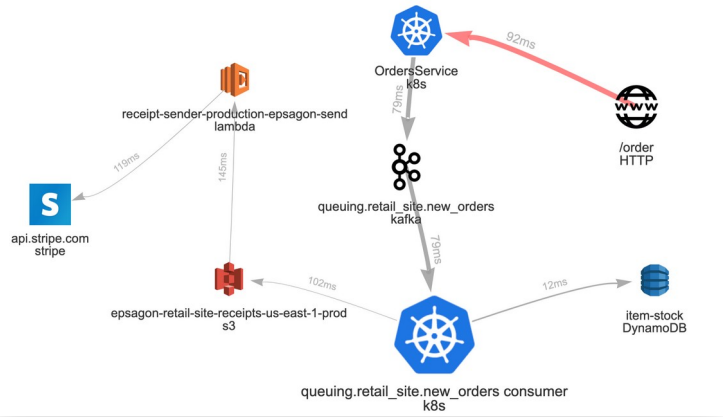
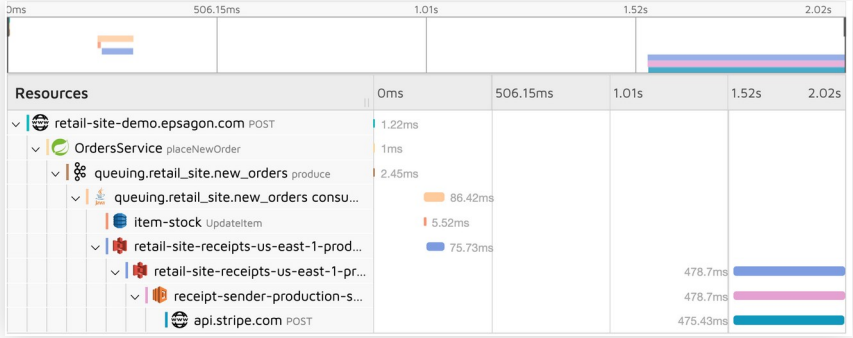
Why Distributed Tracing Is Critical Today

The Only Way to Understand Cloud-Native Workloads

Due to high complexity and the need for manual instrumentation, distributed tracing remained an approach viable only for very **tech savvy** companies

> A trace tells the story of a transaction or workflow as it propagates through a distributed system





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Distributed Tracing Landscape

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Generating Traces

Ingestion and visualization

Distributed Tracing DIY - Generating Traces

Instrument every call
(AWS-SDK, http, postgres, Flask, ...)
A **span** for every request and response
Add **context** to every span
Inject and **Extract** IDs in relevant calls

```python
def handle_request(request):
    span = before_request(request, opentracing.global_tracer())
    # store span in some request-local storage using Tracer.scope_manager,
    # using the returned `Scope` as Context Manager to ensure
    # `Span` will be cleared and (in this case) `Span.finish()` be called.
    with tracer.scope_manager.activate(span, True) as scope:
        # actual business logic
        handle_request_for_real(request)


def before_request(request, tracer):
    span_context = tracer.extract(
        format=Format.HTTP_HEADERS,
        carrier=request.headers,
    )
    span = tracer.start_span(
        operation_name=request.operation,
        child_of(span_context))
    span.set_tag('http.url', request.full_url)

    remote_ip = request.remote_ip
    if remote_ip:
        span.set_tag(tags.PEER_HOST_IPV4, remote_ip)

    caller_name = request.caller_name
    if caller_name:
        span.set_tag(tags.PEER_SERVICE, caller_name)

    remote_port = request.remote_port
    if remote_port:
        span.set_tag(tags.PEER_PORT, remote_port)

    return span
```

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Distributed Tracing DIY

Demo

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Distributed Tracing DIY - Ingestion & Visualization

