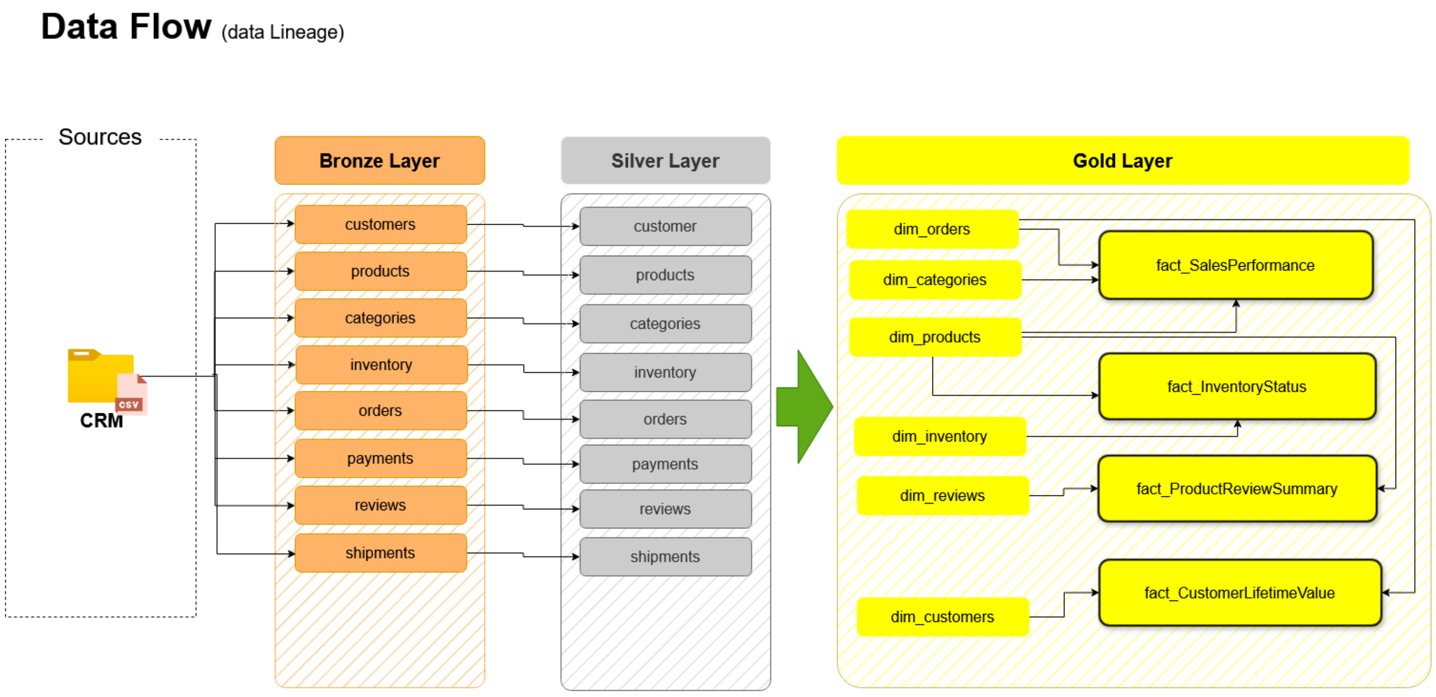
Documentation

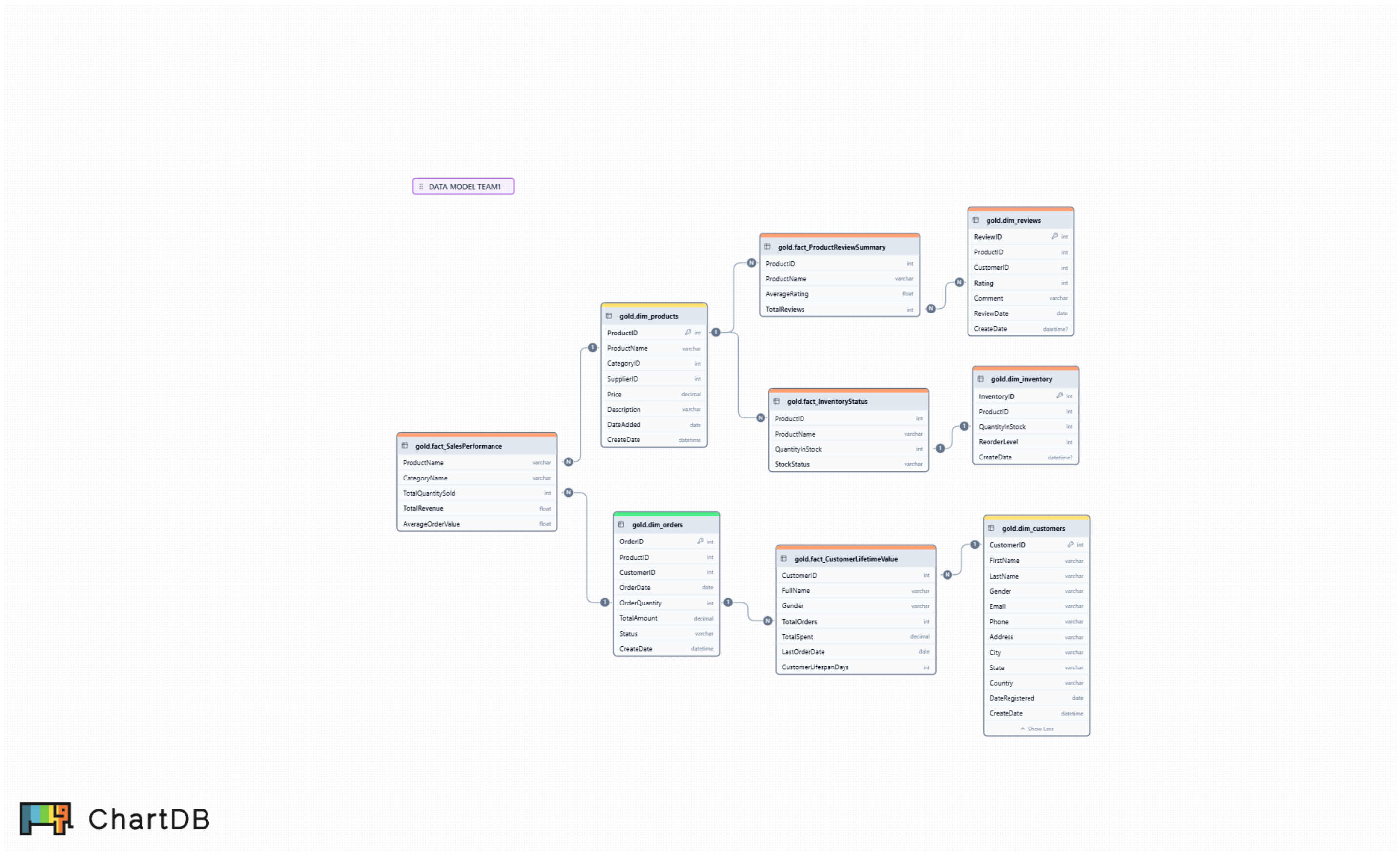
PROJECT: Online_store_DW_project_team1

Online store data warehouse designing project

Data Flow



Data Model



gold.fact_SalesPerformance	
ProductName	varchar
CategoryName	varchar
TotalQuantitySold	int
TotalRevenue	float
AverageOrderValue	float

gold.dim_products	
ProductID	int
ProductName	varchar
CategoryID	int
SupplierID	int
Price	decimal
Description	varchar
DateAdded	date
CreateDate	datetime

gold.fact_ProductReviewSummary	
ProductID	int
ProductName	varchar
AverageRating	float
TotalReviews	int

gold.dim_reviews	
ReviewID	int
ProductID	int
CustomerID	int
Rating	int
Comment	varchar
ReviewDate	date
CreateDate	datetime?

