# DOKUMEN ANALISIS SISTEM

# Sistem Informasi Manajemen LPG (SIM4LON)

**Dokumen**: System Analysis & Design Documentation
**Versi**: 1.0
**Tanggal**: 23 Desember 2024
**Sistem**: SIM4LON (Sistem Informasi Manajemen LPG 4 Jalur Online)
**Dibuat oleh**: System Analyst Team

## DAFTAR ISI

# 1. EXECUTIVE SUMMARY

## 1.1 Tujuan Dokumen

Dokumen ini merupakan **dokumentasi teknis lengkap** untuk sistem SIM4LON yang mencakup seluruh diagram UML dan analisis sistem. Dokumen ini ditujukan untuk:

- Tim Pengembang (Developer)
- System Analyst
- Project Manager
- Quality Assurance
- Stakeholder Teknis

## 1.2 Ringkasan Sistem

**SIM4LON** adalah Sistem Informasi Manajemen LPG 4 Jalur Online yang mengelola distribusi gas LPG dari Agen ke Pangkalan hingga ke Konsumen akhir.

Fitur Utama:

1. **Manajemen Pesanan** - Lifecycle pesanan dari DRAFT hingga SELESAI
2. **Manajemen Stok** - Penerimaan dari SPBE & penyaluran ke pangkalan
3. **Manajemen Pembayaran** - Pencatatan tunai, transfer, DP
4. **Multi-Tenant Pangkalan** - Dashboard khusus untuk setiap pangkalan
5. **Reporting** - Laporan penjualan, stok, pembayaran

## 1.3 Statistik UML

| Diagram Type | Jumlah | Status |
|---|---|---|
| Use Case Diagram | 1 | ☑ Complete |
| Class Diagram | 1 | ☑ Complete |
| ERD | 1 | ☑ Complete |
| Activity Diagram | 25 | ☑ Complete |
| Sequence Diagram | 18 | ☑ Complete |
| State Machine Diagram | 4 | ☑ Complete |
| Deployment Diagram | 1 | ☑ Complete |
| **TOTAL** | **51** | ☑ |

# 2. GAMBARAN UMUM SISTEM

## 2.1 Deskripsi Bisnis

SIM4LON adalah sistem berbasis web untuk mengelola rantai distribusi LPG:

```
SPBE/SUPPLIER → AGEN → PANGKALAN → KONSUMEN
```
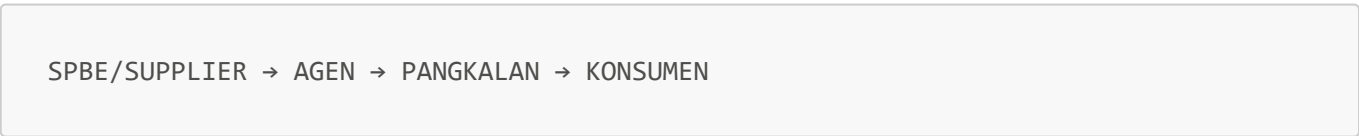
Alur Bisnis:

1. **Agen** menerima LPG dari SPBE (Sales Order/Loading Order)
2. **Agen** menyalurkan LPG ke **Pangkalan**
3. **Pangkalan** menjual LPG ke **Konsumen** akhir
4. Sistem mencatat semua transaksi dan stok

## 2.2 Aktor Sistem

| Aktor | Deskripsi | Hak Akses |
|---|---|---|
| **Admin** | Administrator sistem | Full access |

| Aktor | Deskripsi | Hak Akses |
|-------|-----------|-----------|
| **Operator** | Staff operasional agen | Operasional (pesanan, stok, pembayaran) |
| **Pangkalan** | Pemilik/pengelola pangkalan | Hanya data milik sendiri |

## 2.3 Modul Sistem

| Modul | Fungsi |
|-------|--------|
| **Auth** | Login, logout, session management |
| **Dashboard** | Overview KPI dan statistik |
| **Master Data** | Pengguna, pangkalan, supir, produk |
| **Order** | Pesanan, status, timeline |
| **Payment** | Pembayaran, invoice |
| **Stock** | Penerimaan, penyaluran, riwayat |
| **Pangkalan SaaS** | Module khusus pangkalan |
| **Report** | Laporan dan export |

