



Low Level Design Document

Introduction

This Low Level Design (LLD) document outlines the implementation details for **PulseKPI - Sales Region Performance Dashboard**. The project aims to deliver a Power BI dashboard that visualizes sales KPIs by region, using data extracted from SQL databases. The dashboard will include bar, line, and KPI visuals to highlight top-performing regions and sales trends over time.

1. System Components

Component	Description	Key Responsibilities
SQL Data Source	Sales database (SQL Server)	Store and provide sales data
Data Extraction ETL	Power BI Dataflow or DirectQuery	Extract, transform, and load data
Power BI Dataset	In-memory data model	Model and aggregate sales data
Power BI Report	Dashboard visuals (bar, line, KPI)	Visualize KPIs and trends

2. Class/Interface Overview

Class/Interface	Description	Key Methods/Attributes
SalesDataExtractor	Handles SQL data extraction	<code>get_sales_data(start_date, end_date)</code>
SalesRegionModel	Represents sales by region	<code>region</code> , <code>total_sales</code> , <code>kpi_values</code>
PowerBIVisualBuilder	Builds dashboard visuals	<code>create_bar_chart()</code> , <code>create_kpi()</code>

Relationships:

- `SalesDataExtractor` feeds data to `SalesRegionModel`
- `PowerBIVisualBuilder` consumes `SalesRegionModel` data

3. Data Structure Overview

Table/Model	Fields/Columns	Description
Sales	id, date, region, amount, product_id	Raw sales transactions
RegionKPI	region, total_sales, sales_growth, kpi_status	Aggregated KPI per region

4. Algorithms/Logic

Data Extraction and Aggregation Flow:



```
For each reporting period:  
  Query Sales table for date range  
  Group by region  
  Calculate total_sales, sales_growth, kpi_status  
  Store results in RegionKPI model
```

Dashboard Rendering:

```
For each RegionKPI:  
  Display KPI visual (total_sales, growth)  
  Add bar chart (region vs total_sales)  
  Add line chart (region sales over time)
```

5. Error Handling

Scenario	Handling Approach
SQL connection failure	Log error, show "Data unavailable"
Data extraction timeout	Retry up to 3 times, then alert user
Data model schema mismatch	Log error, skip invalid records
Power BI visual load failure	Display fallback message in dashboard

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