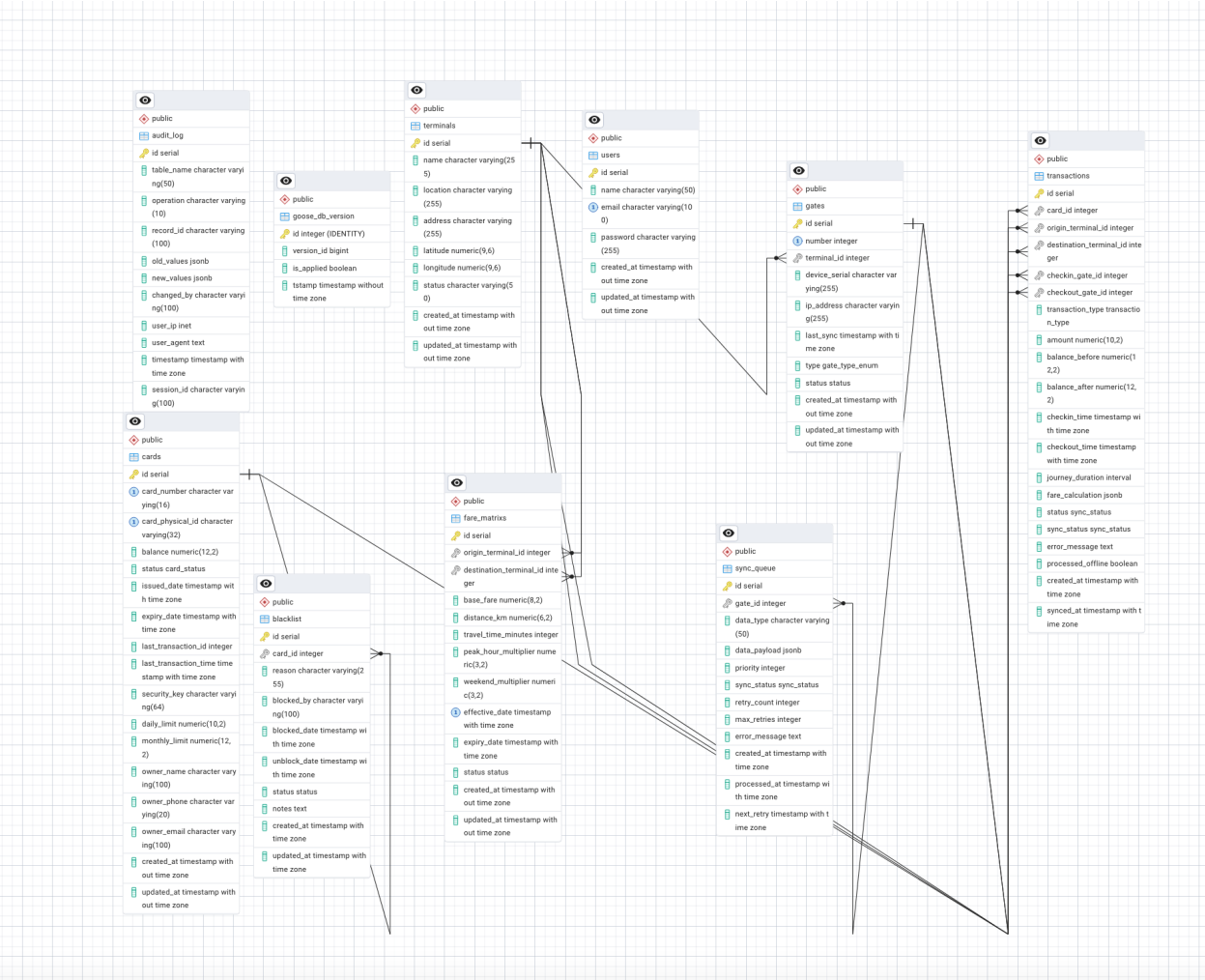
DESIGN DATABASE

SCHEMA DATABASE



1. Table Structure:
    - Cards: Manajemen kartu prepaid dengan enkripsi
    - Terminals: 5 terminal dengan koordinat dan status
    - Gates: Multiple gates per terminal dengan monitoring
    - Transactions: Partitioned table untuk performance
    - Fare Matrix: Dynamic pricing dengan time-based multipliers
    - Sync Queue: Offline transaction management
    - Blacklist: Security management
    - Audit Log: Complete audit trail
    - Enum Types: Type safety untuk status fields
2. Offline Support:
    - Sync Queue Table: Queue management untuk offline transactions
    - Status Tracking: PENDING/SYNCED/FAILED status
    - Retry Mechanism: Automatic retry dengan exponential backoff

Conflict Resolution: Timestamp-based resolution

3. Security Features:
    Role-Based Access: Admin, Operator, ReadOnly roles
    Encryption: Security keys untuk offline validation
    Blacklist Management: Real-time fraud prevention
    Audit Trail: Complete change tracking
4. Performance Optimizations:
    Strategic Indexing: Optimized untuk common queries
    Connection Pooling Ready: Designed untuk high concurrency
5. Business Logic:
    Dynamic Pricing: Peak hour dan weekend multipliers
    Balance Management: Daily/monthly limits
    Journey Tracking: Complete trip lifecycle
    Revenue Reporting: Built-in analytics views

Central Database (PostgreSQL):

1. Master Database -> untuk write data
2. Slave -> untuk keperluan read data
3. Backup Strategy -> continus WAL Archiving
4. Indexing -> optimize read query

Local Databse (Sqlite)

1. Embedded DB di setiap gate
2. Cache Tables : Fare matrix, cards, blacklist
3. Transaction queue : Offline transaction

Cache Layer (Redis)

1. Rate limiting -> API throttling
2. Session cache -> active transactions
3. Fare cache -> Cache tarif

Data Synchronized Strategi

1. Table Structure:

- **Cards**: Manajemen kartu prepaid dengan enkripsi
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- **Sync Queue**: Offline transaction management

- **Blacklist**: Security management
- **Audit Log**: Complete audit trail

2. Advanced Features:

- **UUID Primary Keys**: Untuk security dan distributed systems
- **Partitioning**: Monthly partitions untuk transactions table
- **Triggers**: Auto-update timestamps dan audit logging
- **Functions**: Fare calculation dengan peak hour pricing
- **Views**: Pre-built queries untuk monitoring
- **Enum Types**: Type safety untuk status fields

3. Offline Support:

- **Sync Queue Table**: Queue management untuk offline transactions
- **Status Tracking**: PENDING/SYNCED/FAILED status
- **Retry Mechanism**: Automatic retry dengan exponential backoff
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4. Security Features:

- **Role-Based Access**: Admin, Operator, ReadOnly roles
- **Encryption**: Security keys untuk offline validation
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5. Performance Optimizations:

- **Strategic Indexing**: Optimized untuk common queries
- **Partitioning**: Monthly partitions untuk scalability
- **Views**: Pre-computed aggregations
- **Connection Pooling Ready**: Designed untuk high concurrency

6. Business Logic:

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