AWS re:Invent

NOV. 29 – DEC. 3, 2021 | LAS VEGAS, NV

ENT316

Technology transformation at scale, featuring T-Mobile

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AWS

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Sr. Director, Enterprise Technology Solutions
T-Mobile

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> **"The first step in transformation is not technical; it's very much about leadership. It's about making sure you have senior-level alignment, aggressive top-down goals that force the organization to move faster than it otherwise would, the right training, and then a thoughtful, methodical multi-year plan to make that migration."**

Andy Jassy, CEO
Amazon

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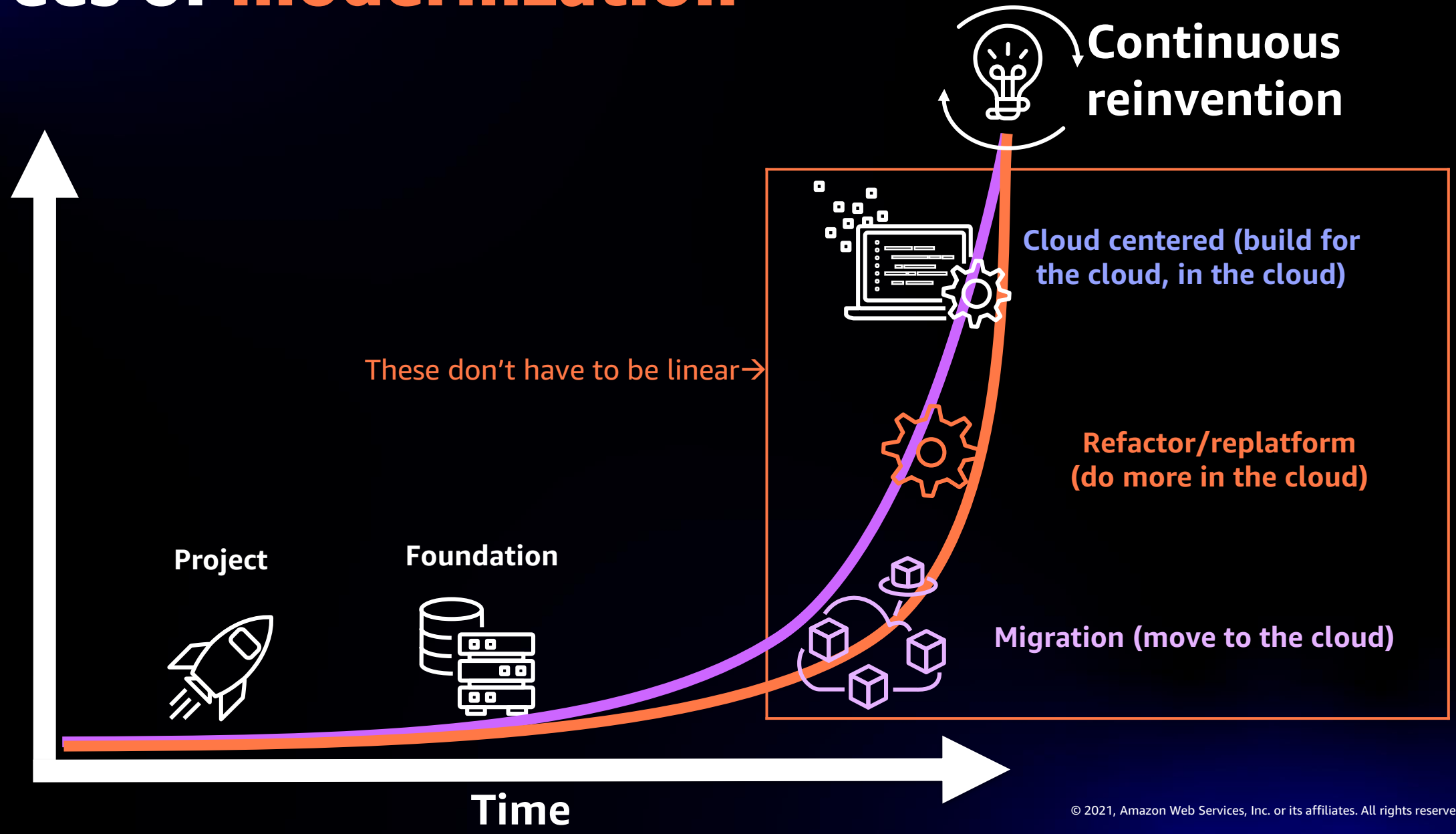
Elements of a successful journey

 Executive sponsorship	Align on business requirements; bring all stakeholders with you
 Cloud-first strategy	Create your vision; incentivize team members to follow your lead
 Organizational change	Define new operating models, policies, processes, economics; provide training
 Adoption roadmap	Start small and iterate, measure, manage, and update plan
 Cloud center of excellence	Provide centralized expertise; guide decentralized innovations
 Principles & standards	Publish guidance and guardrails for how to adopt cloud successfully
 Experiment	Define architectures, patterns, governance; measure, monitor, iterate

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Degrees of modernization



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Efficiency goes up as you modernize

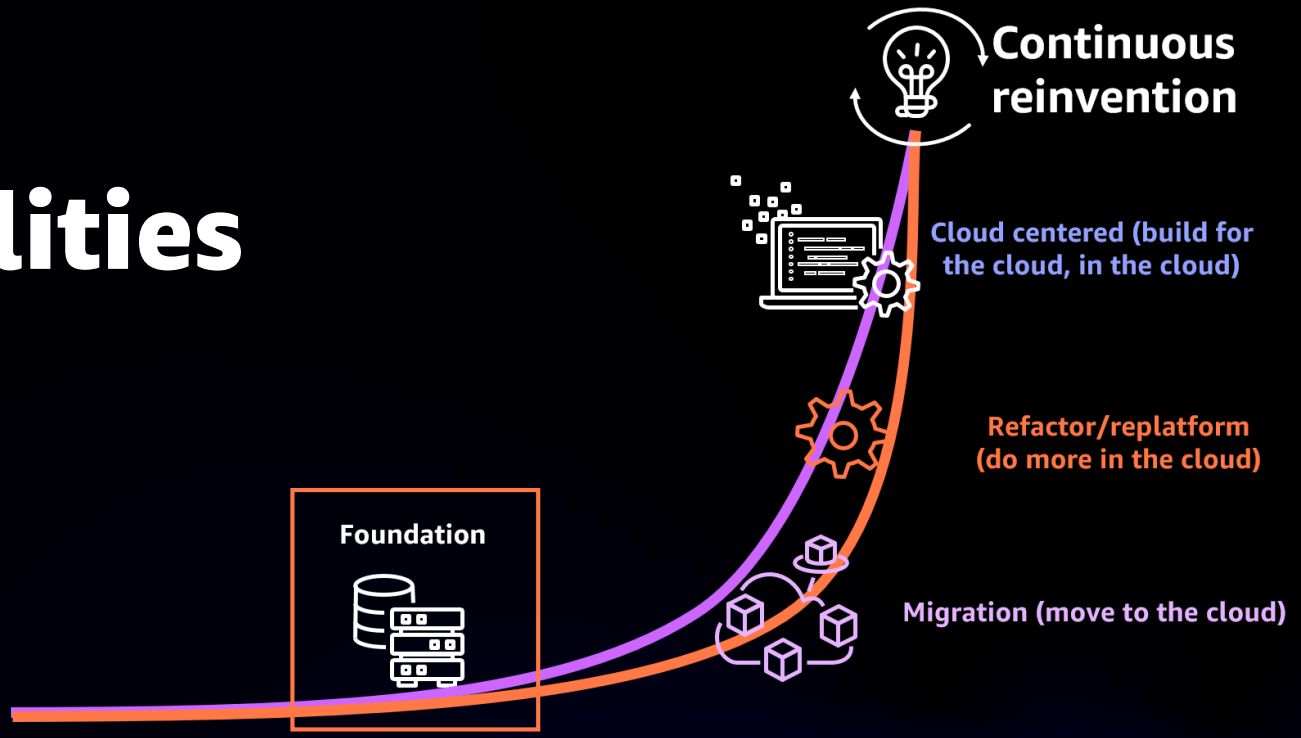
	LEVEL OF MODERNIZATION			
	ON PREMISES	INFRASTRUCTURE SERVICES (Amazon EC2/ VMware Cloud on AWS)	PLATFORM SERVICES (Amazon RDS/Amazon ECS)	CLOUD-CENTERED SERVICES (AWS Lambda/Amazon Athena)
Application code				
Data source integrations				
Capacity planning and scaling				
Software install and maintenance				
Infrastructure provisioning				
Physical server, storage, networking, and facilities				
Security and network configuration				

