NexGate Platfom (Entry)

Social Commerce Platform (Intro)

Nexgate is a unified social commerce platform that combines eCommerce, event management, and social networking into a single ecosystem. Built for the East African market, Nexgate enables users to buy, sell, connect, and experience — all in one place.

The Concept

Nexgate reimagines how commerce happens online. Instead of separating shopping, events, and social media into different apps, Nexgate brings them together.

User creates → Product or Event → **Posts to Social** → Followers see in feed → **Purchase or Book**

A product isn't just listed in a shop — it's shared, liked, and commented on. An event isn't just a ticket page — it's a post that spreads organically through your network.

Platform Architecture

Nexgate follows a microservices architecture with nine independent services communicating via RabbitMQ message broker and backed by PostgreSQL databases.

Core Services

1. **Authentication** — User registration, login, JWT tokens, OAuth, device management
2. **User Profile** — Profiles, followers/following, privacy settings, trust scores
3. **File Manager** — Media uploads, image processing, BlurHash, video transcoding via FFmpeg
4. **Payment** — Payment methods, M-Pesa/Selcom/Tembo Plus integration, escrow, transactions
5. **Direct Message** — Real-time private messaging, conversations, media sharing

Business Services

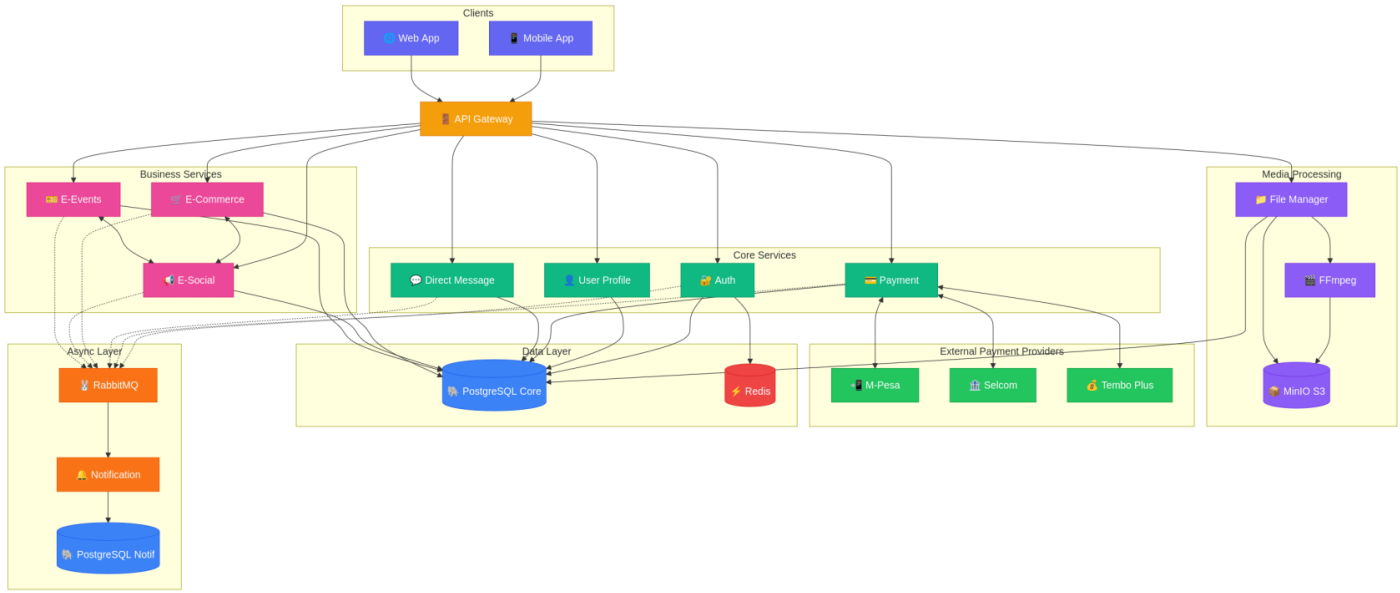
6. **E-Commerce** — Shops, products, orders, cart, checkout, reviews, seller verification

7. **E-Events** — Event creation, ticketing, RSA-signed tickets, check-ins, organizer ratings
8. **E-Social** — Posts, feeds, likes, comments, reposts, polls, mentions, hashtags

External Service

9. **Notification** — Push notifications, in-app alerts, email, SMS (async via RabbitMQ)

Architecture Diagram



Service Relationships

Service	Role	Connects To
Authentication	Identity, tokens, sessions	Redis, PostgreSQL Core, RabbitMQ
User Profile	Profiles, follows, trust scores	PostgreSQL Core, RabbitMQ
File Manager	Media uploads, processing	FFmpeg, MinIO, PostgreSQL Core

