

AWS re:Invent

2016

WERNER VOGELS
CTO, AMAZON.COM



AWS
re:Invent

Welcome to re:Invent 2016

KEYNOTE

amazon
webservices

Transformations



AWS Is Transforming The IT Industry



To Be The Earth's Most Customer
Centric IT Company...



We...

0. Protect customers at all times
1. Listen closely to customers and act
2. Give customers choice
3. Work backwards from the customer
4. Help customers transform



Transformations

JEFF LAWSON
CO-FOUNDER, CEO AND CHAIRMAN, TWILIO



Hi, I'm Jeff
and I'm a software **person**.

Jeff Lawson

CO-FOUNDER, CEO AND CHAIRMAN, TWILIO

AWS
re:Invent

Software Is A Mindset, Not A Skill Set



Software agility
enables competitive differentiation.

&

Communications makes great
customer experiences.

Fuel the future of communications.



Cloud Communications Platform



PROGRAMMABLE VOICE



PROGRAMMABLE MESSAGING



PROGRAMMABLE VIDEO



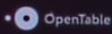
PROGRAMMABLE WIRELESS



AUTHENTICATION



You Use Twilio



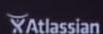
OpenTable



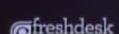
NORDSTROM



UBER



Atlassian



freshdesk



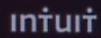
tripadvisor



edmunds.com



Affirm



Intuit



Salesforce



Lyft



box



ING



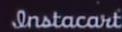
Expedia



StyleSeat



DocuSign



Instacart



Zendesk



SendGrid



DataLotto



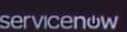
HubSpot



Airbnb



Crisis Text Line



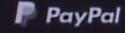
ServiceNow



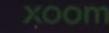
stripe



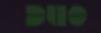
Postmates



PayPal



Xoom



Duo



Polaris



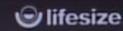
American Red Cross



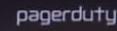
DriveNow



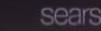
venmo



lifesize



pagerduty



Sears



ViX



ClearSlide



RealPage



Handy

2010

Volume of communications powered by Twilio

Source: Number of Twilio calls and messages as of May 15, 2015

2016

Volume of communications powered by Twilio

2013

Source: Number of Twilio calls and messages as of May 15, 2015

Cloud Scale Communications

8,000 100 Million

"Agents"

Interactions Annually

Cloud Scale Communications

500,000 4 Billion

"Agents"

Interactions Annually

Agility With Resiliency

7,928

Production Deployments in the Last Year

99.999%

Availability in the Last Year

By DEVELOPERS for
DEVELOPERS

1,000,000
DEVELOPERS

100 BILLION

Annual API Requests

Over
1 BILLION
Global Devices

Power Of The Platforms



+



Elastic Compute
Kinesis
Elastic Load Balancers
28 Availability Zones
Lambda Redshift
DynamoDB
Direct Connect

Power Of The Platforms



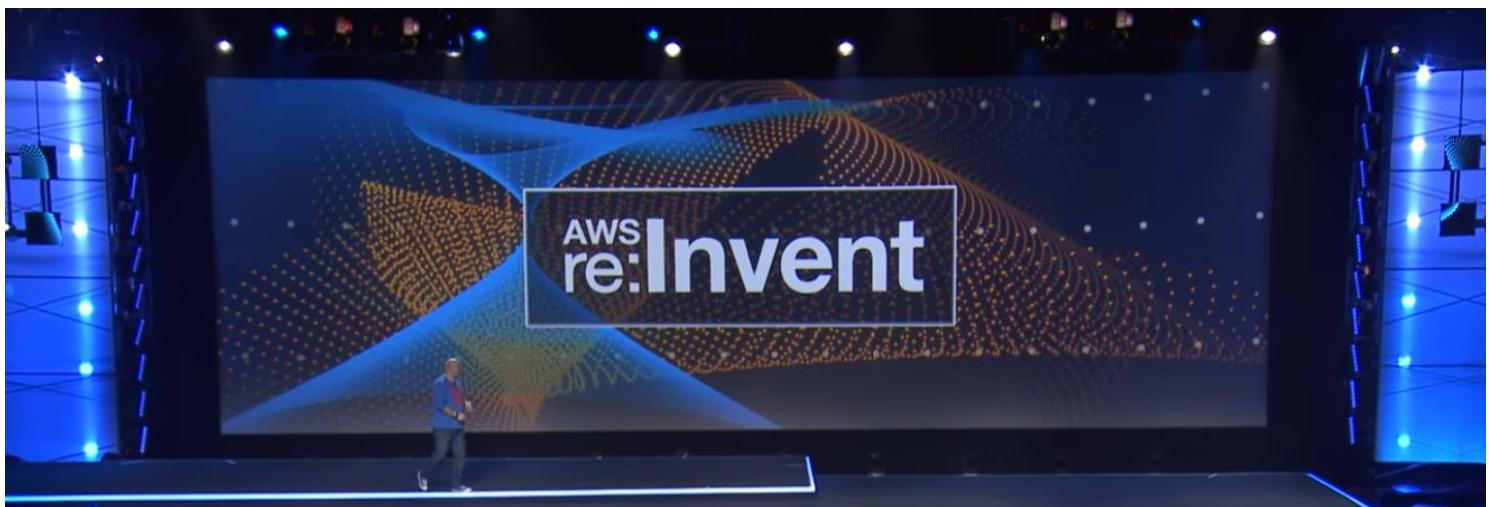
+



Twilio
Super Network



You don't get points for using servers,
you only get points for **serving users.**



Transformations

AWS Gives You The
Superpowers To Transform



Here Is Where We Can Help You Be A Transformer

1. Development

2. Data

3. Compute



Transformations

Development, Testing & Operations

Development Is Changing



Reduce risk



Smaller, targeted applications



Deliver faster



Reactive to customer needs



More experimental



Development And Testing Is Where Agility Lives



Unconstrained
access to resources



Testing with
higher fidelity



Faster to
market



Major productivity
improvements



Significant cost
improvements

What Are The Best Practices Of Transformational Development?



THE TWELVE-FACTOR APP



Well-Architected Framework



Security



Reliability



Performance
efficiency



Cost
optimization



Operational
excellence

Introducing

The Well-Architected Framework Course

With Broader And Deeper Content



Transforming Operational Excellence



Automation



 NEW

Prepare

Amazon EC2 Systems Manager

Collection of AWS tools for package installation, patching, resource configuration, and task automation

Generally Available Today



Operate

Advantages Of Continuous Delivery

- 
Smaller changes, less risk and cost
- 
Automated execution, increased reliability and scalability
- 
Less features, more reliable updates
- 
Fewer lines of code, improved security



Operate

Support CI/CD



Operate

NEW

AWS CodeBuild

Build service for compiling source code and running unit tests

Generally Available Today

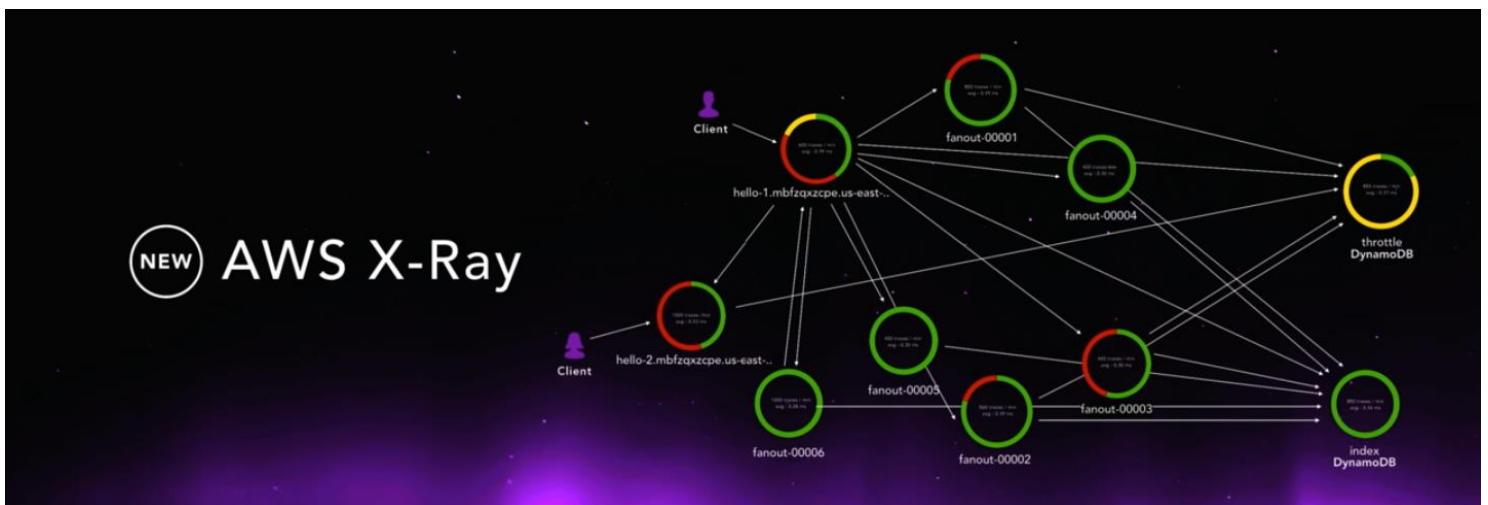
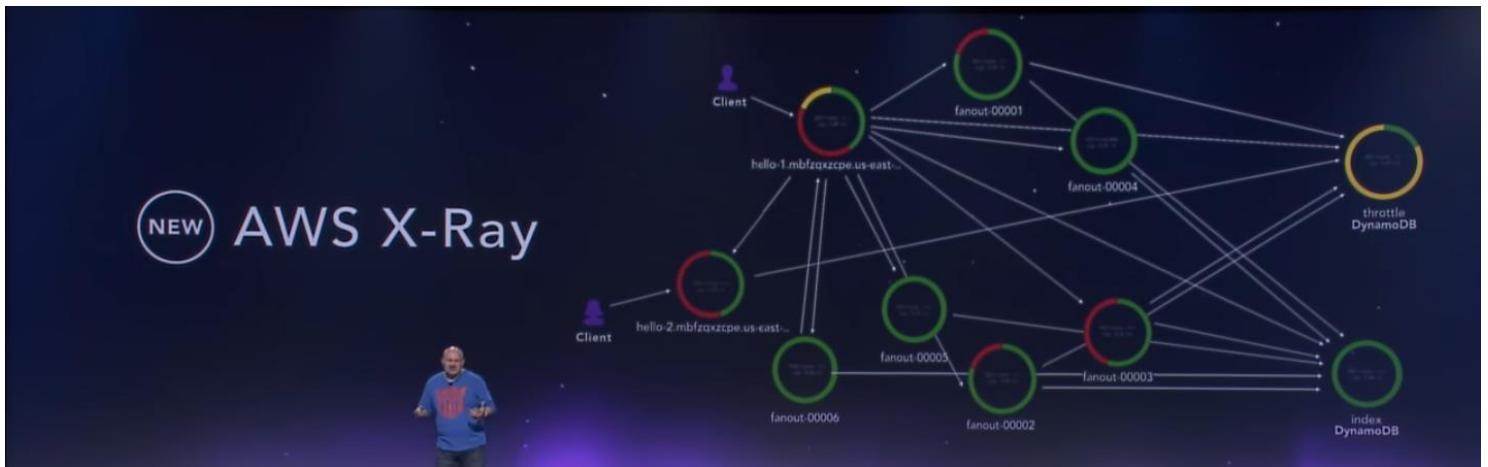




Operate

Deeper Insight Into Application & Service Execution





A screenshot of the AWS X-Ray web interface. On the right, there is a "Trace List" table showing individual trace details. On the left, there is a "Metrics" table showing service-level performance metrics. The interface includes various filters and sorting options.

