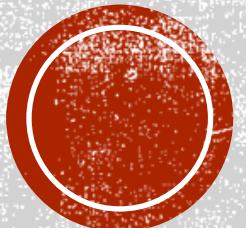


# CloudSiksha

**AWS ARCHITECTURE**

S.Suresh



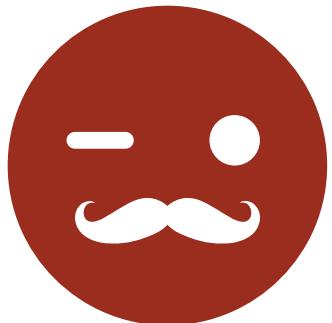
# ABOUT THE TRAINER

- S.Suresh, Founder & CEO of CloudSiksha
- 30 yrs of experience in IT industry
- Worked in major IT companies like IBM, Wipro and Oracle
- Range of assignments including Developer, Architect and Manager
- AWS Solution Architect Professional Certified
- Cloud, Storage and Linux the focus areas



# DISCLAIMER

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All brand names, trademarks, logos are the property of the respective owners



All the images, unless credited, have been taken from the Amazon AWS website

# IMPORTANT DISCLAIMER

- We will be working on the labs using the free tier provided by Amazon. While we will try to ensure that none of the labs cross the free tier threshold, it is possible for various reasons that this threshold could be breached and the user could be charged. We will not be responsible for any additional charge that may incur in your account for any reason.





This course is about AWS Infrastructure



How do you design infrastructure in order to host an application?



How do you provide isolation when required?



How do you secure your infrastructure?



How do you provide high availability & fault tolerance?



How to design for Hybrid cloud cases?



How do you monitor the performance of your infrastructure?

# SOLUTION ARCHITECT



# **ABOUT AMAZON AWS**



# AMAZON WEB SERVICES

- Started in 2004
  - SQS Service Offered
  - Storage Service in 2006
- Large suite of services
  - Keeps increasing at a rapid pace
- The largest Public Cloud Service provider

## Amazon Maintains Dominant Lead in the Cloud Market

Worldwide market share of leading cloud infrastructure service providers in Q3 2024\*



Cloud infrastructure service revenues in Q3 2024

\$84B

(+23% y-o-y)

# CLOUD MARKET SHARE



DISCOVER  
HOW WE DO IT

Global Infrastructure



Regions



Availability Zones



Local Zones



Points of Presence



Network



Custom Hardware



Services



Share

# AWS GLOBAL INFRASTRUCTURE REGIONS



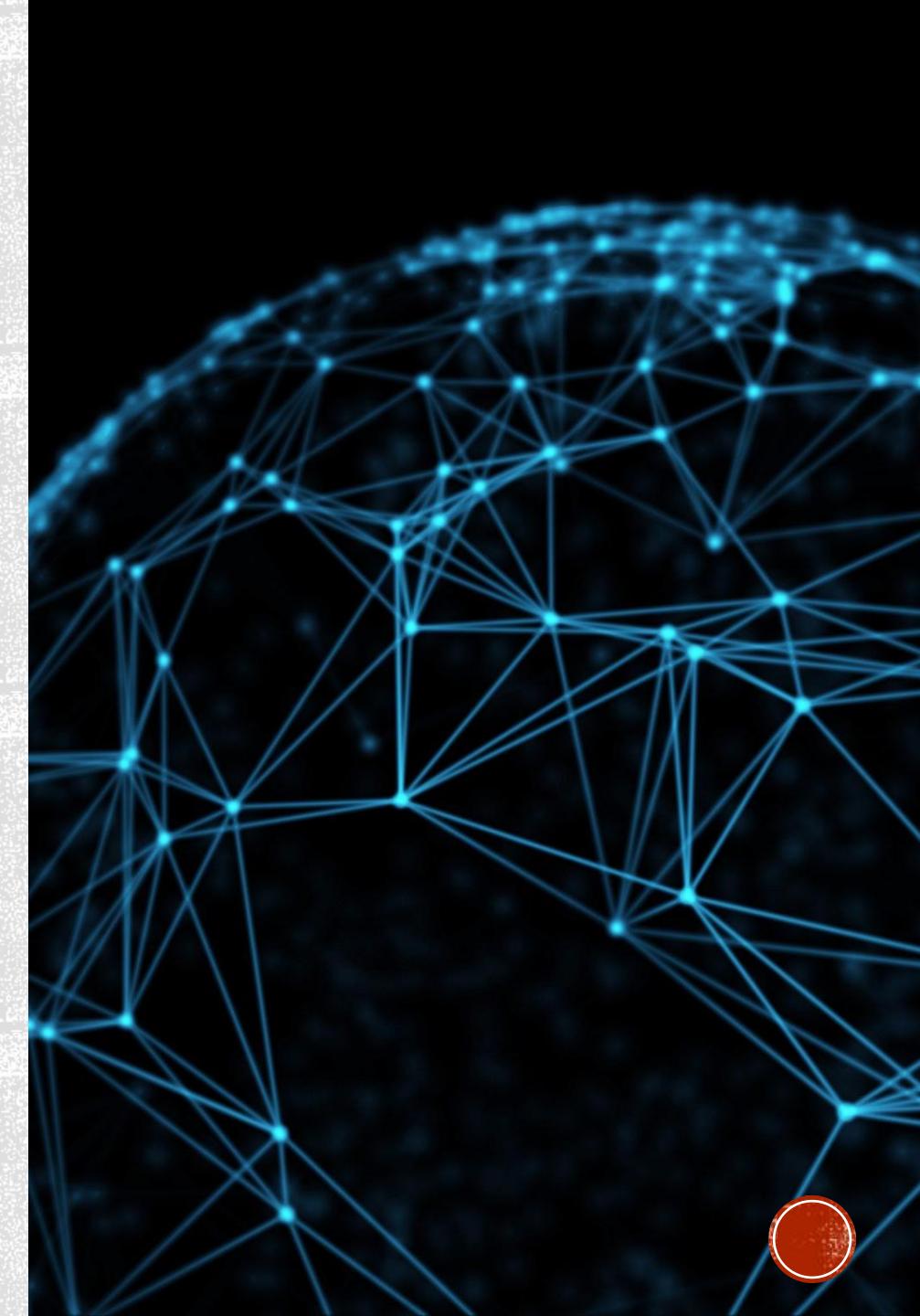
# AWS – AVAILABILITY ZONES

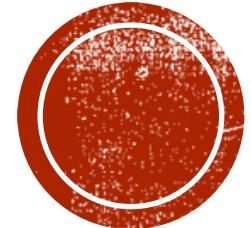
- <http://docs.aws.amazon.com/AWSEC2/latest/UserGuide/using-regions-availability-zones.html>
- Global Infrastructure:
  - <https://aws.amazon.com/about-aws/global-infrastructure/>



# LOCAL ZONES & WAVELENGTH ZONES

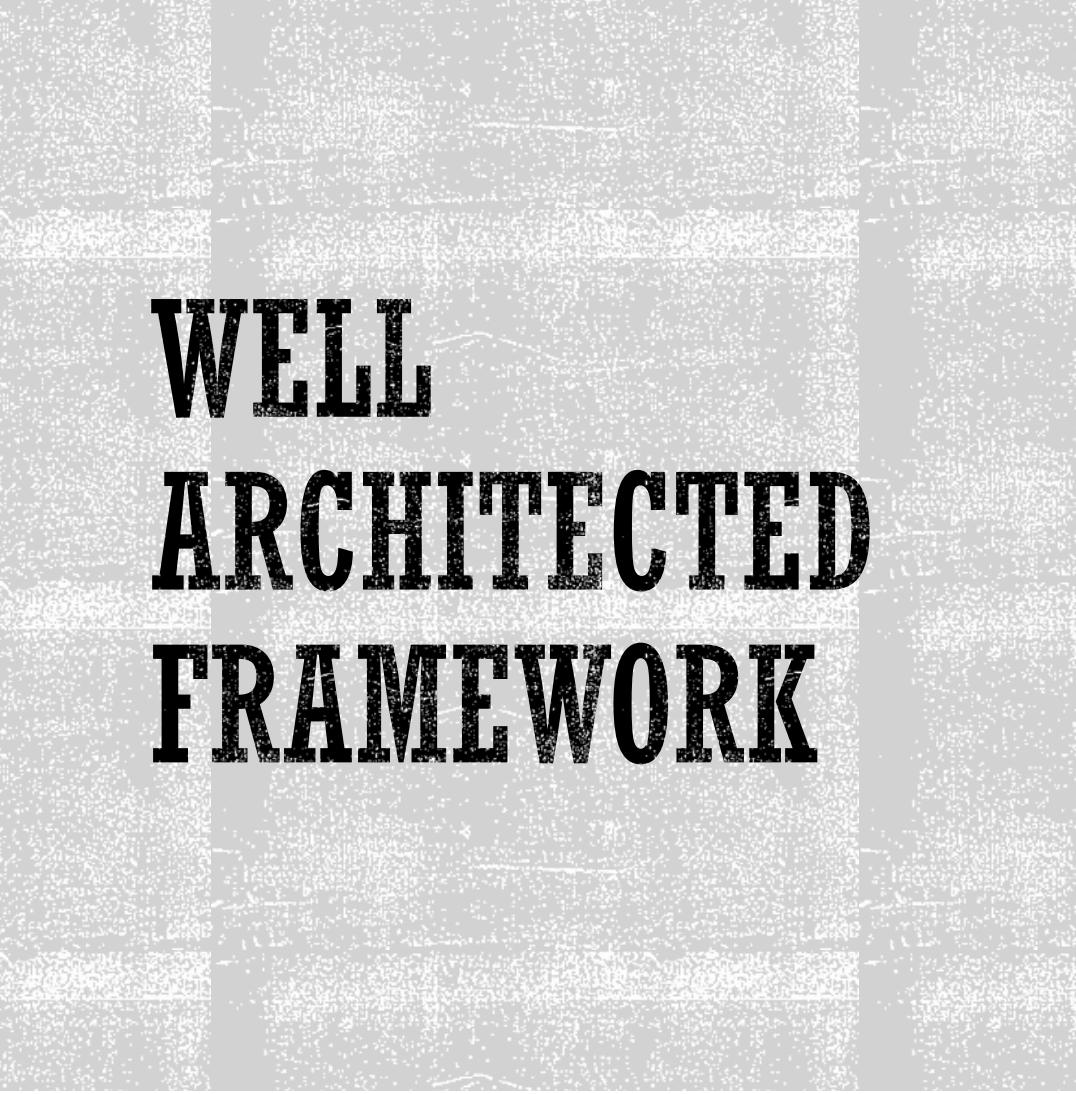
- Local Zones
  - AWS Local Zones are a type of AWS infrastructure deployment that place compute, storage, database, and other select services closer to large population, industry, and IT centers, enabling you to deliver applications that require single-digit millisecond latency to end-users
- Wavelength Zones
  - Wavelength Zones are AWS infrastructure deployments that embed AWS compute and storage services within telecommunications providers' data centers at the edge of the 5G network
  - Application traffic reaches application servers running in Wavelength Zones without leaving the mobile providers' network.





