DOKUMENTASI TEKNIS SISTEM

SIM4LON - Sistem Informasi Manajemen LPG

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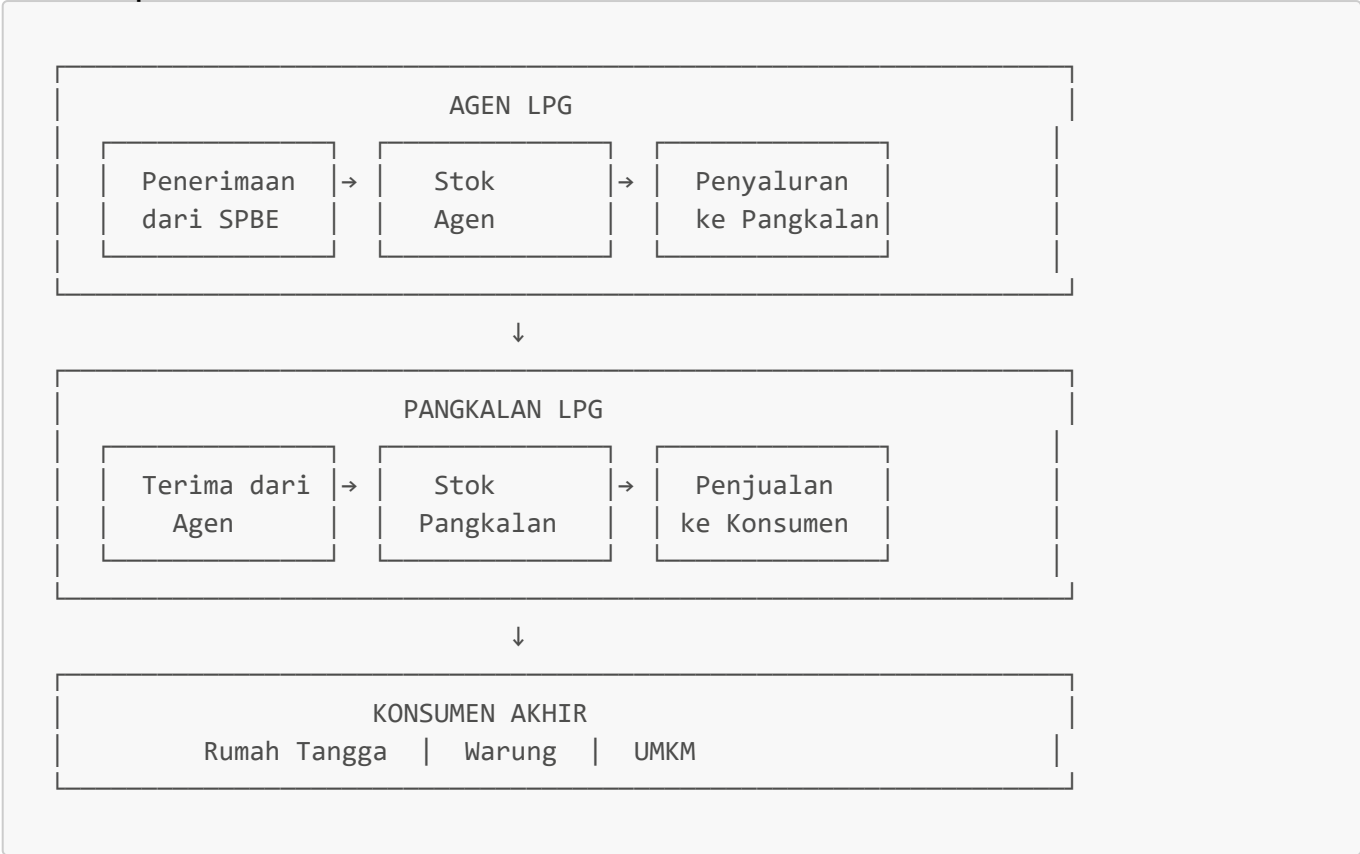**Status:** Final

DAFTAR ISI

1. EXECUTIVE SUMMARY

1.1 Tentang SIM4LON

SIM4LON (Sistem Informasi Manajemen LPG 4 Jalur Online) adalah aplikasi web yang dirancang untuk mengelola distribusi gas LPG dari **Agen** ke **Pangkalan** hingga ke **Konsumen akhir**.

