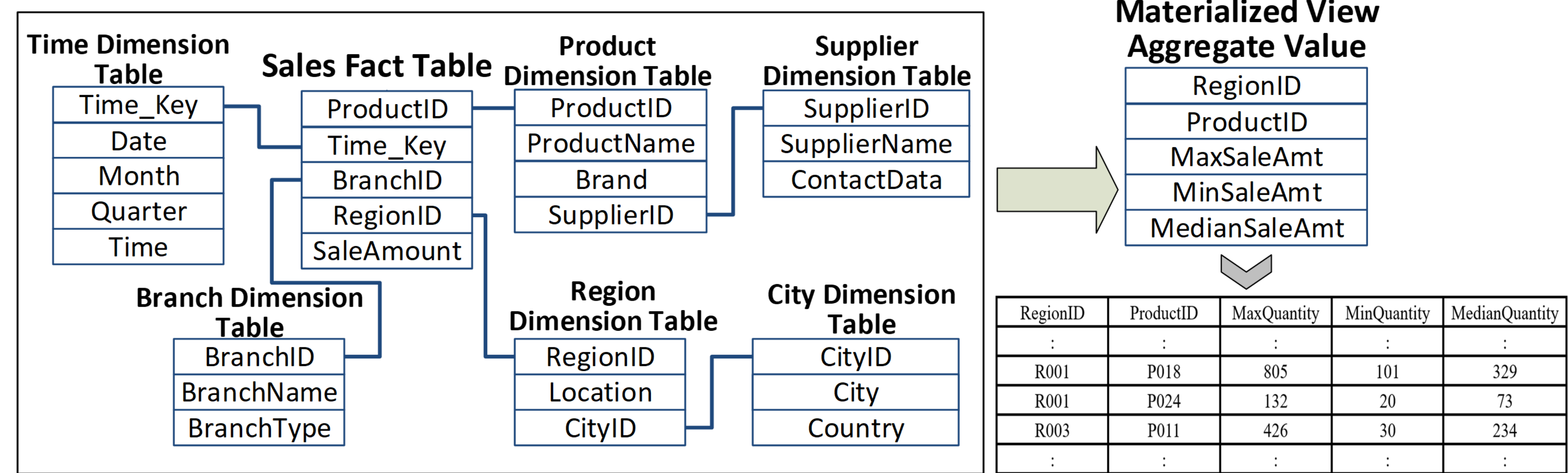
