About the Tutorial

SAP Business Warehouse (BW) integrates data from different sources, transforms and consolidates the data, does data cleansing, and storing of data as well. It also includes data modeling, administration and staging area.

SAP Business Intelligence (BI) means analyzing and reporting of data from different heterogeneous data sources. It allows you to acquire data from multiple data sources, data staging, which can be further distributed to different BI systems. A SAP Business Intelligence system can work as a target system for data transfer or source system for distribution of data to different BI targets.

This is a simple tutorial that covers the basics of SAP Business Intelligence and how to handle its various other components.

Audience

This tutorial is prepared for those readers who wish to learn the essentials as well as the enhancements of SAP BI and bring it in practice. This tutorial is intended to make you comfortable in getting started with SAP BI and its various other modules.

Prerequisites

This is a simple tutorial and the concepts explained here can be easily understood. The readers should have a good understanding of data warehousing concepts as it is very important. Also, it will certainly help, if you have ample business knowledge on various application areas and a little experience of ABAP Language.

Copyright and Disclaimer

© Copyright 2018 by Tutorials Point (I) Pvt. Ltd.

All the content and graphics published in this e-book are the property of Tutorials Point (I) Pvt. Ltd. The user of this e-book is prohibited to reuse, retain, copy, distribute or republish any contents or a part of contents of this e-book in any manner without written consent of the publisher.

We strive to update the contents of our website and tutorials as timely and as precisely as possible, however, the contents may contain inaccuracies or errors. Tutorials Point (I) Pvt. Ltd. provides no guarantee regarding the accuracy, timeliness or completeness of our website or its contents including this tutorial. If you discover any errors on our website or in this tutorial, please notify us at contact@tutorialspoint.com
# Table of Contents

About the Tutorial...........................................................................................................i
Audience ........................................................................................................................i
Prerequisites ...................................................................................................................i
Copyright and Disclaimer ............................................................................................i
Table of Contents ..........................................................................................................ii

1. SAP BW – OVERVIEW OF SAP BI ......................................................................... 1
   SAP BW and BI Introduction ....................................................................................... 1
   Data Acquisition in SAP BI ....................................................................................... 3
   InfoPackage ............................................................................................................... 6
   BI Content ............................................................................................................... 7

2. SAP BW – DATA WAREHOUSING ........................................................................ 8
   Star Schema ............................................................................................................. 8
   Extended Star Schema ............................................................................................. 9
   InfoArea and InfoObjects ....................................................................................... 10

3. SAP BW – DATA FLOW ......................................................................................... 11
   Overview of Data Flow ........................................................................................... 11
   Directly Accessing Source System Data .................................................................. 12

4. SAP BW – TRANSFORMATION ............................................................................. 22
   Real-Time Data Acquisition (RDA) ......................................................................... 26

5. SAP BW – INFOAREA, OBJECT & CATALOG ....................................................... 27
   InfoArea in SAP BI .................................................................................................. 27
   How to Create an InfoObject and InfoObject Catalog? ........................................... 30
   Creating an InfoObject with Key Figures ................................................................ 34
6. SAP BW – DATASTORE OBJECTS AND TYPES .............................................. 40
   What is a DataStore Object? ..................................................................... 40
   DSO Architecture .................................................................................. 40
   Types of DataStore Objects .................................................................. 41
   Standard DataStore Objects .................................................................. 42
   SID Generation ...................................................................................... 46
   Direct Update DataStore Objects .......................................................... 50

7. SAP BW – WRITE OPTIMIZED DSO ..................................................... 54
   Structure of Write Optimized DSO ......................................................... 54

8. SAP BW – INFOSET ............................................................................. 59
   InfoSet in SAP BI .................................................................................. 59
   Types of InfoSet Joins ............................................................................ 59
   Creating an InfoSet ................................................................................ 62
   Editing an InfoSet .................................................................................. 68

9. SAP BW – INFOCUBE ......................................................................... 70
   Star Schema in BI .................................................................................. 70
   How to Create an InfoCube? ................................................................. 72
   Real Time InfoCubes .............................................................................. 78