1.2 Tujuan Sistem

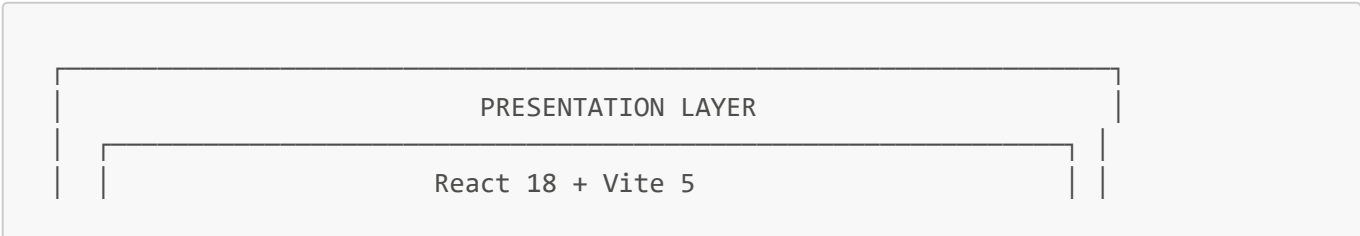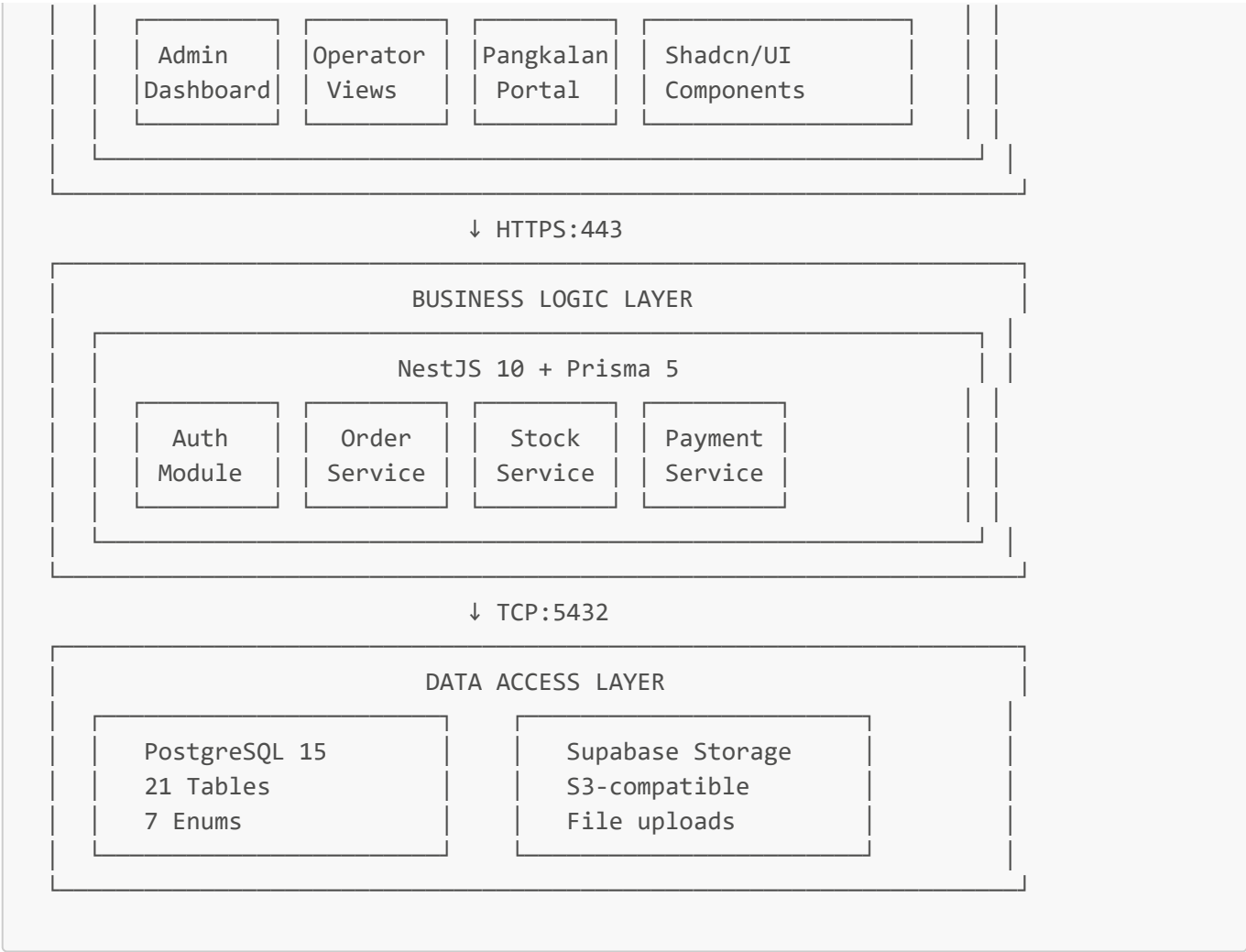| Tujuan	Deskripsi
Efisiensi Operasional	Digitalisasi proses pencatatan pesanan, stok, dan pembayaran
Transparansi	Tracking real-time status pesanan dan stok
Multi-Tenant	Setiap pangkalan hanya akses data miliknya
Reporting	Laporan komprehensif untuk analisis bisnis

