

# Proposed Hybrid Data Warehouse Architecture Based on Data Model

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## ABSTRACT

Data warehousing has come a long way from its inception. In the present scenario, data warehousing is evolving into rich system which is capable of furnishing key performance metrics to top-level management, capability of analytical strength to middle-level management and corrective data back to bottom-level based on information derived from the analytical system. The data warehouse market is currently edged by business-driven solutions focussing on domain specific challenges. The present business nuances of the global village crop up innovative and stiffer challenges for the data warehouse designers and architects. Although, there are numerous methodologies available in the market to cope up to this challenges, the evolutions have not created much of an impact in the global environment and the competitive market posed has prompted to venture into newer horizons over and over again. Data warehouse is a repository of an organization's electronically stored and collected data. Data warehouses are designed to facilitate reporting and analysis. A data warehouse comprises of a standardized, consistent, clean and integrated form of data sourced from various operational systems to be used in the organizational needs, structured in a way to specifically address the reporting and analytical requirements. This definition of the data warehouse primarily focuses on the data storage and acts much like a buffer to absorb continuous collection of data, which gets processed through numerous iterative steps to evolve as information, awaited by all tiers of an organization for various decision-making moves. However, the ways to retrieve and analyze data, to extract, transform and load data, and to manage the data dictionary are also considered essential components of a data warehousing system. Many references to data warehousing use this broader context. Thus, an expanded definition for data warehousing includes business intelligence tools, tools to extract, transform, and load data into the repository, and tools to manage and retrieve metadata, that is, data about data. There are mainly three classifications of data warehouse architecture based on data model given by Inmon and Ralph. There is a fourth classification that has been discussed in a paper named "Comparison of Data Warehouse Architecture Based on Data Model" and it has been compared with the other three existing models. Now, in this paper named "Proposed Hybrid Data Warehouse Architecture Based on Data Model" we have classified a fifth variation to the already existing ones and the pictorial presentation has been ensured to establish it. The model is conceived on the line of Hybrid Architecture and Hybrid Implementation. The architecture and the implementation are bi-directional and the flow is to-and-fro.

**Keywords:** Data Warehouse, Hybrid Schema, Business Intelligence and Data Mart.

## 1. INTRODUCTION

Data warehouse is a well-established repository of an organization's electronically stored data. Data warehouses are designed to facilitate comprehensive reporting and minute analysis.

The concept of data warehouse architecture comparison via data model was perceived at the very onset with the notion of evolving a newer and concise model comprising of all the basic nuances pre-existing in the models incorporated by the industrial houses. The inception of the Hybrid model was instantiated by vivid survey and collection of raw data that ensured its unfathomable foundation in the modern trends.

The model perceived was conjured from the basic idea of incorporating simultaneously the key features of Top-down model and Bottom-up model, and adding extra edges to ensure its presence to be felt.

## 2. CONCEPTUAL LITERATURE REVIEW

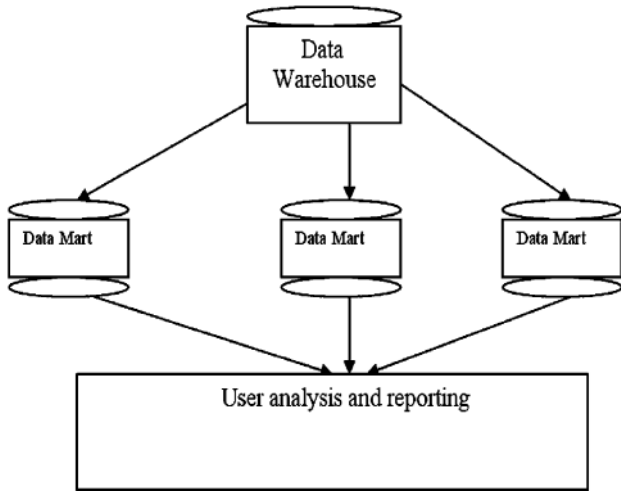
In order to fully understand the impact of data warehouse in an industrial scenario, it is important to first take a back-seat and ensure what data warehouse is by having feasibility study and evaluating various scenarios, and why it should be implemented and from what perspective it will be accountable? Lastly, the conceptual literature review will focus on how a hybrid model can be implemented alongside the pre-existing models in the modern trends of an industrial scenario, keeping in mind of both the subject world and the usage world.