10. SAP BW – VIRTUAL INFOPROVIDER ...................................................... 81
    Types of Virtual Providers .................................................................... 81
    VirtualProvider Based on Data Transfer Process .................................. 81
    VirtualProvider with BAPI .................................................................... 83
    Virtual Provider Based on Functional Module ....................................... 84
    Using InfoObjects as Virtual Providers ................................................ 84
11. SAP BW – MULTIPROVIDER ................................................................. 86
   MultiProvider Structure ........................................................................ 86
   Creating a MultiProvider ...................................................................... 87

12. SAP BW – FLAT FILE DATA TRANSFER .............................................. 93
   Define a File Source System ............................................................. 94

13. SAP BW – DB CONNECT ................................................................. 100
   DB Architecture ................................................................................ 100

14. SAP BW – UNIVERSAL DATA CONNECT ......................................... 105
   Creating a UD Connect Source System ........................................... 106

15. SAP BW – PROCESS CHAIN .......................................................... 109
   Structure of a Process Chain ............................................................ 109
   Start Process for Designing a Process Chain .................................... 110

16. SAP BW – REPORTING ................................................................. 119
   BEx Query Designer .......................................................................... 119
   Query Properties .............................................................................. 124
   Variables .......................................................................................... 124
   Restricted Key Figures ..................................................................... 125
   BEx Analyzer: Reporting and Analysis ............................................ 125
In this chapter, we will get to understand the basics of SAP BW and SAP BI. How it has evolved and improved over the years.

**SAP BW and BI Introduction**

SAP Business Intelligence (BI) means analyzing and reporting of data from different heterogeneous data sources. SAP Business Warehouse (BW) integrates data from different sources, transforms and consolidates the data, does data cleansing, and storing of data as well. It also includes data modeling, administration and staging area.

The data in SAP BW is managed with the help of a centralized tool known as SAP BI Administration Workbench. The BI platform provides infrastructure and functions which include:

- OLAP Processor
- Metadata Repository,
- Process designer and other functions.

The Business Explorer (BEx) is a reporting and analysis tool that supports query, analysis and reporting functions in BI. Using BEx, you can analyze historical and current data to different degree of analysis.

SAP BW is known as an open, standard tool which allows you to extract the data from different systems and then send it to the BI system. It also evaluates the data with different reporting tools and you can distribute this to other systems.

The following diagram shows an open, broad and standard based Architecture of Business Intelligence.
• BI stands for Business Intelligence
• BW stands for Business Warehouse

In 1997, SAP had first introduced a product for reporting, analysis and data warehousing and it was named as **Business Warehouse Information System (BIW)**.

Later, the name was changed from SAP BIW to SAP Business Warehouse (BW). After SAP acquired Business Objects, the name of the product has been changed to SAP BI.

<table>
<thead>
<tr>
<th>Name</th>
<th>BIW Version</th>
<th>Release Date and Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIW</td>
<td>1.2A</td>
<td>Oct 1998</td>
</tr>
<tr>
<td>BIW</td>
<td>1.2B</td>
<td>Sep 1999</td>
</tr>
<tr>
<td>BIW</td>
<td>2.0A</td>
<td>Feb 2000</td>
</tr>
</tbody>
</table>
### Data Acquisition in SAP BI

SAP BI allows you to acquire data from multiple data sources that can be distributed to different BI systems. A SAP Business Intelligence system can work as a target system for data transfer or source system for distribution of data to different BI targets.

![Data Acquisition Diagram]

- **BIW** 2.0B  Jun 2000
- **BIW** 2.1C  Nov 2000
- **BW (Name changed to BW)** 3.0A  Oct 2001
- **BW** 3.0B  May 2002
- **BW** 3.1  Nov 2002
- **BW** 3.1C  Apr 2004
- **BW** 3.3  Apr 2004
- **BW** 3.5  Apr 2004
- **BI (Name changed to BI)** 7  Jul 2005
As mentioned in the above image, you can see SAP BI source systems along with other systems –

- SAP systems (SAP Applications/SAP ECC)
- Relational Database (Oracle, SQL Server, etc.)
- Flat File (Excel, Notepad)
- Multidimensional Source systems (Universe using UDI connector)
- Web Services that transfer data to BI by means of push

