

AWS
re:Invent



INO203

Amazon.com's architecture evolution and AWS strategy

Jason Mortensen
Head WW, Innovation
Learning from Amazon
AWS

Seth Eliot
Principal Reliability Solution Architect
AWS Well-Architected
AWS

The beginning – Obidos

AMAZON'S ORIGINAL MONOLITH SYSTEM



Hosted in multiple
data centers in
Seattle



Large binary = slow
developer productivity

Tightly coupled =
stacked release and
slow cadence



Architecture
slowed the pace
of innovation

Breaking down the monolith

Monolith



1995

Obidos

One binary
One database
All the business logic

Start transition to SOA



2000

Distributed computing manifesto

Break up Obidos

Customer service
Order service
Item service

Start of microservices



2006

Gurupa

Replaced Obidos
Page assembly engine
Hundreds of services → page

Break up mini-monoliths

"Business bottleneck"-
driven rearchitecture
Rearchitect in pieces

Amazon "detail page"

Navigation bar: Hello Select your address, Best Sellers, Customer Service, Today's Deals, New Releases, Find a Gift, Whole Foods, Gift Cards, Free Shipping, Registry, Sell, Coupons, AmazonBasics, #FoundIt, Sign in, Shop College Essentials

Secondary navigation: Amazon Devices, Echo & Alexa, Fire Tablets, Fire TV, Kindle, Home Security, Smart Home, Pre-Owned, Device Deals, Accessories, Device Support, New customer? Start here, Tablets and Devices

All-new
fire HD8
32/64 GB storage | 12-hour battery | 2 GB RAM

prime video, NETFLIX, Disney+, Spotify, zoom, kindle

All-new Fire HD 8 tablet, 8" HD display, 32 GB, designed for portable entertainment, Black

by Amazon
★★★★★ 5,055 ratings | 1000+ answered questions
Amazon's Choice for "8 inch tablet"

Price: **\$89.99** & FREE Shipping. [Details](#)

In Stock.

Arrives: **Monday, Aug 10** [Details](#)

Fastest delivery: **Friday, Aug 7** [Details](#)

Ships from and sold by Amazon.com Services LLC.

Style: **Fire HD 8**

Fire HD 8 | Fire HD 8 Plus | Fire HD 8 Plus + Wireless Charging Dock

Digital Storage Capacity: **32 GB**

32 GB | 64 GB

Offer Type: **With Special Offers**

With Special Offers | Without Special Offers

Color: **Black**

Share

Upgrade and save with Trade-In

Qty: 1

Secure transaction

This is a gift
 Link to my Amazon account to simplify setup. [Why is this important?](#)

Select delivery location

Add Additional Items

- Amazon Standing Case: Charcoal Black \$29.99
- Extended Warranty: 2 year \$16.99
- Themed cases made for Amazon: Mickey No Bad Days \$34.99
- Screen Protector: Clear \$12.99
- Memory Card: 32 GB \$19.99

Amazon "detail page" makes hundreds of service calls

imageBlock (DYNAMIC) ViewModel DebugInfoError x

All-new
fire HD8
32/64 GB storage | 12-hour battery | 2 GB RAM

title (DYNAMIC) ViewModel DebugInfoError x
All-new Fire HD 8 tablet, 8" HD display, 32 GB,
designed for portable entertainment, Black