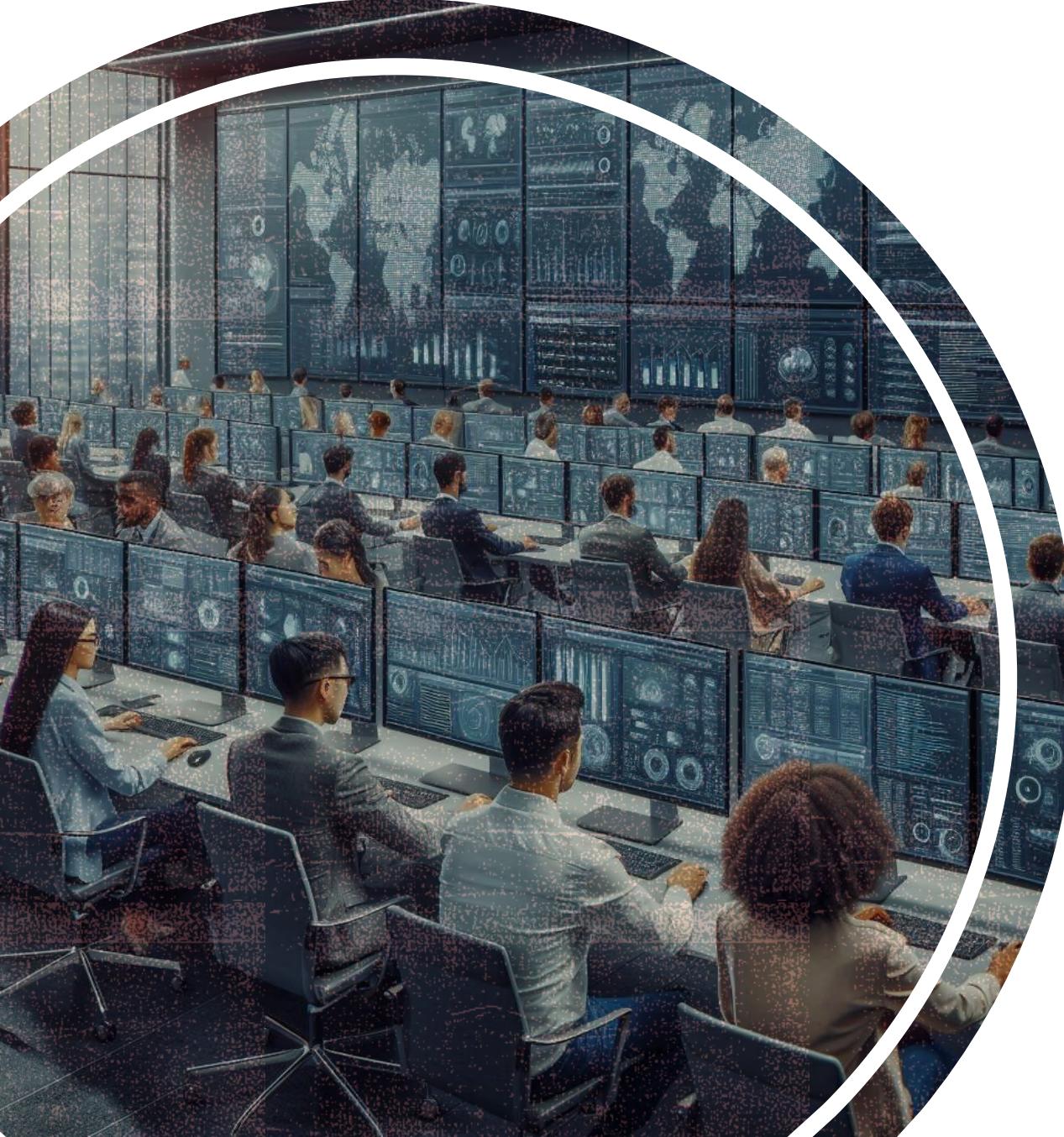
# ARCHITECTING IN AWS





# WELL ARCHITECTED FRAMEWORK

- When architecting on AWS, AWS suggests that we use their Well Architected Framework
  - <https://aws.amazon.com/architecture/well-architected/?wa-lens-whitepapers.sort-by=item.additionalFields.sortDate&wa-lens-whitepapers.sort-order=desc>
- Six Pillars
  - Operation Excellence
  - Reliability
  - Performance Efficiency
  - Security
  - Cost Optimization
  - Sustainability
- Well Architected Lenses
  - Architectural Guidance to specific industries



# OPERATIONAL EXCELLENCE

- Define standards to manage daily operations
- Running and monitoring of all systems
- Continuous improvements in process and procedures
- Automating changes
- Responding to events

A photograph showing a person from the waist down, sitting at a desk. The desk is covered with numerous colorful sticky notes of various shapes and sizes, some with handwritten text and arrows. The person is wearing a grey ribbed sweater over a white shirt and plaid pajama bottoms. They are looking down at the notes on the desk.

# RELIABILITY

- How to recover quickly from a failure
- Distributed system design
- Recovery planning
- Adapting to changing requirements





# PERFORMANCE EFFICIENCY

- Selecting resource types
- Meeting the performance requirements
- Monitoring performance efficiency
- Maintaining efficiency when business needs evolve



# SECURITY

- Infrastructure Security
- Data Integrity and Data Security
- Identity and Access Management
- Controls to detect security events
- Responding to security events





# COST OPTIMIZATION

- Understanding spending over time
- Controlling fund allocation
- selecting resources of the right type and quantity
- Scaling to meet business needs without overspending



# SUSTAINABILITY

- Understanding impact, and
- Maximizing utilization to minimize required resources
- Reduce downstream impacts

# GENERAL DESIGN PRINCIPLES

- Stop guessing your capacity needs
- Test systems at production scale
- Automate with architectural experimentation in mind
- Consider evolutionary architectures
- Drive architectures using data
- Improve through game days





# FINANCIAL LENS

- General Design Principles for Financial Industry
  - Documented operational planning
  - Automated infrastructure and application deployment
  - Security by design
  - Automated Governance

