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ARE WE ALL ON THE SAME PAGE?

LET'S FIX THAT

Luis Mineiro @voidmaze

SRE @ Zalando

Coding Serbia, 17.05.2019

ZALANDO AT A GLANCE

~ 5.4 billion EUR

revenue 2018

> 300 million visits per month

> 27 million active customers

> 400,000 product choices

> 15,500 employees in Europe

> 80% of visits via mobile devices

~ 2,000 brands

17 countries

as of March 2019

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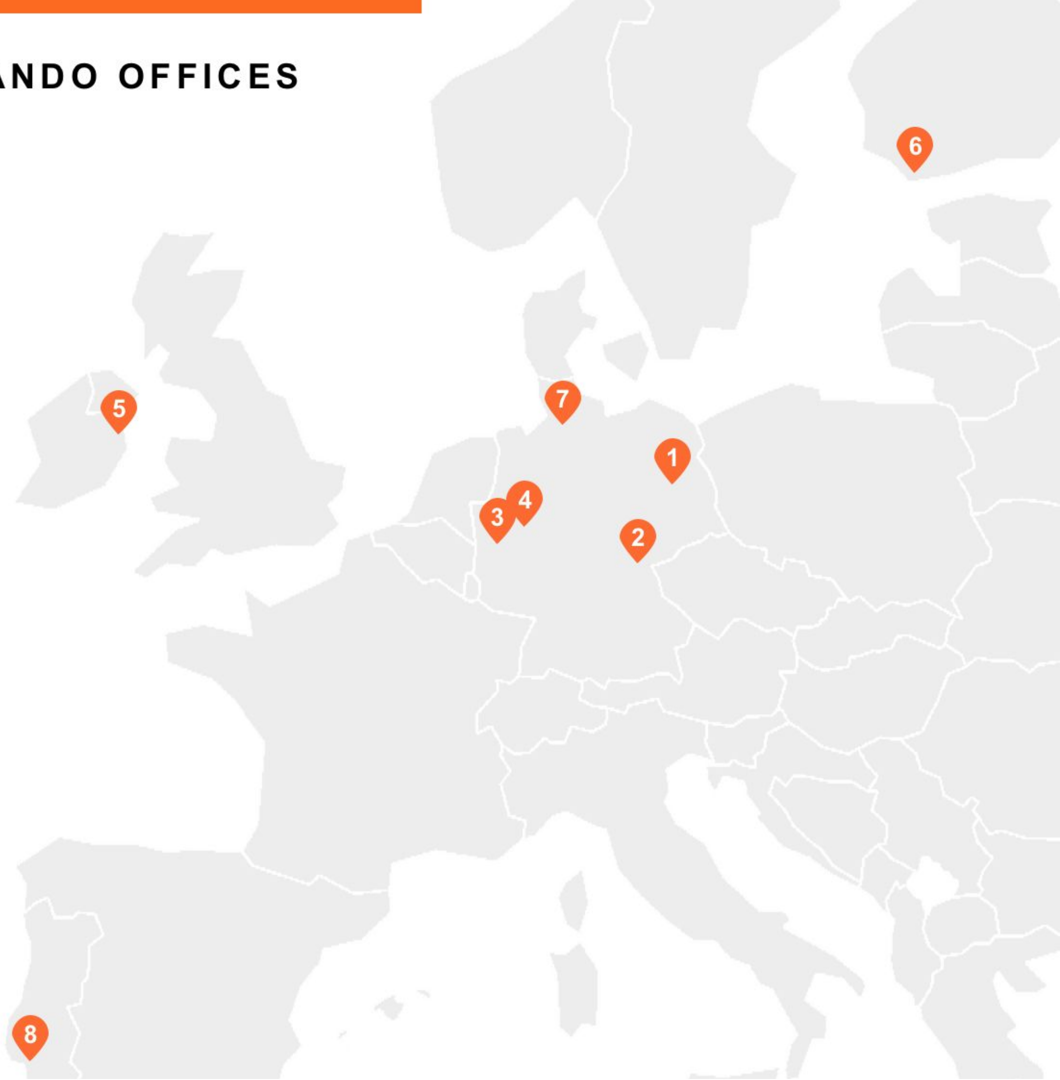
ZALANDO OFFICES



1	BERLIN **HEADQUARTERS**
2	ERFURT **TECH OFFICE**
3	MÖNCHENGLADBACH **TECH OFFICE**
4	DORTMUND **TECH HUB**
5	DUBLIN **TECH HUB**
6	HELSINKI **TECH HUB**
7	HAMBURG **ADTECH LAB**
8	LISBON **TECH HUB**

as of March 2019

WE ARE CONSTANTLY INNOVATING TECHNOLOGY

HOME-BREWED, CUTTING-EDGE & SCALABLE
technology solutions

help our brand to
WIN ONLINE

8 international tech locations

HQs
in Berlin

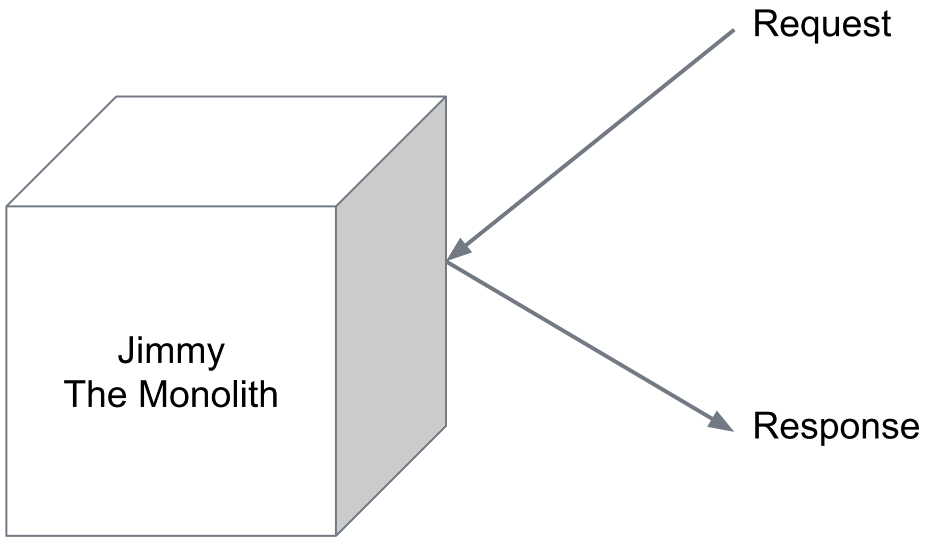
> 2,000
employees at

zalando

Photo by Dawn Armfield on Unsplash

THE AGE OF THE MONOLITH

Single, large boxes
that did everything



MONITORING THE MONOLITH

Ops Monitoring

- Is the box alive?
- Is the monolith process up?

Devs Monitoring

- Are requests returning errors?
- Are requests reasonably fast?

Photo by Deneen LT on Pexels

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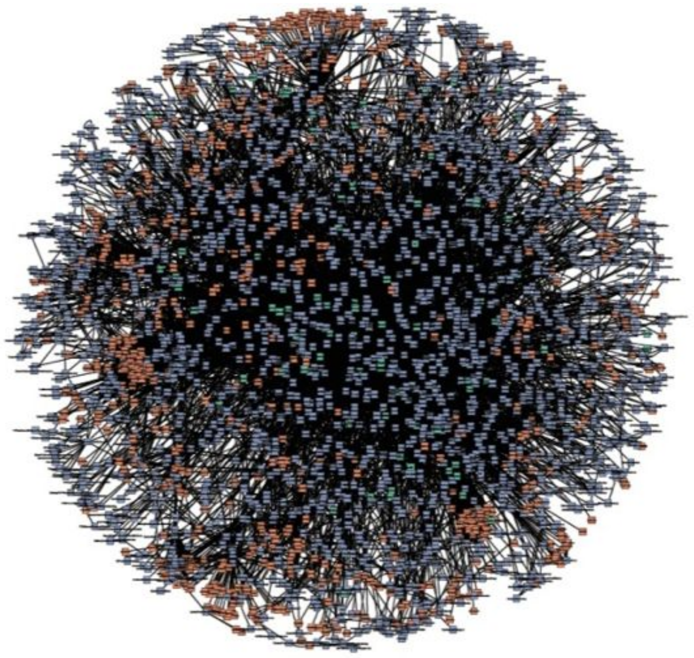
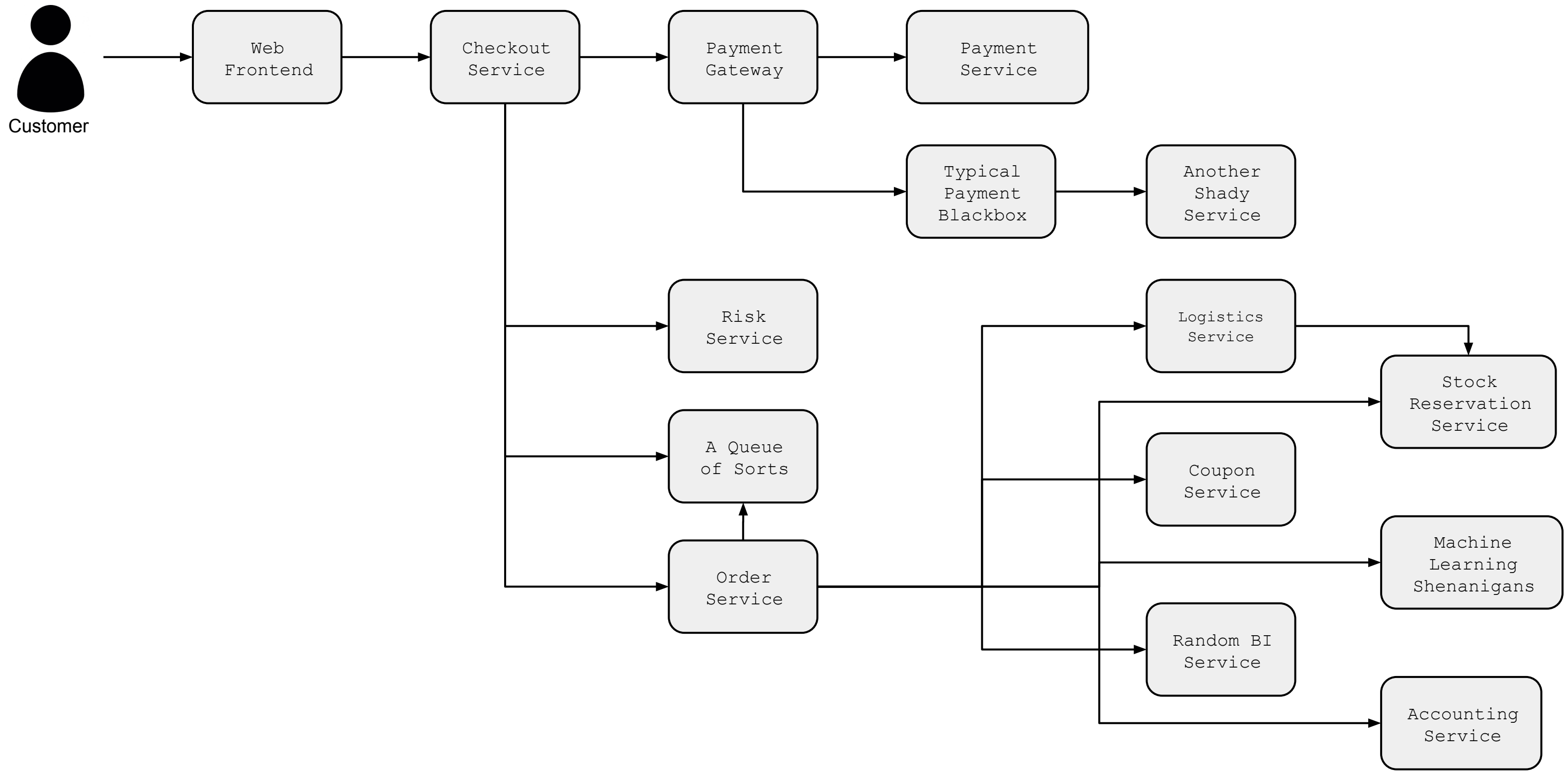
MODERN MICROSERVICES ARCHITECTURES



Amazon internal service dependency visualization

EXAMPLE - PLACING AN ORDER



MONITORING MICROSERVICES

"DevOps" Monitoring

- Is the box alive?
- Is the micro-service process up?
- Are requests returning errors?
- Are requests reasonably fast?

