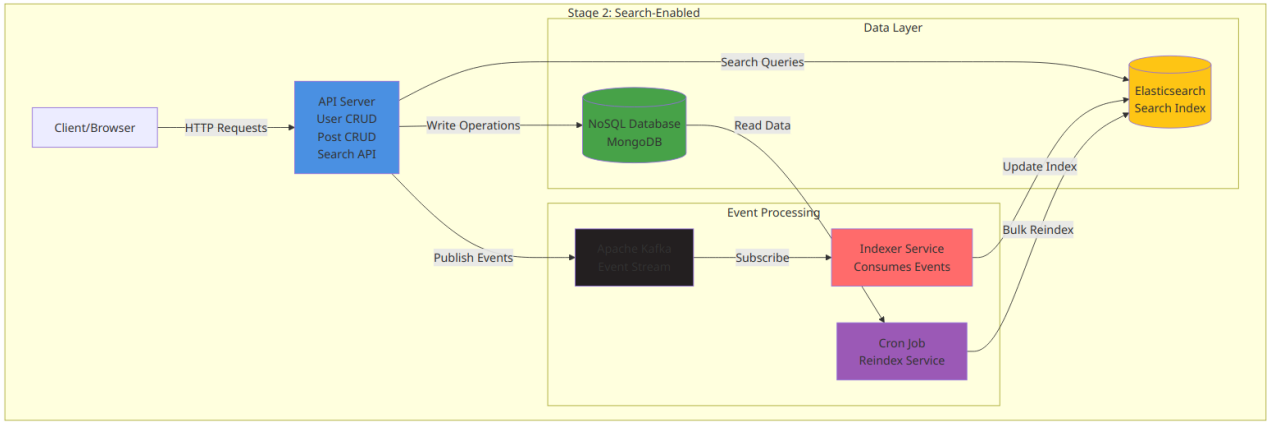
Test creaeting pdf from markdown

Generating single mermaid chart 🎨 Rendered Mermaid diagram 1 Generating single mermaid chart 🎨 Rendered Mermaid diagram 2 Generating single mermaid chart 🎨 Rendered Mermaid diagram 3 Generating single mermaid chart 🎨 Rendered Mermaid diagram 4 Generating single mermaid chart 🎨 Rendered Mermaid diagram 5 Generating single mermaid chart 🎨 Rendered Mermaid diagram 6 Generating single mermaid chart 🎨 Rendered Mermaid diagram 7 Generating single mermaid chart 🎨 Rendered Mermaid diagram 8 Generating single mermaid chart ⚠️ Failed to render Mermaid diagram 9, keeping as code Generating single mermaid chart 🎨 Rendered Mermaid diagram 10 Generating single mermaid chart 🎨 Rendered Mermaid diagram 11 Generating single mermaid chart 🎨 Rendered Mermaid diagram 12 Generating single mermaid chart 🎨 Rendered Mermaid diagram 13 # Social Media System Design - Progressive Stages

Stage 2: Search with Elasticsearch

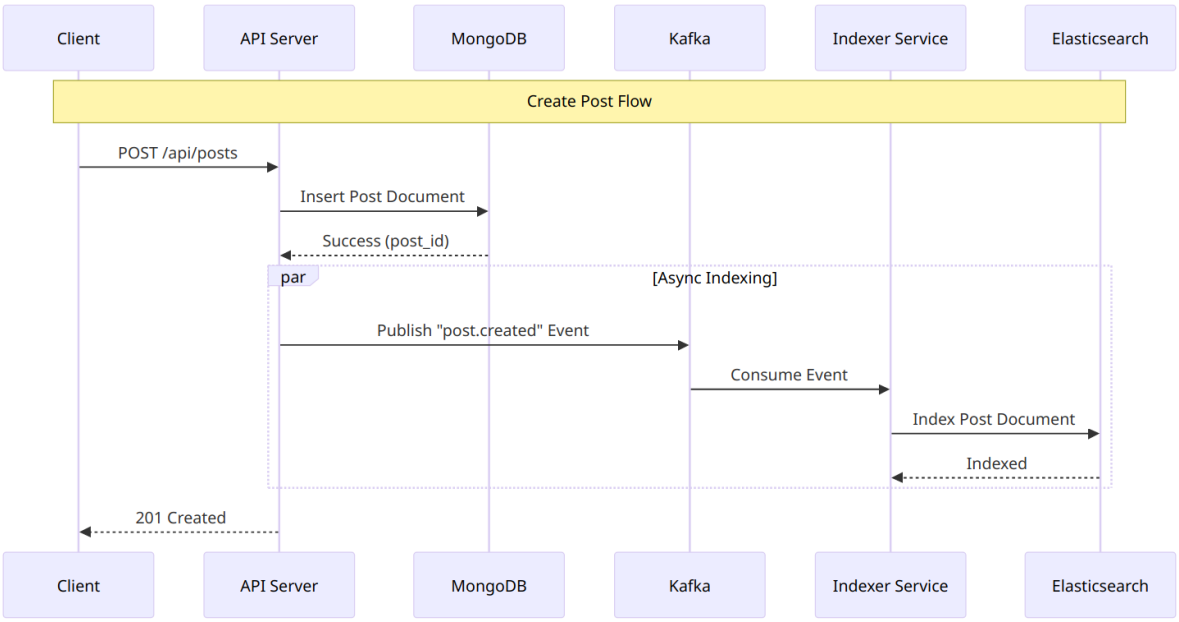
Architecture Overview

Added full-text search capability with Elasticsearch, migrated to NoSQL, and implemented event-driven indexing.