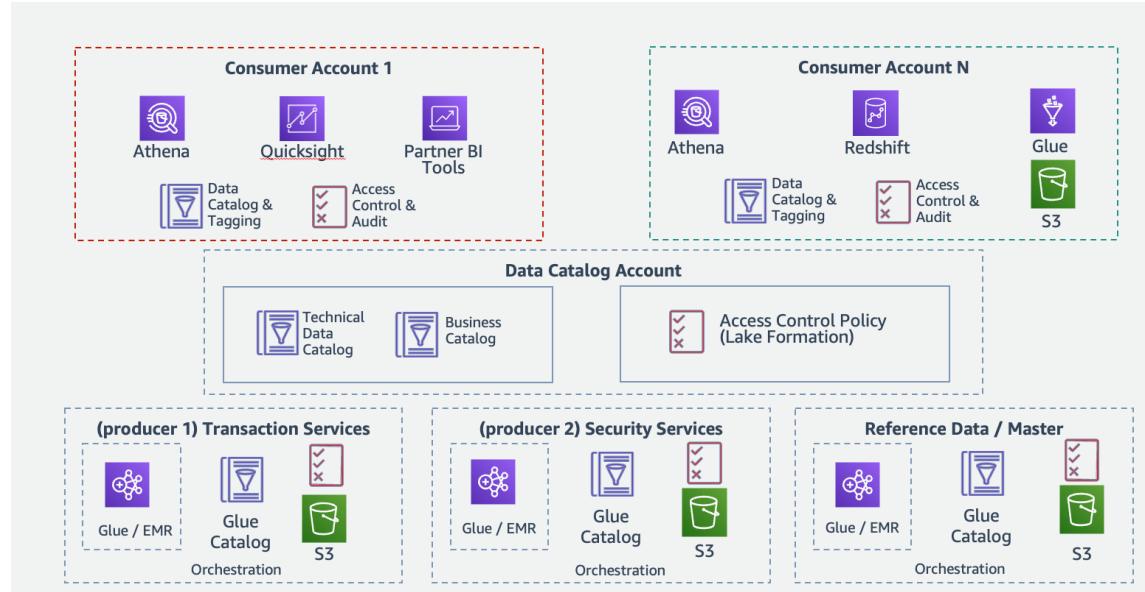


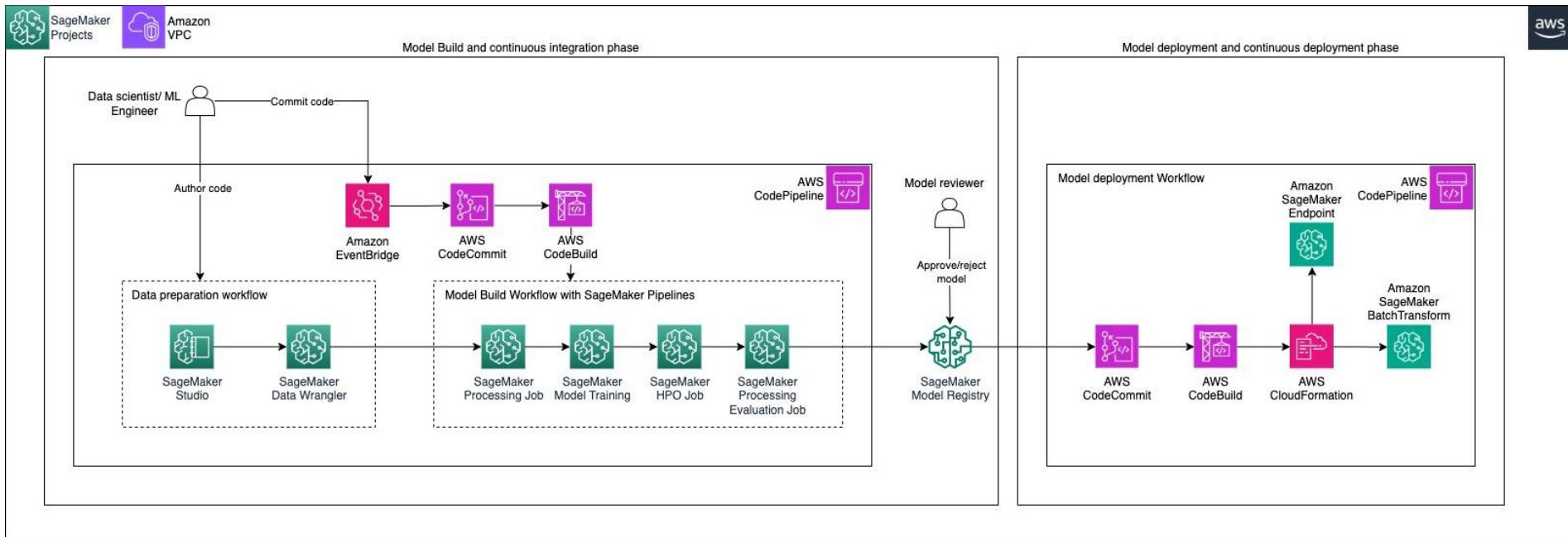


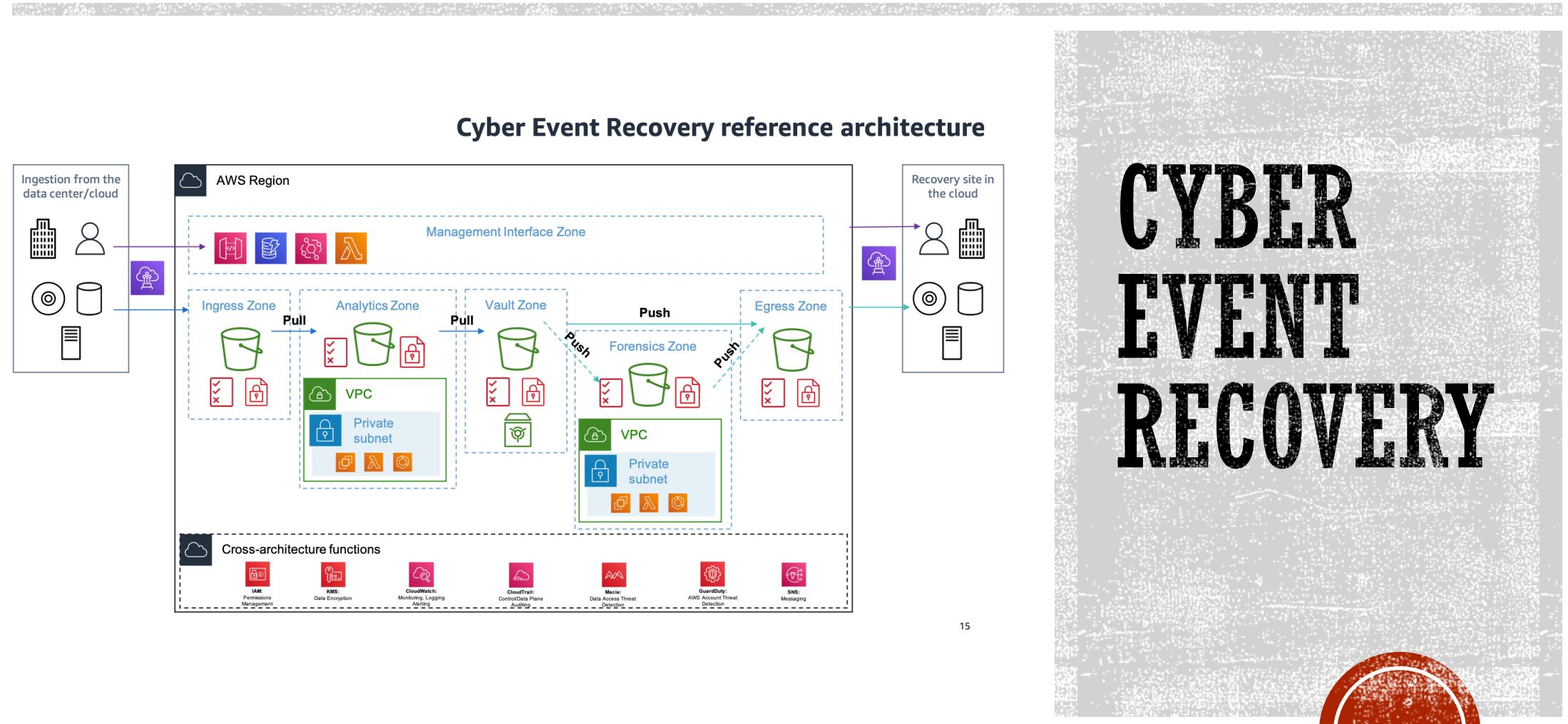
# FINANCIAL DATA MESH

- Provide access to data and to extract additional value from data that is generated or acquired across their multiple business units
  - Historical market data, alternative investment data, transaction and business process data
- Data mesh refers to any architectural framework that enables access to a diverse set of data across the enterprise through a distributed and decentralized ownership model
- Data mesh reference architecture is built around the following architectural principles
  - Distributed domain-driven architecture
  - Data as a product
  - Federated data governance
  - Common access and self-serve data