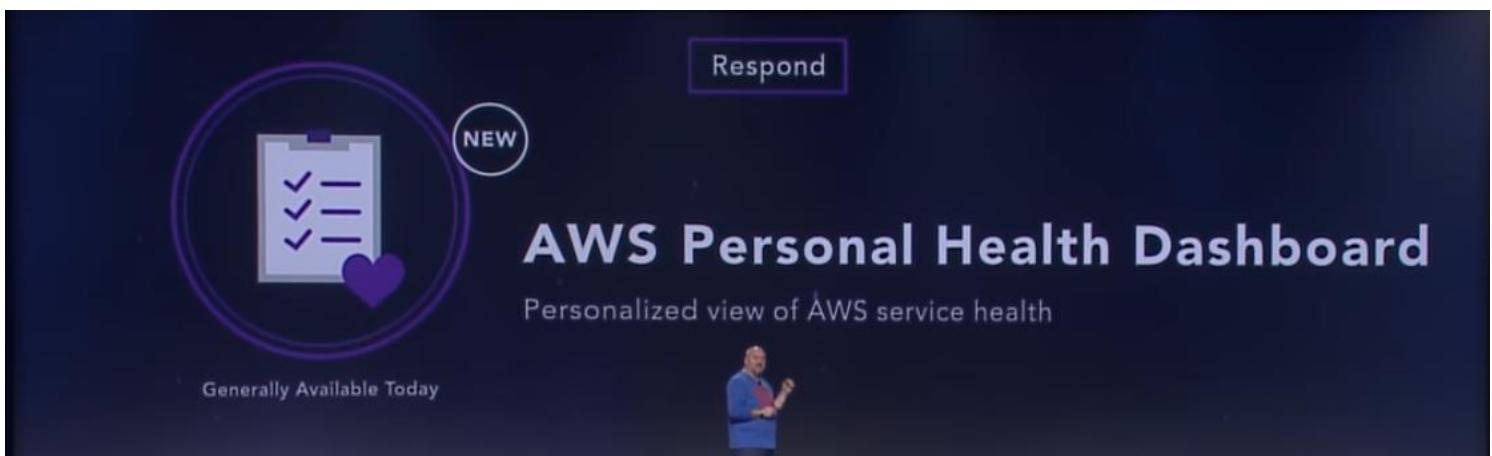
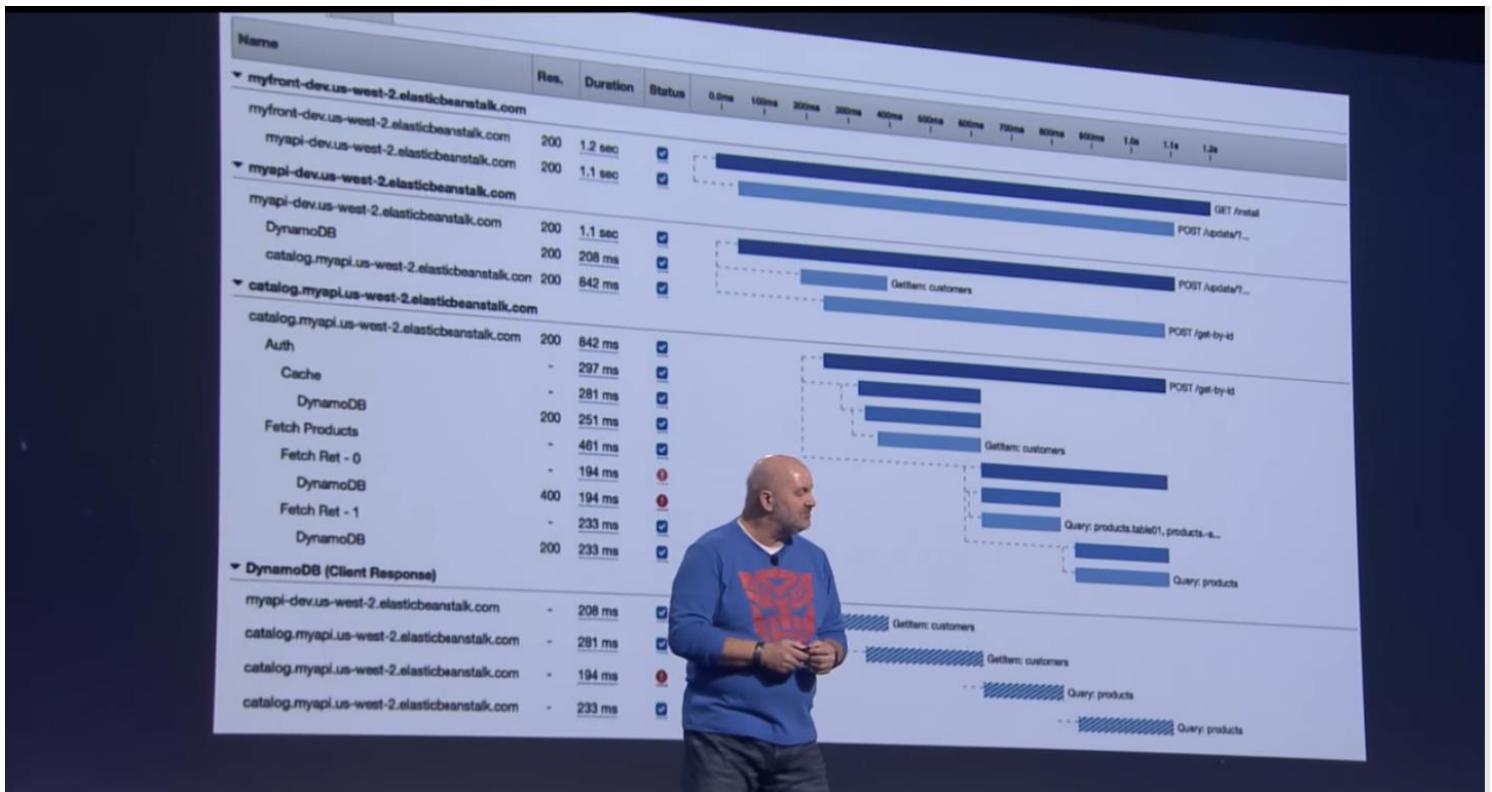
| Group By | URI | Avg latency | % of traces | Status |
|----------|-----------|-------------|-------------|---------------------------------------|
| URI | /hello | 1.0ms | 2% | OK |
| URI | /fanout | 1.0ms | 10% | OK |
| URI | /throttle | 1.0ms | 20% | OK |
| URI | /index | 1.0ms | 30% | OK |
| URI | /latency | 0.0ms | 50% | OK |

| Trace ID | Age | URI | Latency | Response | Annotations | Services |
|----------|---------|-------|---------|----------|----------------------|--------------------------|
| _274114d | 1.5 min | /read | 0.00ms | 200 | 2.08121, Endpoint... | 2 (readback, ordinal...) |
| _274114d | 1.3 min | /read | 0.00ms | 200 | 2.08121, Endpoint... | 2 (readback, ordinal...) |
| _274114d | 2 min | /read | 0.00ms | 200 | 2.08121, Endpoint... | 2 (readback, ordinal...) |
| _274114d | 2 min | /read | 0.00ms | 200 | 2.08121, Endpoint... | 2 (readback, ordinal...) |
| _274114d | 3 min | /read | 0.00ms | 200 | 2.08121, Endpoint... | 2 (readback, ordinal...) |
| _274114d | 3 min | /read | 0.00ms | 200 | 2.08121, Endpoint... | 2 (readback, ordinal...) |
| _274114d | 3 min | /read | 0.00ms | 200 | 2.08121, Endpoint... | 2 (readback, ordinal...) |
| _274114d | 4 min | /read | 0.00ms | 200 | 2.08121, Endpoint... | 2 (readback, ordinal...) |

NEW AWS X-Ray

NEW AWS X-Ray

NEW AWS X-Ray



Respond

Protecting Your Customers And Your Business Is Priority #1

Security By Design



CloudHSM



CloudTrail



IAM



Config



KMS



Applications



CI/CD Pipeline

Web Application Firewall

Inspector

Automation Is Key To Protect Your:



Respond

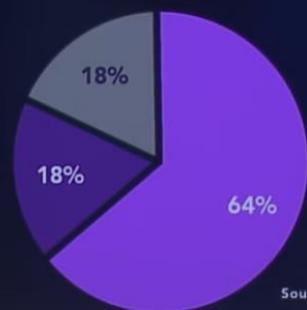
Types Of DDoS Attacks



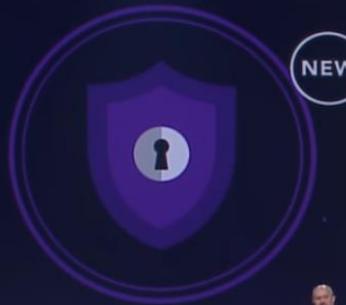
Respond

DDoS Attack Trends

- Volumetric
- State Exhaustion
- Application Layer



Source: Arbor Networks



Respond

AWS Shield For Everyone

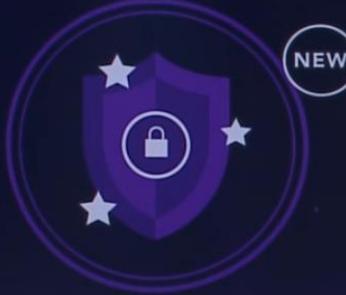
Web applications running on AWS are already protected by Shield Standard - no action is required

Protection from volumetric and state exhaustion attacks

Generally Available Today

NEW

A man in a blue shirt is standing on the right side of the slide.



Respond

AWS Shield Advanced

For additional protection against very large and sophisticated attacks

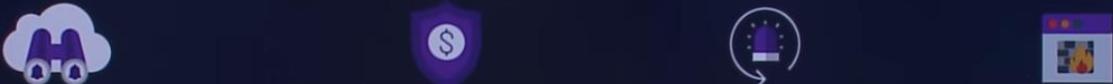
Generally Available Today

NEW

A man in a blue shirt is standing on the right side of the slide.

Respond

AWS Shield Advanced



Advanced notifications via CloudWatch

Cost protection on ELB, CloudFront, Route 53

24/7 DDoS response team and support

WAF included at no additional cost

A man in a blue shirt is standing in the center of the slide.

Transforming Operational Excellence

We are helping our customers build modern applications that are:

- 1 Secure
- 2 Reliable
- 3 Predictable Performance
- 4 Well Operated
- 5 Good Cost Control

A man in a blue shirt is standing on the right side of the slide.

Transformations



Chris Turvil

HEAD OF CLOUD AND PLATFORM AGILITY, TRAINLINE

AWS re:Invent

Rail In Europe Is Huge

US

17M passenger miles

vs

Europe

265M passenger miles

Trainline: Europe's #1 Independent Rail Ticket Retailer

24

Countries

100k

Journeys/day

\$3 Billion

Annual ticket sales

Business Reality

Massive Growth

Speed To Market



Tech Reality

Physical Data Centers

30-50% Dev Time Wasted

Why AWS?

Amazon Innovation



Considerations For AWS Migration



Security

PCI Level 1
compliance



Performance

300ms latency =
\$10 million revenue



Cost

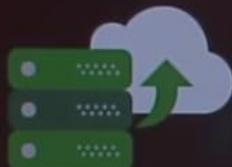
\$1.5 million potential
annual savings



Legacy

Monolithic
Nasty old technology

Our Migration Plan



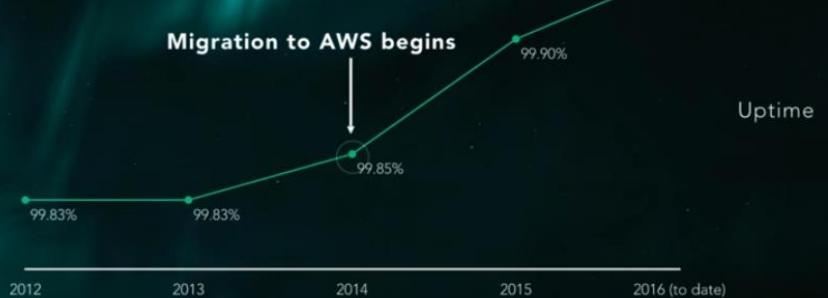
- Wave 1: Training & Amazon Professional Services
- Wave 2: Infrastructure as code
- Wave 3: Standalone services
- Wave 4: Latency tolerant services
- Wave 5: Database big bang + services mop up

Oracle on AWS is
10% faster than Exadata on
premises ... and much less costly

800x More agile 150 Releases per week

60%

More reliable

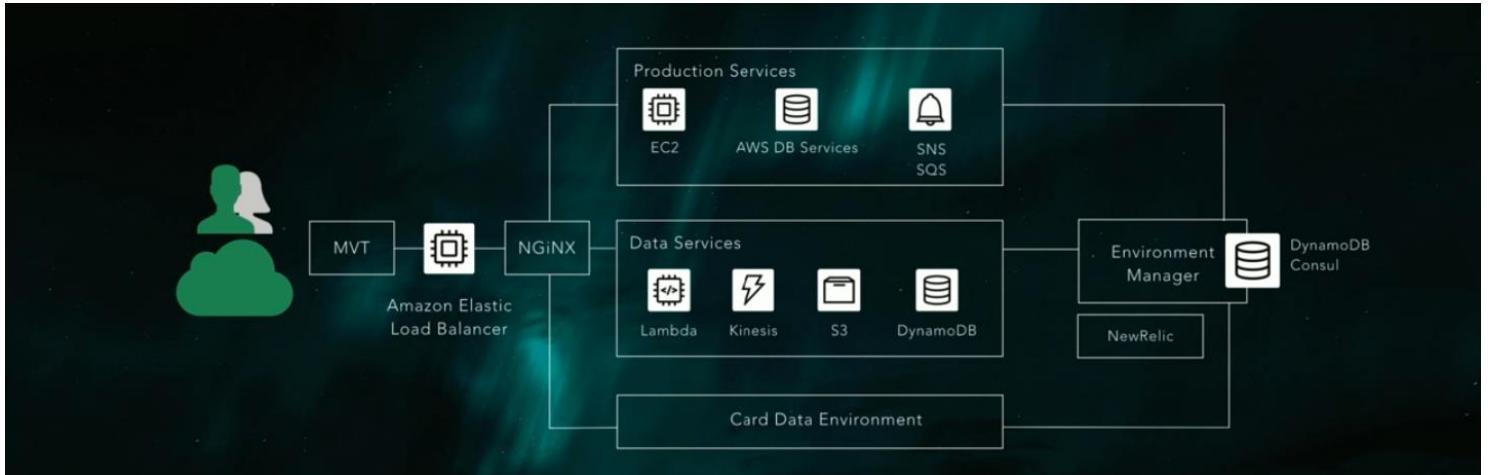
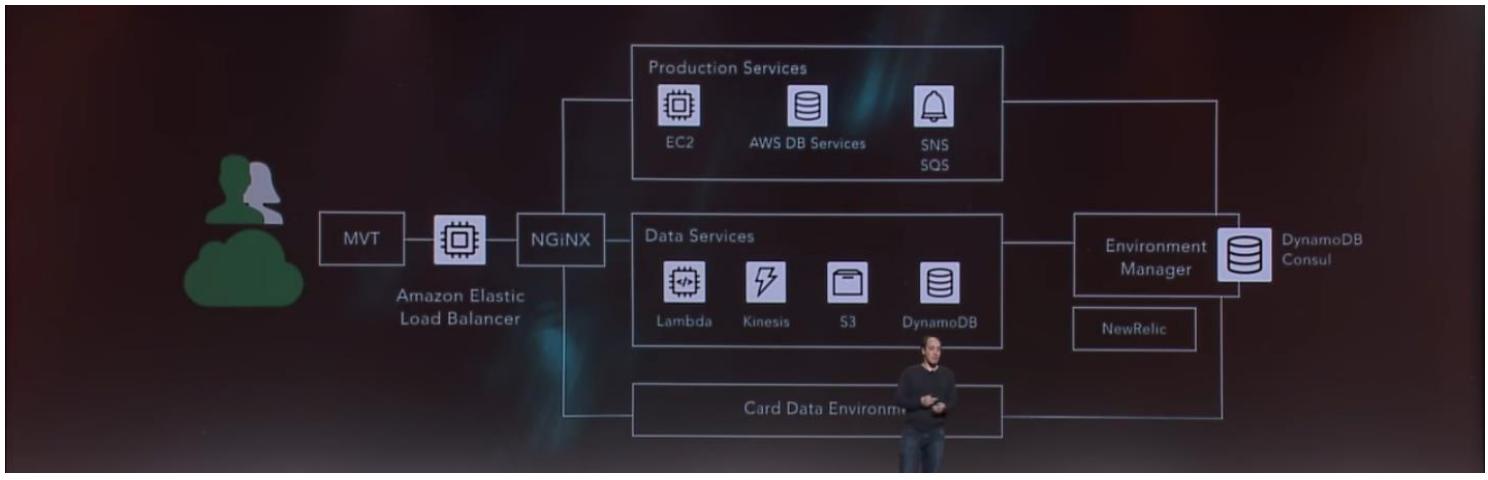


Environment
Manager

Enables continuous
delivery
Un-opinionated
Open Source

"Deploy
version 2
of ApplePayService
into Production
using Blue/Green"

<https://trainline.github.io/environment-manager/>



A screenshot of a mobile application interface titled "Journey tracker". The screen shows a train journey from "London Paddington" to "Reading Station". The top card displays the departure time "13:36", arrival time "14:00", and platform information. Below this, a message asks if the carriage has empty seats. At the bottom are "Yes", "No", and "Dismiss" buttons. To the right of the app, there is promotional text for "BusyBot" and "Waze for Trains". A legend identifies the icons: a server tower for API Gateway, a microchip for Lambda, and a database for DynamoDB. A person stands in front of the app screen.