Photo by Antoine Plüss on Unsplash

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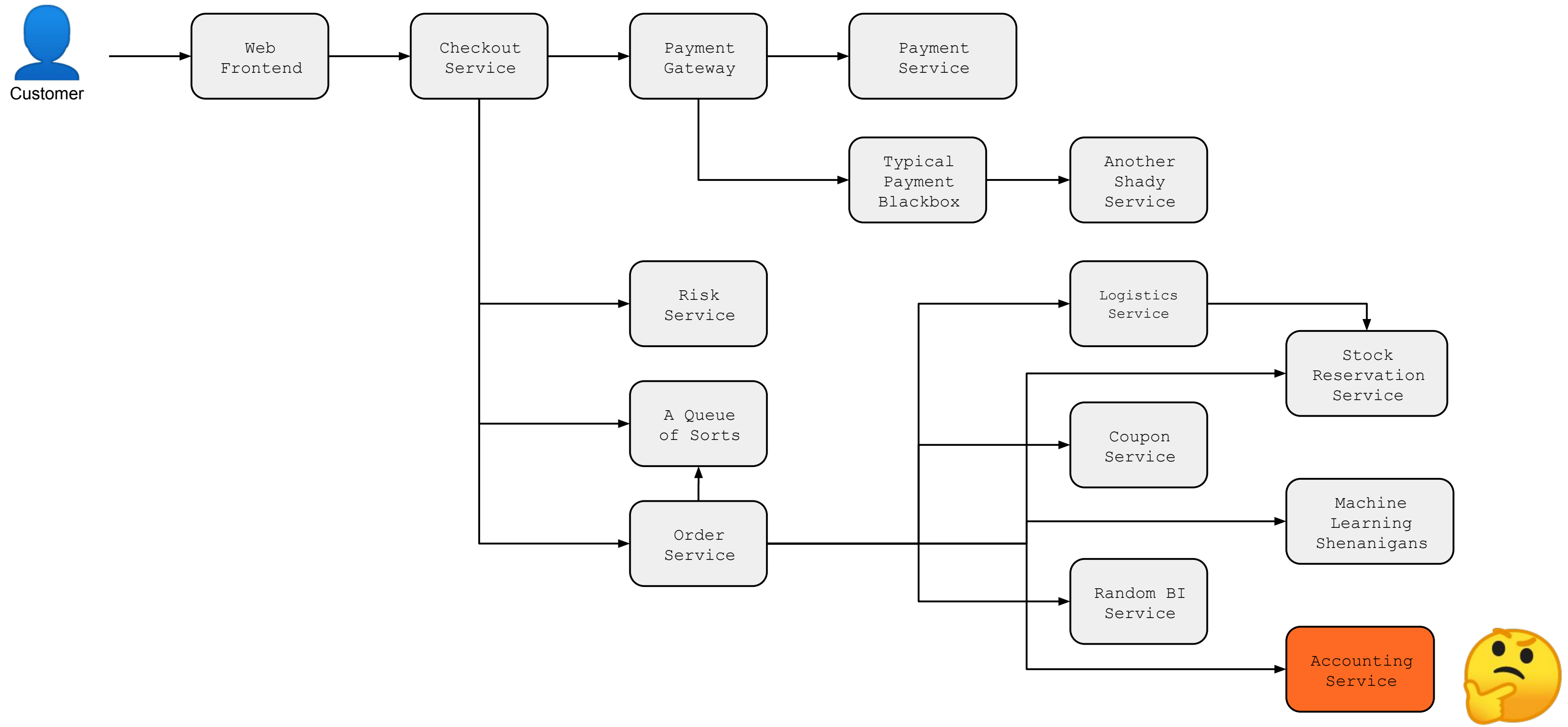
FAILURE PLACING AN ORDER



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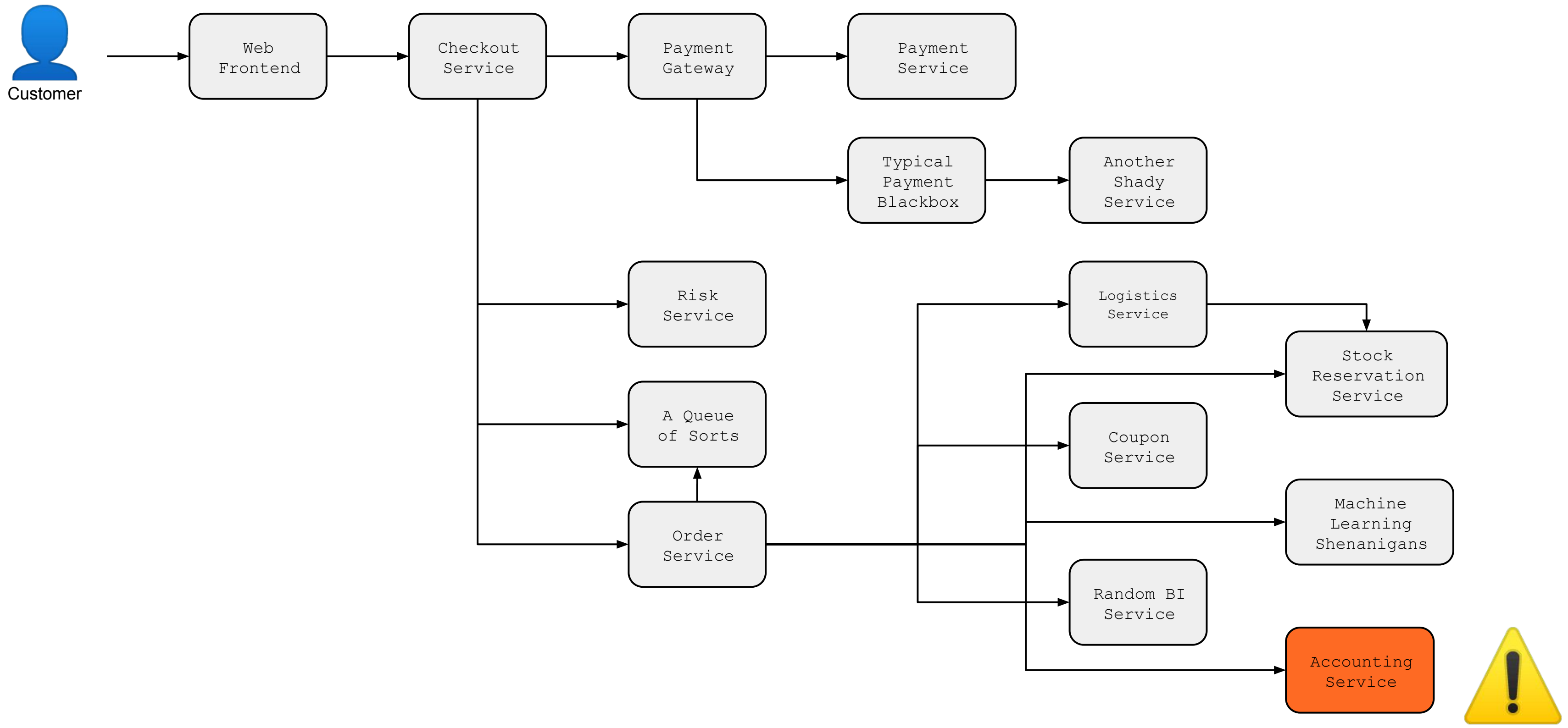
ALERTS ON FAILURE PLACING AN ORDER



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ALERTS ON FAILURE PLACING AN ORDER