1.3 Scope Sistem

```
┌─────────────────────────────────────────────────────┐
│  ┌─────────────────────────────────────────────┐   │
│  │                 AGEN LPG                     │   │
│  │  ┌──────────┐   ┌──────────┐   ┌──────────┐  │   │
│  │  │Penerimaan│ → │  Stok    │ → │Penyaluran│  │   │
│  │  │dari SPBE │   │  Agen    │   │ke Pangkalan│ │   │
│  │  └──────────┘   └──────────┘   └──────────┘  │   │
│  └─────────────────────────────────────────────┘   │
│                        ↓                            │
│  ┌─────────────────────────────────────────────┐   │
│  │               PANGKALAN LPG                  │   │
│  │  ┌──────────┐   ┌──────────┐   ┌──────────┐  │   │
│  │  │Terima dari│→ │  Stok    │ → │Penjualan │  │   │
│  │  │  Agen    │   │ Pangkalan│   │ke Konsumen│ │   │
│  │  └──────────┘   └──────────┘   └──────────┘  │   │
│  └─────────────────────────────────────────────┘   │
│                        ↓                            │
│  ┌─────────────────────────────────────────────┐   │
│  │              KONSUMEN AKHIR                  │   │
│  │     Rumah Tangga  │  Warung  │  UMKM          │   │
│  └─────────────────────────────────────────────┘   │
└─────────────────────────────────────────────────────┘
```

1.4 Statistik Dokumentasi

Diagram Type	Jumlah	File Type
Use Case	1	PlantUML
Class Diagram	1	PlantUML
ERD	1	PlantUML
Activity Diagram	25	PlantUML
Sequence Diagram	18	PlantUML
State Machine	4	PlantUML
Deployment	1	PlantUML
TOTAL	**51**	

2. SYSTEM OVERVIEW

2.1 Arsitektur High-Level

```
┌─────────────────────────────────────────────────────┐
│  ┌─────────────────────────────────────────────┐   │
│  │              PRESENTATION LAYER              │   │
│  │  ┌─────────────────────────────────────────┐ │   │
│  │  │            React 18 + Vite 5             │ │   │
```

```
  |  |                                                      |  | |
  |  |  | Admin      | | Operator | | Pangkalan| | Shadcn/UI      |  | | |
  |  |  | Dashboard  | | Views    | | Portal   | | Components      |  | | |
  |  |  |_____| |_____| |_____| |_____|  | | |
  |  |_____|  | |
  |_____| |
```