Service	Role	Connects To
Payment	Transactions, escrow	M-Pesa, Selcom, Tembo Plus, PostgreSQL Core, RabbitMQ
Direct Message	Private conversations	PostgreSQL Core, RabbitMQ
E-Commerce	Shops, products, orders	E-Social (embed products in posts), PostgreSQL Core, RabbitMQ
E-Events	Events, tickets, check-ins	E-Social (embed events in posts), PostgreSQL Core, RabbitMQ
E-Social	Posts, feeds, interactions	E-Commerce, E-Events (receives embeds), PostgreSQL Core, RabbitMQ
Notification	Push, email, SMS	RabbitMQ (consumes events), PostgreSQL Notif

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Data Flow Summary

Flow	Path
User creates product	E-Commerce → Post to E-Social → Followers see in feed
User creates event	E-Events → Post to E-Social → Followers see in feed
User uploads media	File Manager → FFmpeg (if video) → MinIO → BlurHash generated
User makes payment	Payment → External Provider (M-Pesa/Selcom/Tembo) → Callback → Update order
Any action triggers notification	Service → RabbitMQ → Notification Service → Push/Email/SMS

Infrastructure Components

Component	Purpose
PostgreSQL (Core)	Shared DB for Auth, User, File, Payment, DM, E-Commerce, E-Events, E-Social
PostgreSQL (Notif)	Separate DB for Notification service
Redis	Session storage, caching, rate limiting
RabbitMQ	Async messaging, triggers notifications
MinIO	S3-compatible object storage for all media
FFmpeg	Video transcoding, thumbnails, compression

Tech Stack

Layer	Technology
Backend	Java 21, Spring Boot 3.x
Database	PostgreSQL (Core + Notification)
Cache	Redis
Messaging	RabbitMQ
Storage	MinIO (S3-compatible)
Media Processing	FFmpeg
Payments	M-Pesa, Selcom, Tembo Plus
Security	JWT, RSA signatures, device fingerprinting

Services Requrements

Core Services

1. Authentication Service

Handles all identity and access management for the platform.

What it does:

- User registration (email, phone, social OAuth)
- Login/logout with JWT token generation
- Access token & refresh token management
- Password reset and email verification
- Device management and tracking
- Session management via Redis
- Multi-factor authentication support

Key concepts:

- Tokens are short-lived (access) + long-lived (refresh)
- Each device is fingerprinted and tracked
- Failed login attempts trigger rate limiting
- OAuth supports Google, Apple, Facebook

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2. User Profile Service

Manages user identity, relationships, and platform reputation.

What it does:

- Profile creation and editing (bio, avatar, cover photo)
- Username and display name management
- Follow/unfollow functionality
- Followers and following lists
- Block and mute users
- Privacy settings (public/private account)
- Trust score calculation for sellers and organizers
- Account verification status

Key concepts:

- Private accounts require follow approval
- Trust scores build over time based on transactions and feedback
- Blocking hides all content bidirectionally
- Profiles link to shops (E-Commerce) and organizer pages (E-Events)

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3. File Manager Service

Central media handling for the entire platform.

What it does:

- Image uploads with compression and resizing
- Video uploads with FFmpeg transcoding
- BlurHash generation for image placeholders
- Multiple format support (JPEG, PNG, WebP, MP4, MOV)
- Thumbnail generation for videos
- File validation (size limits, type checking)
- CDN-ready URL generation via MinIO
- Parallel upload processing for multiple files

Key concepts:

- All media goes through this service regardless of source (posts, products, events, messages)
- Videos are transcoded to web-optimized formats
- BlurHash provides instant low-res preview while full image loads
- Files are stored in MinIO with organized bucket structure

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4. Payment Service

Handles all money movement on the platform.

What it does:

- Payment method management (add/remove cards, mobile money)
- M-Pesa, Selcom, Tembo Plus integration
- Payment initiation and callback processing
- Escrow system for marketplace transactions
- Escrow release upon delivery confirmation or event completion
- Refund processing
- Transaction history and receipts

- Payout to sellers and organizers

Key concepts:

- Escrow protects buyers — money is held until satisfaction
- Event payments release after event completes with good feedback
- Product payments release after delivery confirmation
- All transactions are logged for audit and dispute resolution

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5. Direct Message Service

Private real-time communication between users.

What it does:

- One-on-one conversations
- Group conversations
- Text messages
- Media sharing (images, videos via File Manager)
- Read receipts and typing indicators
- Message reactions
- Conversation muting
- Message search

Key concepts:

- Messages are stored persistently
- Blocked users cannot send messages
- Media in DMs goes through File Manager
- Supports future WebSocket integration for real-time delivery

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Business Services

6. E-Commerce Service

Full marketplace functionality for buying and selling products.