MANAGED BY |  CUSTOMER  AWS

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Foundational capabilities

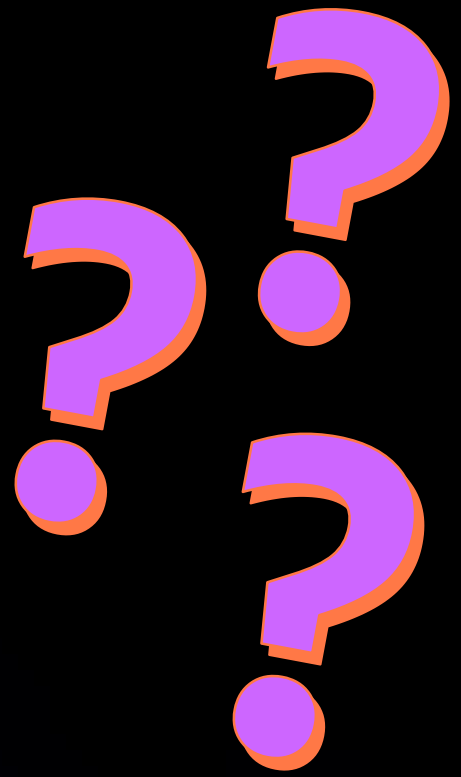


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To start on AWS, many decisions are needed

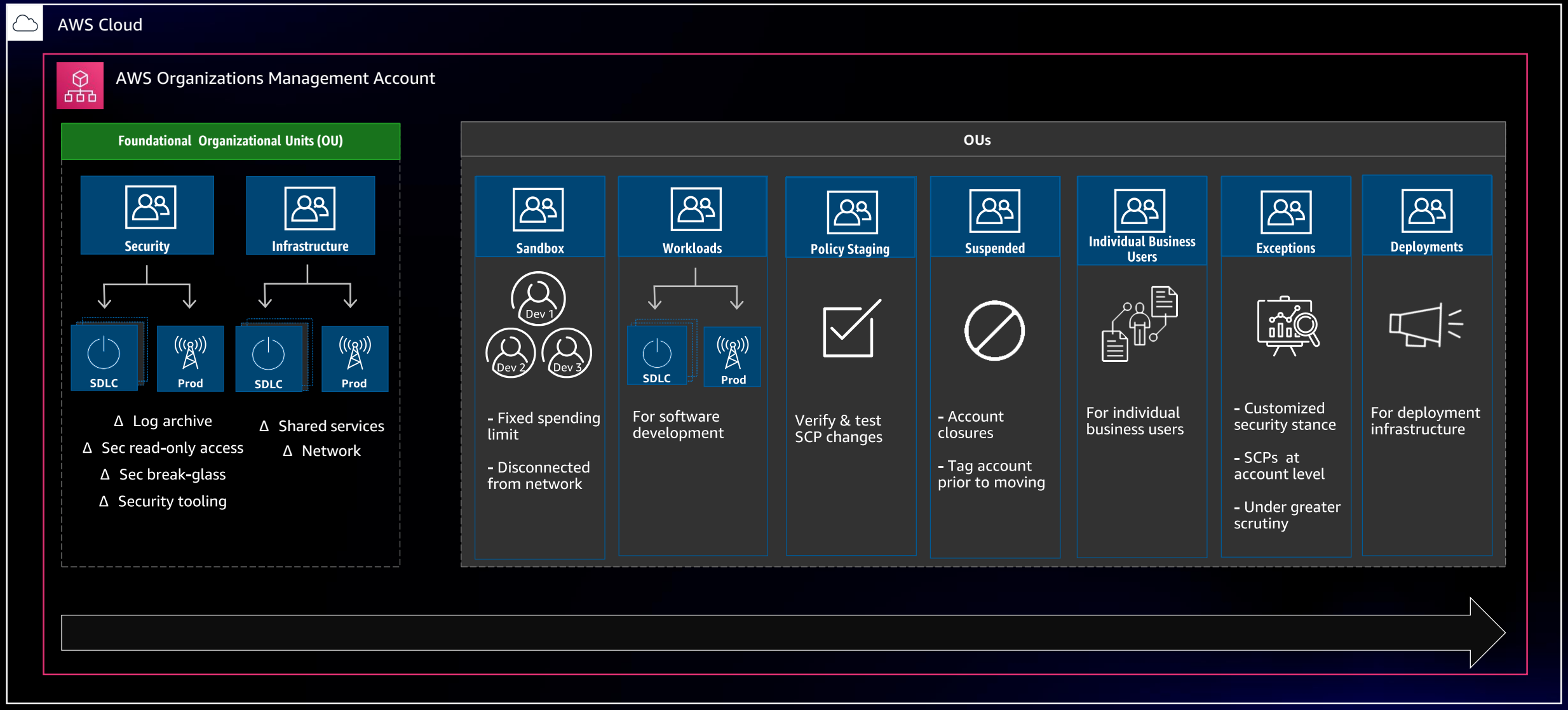
- Security, Identity, and Compliance
- AWS Cost Management
- Management and Governance
- Compute
- Developer Tools
- Database

- AWS services
- AWS solutions
- AWS Partners



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Multi-account framework



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Multi-account and foundations sessions

#CLOUD-FOUNDATIONS-TRACK

Architecture



[SEC203 – breakout]
AWS Security Reference Architecture: Visualize your security

[ARC312 – chalk talk]
Architecting security and governance in multi-account environments

[ARC318 – chalk talk]
Designing a multi-account environment for disaster recovery

[COP319 – chalk talk]
Best practices for multi-account environments

Implementation



[SEC201 – chalk talk]
Manage and customize service control policies at scale

[SEC314 – chalk talk]
The journey to least privilege on AWS

[DOP402 – breakout]
Automating cross-account CI/CD pipelines

Discussion



[ARC303 – chalk talk]
Getting Started on AWS for production workloads

[COP303 – chalk talk]
How to prepare your cloud environment for scale and migrations

Hands on



[COP309 – workshop]
Managing multi-account environments following best practices

[NET308 – workshop]
Protect your web applications across multiple AWS accounts

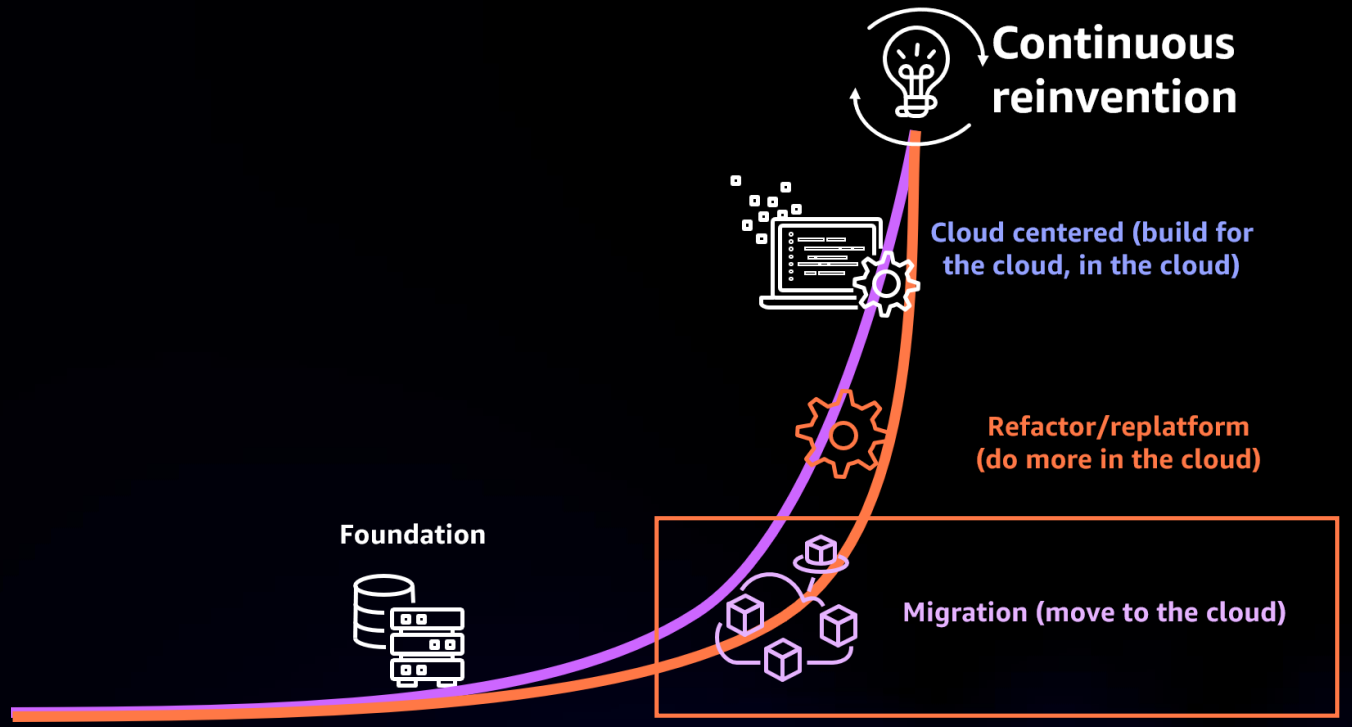
[ENT301 – workshop]
Discover, plan, and migrate at scale