↓ HTTPS:443

```
  |_____|
  |                      BUSINESS LOGIC LAYER                          |
  |  _____  |
  |  |                   NestJS 10 + Prisma 5                       |  |
  |  |  _____  _____  _____  _____          |  |
  |  |  |  Auth   | |  Order  | |  Stock  | | Payment |            |  |
  |  |  | Module  | | Service | | Service | | Service |            |  |
  |  |  |_____| |_____| |_____| |_____|            |  |
  |  |_____|  |
  |_____|
```

↓ TCP:5432

```
  |_____|
  |                      DATA ACCESS LAYER                            |
  |  _____    _____      |
  |  | PostgreSQL 15          |    | Supabase Storage        |        |
  |  | 21 Tables              |    | S3-compatible           |        |
  |  | 7 Enums                |    | File uploads            |        |
  |  |_____|    |_____|        |
  |_____|
```

2.2 Aktor Sistem

Aktor	Role	Akses
Admin	Administrator	Full access semua fitur + master data
Operator	Staff Operasional	Pesanan, stok, pembayaran
Pangkalan	Pemilik Pangkalan	Data milik sendiri saja (multi-tenant)

3. TECHNOLOGY STACK

3.1 Frontend

Technology	Version	Fungsi
React	18	UI Library
Vite	5	Build Tool & Dev Server
TypeScript	5	Type Safety
TanStack Query	v5	Data Fetching & Caching

Technology	Version	Fungsi
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

3.2 Backend

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

3.3 Database & Storage

Technology	Fungsi
PostgreSQL 15	Relational Database
Supabase Storage	S3-compatible File Storage

3.4 Hosting

Layer	Provider
Frontend	Vercel
Backend	Railway
Database	Railway PostgreSQL
Storage	Supabase

4. USE CASE DIAGRAM

4.1 Diagram

File: `SIM4LON_UseCase.puml`

4.2 Daftar Use Case

Use Case SEMUA AKTOR

Use Case	Deskripsi
Login	Masuk dengan email + password (single-session)
Kelola Profil	View & update profil pengguna

Use Case ADMIN Only

Use Case	Deskripsi
Kelola Pengguna	CRUD data Admin/Operator
Kelola Pangkalan	CRUD pangkalan + auto-create user
Kelola Supir	CRUD data driver
Lihat Log Aktivitas	Audit trail sistem
Kelola Perencanaan	Perencanaan alokasi bulanan

Use Case ADMIN + OPERATOR

Use Case	Deskripsi
Kelola Dashboard	Ringkasan KPI
Kelola Pesanan	CRUD pesanan + update status
Kelola Pembayaran	Catat pembayaran tunai/transfer
Kelola Stok	Penerimaan + penyaluran
Kelola Laporan	Generate & export laporan

Use Case PANGKALAN Only

Use Case	Deskripsi
Kelola Penjualan	Catat penjualan ke konsumen
Kelola Konsumen	CRUD data konsumen
Buat Order ke Agen	Order stok ke agen

4.3 Access Matrix

Use Case	Admin	Operator	Pangkalan
Login	☑	☑	☑

Use Case	Admin	Operator	Pangkalan
Kelola Pengguna	☑	✗	✗
Kelola Pangkalan	☑	✗	✗
Kelola Pesanan	☑	☑	✗
Kelola Stok	☑	☑	✗
Kelola Penjualan	✗	✗	☑
Kelola Konsumen	✗	✗	☑

5. CLASS DIAGRAM & ERD

5.1 Overview

File Diagram:

- Class Diagram: `SIM4LON_ClassDiagram.puml`
- ERD: `SIM4LON_ERD.puml`

5.2 Database Statistics

Metric	Value
Total Tables	21
Total Enums	7
Primary Key Type	UUID
Extensions	pgcrypto, uuid-ossp

5.3 Daftar Entitas

Master Data (5 Tables)

No	Table	Deskripsi
1	`users`	Akun pengguna sistem
2	`agen`	Distributor LPG
3	`pangkalans`	Pangkalan LPG
4	`drivers`	Supir pengiriman
5	`lpg_products`	Katalog produk LPG

Order Management (6 Tables)

No	Table	Deskripsi
6	orders	Pesanan utama
7	order_items	Item dalam pesanan
8	timeline_tracks	Riwayat status pesanan
9	invoices	Faktur/invoice
10	order_payment_details	Summary pembayaran (1:1)
11	payment_records	Catatan transaksi payment

Pangkalan Operations (7 Tables)

No	Table	Deskripsi
12	consumers	Konsumen pangkalan
13	consumer_orders	Penjualan ke konsumen
14	lpg_prices	Harga jual per pangkalan
15	pangkalan_stocks	Stok pangkalan
16	pangkalan_stock_movements	Riwayat stok pangkalan
17	expenses	Pengeluaran operasional
18	agen_orders	Order pangkalan ke agen

Stock & Distribution (3 Tables)

No	Table	Deskripsi
19	penerimaan_stok	Penerimaan dari SPBE
20	penyaluran_harian	Penyaluran ke pangkalan
21	perencanaan_harian	Perencanaan alokasi

Audit (2 Tables)

No	Table	Deskripsi
22	stock_histories	Riwayat stok agen
23	activity_logs	Log aktivitas sistem

5.4 Enumerasi

Enum	Values
user_role	ADMIN, OPERATOR, PANGKALAN

Enum	Values
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

5.5 Key Relationships

From	To	Type	Cardinality
agen	pangkalans	1:N	Agen memasok banyak pangkalan
pangkalans	orders	1:N	Pangkalan membuat pesanan
orders	order_items	1:N	Pesanan berisi items
orders	order_payment_details	1:1	Pesanan punya 1 payment summary
pangkalans	consumers	1:N	Pangkalan punya konsumen
consumers	consumer_orders	1:N	Konsumen membeli LPG

6. ACTIVITY DIAGRAMS

6.1 Overview

Total: **25 Activity Diagrams**

Fase	Jumlah	Fokus
Fase 1	9	Core Business Processes
Fase 2	16	Supporting Processes

6.2 Daftar Activity Diagrams

Fase 1: Core Processes

ID	Nama	File
AD-01	Login	AD_01_Login.puml
AD-02	Buat Pesanan	AD_02_BuatPesanan.puml

ID	Nama	File
AD-03	Update Status Pesanan	AD_03_UpdateStatusPesanan.puml
AD-04	Catat Pembayaran	AD_04_CatatPembayaran.puml
AD-05	Catat Penerimaan Stok	AD_05_CatatPenerimaanStok.puml
AD-06	Catat Penyaluran	AD_06_CatatPenyaluran.puml
AD-07	Catat Penjualan	AD_07_CatatPenjualan.puml
AD-08	Buat Order ke Agen	AD_08_BuatOrderKeAgen.puml
AD-09	Kelola Pangkalan	AD_09_KelolaPangkalan.puml

