

Drop Srbija v2 — Tech Stack

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ALAI Standard Stack (CEO Decision 2026-03-17)

Backend

Component	Version	Purpose
Kotlin	2.1.0	Primary backend language (ALAI standard)
Ktor	3.1.2	Async HTTP framework, netty transport
Exposed	0.58.0	Kotlin-native ORM, DSL-based
PostgreSQL	16	Primary database (port 5436)
Flyway	10.21.0	Database migrations (22 scripts V1-V22)
HikariCP	6.2.1	Connection pooling
Koin	4.0.2	Dependency injection
JWT (nimbus-jose-jwt)	9.46.1	Authentication tokens (HS256)
Kotest	5.9.1	Testing framework (79 test files, 617 tests)
Testcontainers	1.20.4	Integration tests (PostgreSQL in Docker)

Frontend

Component	Version	Purpose
Next.js	15.1.3	React framework, app router, server components
React	19.0.0	UI library

Component	Version	Purpose
TypeScript	5.7.2	Type safety
Tailwind CSS	4.0.0	Utility-first CSS
shadcn/ui	Latest	Component library (ALAI standard)
Lucide React	Latest	Icon library (ALAI standard)
next-intl	Latest	i18n (Serbian sr-RS + English fallback)
Vitest	Latest	Unit testing (1721 passing / 1777 total)
Playwright	Latest	E2E testing (15 journeys)

Database

Component	Purpose
PostgreSQL 16	Primary database
Port	5436 (separate from Drop Norway 5433, Bilko 5434)
Timezone	UTC+0 (TIMESTAMP WITH TIME ZONE)
Tables	22 (via Flyway V1-V22)
RLS	PostgreSQL Row-Level Security for multi-tenancy

Database Tables

22 tables across 22 Flyway migrations:

- V1:** users, phone_verifications, recipients, transactions, nbs_ips_logs, merchants, settings
- V2:** nbs_ips_logs ISO20022 fields
- V3:** linked_accounts
- V4:** transaction idempotency_key_hash
- V5:** kyc_sessions
- V6:** users JMBG fields (encrypted + hash)
- V7:** aml_flags
- V8:** disclosure_acknowledged
- V9:** complaints
- V10:** phone_verifications max_attempts
- V11:** audit_log
- V12:** data_access_requests
- V13:** recipients enhanced (IBAN, country)
- V14:** merchants (business_name, national_id, bank_account, fee_rate, qr_hmac_key)

- 15. **V15:** exchange_rates
- 16. **V16:** notifications
- 17. **V17:** webhook_deliveries
- 18. **V18:** user_consent
- 19. **V19:** feature_flags
- 20. **V20:** withdrawal_requests
- 21. **V21:** cards_scaffold (stub for Phase 2)
- 22. **V22:** disputes

Infrastructure

Component	Purpose
Azure Container Apps	Backend + frontend hosting
Azure Container Registry	Docker image registry
Azure Database for PostgreSQL	Managed PostgreSQL 16
Azure Cache for Redis	Session store, rate limiting
Azure DNS	drop.rs domain management
Azure Key Vault	Secrets management
Caddy	Reverse proxy (prod/staging/dev profiles)
Terraform	IaC (11 modules)

Observability

Component	Purpose
OpenTelemetry	Distributed tracing (backend + frontend)
Sentry	Error tracking (client + server + edge)
Prometheus	Metrics collection
Grafana	Dashboards (3: overview, infra, errors)
Loki	Log aggregation
Tempo	Trace storage
LGTM Stack	Grafana + Loki + Tempo + Mimir (docker-compose profile)

Testing

Type	Framework	Coverage
Backend Unit	Kotest	617 tests (79 files)
Backend Integration	Testcontainers	11 tests (real PostgreSQL)
Frontend Unit	Vitest	1721 passing / 1777 total
E2E Journeys	Playwright	15 journeys
Load Testing	k6	4 scenarios
Accessibility	axe-core	23 rules
Contract Testing	Pact	12 interactions
Visual Regression	Playwright	Baseline snapshots

Coverage Gates

- **Backend:** 52% (JaCoCo gate, unit-only due to docker-java issue)
 - Target: 60% once docker-java issue fixed to restore integration tests
- **Frontend:** No strict gate (vitest coverage tracked)

CI/CD

Workflow	Trigger	Purpose
test.yml	PR, push to develop/main	Unit + integration tests
quality-gate.yml	PR	Coverage gate enforcement
security.yml	PR, push	CORS, rate limiting, EnvGuard checks
accessibility.yml	PR, push	axe-core ally testing
contract.yml	PR, push	Pact contract testing
k6.yml	PR, push to main	Load testing (4 scenarios)
backup-verify.yml	Daily	Backup/DR verification
build.yml	Push to develop	Docker image build
deploy-staging.yml	Push to develop	Staging deployment
deploy-production.yml	Tag v*	Production deployment
sonar.yml	PR, push	SonarCloud static analysis

Security

Component	Purpose
CORS	Configured via CORS.kt plugin
Rate Limiting	RateLimit.kt plugin (10 OTP/hour, 50 tx/hour)
EnvGuard	Startup validation (12 required env vars)
AuditLogger	V11 migration, logs all sensitive actions
JWT HS256	Stateless auth (24h expiry)
SHA-256 Hashing	OTP codes, idempotency keys
PostgreSQL Encryption	JMBG encrypted (KMS key rotation in Azure)
mTLS	NBS IPS API calls (Phase 5)

Configuration

Environment Variables (12 required)

```
# Database
DATABASE_URL=postgresql://localhost:5436/dropsrbija_dev
DATABASE_USER=dropsrbija
DATABASE_PASSWORD=<secret>

# API
PORT=3002
JWT_SECRET=<64+ bytes>
JWT_EXPIRY_SECONDS=86400

# NBS IPS (Phase 5)
NBS_IPS_ENDPOINT=https://ips.nbs.rs/api/v1
NBS_IPS_API_KEY=<secret>

# Redis
REDIS_URL=redis://localhost:6380

# Frontend
NEXT_PUBLIC_API_URL=http://localhost:3003
NEXT_PUBLIC_APP_LANGUAGE=sr
```

Development Setup

Prerequisites

- Docker + Docker Compose
- Kotlin 21 (backend local dev)
- Node.js 20+ (frontend local dev)

Quick Start

```
# Full stack
docker-compose up

# Or separate services
docker-compose up postgres redis -d
cd backend && ./gradlew run
cd frontend && npm run dev
```

Services

- **Frontend:** http://localhost:3000
- **Backend API:** http://localhost:3003
- **PostgreSQL:** localhost:5436 (dropsrbija_dev)
- **Redis:** localhost:6380

Comparison to Drop Norway

Aspect	Drop Norway	Drop Srbija
Backend	Hono + TypeScript	Kotlin + Ktor
Frontend	Next.js 15	Next.js 15 (1:1 copy)
Auth	BankID	Phone OTP
Payment Rails	PSD2 Open Banking	NBS IPS
Currency	NOK	RSD (+ EUR corridor)
Database Port	5433	5436
Issuer	"drop-api"	"dropsrbija-api"

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