[ENT302 – workshop]
Incremental refactoring: Evolve existing apps with microservices

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Migrations



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Migration methodology

Assess

Rapid discovery

TCO report

Migration Readiness Assessment

Briefings and workshops

Immersion day

Accelerators

Mobilize

Portfolio

Discovery and planning

Migration plan

Business case/ mig. evaluator

Migrate

Migration and modernization experience

Skills/center of excellence

People

Landing zone

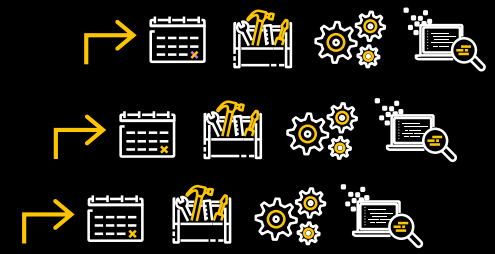
Operating model

Security and compliance

Platform

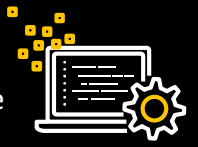
Migrate and modernize

Migrate



Operate and optimize

Modernize



Create a case for change

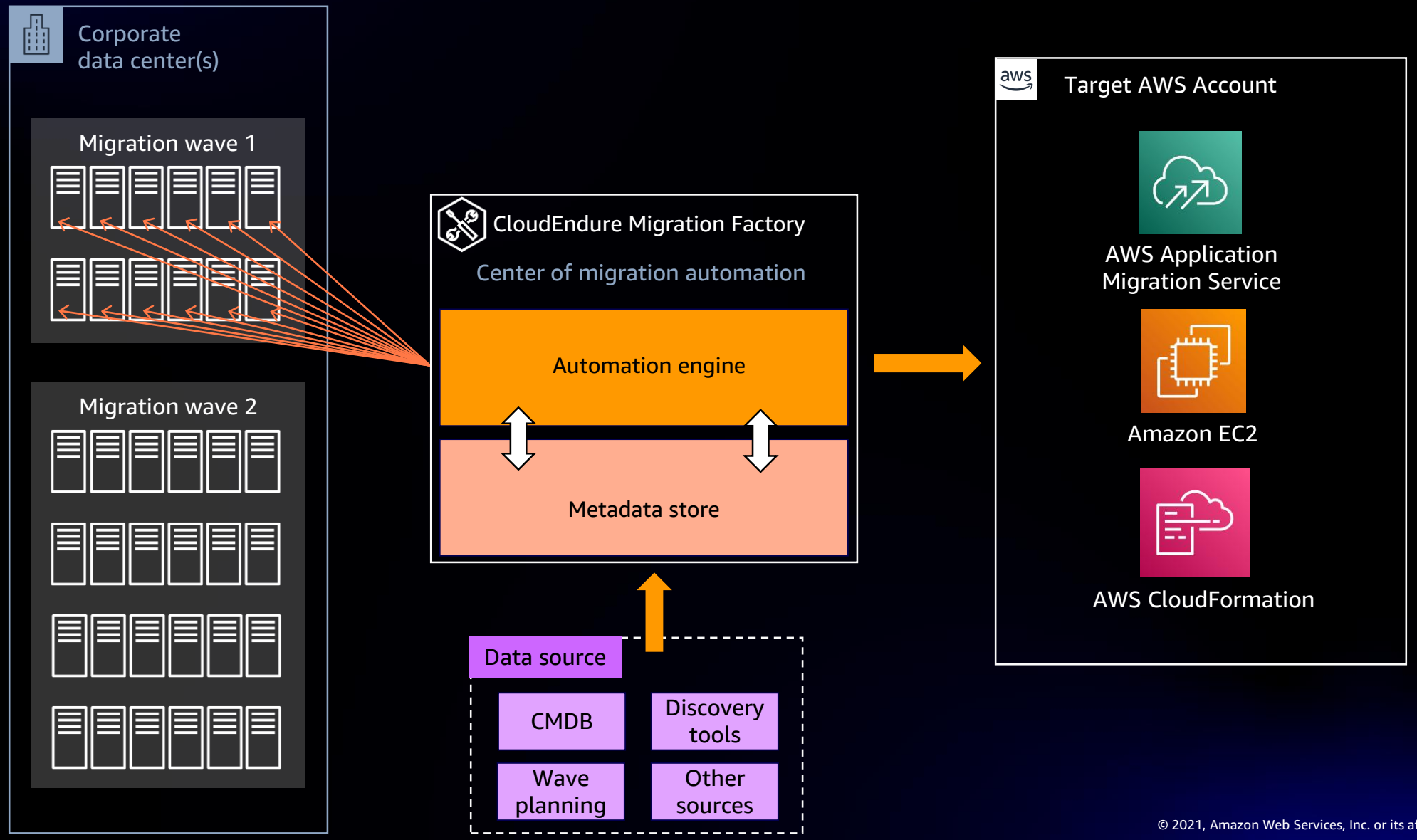
Build readiness through experiences

Accelerate transformation at scale

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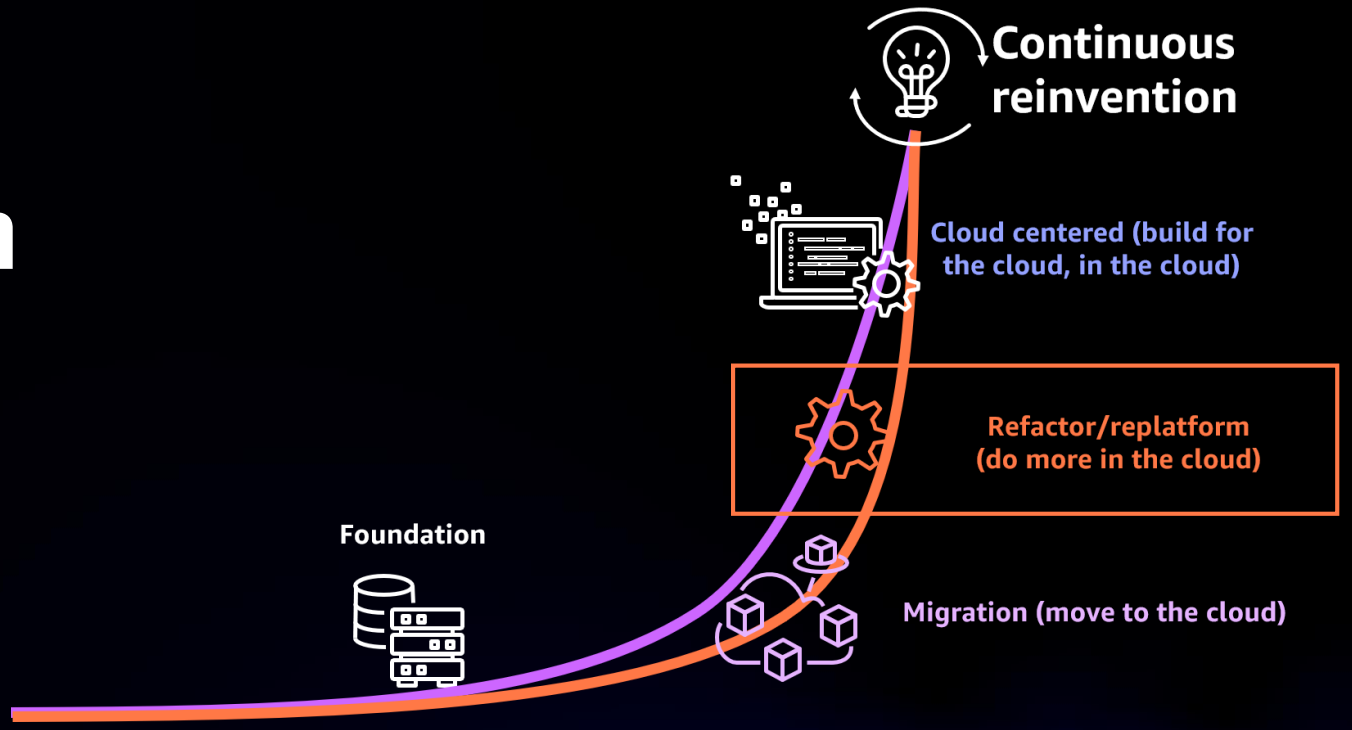
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Factory-based approach for large migrations