# 3. FULL STACK TECHNOLOGY

## 3.1 Architecture Overview

```
┌─────────────────────────────────────────────────────────────┐
│                     SIM4LON FULL STACK                        │
├─────────────────────────────────────────────────────────────┤
│ FRONTEND             │ BACKEND             │ DATABASE/STORAGE │
│ ────────             │ ───────             │ ──────────────── │
│ React 18             │ NestJS 10           │ PostgreSQL 15    │
│ Vite 5               │ Prisma 5            │ Supabase Storage │
│ TanStack Query v5    │ JWT + Passport      │                  │
│ React Router v6      │ Multer              │                  │
│ Tailwind CSS         │ class-validator     │                  │
│ Shadcn/UI            │                     │                  │
├─────────────────────────────────────────────────────────────┤
│ Vercel               │ Railway             │ Railway + Supabase │
└─────────────────────────────────────────────────────────────┘
```
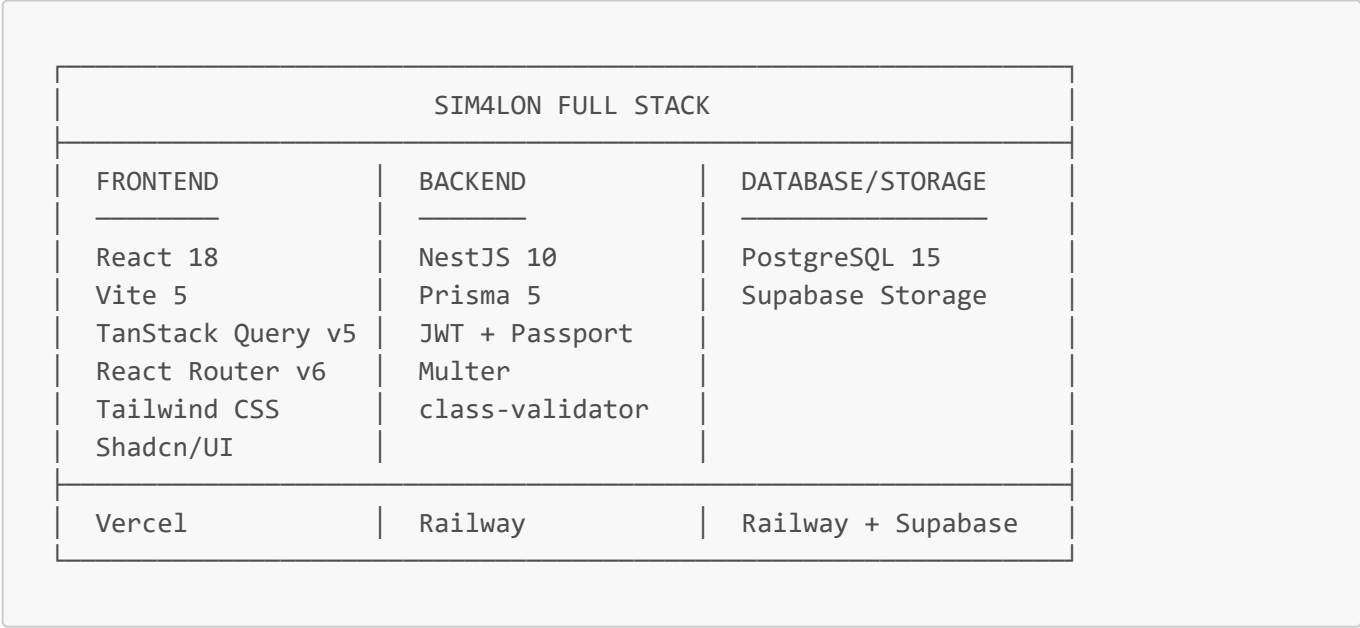
## 3.2 Frontend Stack

| Technology | Version | Purpose |
|------------|---------|---------|
| React | 18 | UI Library |

| Technology | Version | Purpose |
|---|---|---|
| Vite | 5 | Build Tool & Dev Server |
| TanStack Query | v5 | Data Fetching & Caching |
| React Router | v6 | Client-side Routing |
| Tailwind CSS | 3 | Utility-first CSS |
| Shadcn/UI | Latest | Pre-built Components |
| Lucide Icons | Latest | Icon Library |
| Recharts | Latest | Charts & Graphs |