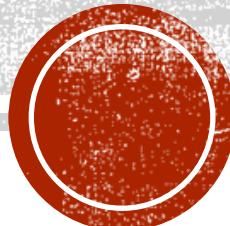


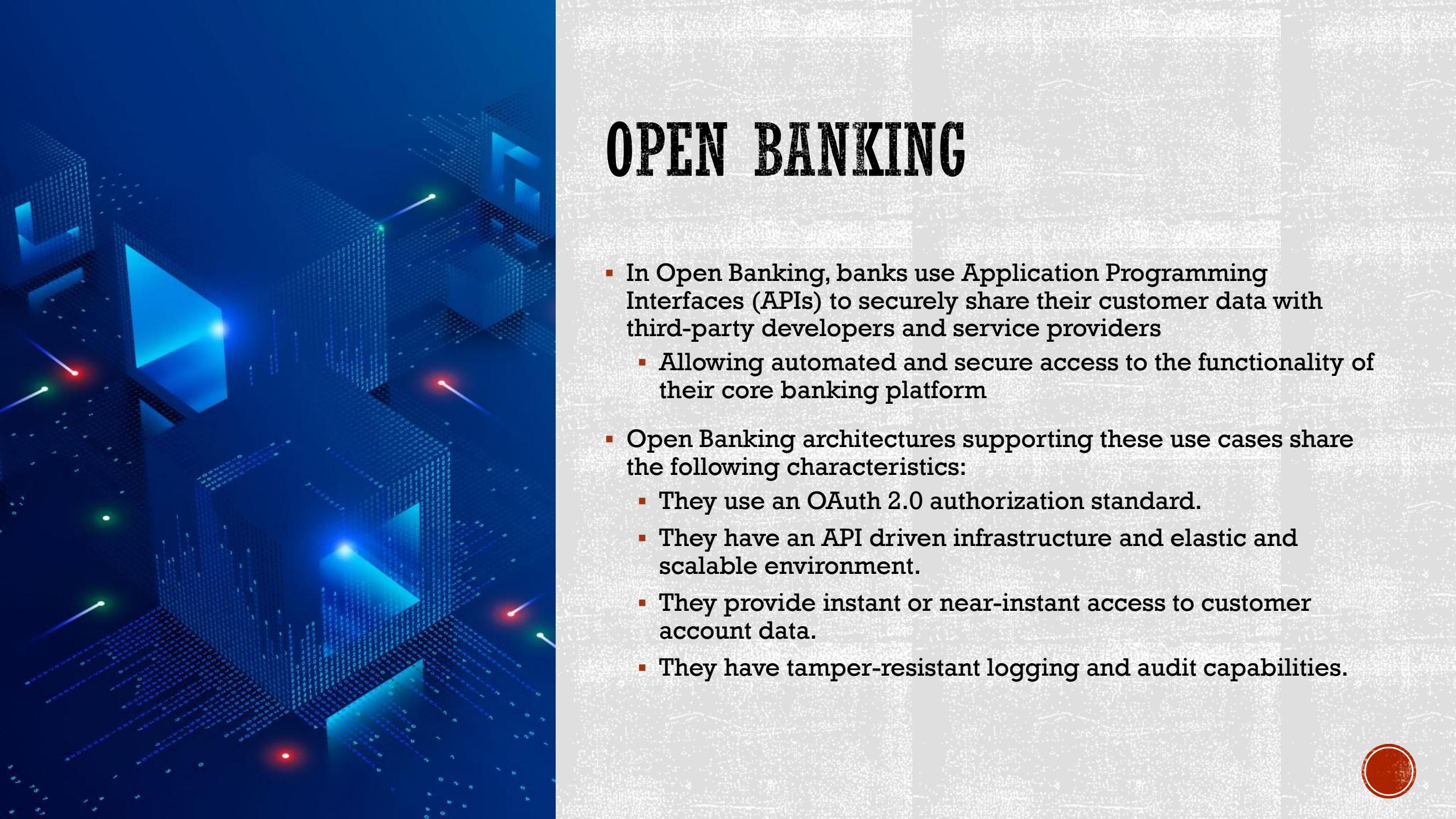






# CYBER EVENT RECOVERY

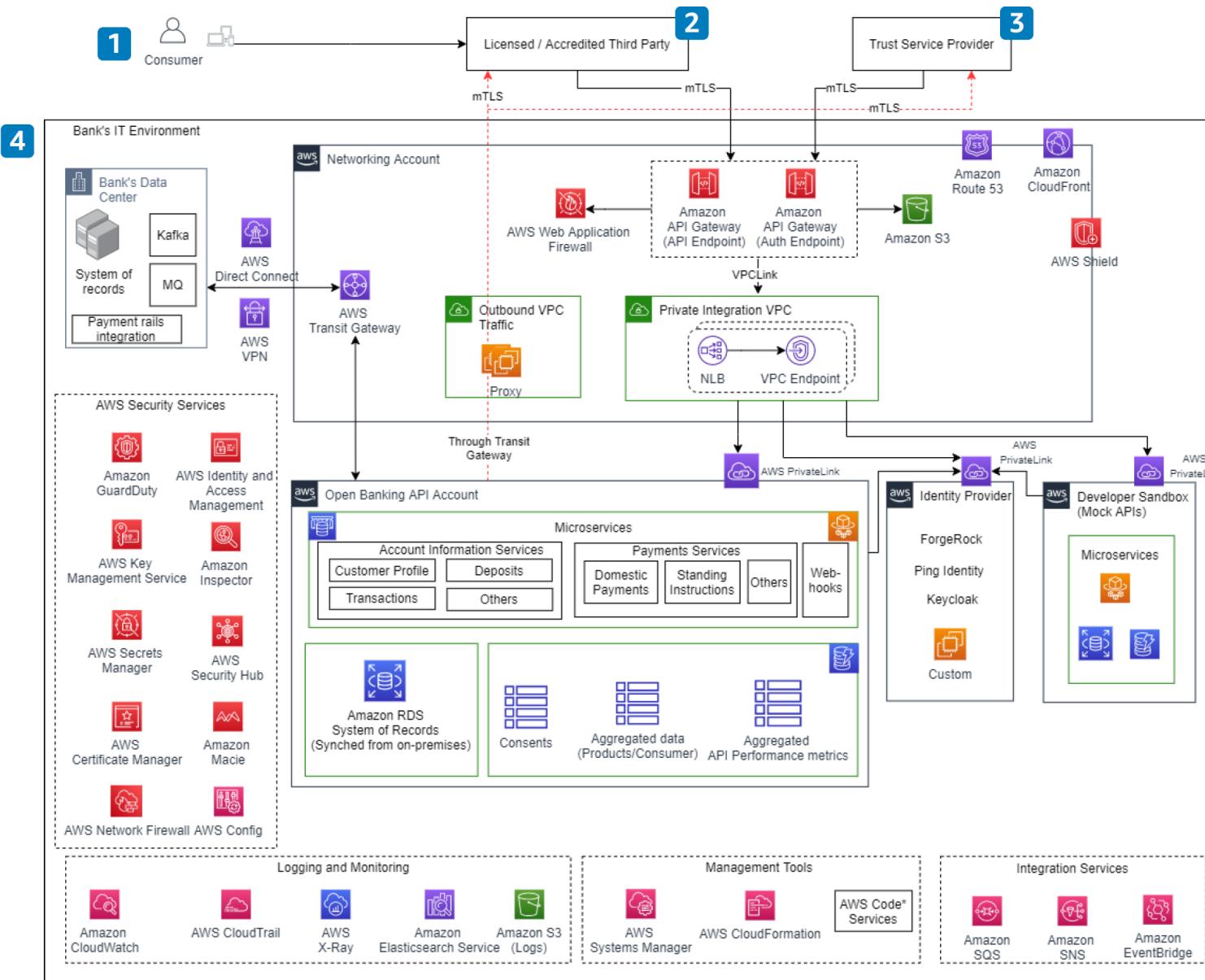




# OPEN BANKING

- In Open Banking, banks use Application Programming Interfaces (APIs) to securely share their customer data with third-party developers and service providers
  - Allowing automated and secure access to the functionality of their core banking platform
- Open Banking architectures supporting these use cases share the following characteristics:
  - They use an OAuth 2.0 authorization standard.
  - They have an API driven infrastructure and elastic and scalable environment.
  - They provide instant or near-instant access to customer account data.
  - They have tamper-resistant logging and audit capabilities.

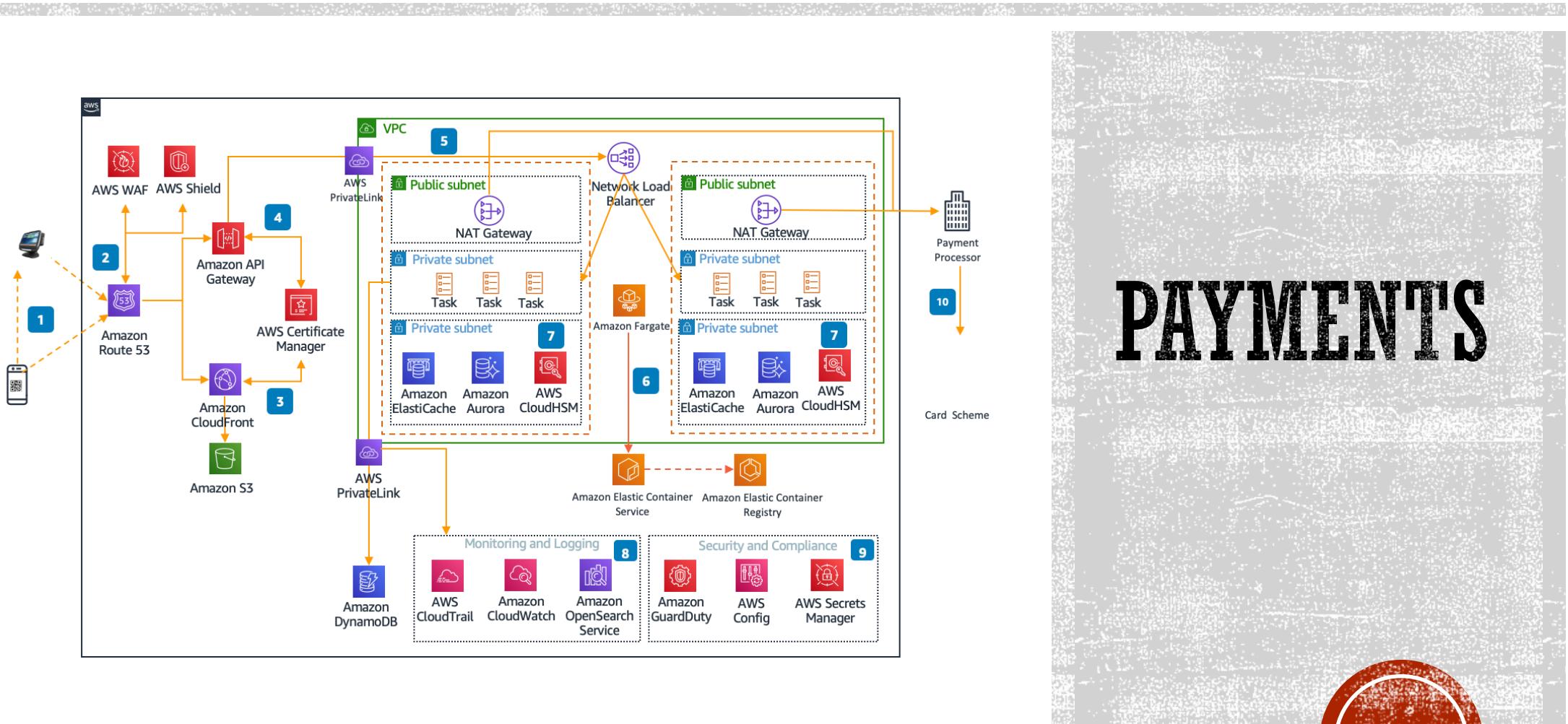
# OPEN BANKING - REFERENCE ARCHITECTURE



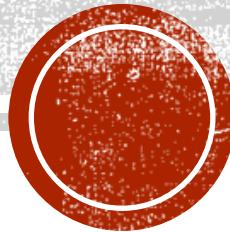
A photograph showing a person's hand holding a silver smartphone. In the background, a payment terminal with a card slot is visible. The overall theme is digital payment technology.

