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Data Modeling in SAP NetWeaver® BW

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1 Introduction

Analysis-oriented information systems are used to support planning and strategic processes. They provide enterprises with current and historical data. Analysis-oriented information systems are frequently based on a data warehouse in which relevant data is collected, formatted, and made available. The core of a data warehouse is a (usually relational) database.

With SAP® NetWeaver Business Warehouse (BW), SAP provides a solution that includes all of the required components for setting up a data warehouse architecture. In addition to the basic technology for data retention, the system provides all of the essential components for evaluating the data stored in BW, that is, reporting tools, data mining methods, and an option for a portal connection. One essential feature when compared to other solutions is SAP's Business Content, which includes preconfigured sample solutions for various business areas.

Although BW supplies predefined content, a BW implementation is basically an individual solution. This is necessary, because users' requirements and preferences are as diverse as their business models and corporate cultures. Moreover, BW content is developed continuously. The modification of business strategies, the mapping of new business processes, or quite simply the emergence of new analytical problems all result in — and indeed require — the further development of content mapped in BW to ensure the goal of supplying an enterprise with relevant information.

Before it can be stored in BW, the content is systematically structured (into a data model) on the basis of the technical relevance of the content that is supposed to be mapped. This structure in turn determines the available options for data analyses. Besides the evaluation options for content and restrictions resulting from the data model, further criteria that can affect the data model's quality have to be considered, such as the performance of the data retrieval (report execution) and the time and effort involved in making modifications to the model (flexibility of
modifications), both defining the acceptance and therefore the success of a BW implementation. These aspects are essentially determined by the data model, which has been created for mapping the content.

Your enterprise’s or organization’s experience with analysis-oriented information systems will be just as varied as the requirements you place on the content in the BW system. A solution is often developed gradually (see Figure 1.1), from a simple reporting solution, to more complex Excel-based analyses, to solutions that are based on a department-related dataset (so-called data marts) or, in a further step, on a company-wide, integrated dataset (the data warehouse). It can be frustrating at this point (see the gap in Figure 1.1) if, for example, you notice that it takes too long to implement technical requirements or load data, or if you find that the acceptance of the BW system in the company is at risk, which stalls further development of the system.

![Maturity model](image)

**Figure 1.1** Phases in the Business Intelligence (BI) Maturity Model (TDWI, 2007)

When introducing a BW system, you don’t need to start from scratch and learn everything the hard way. Business Content makes it easier for you to reconcile and integrate content. DataSources and basic modules of the Business Content’s data model (characteristics and key data) are often integrated in the implementation.
As of Release 7.x, BW provides technologies that enable the development of an architecture facilitating the integration of user departments and the consideration of their interests within the overall architecture. This helps you bridge the gap more efficiently and develop a “mature system” that has the necessary support within the user departments.

At the core of the implementation of requirements is the data model — whether it is on a logical level as the basis for reconciliation and discussion with the user department or as a high-performing physical model that supports data loading (staging) and data retrieval (reporting). Moreover, new technologies, such as Nearline Storage (NLS) for outsourcing data or Business Warehouse Accelerator (BWA) for high-performing data retrieval, must also be integrated at the physical model level. The integration of these technologies requires a coherent architecture of the data model. It becomes clear that the issue of data modeling in BW is very complex and not limited to the consideration of conventional modeling types for data-warehouse systems (for example, the star schema, a denormalized type of data storage). The physical mapping of the data store even takes a back seat to some extent, because the BW system generates these structures. Instead, the optimization of the architecture, especially the formation of so-called layers, assumes particular significance. These layers help you standardize the development and ensure a high degree of flexibility with regard to modifications to the data model.

### 1.1 Target Audience

This book addresses those who need to know how to design and develop new content in BW or how to optimize existing content. The emphasis is on growth-oriented modeling and the design of an extensible data model. This means you can benefit from this book if you’ve started with a small implementation at first, but also if you want to gradually optimize the data modeling of an existing system and use new technologies.

For BW consultants and developers (internal and external), this book is a good starting point for familiarizing yourself with data modeling. Besides the conventional data modeling concepts, you also get to know the specific characteristics of the BW data model and a reference architecture, which helps you standardize and design a future-oriented model.
This book also addresses employees of user departments responsible for defining and communicating (new) requirements. On the one hand, the methods for logical data modeling are useful when describing requirements; on the other hand, the explanations on the reference architecture in this book provide knowledge about methods every project member should be acquainted with. The explanations on Business Content and the modeling examples also teach you how to efficiently model data using Business Content.

The sections on reference architecture are of particular interest for decision makers and project leads who want to address these critical issues and consider them in their departments or projects.

1.2 Structure of the Book

This book first provides the necessary background information on data modeling in general and on the BW data model in particular.

Knowing the individual modules of the data model, this book discusses the concepts of the reference architecture introduced by SAP, the Layered, Scalable Architecture (LSA). This architecture describes multiple layers with different tasks. Each of these tasks requires an appropriately adapted data model. After covering these special features, the theory is applied to concrete case studies from real life. The topics “data modeling for planning applications,” “optimization of data retention for planning applications,” and “special aspects of data modeling” round off the book.