All-in On AWS

18 Months Later...

- 250 micro-services
- 70% reduction in environment drag
- 150+ production releases per week
- 60% less downtime
- \$1.5M annual savings

A person stands in front of the summary text.

Transformations

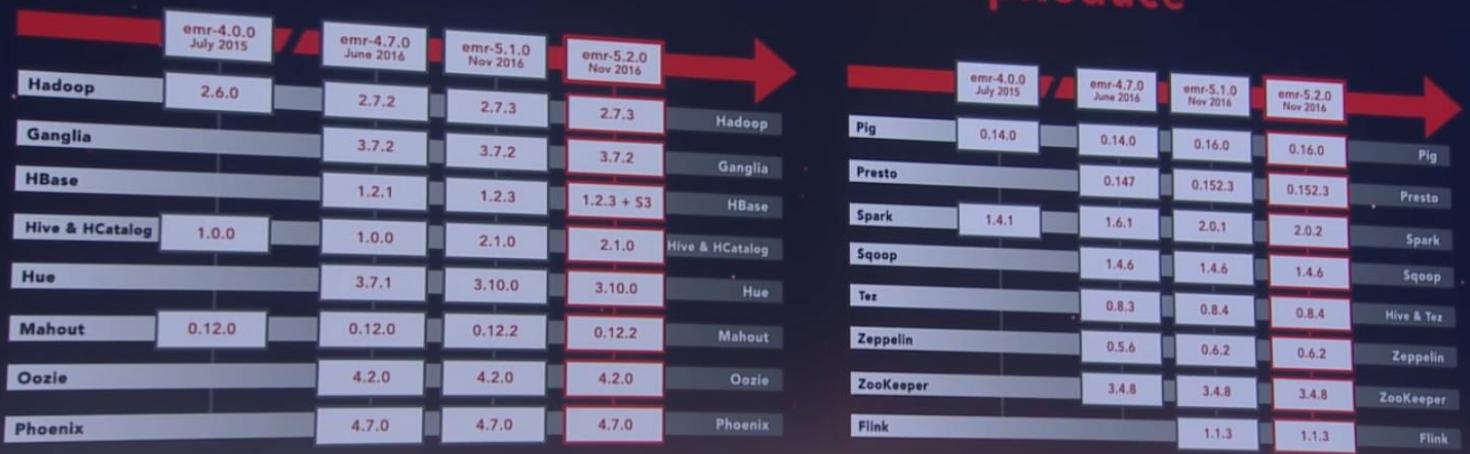
Data

Data As Competitive Differentiator

Broadest Set Of Analytics Capabilities



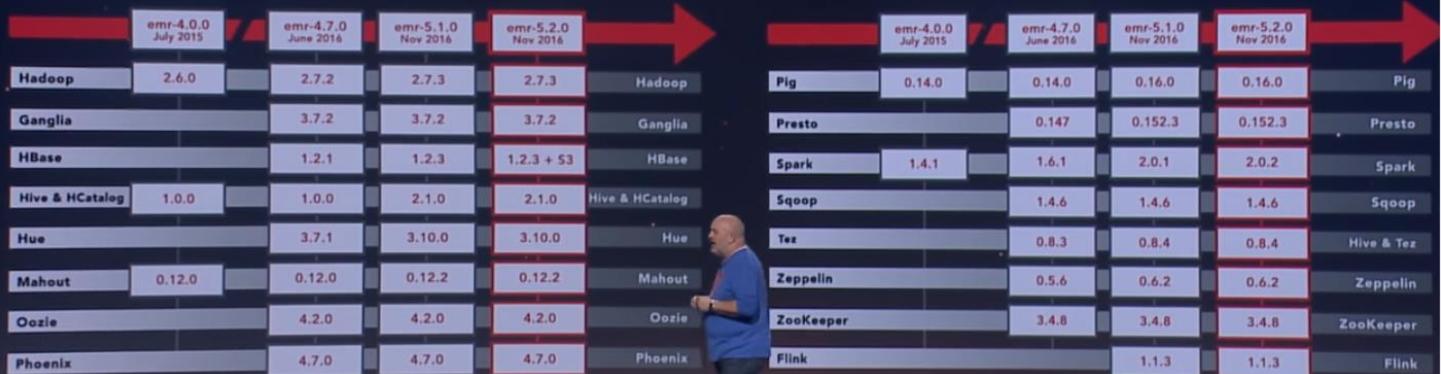
Data Processing Amazon Elastic MapReduce



Data Processing



Amazon Elastic MapReduce



Data Querying

NEW



Amazon Athena

Interactive query service that makes it easy to analyze data in Amazon S3 using standard SQL



Data Warehousing

Amazon Redshift

UTF-8 character support

Updated ODBC/JDBC drivers

Oracle DW, Teradata, Netezza, Greenplum schema conversion

Automatic compression

Estimate storage space savings with compression

Connection limits for users and databases

Timezone in time stamp support

Enhanced VPC routing

2x throughput performance

10x faster UNION ALL and VACUUM queries

AWS Database Migration Service support

IAM roles support with COPY and UNLOAD commands

Table level restore

Append rows to target table

Export query results to BZIP2-compressed files

Automatic queue hopping



Business Intelligence

Amazon QuickSight

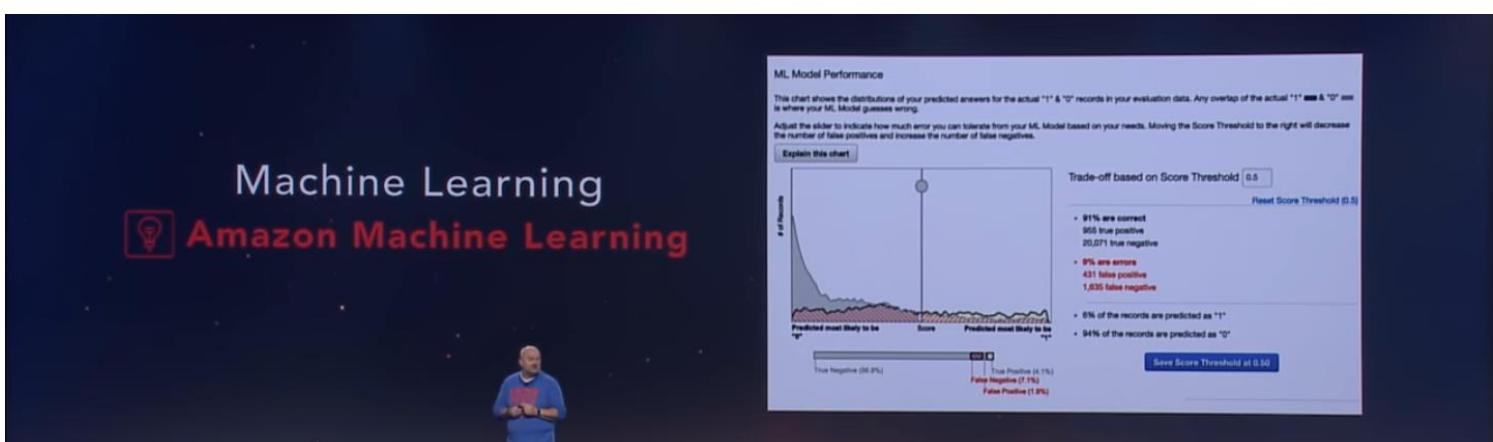
The screenshot shows the Amazon QuickSight interface. On the left, there's a sidebar with 'Fields list' containing fields like Channel, Customer ID, Customer Name, etc., and 'Visual types' with icons for different chart types. The main area is titled 'Business Review' and contains four visual components: a line chart 'Revenues vs Goals' comparing Billed Amount and Revenue Goal from 2012 to 2014; a bar chart 'Revenues by Customer Segment' showing data for Enterprise, SMB, and Startup; a table 'YTD Revenues by Service Line and Segment' with data for Billing, HR, and Marketing; and a stacked bar chart 'Revenues by Region' showing data for APAC, EMEA, and US.

The screenshot shows the Amazon QuickSight interface, similar to the one above but with a different set of visualizations. The 'Business Review' dashboard includes a line chart 'Revenues vs Goals', a bar chart 'Revenues by Customer Segment', a table 'YTD Revenues by Service Line and Segment', and a stacked bar chart 'Revenues by Region'.

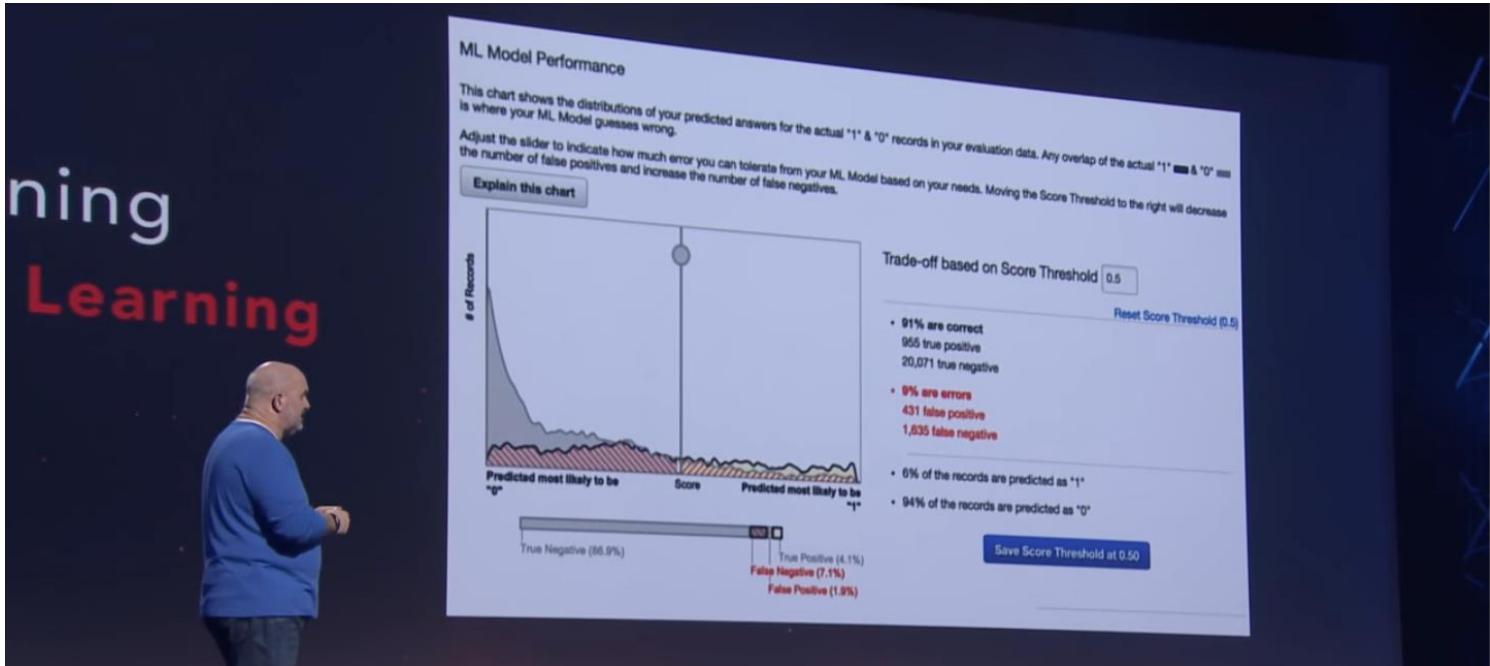
Search & Analytics

Amazon Elasticsearch Service

The screenshot shows the Amazon Elasticsearch Service interface. It features a complex dashboard with multiple charts and maps. At the top, there's a search bar and navigation links. Below it, there are several data visualizations including a line graph showing trends over time, a world map with color-coded regions, and various pie and bar charts. The interface is designed for monitoring and analyzing large-scale search data.



