# Architecture Decisions & Trade-offs - BookMyEvent Platform

## 1. Microservice Architecture vs Modular Monolith

1. Decision: System designed using microservices (Booking, Event, User, SeatLock).
2. Why: Independent scaling, clear domain ownership, high-traffic isolation.
3. Pros: Scalability, fault isolation, team autonomy.
4. Cons: Operational complexity, network latency, distributed debugging challenges.

## 2. Redis-based Seat Locking

1. Decision: Use Redis for temporary seat reservation with TTL.
2. Why: Handle high concurrency with atomic operations.
3. Pros: Prevents double booking, extremely fast, reduces DB contention.
4. Cons: Dependency on Redis availability, eventual consistency risks.

## 3. API Gateway as Single Entry Point

1. Decision: All client traffic routed via API Gateway.
2. Why: Centralized routing, authentication, rate limiting.
3. Pros: Simplified client integration, centralized security.
4. Cons: Potential bottleneck if not scaled properly.

## 4. Separate Database Ownership per Service (Logical Separation)

1. Decision: Each service owns its data domain (logical separation even if same MySQL instance).
2. Why: Loose coupling and future scalability.
3. Pros: Service independence, schema autonomy.
4. Cons: Cross-service joins avoided; requires API-based data access.

## 5. CDN Usage

1. Decision: CDN placed before API Gateway.
2. Why: Cache static assets and read-heavy endpoints.
3. Pros: Faster performance, reduced backend load.

4. Cons: Cache invalidation complexity.

## 6. Synchronous Service Communication (Feign/REST)

1. Decision: Services communicate via REST (Feign clients).
2. Why: Simplicity and easier debugging.
3. Pros: Straightforward implementation, familiar patterns.
4. Cons: Runtime coupling and cascading latency risks.

## 7. Dynamic Seat Availability Calculation

1. Decision: Seat availability derived from confirmed bookings + active Redis locks.
2. Why: Prevent stale state under high concurrency.
3. Pros: Accurate availability management.
4. Cons: Slightly more complex logic.