

# Tech Stack

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Tok is a Kotlin-native backend built for reliability and financial-grade security.

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## Core Stack

Layer	Technology	Notes
Language	<b>Kotlin</b>	JVM-based, coroutine-native
HTTP Framework	<b>Ktor</b>	Kotlin-idiomatic, coroutines-native routing
Dependency Injection	<b>Koin</b>	Lightweight, Kotlin-first DI
Database	<b>PostgreSQL</b>	Primary data store
ORM	<b>Exposed</b> (Kotlin SQL framework)	Type-safe SQL DSL
Connection Pooling	<b>HikariCP</b>	High-performance JDBC pool
DB Migrations	<b>Flyway</b>	Version-controlled schema migrations
Job Scheduling	<b>Quartz Scheduler + coroutines</b>	Bank sync scheduling
Serialization	<b>kotlinx.serialization</b>	Native Kotlin JSON
Build	<b>Gradle (Kotlin DSL)</b>	Multi-module project

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## Security & Encryption

Concern	Technology
Token encryption	<b>AES-256-GCM</b>
Key management	<b>GCP Cloud KMS</b> (HSM-backed)
PSD2 mTLS (QWAC)	DigiCert or GlobalSign certificate
CSRF protection	Cryptographic random <code>state</code> parameter per consent

Concern	Technology
Secret storage	<b>GCP Secret Manager</b>

### Token encryption flow:

1. Receive OAuth token from bank API
2. Call GCP Cloud KMS generateDataKey (DEK + encrypted DEK)
3. Encrypt token with DEK (AES-256-GCM, random IV)
4. Store: encrypted\_dek + iv + ciphertext in PostgreSQL
5. DEK discarded from memory after use

QWAC private key is stored in GCP Cloud KMS HSM — never extracted to filesystem.

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## Testing

Tool	Purpose
<b>Kotest</b>	Primary test framework (BDD-style)
<b>MockK</b>	Kotlin-idiomatic mocking
<b>Testcontainers</b>	Ephemeral PostgreSQL for integration tests

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## Cloud Infrastructure — GCP

Service	Purpose
<b>Cloud Run</b>	API server deployment (serverless containers)
<b>Cloud SQL</b>	Managed PostgreSQL
<b>Cloud KMS</b>	HSM-backed key management for OAuth tokens
<b>Secret Manager</b>	QWAC certs, API credentials

Data residency: `europa-north1` (Finland) — covers EU/GDPR requirements for Croatian data, and PDPL-equivalent requirements for Serbian data.

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## API Design



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# SDKs

SDK	Language	Package
<code>sdk-kotlin/</code>	Kotlin	<code>io.tokapi:sdk-kotlin</code>
<code>sdk-node/</code>	TypeScript	<code>@tokapi/sdk</code>
<code>packages/sdk-python/</code>	Python 3.10+	<code>tokapi-sdk</code>

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