gold.fact_InventoryStatus	
ProductID	int
ProductName	varchar
QuantityInStock	int
StockStatus	varchar

gold.dim_inventory	
InventoryID	int
ProductID	int
QuantityInStock	int
ReorderLevel	int
CreateDate	datetime?

gold.dim_orders	
OrderID	int
ProductID	int
CustomerID	int
OrderDate	date
OrderQuantity	int
TotalAmount	decimal
Status	varchar
CreateDate	datetime

gold.fact_CustomerLifetimeValue	
CustomerID	int
FullName	varchar
Gender	varchar
TotalOrders	int
TotalSpent	decimal
LastOrderDate	date
CustomerLifespanDays	int

gold.dim_customers	
CustomerID	int
FirstName	varchar
LastName	varchar
Gender	varchar
Email	varchar
Phone	varchar
Address	varchar
City	varchar
State	varchar
Country	varchar
DateRegistered	date
CreateDate	datetime

Data Warehouse Project Documentation

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1. Project Overview

Purpose:

The purpose of this Data Warehouse project is to provide a structured and reliable framework for analyzing data from an online store. The system supports advanced analytics by organizing data into three distinct layers: **Bronze**, **Silver**, and **Gold**.

Target Audience:

- **Technical Users**: Data Engineers, Database Administrators, and Developers.
- **Business Users**: Data Analysts, Business Intelligence Teams, and Decision-Makers.

Key Objectives:

1. **Bronze Layer**: Load raw data from source CSV files with minimal transformations.
2. **Silver Layer**: Perform ETL (Extract, Transform, Load) processes to clean, validate, and enrich the data.
3. **Gold Layer**: Create analytical views for business intelligence purposes, such as sales performance, customer lifetime value, inventory status, and product review summaries.

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2. Database Initialization Script

Purpose:

This script initializes the database and sets up the necessary schemas (`bronze`, `silver`, `gold`) for the Data Warehouse.

Code Snippet:

```
USE master;
GO

-- Drop and recreate the 'Team1' database
IF EXISTS (SELECT 1 FROM sys.databases WHERE name = 'Team1')
BEGIN
    ALTER DATABASE Team1 SET SINGLE_USER WITH ROLLBACK IMMEDIATE;
    DROP DATABASE Team1;
END;
GO

CREATE DATABASE Team1;
GO

USE Team1;
GO

-- Create Schemas
```

```
CREATE SCHEMA bronze;
GO

CREATE SCHEMA silver;
GO

CREATE SCHEMA gold;
GO
```

Warning:

Running this script will permanently delete all data in the `Team1` database. Ensure proper backups before execution.

---

3. Bronze Layer

Purpose:

The Bronze layer serves as the landing zone for raw data. It contains exact copies of the source tables without any transformations.

Table Definitions:

DDL Script:

- Creates tables for `Customers` , `Products` , `Categories` , `Orders` , `Shipments` , `Inventories` , and `Reviews` .
- Each table mirrors the structure of the corresponding source CSV file.

Example Table Definition:

```
CREATE TABLE bronze.orders (
    OrderID       INT,
    ProductID     INT,
    CustomerID    INT,
    OrderDate     DATE,
    OrderQuantity INT,
    TotalAmount   DECIMAL(10, 2),
    Status        NVARCHAR(20) NOT NULL CHECK (Status IN ('Cancelled', 'Sh
);
```

Bulk Insert Process:

1. **Script Name:** `proc_load_bronze.sql`
2. **Purpose:** Bulk inserts data from CSV files into the corresponding Bronze tables.
3. **Key Features:**
    - Automates the ingestion of raw data.
    - Ensures data integrity by matching column structures.

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4. Silver Layer

Purpose:

The Silver layer performs ETL operations to transform and enhance the data from the Bronze layer. This ensures high-quality, standardized data for downstream analysis.