ning Learning



Targeting

NEW

Amazon Pinpoint

Targeted push notifications for mobile apps

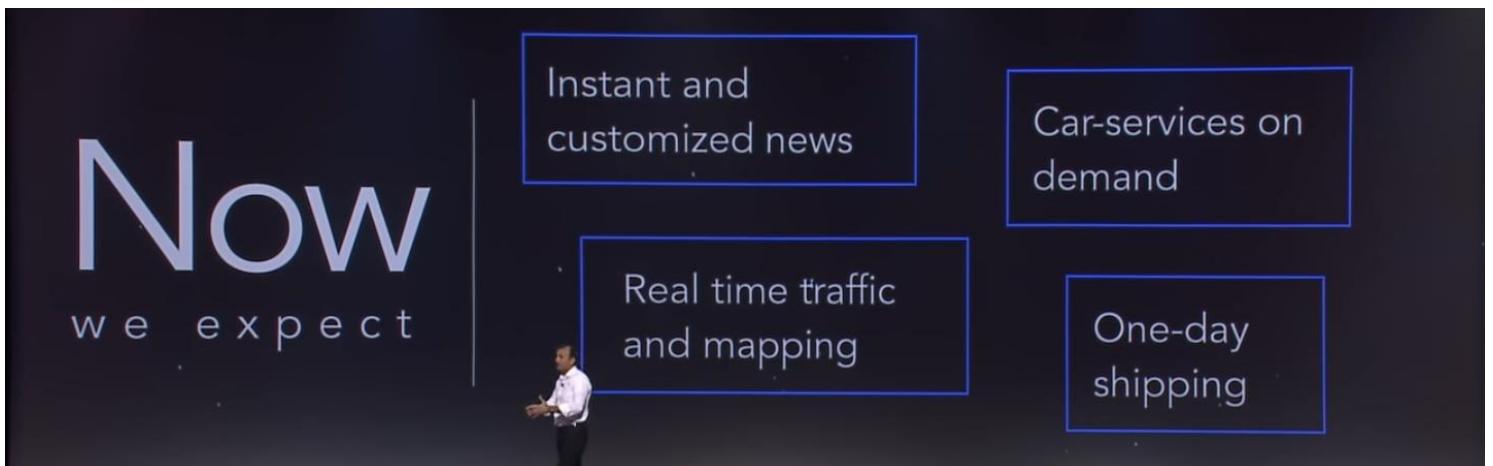
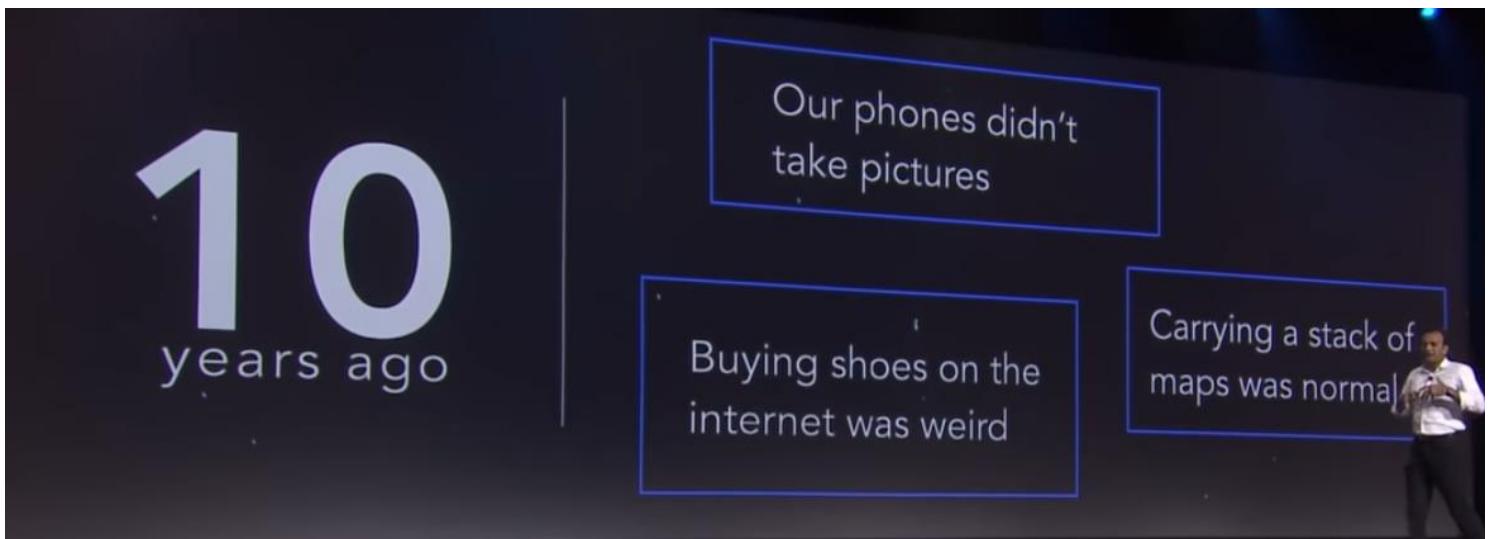
Generally Available Today

A man in a blue shirt is speaking on stage.





We live in a truly remarkable time.



Our mission:

To responsibly unleash the power of data for
the benefit of all Americans.



11.4 million people move
through America's 3,100 local
jails every year.



95% won't go to prison.

They stay an average of **23 days**.



*Where is the tech
revolution for them?*



Cancer.

*The answer isn't in a database.
It's fragmented across
thousands of databases.*



Technology has to work for us
not against us

3

core
principles

People >> Data

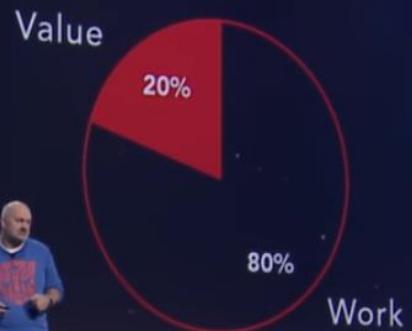
Data is a force multiplier.

The time to engage is now.

Transformations

80%

Of What We Consider
Analytics Is Not Analytics



80% Of What We Consider Analytics Is Not Analytics



The **Modern** Data Architecture

The Modern Data Architecture Is Agile



Users



Sources



Models



Applications



Queries



Processing



What Does The Modern Data Architecture Look Like?



Automated And Reliable
Data Ingestion

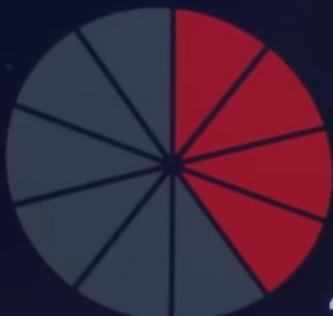


Preservation Of Original
Source Data





3 Lifecycle Management And Cold Storage



4

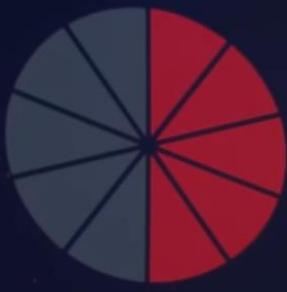
Metadata Capture



5

Managing Governance, Security, Privacy





Managing Governance, Security, Privacy

5

Data classification:

| | | | | |
|----------|------------|---------------------|--------------|--------|
| Critical | Restricted | Highly Confidential | Confidential | Public |
|----------|------------|---------------------|--------------|--------|



6

Self-Service Discovery, Search, Access



7

Managing Data Quality



8

Preparing For Analytics



9



Orchestration And Job Scheduling



10



Capturing Data Change



The Reality Is That Most Of
Your Data Is In **Silos**



What Does The Modern Data
Architecture Look Like On AWS?



Automated Ingestion



S3 Upload



S3 Acceleration



Kinesis



Snowball
Snowball Edge
Snowmobile



DynamoDB Streams



Preservation Of Original Source Data



S3



EFS



EBS



DynamoDB



RDS



Innovations In S3



S3 Storage Management

- S3 Data Events in CloudTrail
- S3 Object Tagging
- S3 Analytics - Storage Class Analysis
- S3 CloudWatch Metrics
- S3 Inventory



Lifecycle Management And Cold Storage



S3 Storage Management



Glacier



Manage Governance, Security, Privacy



Config



CloudTrail



KMS



Managing Data Quality



Elastic MapReduce

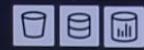
We Are Missing A Few Pieces



AWS Glue

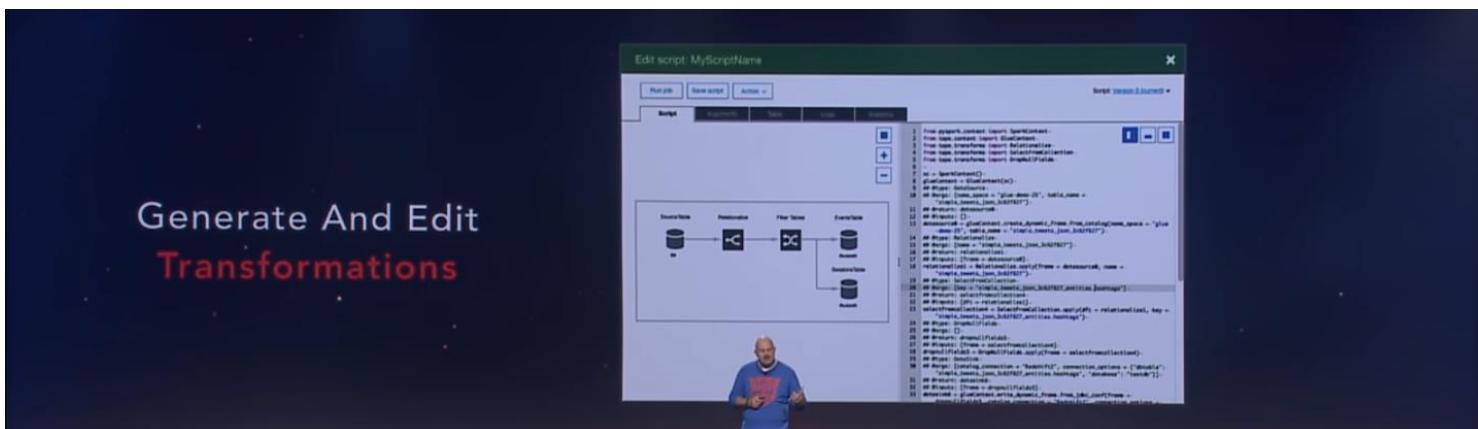
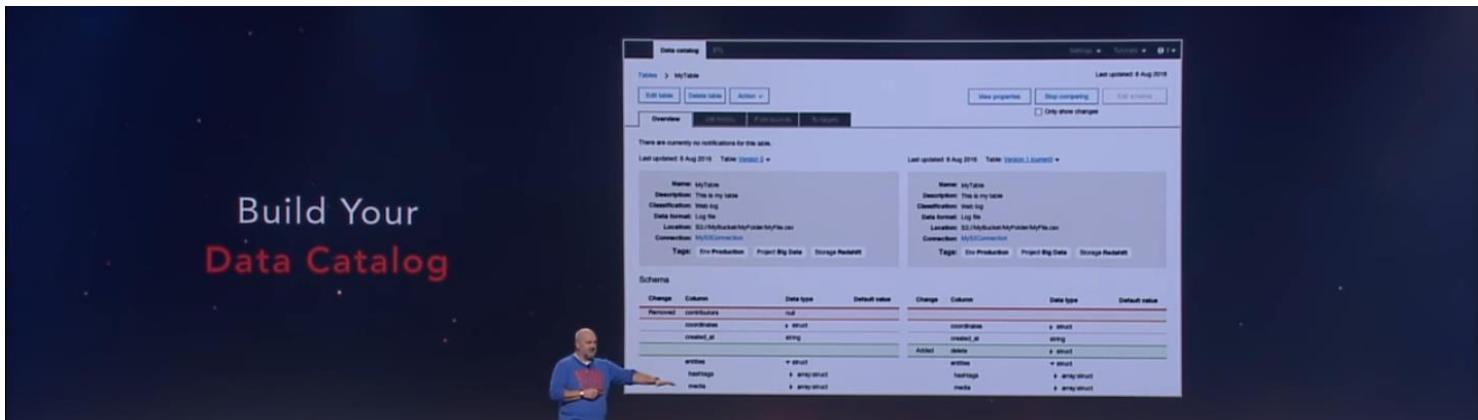
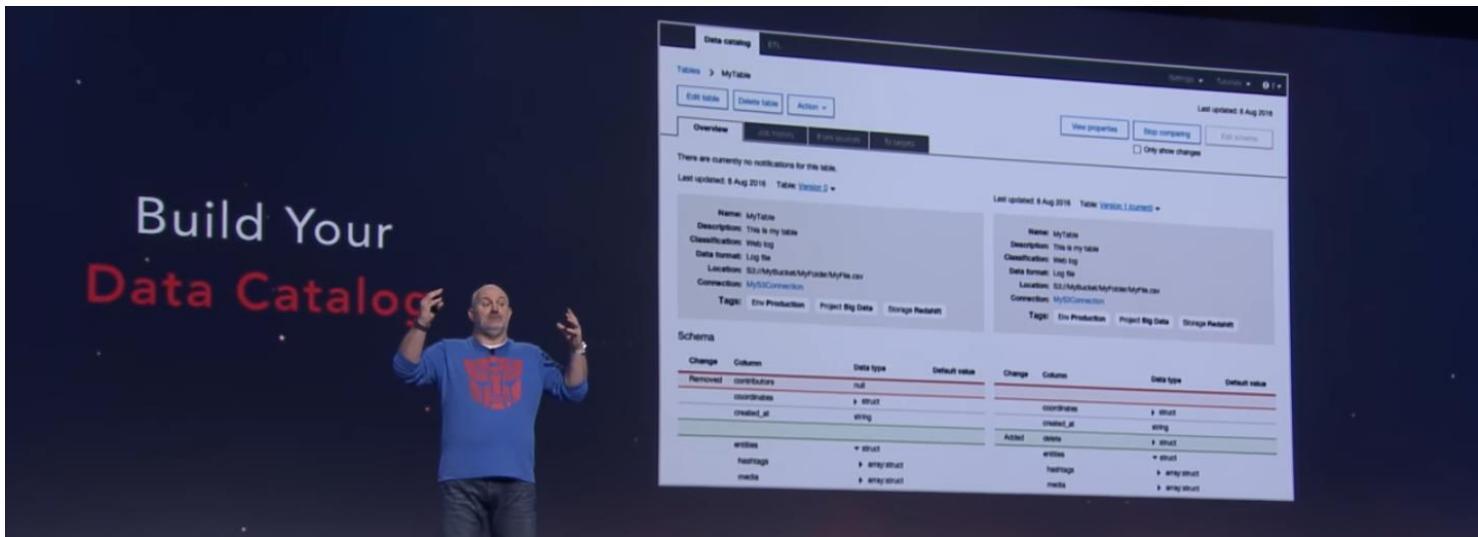
Fully-managed data catalog and ETL service