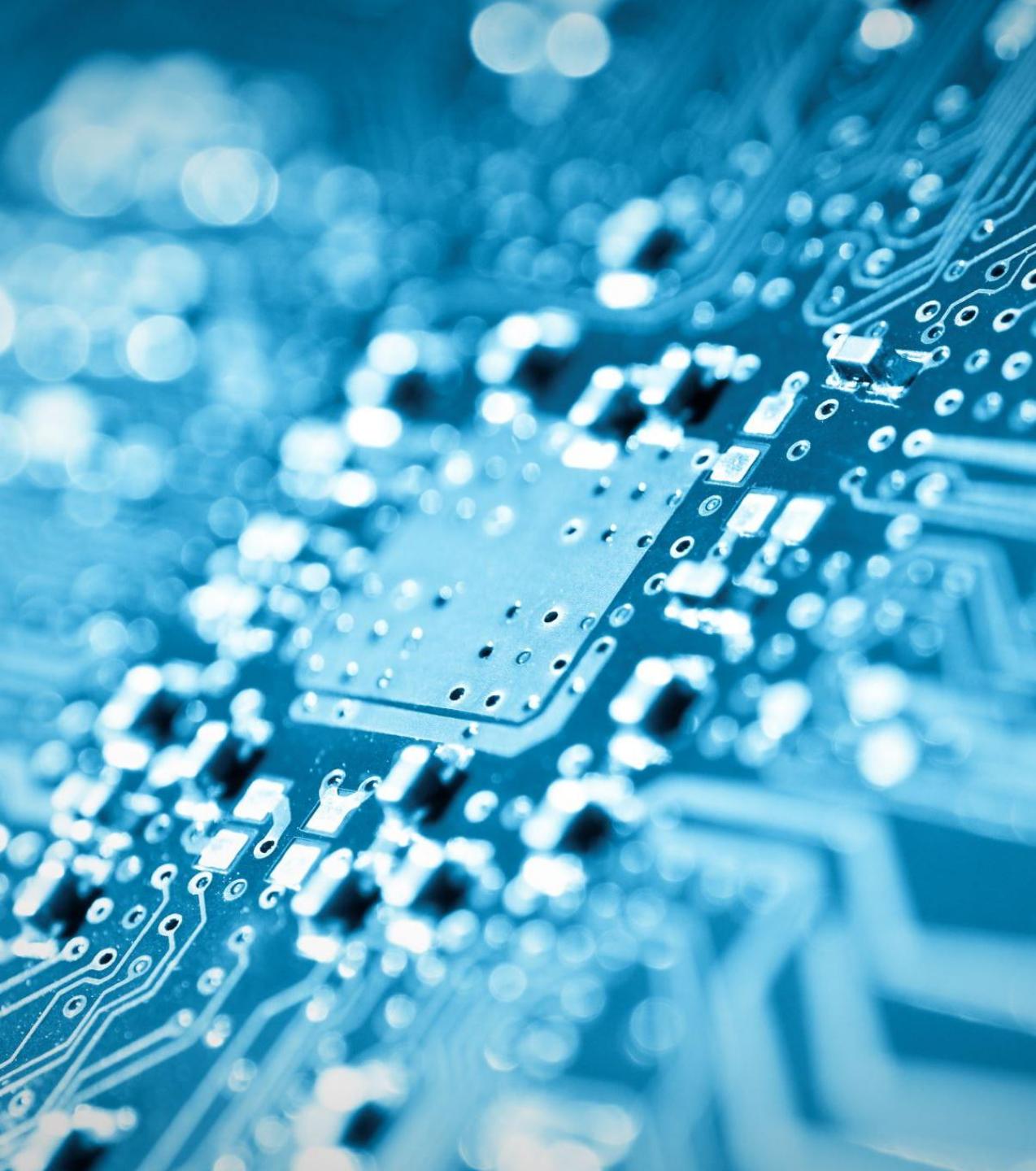
# PAYMENTS

- Payment gateways facilitate financial services to make online transactions between customers and merchants
  - They provide a secure and highly available API that supports TLS 1.2 protocol for encryption
  - They have to comply with industry regulations and standards, including PCI DSS and PSD2, to protect customer data
  - They should be highly secure by following industry card standards, including features like tokenization, encryption, and fraud detection
  - They can support multiple payment methods, including debit cards, credit cards, mobile wallets, and bank transfers
  - They can help merchants with detailed analytics and reporting tools to track transactions, volumes, and key metrics



# PAYMENTS

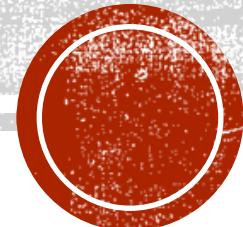
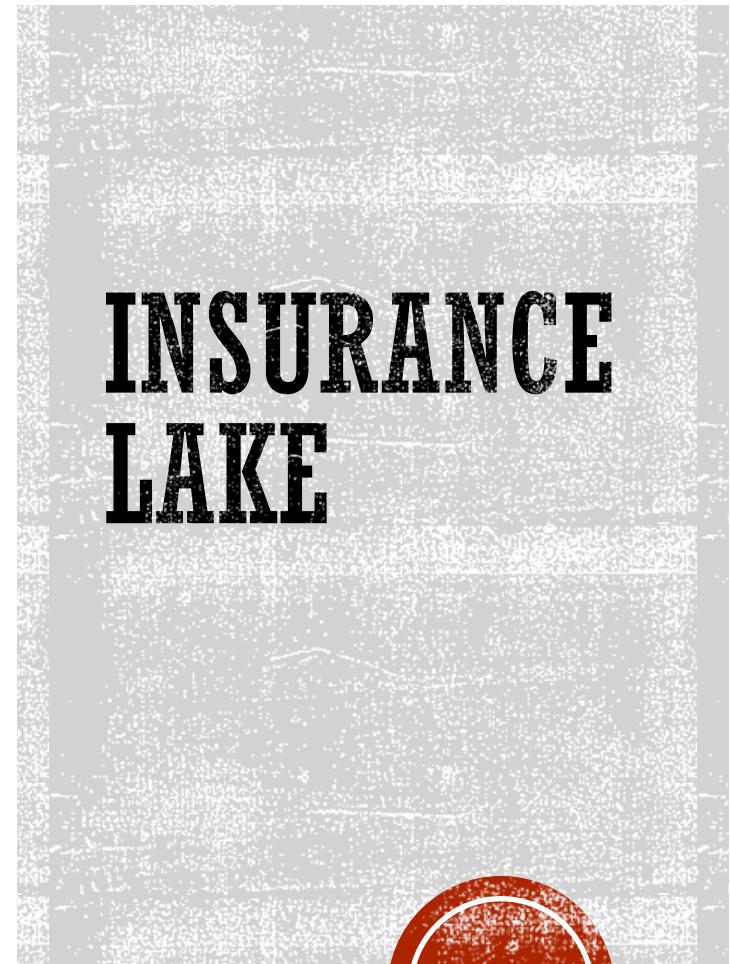
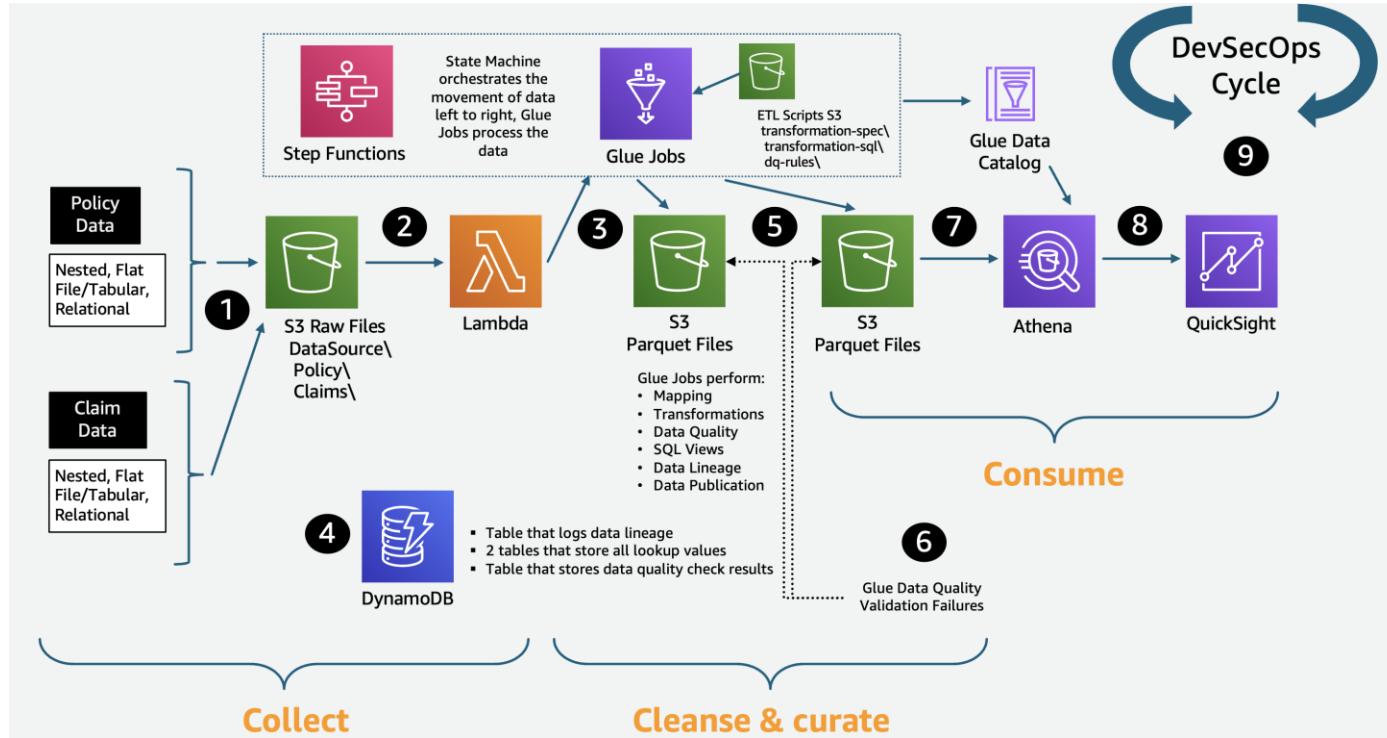