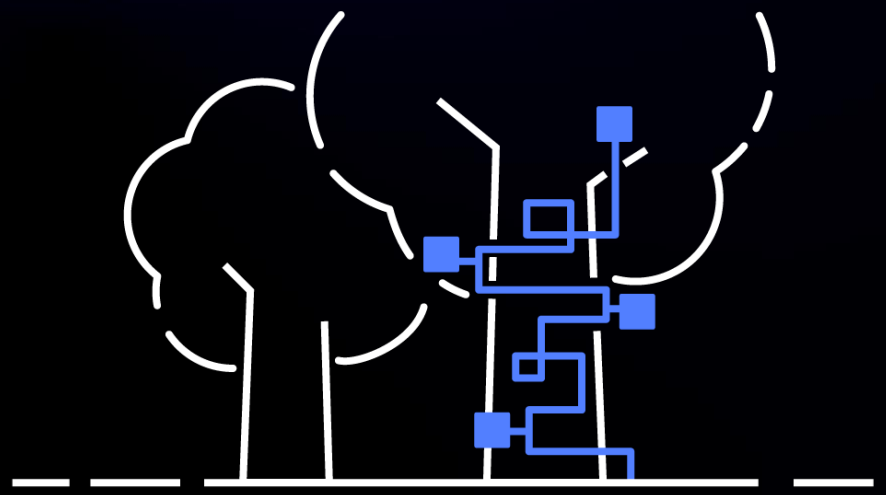
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Refactor/Replatform



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Martin Fowler's Strangler Fig pattern



"[G]radually create a new system around the edges of the old, letting it grow slowly over several years until the old system is strangled."

Martin Fowler, Thoughtworks
June 29, 2004

Incrementally migrate a legacy system, gradually replacing specific pieces of functionality with new applications and services

Features from the legacy system are replaced by the new system features eventually, strangling the old system and allowing you to decommission it

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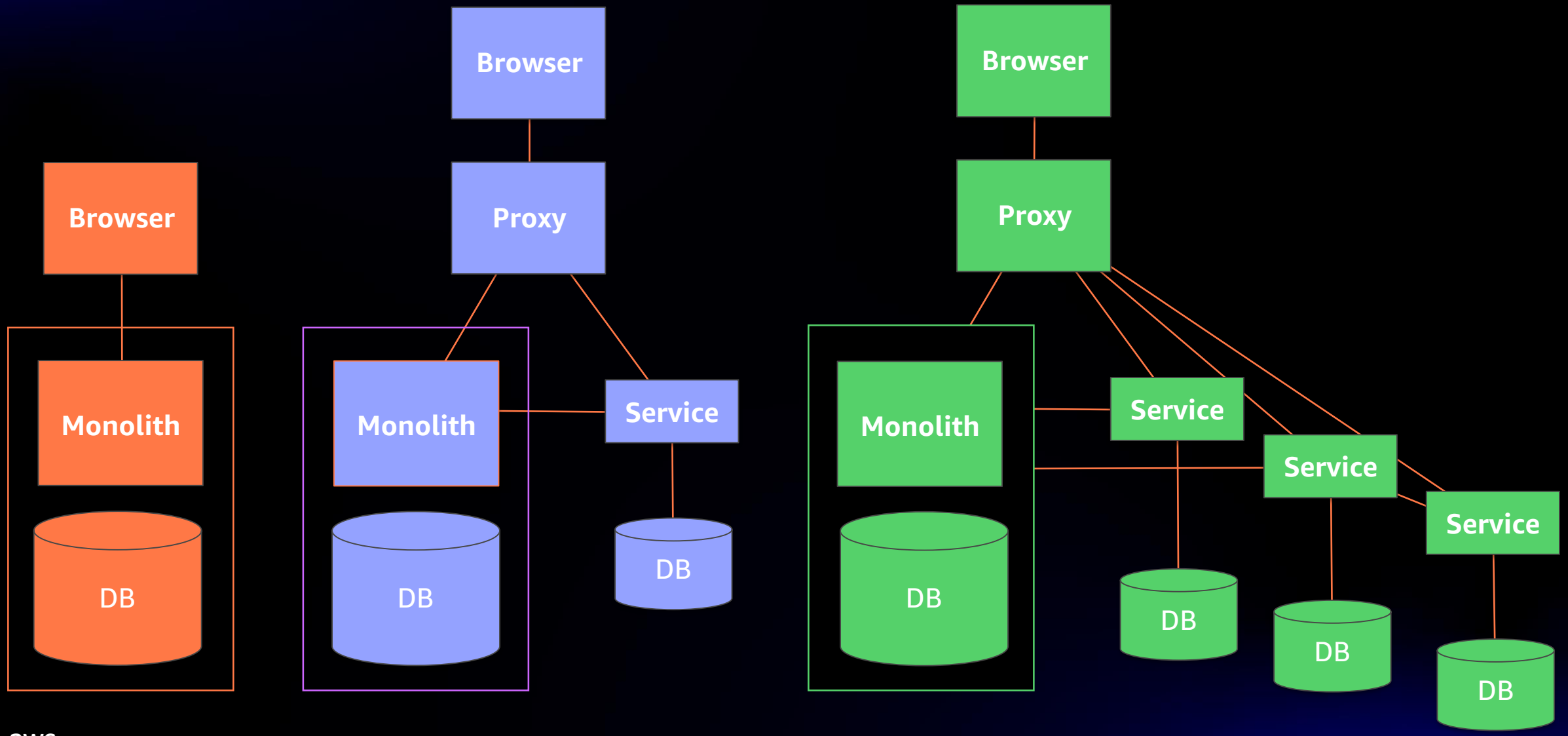
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On-premises infrastructure mapped to AWS

Technology stack	On-premises solution	AWS
Network	VPN, MPLS	Amazon VPC, AWS VPN, AWS Direct Connect
Security	Firewalls, NACLs, routing tables, disk encryption, SSL, IDS, IPS	AWS security groups, AWS CloudHSM, NACLs, routing tables, disk encryption, SSL, IDS, IPS
Storage	DAS, SAN, NAS, SSD	Amazon EBS, Amazon S3, Amazon EC2 instance storage (SSD), GlusterFS
Computer	Hardware, virtualization	Amazon EC2
Content delivery	CDN solutions	Amazon CloudFront
Databases	IBM Db2, MS SQL Server, MySQL, Oracle, PostgreSQL, MongoDB, Couchbase	Amazon RDS, Amazon DynamoDB, MS SQL Server, MySQL, PostgreSQL, Oracle, MongoDB, Couchbase
Load balancing	Hardware and software load balancers, HAProxy	Elastic Load Balancing (ELB), software load balancers, HAProxy
Scaling	Hardware and software clustering, Apache ZooKeeper	AWS Auto Scaling, software clustering, Apache ZooKeeper
Domain name services	DNS providers	Amazon Route 53

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Creating a new system around the edges