## 3. SYSTEM CONTROL FLOW → EXISTING MODELS AND PROPOSED MODEL

The three existing architectural classifications are:

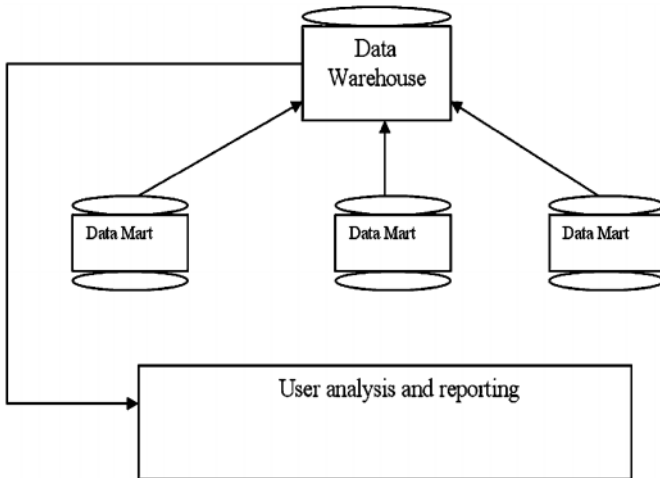
- (1) *Top Down Architecture, Top Down Implementation:*  
In this architecture, data marts are created from

data warehouse and user can then directly use the data warehouse without any hindrance. Data marts provide faster access and very specific analysis. The corresponding architecture is given below:



**Top Down Architecture, Top Down Implementation**

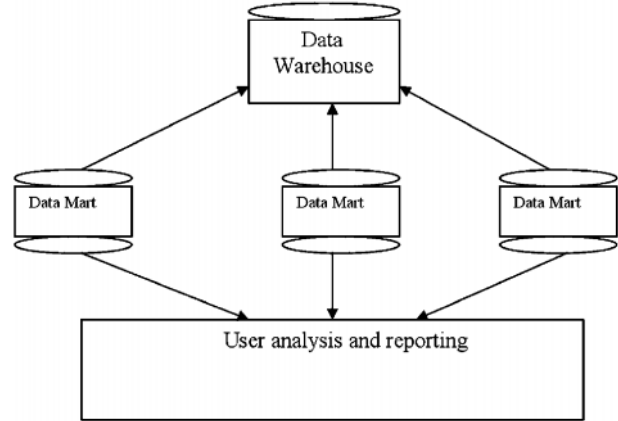
(2) *Bottom up Architecture, Bottom up Implementation:* Based on star schema, this architecture data warehouse is created from the union of all data marts and data warehouses. The architecture is used by users for analysis purpose. Here, specified data for use can be available if data warehouse can go through staging process. The corresponding architecture is given below:



**Bottom Up Architecture, Bottom Up Implementation**

(3) *Top Down Architecture, Bottom Up Implementation:* In this architectural approach, data marts are created from data warehouse but while implementing them, the users have to follow the above approach. This architecture is not commonly used in the industry because data mart creation, according to the authors, is not optimal in use.

(4) *Bottom Up Architecture, Top Down Implementation:* The proposed architecture in the paper named “Comparison of data warehouse architecture based on data model” corresponding to the bottom up architecture and top down implementation is given below:



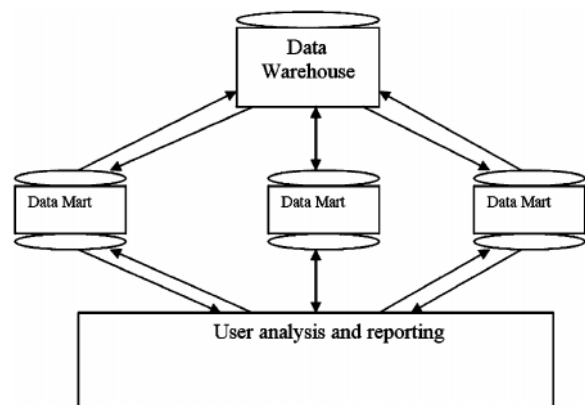
**Bottom Up Architecture, Top Down Implementation**

Here, if data marts are directly available, then the user can use them for analysis and reporting without need of even creating a data warehouse. If companies can improve the performance of data marts separately, then it will be quite beneficiary for the users.

**Implementation Via Case Study**

(5) *Hybrid Architecture, Hybrid Implementation:* The proposed model is implemented under the framework of conjuring up the basic nuances and traits of all the existing architecture models and enhancing them with the concept of Hybrid mechanism. In the proposed model, both the architecture and the implementation is to-and-fro that is bidirectional by nature and the flow of the arrow signifies the establishment of the fact.

The corresponding pictorial representation of the Hybrid architecture Hybrid implementation is given below:



**Hybrid Architecture, Hybrid Implementation**

#### 4. CONCLUSION

At the end of the evolution, we have come to the conclusion that the data warehouse and the data mart have a co-existing relationship by adhering to the user analysis and reporting methodology, designed and conceptualized from user perspective and which has very prominent practical application in the real world.

The architecture given in (1) is very common in industry. The one discussed in (4) can also be used for various applications which require fast and explicit processing. The architecture of (3) is not of much use and does not find that kind of a response in the global market.

#### REFERENCES

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