What it does:

- Shop creation and management
- Product listing with variants (size, color, etc.)
- Inventory tracking

- Shopping cart management
- Multiple checkout options (see below)
- Order management and status tracking
- Delivery address management
- Product reviews and ratings
- Seller verification and trust badges
- Wishlist/saved items

Purchase Options:

Type	Description
Individual	Buy single item, standard checkout
Quantity-based	Buy multiple units, bulk pricing available
Group Buy	Multiple buyers join to unlock discount, minimum participants required
Buy Together	Friends pool money for shared purchase (gifts, shared items)
Installment	Pay in scheduled parts, product released after full payment or based on seller terms

Key concepts:

- Group buy has deadline and minimum participant threshold
- Installment plans are configured per product by seller
- Buy together splits payment among participants
- All payments go through escrow until delivery confirmed
- Sellers build trust score through successful transactions

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7. E-Events Service

Complete event management from creation to check-in.

What it does:

- Event creation with draft system (step-by-step)
- Ticket type management (free, paid, VIP, early bird)
- Ticket quantity and availability tracking
- RSA-signed secure tickets (QR code)
- Check-in system with multiple methods
- Attendee management
- Event analytics (views, sales, check-ins)
- Organizer ratings and reviews
- Refund handling for cancelled events

Event Types:

Type	Description
In-Person	Physical location, requires venue details and check-in
Online	Virtual event, streaming link provided to ticket holders
One-Time	Single date/time event
Multi-Day	Spans multiple days (festivals, conferences), each day can have separate check-in

Check-in System:

Method	Use Case
Mobile App Scan	Organizer uses Nexgate app to scan attendee QR
Ticket Scanner Machine	Hardware scanner integration via API
Manual Entry	Enter ticket code manually for backup
Self Check-in Kiosk	Attendee scans own ticket at kiosk

Key concepts:

- One draft at a time per user (prevents abandoned drafts piling up)
- Tickets are RSA-signed to prevent forgery
- Multi-day events track check-in per day
- Online events auto-deliver streaming link after purchase
- Escrow holds payment until event completes successfully
- Bad events (cancellation, poor feedback) affect organizer trust score

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8. E-Social Service

The social layer that connects everything together.

What it does:

- Post creation (text, images, videos)
- Product embeds in posts (from E-Commerce)
- Event embeds in posts (from E-Events)
- Feed generation (following, trending, discover)
- Like, comment, repost interactions
- Bookmarks/save posts
- Polls with voting
- Mentions: @users, $shops
- Hashtags (#topics)

- Collaborative posts (multiple authors)
- Scheduled posting
- Post visibility controls (public, followers only)

Post Types:

Type	Description
Standard	Text + optional media
Product Post	Embedded product card, click to buy
Event Post	Embedded event card, click to book
Poll	Question with voting options, timed or open
Collaborative	Multiple users co-author, shared credit
Repost	Share another post with optional comment

Key concepts:

- E-Social is the hub — products and events flow through it
- Feed algorithm considers follows, engagement, recency
- Product/event posts drive organic discovery and sales
- Polls can be standalone or attached to products (customer feedback)
- Collaborative posts useful for brand partnerships, co-selling

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External Service

9. Notification Service

Async notification delivery across all channels.

What it does:

- Push notifications (mobile/web)
- In-app notification center
- Email notifications
- SMS notifications
- Notification preferences management
- Read/unread status tracking
- Notification grouping (batch similar notifications)
- Scheduled notifications
- Delivery status tracking

How it works:

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Any Service → Event → RabbitMQ → Notification Service → Deliver
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Notification service is fully decoupled. It only listens to RabbitMQ events and decides how to notify based on user preferences.

Notification Triggers:

Source	Events
Auth	Welcome, password reset, new device login, suspicious activity
User Profile	New follower, follow request (private account), mention
Direct Message	New message, message reaction
E-Commerce	Order placed, order shipped, order delivered, payment received (seller), review received, group buy progress, installment reminder
E-Events	Ticket purchased, event reminder, event cancelled, check-in confirmation, event starting soon
E-Social	Like, comment, repost, mention (@user), shop mention ($shop), poll ended, collaborative post invite
Payment	Payment successful, payment failed, escrow released, refund processed, payout sent

User Preferences:

Setting	Options
Push	All, important only, none
Email	All, digest (daily/weekly), none
SMS	Critical only (payments, security), none
Quiet hours	Disable notifications during set hours
Per-type toggle	Enable/disable specific notification types

Key concepts:

- User controls what they receive and how
- Critical notifications (security, payments) bypass quiet hours
- Similar notifications are grouped (e.g., "5 people liked your post")
- Failed deliveries are retried with exponential backoff
- Separate database to not impact core service performance
