Database Distribution & Management Strategy

1. Database Distribution

Database	Primary Services	Tables	Purpose
User Database	auth-service, user-service	User, UserType, UserJWTToken, Country	User management, authentication
Content Database	content-service, search-service (read)	Song, SongInfo, Artist, Album, Genre, Country, SongArtistRelation, SongAlbumRelation, SongGenreRelation, ArtistCountryRelation, ArtistGenreRelation, ArtistAlbumRelation, SongCountryRelation	Core content and metadata
Playlist Database	playlist-service	Playlist, SongPlaylistRelation, UserPlaylistRelation	Playlist management
Activity Database	activity-service	UserFollowedArtist, UserSavedAlbum, UserFavouriteSong, UserFollowedGenre, UserPinned, PinnedTypes	User interactions and preferences
Analytics Database	analytical-service, recommendation-service (read)	Play counts, User behavior logs, Popularity metrics, Session data	Analytics and recommendations
Operational Database	player-service, notification-service	Playing sessions, Notification queues, User preferences	Real-time operations

2. Read Replica Strategy

Database	Master	Read Replicas	Services Using Replicas	Replica Purpose
Content Database	1	3-5	search-service, recommendation-service, streaming-service	High read load distribution
User Database	1	2-3	All services (user validation), Profile reads	User data distribution
Analytics Database	1	2-3	recommendation-service, reporting services	Analytics queries
Playlist Database	1	1-2	content-service (playlist content)	Playlist data reads
Activity Database	1	1-2	recommendation-service	User preference reads
Operational Database	1	1	monitoring-service	Real-time monitoring

3. Service Database Access Patterns

Service	Primary Database Access	Read Replica Access	Cache Layer	Purpose
auth-service	User DB (Write/Read)	-	Redis (sessions)	Authentication
user-service	User DB (Write/Read)	User DB replicas	Redis (profiles)	Profile management
content-service	Content DB (Write/Read)	-	Redis (popular content)	Content CRUD operations
search-service	-	Content DB replicas	Redis (search results)	Search operations
playlist-service	Playlist DB (Write/Read)	Content DB replicas	Redis (playlists)	Playlist management
activity-service	Activity DB (Write/Read)	User DB replicas	Redis (user activities)	User interactions
recommendation-service	-	Analytics DB, Content DB, Activity DB replicas	Redis (recommendations)	ML recommendations
analytical-service	Analytics DB (Write/Read)	-	Redis (metrics)	Analytics processing
player-service	Operational DB (Write/Read)	Content DB replicas	Redis (sessions)	Music player state
streaming-service	-	Content DB replicas	CDN + Redis	Content delivery
notification-service	Operational DB (Write/Read)	User DB replicas	Redis (notifications)	Push notifications

4. Data Management Responsibilities

Service	Data Ownership	Read Access	Write Access	Sync Responsibilities
content-service	Songs, Artists, Albums, Genres	Full access	Full CRUD	Broadcast content changes
user-service	User profiles, Countries	Full access	Full CRUD	Broadcast user updates
playlist-service	Playlists, Relations	Full access	Full CRUD	Validate songs via content-service
activity-service	User activities	Full access	Full CRUD	Update analytics async
analytical-service	Analytics data	Full access	Full CRUD	Consume activity events
auth-service	JWT tokens	Full access	Full CRUD	Manage session state

5. Caching Strategy

Service	Cache Type	Cache Data	TTL	Update Strategy
content-service	Redis Cluster	Popular songs, artists, albums	1-6 hours	Cache-aside pattern
user-service	Redis	User profiles, preferences	30 minutes	Write-through pattern
search-service	Redis + Elasticsearch	Search results, indexes	15 minutes	Cache invalidation on content update
playlist-service	Redis	Popular playlists	1 hour	Write-behind pattern
recommendation-service	Redis	User recommendations	24 hours	Batch update
player-service	Redis	Current sessions	Session duration	Session-based

6. Event-Driven Synchronization

Event Type	Producer	Consumers	Message Queue	Purpose
Content Updated	content-service	search-service, recommendation-service	Kafka	Update search indexes, recommendations
User Activity	activity-service	analytical-service, recommendation-service	Kafka	Analytics, ML model updates
Playlist Modified	playlist-service	analytical-service	RabbitMQ	Track playlist popularity
User Registration	auth-service	user-service, notification-service	RabbitMQ	Profile creation, welcome messages
Play Event	player-service	analytical-service, activity-service	Kafka	Play count, user history