MELODYUD: PLATFORM DESIGN INSPIRED BY SPOTIFY'S BUSINESS MODEL

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INTRODUCTION

Spotify faces major technical challenges in delivering massive music catalogs with low latency and real-time personalization while staying profitable due to high royalty costs. Traditional systems can't handle this. This paper analyzes Spotify's open-source, multi-layered database architecture, detailing the business needs driving its design, its distributed nature with consistency-availability tradeoffs, and its real-world performance.

GOAL:

Research question: How can an open-source, geo-distributed database stack keep Spotify's 600 million-user freemium service under a 300 ms playback-startup threshold while controlling costs?

Expected outcome: A transferable blueprint—entity model, technology choices, and validated benchmarks—that any large-scale streaming platform can adopt to achieve the same low-latency, cost-efficient performance.

METHODS

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METHODS

Royalty economics set strict cost-per-stream and latency limits, which fed a Business Model Canvas and dictated a multi-layer, open-source data stack tuned to OLTP, sessions, objects, and analytics. Benchmarks plus expert review showed the design meets Spotify-level scale and recommendation load while staying within those business constraints.

Business Model Canvas

Designed for: MelodyUD | *Designed by:* MelodyUd - Team | *Date:* 08/07/2025 | *Version:* 4.0

Key Partners

- Musicians & artists
- Major labels & music records
- Independent artists
- Independent labels
- Cloud infrastructure providers
- CDN providers
- Advertisers & agencies
- Payment gateways
- Rights-management societies

Key Activities

- Ingest, encode & publish audio
- Personalized playback & discovery
- Serve targeted ads & process payments
- Royalty calculation & compliance

Key Resources

- Partitioned PostgreSQL clusters
- Kafka event spine
- MinIO object store
- Analytics stack (ClickHouse, Superset)
- ML feature store, brand reputation

Value Propositions

For Listeners: Instant, legal on-demand access to a global audio library; personalized discovery; offline, ad-free, Hi-Fi options via Premium.

For Creators: Worldwide distribution, real-time analytics, monetization via royalties, ads, merch, live-event tools.

For Advertisers: Highly targeted audio, video & display inventory with first-party listening data.

Customer Relationships

- Personalized discovery feeds
- Community features like collaborative playlists
- Lifecycle notifications via email for retention
- Real-time creator dashboards

Channels

- Native Mobile App
- Desktop apps
- Smart-speaker integrations
- Web player
- Partner embeds

Customer Segments

- Ad-supported listeners - (free tier)
- Premium subscribers: Individual, Duo, Family, Student
- Artists, labels, creators seeking distribution & insights
- Advertisers & agencies targeting engaged audio audiences
- Enterprise partners

Cost Structure

- Royalties & minimum-guarantee advances (~70 % of revenue)
- Cloud hosting, CDN bandwidth & data storage
- R&D and product development (AI, UX, audio tech)
- Marketing & promotional spend
- Payment processing fees, customer service & global operations

Revenue Streams

- Primary: recurring subscription fees (Premium, Duo, Family, Student)
- Secondary: advertising sales (audio, video, display, podcast ads, sponsored playlists)
- Emerging: commissions on ticketing & merch, Artist marketing tools, creator subscription features

RESULTS

Expected results (a one-line Vine):

<300ms playback start → <150ms seek latency → 20 million concurrent streams with 99.99% availability → cost per stream within freemium margins → open-source model portable to other platforms.

CONCLUSIÓN

Spotify's database architecture demonstrates how specialized layers can combine to support massive-scale streaming

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