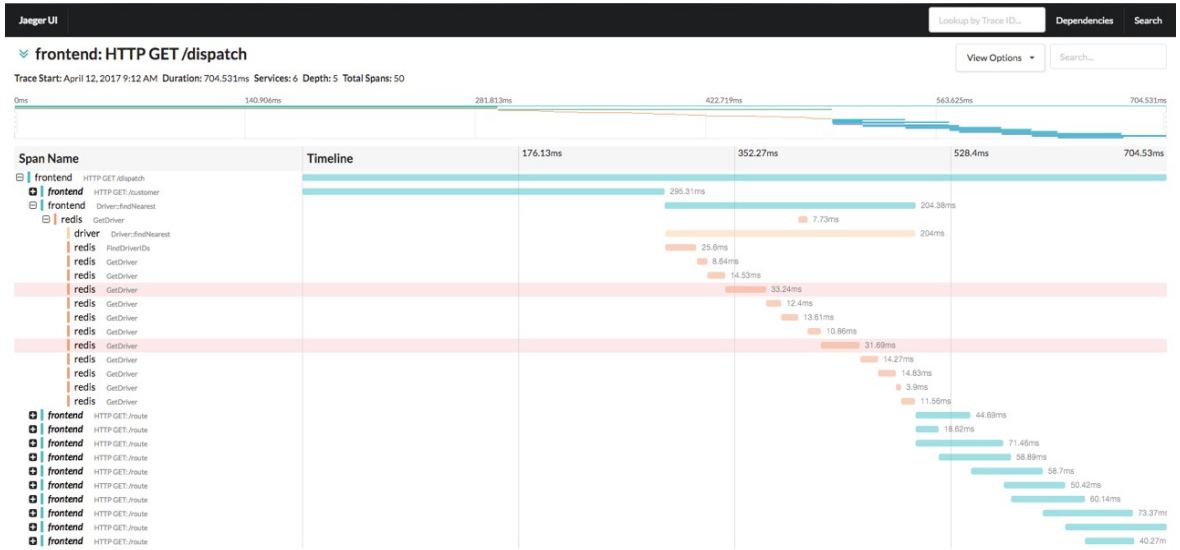
Ingestion according to our scale (millions? billions?)

Index context and tags for easy search

Visualize traces (timeline, graph)

Set alerts

Distributed Tracing DIY - Ingestion & Visualization



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Tagging Traces

Adding tags for search and aggregations:

Identifiers – user ID, customer ID, device ID
Flow control – event type, business logic
Business metrics – items in cart, minutes watched

Tracing with payload

Search an event according to:

HTTP headers or body - IDs
Key or query in SQL/NoSQL
Response payload from HTTP call

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Tracing As a Glue

Trace ⟶ Logs

Trace ⟷ Environment

Best Practices for Observability

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Best Practices for Observability

Automated setup and zero maintenance

Support any environment

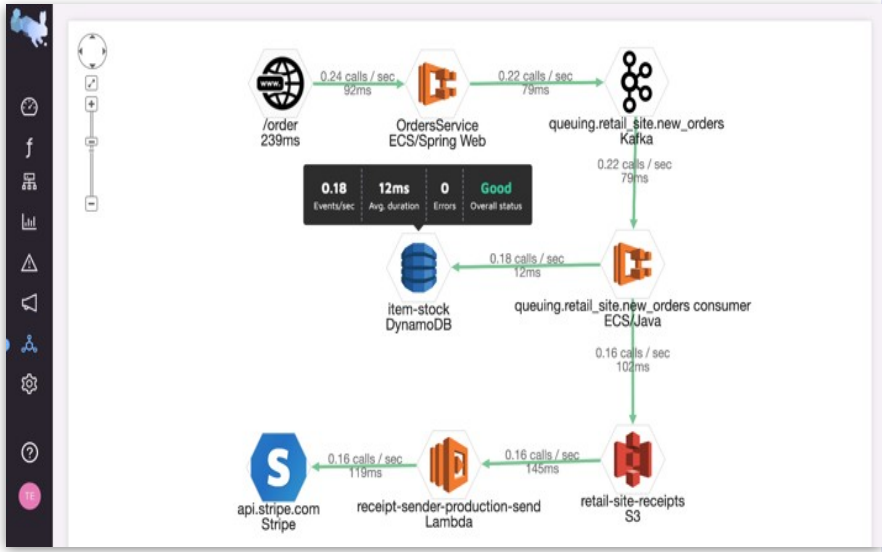
(K8s, Serverless, ECS, AKS, On Prem)

Connects **every request**

in a transaction

Search and analyze your **data**

Helps to quickly pinpoint problems



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Summary

Modern applications requires more than just monitoring

Distributed tracing becomes a crucial component in such environments

Stop implementing your own solutions unless needed

Q&A

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