## 3.3 Backend Stack

| Technology | Version | Purpose |
|---|---|---|
| NestJS | 10 | Backend Framework |
| Prisma | 5 | ORM & Database Client |
| Passport | Latest | Authentication |
| JWT | Latest | Token-based Auth |
| Multer | Latest | File Upload Handler |
| class-validator | Latest | DTO Validation |
| bcrypt | Latest | Password Hashing |

## 3.4 Database & Storage

| Service | Purpose |
|---|---|
| PostgreSQL 15 | Primary Database (21 tables, 7 enums) |
| Supabase Storage | File Storage (profile pics, payment proofs) |

## 3.5 Hosting

| Layer | Provider | URL Pattern |
|---|---|---|
| Frontend | Vercel | https://sim4lon.vercel.app |
| Backend | Railway | https://sim4lon-api.up.railway.app |
| Database | Railway | Internal connection |
| Storage | Supabase | CDN delivery |

# 4. USE CASE DIAGRAM

# 4.1 Diagram File

- **File**: `SIM4LON_UseCase.puml`

# 4.2 Daftar Use Case

## Use Case Semua Aktor

| ID | Use Case | Deskripsi |
| --- | --- | --- |
| UC-01 | Login | Masuk ke sistem dengan single-session |
| UC-02 | Kelola Profil | Melihat dan mengubah data profil |

## Use Case Admin Only

| ID | Use Case | Deskripsi |
| --- | --- | --- |
| UC-03 | Kelola Pengguna | CRUD data pengguna |
| UC-04 | Kelola Pangkalan | CRUD data pangkalan + auto-create user |
| UC-05 | Kelola Supir | CRUD data driver |
| UC-06 | Lihat Log Aktivitas | Audit trail sistem |
| UC-07 | Kelola Perencanaan | Alokasi LPG bulanan |

## Use Case Admin + Operator

| ID | Use Case | Deskripsi |
| --- | --- | --- |
| UC-08 | Kelola Dashboard | Overview KPI |
| UC-09 | Kelola Pesanan | Lifecycle pesanan |
| UC-10 | Buat Pesanan | Create order baru |
| UC-11 | Lihat Pesanan | View order detail |
| UC-12 | Update Status | Ubah status order |
| UC-13 | Assign Driver | Tugaskan driver (extend) |
| UC-14 | Kelola Pembayaran | Catat pembayaran |
| UC-15 | Cetak Nota | Print invoice (extend) |
| UC-16 | Kelola Stok | Manage stok agen |
| UC-17 | Catat Penerimaan | Input stok dari SPBE |
| UC-18 | Catat Penyaluran | Distribusi ke pangkalan |
| UC-19 | Kelola Laporan | Generate & export reports |

Use Case Pangkalan Only

| ID | Use Case | Deskripsi |
|---|---|---|
| UC-20 | Kelola Penjualan | Jual LPG ke konsumen |
| UC-21 | Kelola Konsumen | CRUD data konsumen |
| UC-22 | Buat Order ke Agen | Pesan LPG ke agen |
| UC-23 | Kelola Stok Pangkalan | Manage stok sendiri |

# 4.3 Relasi Use Case

## Include Relationships

| Use Case Utama | Include |
|---|---|
| Kelola Stok | → Catat Penerimaan |
| Kelola Stok | → Catat Penyaluran |
| Kelola Pesanan | → Buat Pesanan |
| Kelola Pesanan | → Lihat Pesanan |

## Extend Relationships

| Use Case Utama | Extension |
|---|---|
| Update Status | → Assign Driver |
| Kelola Pembayaran | → Cetak Nota |