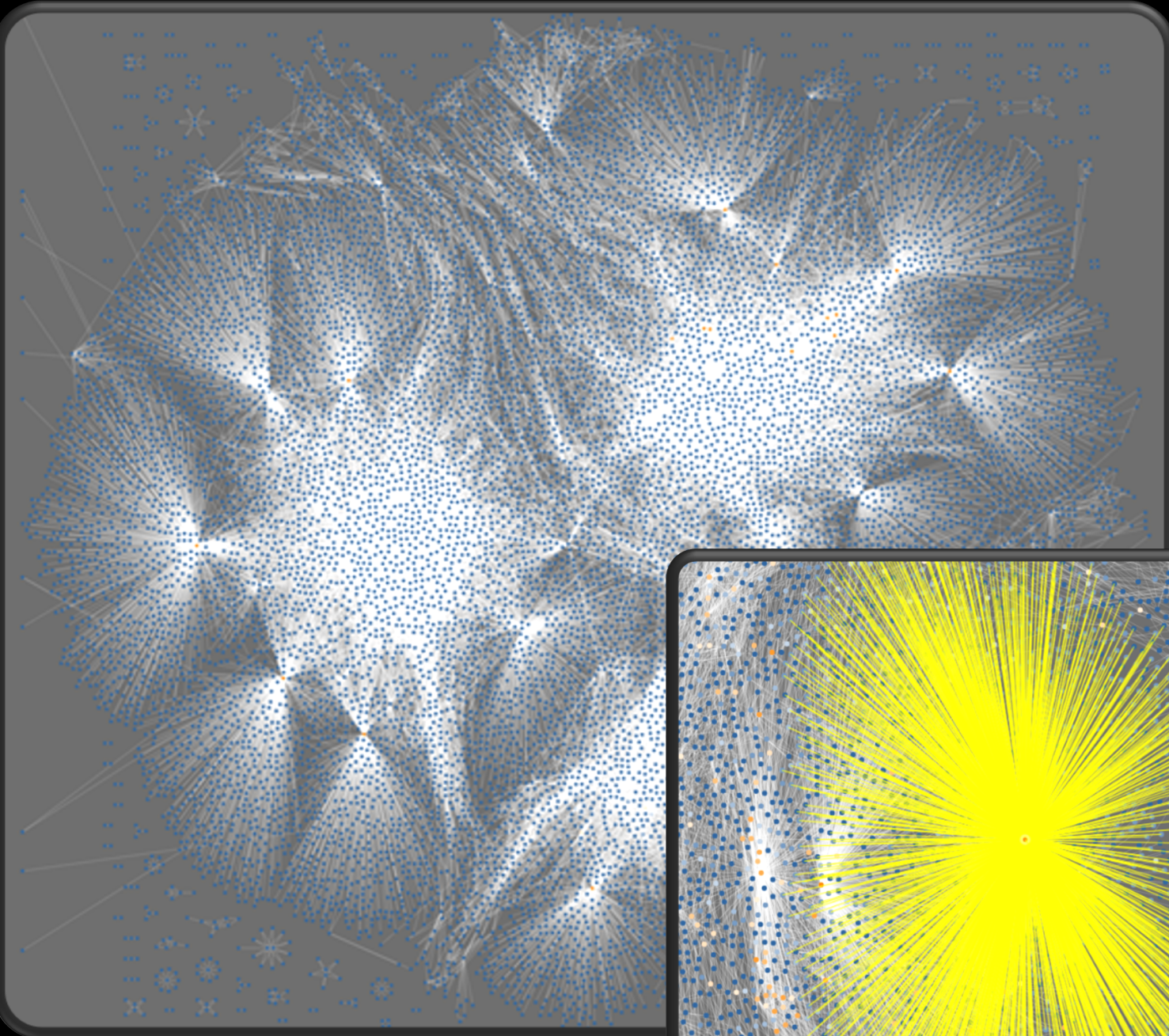
bylineInfo (DYNAMIC) ViewModel DebugInfoError x
by Amazon

averageCustomerReviews (DYNAMIC) ViewModel DebugInfoError x
★★★★☆ 5,052 ratings

ask (DYNAMIC) ViewModel x
| 1000+ answered questions

acBadge (DYNAMIC) ViewModel DebugInfoError x
Amazon's Choice for "8 inch tablet"