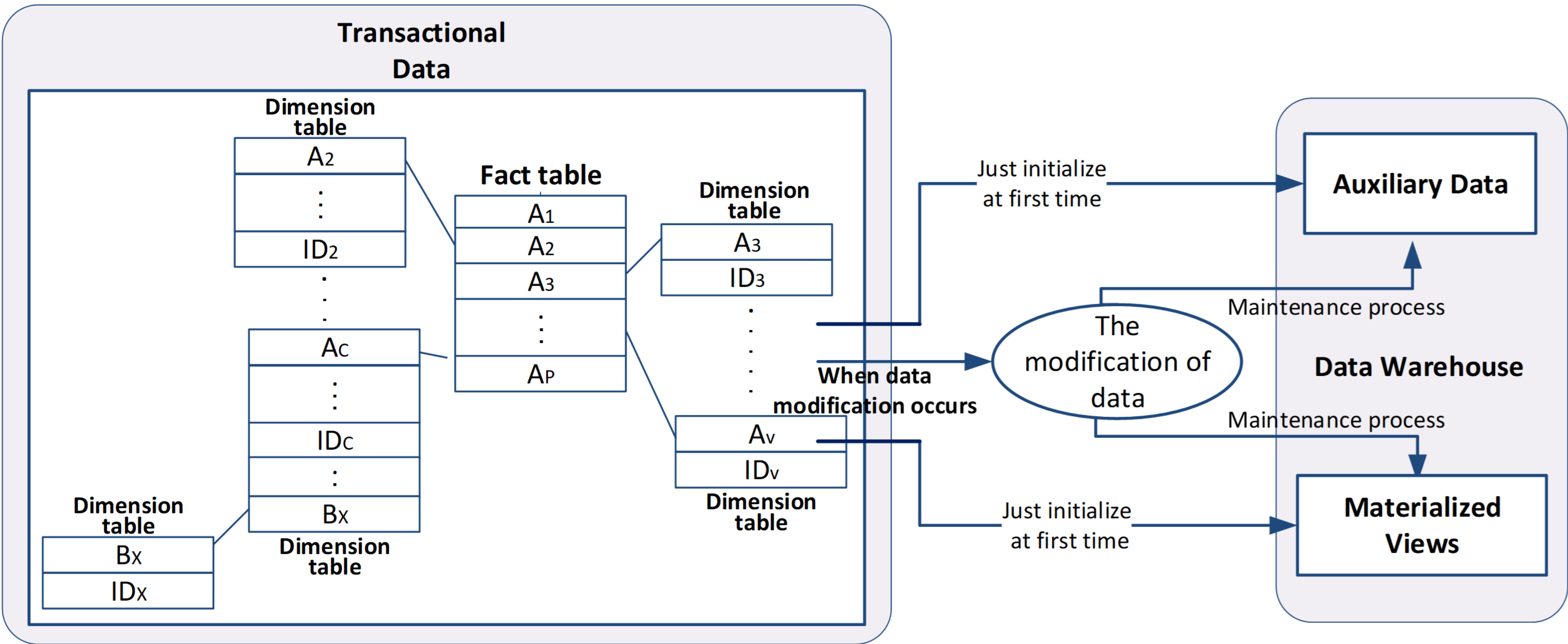