This book is divided into the following chapters:

Chapter 2, Basic Principles of Data Modeling, describes the required conceptual principles of data modeling. It introduces modeling methods and discusses the logical, conceptual, and physical level of a BW data model.

Chapter 3, Overview of SAP NetWeaver BW and SAP BusinessObjects, provides an overview of the diversity of reports and evaluations that can be implemented on the basis of SAP NetWeaver BW. The tools introduced in this chapter are the interface between data model and user. In addition to SAP Business Explorer (BEx) front ends, you also get to know SAP BusinessObjects.
Chapter 4, Structure of a BW Data Model, details the various types of DataProviders that are used to store and provide data in SAP NetWeaver BW.

Now that you’re familiar with the individual modules of the BW data model, Chapter 5, Reference Architecture for Data Modeling, addresses the structure of an architecture in which the individual DataProviders are organized in layers. In this context, you have to distinguish between two areas: the area in which data is formatted in such a way that you can easily use them for various analysis contexts (Enterprise Data Warehouse (EDW) Layer) and the area that provides analysis datasets for specific issues (Reporting Layer). These two areas place completely different requirements on the data modeling types that are discussed in Chapters 7 and 8.

Business Content is covered in Chapter 6, Business Content. Business Content refers to predefined content that is related to specific business application fields. This chapter provides numerous tips on how to efficiently develop your own solutions using Business Content.

Chapter 7, Modeling the Enterprise Data Warehouse, provides details on the specific modeling aspects of the EDW Layer. Besides data integration and storage, the chapter also describes transformations that are used to process data in BW. The implementation of process chains and a loading process control round off this chapter.

The essential goal of the data warehouse is to provide data in such a way that it can be queried with a high performance. To do this, a special layer, the Reporting Layer, is modeled. Because reporting requirements can change frequently, in addition to the performance, flexibility is also a critical goal for the modeling of the Reporting Layer. Chapter 8 deals with data modeling in the Reporting Layer.

Chapter 9, Case Studies, applies the newly acquired knowledge to two concrete case studies. The first case study describes the layered, Scalable Architecture (LSA), where the respective data model is developed and implemented step by step. The second case study discusses the use of Business Content with examples of various representative application cases.

With BW-integrated planning, SAP has created a planning solution that is based directly on a BW data model and also writes to such a data
model. Some alternative modeling options are possible here. Chapter 10, Data Modeling for Planning Applications, discusses the corresponding issues.

In **Chapter 11**, Optimizing Data Retention, you learn how to secure your investments in the BW data model for the long term, make them more economical, and adjust them to new requirements.

**Chapter 12**, Data Modeling in BW Projects, summarizes some BW-specific data modeling aspects.

After a brief outlook in **Chapter 13**, the **Appendix** provides a selection of useful information: abbreviations, transaction codes, programs, function modules, includes, tables, posting keys, literature, and a glossary.

### 1.3 How to Use This Book

For readers who want to enter the world of data modeling, Chapter 2 introduces the basic principles of data modeling.

If you're already acquainted with the theoretical principles of data modeling in data warehouse environments but you're new to SAP NetWeaver BW world, Chapter 3 provides an overview of the modeling tool, of the Data Warehousing Workbench, and of the BW reporting tools. Alternatively, you can start with Chapter 4 and directly turn to the structure of the BW data model. Chapters 7 (structure of the EDW Layer) and 8 (structure of the Reporting Layer) detail further data modeling aspects, particularly with regard to the layer architecture introduced in Chapter 5. Depending on your fields of interest, you can read Chapter 6, Chapter 10, and Chapter 12. Chapter 11 provides tips for optimizing and remodeling data retention and data modeling.

If you already have experience with working in BW and are looking for architecture or data modeling improvements, you should read the explanations on the LSA, SAP’s reference architecture, described in Chapter 5. In addition, the descriptions of the specific modeling topics in Chapters 7 and 8 provide detailed information about the topics relevant for you. You can read Chapter 10 and Chapter 11.

Readers who specifically deal with the implementation of new technologies and want to analyze their effects on data modeling can directly start
with the respective chapters, that is, Chapter 10 regarding the integration of planning applications and Chapter 11 regarding NLS solutions and remodeling. Chapter 8 also addresses BWA. However, you should read Chapter 5 on the LSA first. This architecture lays the foundation for a flexible integration of new technologies with the existing solution.

It was very important to us to include our wealth of experience gained in numerous BW projects. Therefore, Chapter 6 and the case studies in Chapter 9 introduce many application cases from real life and their modeling. Chapter 12 discusses the special features of BW project management. If you face the challenge of having to map specific topics in BW, these explanations can be invaluable — and considerably accelerate the processing of projects.

To make it easier for you to work with this book, we use specific icons to highlight certain sections:

The tips marked with this icon provide recommendations from real life, which will make your work easier.

Notes marked with this icon contain information on critical requirements or effects you should always take into account.

This icon refers to examples that explain the topic discussed in more detail and are supposed to illustrate how to use the individual functions in your enterprise.

### 1.4 Acknowledgments

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