Current state – microservices and AWS usage

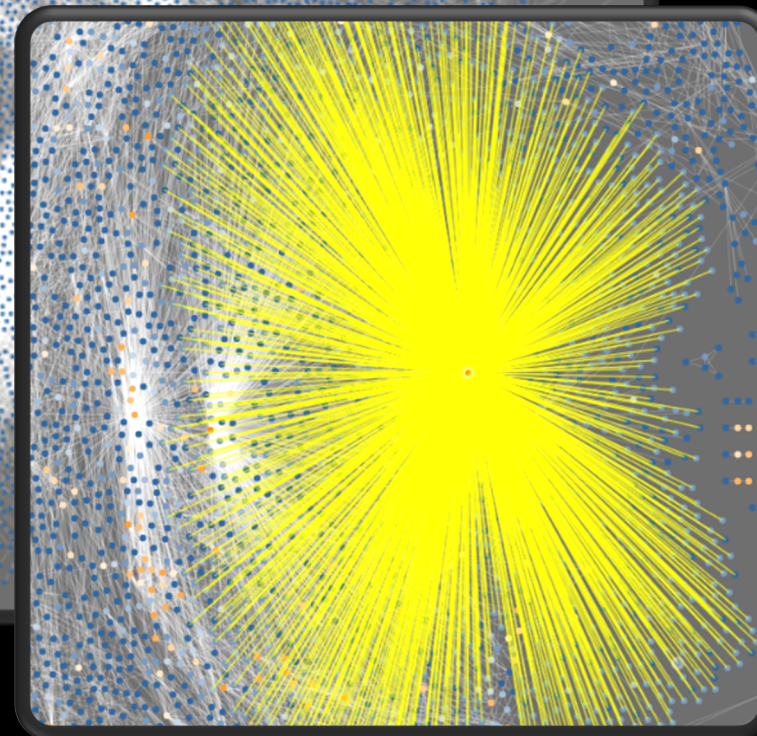


100,000+ microservices

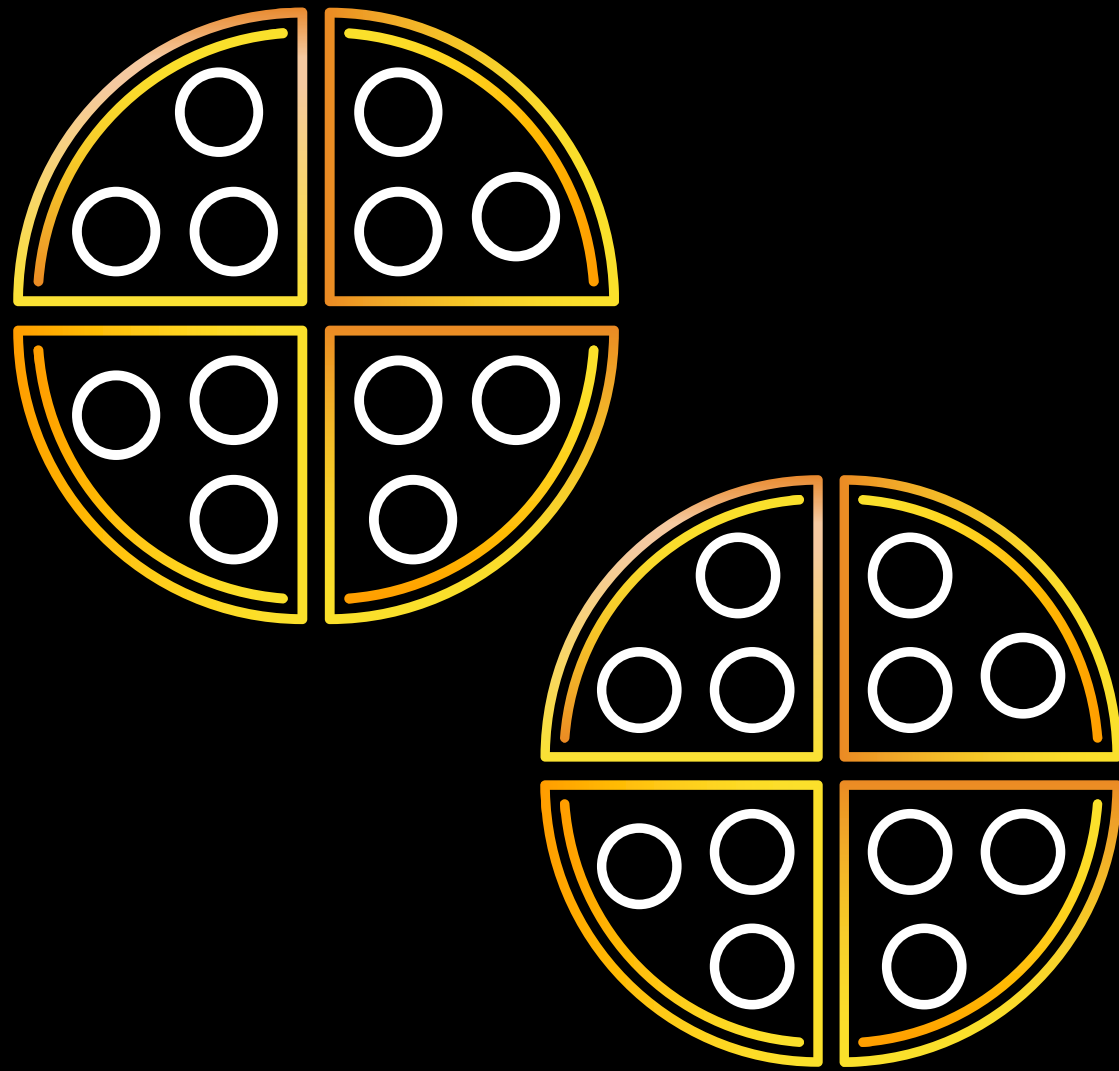
Simplified migration
of components / functions