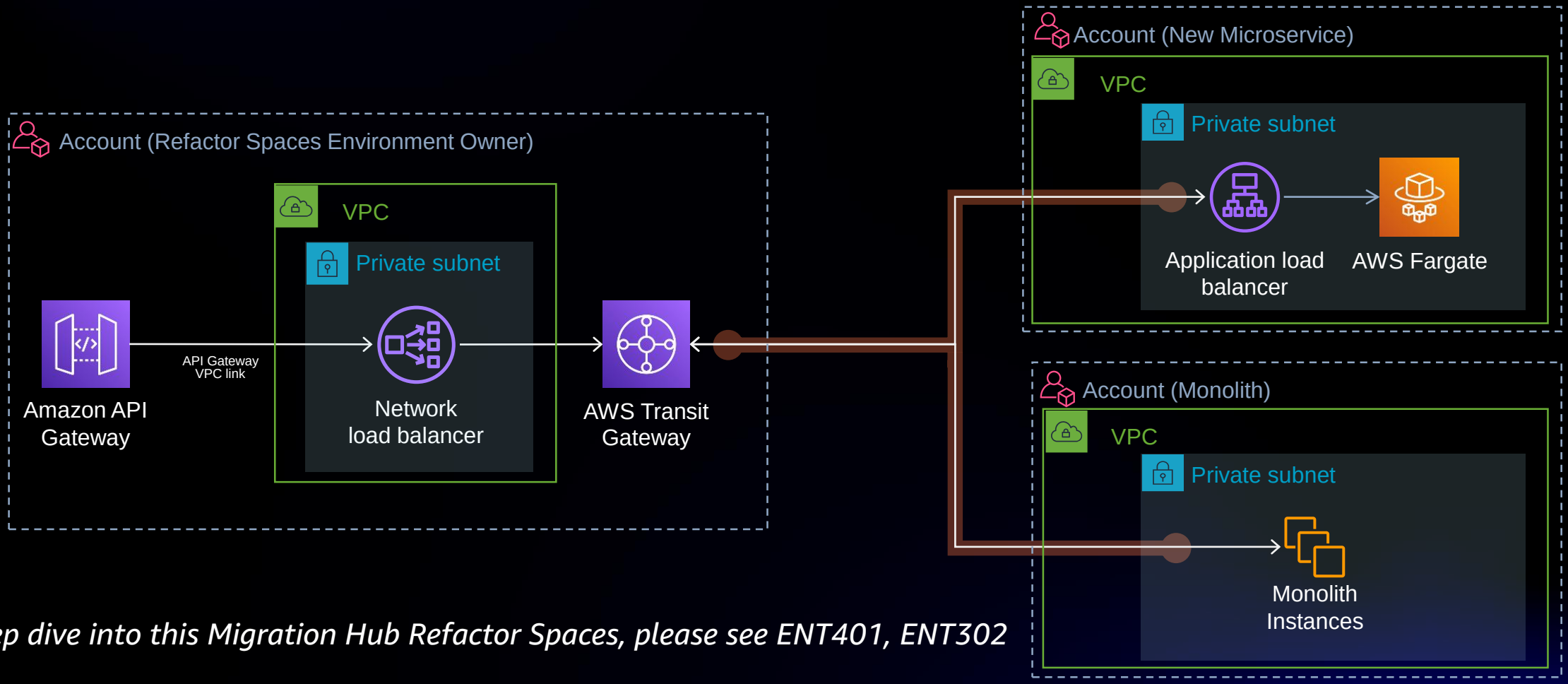


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Introducing Migration Hub Refactor Spaces

Preview

Create Environment → Add Accounts → Create Application → Create Services w/ VPC or Lambda → Add Routes

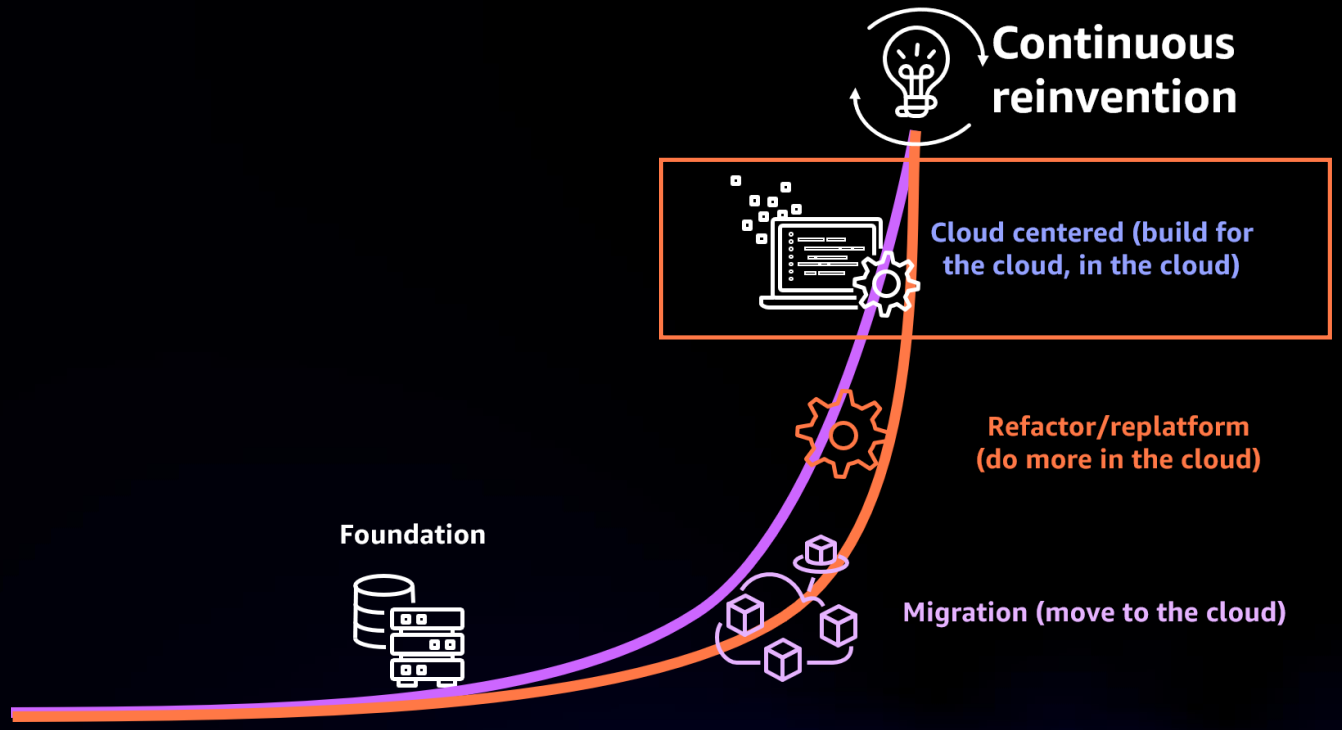


For deep dive into this Migration Hub Refactor Spaces, please see ENT401, ENT302

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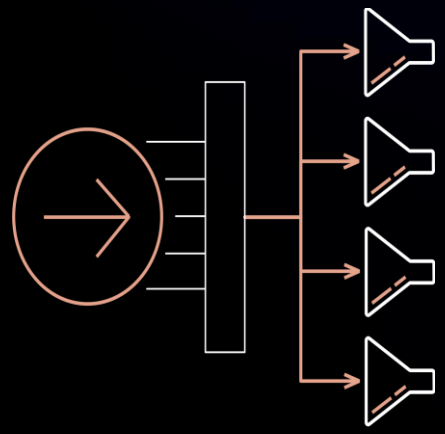
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Cloud centered



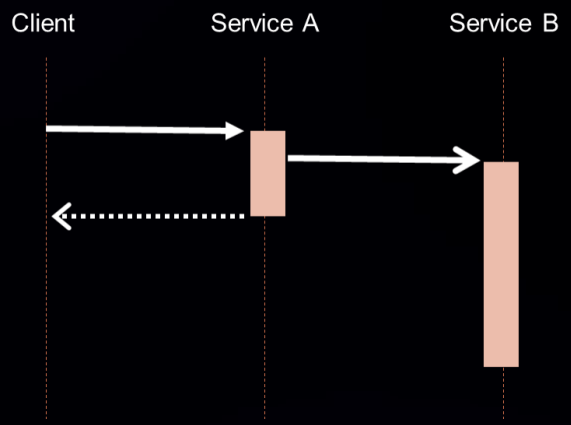
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Event-driven architecture