# INSURANCE LAKE

- The insurance data lake provides a method for aggregating end user customer data from a large number of diverse sources, including core systems and third parties, and consolidating it within a single, secure location
- The four Cs provide a best practice data lake pattern for creation of your insurance data lake
  - Collect: Store all of your data in Amazon S3
  - Cleanse and curate: Validate, map, transform, and log the actions performed on your data
  - Consume: Derive insights from your data
  - Comply and secure: Automate your audit and regulatory compliance requirements and secure your data

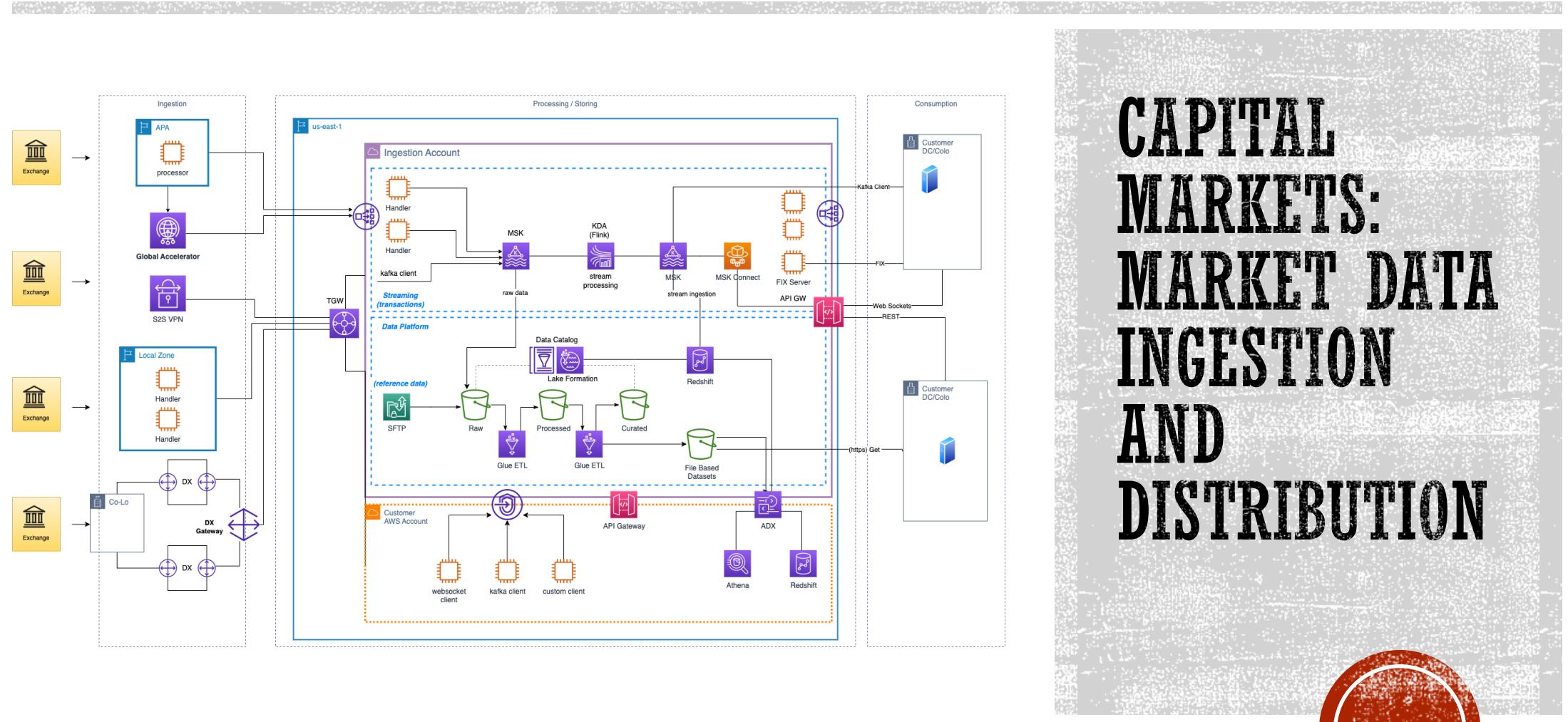




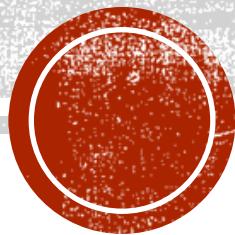
# CAPITAL MARKETS: MARKET DATA INGESTION AND DISTRIBUTION

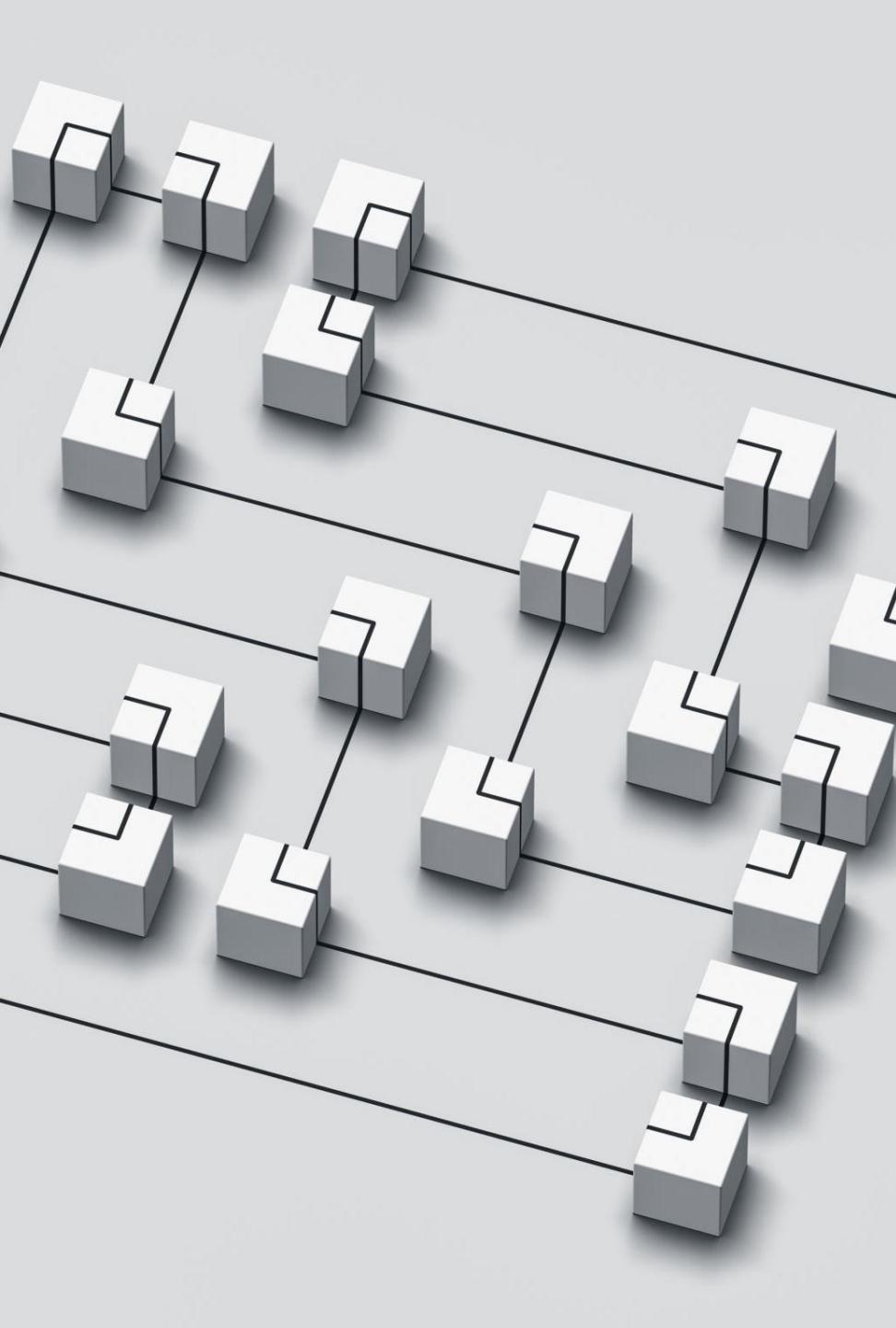
- Capital Markets customers need access to data from a variety of sources including: market data, reference data, earnings data, alternative data, and other financial data sources
- Financial data is used for making trading decisions, shaping investment strategies, providing information to regulators, and managing risk





# CAPITAL MARKETS: MARKET DATA INGESTION AND DISTRIBUTION





# ARCHITECTURE PATTERNS IN OUR COURSE

- 3 tier architecture model
  - Understand current and legacy deployments
  - Hybrid cloud
  - Global Deployment
- Event Driven Architecture model
  - Increasingly used for customer engagements
- Microservices Model
  - Modern App development and Deployment