Decreased size / scale of code base

All AWS services utilized in some form



Two-pizza teams are fast and agile

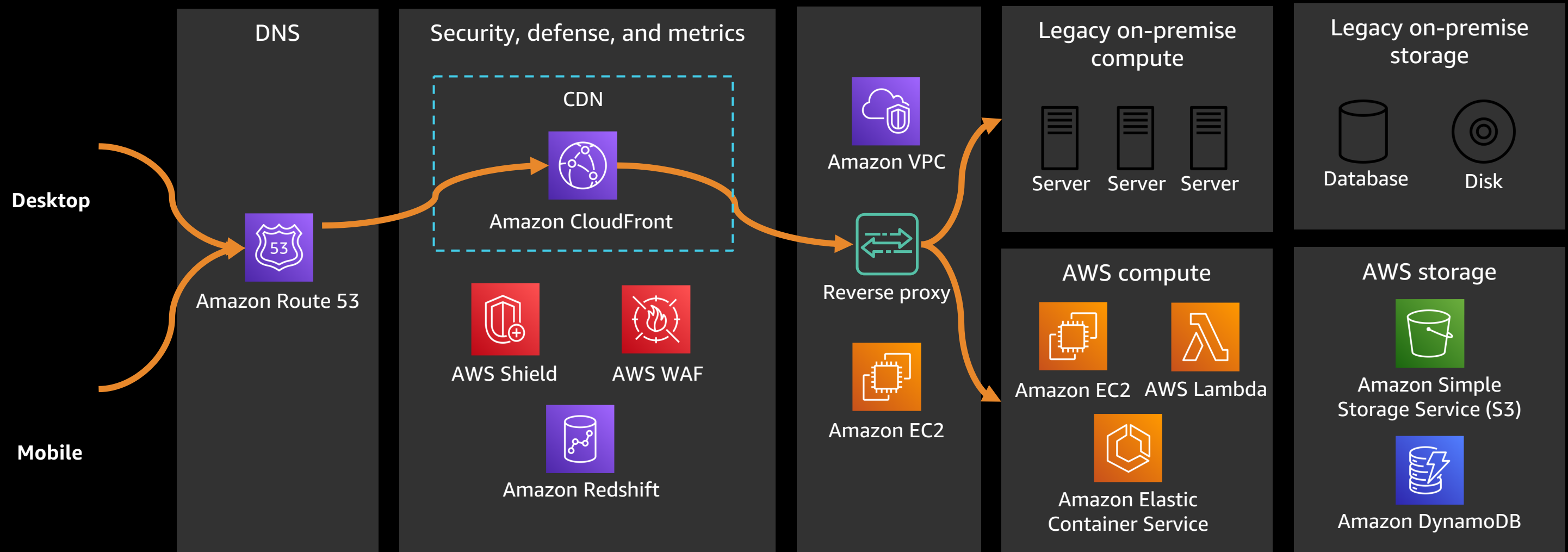


Full ownership and autonomy

You build it, you run it

Choice of programming language
(with standard / supported tools)

