VOLT ACTIVE DATA

INDUSTRY BRIEF

Real-Time Flight Search and Inventory Management for Airlines

Always-current fares, zero overbooking risk, and fast search at scale

The Challenge

Airline search is one of the most demanding real-time data problems in enterprise technology. At peak load, a major carrier must handle thousands of concurrent search requests while maintaining an accurate, consistent view of seat availability and dynamic pricing across hundreds of routes, updated continuously as fares change and bookings land.

Most airline architectures fail at this in two ways. Static or batch-updated caches serve stale fare data, leading to pricing inconsistencies at checkout. And databases not designed for in-memory transactional throughput struggle under concurrent search load, introducing latency precisely when customers are least likely to wait.

3,000+	15 min	<10ms	6 months
Flights Per Day	Fare Refresh Cycle	Target Search Response	Forward Inventory

Built for Speed, Guaranteed to be Correct

Volt Active Data acts as an ACID-compliant in-memory data layer between backend inventory systems and the customer-facing search experience. It holds and manages the full forward inventory and serves search queries at low latency, with consistency guaranteed at every step.

In-memory inventory cache

Volt holds up to six months of forward flight inventory in memory, partitioned by route (source airport, destination, date). A precomputed search key index means matching flights are identified in a single lookup, with no full table scans and no join overhead.

Real-time fare updates

Fare data is refreshed every 15 minutes via batch ingestion. Partitioning on flight_id means bulk updates are targeted and fast, ensuring every active flight's pricing is current within the refresh window.

Transactional seat availability

Seat availability changes are applied in real time via the booking service. Volt's ACID guarantees ensure every available_seats count is authoritative: no double-sells, no phantom availability, no reconciliation overhead.

ACID-guaranteed consistency

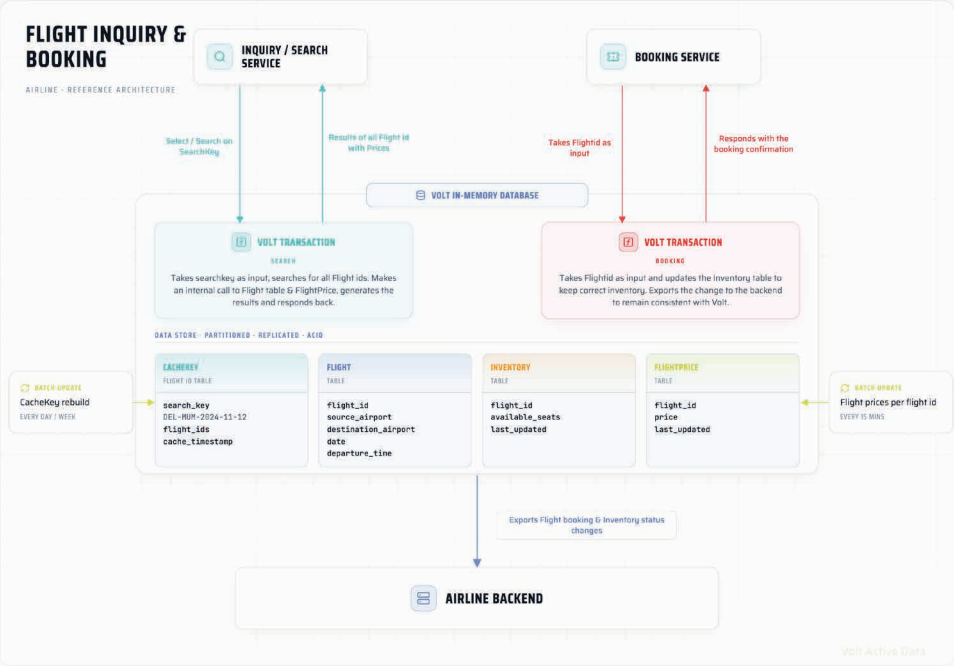
Concurrent updates (fare changes, seat bookings, inventory adjustments) are always applied in a serialized, consistent manner. There is no eventual consistency window in which two customers can book the same seat or see contradictory fares.

Capability at a Glance

Challenge	How Volt solves it
Stale fare data at checkout	Fare cache refreshed every 15 minutes with partitioned batch updates
Search latency under concurrent load	In-memory execution with precomputed search key index
Overbooking and seat count errors	Real-time seat updates with ACID transaction guarantees
Inventory gaps on new routes	Forward inventory pre-loaded up to 6 months; cache keys generated at ingestion
Single point of failure in search layer	Distributed active-active architecture with no single node dependency

Solution Architecture

The solution uses three core structures in Volt: a `search_key_index` partitioned by route for O(1) lookup; a flights-and-seats table updated transactionally on every booking; and a fares table partitioned on `flight_id` refreshed every 15 minutes. A single stored procedure, `GetFlightPrices()`, traverses all three in one transaction and one round-trip.



About Volt Active Data

Volt Active Data provides the real-time decisioning layer for mission-critical telco systems. Purpose-built for the volume, velocity and consistency demands of 5G mediation, Volt maintains authoritative state, executes decision logic, and enforces outcomes atomically — with under 10 millisecond latency and carrier-grade availability. Deployed in production at 100K+ TPS across multi-site, multi-protocol operator environments.

See it running live

Explore the Volt demo lab to see in-memory search performance and ACID-consistent inventory management in action.

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