# 4.4 Matriks Akses

| Use Case | Admin | Operator | Pangkalan |
|---|---|---|---|
| Login | ☑ | ☑ | ☑ |
| Kelola Profil | ☑ | ☑ | ☑ |
| Kelola Pengguna | ☑ | ✖ | ✖ |
| Kelola Pangkalan | ☑ | ✖ | ✖ |
| Kelola Supir | ☑ | ✖ | ✖ |
| Kelola Dashboard | ☑ | ☑ | ✖ |
| Kelola Pesanan | ☑ | ☑ | ✖ |
| Kelola Pembayaran | ☑ | ☑ | ✖ |
| Kelola Stok | ☑ | ☑ | ✖ |

| Use Case | Admin | Operator | Pangkalan |
|----------|-------|----------|-----------|
| Kelola Laporan | ☑ | ☑ | ✖ |
| Kelola Penjualan | ✖ | ✖ | ☑ |
| Kelola Konsumen | ✖ | ✖ | ☑ |
| Buat Order ke Agen | ✖ | ✖ | ☑ |

# 5. CLASS DIAGRAM

## 5.1 Diagram File

- **File**: SIM4LON_ClassDiagram.puml

## 5.2 Daftar Class (21 Entitas)

### Master Data

| Class | Deskripsi | PK |
|-------|-----------|-----|
| users | Akun pengguna sistem | UUID |
| agen | Distributor LPG | UUID |
| pangkalans | Pangkalan/outlet | UUID |
| drivers | Supir pengiriman | UUID |
| lpg_products | Katalog produk LPG | UUID |

### Order Management

| Class | Deskripsi | PK |
|-------|-----------|-----|
| orders | Pesanan utama | UUID |
| order_items | Detail item pesanan | UUID |
| timeline_tracks | Riwayat status | UUID |

### Payment

| Class | Deskripsi | PK |
|-------|-----------|-----|
| invoices | Faktur/invoice | UUID |
| order_payment_details | Summary pembayaran | UUID |
| payment_records | Catatan transaksi | UUID |

### Stock Management

| Class | Deskripsi | PK |
|---|---|---|
| stock_histories | Riwayat stok agen | UUID |
| penerimaan_stok | Penerimaan dari SPBE | UUID |
| perencanaan_harian | Perencanaan alokasi | UUID |
| penyaluran_harian | Penyaluran ke pangkalan | UUID |

### Pangkalan Module

| Class | Deskripsi | PK |
|---|---|---|
| consumers | Konsumen pangkalan | UUID |
| consumer_orders | Penjualan ke konsumen | UUID |
| pangkalan_stocks | Stok per pangkalan | UUID |
| pangkalan_stock_movements | Riwayat pergerakan | UUID |
| lpg_prices | Harga jual per pangkalan | UUID |
| expenses | Pengeluaran operasional | UUID |
| agen_orders | Order ke agen | UUID |

### Audit

| Class | Deskripsi | PK |
|---|---|---|
| activity_logs | Log aktivitas sistem | UUID |

## 5.3 Enumerasi

| Enum | Values |
|---|---|
| user_role | ADMIN, OPERATOR, PANGKALAN |
| status_pesanan | DRAFT, MENUNGGU_PEMBAYARAN, DIPROSES, SIAP_KIRIM, DIKIRIM, SELESAI, BATAL |
| lpg_type | kg3, kg5_5, kg12, kg50 |
| lpg_category | SUBSIDI, NON_SUBSIDI |
| payment_method | TUNAI, TRANSFER |
| stock_movement_type | MASUK, KELUAR |
| consumer_type | RUMAH_TANGGA, WARUNG |

# 6. ENTITY RELATIONSHIP DIAGRAM (ERD)

## 6.1 Diagram File

- **File**: `SIM4LON_ERD.puml`

## 6.2 Relasi Utama

One-to-Many Relationships

| Parent | Child | Deskripsi |
|---|---|---|
| agen | pangkalans | Agen melayani banyak pangkalan |
| pangkalans | users | Pangkalan memiliki user |
| pangkalans | orders | Pangkalan membuat pesanan |
| orders | order_items | Pesanan berisi items |
| orders | timeline_tracks | Pesanan punya riwayat |
| pangkalans | consumers | Pangkalan punya konsumen |
| consumers | consumer_orders | Konsumen membeli |