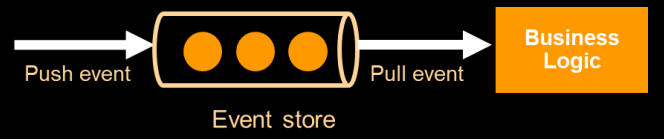
Event routers

Abstract producers and consumers from each other



Asynchronous events

Improve responsiveness and reduce dependencies



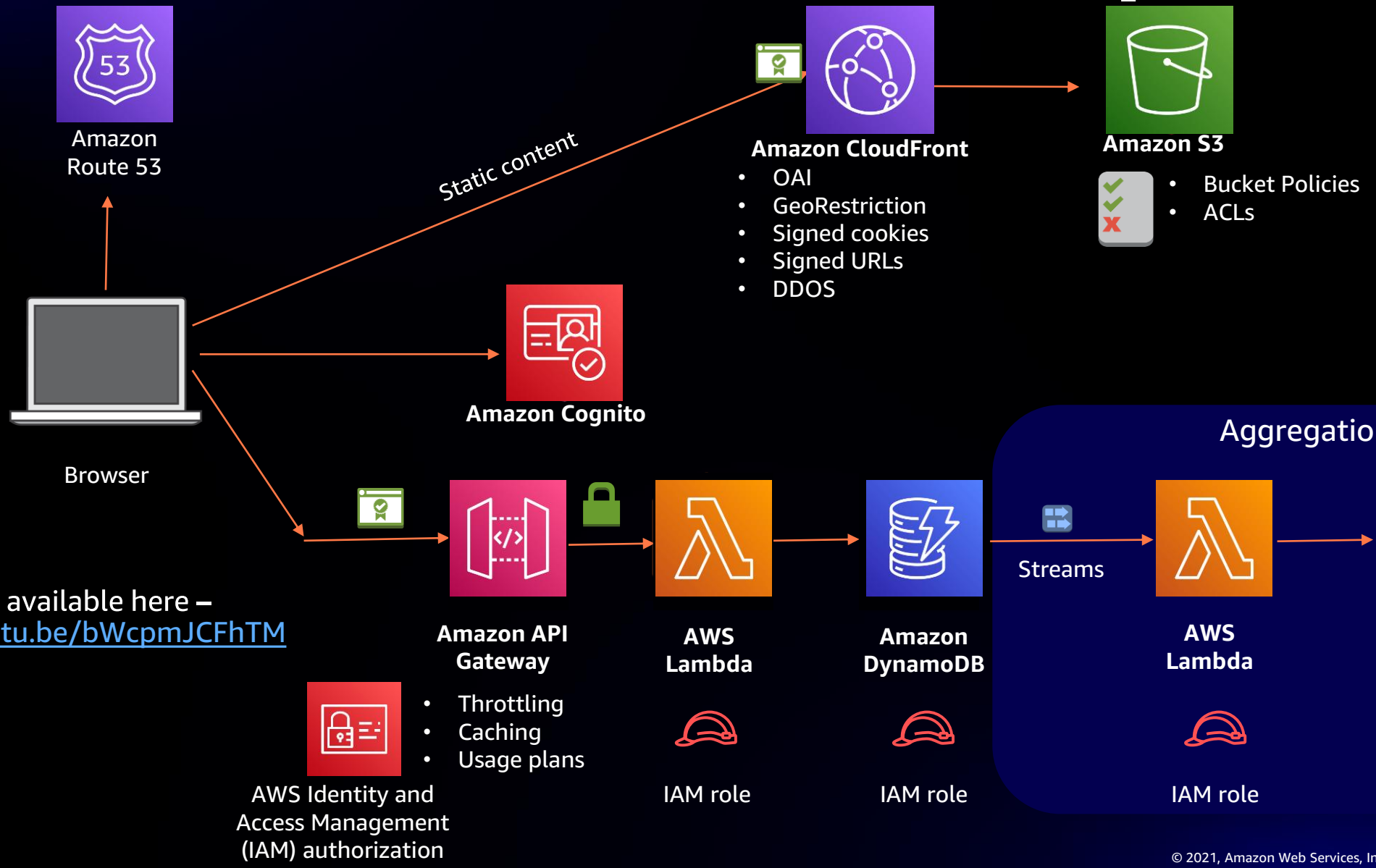
Event stores

Buffer messages until services are available to process

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Cloud-centered architecture example



Full session available here – https://youtu.be/bWcpmJCFhTM

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T-Mobile's transformation journey

Steve Hull



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About The Un-carrier



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Technology transformation

T-Mobile has leveraged **AWS** as a key element of our transformation strategy for bringing these values to life in service of our customers

- Listening to our customers
- Diversity, equality, and inclusivity
- Innovation
- Continuous learning

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Public cloud concerns



Cost



Security and privacy

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Public cloud goals





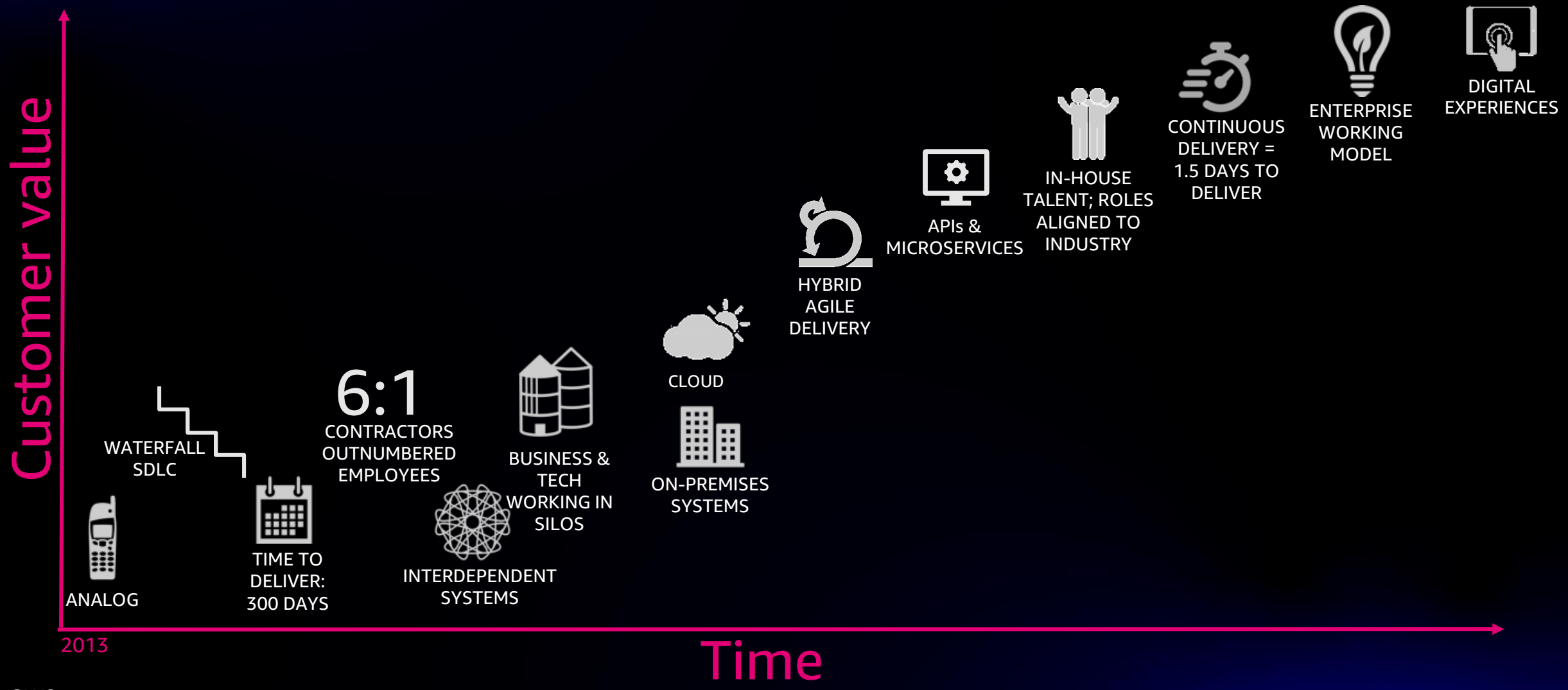




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T-Mobile's transformation journey



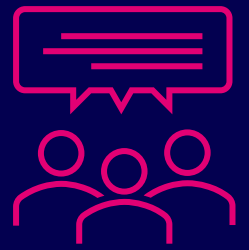
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Keys to success