Amazon.com hybrid architecture

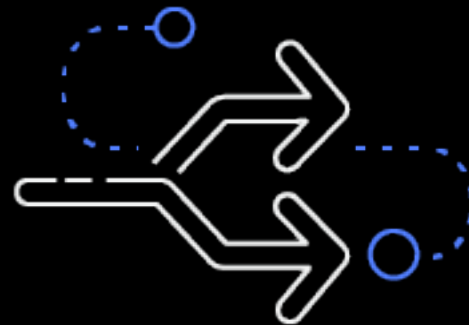


Migration to AWS approach

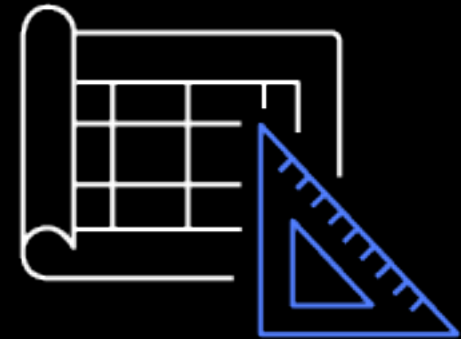
There is no one-size-fits-all approach –
in general, migrations follow three core steps



Secure

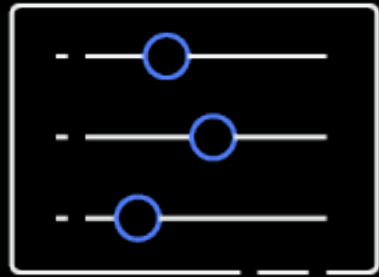


Migrate



**Rearchitecture /
Replatform**

Continuous rearchitecture *is an opportunity*



Speed
of execution



Increase
functionality



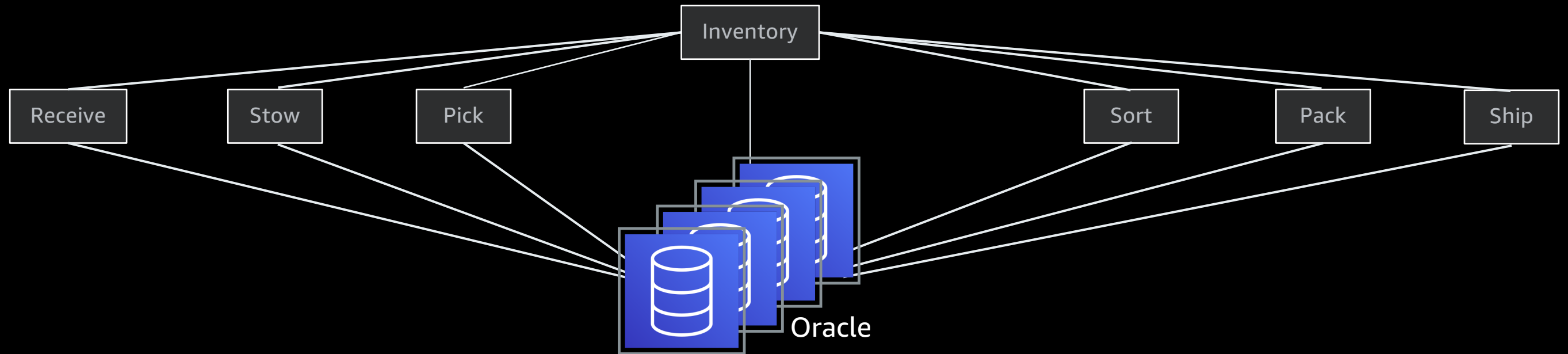
Improve code
base

Amazon fulfillment technologies



Amazon fulfillment technologies

Previous architecture

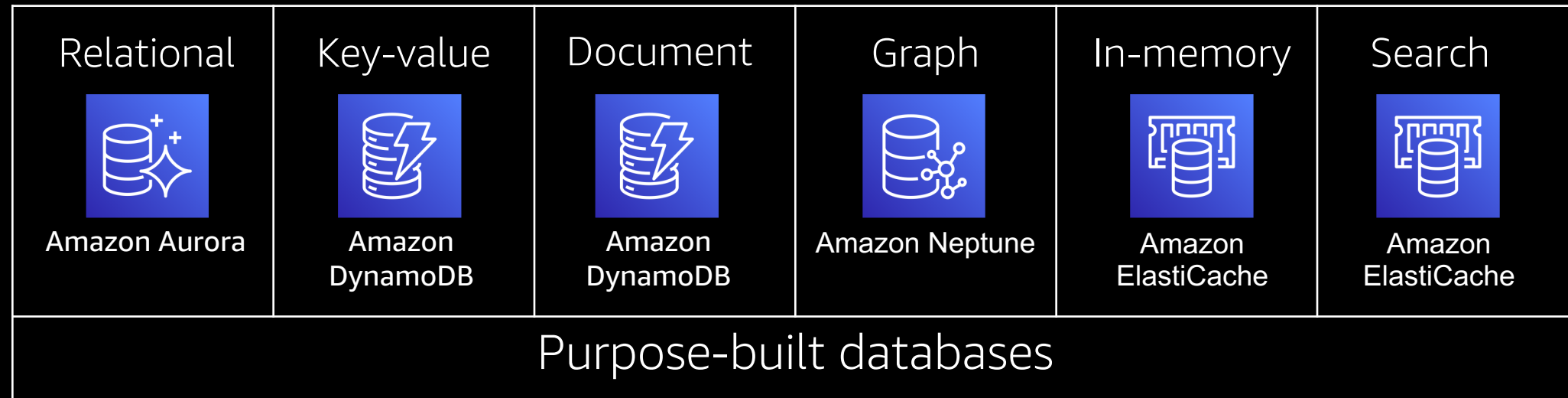


300+ Oracle source databases

Issues with:

- Scaling
- Availability when failures occurred
- Forecasting

Amazon fulfillment technologies



Amazon Aurora
PostgreSQL

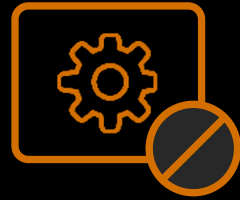


Improved performance and availability

Reduced costs

Eased scalability and reduced overhead

Transition to serverless

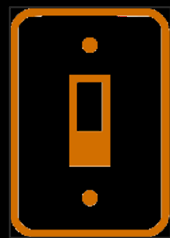


No infrastructure provisioning,
no management



Automatic scaling

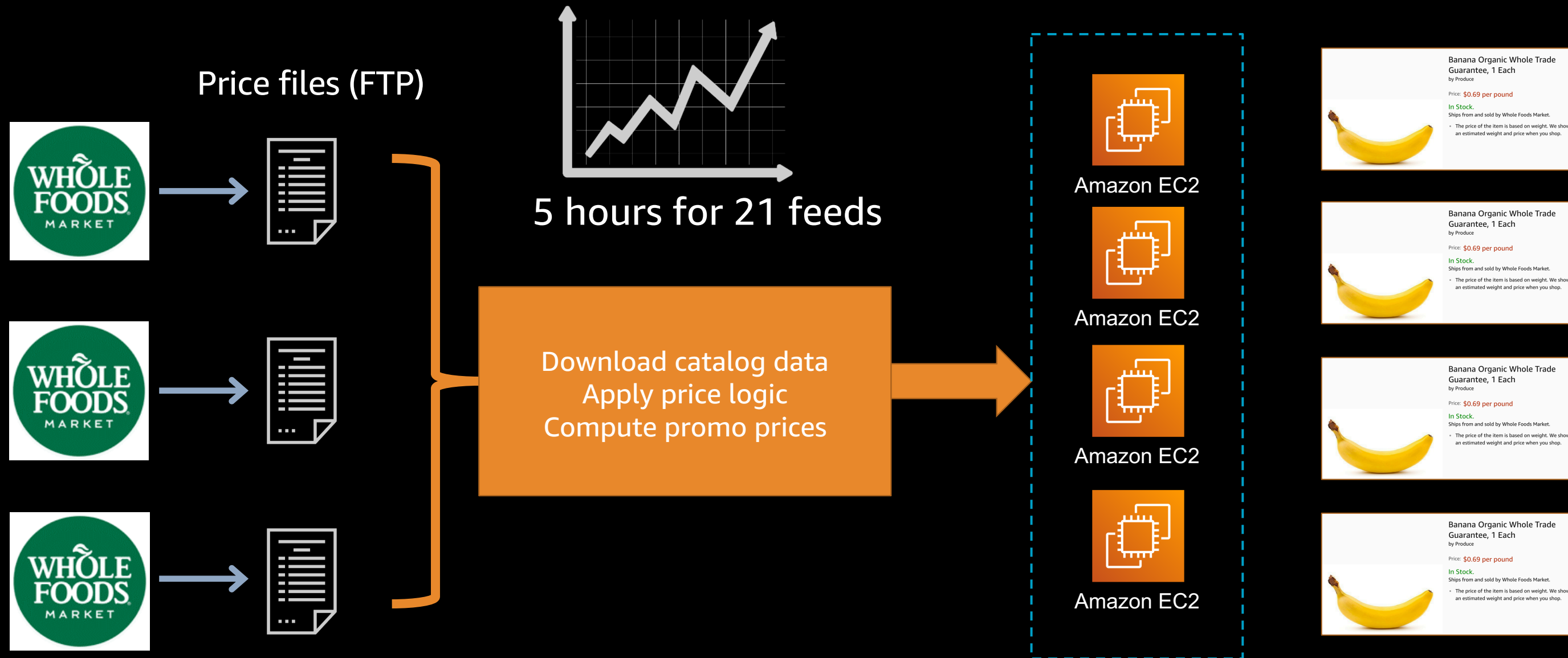
Pay for value



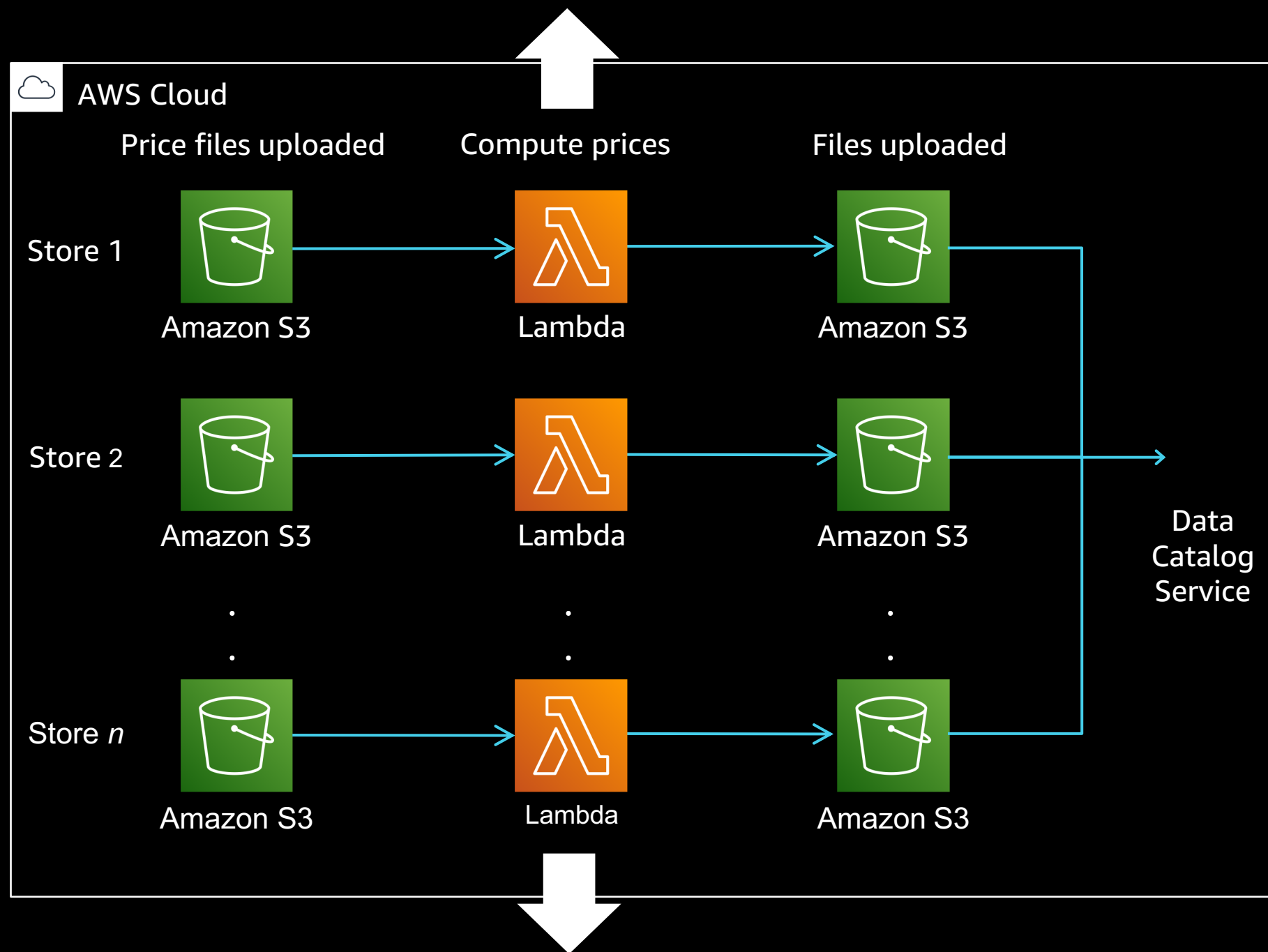
Highly available and secure



Whole Foods/Prime Now price feeds



Scale pricing feeds to 450+ stores



20 seconds per feed

The feeds are computed in parallel

Can use cached catalog data stored in Amazon S3

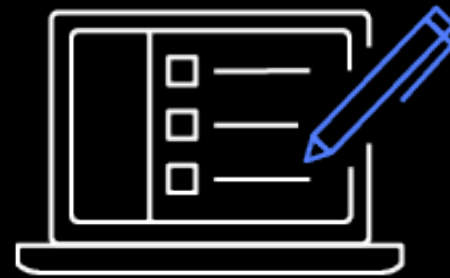
Resilience score

ADOPTING BEST PRACTICES FOR RESILIENCY – AMAZON.COM SERVICES



Testing

- Chaos
- Load



Risk assessment

- Limit retries
- Log file cleanup
- And more



Automated policies

- TLS certificates valid
- Autoscaling
- And more

AWS Well-Architected

ADOPTING BEST PRACTICES FOR RESILIENCY – YOUR WORKLOADS



<https://aws.com/well-architected-tool>

REL 5. How do you design interactions in a distributed system to mitigate or withstand failures? [Info](#)