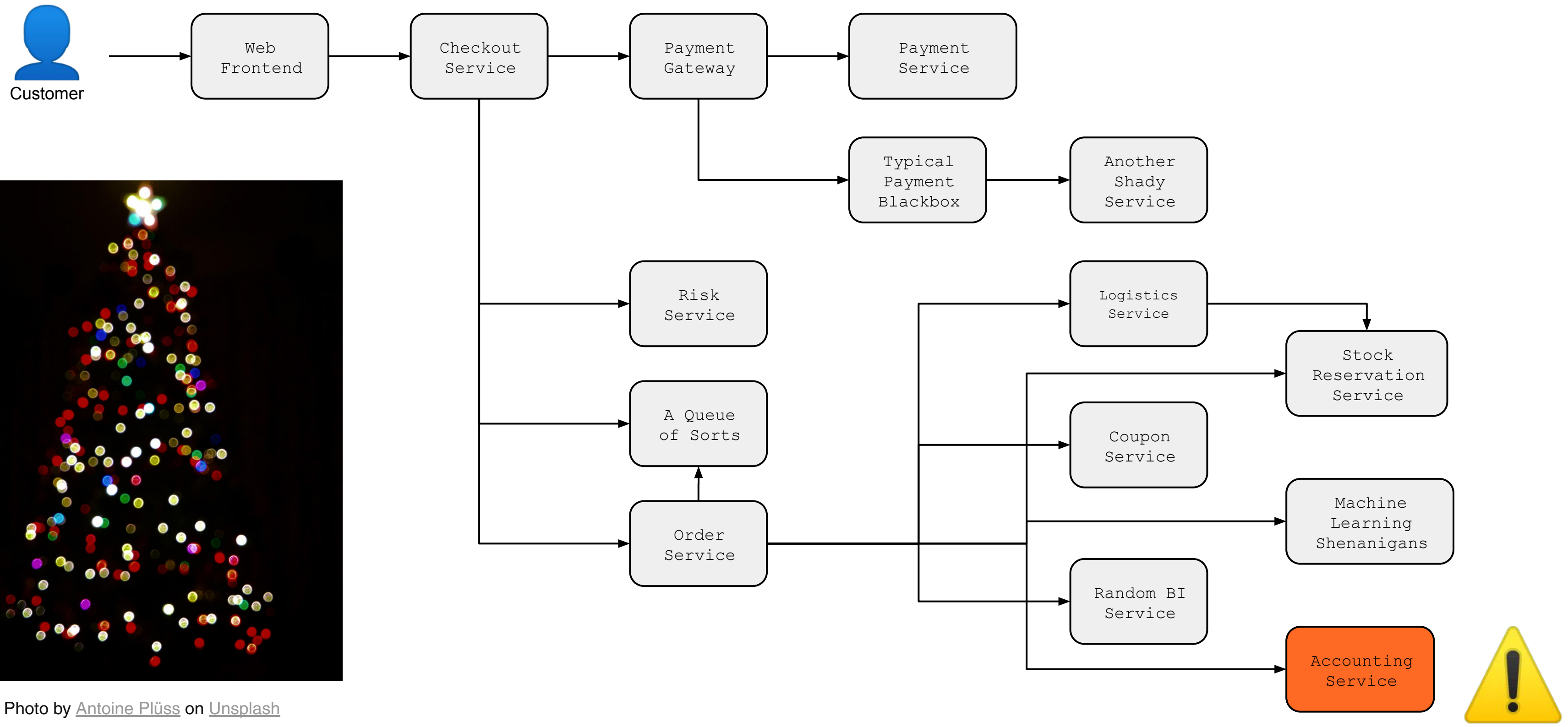

Photo by Antoine Plüss on Unsplash

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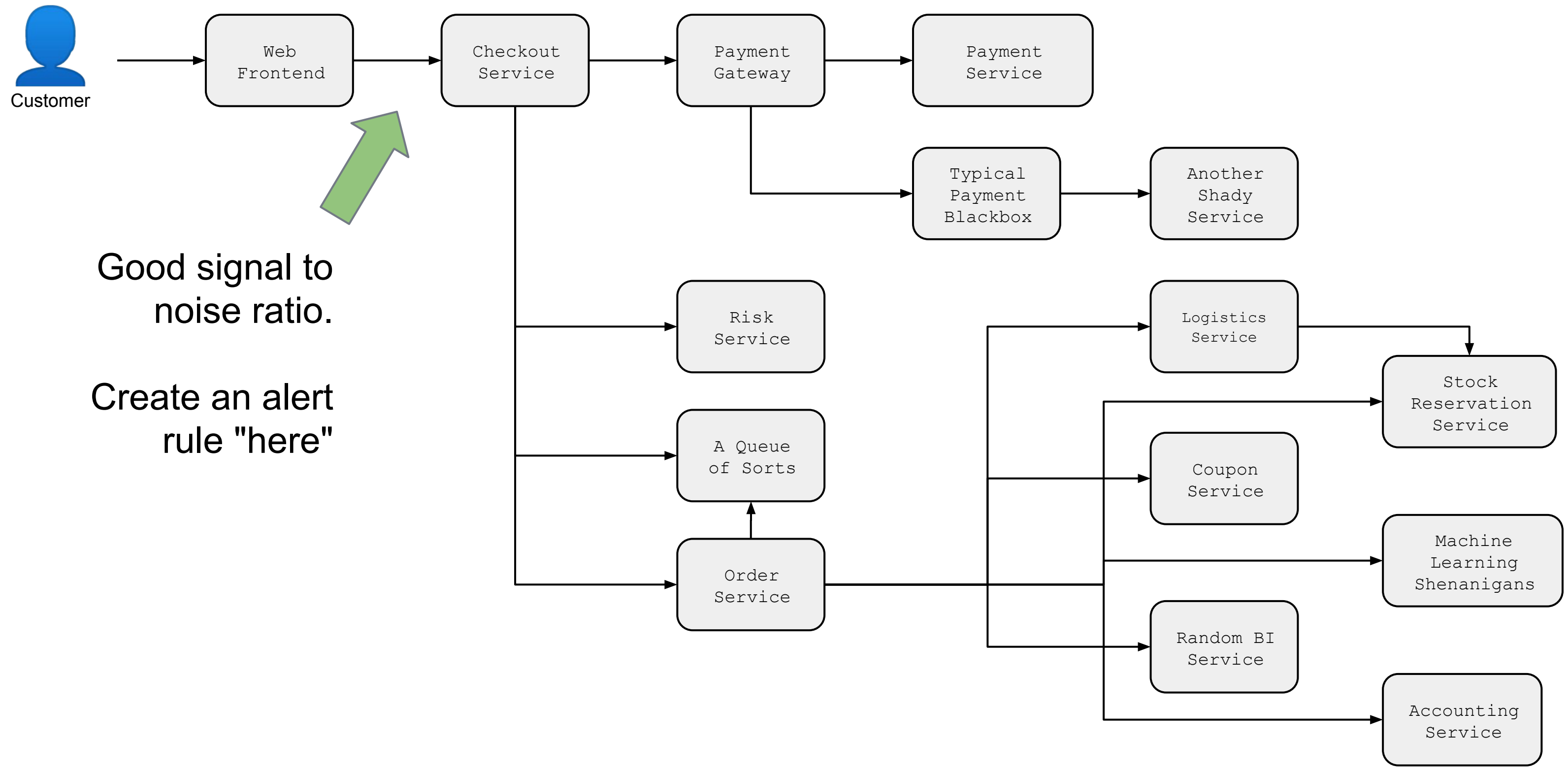
SYMPTOM BASED ALERTING RULE



Good signal to noise ratio.

Create an alert rule "here"

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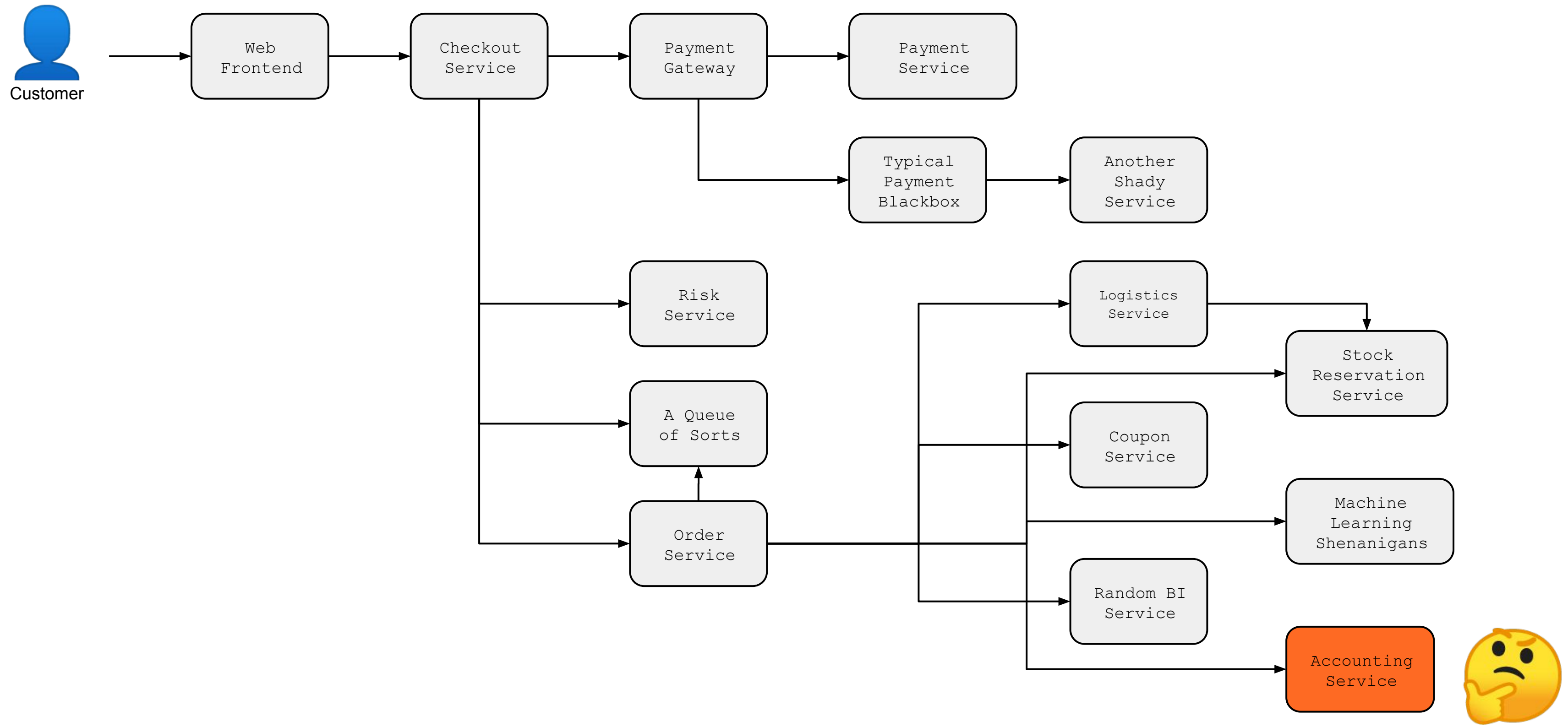
ALERT ON THE SYMPTOM



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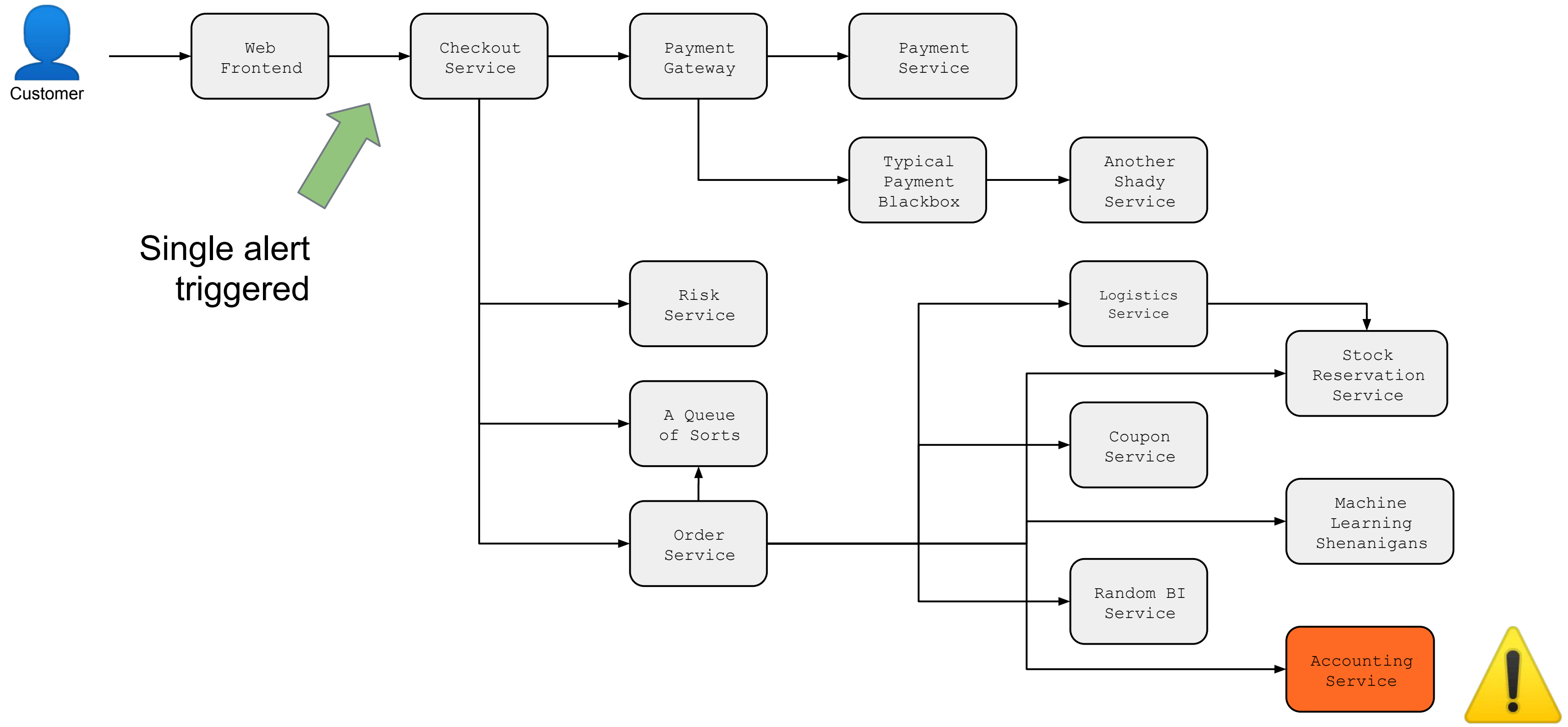
ALERT ON THE SYMPTOM