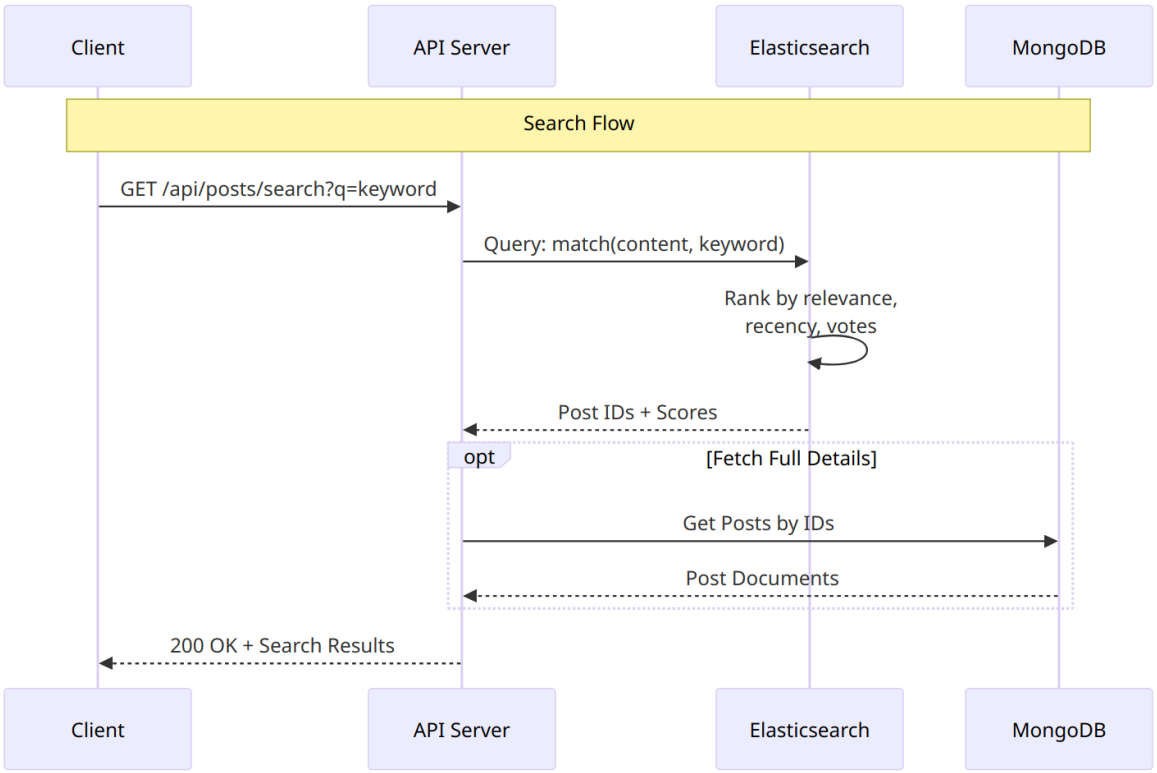
Diagram

Data Flow - Create Post with Indexing



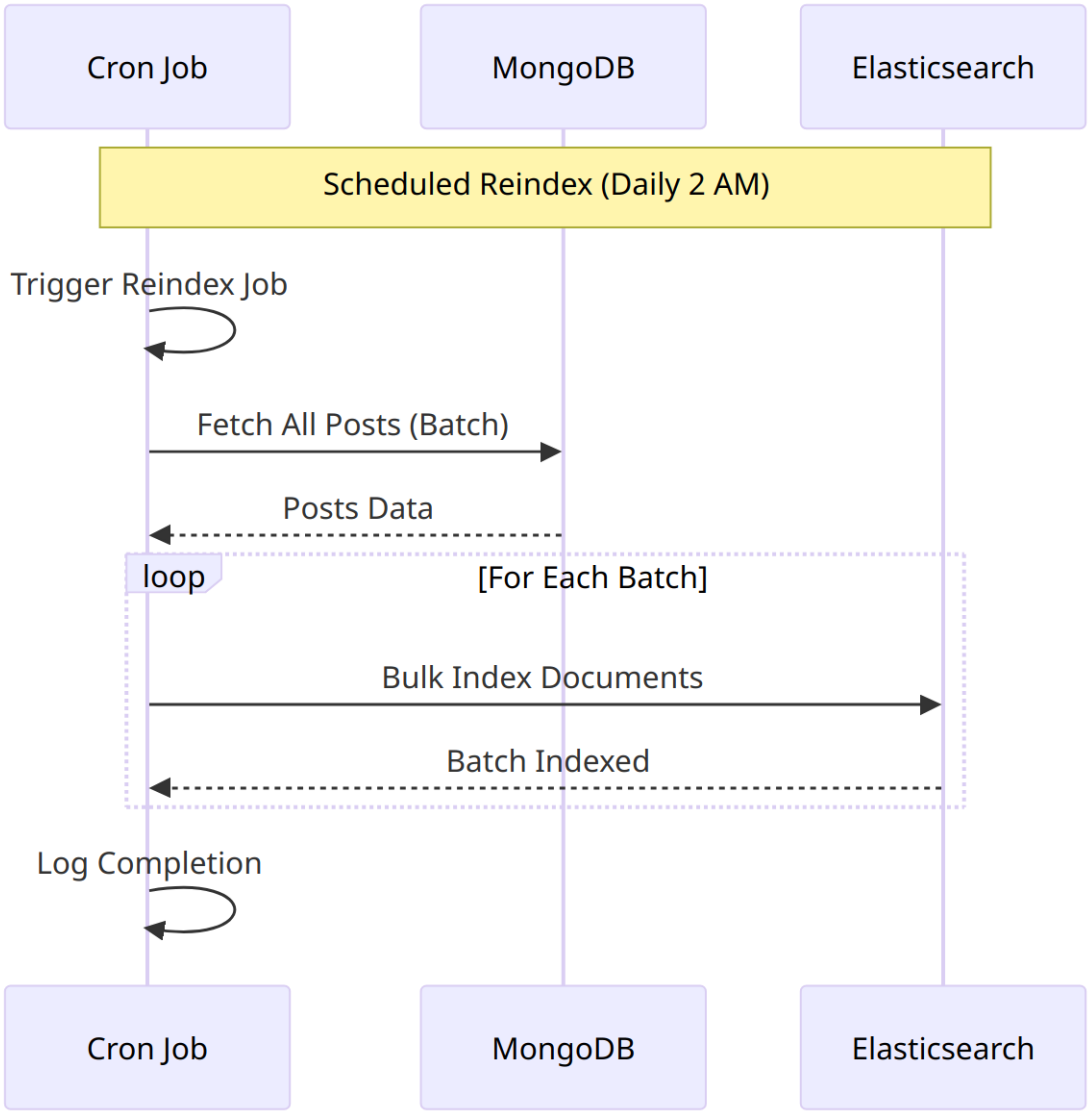
Diagram

Data Flow - Search Posts



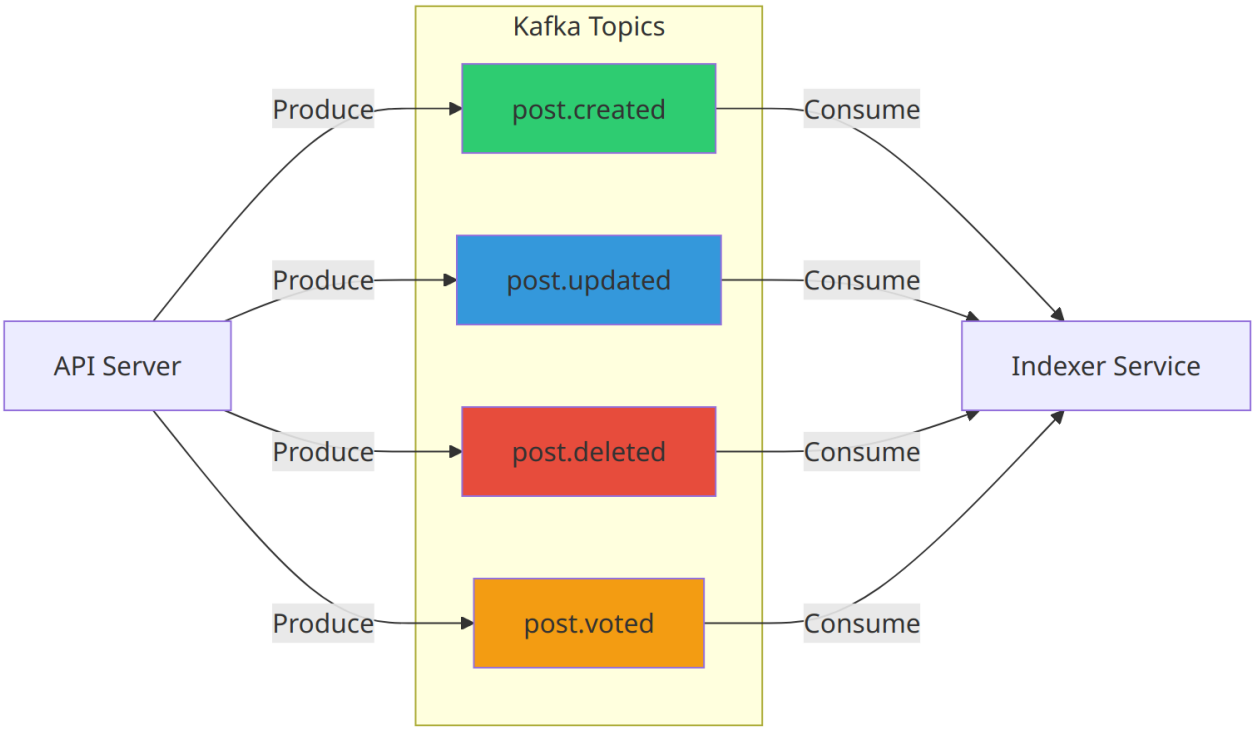
Diagram

Reindexing Flow



Diagram

Kafka Topics Structure

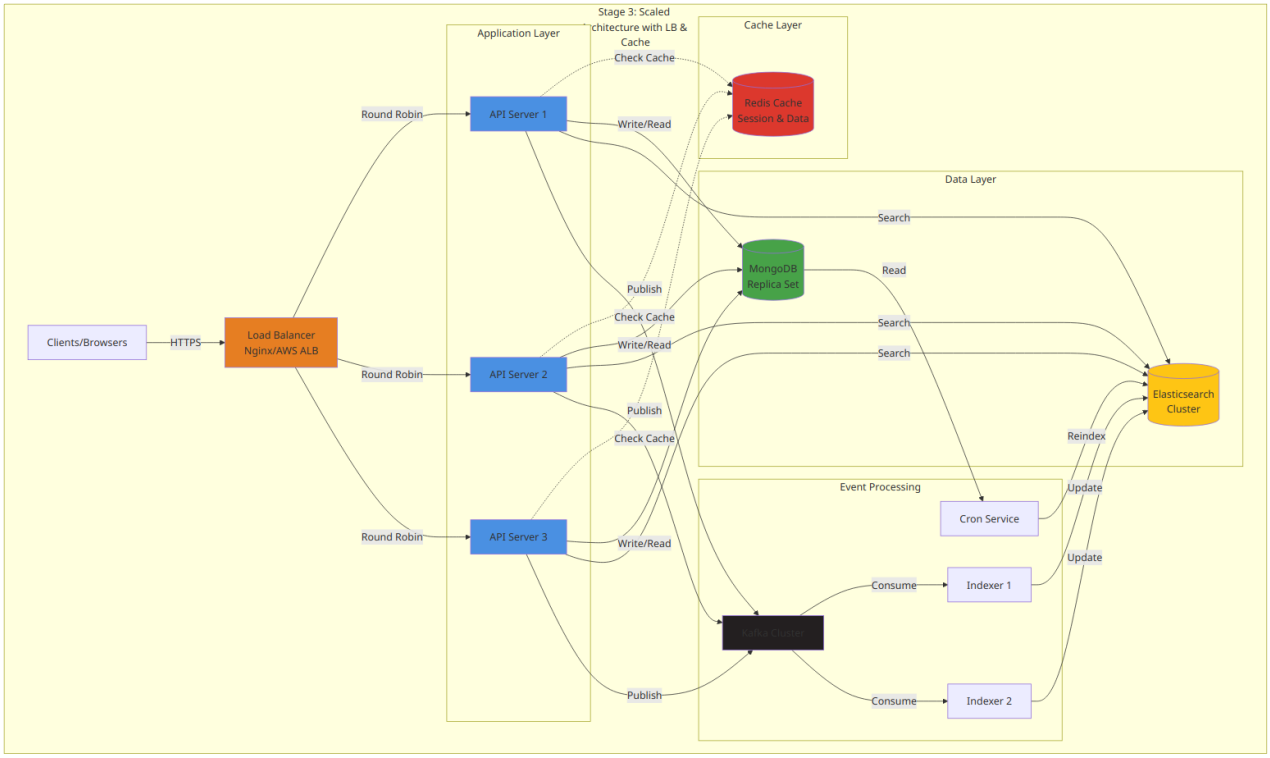


Diagram