Scripts:

1. Silver DDL:

- Defines transformed tables with additional columns (e.g., `Created_At`).
- Includes constraints, indexes, and relationships.

2. Silver Procedure:

- Pulls data from the Bronze layer.
- Applies transformations such as data cleaning, deduplication, and enrichment.

Example Transformation Logic:

```
INSERT INTO silver.orders (
    OrderID,
    ProductID,
    CustomerID,
    OrderDate,
    OrderQuantity,
    TotalAmount,
    Status,
    CreatedAt
)
```

```
SELECT
    OrderID,
    ProductID,
    CustomerID,
    OrderDate,
    OrderQuantity,
    TotalAmount,
    Status,
    GETDATE() AS CreatedAt
FROM bronze.orders
WHERE Status IN ('Pending', 'Shipped', 'Delivered');
```

Stored Procedures:

1. **PlaceOrder**:
    - Inserts new orders into the `silver.orders` table.
    - Automatically generates unique `OrderID` values using an `IDENTITY` column or sequence.
2. **UpdateInventory**:
    - Updates inventory levels based on order and shipment data.
    - Ensures consistency between `silver.inventory` and `silver.orders`.

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5. Gold Layer

Purpose:

The Gold layer provides analytical views for business intelligence. These views aggregate and summarize data to support specific use cases.

Views:

1. Dimension Tables:

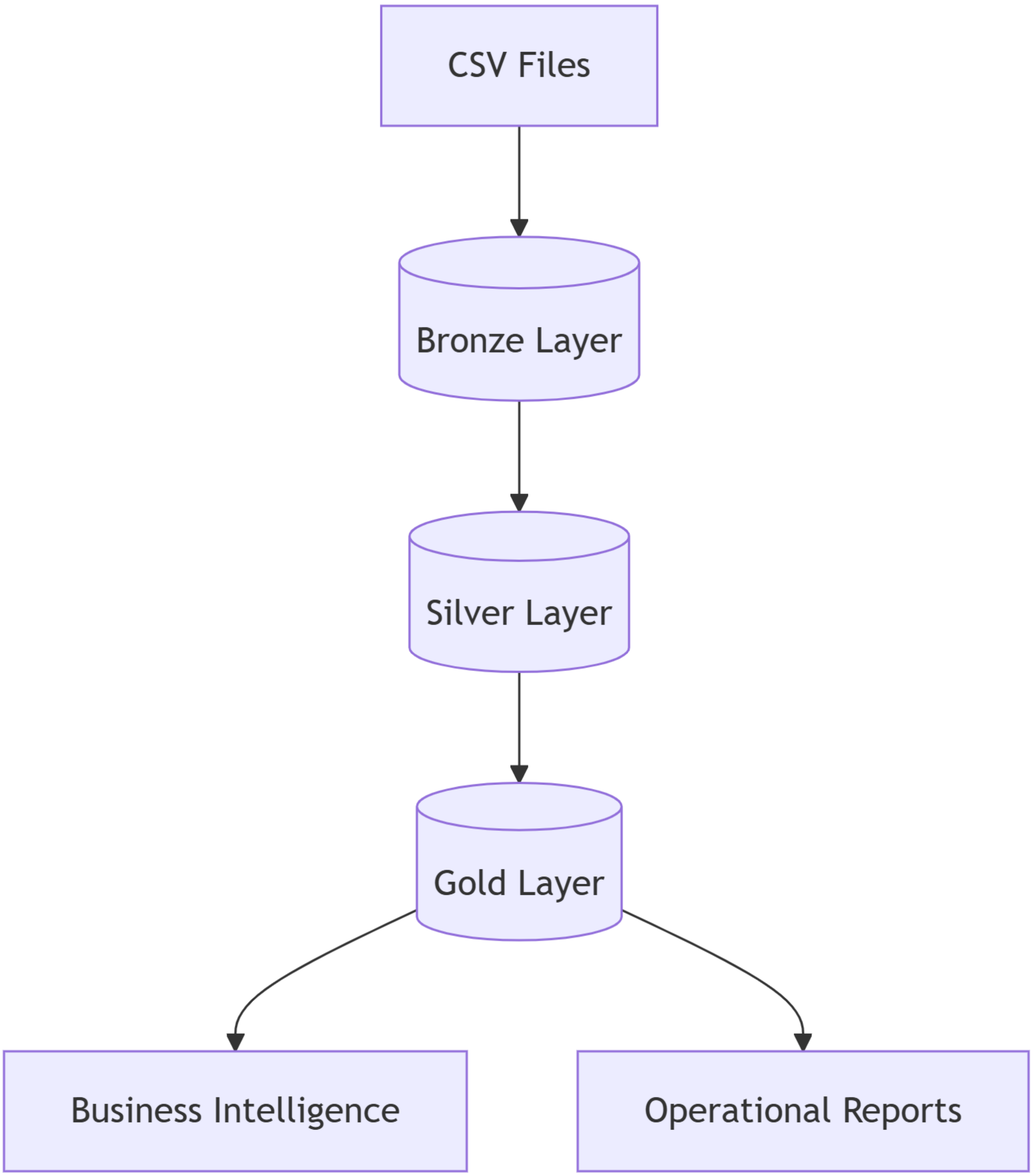
- `DimCustomers` : Customer-related attributes.
- `DimProducts` : Product-related attributes.
- `DimCategories` : Category-related attributes.