One-to-One Relationships

| Table 1 | Table 2 | Deskripsi |
|---|---|---|
| orders | order_payment_details | 1 pesanan = 1 summary bayar |

## 6.3 Composite Unique Keys

- `lpg_prices(pangkalan_id, lpg_type)`
- `pangkalan_stocks(pangkalan_id, lpg_type)`
- `penyaluran_harian(pangkalan_id, tanggal, lpg_type)`

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# 7. ACTIVITY DIAGRAM

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## 7.1 Diagram Files

Fase 1: Core Processes (9 Diagram)

| ID | File | Proses |
|---|---|---|
| AD-01 | `AD_01_Login.puml` | Login dengan single-session |
| AD-02 | `AD_02_BuatPesanan.puml` | Membuat pesanan baru |
| AD-03 | `AD_03_UpdateStatusPesanan.puml` | Update status order |
| AD-04 | `AD_04_CatatPembayaran.puml` | Record payment |

| ID | File | Proses |
|---|---|---|
| AD-05 | AD_05_CatatPenerimaanStok.puml | Terima stok dari SPBE |
| AD-06 | AD_06_CatatPenyaluran.puml | Distribusi ke pangkalan |
| AD-07 | AD_07_CatatPenjualan.puml | Pangkalan jual ke konsumen |
| AD-08 | AD_08_BuatOrderKeAgen.puml | Pangkalan order ke agen |
| AD-09 | AD_09_KelolaPangkalan.puml | CRUD pangkalan + auto user |

Fase 2: Supporting Processes (16 Diagram)

| ID | File | Proses |
|---|---|---|
| AD-10 | AD_10_UbahPassword.puml | Change password |
| AD-11 | AD_11_KelolaPengguna.puml | Manage users |
| AD-12 | AD_12_KelolaSupir.puml | Manage drivers |
| AD-13 | AD_13_KelolaProdukLPG.puml | Manage products |
| AD-14 | AD_14_AssignDriver.puml | Assign driver |
| AD-15 | AD_15_LihatDetailPesanan.puml | View order detail |
| AD-16 | AD_16_GenerateInvoice.puml | Generate invoice |
| AD-17 | AD_17_CetakNota.puml | Print receipt |
| AD-18 | AD_18_KelolaPerencanaan.puml | Planning/allocation |
| AD-19 | AD_19_LihatInOutAgen.puml | View agent in/out |
| AD-20 | AD_20_KelolaKonsumen.puml | Manage consumers |
| AD-21 | AD_21_KelolaStokPangkalan.puml | Manage pangkalan stock |
| AD-22 | AD_22_TerimaOrderDariAgen.puml | Receive from agen |
| AD-23 | AD_23_KelolaPengeluaran.puml | Manage expenses |
| AD-24 | AD_24_GenerateLaporan.puml | Generate reports |
| AD-25 | AD_25_ExportLaporan.puml | Export to Excel |

## 7.2 Struktur Diagram

- **Partisi**: User/Admin/Pangkalan | Sistem
- **Notasi**: Start → Actions → Decisions → End

# 8. SEQUENCE DIAGRAM

# 8.1 Diagram Files

## Fase 1: Core Interactions (8 Diagram)

| ID | File | Interaksi |
|---|---|---|
| SD-01 | SD_01_Login.puml | Login + JWT + single-session |
| SD-03 | SD_03_CreateOrder.puml | Create order + PPN calc |
| SD-04 | SD_04_UpdateStatus.puml | Update status + auto-sync stock |
| SD-07 | SD_07_RecordPayment.puml | Record payment + auto status |
| SD-09 | SD_09_ReceiveStock.puml | Receive from SPBE |
| SD-10 | SD_10_RecordDistribution.puml | Distribution to pangkalan |
| SD-12 | SD_12_RecordSale.puml | Pangkalan sale to consumer |
| SD-16 | SD_16_CreatePangkalan.puml | Create pangkalan + auto user |