Stage 3: Load Balancing & Caching

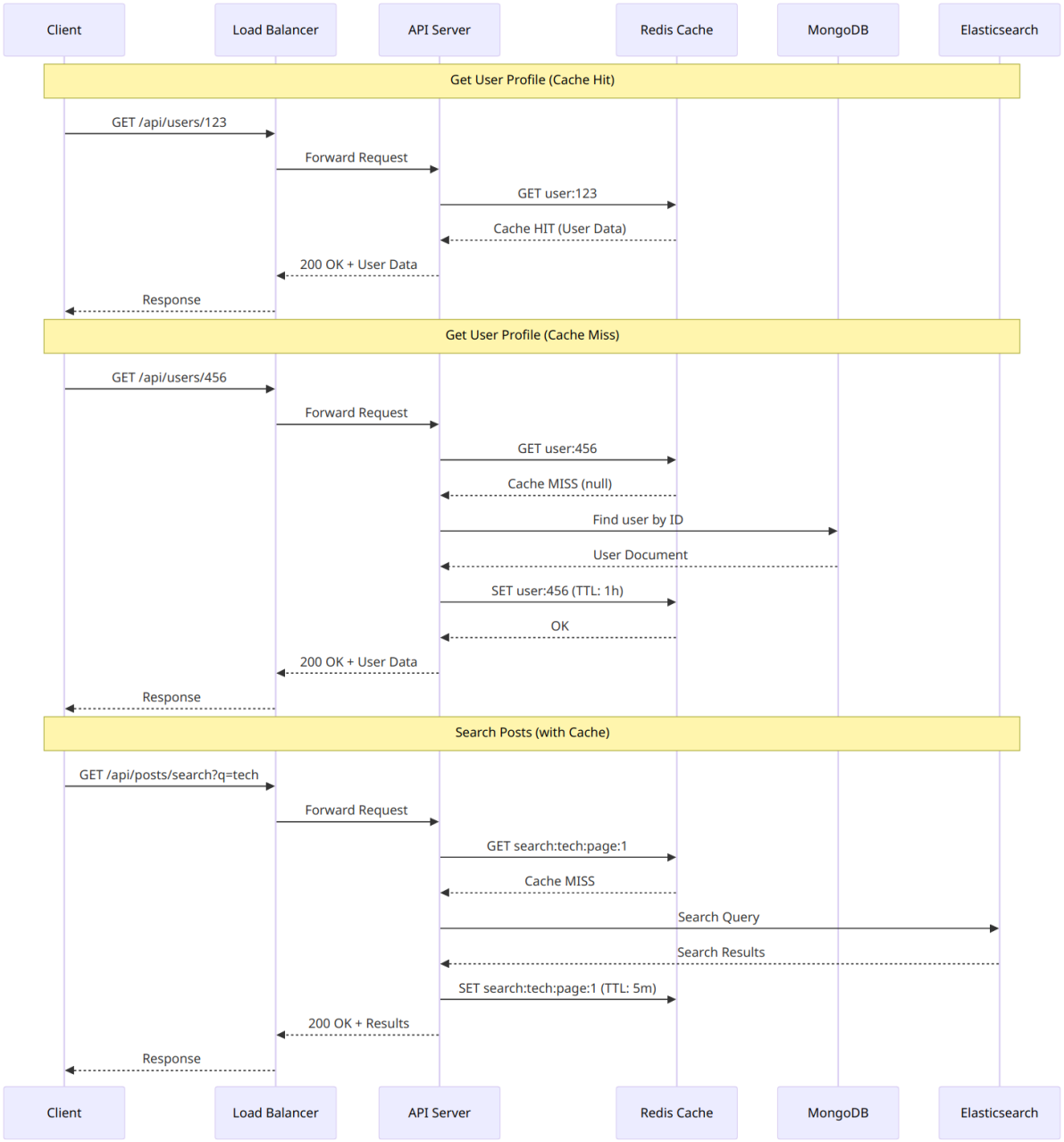
Architecture Overview

Production-ready architecture with load balancing, caching layer, and horizontal scaling.


Stage 3: Scaled
chitecture with LB &
Cache
Application Layer
Cache Layer
Check Cache
Redis Cache
Session & Data
Round Robin
API Server 1
Write/Read
Data Layer
Search
MongoDB
Replica Set
Read
Publish
Check Cache
Search
Clients/Browsers
HTTPS
Load Balancer
Nginx/AWS ALB
Write/Read
Search
Round Robin
API Server 2
Elasticsearch
Cluster
Publish
Check Cache
Reindex
Event Processing
Update
Cron Service
Round Robin
API Server 3
Write/Read
Update
Consume
Indexer 1
Kafka Cluster
Publish
Consume
Indexer 2