Fase 2: Supporting Processes

ID	Nama	File
AD-10	Ubah Password	AD_10_UbahPassword.puml
AD-11	Kelola Pengguna	AD_11_KelolaPengguna.puml
AD-12	Kelola Supir	AD_12_KelolaSupir.puml
AD-13	Kelola Produk LPG	AD_13_KelolaProdukLPG.puml
AD-14	Assign Driver	AD_14_AssignDriver.puml
AD-15	Lihat Detail Pesanan	AD_15_LihatDetailPesanan.puml
AD-16	Generate Invoice	AD_16_GenerateInvoice.puml
AD-17	Cetak Nota	AD_17_CetakNota.puml
AD-18	Kelola Perencanaan	AD_18_KelolaPerencanaan.puml
AD-19	Lihat In/Out Agen	AD_19_LihatInOutAgen.puml
AD-20	Kelola Konsumen	AD_20_KelolaKonsumen.puml
AD-21	Kelola Stok Pangkalan	AD_21_KelolaStokPangkalan.puml
AD-22	Terima Order dari Agen	AD_22_TerimaOrderDariAgen.puml
AD-23	Kelola Pengeluaran	AD_23_KelolaPengeluaran.puml
AD-24	Generate Laporan	AD_24_GenerateLaporan.puml
AD-25	Export Laporan	AD_25_ExportLaporan.puml

6.3 Struktur Activity Diagram

Semua Activity Diagram menggunakan 2 swimlanes:

- **User/Admin/Pangkalan**: Aksi yang dilakukan pengguna
- **Sistem**: Response dan proses backend

7. SEQUENCE DIAGRAMS

7.1 Overview

Total: **18 Sequence Diagrams**

Fase	Jumlah	Fokus
Fase 1	8	Core Processes
Fase 2	10	Supporting Processes

7.2 Participant Types

Stereotype	Simbol	Fungsi
actor	😀	Pengguna sistem
boundary	☐	UI/Interface
control	◎	Business Logic
database	⬡	Table Database

7.3 Daftar Sequence Diagrams

Fase 1: Core Processes

ID	Nama	Tables
SD-01	Login	users, activity_logs
SD-03	Create Order	pangkalans, orders, order_items, timeline_tracks
SD-04	Update Status	orders, order_items, timeline_tracks, pangkalan_stocks
SD-07	Record Payment	order_payment_details, payment_records, orders
SD-09	Receive Stock	penerimaan_stok, stock_histories
SD-10	Record Distribution	pangkalans, penyaluran_harian, stock_histories
SD-12	Record Sale	consumers, pangkalan_stocks, consumer_orders
SD-16	Create Pangkalan	pangkalans, users, activity_logs

Fase 2: Supporting Processes

ID	Nama	Tables
SD-02	Logout	users
SD-05	Assign Driver	drivers, orders, timeline_tracks

ID	Nama	Tables
SD-06	Get Order Detail	orders, order_items, timeline_tracks, order_payment_details
SD-08	Generate Invoice	invoices, orders, order_items
SD-11	Get Stock Summary	stock_histories, lpg_products
SD-13	Create Order to Agen	agen_orders, pangkalans
SD-14	Confirm Receipt	agen_orders, pangkalan_stocks
SD-15	Dashboard Pangkalan	consumer_orders, pangkalan_stocks, expenses
SD-17	CRUD Generic	(template)
SD-18	Generate & Export Report	orders, payment_records, stock_histories

8. STATE MACHINE DIAGRAMS

8.1 Overview

Total: **4 State Machine Diagrams**

8.2 Daftar State Machines

SM-01: Order Status (status_pesanan)

State	Deskripsi
DRAFT	Pesanan baru dibuat
MENUNGGU_PEMBAYARAN	Menunggu pembayaran
DIPROSES	Sedang diproses
SIAP_KIRIM	Siap untuk dikirim
DIKIRIM	Dalam pengiriman
SELESAI	Pesanan selesai → auto-sync stok
BATAL	Dibatalkan

Transition Flow:

```
DRAFT → MENUNGGU_PEMBAYARAN → DIPROSES → SIAP_KIRIM → DIKIRIM → SELESAI
                        (Cancel dari state manapun) → BATAL
```

SM-02: Payment Status

State	Field Values
UNPAID	is_paid=false, is_dp=false
PARTIAL	is_paid=false, is_dp=true
PAID	is_paid=true