## Fase 2: Supporting Interactions (10 Diagram)

| ID | File | Interaksi |
|---|---|---|
| SD-02 | SD_02_Logout.puml | Logout + invalidate session |
| SD-05 | SD_05_AssignDriver.puml | Assign driver to order |
| SD-06 | SD_06_GetOrderDetail.puml | Load order with relations |
| SD-08 | SD_08_GenerateInvoice.puml | Generate invoice |
| SD-11 | SD_11_GetStockSummary.puml | Stock summary |
| SD-13 | SD_13_CreateOrderToAgen.puml | Pangkalan order to agen |
| SD-14 | SD_14_ConfirmReceipt.puml | Confirm receipt + update stock |
| SD-15 | SD_15_DashboardPangkalan.puml | Dashboard with stats |
| SD-17 | SD_17_CRUDGeneric.puml | Generic CRUD template |
| SD-18 | SD_18_GenerateExportReport.puml | Generate & export report |

# 8.2 Participants

- actor - User (Admin/Operator/Pangkalan)
- boundary - UI Pages (LoginPage, OrderPage, etc)
- control - Services (AuthService, OrderService, etc)
- database - Tables (users, orders, etc)
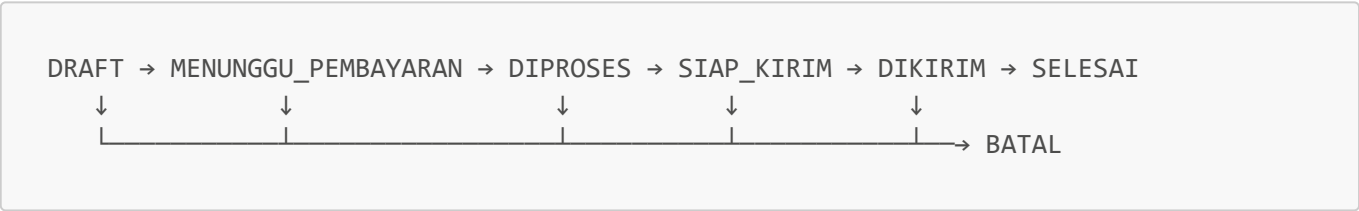
# 8.3 Notasi

- Numbered messages: 1.1, 1.1.1, 1.1.1.1

---

# 9. STATE MACHINE DIAGRAM

## 9.1 Diagram Files

| ID | File | Entity | States |
|---|---|---|---|
| SM-01 | SM_01_OrderStatus.puml | Order | 7 states |
| SM-02 | SM_02_PaymentStatus.puml | Payment | 3 states |
| SM-03 | SM_03_AgenOrderStatus.puml | Agen Order | 4 states |
| SM-04 | SM_04_UserSession.puml | Session | 4 states |

## 9.2 SM-01: Order Status

```
DRAFT → MENUNGGU_PEMBAYARAN → DIPROSES → SIAP_KIRIM → DIKIRIM → SELESAI
  ↓              ↓                 ↓           ↓           ↓
  └──────────────┴─────────────────┴───────────┴───────────┴──→ BATAL
```

| State | Trigger | Next State |
|---|---|---|
| DRAFT | Submit | MENUNGGU_PEMBAYARAN |
| MENUNGGU_PEMBAYARAN | Payment received | DIPROSES |
| DIPROSES | Ready | SIAP_KIRIM |
| SIAP_KIRIM | Driver assigned | DIKIRIM |
| DIKIRIM | Confirmed | SELESAI |
| Any | Cancel | BATAL |

