**SSAS Analysis Documentation**

**Project:** UdemyDWH  
**Environment:** SQL Server Analysis Services (SSAS)  
**Model:** Multidimensional Star Schemas  
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**1. Introduction**

The following document describes the **multidimensional analytical cubes** built on top of the UdemyDWH project to support decision-making, reporting, and advanced analytics. Each cube represents a specific analysis domain:

* **Sales and Revenue Analysis**: Focused on sales metrics and financial insights.
* **Enrollment Analysis**: Focused on student progress and course completion.
* **Cart Analysis**: Focused on shopping cart behavior and abandoned carts.

Each cube is based on a **star schema** design, optimizing query performance and aggregation calculation.

**2. Cube 1: Sales and Revenue Analysis Cube**

**2.1 Fact Table: FactOrder**

| **Column** | **Description** |
| --- | --- |
| OrderId\_SK | Surrogate key for order record. |
| OrderId\_BK | Business key from OLTP. |
| UserId\_SK | Foreign key to DimStudents. |
| CourseId\_SK | Foreign key to DimCourses. |
| TotalAmount | Final amount paid (after discount). |
| OrderPrice | Base price before discounts. |
| Discount | Discount value applied. |
| OrderDateKey | Foreign key to DimDate. |
| StatusCode | Purchase status (completed, canceled). |
| PaymentMethodCode | Payment method used. |
| OrderPriceCompleted | Amount for successfully completed transactions. |
| OrderPricePending | Amount for pending/uncompleted orders. |

**2.2 Dimension Tables**

* DimStudents: Details about the student (demographics, social media presence, etc.)
* DimCourses: Details about the course (category, price, approval status).
* DimDate: Calendar details (day, month, quarter, year).
* DimStatus: Mapping of status codes to descriptions.
* DimPaymentMethod: Mapping of payment codes to payment methods (Visa, PayPal, etc.)

**2.3 Measures**

| **Measure** | **Description** |
| --- | --- |
| Average Discount | AVG(Discount) per transaction. |
| Average Order Price | AVG(OrderPrice) per transaction. |
| Completed Revenue | SUM(OrderPriceCompleted). Revenue from successful transactions. |
| Lost Revenue | SUM(OrderPricePending). Potential revenue from pending or canceled transactions. |
| Total Amount | SUM(TotalAmount) across all orders. |
| Total Orders | COUNT(OrderId\_SK). Number of transactions. |

**3. Cube 2: Enrollment Analysis Cube**

**3.1 Fact Table: FactEnrollment**

| **Column** | **Description** |
| --- | --- |
| EnrolId\_SK | Surrogate key for enrollment record. |
| UserId\_SK | Foreign key to DimStudents. |
| CourseId\_SK | Foreign key to DimCourses. |
| StartDateKey | Foreign key to DimDate. |
| CompletionDateKey | Foreign key to DimDate. |
| Rating | Rating given by the student. |
| ProgressPercentage | Percentage of course completed. |
| Grade | Final score achieved by the student. |

**3.2 Dimension Tables**

* DimStudents
* DimCourses
* DimDate

**3.3 Measures**

| **Measure** | **Description** |
| --- | --- |
| Average Grade | AVG(Grade) across enrollments. |
| Average Progress Percentage | AVG(ProgressPercentage). |
| Average Rating | AVG(Rating) given by students. |
| Completion Rate | % of enrollments where ProgressPercentage = 100%. |
| Enrollment Count | COUNT(EnrolId\_SK). Number of enrollments. |
| Not Completed Count | COUNT where ProgressPercentage < 100%. |
| Student Engagement Score | Custom metric based on Progress, Grade, and Rating: *(ProgressPercentage \* 0.5) + (Grade \* 0.3) + (Rating \* 0.2)* |

**4. Cube 3: Cart Analysis Cube**

**4.1 Fact Table: FactCarts**

| **Column** | **Description** |
| --- | --- |
| CartId\_SK | Surrogate key for cart record. |
| CartId\_BK | Business key from OLTP. |
| StudentId\_SK | Foreign key to DimStudents. |
| CourseId\_SK | Foreign key to DimCourses. |
| Amount | Value of the cart. |
| CartDateKey | Foreign key to DimDate. |

**4.2 Dimension Tables**

* DimStudents
* DimCourses
* DimDate

**4.3 Measures**

| **Measure** | **Description** |
| --- | --- |
| Total Amount | SUM(Amount) in carts. |
| Total Carts | COUNT(CartId\_SK). |
| Total Courses Cart | DISTINCT COUNT of CourseId\_SK. |
| Total Students Cart | DISTINCT COUNT of StudentId\_SK. |

**5. Relationships and Star Schema Design**

Each cube uses **star schema** with:

* A **central Fact table** containing measurable data.
* Several **Dimension tables** providing contextual attributes.

**Relationships** are defined as **Many-to-One** from Fact to Dimensions.  
Each Fact FK maps to Dimension PK (Surrogate Keys used everywhere).

**6. Processing and Aggregations**

* Cubes are processed **incrementally** daily after ETL finishes.
* Aggregations are defined for:
  + Month/Quarter/Year levels (for Date dimension).
  + Student/Course combinations (for Fact tables).
* Measure Groups designed for fast query performance using MOLAP storage.