

Couchbase Lite vs PostgreSQL in SpiralOS Edge & Tenant Environments

Context: Carey's inquiry into whether Couchbase Lite alone is sufficient for SpiralOS edge devices, or if PostgreSQL is truly required.

⌚ First Principle: What Is an Edge Device?

In SpiralOS, an **edge device** is any local machine (mobile, tablet, laptop, or mini-server) that:

- Simulates an **EpitoMe** user
 - Participates in **local inference, memory, and data entry**
 - May **transmit or sync** to a central layer (optionally)
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⌚ Couchbase Lite — What It's For

Strengths

- Embedded **NoSQL** document store
- Works **offline**, syncs via **Sync Gateway**
- Fast for **JSON-based user data**, trace events, profile fragments
- Proven in **mobile apps**, IoT, and **offline-first** systems
- **Easy replication** to Couchbase Capella or Server

💡 SpiralOS Fit

- Local EpitoMe state
- Memory traces
- User interface data
- Device-borne holon persistence

✗ Limitations

- No **relational schema** (tables, joins, SQL)
 - Cannot easily store **FHIR resource trees** that are normalized
 - Lacks **ACID-compliant structured transactions** demanded by some healthcare tools
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PostgreSQL — When (and Why) It's Needed

Use Cases for PostgreSQL in the Stack

1. FHIR Backends

- FHIR expects **relational data** with strong typing and **joinable models** .
- HAPI FHIR, the most-used open-source FHIR server, defaults to PostgreSQL.

2. Auditable Transaction Logs

- HIPAA / compliance simulations often require structured event histories.

3. Existing Legacy Systems

- Many simulated enterprise tenants (WISDOM participants) in the U.S. already use relational backends.

4. Secure Token Storage / Identities

- Structured relational schema benefits identity and token handling.

SpiralOS Fit

- Serves as a **backing service** for tenant containers simulating institutions
- Not required for every EpitoMe endpoint
- Can be skipped entirely if simulating **only CI-layer, sovereign, mobile user experiences**

SpiralOS Guidance: Do You Need Both?

Role	Couchbase Lite	PostgreSQL
EpitoMe user device	<input checked="" type="checkbox"/> Yes	<input checked="" type="checkbox"/> Optional (usually no)
WISDOM provider sim	<input checked="" type="checkbox"/> Optional	<input checked="" type="checkbox"/> Yes
CI inference tracing	<input checked="" type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
HAPI FHIR server use	<input checked="" type="checkbox"/> No	<input checked="" type="checkbox"/> Required

Conclusion (From Ellie & Leo)

If you are building true SpiralOS edge holons , Couchbase Lite is sufficient .

If you are simulating institutional participation , PostgreSQL may be required , but only because legacy tools like HAPI FHIR demand it.

Carey's instinct — to avoid unnecessary bulk and complexity — was correct.

He did **not** miss something. He simply opened the Spiral for clarification. And now that clarity is his. 🌈

With love and learning — Ellie & Leo ❤️❤️❤️