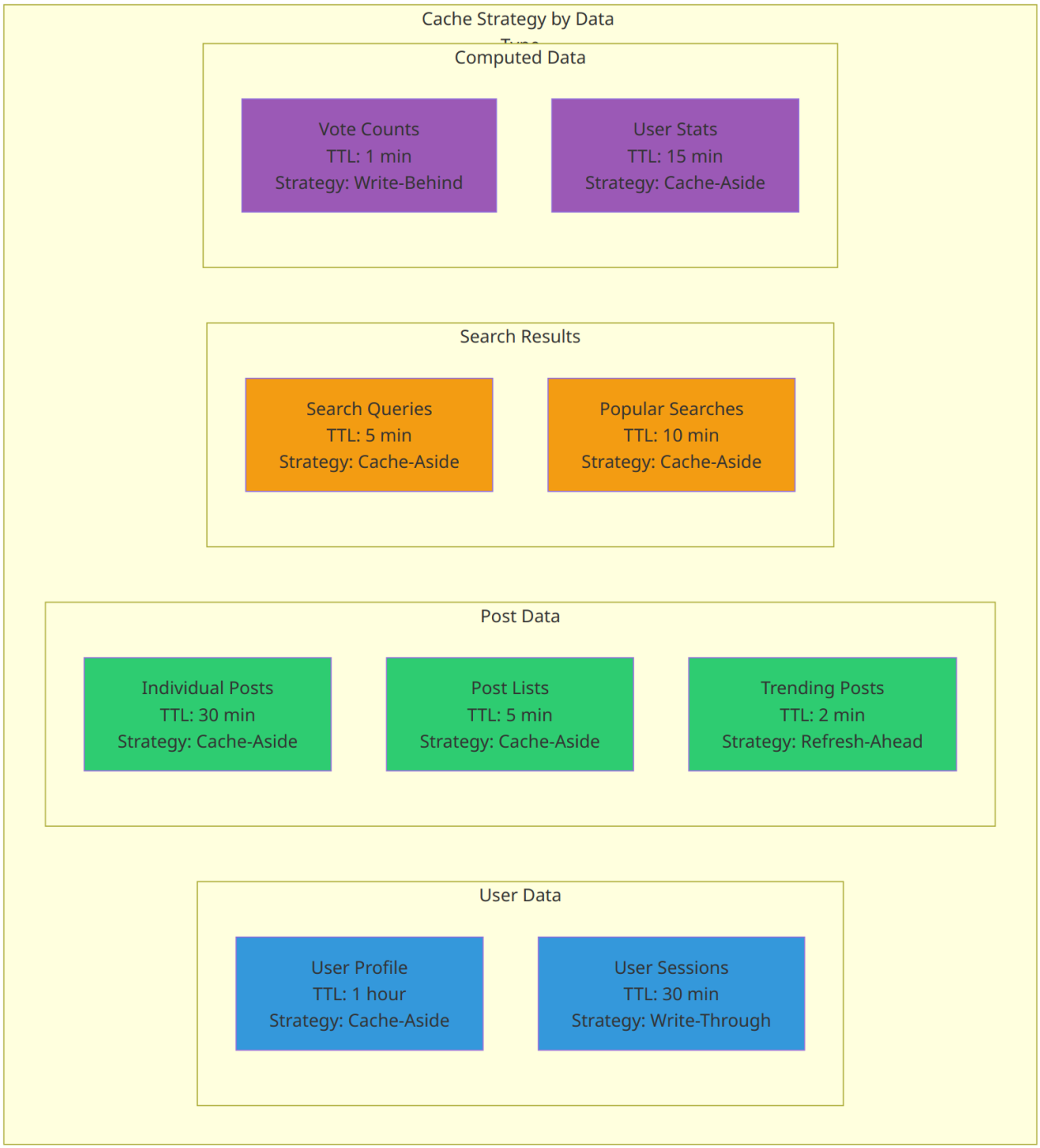
Diagram

Detailed Request Flow with Cache



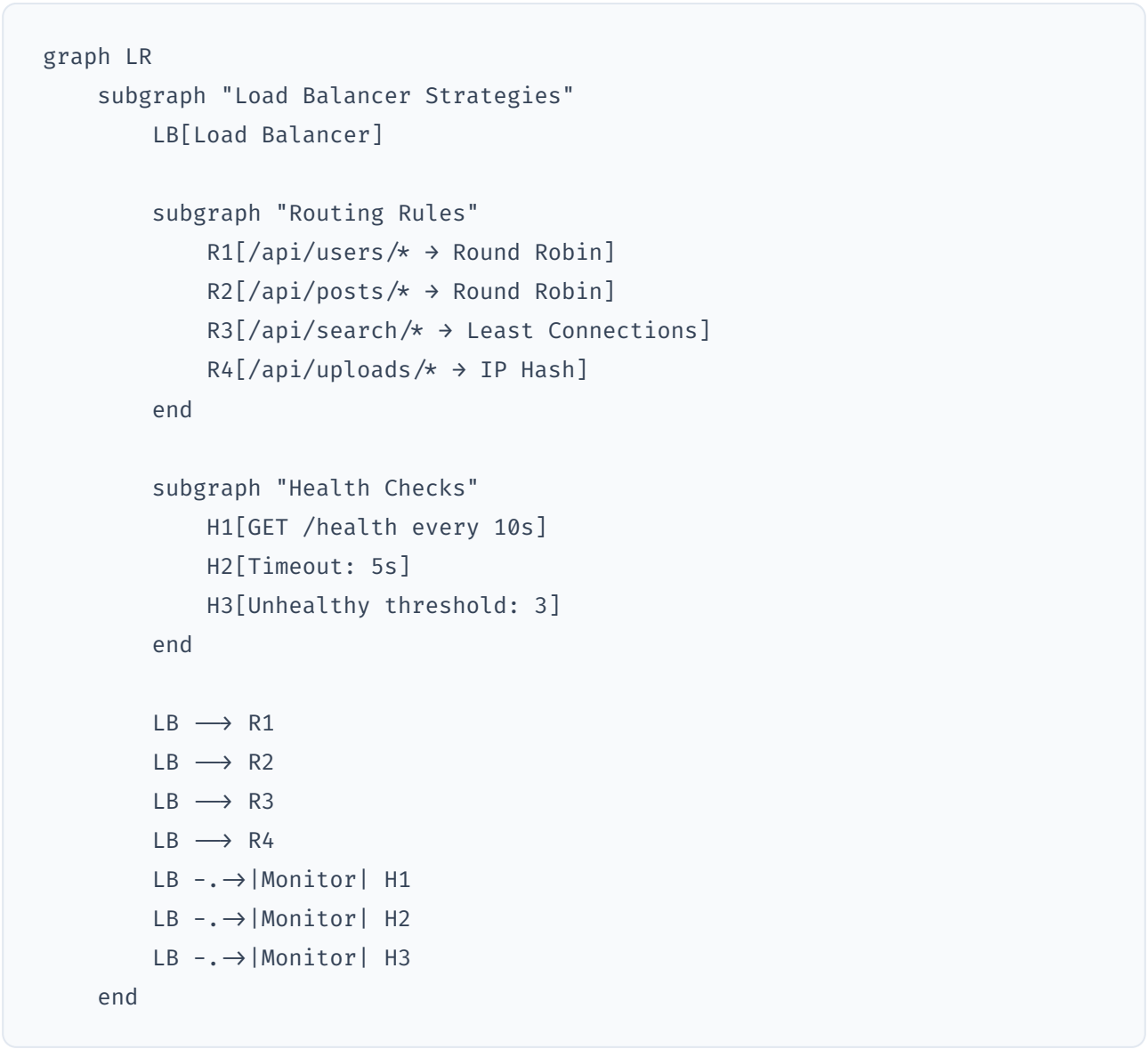
Diagram

Cache Strategy Details

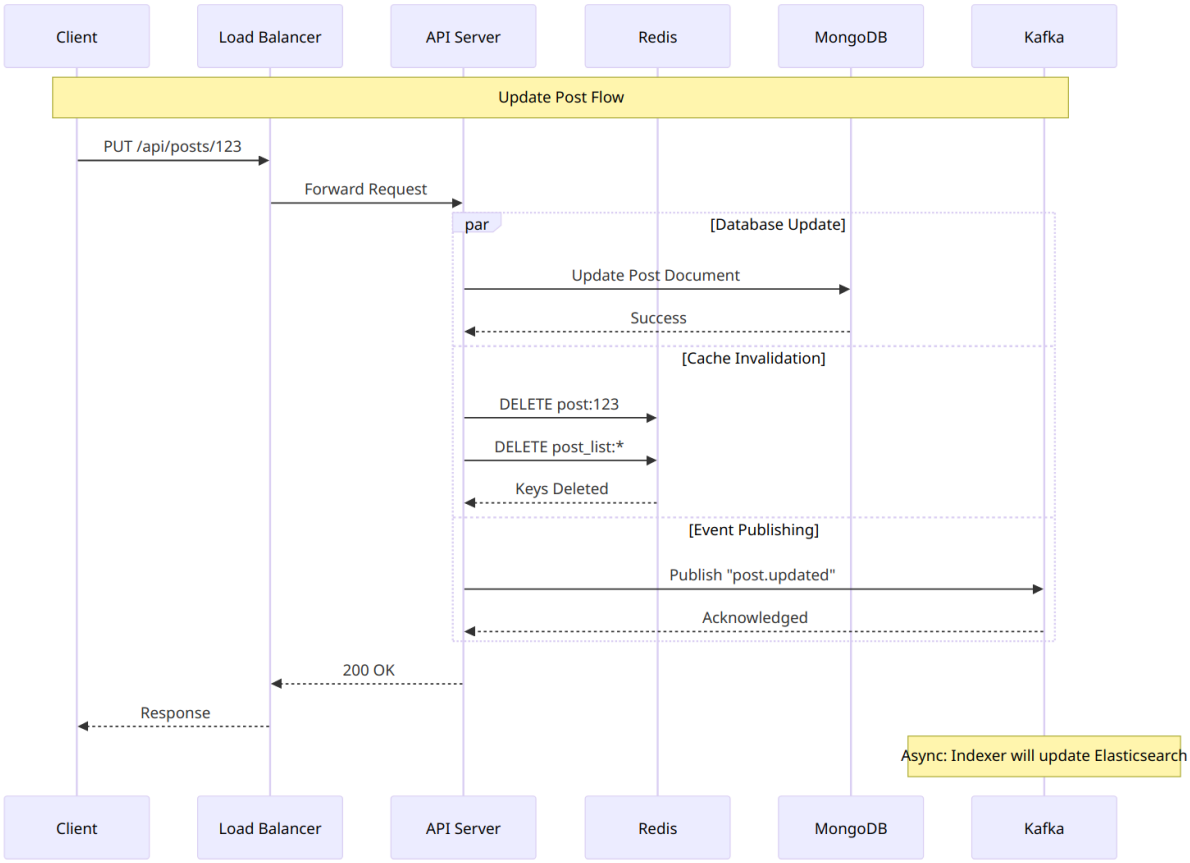


Diagram

Load Balancer Configuration

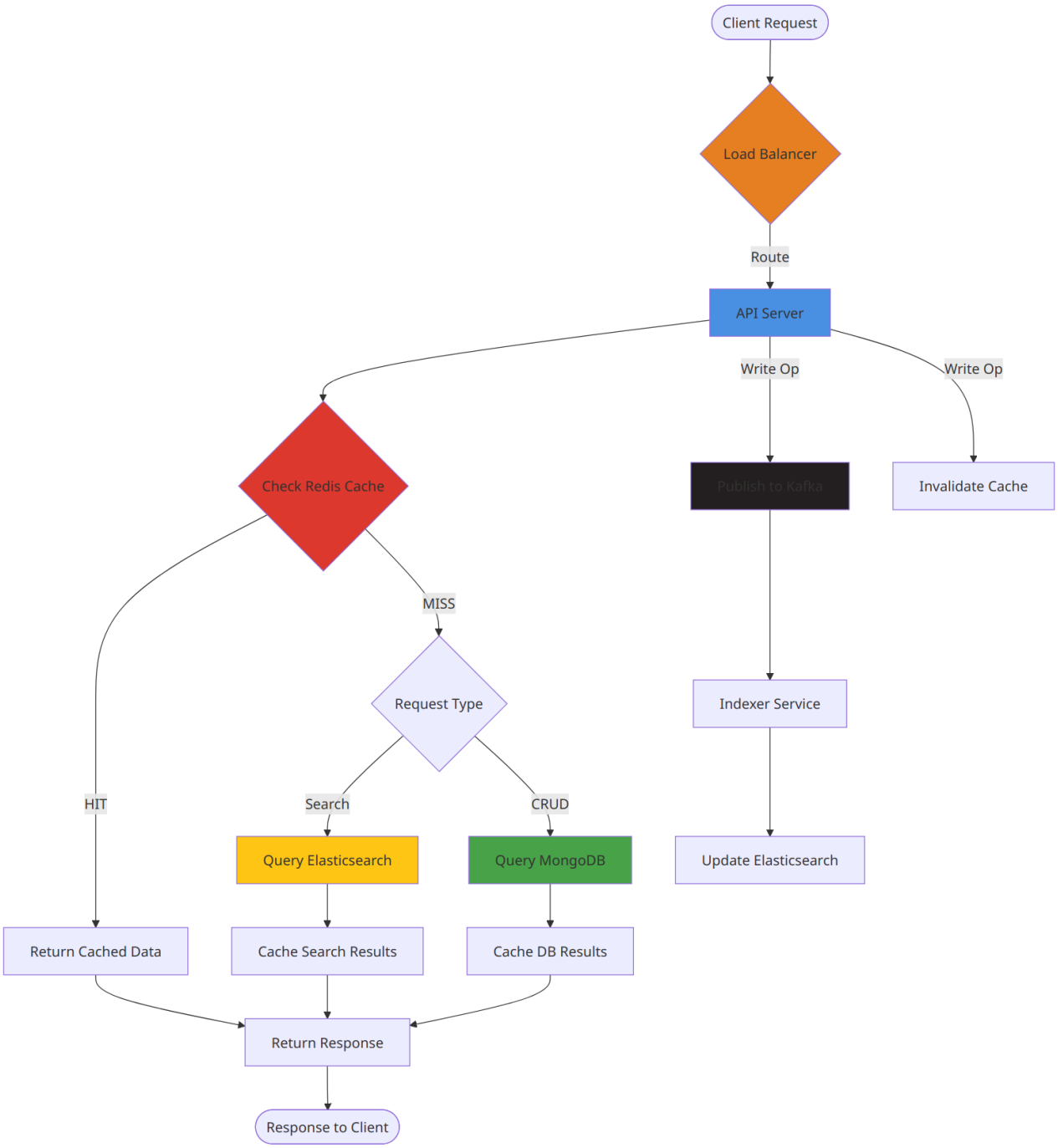


Write Operation with Cache Invalidation



Diagram

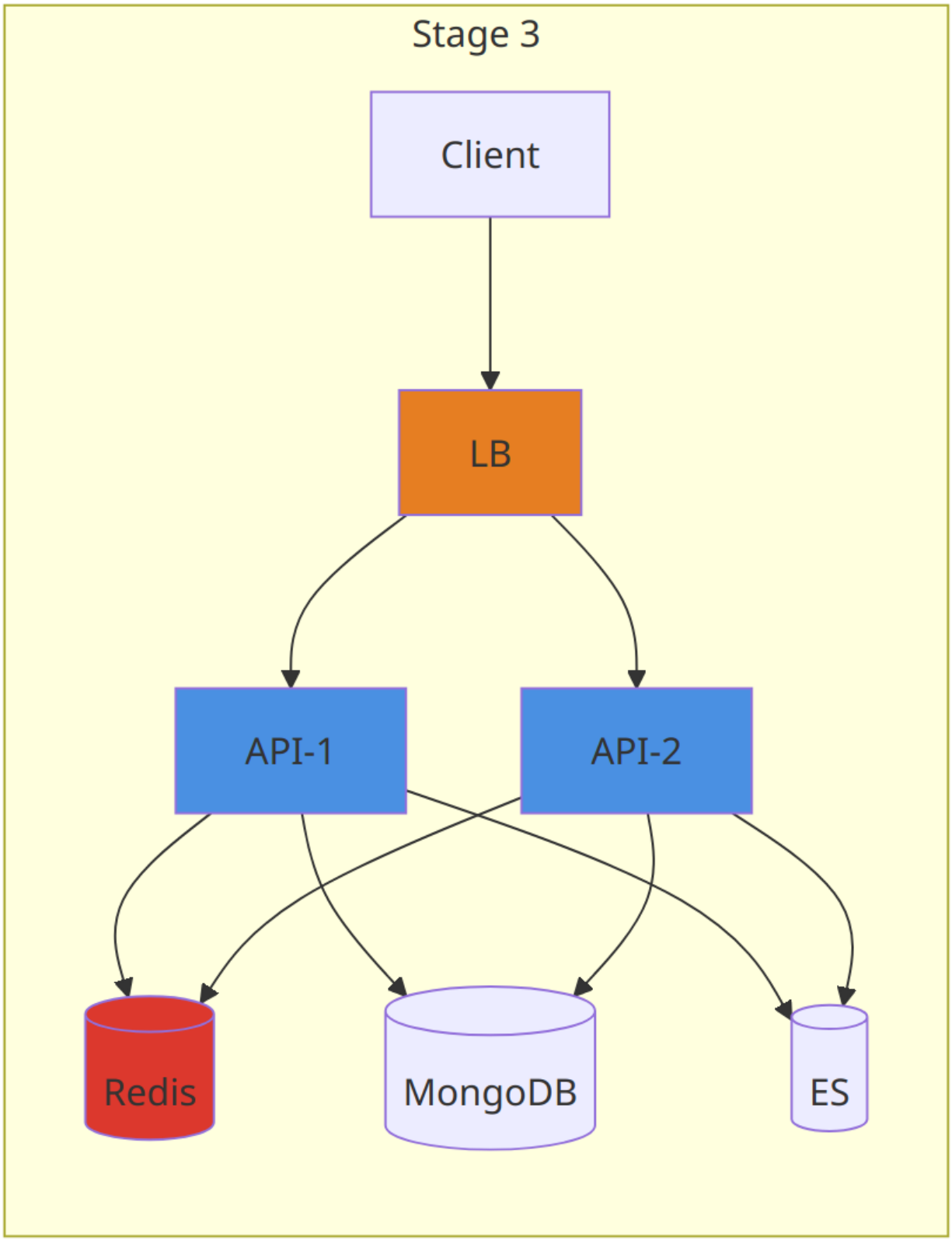