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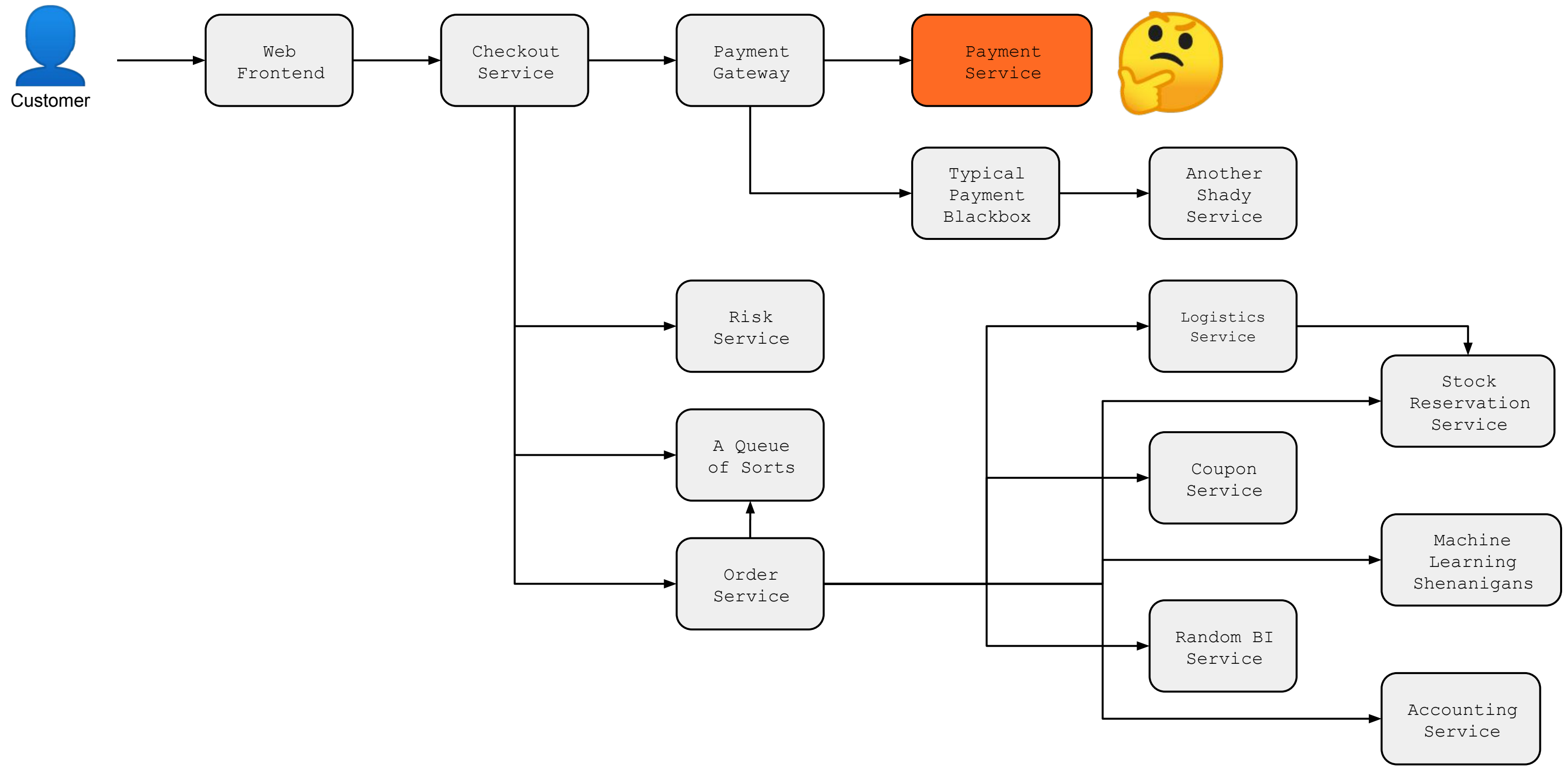
ALERT ON THE SYMPTOM - DIFFERENT ISSUE



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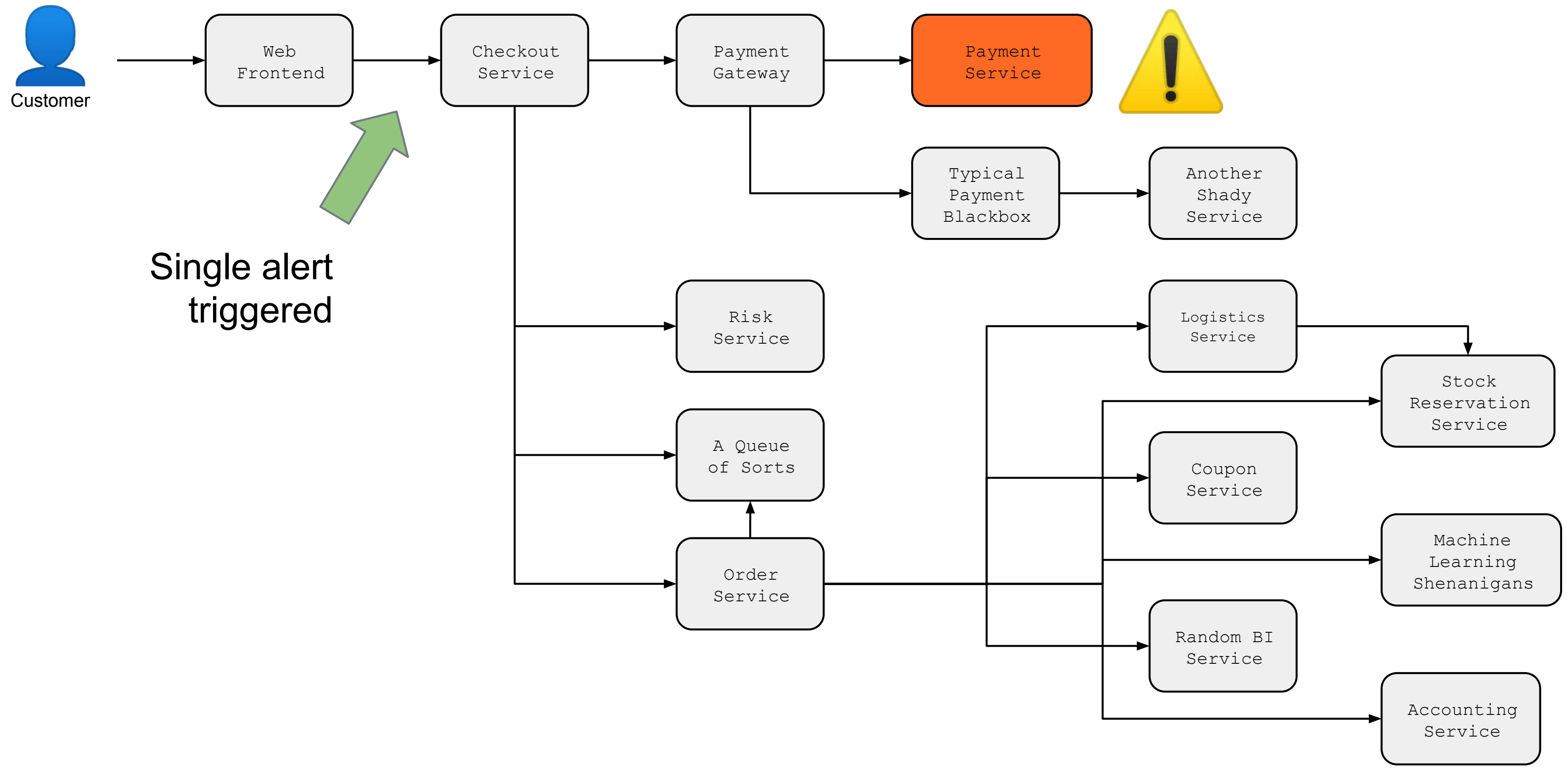
ALERT ON THE SYMPTOM - DIFFERENT ISSUE



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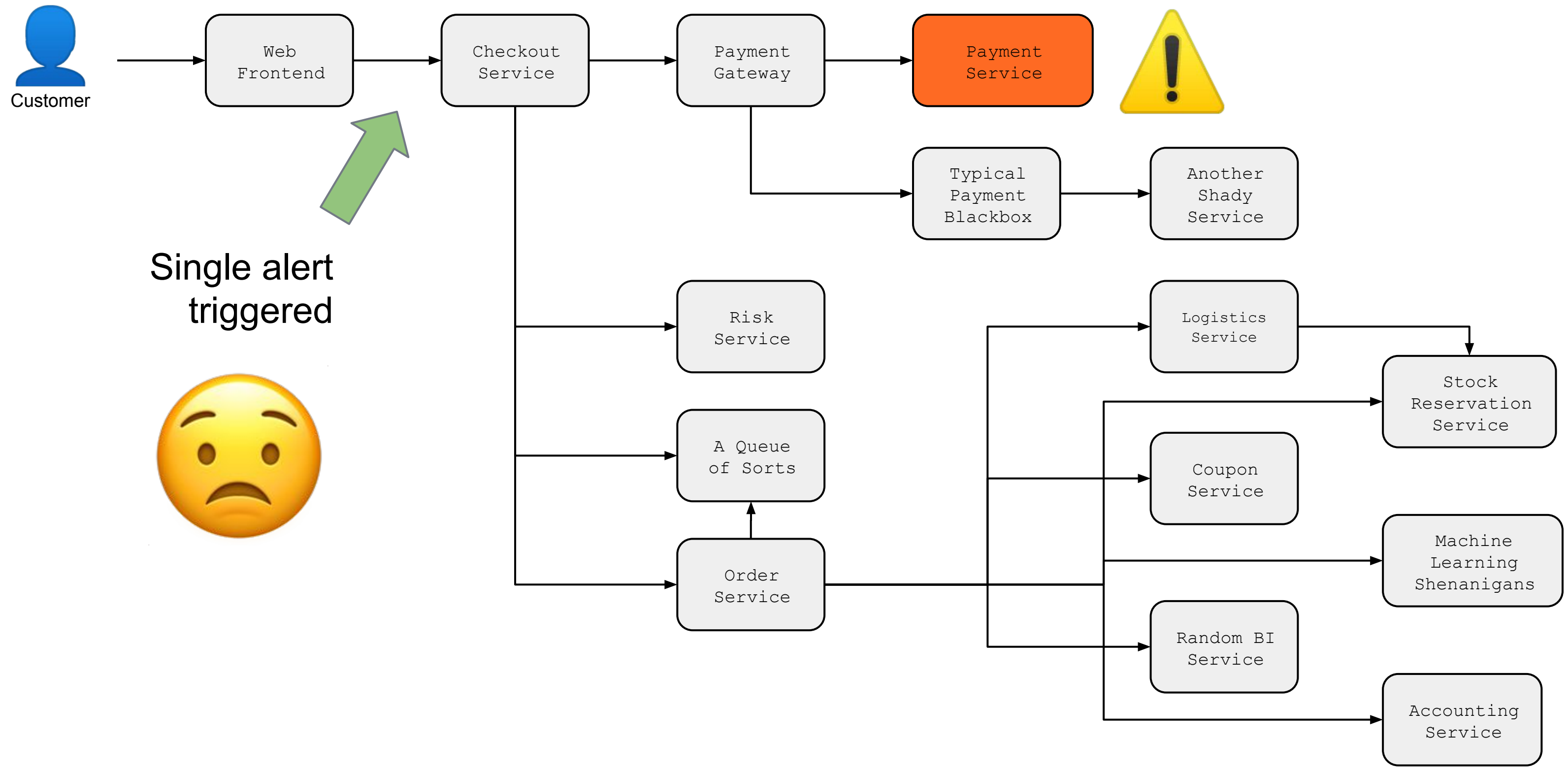
PLACING AN ORDER - ALERT BOMBING



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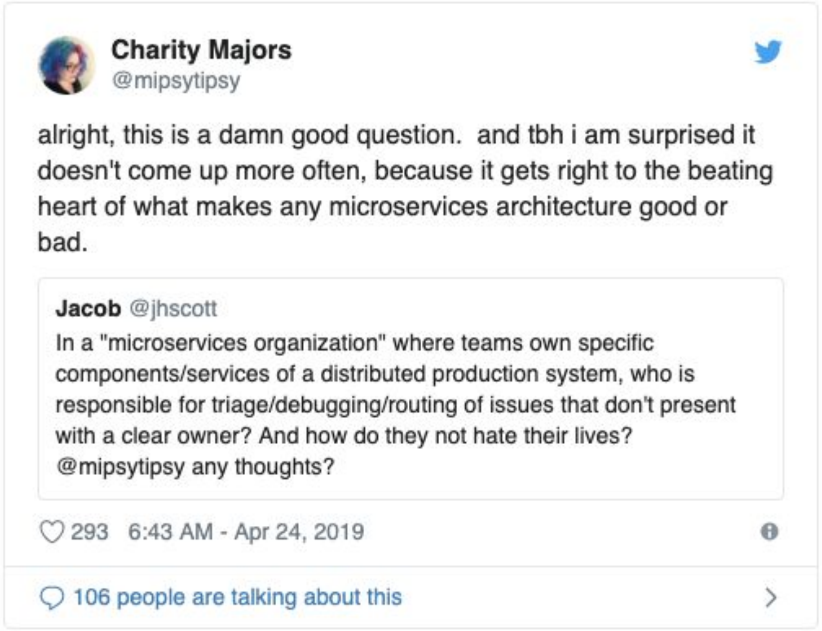
ALERTING FOR MICROSERVICES



