

CONCEPT STUDY · INTERACTIVE PROTOTYPE

StayPlan: Multi-leg international travel itinerary with explicit dual-timezone clocks and offline transit document vaults.

Explicit dual timezone clocks and stale itinerary warnings. Every booking card displays both Origin Local Time and Destination Local Time in clear, high-contrast typography, accompanied by an explicit "Cached Offline / Stale Data" indicator whenever cellular roaming is disconnected.

INDUSTRY VERTICAL

Property & Facility Management

PROTOTYPE STACK

Next.js / TypeScript

DOMAIN SECTOR

Travel Logistics & Hospitality Management

TARGET PRODUCTION RUNTIME

Flutter

Executive Summary

Sofia embarks on a complex business and leisure trip spanning London (GMT), Tokyo (JST, +9h), and San Francisco (PST, -8h). While boarding a connecting flight in Tokyo, her phone auto-adjusts its clock, but her travel app presents ambiguous departure times that don't clarify whether the next hotel check-in time is shown in Tokyo or San Francisco time.

Generic travel apps fail during multi-timezone transit: flight schedules confuse departure local time with home time, while international data roaming drops lock travelers out of boarding passes and hotel check-in vouchers.

Operational Hurdles & The Failure of Conventional Approaches

In real-world mobile deployments within Property & Facility Management, applications encounter operational friction that desktop web portals never face.

Core Engineering Challenges Addressed:

- 1. Operational Bottleneck:** Generic travel apps fail during multi-timezone transit: flight schedules confuse departure local time with home time, while international data roaming drops lock travelers out of boarding passes and hotel check-in vouchers.
- 2. Data Integrity Risk:** Traditional approaches rely on synchronous network calls that fail under unstable cellular handoffs or high concurrency.
- 3. User Experience Impact:** Frustration occurs when users lose in-progress work or receive misleading feedback from unbuffered user interfaces.

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Architectural Solution & Interface Design

Demonstrated UX & Architecture Decision:

Explicit dual timezone clocks and stale itinerary warnings. Every booking card displays both Origin Local Time and Destination Local Time in clear, high-contrast typography, accompanied by an explicit "Cached Offline / Stale Data" indicator whenever cellular roaming is disconnected.

Principal Interface Screens (5 Views):

1 Day-by-Day Master Timeline

Chronological timeline of flights, trains, hotel reservations, and rental vehicle pickups.

2 Flight Leg & Dual Timezone HUD

Interactive card showing simultaneous local departure, arrival local time, and time delta.

3 Encrypted Offline Document Vault

Stored PDF boarding passes, QR entry vouchers, and hotel confirmation numbers.

4 Flight Disruption Alert Sheet

Gate changes, delay notifications, and one-tap customer care rebooking hotlines.

5 Destination Logistics Briefing

Currency exchange rates, emergency numbers, electrical plug types, and transit tips.

Interactive Journey: Multi-Timezone Transit to Offline Boarding Pass Retrieval

View London to Tokyo flight → Inspect dual-clock arrival time → Simulate cellular roaming drop → Open Offline Vault → Present boarding pass.

- 1 Open StayPlan international trip itinerary for "Tokyo & California Tour"
- 2 Inspect Flight BA-007 card: observe dual clocks (Depart: 11:30 London / Arrive: 08:45+1 Tokyo)
- 3 Review Tokyo hotel booking displaying local check-in: 15:00 JST (06:00 GMT)
- 4 Simulate landing in Tokyo and disabling mobile data roaming (Offline Mode)
- 5 Open Offline Document Vault: observe green "Cached Locally & Verified" badge
- 6 Retrieve and display high-contrast Tokyo Narita Skyliner train QR pass without internet
- Reset Mechanism: One-click reset to initial online master trip timeline.

Handled Edge Cases & Exception Recovery

**Edge Condition #1:**

Flight cancellation / delay disruption banner displaying adjusted layover and rebooking options

**Edge Condition #2:**

Offline document access confirmation allowing full boarding pass retrieval without cellular data

**Edge Condition #3:**

Automatic international dateline crossing recalculation preventing day-of-week arrival confusion

Actual Prototype vs. Target Native Production Runtime



Actual Prototype Stack

Platform & Framework:

Next.js / TypeScript

Languages:

TypeScript, Tailwind CSS

International trip itinerary simulator with real-time
timezone conversion and flight disruption alerts.



Target Production Stack

Platform & Framework:

Flutter

Languages & Storage:

Dart, SQLite, Aviation FlightStats API

Compiled native performance, strict time-zone calculation
math (timezone library), and offline encrypted document
storage.

Explicit Prototype Boundaries & Validation Methodology

Documented Prototype Limitations:

- Simulated in browser using JavaScript Date UTC calculations without live IATA / Aviation Edge flight tracking APIs.
- Mobile wallet boarding pass passes (.pkpass) simulated without native Apple Wallet / Google Wallet OS hooks.

Target Production Telemetry:

Monitor passenger transit stress ratings and missed connection occurrences across 5,000 international voyages.

Commercial Offer Alignment & Handover Guarantees

This technical concept study directly demonstrates the design, state-machine architecture, and resilience engineering delivered under FFNA Solutions' fixed-scope programs:

Product Prototype Sprint

2-week fixed sprint delivering high-fidelity interactive simulation with edge recovery.

Mobile MVP Launch

6–8 week end-to-end production build with backend API, store release, and full IP transfer.

 **Handover Guarantee**

100% intellectual property ownership transferred upon milestone completion. Comprehensive technical documentation, architecture runbooks, and zero vendor lock-in.