Distributed systems rely on communications networks to interconnect components (such as servers or services). Your workload must operate reliably despite data loss or latency over these networks. Components of the distributed system must operate in a way that does not negatively impact other components or the workload. These best practices enable workloads to withstand stresses or failures, more quickly recover from them, and mitigate the impact of such impairments. The result is improved mean time to recovery (MTTR).

Question does not apply to this workload [Info](#)

Select from the following

- Implement graceful degradation to transform applicable hard dependencies into soft dependencies [Info](#)
- Throttle requests [Info](#)
- Control and limit retry calls [Info](#)
- Fail fast and limit queues [Info](#)
- Set client timeouts [Info](#)
- Make services stateless where possible [Info](#)

AWS Well-Architected

ADOPTING BEST PRACTICES FOR RESILIENCY – YOUR WORKLOADS



<https://aws.com/well-architected-tool>

REL 12. How do you test reliability? [Info](#)

After you have designed your workload to be resilient to the stresses of production, you must test it to ensure that it will operate as designed, and deliver the resiliency you expect.

Question does not apply to this workload [Info](#)

Select from the following

Use playbooks to investigate failures [Info](#)

Perform post-incident analysis [Info](#)

Test functional requirements [Info](#)

Test scaling and performance requirements [Info](#)

Test resiliency using chaos engineering [Info](#)

Dive deeper into innovation

Dive deeper into innovation by visiting some of our other **Innovation Track sessions** at re:Invent

- INO201 – Amazon's culture of innovation
- INO202 – Innovating with Amazon
- INO203 – Amazon.com's architecture evolution and AWS strategy
- INO204 – Solving societal challenges with digital innovation on AWS
- INO205 – Amazon.com's use of AI/ML to enhance the customer experience
- INO206 – Working backwards: Amazon's approach to innovation
- INO207 – Two-pizza teams: Building innovative teams that scale

To further explore Amazon's approach to innovation, please contact your AWS Account Team.

Thank you!

Jason Mortensen

Head WW, Innovation
Learning from Amazon
AWS

www.linkedin.com/in/jason-mortensen

Seth Eliot

Principal Reliability Solution Architect
AWS Well-Architected
AWS

www.linkedin.com/in/setheliot/

Twitter - @setheliot



Please complete
the session survey