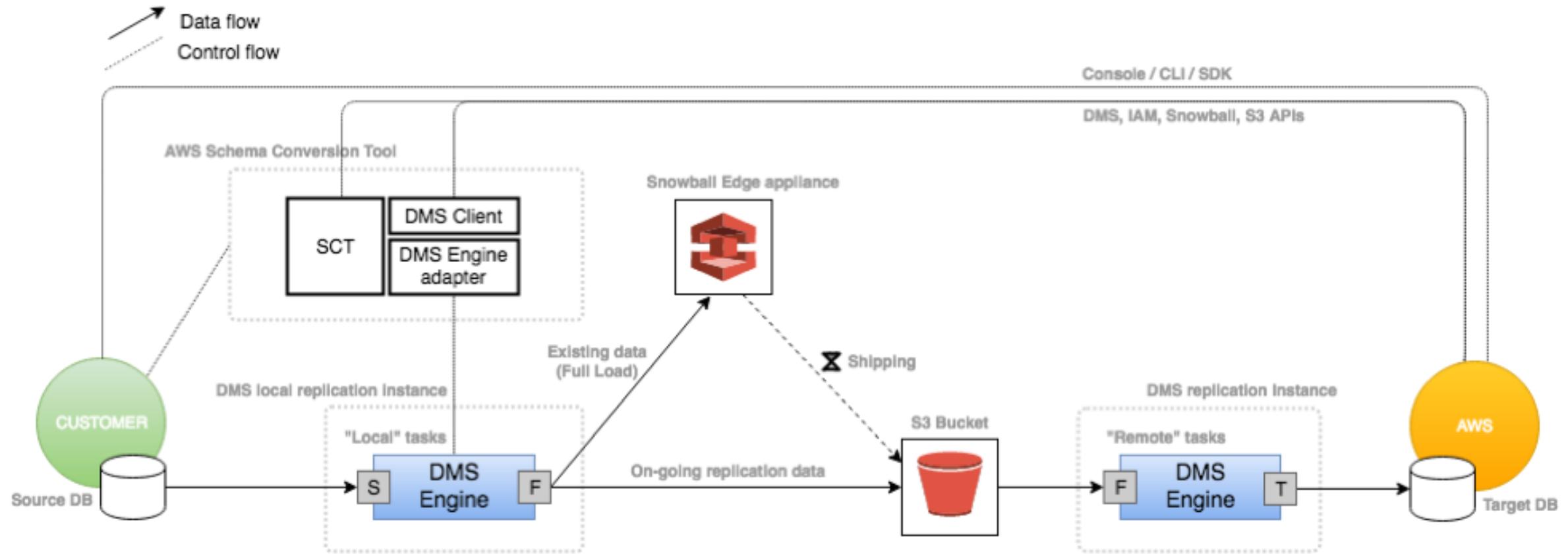
# CloudSiksha



**THANK YOU**

[suresh@cloudsiksha.com](mailto:suresh@cloudsiksha.com)

# MIGRATING LARGE DATASTORES



# AWS LOCAL ZONES

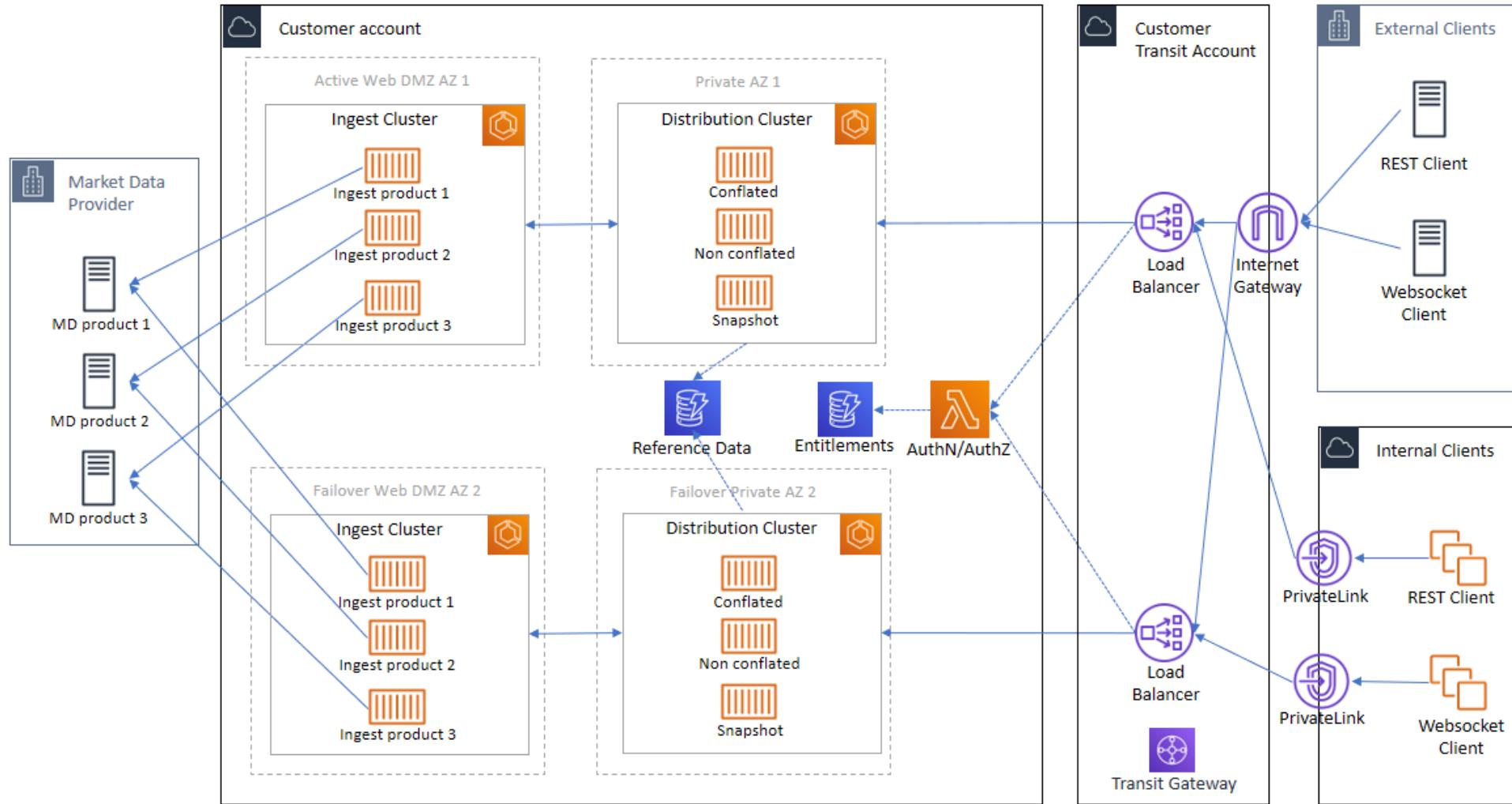
- AWS Local Zones are a new type of AWS infrastructure deployment
  - Places AWS compute, storage, database, and other select services closer to large population, industry, and IT centers
  - Where no AWS Region exists today
- Services which can run in Local Zones
  - EC2
  - EBS
  - VPC
  - FSx
  - ELB

# FINANCIAL DATA

- Access to financial data for workloads running in the cloud is a key component for the operations of financial services institutions
  - Real-time and historical market data, alternative data such as consumer movement, and buying decisions
- Data has strict requirements around user entitlements and data redistribution
- Low latency requirements that vary depending on how the market data is used
  - Trade decision vs. post trade analytics
  - Can vary from seconds to sub-millisecond
- Reliable network connectivity for market data providers and exchanges