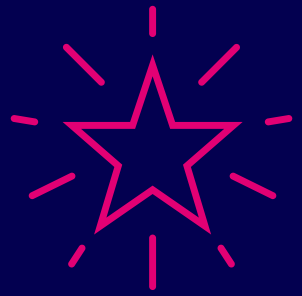
Executive sponsorship



Cloud governance board



Cloud center of excellence



Culture of learning and iterating



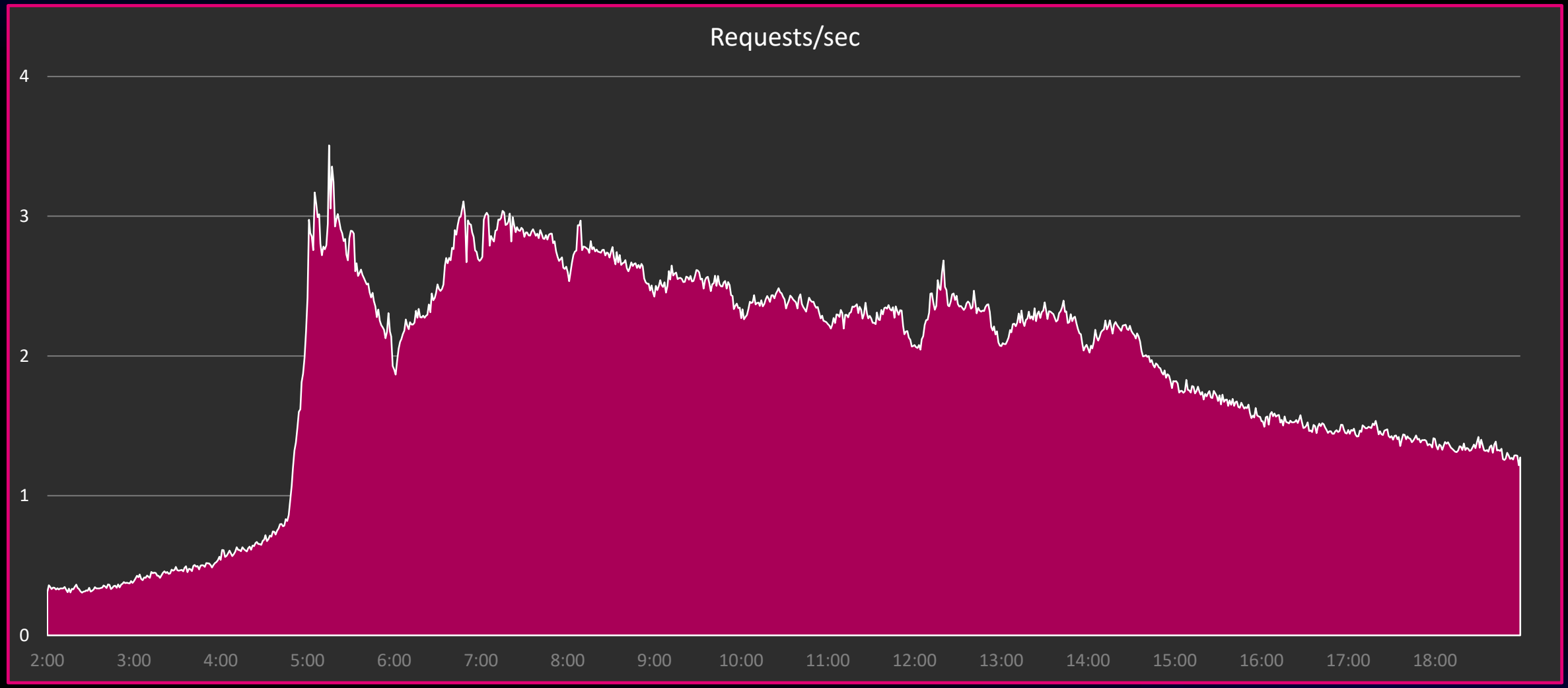
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NPI

New Product Initiatives

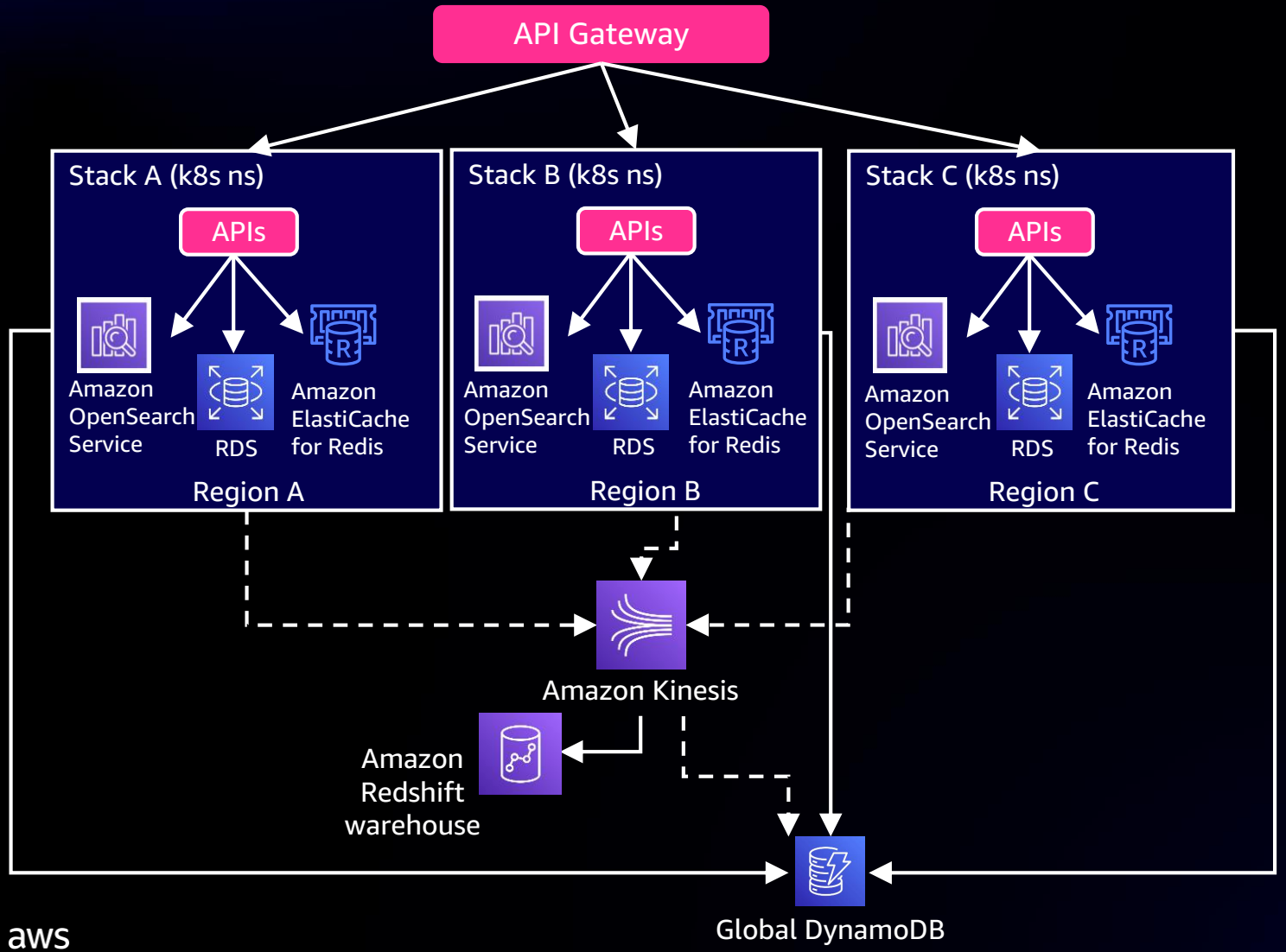
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Case study: NPI



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Case study: NPI



- Independent stacks reside in one or more Regions
- Each stack is fully set up with k8s-based microservices to support E2E transactions
- Multi-AZ AWS services in each stack – Amazon OpenSearch Service, Amazon ElastiCache for Redis, and Amazon RDS
- Global DynamoDB tables for cross-Region critical data availability
- Real-time streaming to Amazon Redshift for operational and analytical purposes
- Allows canary full-stack deployments using traffic routing
- “Disposable” stacks

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Case study: Kafka → MSK

New workload was deployed to AWS to provide critical data for device troubleshooting (2015)