When you go to SAP BI Administration workbench, the source system is defined there. Go to RSA1 -> Source Systems
As per the data source type, you can differentiate between the source systems:

- Data Sources for transaction data
- Data Sources for master data
- Data Sources for hierarchies
- Data Sources for text
- Data Sources for attributes

You can load the data from any source in the data source structure into BI with an **InfoPackage**. Target system where the data is to be loaded is defined in the transformation.
InfoPackage

An InfoPackage is used to specify how and when to load data to the BI system from different data sources. An InfoPackage contains all the information on how the data is loaded from the source system to a data source or a PSA. InfoPackage consists of condition for requesting data from a source system.

Note: Using an InfoPackage in BW 3.5, you can load data in Persistence Staging Area and also in targets from source system, but If you are using SAP BI 7.0 the data load should be restricted to PSA only for latest versions.

BI Data Flow (InfoPackage and InfoProvider)
**BI Content**

BI objects consists of the following components:

- Roles
- Web templates and workbook
- Queries
- InfoProvider
- Update Rules
• InfoSource
• Transfer Rules
• InfoObjects
• DataSources

BI objects are divided into multiple BI content areas so that they can be used in an efficient way. This includes content area from all the key modules in an organization, which include –

• SCM
• CRM
• HR
• Finance Management
• Product Lifecycle
• Industry Solutions
• Non-SAP data sources, etc.
In this chapter, we will discuss about Star and Extended Star Schema. We will also understand what InfoArea and InfoObjects are.

**Star Schema**

In Star Schema, each dimension is joined to one single fact table. Each dimension is represented by only one dimension and it is not further normalized. A dimension Table contains a set of attributes that are used to analyze the data.

For example: We have a fact table called `FactSales` that has primary keys for all the Dim tables and measures `units_sold` and `dollars_sold` to do analysis.

We have 4 Dimension tables: DimTime, DimItem, DimBranch, DimLocation as shown in the following image.

---

![Star Schema: Dim and Fact Tables](image)

**Star Schema: Dim and Fact Tables**

Each dimension table is connected to a fact table as the fact table has the primary Key for each dimension tables that are used to join two tables.
Facts/Measures in the Fact Table are used for analysis purpose along with the attribute in the dimension tables.

**Extended Star Schema**

In Extended Star schema, fact tables are connected to dimension tables and this dimension table is further connected to SID table and this SID table is connected to master data tables. In an extended star schema, you have the fact and dimension tables inside the cube, however SID tables are outside the cube. When you load the transactional data into the Info cube, the Dim Id’s are generated based on SID’s and these Dim ids’ are then used in the fact tables.

In the extended star schema one fact table can connect to 16 dimension tables and each dimension table is assigned with 248 maximum SID tables. These SID tables are also called as characteristics and each characteristic can have master data tables like ATTR, Text, etc.

- **ATTR** – It is used to store all the attribute data.
- **Text** – It is used to store description in multiple languages.
**InfoArea and InfoObjects**

InfoObjects are known as the smallest unit in SAP BI and are used in Info Providers, DSO’s, Multi providers, etc. Each Info Provider contains multiple InfoObjects.

InfoObjects are used in reports to analyze the data stored and to provide information to decision makers. InfoObjects can be categorized into the following categories:

- Characteristics like Customer, Product, etc.
- Units like Quantity sold, currency, etc.
- Key Figures like Total Revenue, Profit, etc.
- Time characteristics like Year, quarter, etc.

InfoObjects are created in InfoObject catalog. It is possible that an InfoObject can be assigned to a different Info Catalog.

**Info Area**

Info Area in SAP BI is used to group similar types of objects together. Info Area is used to manage Info Cubes and InfoObjects. Each InfoObjects resides in an Info Area and you can define it in a folder which is used to hold similar files together.
In this chapter, we will discuss about data flow and data acquisition in SAP BW.

**Overview of Data Flow**

Data flow in data acquisition involves transformation, info package for loading to PSA, and data transfer process for distribution of data within BI. In SAP BI, you determine which data source fields are required for decision making and should be transferred.

When you activate the data source, a PSA table is generated in SAP BW and then data can be loaded.