**Special**: Saat status = SELESAI, stok pangkalan **otomatis bertambah**.

## 9.3 SM-02: Payment Status

```
UNPAID → PARTIAL → PAID
  ↓         ↑
  └─────────┴──→ PAID
```
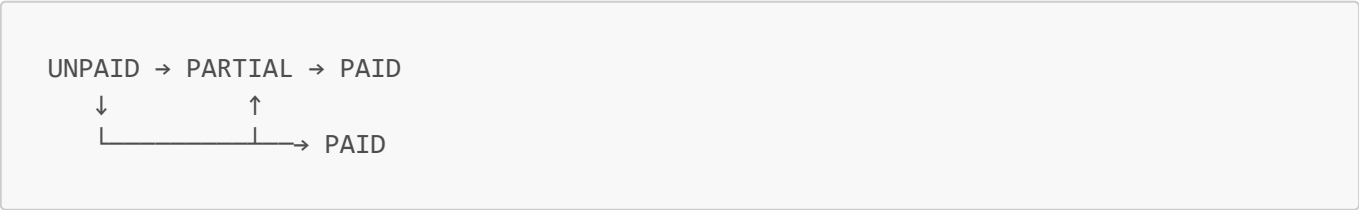
| State | Condition | Field Values |
|---|---|---|
| UNPAID | No payment | is_paid=false, is_dp=false |

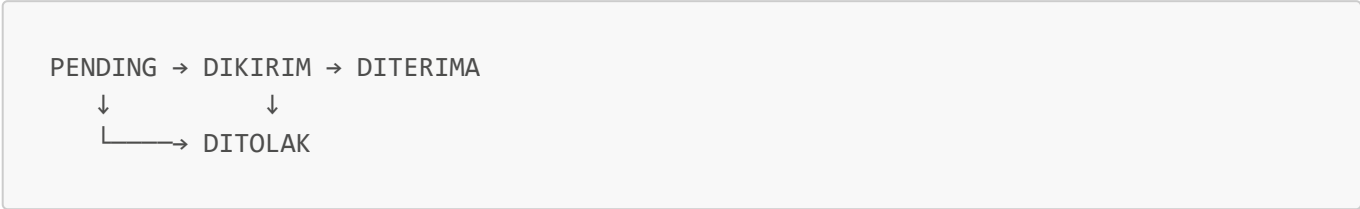| State | Condition | Field Values |
|-------|-----------|--------------|
| PARTIAL | Has DP | is_paid=false, is_dp=true |
| PAID | Full payment | is_paid=true |

## 9.4 SM-03: Agen Order Status

```
PENDING → DIKIRIM → DITERIMA
   ↓          ↓
   └────→ DITOLAK
```

## 9.5 SM-04: User Session

```
LOGGED_OUT ⇔ LOGGED_IN → SESSION_EXPIRED
                 ↓
            KICKED_OUT (single-session)
```

# 10. DEPLOYMENT DIAGRAM

## 10.1 Diagram File

- **File**: SIM4LON_Deployment.puml

## 10.2 Infrastructure

```
┌──────────┐      ┌──────────┐     ┌──────────┐     ┌──────────┐
│  Client  │─────▶│  Vercel  │────▶│  Railway │────▶│PostgreSQL│
│ (Browser)│HTTPS │(Frontend)│ API │(Backend) │ TCP │(Database)│
└──────────┘      └──────────┘     └──────────┘     └──────────┘
                                        │
                                        ▼
                                   ┌──────────┐
                                   │ Supabase │
                                   │(Storage) │
                                   └──────────┘
```
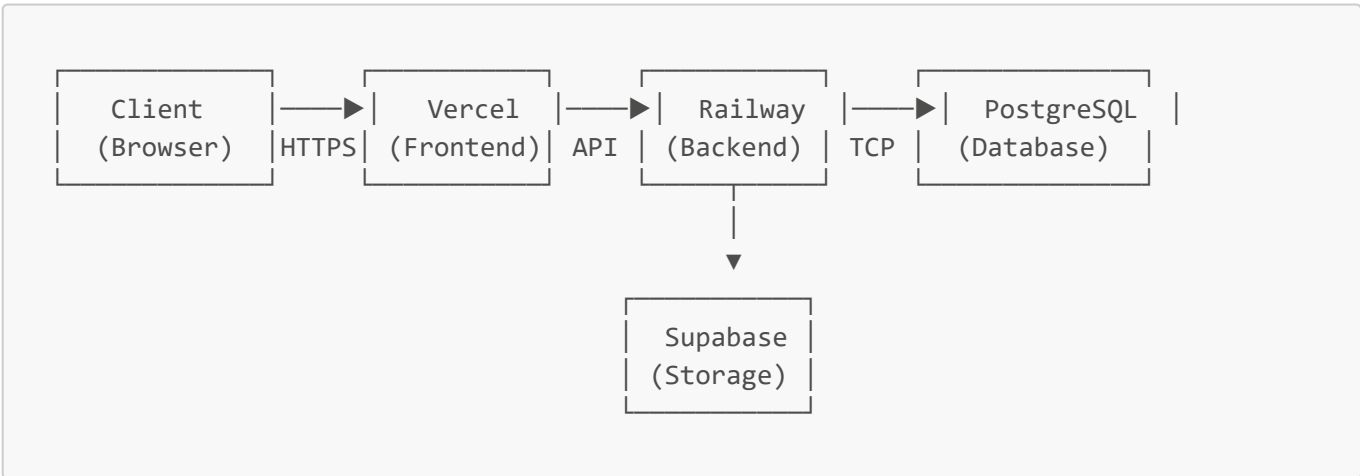
## 10.3 Nodes