Charity Majors
@mipsytipsy

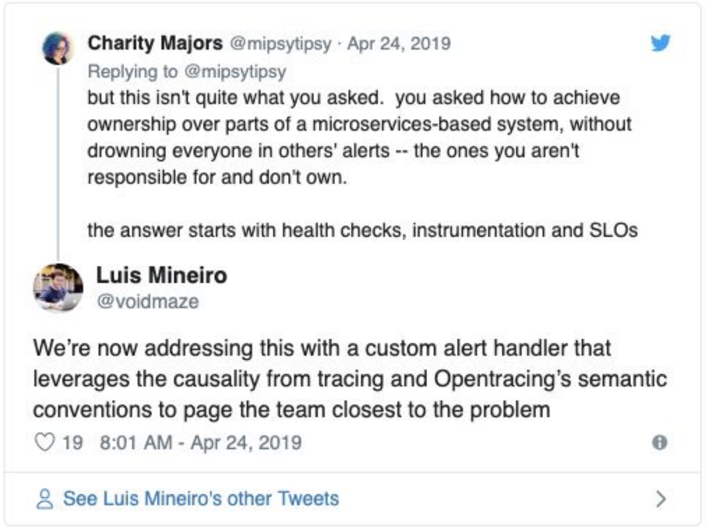
alright, this is a damn good question. and tbh i am surprised it doesn't come up more often, because it gets right to the beating heart of what makes any microservices architecture good or bad.

Jacob @jhscott
In a "microservices organization" where teams own specific components/services of a distributed production system, who is responsible for triage/debugging/routing of issues that don't present with a clear owner? And how do they not hate their lives? @mipsytipsy any thoughts?

293 6:43 AM - Apr 24, 2019

106 people are talking about this

ADAPTIVE PAGING



Charity Majors @mipsytipsy · Apr 24, 2019

Replying to @mipsytipsy

but this isn't quite what you asked. you asked how to achieve ownership over parts of a microservices-based system, without drowning everyone in others' alerts -- the ones you aren't responsible for and don't own.

the answer starts with health checks, instrumentation and SLOs

Luis Mineiro
@voidmaze

We're now addressing this with a custom alert handler that leverages the causality from tracing and Opentracing's semantic conventions to page the team closest to the problem

19 8:01 AM - Apr 24, 2019

See Luis Mineiro's other Tweets

Adaptive Paging is an **alert handler**

that leverages the **causality from tracing**

and **OpenTracing's semantic conventions**

to page the team **closest the problem**.

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DISTRIBUTED TRACING AND OPENTRACING

- A trace tells the **story of a transaction or workflow as it propagates** through a distributed system.
- It's basically directed acyclic graph (DAG), with a **clear start** and a **clear end** - no loops.
- A trace is made up of **spans** representing contiguous segments of work in that trace.
- Opentracing is a set of **vendor-neutral APIs** and code instrumentation **standard for distributed tracing**

OPENTRACING

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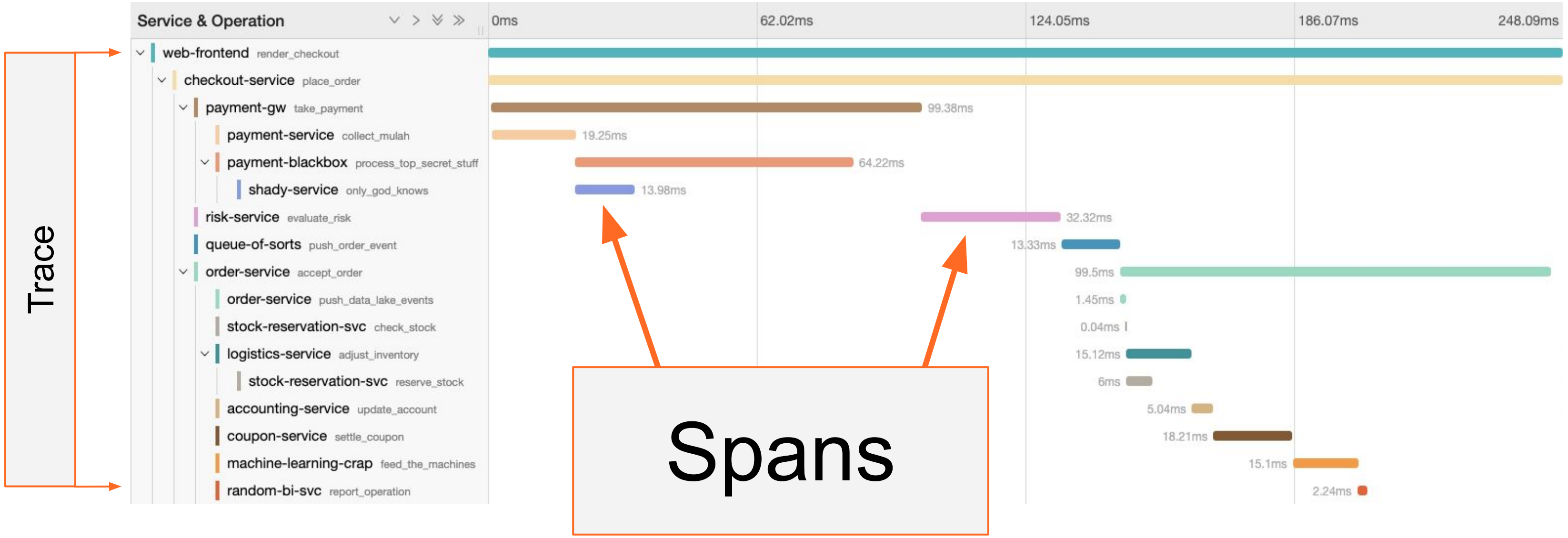
OPENTRACING CONCEPTS

Span: a named operation which records the **duration**, usually a remote procedure call, with optional **Tags** and Logs.



Service & Operation	
web-frontend render_checkout	
checkout-service place_order	
payment-gw take_payment	99.38ms
payment-service collect_mulah	19.25ms
payment-blackbox process_top_secret_stuff	64.22ms
shady-service only_god_knows	13.98ms
risk-service evaluate_risk	32.32ms
queue-of-sorts push_order_event	13.33ms
order-service accept_order	99.5ms
order-service push_data_lake_events	1.45ms
stock-reservation-svc check_stock	0.04ms
logistics-service adjust_inventory	15.12ms
stock-reservation-svc reserve_stock	6ms
accounting-service update_account	5.04ms
coupon-service settle_coupon	18.21ms
machine-learning-crap feed_the_machines	15.1ms
random-bi-svc report_operation	2.24ms

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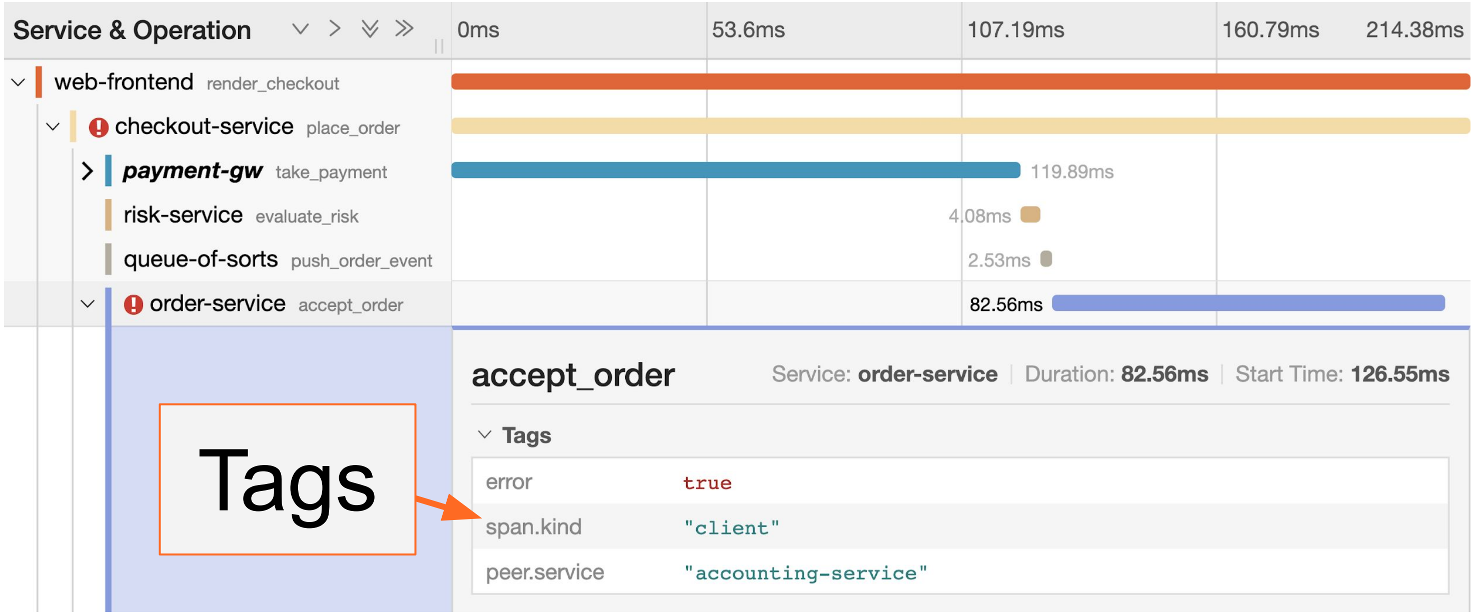
OPENTRACING CONCEPTS

Tag: A "mostly" arbitrary **Key:Value pair** (value can be a string, number or bool)


Service & Operation
0ms
53.6ms
107.19ms
160.79ms
214.38ms
web-frontend render_checkout
checkout-service place_order
payment-gw take_payment
119.89ms
risk-service evaluate_risk
4.08ms
queue-of-sorts push_order_event
2.53ms
order-service accept_order
82.56ms
Tags

accept_order — Service: **order-service** | Duration: **82.56ms** | Start Time: **126.55ms**

Tags

error	true
span.kind	"client"
peer.service	"accounting-service"

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OPENTRACING SEMANTIC CONVENTIONS

Span tag name	Type	Notes and examples
component	string	The **software package**, framework, library, or module that generated the associated Span. E.g., "checkout-service".
error	bool	**true** if and only if the application considers the operation represented by the Span to have failed
peer.service	string	**Remote service name** (for some unspecified definition of "service"). E.g., "accounting-service"
span.kind	string	Either "client" or "server" for the appropriate roles in an RPC.
… and more		