In the transformation process, fields are determined for InfoObjects and their values. This is done by using the DTP data which is transferred from PSA to different target objects.

The transformation process involves the following different steps:

- Data Consolidation
- Data Cleansing
- Data Integration
When you move the data from one BI object to another BI object, the data is using a transformation. This transformation converts the source field in to the format of the target. Transformation is created between a source and a target system.

**BI Objects** – InfoSource, DataStore objects, InfoCube, InfoObjects, and InfoSet act as the source objects and these same objects serve as target objects.

A Transformation should consist of at least one transformation rule. You can use different transformation, rule types from the list of available rules and you can create simple to complex transformations.

**Directly Accessing Source System Data**

This allows you to access data in the BI source system directly. You can directly access the source system data in BI without extraction using Virtual Providers. These Virtual
providers can be defined as InfoProviders where transactional data is not stored in the object. Virtual providers allow only read access on BI data.

There are different types of Virtual Providers that are available and can be used in various scenarios:

- Virtual Providers based on DTP
- Virtual Providers with function modules
- Virtual Providers based on BAPI’s

**Virtual Providers Based on DTP**

These Virtual Providers are based on the data source or an InfoProvider and they take characteristics and key figures of the source. Same extractors are used to select data in a source system as you use to replicate data into the BI system.

- When are Virtual Providers based on DTP?
- When only some amount of data is used.
- You need to access up to date data from a SAP source system.
- Only few users execute queries simultaneously on the database.

Virtual Providers based on DTP shouldn’t be used in the following conditions:

- When multiple users are executing queries together.
- When same data is accessed multiple times.
- When a large amount of data is requested and no aggregations are available in the source system.

**Creating a Virtual Provider based on DTP**

To go to Administration Workbench, use **RSA1**
In the **Modeling tab** -> **go to Info Provider tree** -> **In Context menu** -> **Create Virtual Provider**.
Data Warehousing Workbench: Modeling

- Modeling
  - InfoProvider
  - InfoObjects
  - InfoSources
  - DataSources
  - Source Systems
  - Open Hub Destination
  - Planning Scenarios
  - Process Chains

- Change
  - Delete
  - Display Metadata
  - Display Data Flow
  - Create InfoArea...
  - Create InfoCube...
  - Create DataStore Object
  - Create MultiProvider...
  - Create VirtualProvider...
  - Create InfoSet...
  - Create HybridProvider...
  - Create Aggregation Level
  - Create CompositeProvider...

SAP BW
In **Type Select Virtual Provider** based on Data Transfer Process for direct access. You can also link a Virtual Provider to a SAP source using an **InfoSource 3.x**.
A **Unique Source System Assignment Indicator** is used to control the source system assignment. If you select this indicator, only one source system can be used in the assignment dialog. If this indicator is not checked, you can select more than one source system and a Virtual Provider can be considered as a multi-provider.
Click on **Create (F5)** at the bottom. You can define the virtual provider by copying objects. To Activate the Virtual Provider, click as shown in the following screenshot.
To define Transformation, right click and go to Create Transformation.

Define the Transformation rules and activate them.
The next step is to create a Data Transfer Process. Right click -> Create Data Transfer Process.
The default type of DTP is DTP for Direct access. You have to select the source for Virtual Provider and activate DTP.

To activate direct access, context menu -> Activate Direct Access.
Select one or more Data transfer processes and activate the assignment.

**Virtual Providers with BAPIs**

This is used for reporting on the data in external systems and you don’t need to store transaction data in the BI system. You can connect to non-SAP systems like hierarchical databases.
When this Virtual Provider is used for reporting, it calls Virtual Provider BAPI.

**Virtual Provider with Function Module**

This Virtual Provider is used to display data from a non BI data source to a BI without copying the data to BI structure. The data can be local or remote. This is primarily used for SEM applications.

If you compare this with other Virtual Providers, this is more generic and offer more flexibility, however you need to put a lot of efforts in implementing this.

Enter the name of the Function Module that you want to use as data source for Virtual Providers.
End of ebook preview

If you liked what you saw...

Buy it from our store @ https://store.tutorialspoint.com