Integrated with:



S3, RDS, Redshift & any
JDBC-compliant data store





Edit script: MyScriptName

Run job Save script Action ▾ Script Arguments Table Logs Statistics

```

1 from pyspark.context import SparkContext-
2 from tape.context import GlueContext-
3 from tape.transforms import Relationalize-
4 from tape.transforms import SelectFromCollection-
5 from tape.transforms import DropNullFields-
6 -
7 sc = SparkContext()
8 glueContext = GlueContext(sc)
9 ## @type: DataSource
10 ## @args: [name_space = "glue-demo-25", table_name =
11 ## "simple_tweets_json_3c62f827"]
12 ## @return: datasource0
13 datasource0 = glueContext.create_dynamic_frame.from_catalog(name_space = "glue-
14 -demo-25", table_name = "simple_tweets_json_3c62f827")
15 ## @type: Relationalize
16 ## @args: [name = "simple_tweets_json_3c62f827"]
17 ## @return: relationalize1
18 ## @inputs: [frame = datasource0]
19 relationalize1 = Relationalize.apply(frame = datasource0, name =
20 ## "simple_tweets_json_3c62f827")
21 ## @return: selectfromcollection4
22 ## @inputs: [dfc = relationalize1]
23 selectfromcollection4 = SelectFromCollection.apply(dfcc = relationalize1, key =
24 ## "simple_tweets_json_3c62f827_entities.hashtags")
25 ## @return: dropnullfields5
26 ## @return: dropnullfields5
27 ## @inputs: [frame = selectfromcollection4]
28 dropnullfields5 = DropNullFields.apply(frame = selectfromcollection4)
29 ## @type: DataLink
30 ## @args: [catalog_connection = "Redshift2", connection_options = {"dbtable":-
31 ## "simple_tweets_json_3c62f827_entities.hashtags", "database": "testDB"}]-
32 ## @return: datasource6
33 ## @inputs: [frame = dropnullfields5]
34 datasource6 = glueContext.write_dynamic_frame.from_jdbc_conf(frame =
35 ## dropnullfields5, catalog_connection = "Redshift2", connection_options =-

```

The screenshot shows the AWS Glue Studio interface. On the left, there's a data flow graph with four main components: 'SourceTable' (represented by a cylinder), 'Relationalize' (represented by a curved arrow), 'Filter Tables' (represented by a cross), and 'EventsTable' (represented by a cylinder). Arrows connect 'SourceTable' to 'Relationalize', 'Relationalize' to 'Filter Tables', and 'Filter Tables' to 'EventsTable'. A branch from 'Filter Tables' also connects to two 'Redshift' tables: 'SessionsTable' and 'EventsTable'. On the right, the Python code for this workflow is displayed, showing imports for SparkContext, GlueContext, and various transform functions from the tape library. The code defines a 'datasource0' from a catalog, applies a 'Relationalize' step, and then a 'SelectFromCollection' step to extract hashtags. Finally, it writes the results to a Redshift database.

Schedule And Run Your Jobs

A job is your business logic required to perform extract, transform and load (ETL) work. Job runs are initiated by triggers which can be scheduled or driven by events.

| Job | Trigger status | Last run | Job status | Rows read | Rows written | Dates | Duration | Start time |
|------------|----------------|----------|------------|------------|--------------|-------------------------|-------------------------|------------|
| Unspun job | Active | 1/11 | 0,400 | 0,000 (0%) | 11 min | 12 Nov 2018 0:01 PM PST | 12 Nov 2018 0:01 PM PST | |
| Amber | Inactive | 0/12 | 0,012 | 0,012 (0%) | 23 min | 12 Nov 2018 2:01 PM PST | 12 Nov 2018 2:01 PM PST | |
| Robot | Active | 0/12 | 0,012 | 0,012 (0%) | 2 h 10 min | 12 Nov 2018 2:01 PM PST | 12 Nov 2018 2:01 PM PST | |
| Blue | Active | 1/24 | 0,000 | 0,000 (0%) | 23 min | 12 Nov 2018 2:01 PM PST | 12 Nov 2018 2:01 PM PST | |
| Dear | No trigger | 1/20 | 0,012 | 0,012 (0%) | 23 min | 12 Nov 2018 2:01 PM PST | 12 Nov 2018 2:01 PM PST | |
| Elphanto | Active | 0/12 | 0,000 | 0,000 (0%) | 23 min | 12 Nov 2018 2:01 PM PST | 12 Nov 2018 2:01 PM PST | |

Details

Name: Amber
Description: Listen to your door at home...
Run success: 31
Run failure: 27
Run duration: 2 h 10 min
Run time: 12 Nov 2018 2:01 PM PST

90% Success

The screenshot shows the AWS Glue Jobs interface. It displays a list of jobs with columns for Name, Trigger status, Last run, Job status, Rows read, Rows written, Dates, Duration, and Start time. The 'Amber' job is highlighted. Below this, a detailed view for the 'Amber' job shows its configuration: Name: Amber, Description: Listen to your door at home..., Run success: 31, Run failure: 27, Run duration: 2 h 10 min, and Start time: 12 Nov 2018 2:01 PM PST. A progress bar indicates a 90% success rate.

Jobs A job is your business logic required to perform extract, transform and load (ETL) work. Job runs are initiated by triggers which can be scheduled or driven by events.

Jobs Repositories

Add job Edit job Action Filter jobs... Save view Job performance Showing 1-20 of 999

Drag a rectangle over a chart to choose jobs you would like to view.

Median run time: 25 mins

Median run frequency: 5 Days

Legend: Job run, Selection, Job error

| Jobs | Trigger status | Most recent | Job status | Rows read | Rows written | Errors | Duration | Start time |
|--|----------------|-------------|------------|-----------|--------------|-------------|-------------|-------------------------|
| Unsaved job | Active | | Running | 1,011 | 3,456 | 3,456 (77%) | 11 min | 12 Nov 2015 2:01 PM PST |
| <input checked="" type="checkbox"/> Aardvark | Inactive | | Completed | 9,012 | 9,012 | 9,012 (50%) | 23 min | 12 Nov 2015 2:01 PM PST |
| <input type="checkbox"/> Bobcat | Active | | Failed | 9,012 | 9,012 | 9,012 (50%) | 1 hr 56 min | 12 Nov 2015 2:01 PM PST |
| <input type="checkbox"/> Crow | Active | | Running | 1,234 | 7,890 | 7,890 (84%) | 55 min | 12 Nov 2015 2:01 PM PST |
| <input type="checkbox"/> Deer | No trigger | | Running | 7,890 | 9,012 | 9,012 (53%) | 13 min | 12 Nov 2015 2:01 PM PST |
| <input type="checkbox"/> Elephant | Active | | Completed | 9,012 | 7,890 | 7,890 (47%) | 13 min | 12 Nov 2015 2:01 PM PST |

Details Diagram Code History

Name: Aardvark

Description: Lorem ipsum dolor sit amet ...

Version: 32

Tags: Env Production

Project: Big Data

Run successes: 321

Run failures: 27

90% Success

- 1. Automated And Reliable Data Ingestion
- 2. Preservation Of Original Source Data
- 3. Lifecycle Management And Cold Storage
- 4. Metadata Capture
- 5. Managing Governance, Security, Privacy
- 6. Self-Service Discovery, Search, Access
- 7. Managing Data Quality
- 8. Preparing For Analytics
- 9. Orchestration And Job Scheduling
- 10. Capturing Data Change



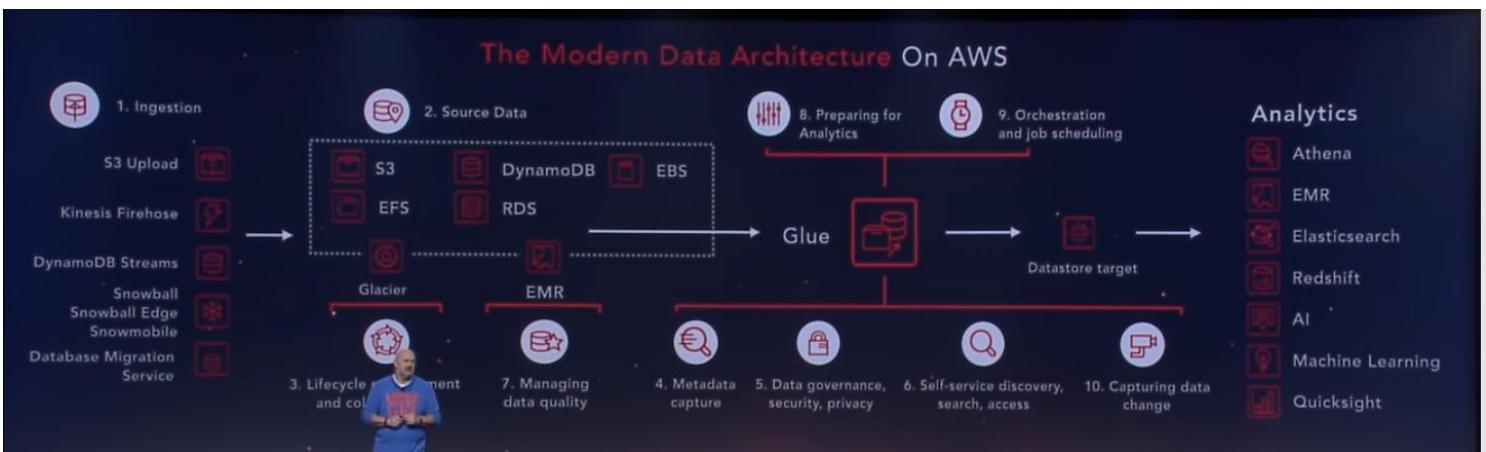
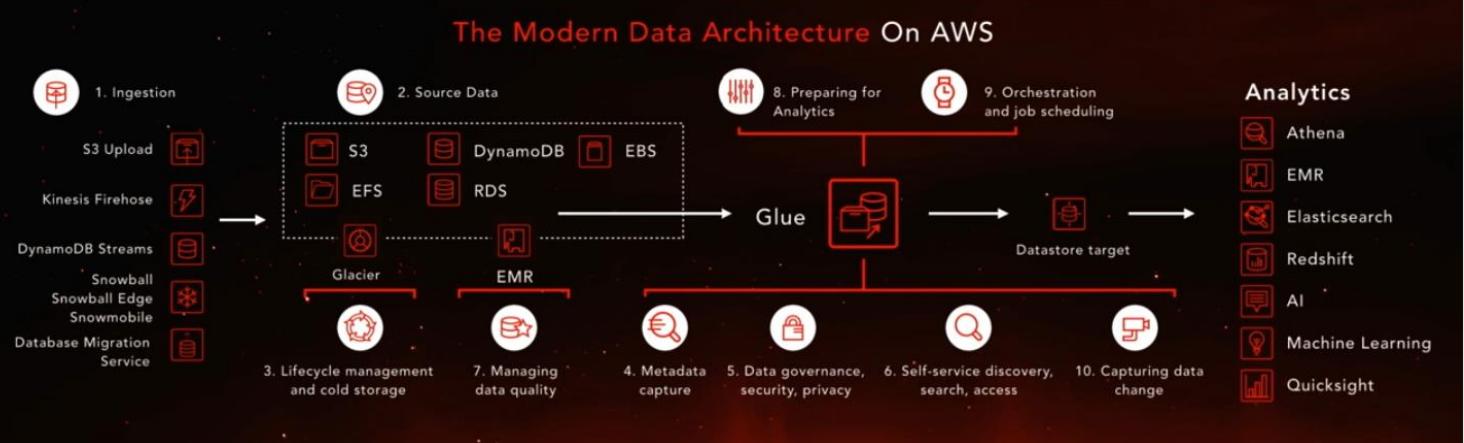


- 1. Automated And Reliable Data Ingestion
- 2. Preservation Of Original Source Data
- 3. Lifecycle Management And Cold Storage
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AWS Glue



AWS Is The Only Place That You Can Have A **Comprehensive Modern Data Architecture**



Every possible analytics engine



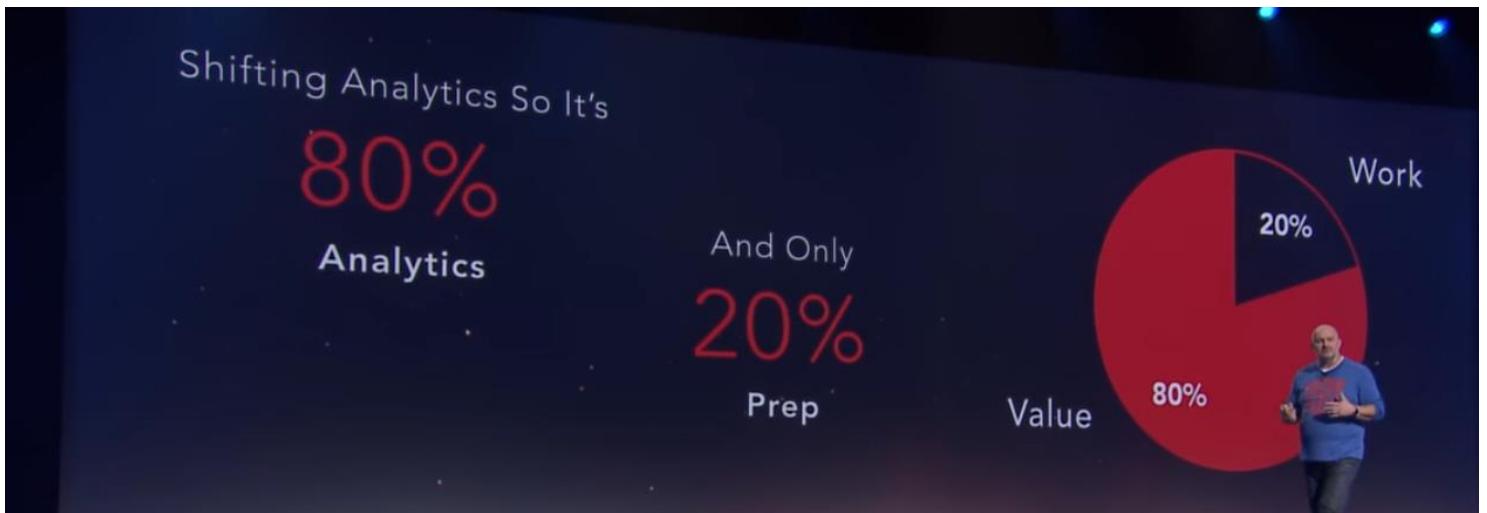
Strong support for exploration and discovery