Opentracing semantic conventions

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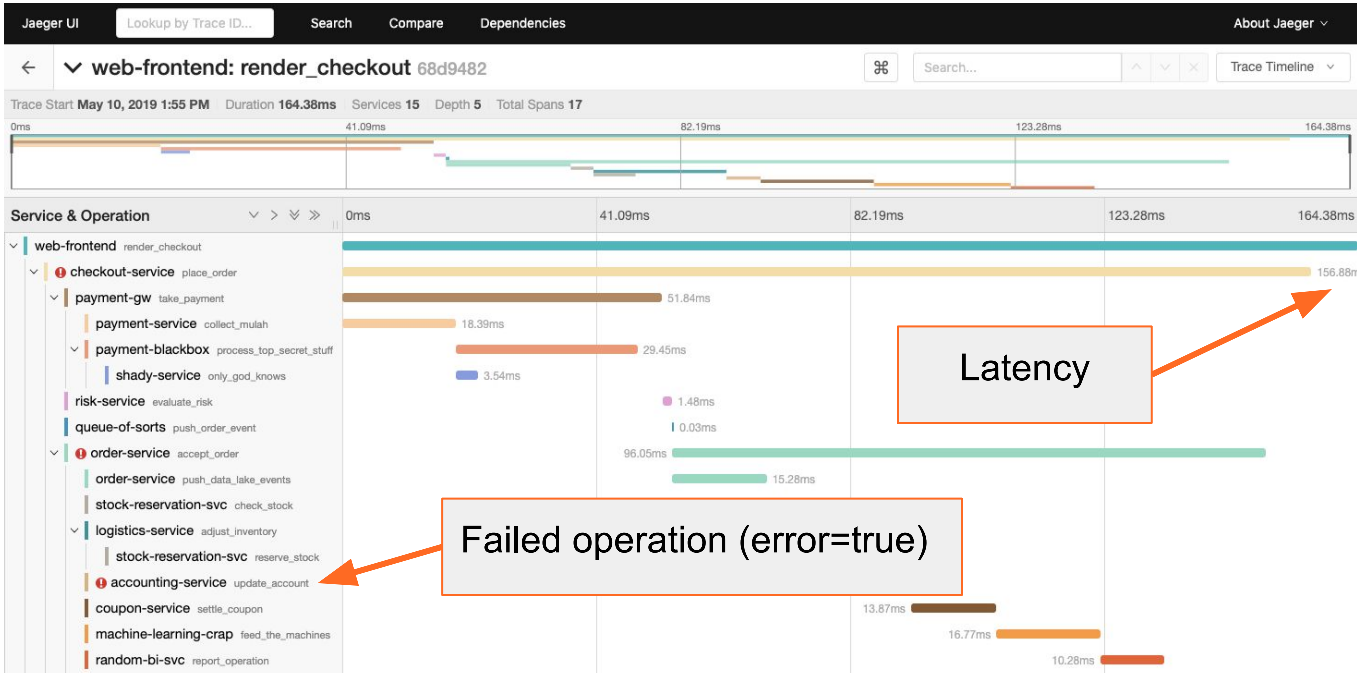
OPENTRACING MONITORING SIGNALS



web-frontend: render_checkout 68d9482

Trace Start **May 10, 2019 1:55 PM** Duration **164.38ms** Services **15** Depth **5** Total Spans **17**

0ms 41.09ms 82.19ms 123.28ms 164.38ms

```
Service & Operation                                   0ms   41.09ms   82.19ms   123.28ms   164.38ms
web-frontend render_checkout
  checkout-service place_order                         156.88m
    payment-gw take_payment                            51.84ms
      payment-service collect_mulah                    18.39ms
      payment-blackbox process_top_secret_stuff        29.45ms
        shady-service only_god_knows                   3.54ms
    risk-service evaluate_risk                         1.48ms
    queue-of-sorts push_order_event                    0.03ms
    order-service accept_order                         96.05ms
      order-service push_data_lake_events              15.28ms
      stock-reservation-svc check_stock
      logistics-service adjust_inventory
        stock-reservation-svc reserve_stock
      accounting-service update_account
      coupon-service settle_coupon                     13.87ms
      machine-learning-crap feed_the_machines          16.77ms
      random-bi-svc report_operation                   10.28ms
```

The Four Golden Signals
SRE Book, Chapter 6: Monitoring Distributed Systems

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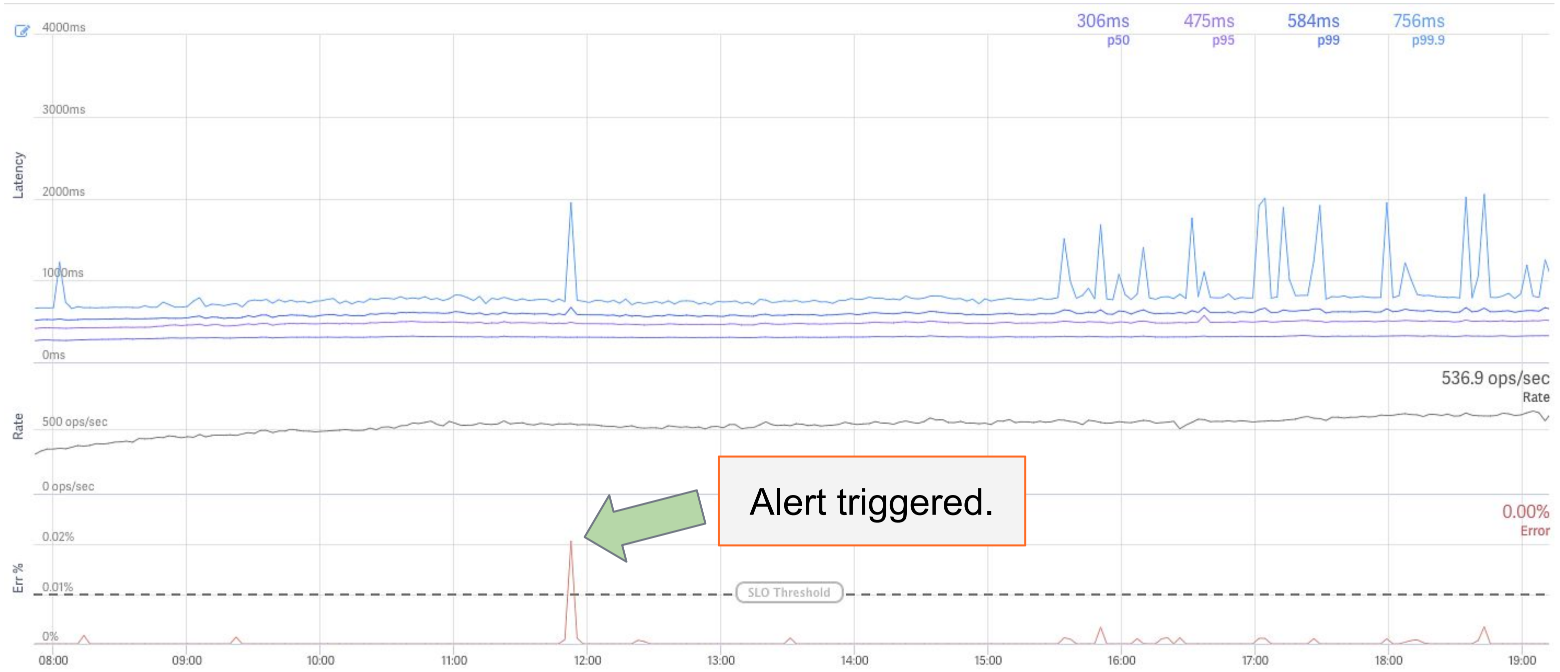
ERROR RATE ALERTING RULE



component: **checkout_service** && operation: **place_order** && error: **true**

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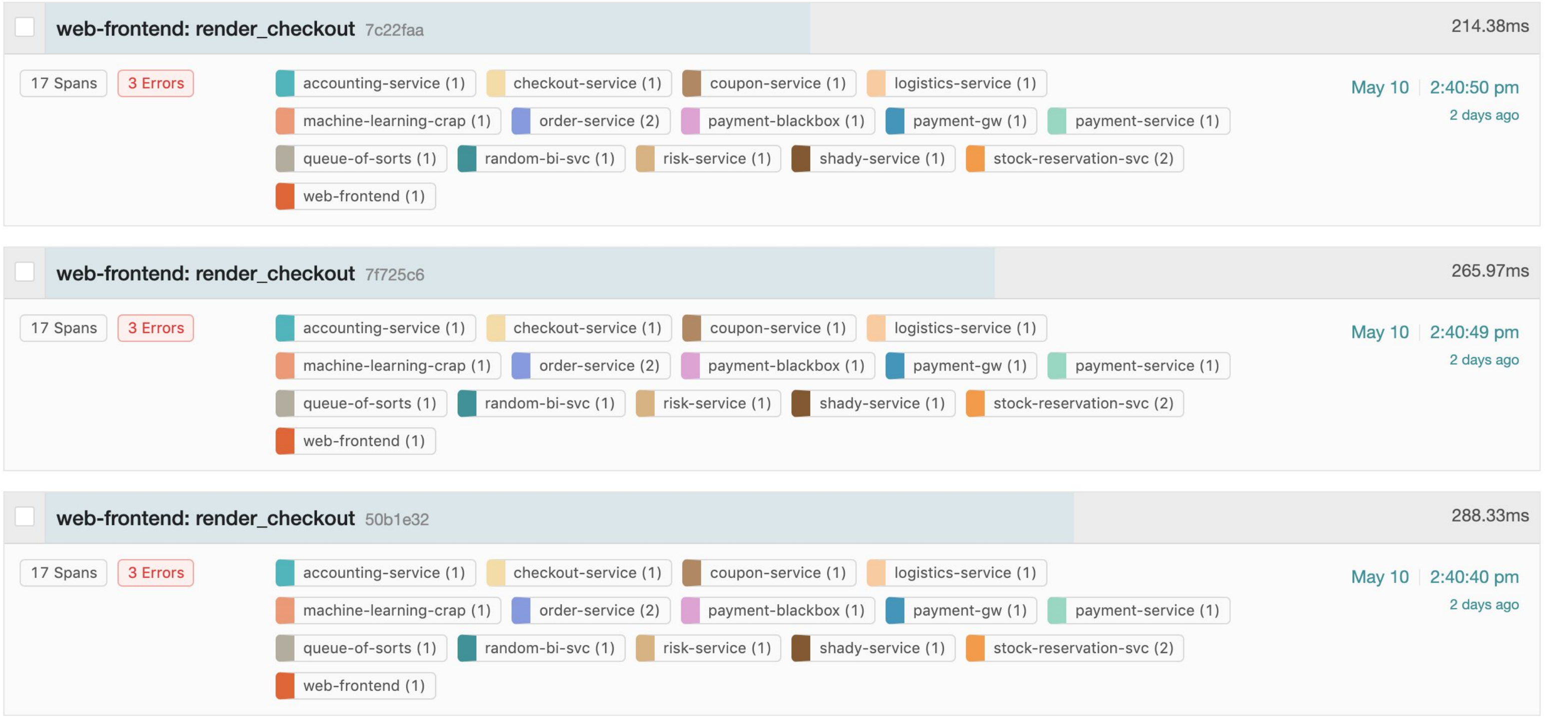
ALERT PAYLOAD



web-frontend: render_checkout 7c22faa 214.38ms

17 Spans 3 Errors

accounting-service (1) checkout-service (1) coupon-service (1) logistics-service (1) machine-learning-crap (1) order-service (2) payment-blackbox (1) payment-gw (1) payment-service (1) queue-of-sorts (1) random-bi-svc (1) risk-service (1) shady-service (1) stock-reservation-svc (2) web-frontend (1)

May 10 | 2:40:50 pm
2 days ago

web-frontend: render_checkout 7f725c6 265.97ms

17 Spans 3 Errors

accounting-service (1) checkout-service (1) coupon-service (1) logistics-service (1) machine-learning-crap (1) order-service (2) payment-blackbox (1) payment-gw (1) payment-service (1) queue-of-sorts (1) random-bi-svc (1) risk-service (1) shady-service (1) stock-reservation-svc (2) web-frontend (1)

May 10 | 2:40:49 pm
2 days ago

web-frontend: render_checkout 50b1e32 288.33ms

17 Spans 3 Errors

accounting-service (1) checkout-service (1) coupon-service (1) logistics-service (1) machine-learning-crap (1) order-service (2) payment-blackbox (1) payment-gw (1) payment-service (1) queue-of-sorts (1) random-bi-svc (1) risk-service (1) shady-service (1) stock-reservation-svc (2) web-frontend (1)