INTRODUCTION: Statistical functions play a crucial role in generating valuable summary insights from corporate databases. However, calculating these functions over large datasets can be time-consuming, especially in computerized systems that manage vast amounts of transactional data. To enhance system performance, data warehouses commonly utilize summary tables or materialized aggregate views. When new transactional data is introduced, all corresponding summary tables in the data warehouse must be updated, which can be challenging due to the large number of tables involved. Efficiently managing these updates is essential for optimizing data warehouse performance. This study presents a novel approach to improving the maintenance of statistical functions—such as MIN, MAX, MEAN, and MEDIAN—by incorporating auxiliary tables within the data warehouse. These auxiliary tables are designed to streamline the update process and reduce maintenance overhead. A comparative analysis is conducted to validate the effectiveness of the proposed method in enhancing data warehouse performance.

CONCEPTUAL ARCHITECTURE OF DATA WAREHOUSE



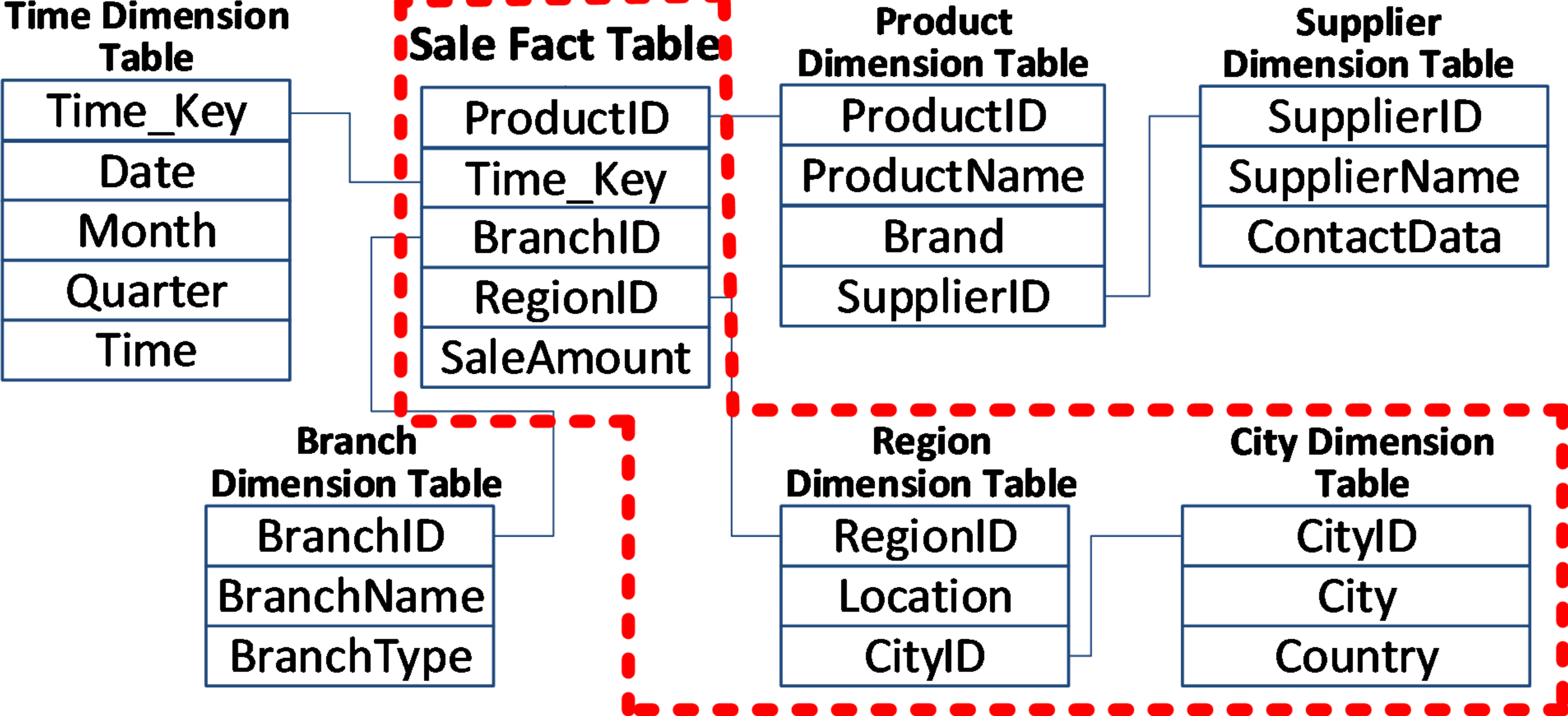
MECHANISM OF MAINTAINING MATERIALIZED VIEWS AND AUXILIARY DATA



STRUCTURES OF FACT TABLE, MATERIALIZE VIEW, AND AUXILIARY DATA

Snowflake schema

(Fact table with its Dimension Tables)