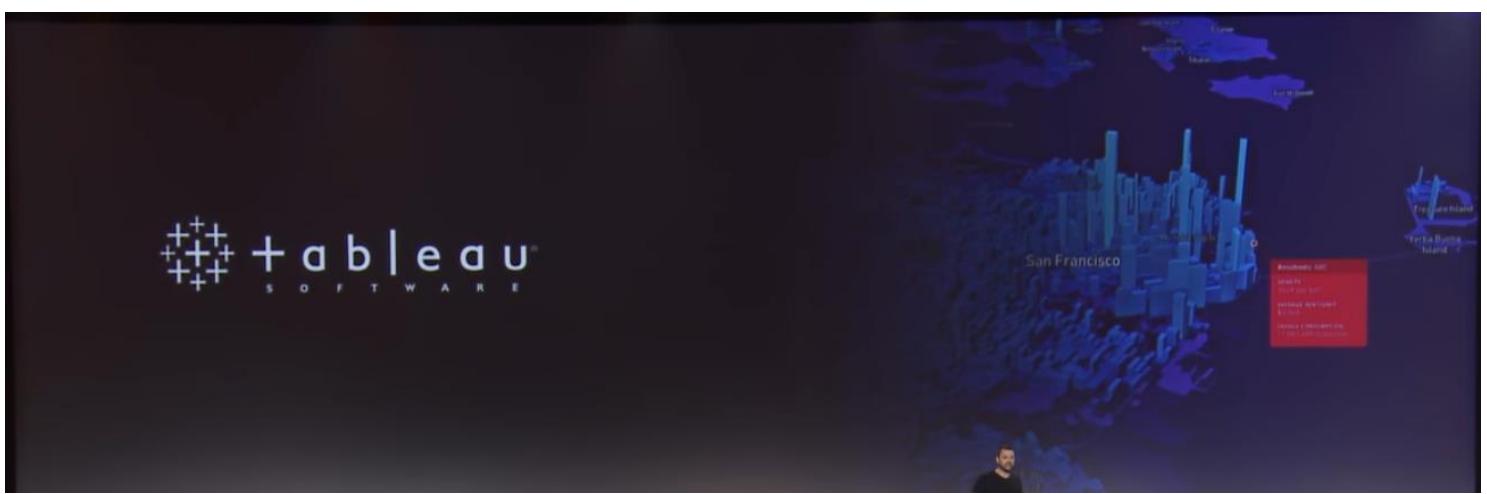


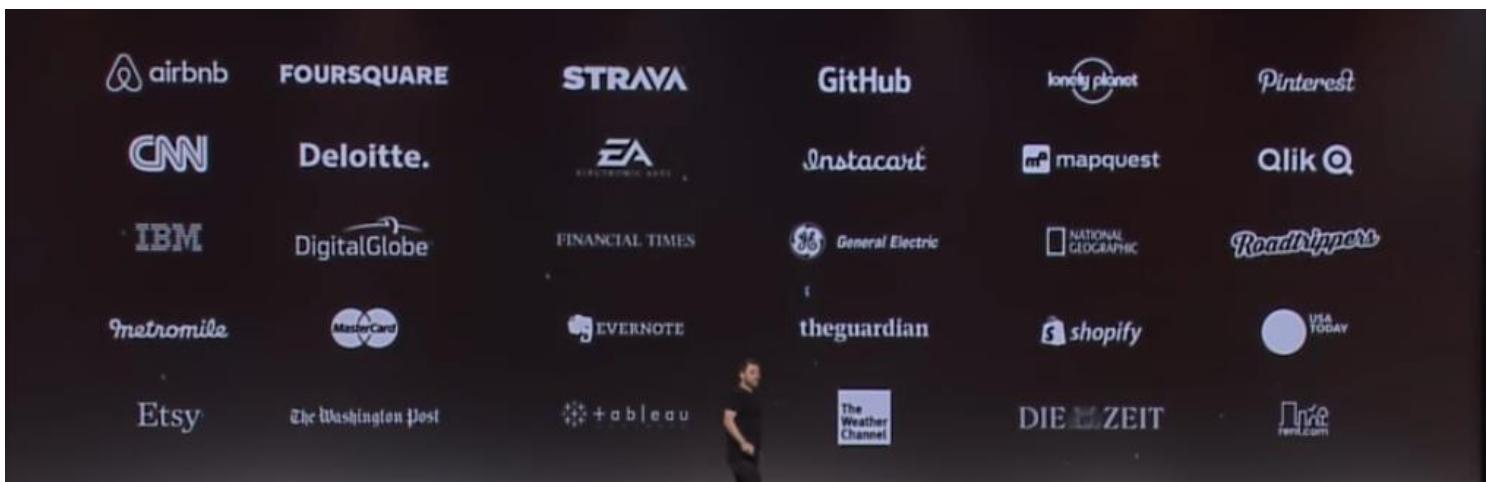
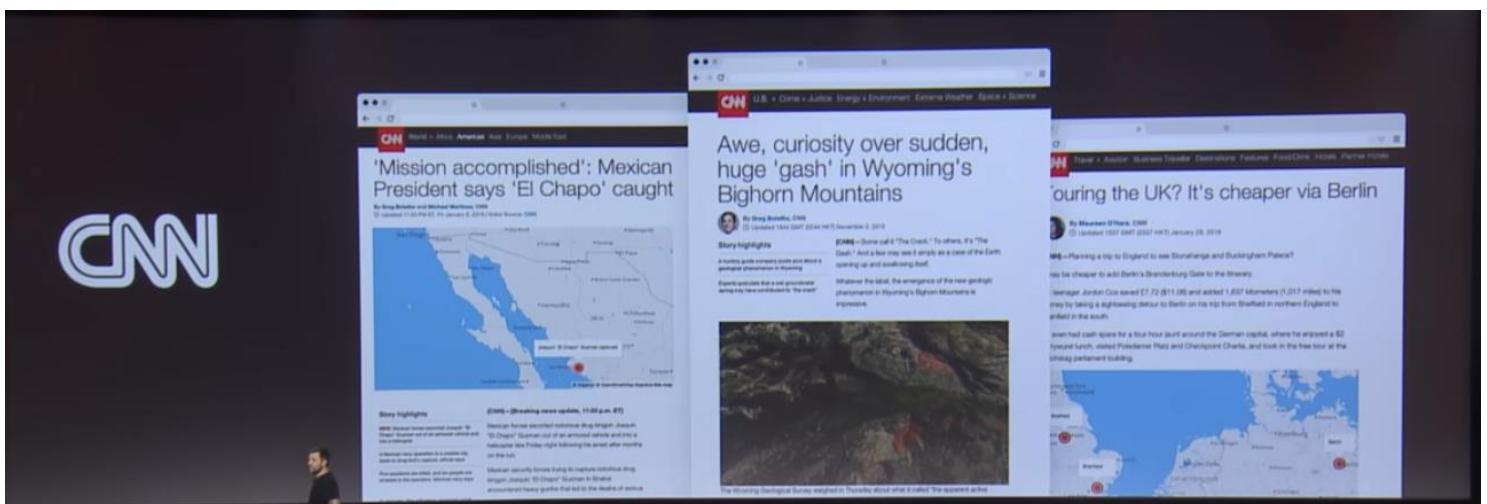
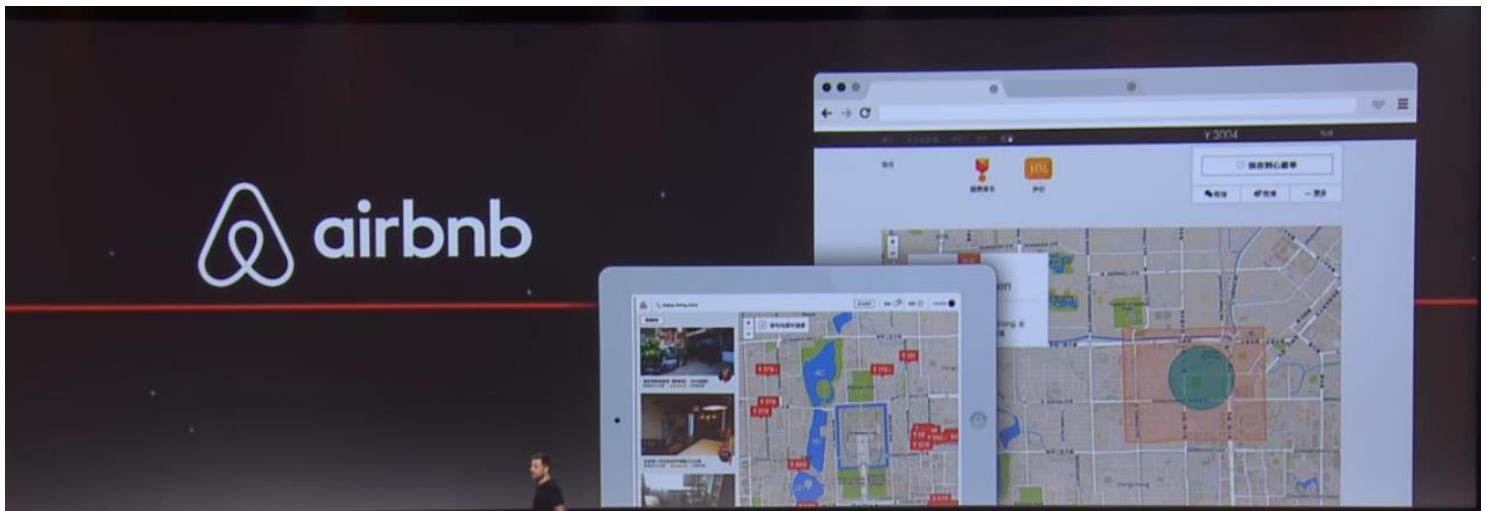
Deep integration of security and governance

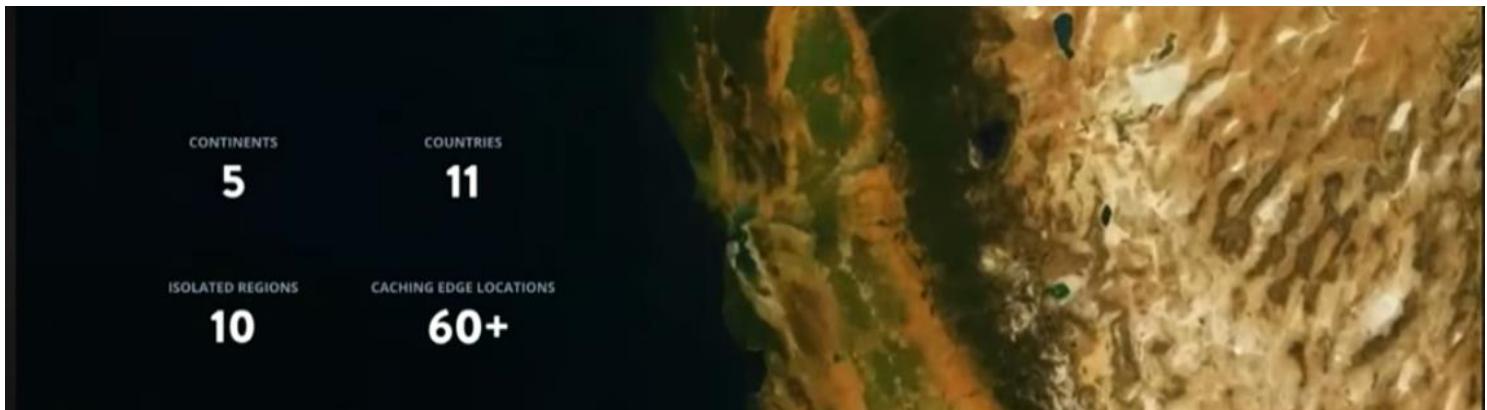
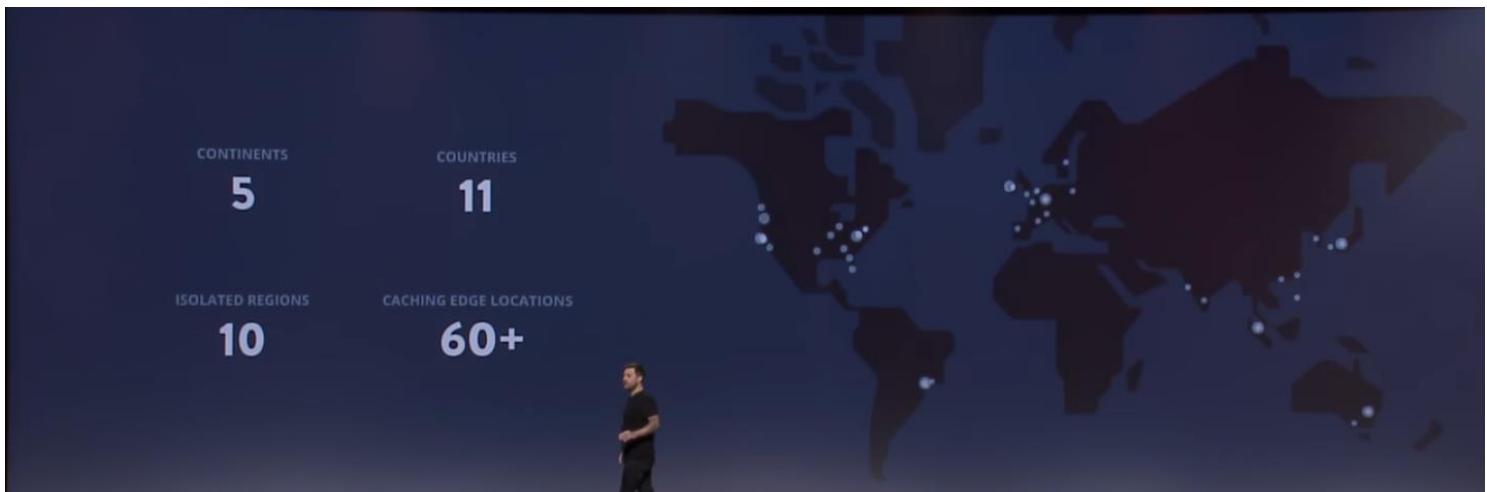