| Node | Stereotype | Contents |
|------|------------|----------|
| Client Layer | <<device>> | Browser, SIM4LON Web App |

| Node | Stereotype | Contents |
|------|-----------|----------|
| Vercel | `<<platform>>` | React, Vite, TanStack Query, Tailwind |
| Railway | `<<platform>>` | NestJS, Prisma, Auth, Services |
| PostgreSQL | `<<service>>` | 21 tables, 7 enums |
| Supabase | `<<service>>` | profile-pictures, payment-proofs |

## 10.4 Communication Protocols

| From | To | Protocol | Port |
|------|-----|----------|------|
| Browser | Vercel | HTTPS | 443 |
| Vercel | Railway | HTTPS | 443 |
| Railway | PostgreSQL | TCP | 5432 |
| Railway | Supabase | HTTPS | 443 |

## 10.5 Security

| Layer | Security Measure |
|-------|-----------------|
| Transport | HTTPS/TLS 1.3 |
| Authentication | JWT + session_id |
| Authorization | Role-based (Admin, Operator, Pangkalan) |
| Database | SSL, connection pooling |
| Storage | RLS policies, signed URLs |
| Password | bcrypt (10 rounds) |

# 11. LAMPIRAN

## 11.1 Daftar File Diagram

PlantUML Files (51 files)

```
diagrams/
├── SIM4LON_UseCase.puml
├── SIM4LON_ClassDiagram.puml
├── SIM4LON_ERD.puml
├── SIM4LON_Deployment.puml
├── AD_01_Login.puml ... AD_25_ExportLaporan.puml (25 files)
├── SD_01_Login.puml ... SD_18_GenerateExportReport.puml (18 files)
└── SM_01_OrderStatus.puml ... SM_04_UserSession.puml (4 files)
```

## Documentation Files (7 files)

```
diagrams/
├── SIM4LON_UseCase_Documentation.md
├── SIM4LON_ClassDiagram_Documentation.md
├── SIM4LON_ERD_Documentation.md
├── SIM4LON_ActivityDiagram_Documentation.md
├── SIM4LON_SequenceDiagram_Documentation.md
├── SIM4LON_StateMachine_Documentation.md
├── SIM4LON_Deployment_Documentation.md
└── SIM4LON_Master_Documentation.md (this file)
```

## 11.2 Tools & Rendering

| Tool | Purpose |
| --- | --- |
| PlantUML Online | Render diagrams |
| PlantUML VS Code Extension | Local preview |
| Markdown PDF Extension | Export to PDF |

## 11.3 Business Rules Summary

| Rule | Description |
| --- | --- |
| Single-Session | 1 user = 1 device aktif |
| Auto-Sync Stock | Stok pangkalan update saat order SELESAI |
| Auto-Create User | Buat pangkalan bisa auto-generate akun |
| PPN 12% | Diterapkan untuk LPG NON_SUBSIDI |
| Soft Delete | Master data menggunakan deleted_at |
| Multi-Tenant | Pangkalan hanya lihat data sendiri |

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