Lots of firsts for T-Mobile

- First deployment of Kafka
- First iteration of immutable infrastructure
- First Docker container in production
- Highest level of security

Learnings over the last six years

- Kafka can handle some serious workloads and is an amazing piece of software
- Zone affinity can be a top-level design decision to minimize inter-zone data transfer costs
- Over time, engineers move on, and new operators need to be trained
- T-Mobile **can** manage Kafka clusters, but it's not the best thing we can do with our time

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Kafka upgrade – Key drivers

Stability

Latest stable version

Security

Use the opportunity to do a security review and implement the latest guidelines

Operational ease

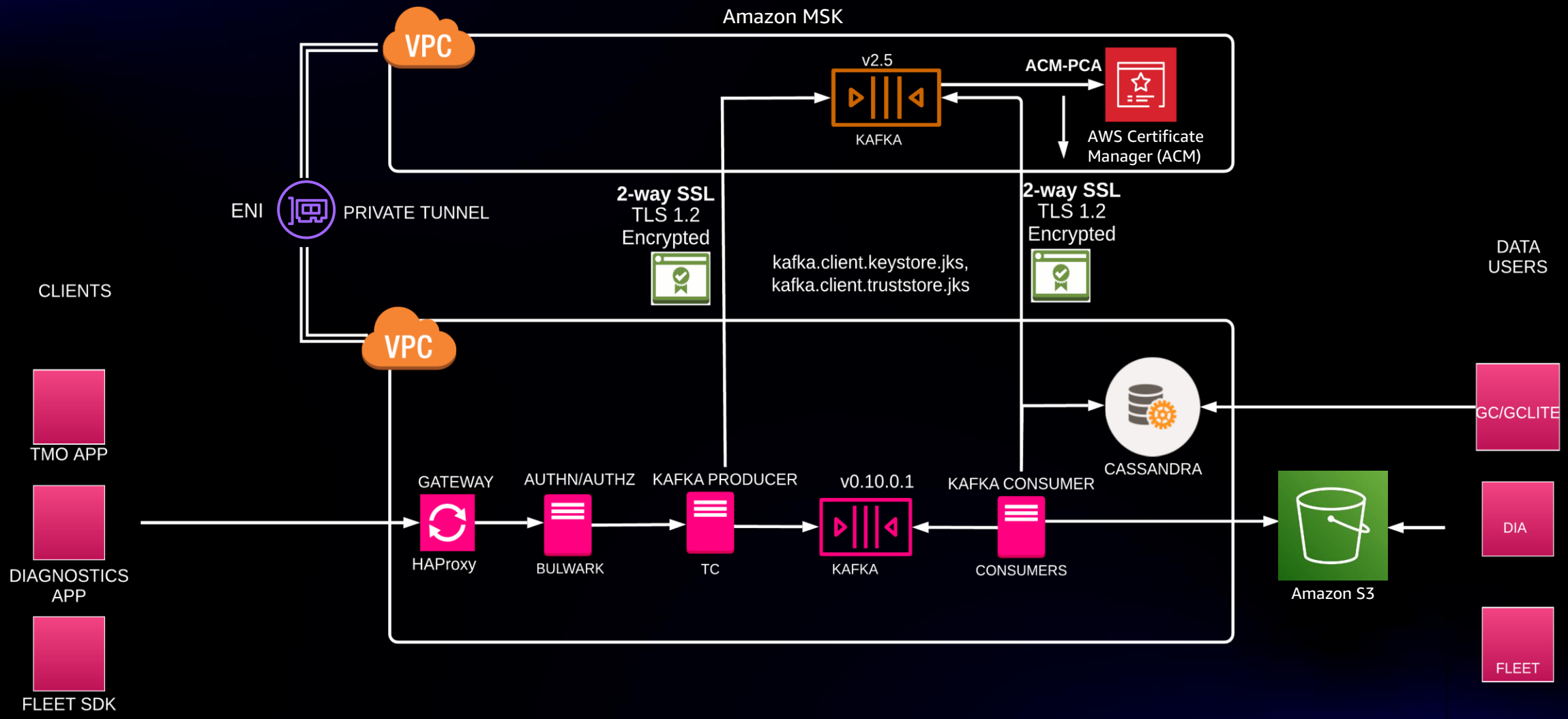
Convert from a self-managed to a managed service solution

Unlocking new capability

Support more use cases and more partners

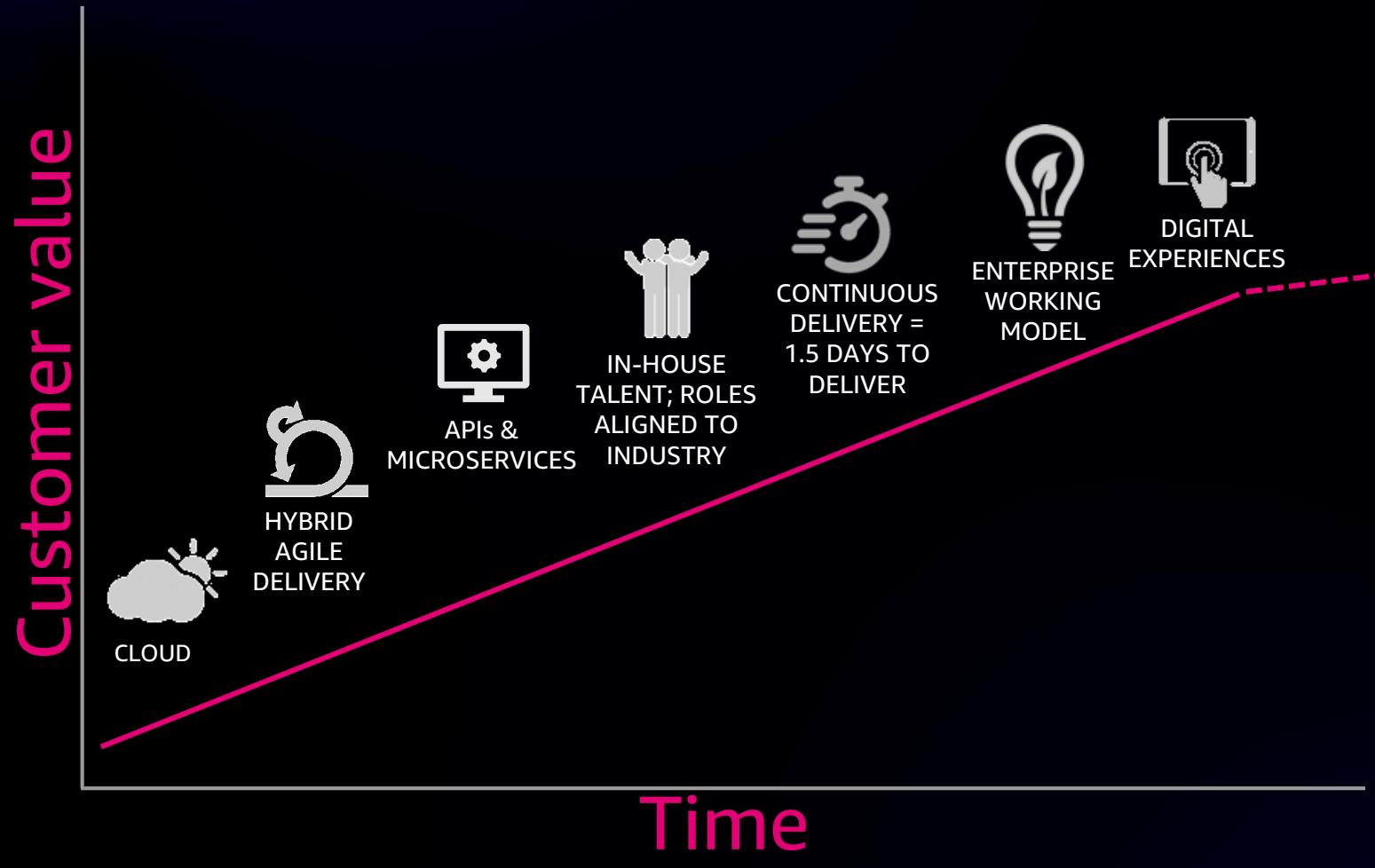
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Kafka upgrade – Architecture



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The journey never ends



- Quarterly releases/year to 1,000s/day
- 0 to 30K+ microservices
- Ops to DevOps
- Reduced shared services
- Websites, ecommerce, social messaging, data analytics

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Thank you!

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