2. Fact Views:

- `SalesPerformance` : Analyzes revenue, order quantities, and trends over time.
- `CustomerLifetimeValue` : Calculates the total value contributed by each customer.
- `InventoryStatus` : Tracks stock levels and identifies low-stock items.
- `ProductReviewSummary` : Aggregates product ratings and feedback.

Example View:

```
CREATE VIEW gold.SalesPerformance AS
SELECT
    YEAR(OrderDate) AS Year,
    MONTH(OrderDate) AS Month,
    SUM(TotalAmount) AS TotalRevenue,
    COUNT(OrderID) AS TotalOrders
FROM silver.orders
GROUP BY YEAR(OrderDate), MONTH(OrderDate);
```



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6. Automation with SQL Agent

Purpose:

Automate the entire ETL process to ensure timely and consistent data updates.

Steps:

1. **Schedule Jobs**:
   - Use SQL Server Agent to schedule recurring jobs for:
     - Bulk inserting data into the Bronze layer.
     - Running ETL processes in the Silver layer.
     - Refreshing views in the Gold layer.
2. **Job Configuration**:
   - Define job steps for each layer.
   - Include error handling and logging to track job execution.

Example Job:

```sql
EXEC msdb.dbo.sp_add_job @job_name = 'Bronze_Data_Ingestion';
EXEC msdb.dbo.sp_add_jobstep @job_name = 'Bronze_Data_Ingestion',
    @step_name = 'Bulk_Insert',
    @command = 'EXEC proc_load_bronze;';
EXEC msdb.dbo.sp_add_schedule @schedule_name = 'Daily_8AM',
    @freq_type = 4, -- Daily
    @active_start_time = 080000;
EXEC msdb.dbo.sp_attach_schedule @job_name = 'Bronze_Data_Ingestion',
    @schedule_name = 'Daily_8AM';
```

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7. Deployment and Maintenance

1. Deployment Checklist:

- Verify that all scripts are tested and error-free.
- Ensure proper permissions for SQL Server Agent jobs.
- Schedule regular backups of the `Team1` database.

2. Maintenance Tasks:

- Monitor job execution logs for errors.
- Periodically review and optimize queries for performance.
- Update transformations and views as business requirements evolve.

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8. Conclusion

This documentation outlines the architecture, scripts, and processes for the Data Warehouse project. By following this structure, you can ensure a robust, scalable, and maintainable system for analyzing online store data.

For further details, refer to the individual scripts and files provided in the repository.

Let me know if you need further adjustments!