The structure of a part of Real data

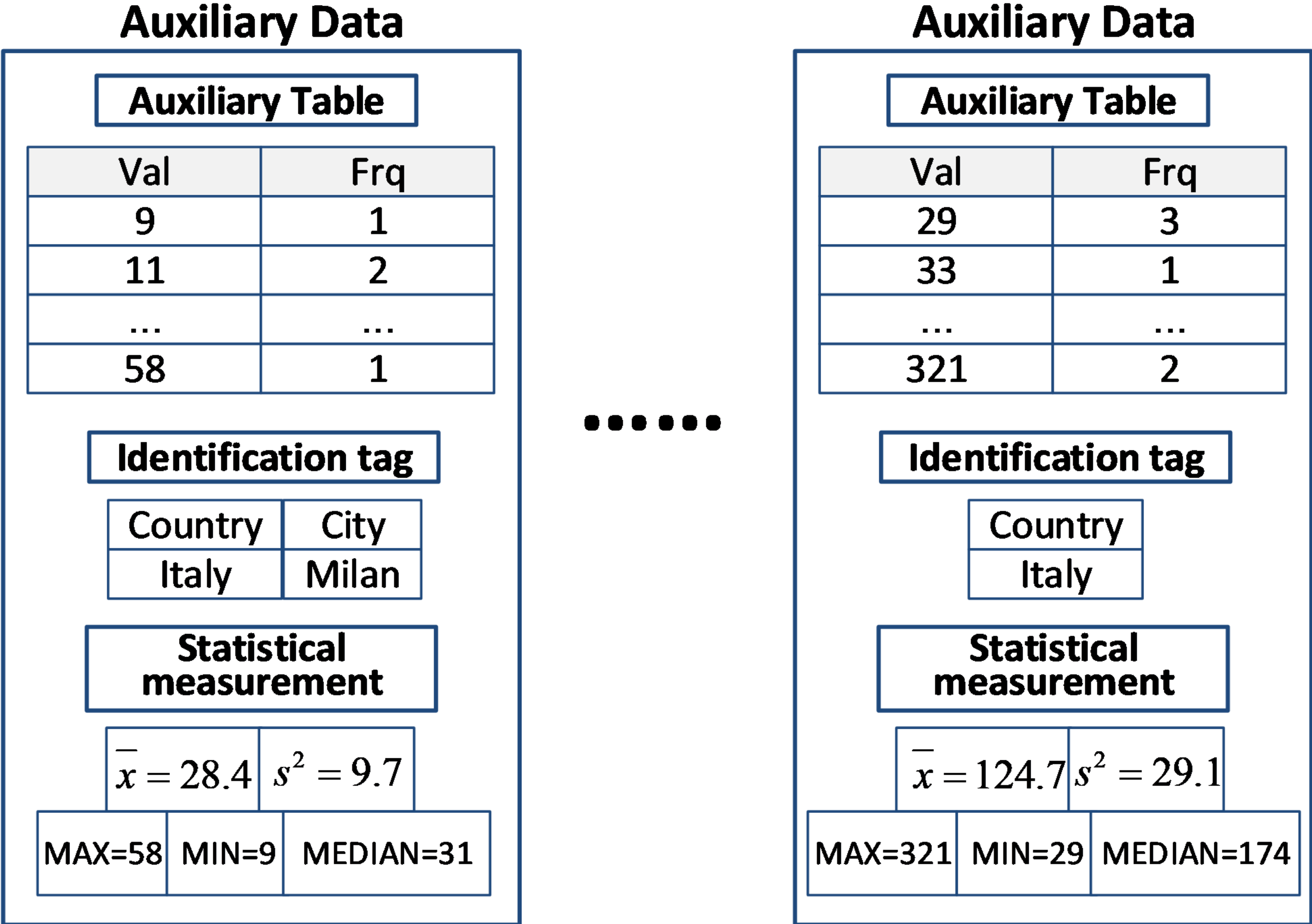
Sale Fact Table				
ProductID	Time_Key	BranchID	RegionID	SaleAmount (thousands)
0256	2012091308	C21	S12	20
0256	2012121511	B14	S07	15
0298	2012101402	C21	S12	42
...	...	...	...	...
0240	2012091308	A12	S04	30
0256	2012121308	B12	S07	21
0256	2012121512	B14	S07	15
0283	2013020218	A03	S02	12
...	...	...	...	...
0283	2013031301	A03	S02	29
0291	2013041201	C19	S09	23
...	...	...	...	...

Region Dimension Table		
RegionID	Location	CityID
S01	...	D13
S02	...	D14
S03	...	D26
S04	...	D27
...	...	...
S07	...	D32
S08	...	D63
S09	...	D64
...	...	...
S12	...	D90
...	...	...

City Dimension Table		
CityID	City	Country
D13	Athens	Greece
D14	Piraeus	Greece
...	...	...
D26	Strasbourg	France
D27	Bordeaux	France
...	...	...
D31	Madrid	Spain
D32	Milan	Italy
...	...	...
D63	San Diego	USA
D64	Seattle	USA
...	...	...
D90	Philadelphia	USA
...	...	...

Example of Auxiliary Data

(According to relevant dimensional criteria)



REFERENCES:

1. Timakum, T., Lee, S., & Song, M., “Exploring the research landscape of data warehousing and mining based on DaWaK Conference full-text articles”, Data & Knowledge Engineering, 135: 101926(2021).

2. Antunes, A. L., Cardoso, E., & Barateiro, J., “Incorporation of ontologies in data warehouse/business intelligence systems-a systematic literature review”, International Journal of Information Management Data Insights, 2.2: 100131(2022).