SM-03: Agen Order Status

State	Deskripsi
PENDING	Menunggu konfirmasi agen
DIKIRIM	Agen sudah kirim
DITERIMA	Pangkalan sudah terima → update stok
DITOLAK	Order ditolak

SM-04: User Session

State	Deskripsi
LOGGED_OUT	Belum login
LOGGED_IN	Aktif dengan token valid
SESSION_EXPIRED	Token expired
KICKED_OUT	Login dari device lain (single session)

9. DEPLOYMENT ARCHITECTURE

9.1 Diagram

File: `SIM4LON_Deployment.puml`

9.2 Infrastructure Components

Component	Provider	Technology
Frontend	Vercel	React 18, Vite 5, Tailwind CSS
Backend	Railway	NestJS 10, Prisma 5
Database	Railway	PostgreSQL 15
Storage	Supabase	S3-compatible

9.3 Communication Protocols

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

9.4 Environment Variables

Frontend

```
VITE_API_URL=https://sim4lon-api.up.railway.app
VITE_SUPABASE_URL=https://xxx.supabase.co
VITE_SUPABASE_ANON_KEY=eyJ...
```

Backend

```
DATABASE_URL=postgresql://user:pass@host:5432/db
JWT_SECRET=your-super-secret-key
PORT=3000
CORS_ORIGIN=https://sim4lon.vercel.app
SUPABASE_URL=https://xxx.supabase.co
SUPABASE_SERVICE_KEY=eyJ...
```

10. SECURITY & AUTHENTICATION

10.1 Authentication Flow

1. User submit email + password
2. Backend validate credentials
3. Backend generate new `session_id`
4. Backend sign JWT with `session_id`
5. Token returned to frontend
6. Frontend store in localStorage
7. Every request validates token + session_id

10.2 Single Session Login

- Setiap login generate `session_id` baru
- JWT berisi `session_id`
- Validation check: token.session_id === users.session_id
- Mismatch = auto logout (kicked out)

10.3 Role-Based Access Control

Role	Access
ADMIN	Full access + master data
OPERATOR	Operasional (orders, stock, payment)
PANGKALAN	Own data only (multi-tenant)

10.4 Security Measures

Layer	Measure
Transport	HTTPS/TLS 1.3
Password	bcrypt (10 rounds)
Token	JWT with expiry
Database	SSL connection
Storage	RLS + signed URLs
Secrets	Environment variables

11. APPENDIX

11.1 File Structure

```
diagrams/
├── Activity Diagrams (25 files)
│   ├── AD_01_Login.puml
│   ├── AD_02_BuatPesanan.puml
│   └── ... (AD_03 - AD_25)
│
├── Sequence Diagrams (18 files)
│   ├── SD_01_Login.puml
│   ├── SD_02_Logout.puml
│   └── ... (SD_03 - SD_18)
│
├── State Machine Diagrams (4 files)
│   ├── SM_01_OrderStatus.puml
│   ├── SM_02_PaymentStatus.puml
│   ├── SM_03_AgenOrderStatus.puml
│   └── SM_04_UserSession.puml
│
├── Other Diagrams
│   ├── SIM4LON_UseCase.puml
│   ├── SIM4LON_ClassDiagram.puml
│   ├── SIM4LON_ERD.puml
```

```
    │   └── SIM4LON_Deployment.puml
    │
    └── Documentation (6 files)
        ├── 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
```

11.2 Total Artifacts

Category	Count
PlantUML Diagrams	51
Documentation Files	8
PDF Exports	8+
TOTAL	**67+ files**

11.3 Rendering Tools

Diagram dapat di-render menggunakan:

- PlantUML Online
- VS Code Extension: "PlantUML"
- IntelliJ IDEA PlantUML Plugin
- Visual Paradigm (import PlantUML)

11.4 Document History

Version	Date	Description
1.0	23 Des 2024	Initial comprehensive documentation

Dokumen ini adalah dokumentasi teknis lengkap SIM4LON
Sistem Informasi Manajemen LPG 4 Jalur Online
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