Complete Data Flow

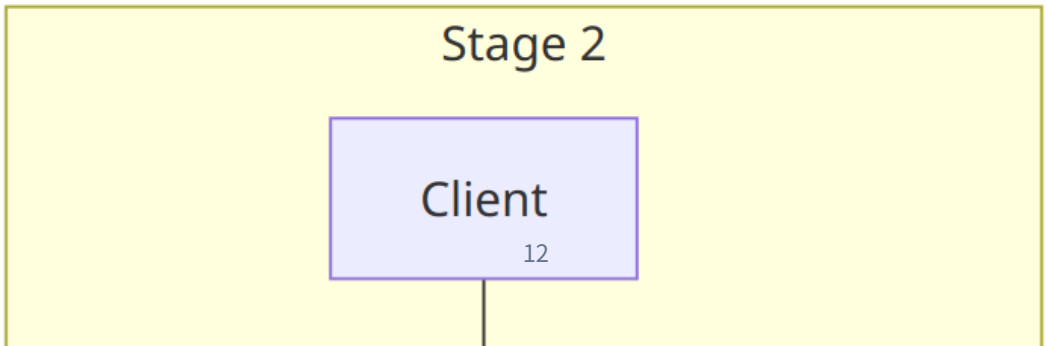


Diagram

Comparison: Stage Evolution

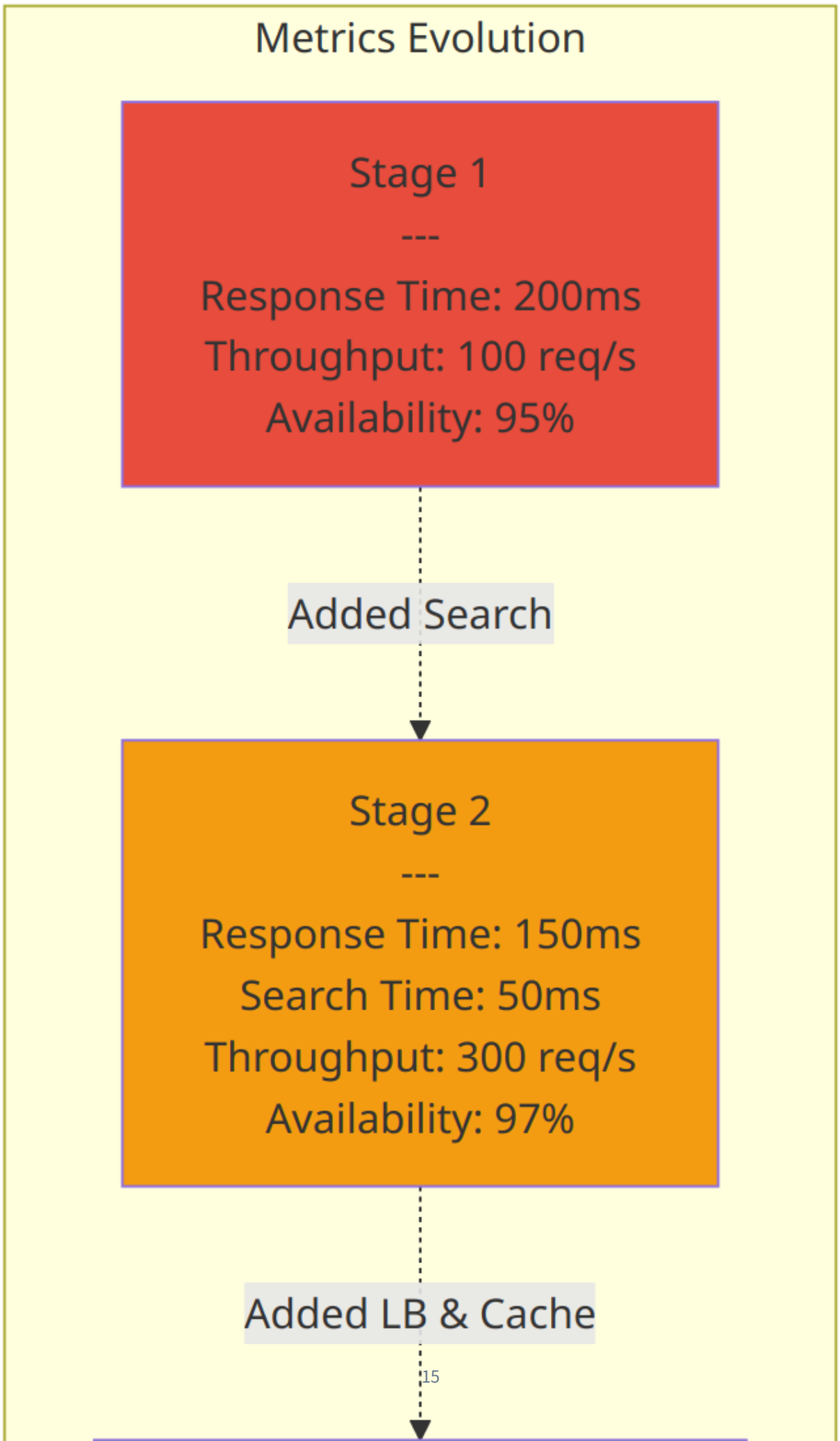
Architecture Complexity


Stage 3
Client
LB
API-1
API-2
Redis
MongoDB
ES


Stage 2
Client

Diagram

Performance Metrics Comparison


Metrics Evolution
Stage 1

Response Time: 200ms
Throughput: 100 req/s
Availability: 95%
Added Search
Stage 2

Response Time: 150ms
Search Time: 50ms
Throughput: 300 req/s
Availability: 97%
Added LB & Cache

Diagram

Key Features by Stage

FEATURE	STAGE 1	STAGE 2	STAGE 3
User CRUD	✅	✅	✅
Post CRUD	✅	✅	✅
Full-Text Search	❌	✅	✅
Search Ranking	❌	✅ (Relevance, Recency, Votes)	✅
Real-time Indexing	❌	✅ (Kafka)	✅
Batch Reindexing	❌	✅ (Cron)	✅
Load Balancing	❌	❌	✅
Caching	❌	❌	✅ (Redis)
Horizontal Scaling	❌	Partial	✅
High Availability	❌	❌	✅

Technology Stack Summary

Technology Stack			
Layer	Stage 1	Stage 2	Stage 3
Load Bal.	-	-	Nginx/ALB
API	Node.js	Node.js	Node.js (3x)
Cache	-	-	Redis
Database	PostgreSQL	MongoDB	MongoDB Cluster
Search	-	Elasticsearch	ES Cluster
Queue	-	Kafka	Kafka Cluster
Indexer	-	Node.js	Node.js (2x)
Scheduler	-	Cron	Cron Service