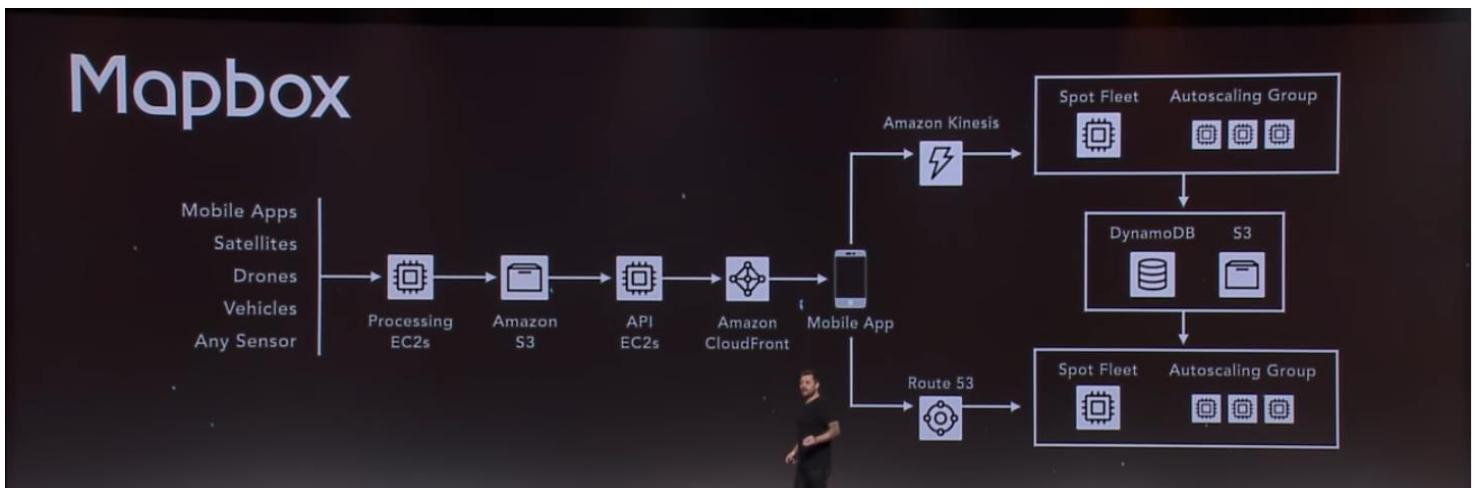
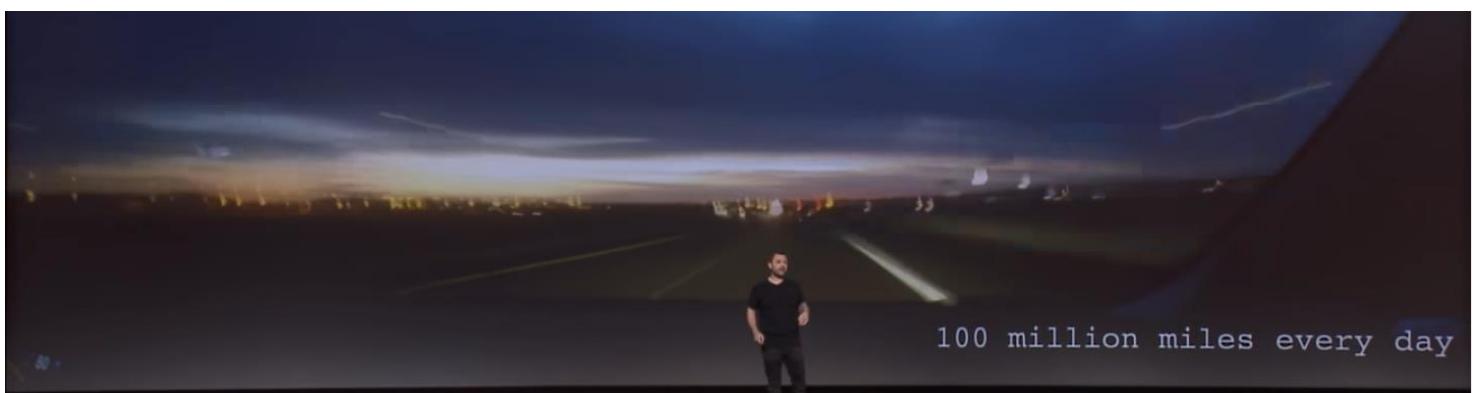
Removal of the heavy lifting of data analytics











Mapbox

Mobile Apps
Satellites
Drones
Vehicles
Any Sensor

Processing EC2s → Amazon S3 → API EC2s → Amazon CloudFront → Mobile App

Amazon Kinesis

Spot Fleet Autoscaling Group



Route 53

Spot Fleet Autoscaling Group



Mapbox.cn

跨平台面向开发者的地图 API

A Strong Need For Large-Scale Processing



Financial Services

- High performance computing
- Post-trade analytics
- Fraud surveillance



Life Sciences

- Drug screening
- DNA sequencing



Digital Media

- Rendering
- Transcoding
- Media supply chain workflows

Challenges Of Large-Scale Batch Processing



Provision server cluster



Install batch software



Manage job interdependency



Manage job queues

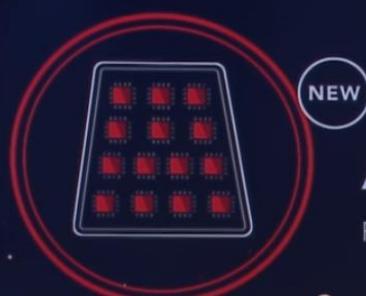


Schedule jobs



Scale server cluster

Challenges Of Large-Scale Batch Processing



AWS Batch

Fully-managed batch processing at any scale

Preview Available Today



AWS Batch



Fully managed



Dynamic provisioning and scaling



Cost optimization through EC2 Spot fleet



Priority-based queues and scheduling



Transformations

Compute



A Spectrum Of Compute



Virtual Machines



Containers



Serverless

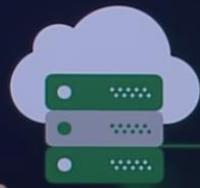
A Spectrum Of Compute



| | Packaging | Updates | Execution | Run time | Unit of Cost |
|------------|----------------|------------|------------------------------|-------------------------|----------------------------------|
| VMs | AMI | Patching | Multi-threaded, multi-task | Hours to months | Per VM per hour |
| Containers | Container File | Versioning | Multi-threaded, single-task | Minutes to days | Per VM per hour |
| Lambda | Code | Versioning | Single-threaded, single-task | Microseconds to seconds | Per memory/second Per request |



A Spectrum Of Compute



Virtual Machines



Strong VM Ecosystem



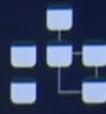
ELB



VPC



Auto Scaling



RDS



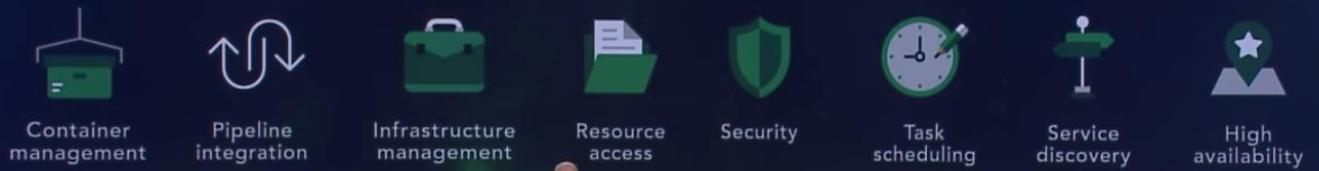
EBS



A Spectrum Of Compute



The Challenges Of Container Based Operations



Amazon ECS

Managed platform for:



Cluster Management



Container Orchestration



Deep AWS Integration

Deep Integration With AWS Platform



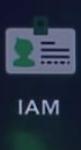
Instance Auto Scaling



Container Auto Scaling



ELB



IAM



VPC



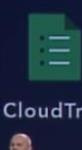
CloudWatch Metrics



CloudWatch Logs



CloudWatch Events



CloudTrail



X-Ray

Task Placement Engine

(Coming Soon)

You can now determine scheduling policies based on:



AMI ID



Availability zone



Instance type

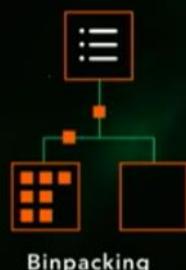


Distinct instances

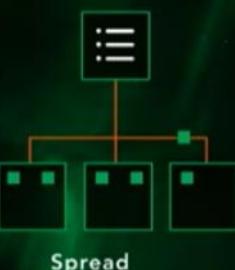


Custom

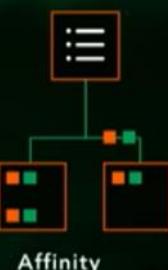
Task Placement Strategies



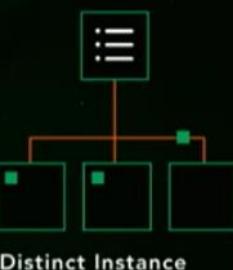
Binpacking



Spread



Affinity



Distinct Instance

Event Stream

Real-time notifications of current state



Container instance events



Task events

Developers Want More Control

They need the ability to:



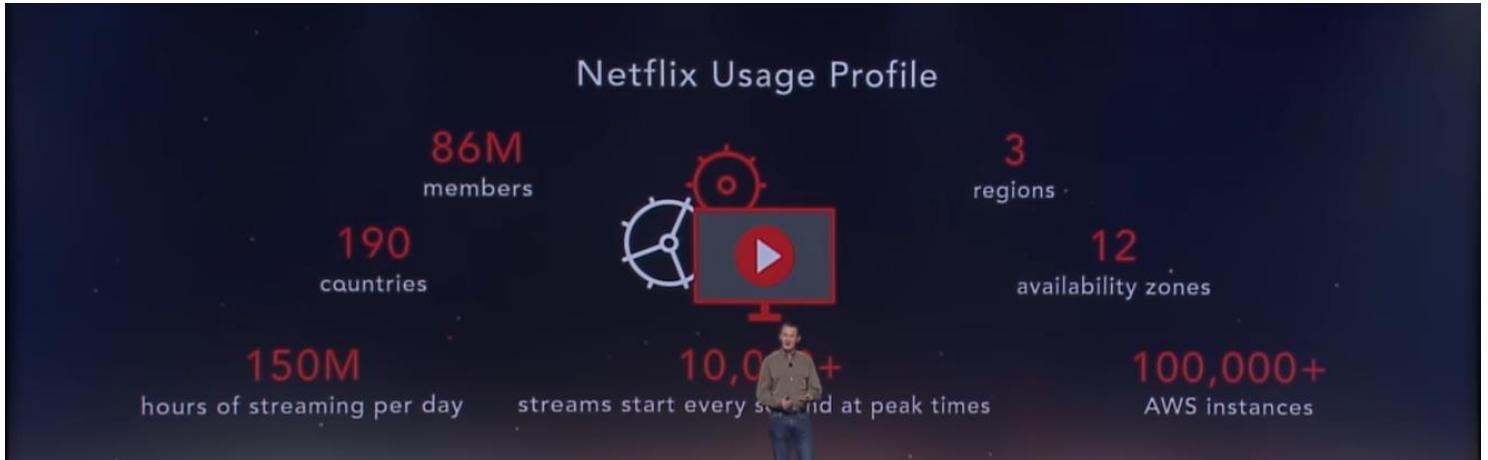
Create custom schedulers



Integrate 3rd party schedulers



Develop and test locally



Operational Agility



Moved to AWS to eliminate heavy lifting



Microservice Architecture

We became more agile...

- Decoupled applications
- Continuous deployment model

More agility → Innovate faster

...and built a diverse ecosystem of tools

- Spinnaker
- Chaos engineering
- Global Cloud



Microservices And Containers

In 2016, we began the shift to containers...

Why?

- Developer productivity
- Isolation at a smaller granularity



How?