May 10 | 2:40:40 pm
2 days ago

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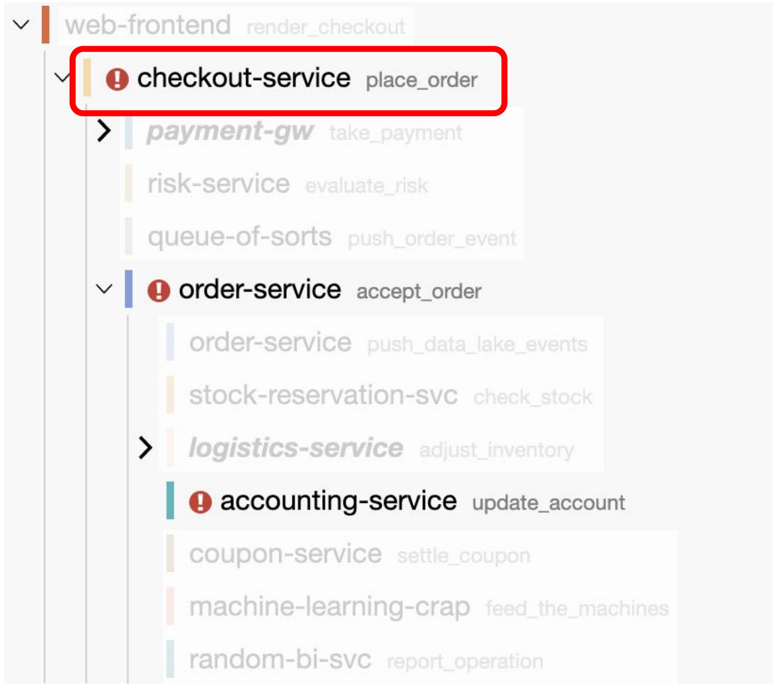
WALKING THROUGH A TRACE


web-frontend render_checkout
checkout-service place_order
payment-gw take_payment
risk-service evaluate_risk
queue-of-sorts push_order_event
order-service accept_order
order-service push_data_lake_events
stock-reservation-svc check_stock
logistics-service adjust_inventory
accounting-service update_account
coupon-service settle_coupon
machine-learning-crap feed_the_machines
random-bi-svc report_operation

1. Starting at the span which was defined as the signal - **place_order**

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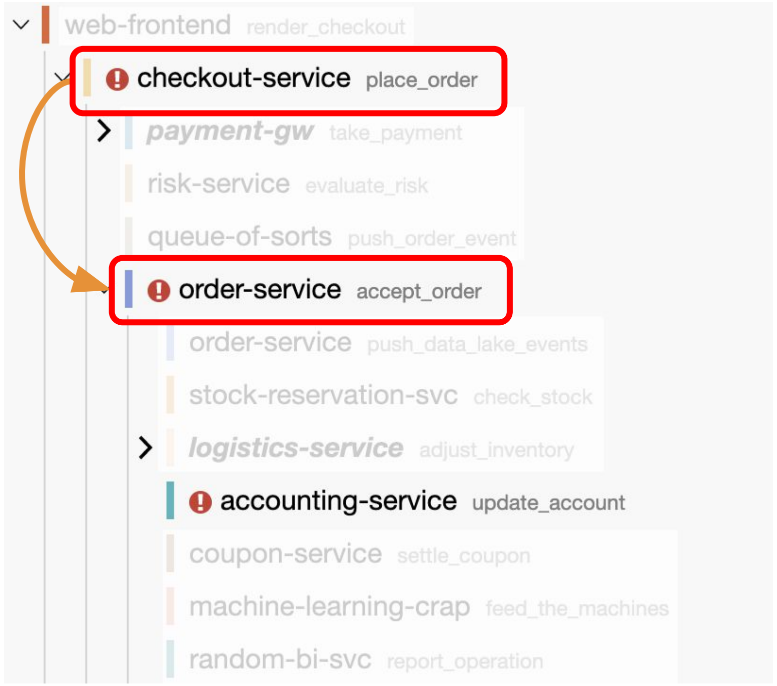
WALKING THROUGH A TRACE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coupon-service settle_coupon
machine-learning-crap feed_the_machines
random-bi-svc report_operation

1. Starting at the span which was defined as the signal - **place_order**
2. Inspect every child span's tags
3. Follow path with **error=true**

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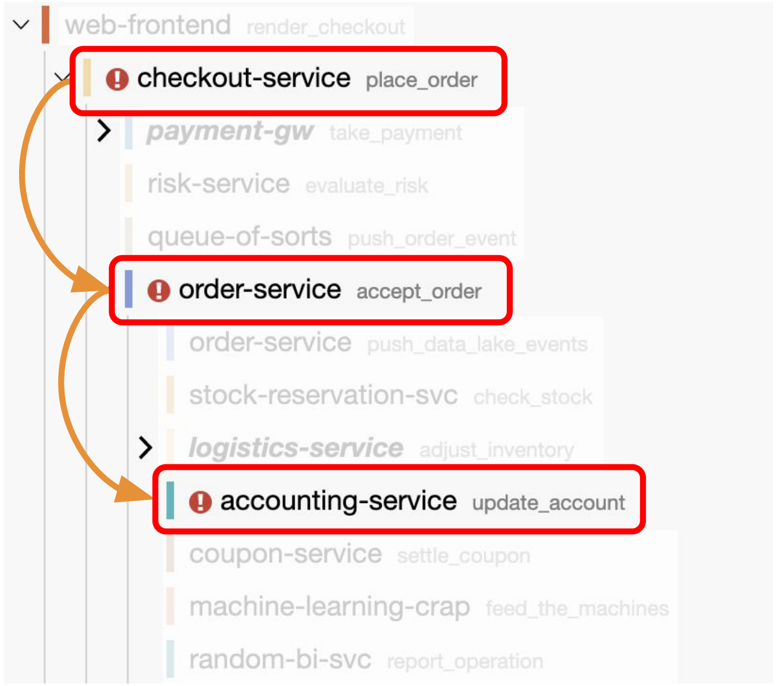
WALKING THROUGH A TRACE



web-frontend render_checkout
checkout-service place_order
payment-gw take_payment
risk-service evaluate_risk
queue-of-sorts push_order_event
order-service accept_order
order-service push_data_lake_events
stock-reservation-svc check_stock
logistics-service adjust_inventory
accounting-service update_account
coupon-service settle_coupon
machine-learning-crap feed_the_machines
random-bi-svc report_operation

1. Starting at the span which was defined as the signal - **place_order**
2. Inspect every child span's tags
3. Follow path with **error=true**
4. Rinse and repeat until no more children

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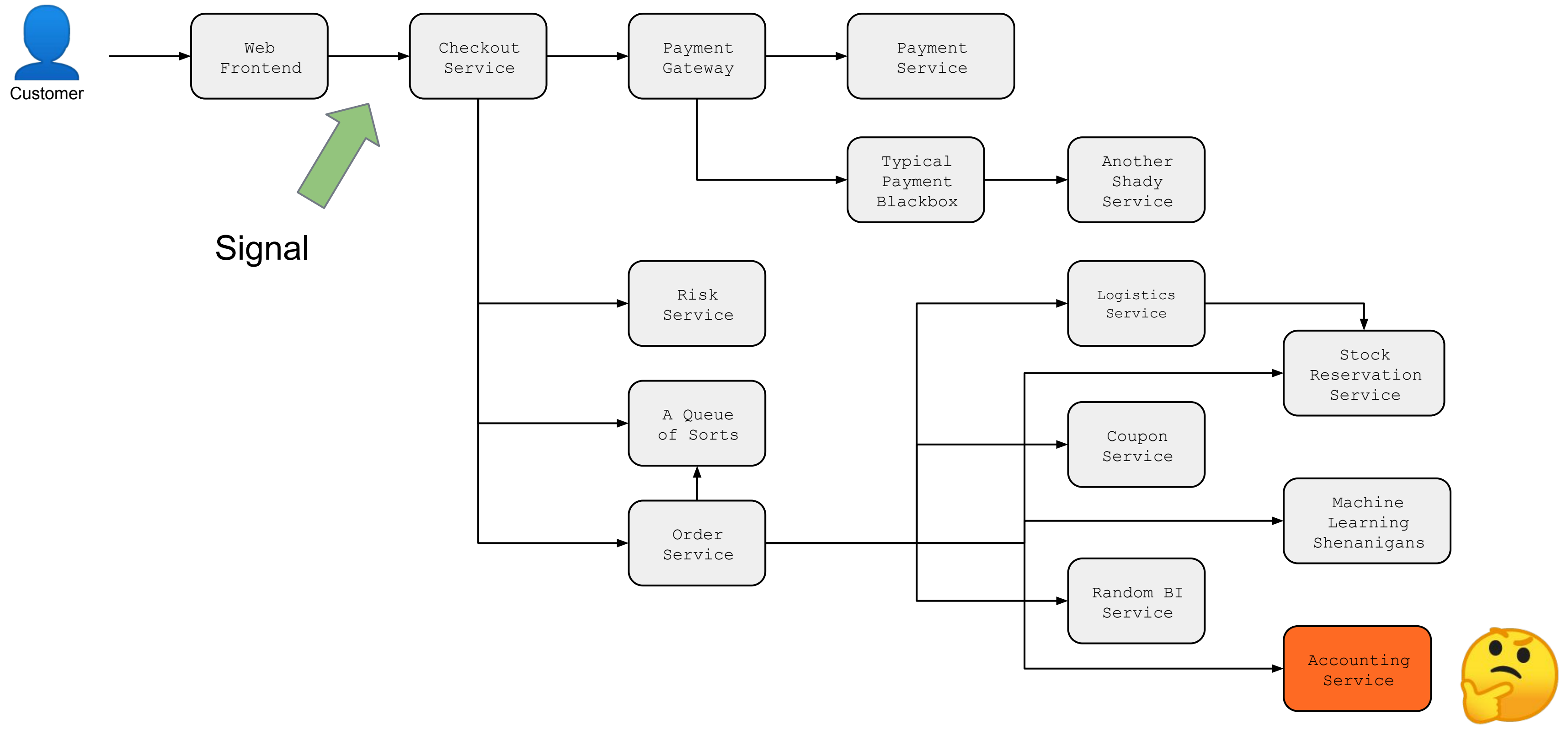
ALERT ON THE SYMPTOM



