AWS-Based Serverless Architecture for a Cross-Border Money Transfer Application

The architecture for our cross-border money transfer application leverages AWS serverless technologies to provide high scalability, security, and cost efficiency. The core Application Service is deployed on AWS Lambda, handling transaction processing, KYC verification, compliance checks, and notifications. Amazon RDS (PostgreSQL) serves as the primary database, ensuring secure financial data storage.

To enhance real-time functionality, additional services such as Amazon SQS, SNS, SES, and Pusher enable reliable communication, messaging, and background processing. AWS Rekognition is integrated for KYC checks, while third-party APIs handle payment processing and compliance monitoring. These components together create a resilient and efficient system, ideal for international remittance operations.

1. Architectural Components & Workflow

1.1 Client Interaction Layer

- Users access the system via Web & Mobile apps, sending API requests through AWS API Gateway.
- The API Gateway routes requests to the Application Service, which processes transactions, user actions, and background tasks.

1.2 Backend Processing (Application Service on AWS Lambda)

The Application Service handles

- Transaction validation & processing
- KYC & AML compliance checks
- Payment API interactions
- Notifications & event-driven workflows
- Amazon RDS (PostgreSQL) stores financial and customer data, ensuring transactional integrity and compliance.

1.3 Storage & Identity Verification

- Amazon S3 securely stores KYC documents, receipts, and audit logs.
- AWS Rekognition verifies customer identity, reducing fraud risks in compliance with financial regulations.

1.4 Asynchronous Processing & Notifications

- Amazon SQS manages background tasks, such as failed transaction retries and rate updates.
- Amazon SNS & SES handle notifications via SMS, email, and push messages.
- Pusher enables real-time updates for transaction tracking.

1.5 Error Handling & Monitoring

- Sentry is integrated for real-time error tracking, allowing proactive issue resolution.

1.6 Third-Party API Integrations

- Payment Providers (Volume, Paga and Appaylo) facilitate payment collection.
- AML/KYC APIs (Sumsub) assist in compliance verification.
- FX Rate APIs (Open Exchange Rates, XE) provide real-time exchange rate data

2. Advantages Over Traditional Application Architectures

1. Serverless Cost Efficiency

- Traditional applications require dedicated servers and database clusters, leading to high fixed costs.
- AWS Lambda scales automatically, charging only for execution time, optimizing costs.

2. Automatic Scaling & Global Availability

- AWS Lambda scales dynamically without manual intervention, ensuring seamless performance during peak hours.
- AWS Edge Locations and CDN reduce latency for international transactions.

3. Security & Compliance

- AWS services comply with PCI DSS, GDPR, and SOC standards, ensuring regulatory adherence.
- AWS Rekognition and KYC APIs prevent fraudulent transactions.

4. Real-Time Transaction Tracking

- Instead of traditional polling-based status updates, Pusher and SNS enable instant notifications to users and administrators.

5. Reliable Transaction Processing

- Amazon SQS ensures fault-tolerant processing, preventing transaction failures due to temporary API outages.
- AWS RDS maintains ACID compliance, ensuring financial data consistency.

3. Why This Architecture is Ideal for Cross-Border Money Transfers?

1. High Uptime & Resilience

- AWS fully manages infrastructure, eliminating downtime risks caused by server failures.
- Fault-tolerant services like SQS ensure reliable transaction processing, even if external APIs or internal components experience temporary failures.
- AWS Multi-AZ RDS deployment ensures database availability, automatically failing over to a standby instance in case of hardware failure.
- AWS S3 provides durable storage with 99.9999999999% (11 9's) availability, ensuring that KYC documents, transaction receipts, and compliance data remain accessible.
- AWS Lambda operates across multiple Availability Zones (AZs), reducing the risk of regional outages affecting core transaction processing.
- AWS Backup and automated snapshots for RDS protect critical financial data from corruption or accidental deletion.
- AWS Disaster Recovery Strategies (Pilot Light, Warm Standby, and Multi-Region Active-Active) can be implemented based on business requirements to ensure seamless operations even during large-scale outages.

2. Secure & Compliant Financial Transactions

- AWS security best practices protect sensitive financial data.
- AML/KYC integrations enhance fraud detection and regulatory compliance.
- AWS KMS (Key Management Service) encrypts sensitive data, including customer PII, transaction details, and payment credentials.
- Amazon RDS (PostgreSQL) uses encryption at rest with automatic key rotation to protect stored financial records.
- TLS encryption ensures data in transit remains secure, preventing unauthorized interception during transactions.

- AWS Rekognition is used for facial recognition and identity verification, ensuring that users submitting KYC documents are legitimate.
- Third-party KYC/AML APIs (e.g., Sumsub, Trulioo) verify user identity against global databases to prevent fraud and comply with international regulations.
- Amazon S3 stores KYC documents securely, with restricted access and audit trails to prevent unauthorized data exposure.
- AWS CloudTrail & AWS GuardDuty continuously monitor for suspicious activities, such as multiple failed login attempts, unusual transaction patterns, or access anomalies.
- Sentry helps track application-level errors and anomalies in transaction processing, enabling proactive fraud detection.
- AWS WAF (Web Application Firewall) prevents malicious attacks, such as SQL injection and cross-site scripting (XSS).
- AWS services comply with financial industry standards including PCI DSS, GDPR, SOC 2, and ISO 27001, ensuring the platform meets regulatory expectations.
- Amazon SES ensures secure email communication, which is essential for sending regulatory notifications and OTP verifications.

3. Cost Optimization for Variable Transaction Volume

- Serverless architecture scales based on demand, preventing unnecessary infrastructure costs.

4. Seamless Integration with Financial APIs

- Low-latency interactions with payment, compliance, and FX rate providers ensure efficient transaction processing.

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Thank You

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