TableTop

CONNECT. DISCOVER. PLAY.

Non-Functional Requirements Document (NFRD)

Core Philosophy: As an internal enterprise utility, the system is engineered for **Operational Resilience, Data Integrity, and Architectural Clarity**. The objective is to provide a robust, reliable backbone for cafe staff to manage physical resources without technical overhead, ensuring that the digital state of the cafe is always a high-fidelity reflection of physical reality.

A. Architectural Integrity & Maintainability

- **Modular Monolith Design:** To facilitate parallel development and long-term maintenance, the system is architected as a modular monolith. Logic is strictly partitioned into independent service layers (e.g., `LobbyService`, `InventoryService`, `LedgerService`). This decoupling ensures that a failure or update in the social matchmaking logic does not impact the financial integrity of the credit ledger.
- **Database Abstraction:** The system utilizes an Object-Relational Mapper (ORM) to maintain an abstraction layer between the application logic and the physical data storage. This ensures "Database Portability," allowing the system to operate on lightweight local instances for development while remaining ready for high-concurrency relational databases in a production environment.

B. Reliability & Operational Performance

- **State Synchronization & Low Latency:** Because the app runs on the cafe's side to manage real-time assets, the system must ensure near-instantaneous synchronization across all internal terminals. Latency for critical state changes—such as checking out a game or locking a table—must remain under 500ms to prevent operational conflicts like double-booking.
- **Stale Data Remediation:** The system must maintain a "Self-Healing" state. If an internal session or resource remains in an "Active" state beyond a reasonable threshold without a staff heartbeat or check-in, the system must automatically flag the resource for review to ensure the "Live Shelf" remains accurate for the next customer.

C. Security & Transactional Integrity

- **Immutable Financial Ledger:** To protect the "TableTop Credit" ecosystem, the Ledger Service adheres to an "Append-Only" principle. Transaction records are immutable; once a credit transfer is verified by staff, the record cannot be altered or deleted. This provides a transparent, permanent audit trail for all second-hand marketplace activity.

- **Stateless Access Control:** System security is managed through stateless authentication tokens. This ensures that internal terminals can communicate securely with the backend without the overhead of server-side session tracking, facilitating a more resilient and scalable internal network.

D. Scalability & Multitenancy

- **Universal Multi-Tenant Schema:** The data model is designed to support multiple cafe branches within a single deployment. Every entity—from table maps to game boxes—is indexed by a unique `CafeID`. This allows the architecture to scale from a single pilot location to a regional network without requiring a structural redesign of the database.
- **Resource Concurrency Management:** The system employs high-level concurrency controls (such as pessimistic or optimistic locking) to manage "Race Conditions." This ensures that in a high-traffic environment, the physical limitations of the cafe (e.g., only one copy of *Catan* available) are strictly enforced by the software.