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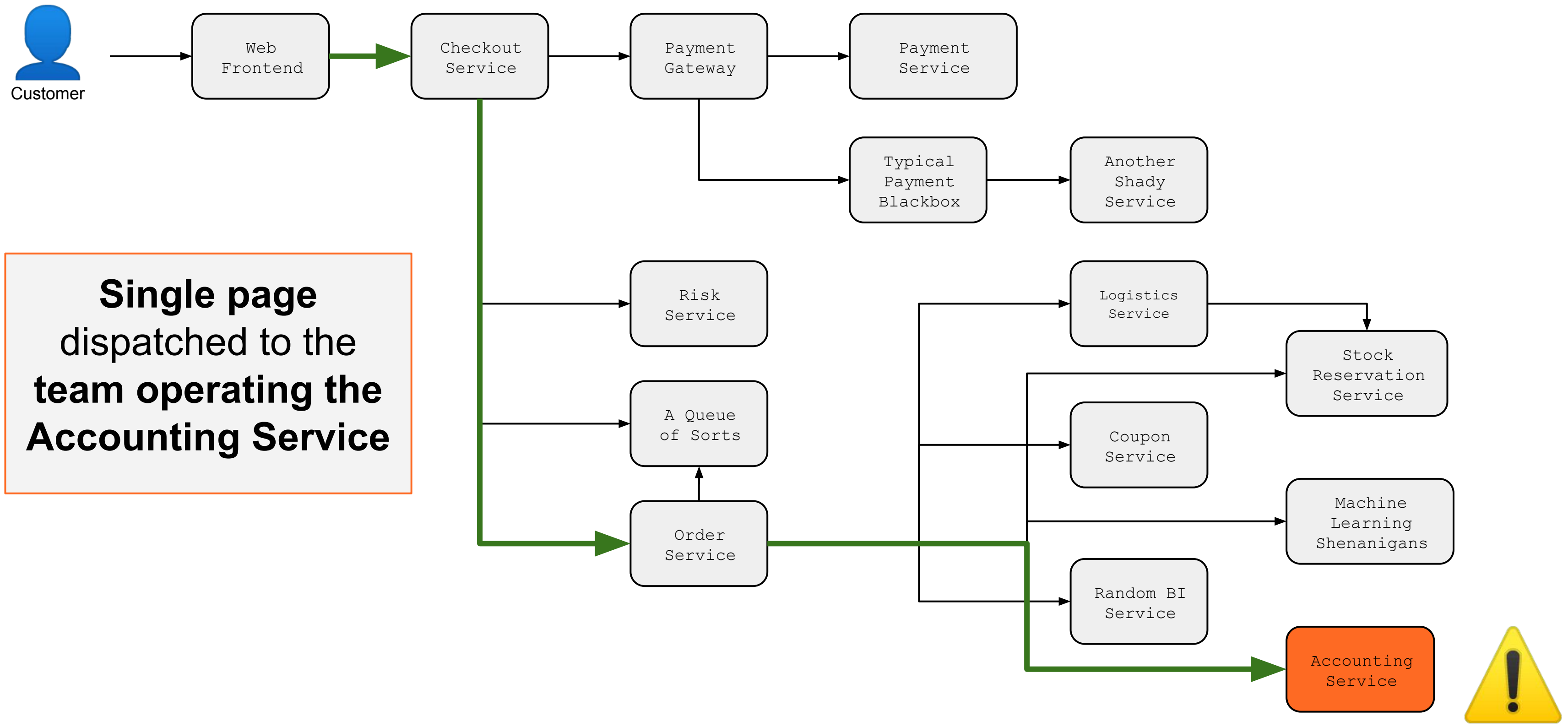
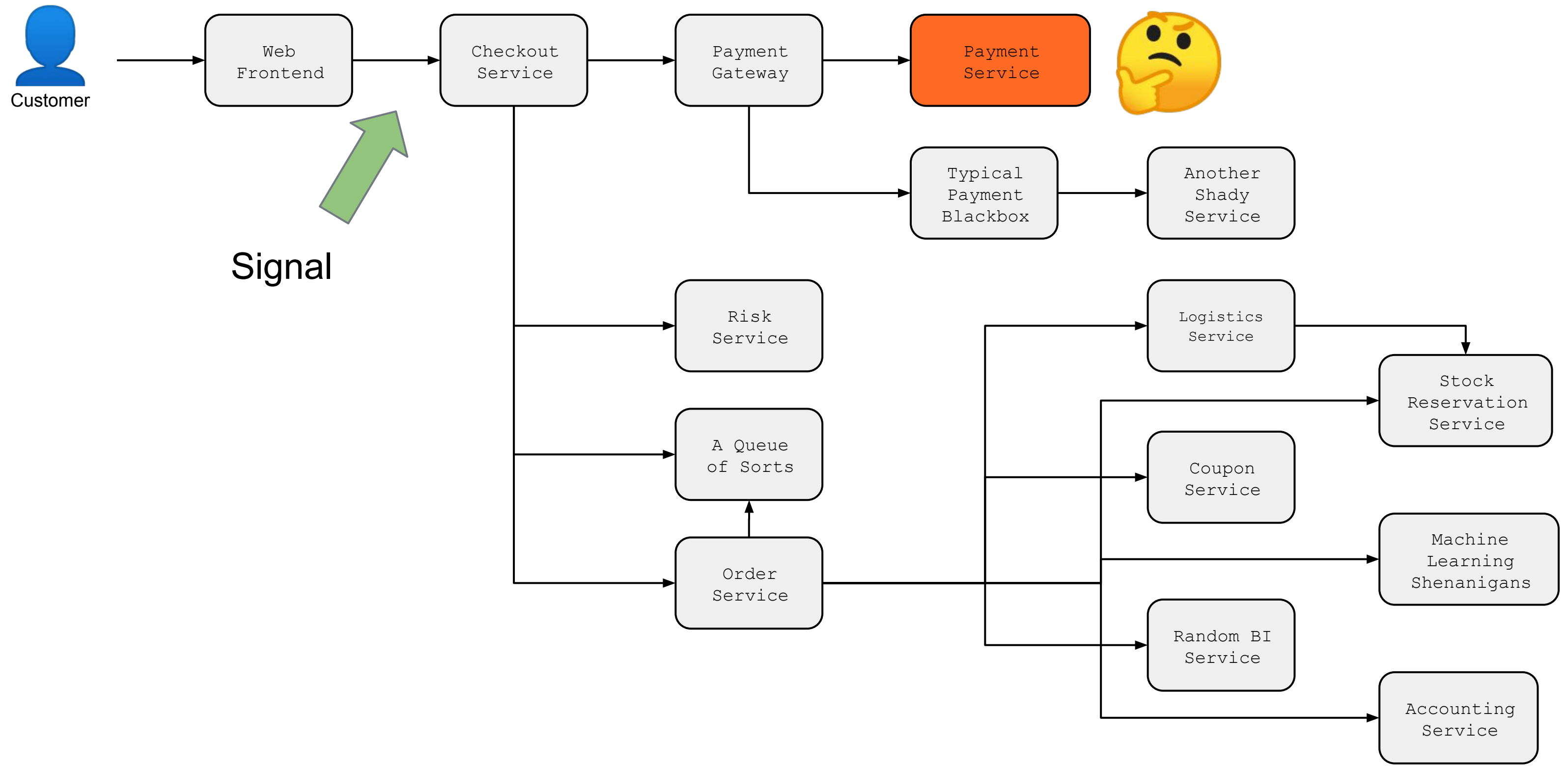
ALERT ON THE SYMPTOM



Single page dispatched to the **team operating the Accounting Service**

ALERT ON THE SYMPTOM - DIFFERENT ISSUE



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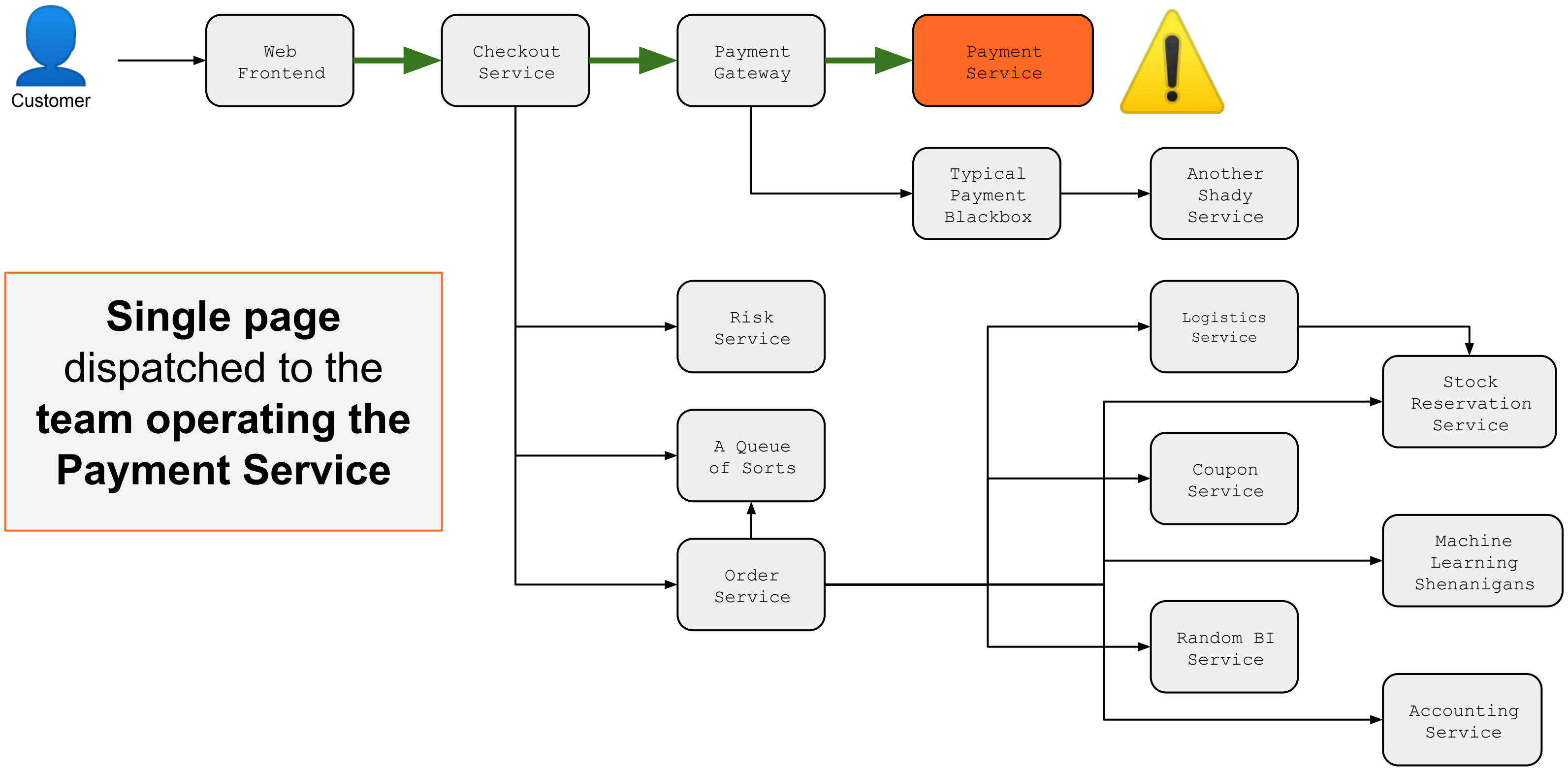
ALERT ON THE SYMPTOM - DIFFERENT ISSUE



Single page dispatched to the **team operating the Payment Service**

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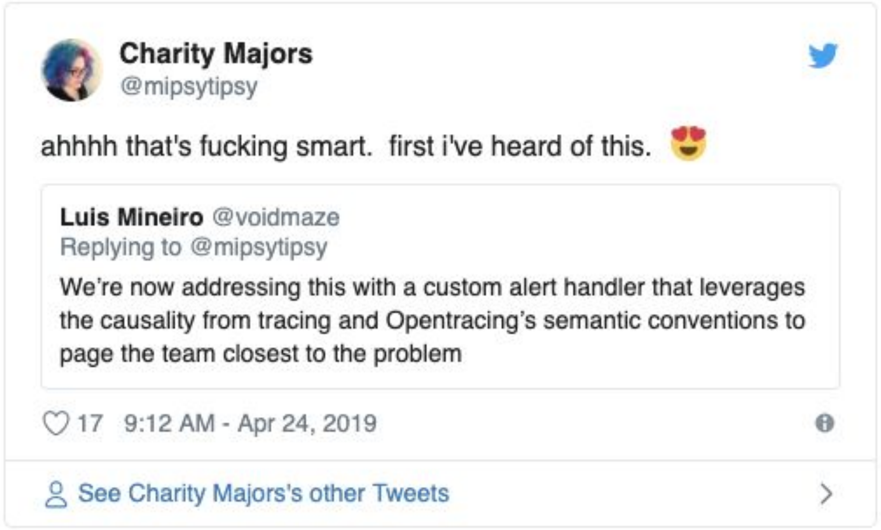
ADAPTIVE PAGING



Charity Majors
@mipsytipsy

ahhhh that's fucking smart. first i've heard of this. 😍

Luis Mineiro @voidmaze
Replying to @mipsytipsy
We're now addressing this with a custom alert handler that leverages the causality from tracing and Opentracing's semantic conventions to page the team closest to the problem

♡ 17   9:12 AM - Apr 24, 2019

See Charity Majors's other Tweets

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CHALLENGES

- Multiple child spans with error=true:
  - Follow each path, attribute the probable cause a score
  - Analyze more exemplars and adjust the scores
  - Worse case scenario, page both probable causes
- Missing instrumentation or circuit breaker open
  - Use the **peer.service** and **span.kind=client** tag to suggest which dependency would be the target
- Mapping services to escalation
  - Owning team may not have their own on-call escalation.

Photo by Patrick Tomasso on Unsplash

QUESTIONS?

Luis Mineiro @voidmaze

We're Hiring!
https://jobs.zalando.com

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