# FINANCIAL DATA - REFERENCE ARCHITECTURE

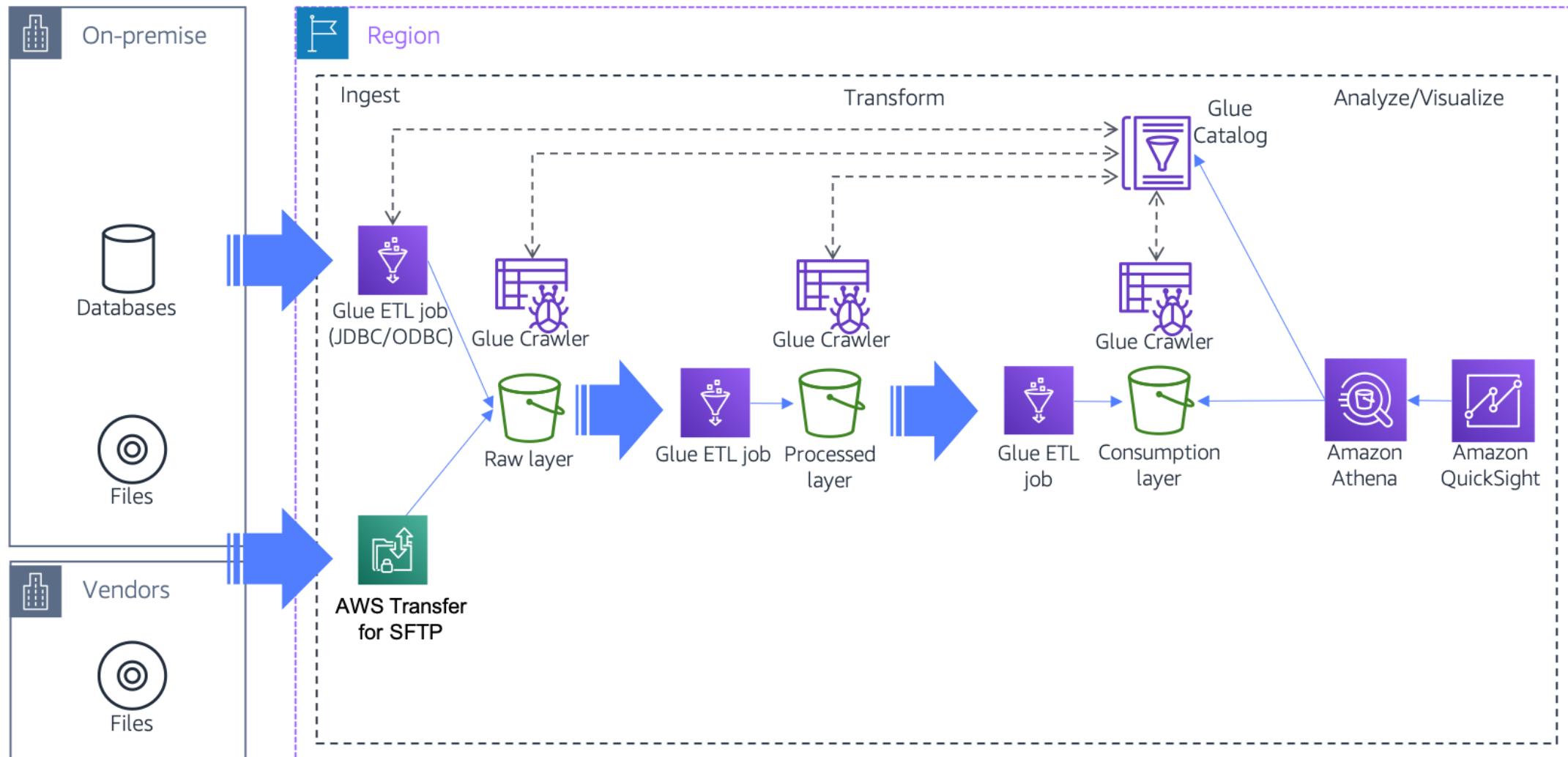


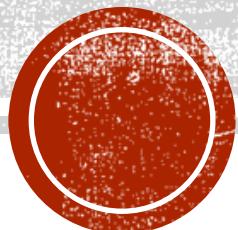
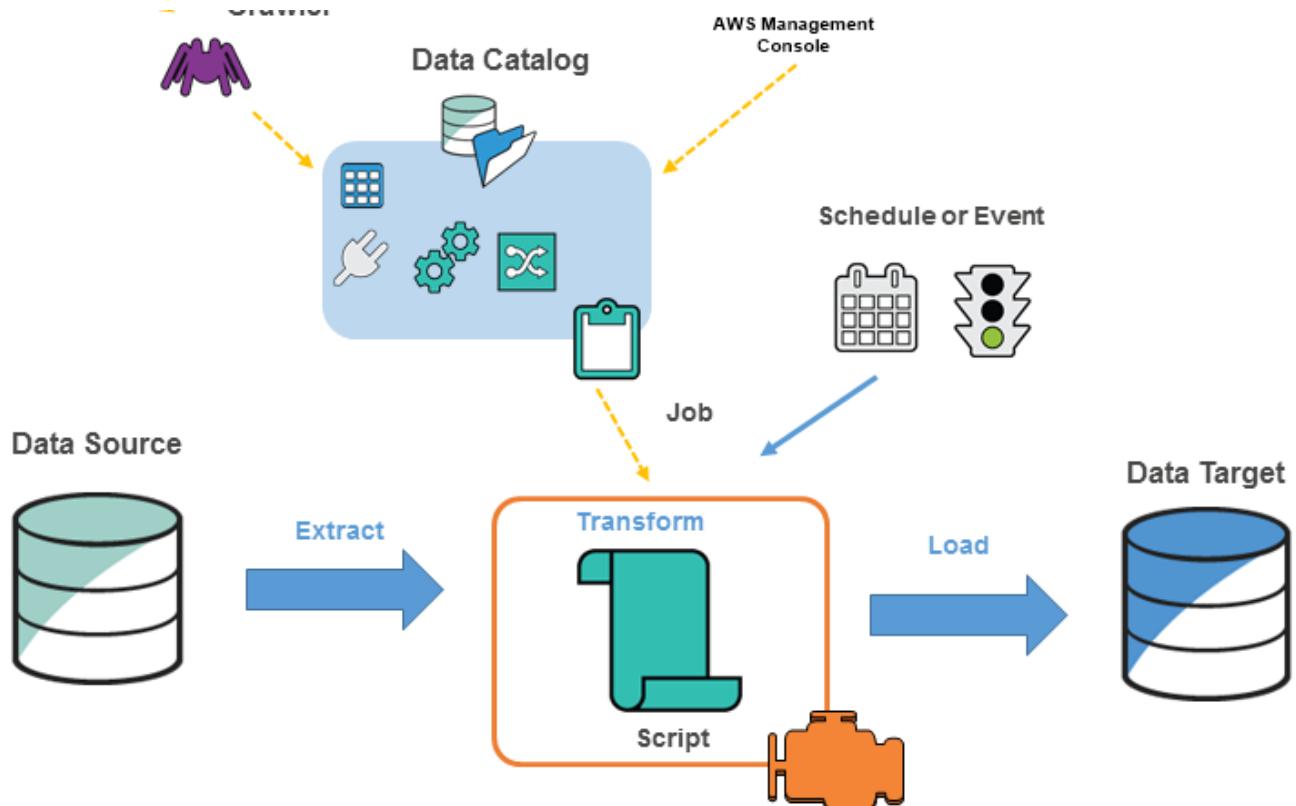


# REGULATORY REPORTING

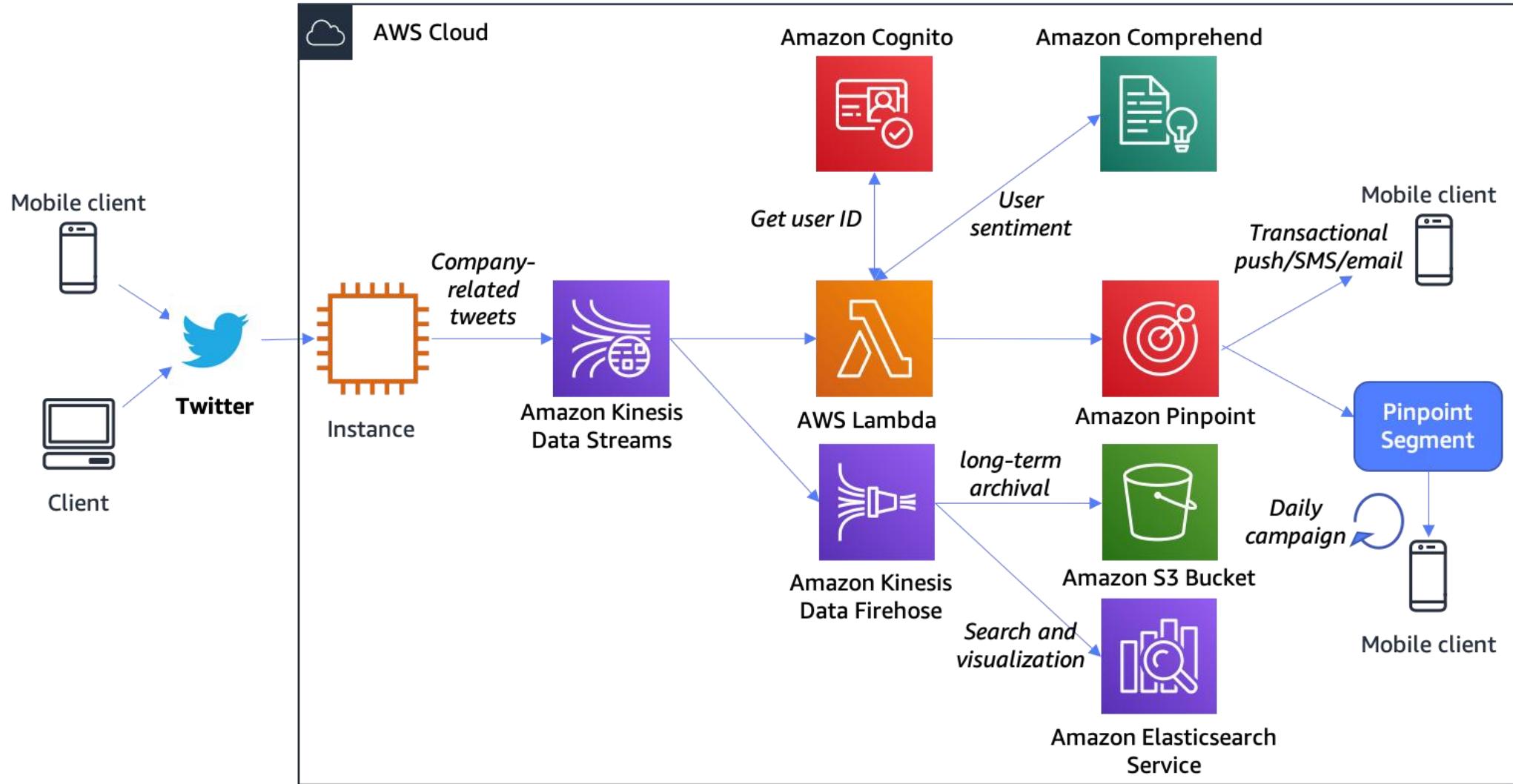
- Every financial institution deals with volumes of information for regulatory reporting
- Financial services data lake architectures supporting these use cases share the following characteristics:
  - They implement data quality, integrity, and lineage into the ingest and processing pipelines
  - They require that data is encrypted at rest and in transit
  - They mask or tokenize personally Identifiable Information (PII) data to meet regulatory requirements (e.g. EU General Data Protection Regulation)
  - They use Data Catalog with fine-grained access control and entitlements

# REGULATORY REPORTING - REFERENCE ARCHITECTURE





# USER ENGAGEMENT - REFERENCE ARCHITECTURE





# USER ENGAGEMENT

- Financial institutions are increasingly investing in their own customer-facing channels
  - Mobile applications, web portals, call center agents and chatbots, advisors/brokers
  - To enhance the overall customer experience
- User engagement architectures supporting these use cases share the following characteristics
  - They use high volumes of real-time data ingestion from public and private sources
  - Require different data protection considerations based on data classification
  - Employ event-driven architectures to leverage on-demand scalability and pay-per-use model
  - Includes real-time and archival data flows