- Titus
- Fenzo

The Evolution Of ECS



ECS has been adding key features for the past two years

IAM roles, container auto scaling, application level load balancing



Blox And Working With AWS

We wanted more control

AWS listened

Blox

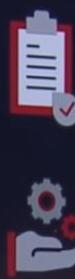
- ECS integration with existing technology
- More roadmap definition
- Integrate Titus through Blox into ECS



Looking Ahead

The goal: Leverage ECS to host our container workloads

Deliver features and improvements to our customers



ECS for all container workloads



AWS takes more operational load



A Spectrum Of Compute



Serverless

AWS Lambda



State Of AWS Lambda

Languages



Node.js (JavaScript)
Java (Java 8 compatible)
Python

Integrations



Amazon API Gateway

Amazon S3

Amazon DynamoDB

Amazon RDS

Amazon Aurora



Amazon Simple Notification Service

Amazon Simple Email Service

Amazon Cognito

Amazon CloudWatch

Amazon Kinesis Streams



AWS CodeCommit



AWS CloudFormation



AWS Config



New Serverless Features In 2016

NEW

| | |
|--------------|------------------------------|
| VPC Support | API Gateway Binary Support |
| Node 4.3 | Environment Variables |
| Simple Proxy | Serverless Application Model |



NEW

C# In AWS Lambda



Serverless Security



IAM Roles



VPC Support



There Are No Cattle, There Is Only The Herd



AWS Lambda



Amazon DynamoDB



Amazon SQS



Amazon Kinesis Streams



AWS X-Ray



Amazon API Gateway



Amazon ElastiCache



Amazon SNS



Amazon Elasticsearch



AWS CloudFront



Amazon S3



Amazon Athena



Amazon SES



Amazon CloudSearch



Massive Scale Achieved



Thomson Reuters processes 4,000 requests per second



FINRA processes half a trillion validations of stock trades daily



Hearst reduced the time to ingest and process data for its analytics pipeline by 97%



Vevo can handle spikes of 80x normal traffic



Expedia triggers 1.2 billion Lambda requests each month



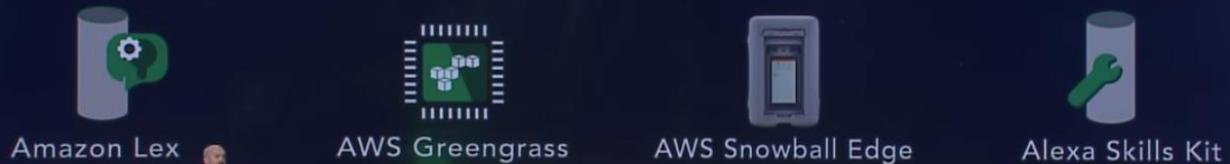
Lambda As Extensibility Mechanism

Connective Tissue Of AWS Environments



Lambda As Extensibility Mechanism

Connective Tissue Of AWS Environments



AWS Lambda@Edge

Run AWS Lambda functions at CloudFront locations

Turning Functions Into Applications

"I want to sequence functions"

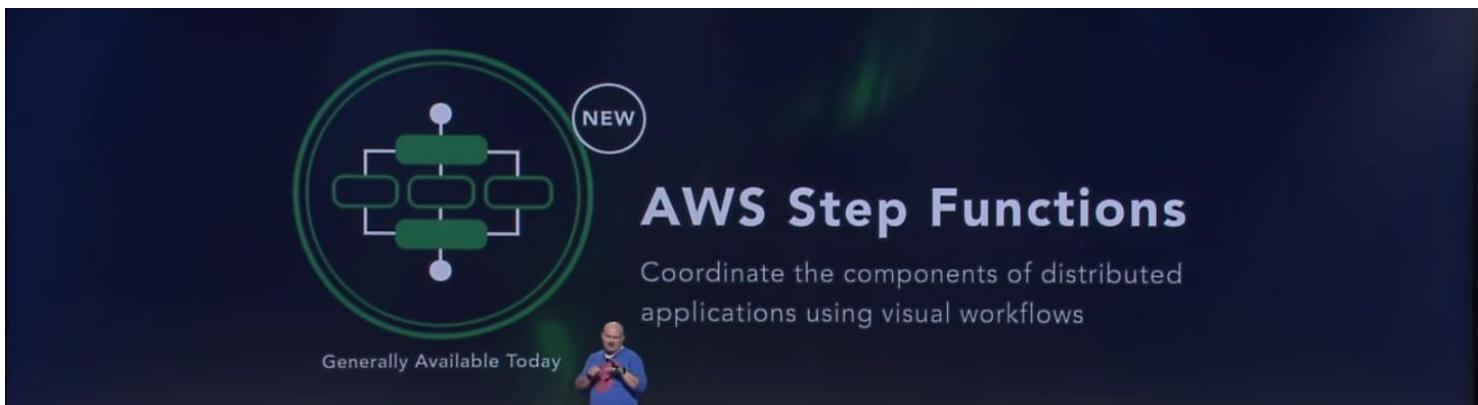
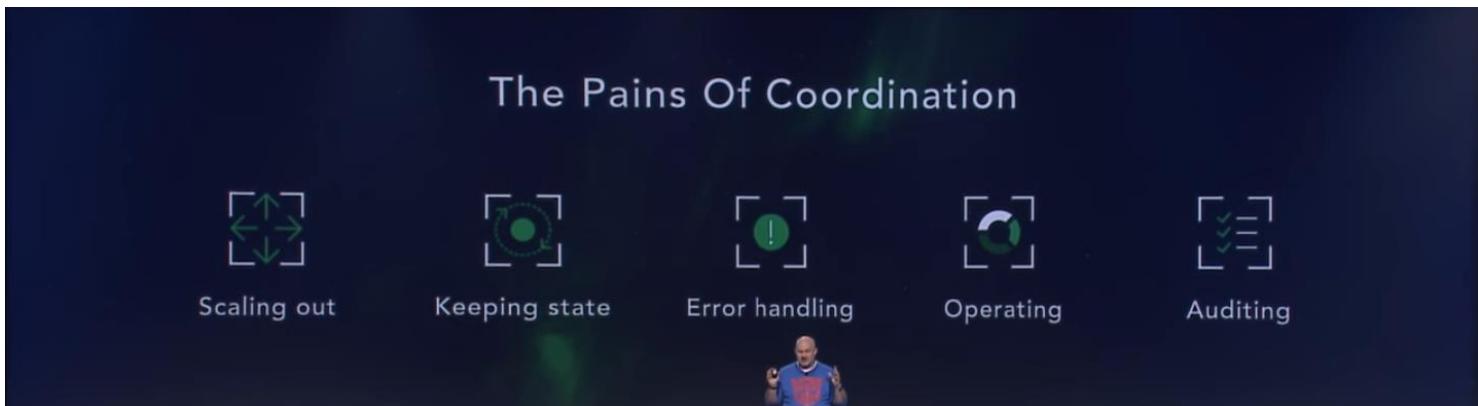
"I want to retry functions"

"I want to run functions in parallel"

"I want to try/catch/finally"

"I want to select functions based on data"

"I have code that runs for hours"

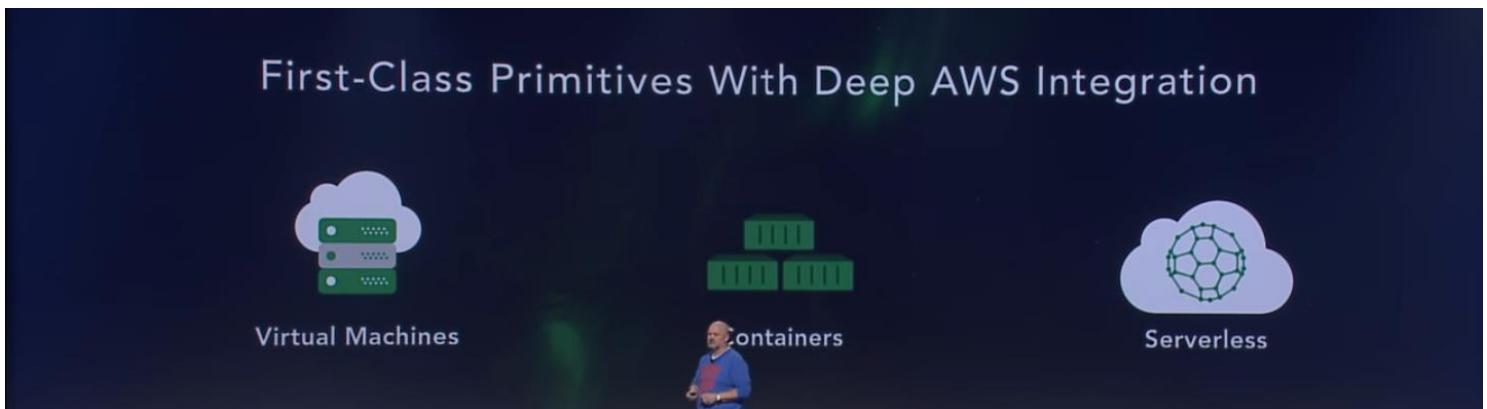
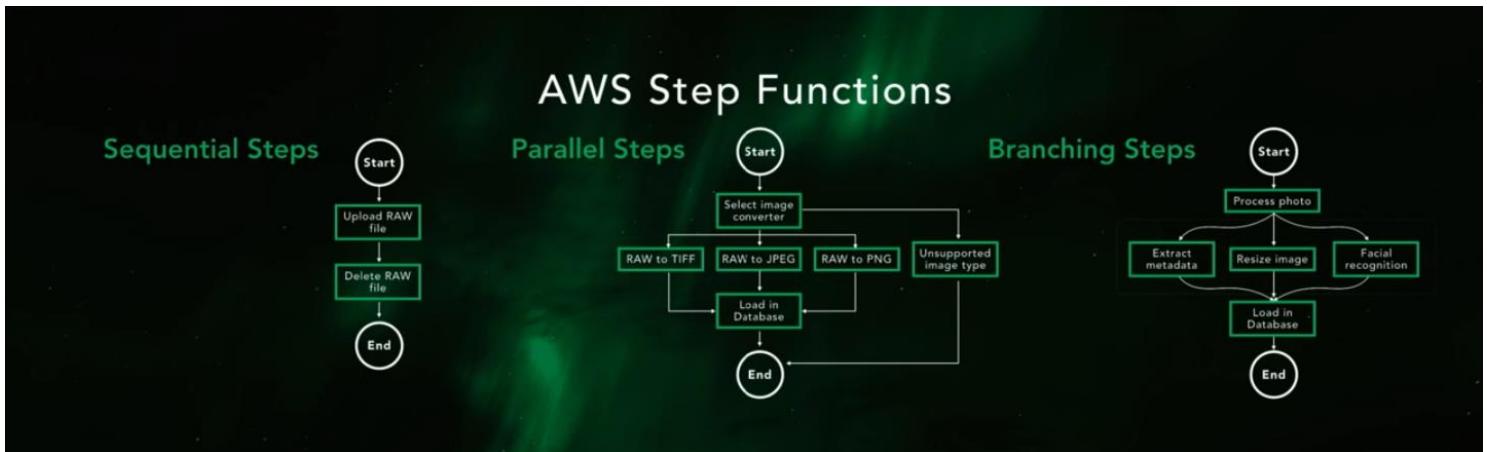
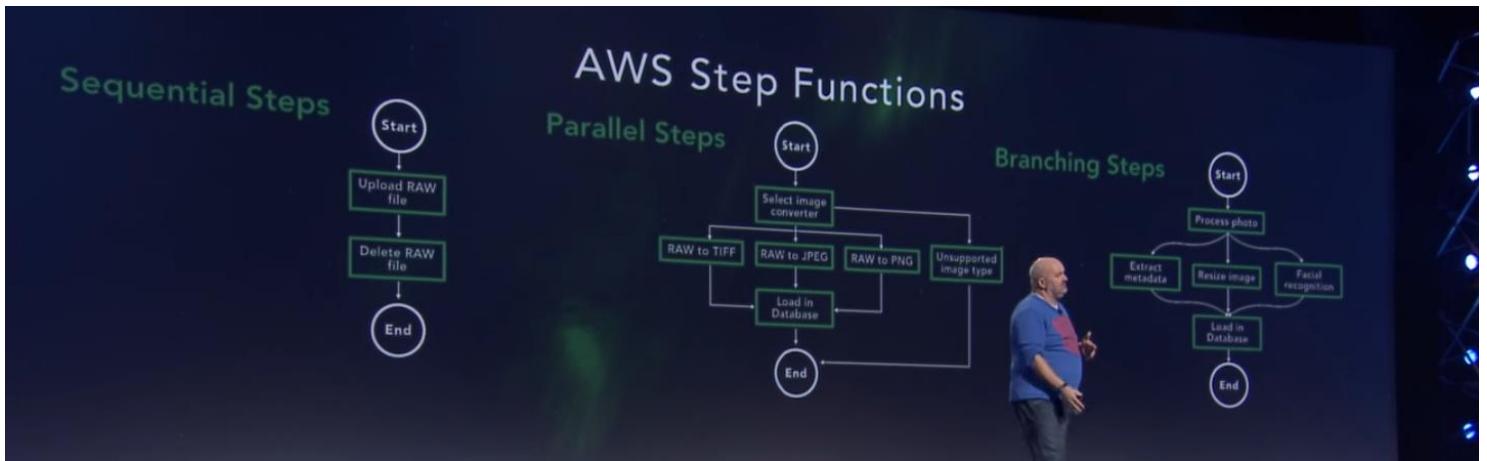


AWS Step Functions

The screenshot shows the AWS Step Functions console with the following details:

- Graph:** A visual workflow graph for "My_EU_Order" showing states like "Start", "ProcessOrder", "GetCustomer", "Determine", "ChargeRegion", and "End".
- Execution Details:**
 - Execution Status: SUCCEEDED
 - State MachineArn: arn:aws:states:eu-central-1:4321123456789012:stateMachine:OrderProcessingStateMachine
 - Execution ID: 1-4321123456789012-execution:OrderProcessingStateMachine:My_EU_Order
 - Began: Oct 25, 2018 2:31:40 PM
 - Closed: Oct 25, 2018 2:31:55 PM
- Step Details:** A table showing the history of steps:

| Type | Timestamp |
|-----------------------------|-------------------------|
| 1 - ExecutorStarted | Oct 25, 2018 2:31:40 PM |
| 2 - TaskScheduled | Oct 25, 2018 2:31:40 PM |
| 3 - LambdaFunctionScheduled | Oct 25, 2018 2:31:40 PM |



Transformations

Day 1

- Elastic GPUs For EC2
- Amazon Lightsail
- F1 Instances
- Amazon Athena
- Amazon AI
- Amazon Rekognition

Day 2

- Amazon Polly
- Amazon Lex
- PostgreSQL For Aurora
- AWS Greengrass
- AWS Snowball Edge
- AWS Snowmobile
- AWS OpsWorks For Chef Automate
- Amazon EC2 Systems Manager
- AWS CodeBuild
- AWS X-Ray
- AWS Personal Health Dashboard
- AWS Shield

- Amazon Pinpoint
- AWS Glue
- AWS Batch
- C# In AWS Lambda
- AWS Lambda@Edge
- AWS Step Functions

Transformations

The Party