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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.

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1. SAP BW – Overview of SAP BI

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.

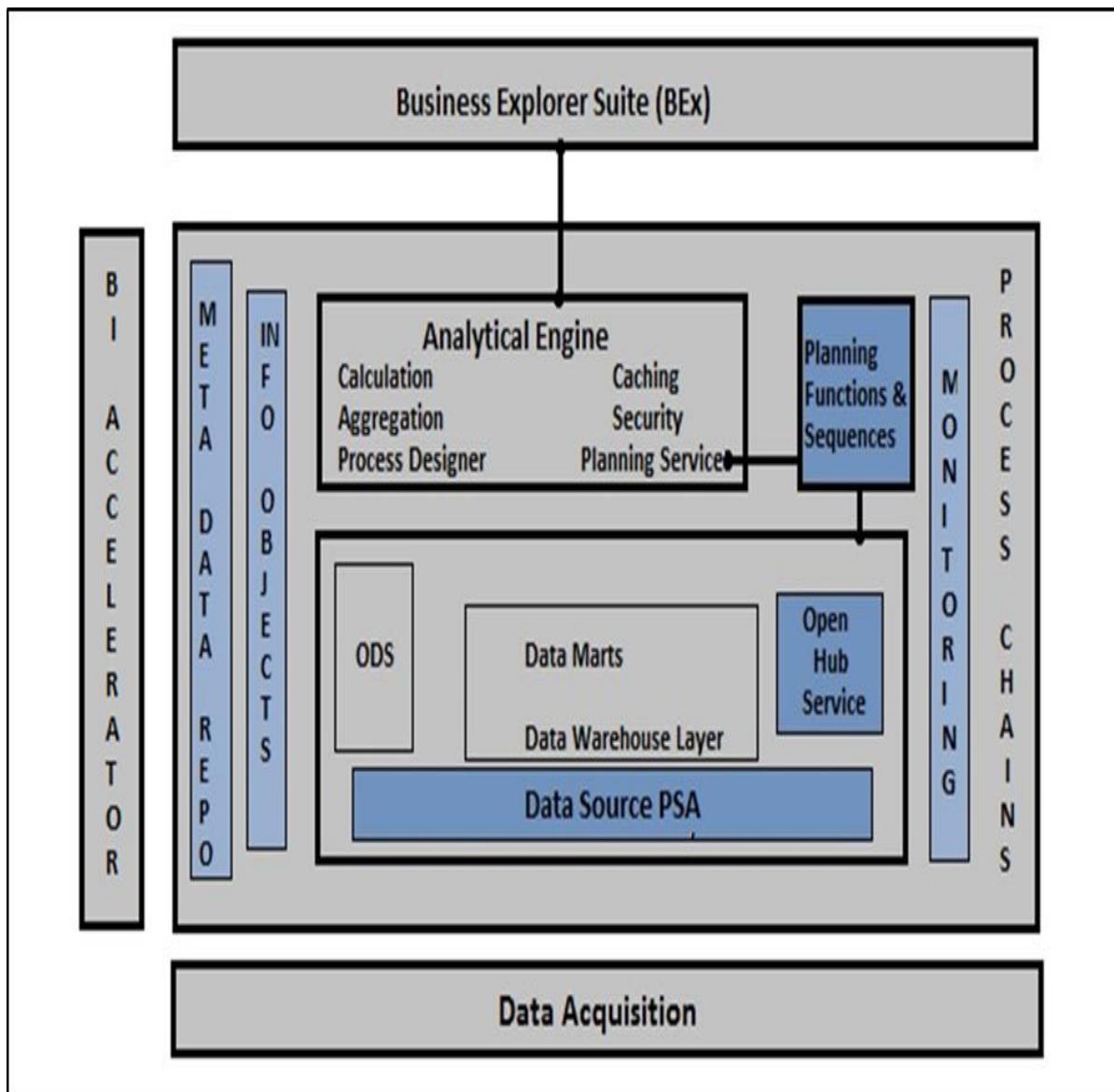
The data in SAP BW is managed with the help of a centralized tool known as **SAP BI Administration Workbench**. The BI platform provides infrastructure and functions which include:

- 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)**.

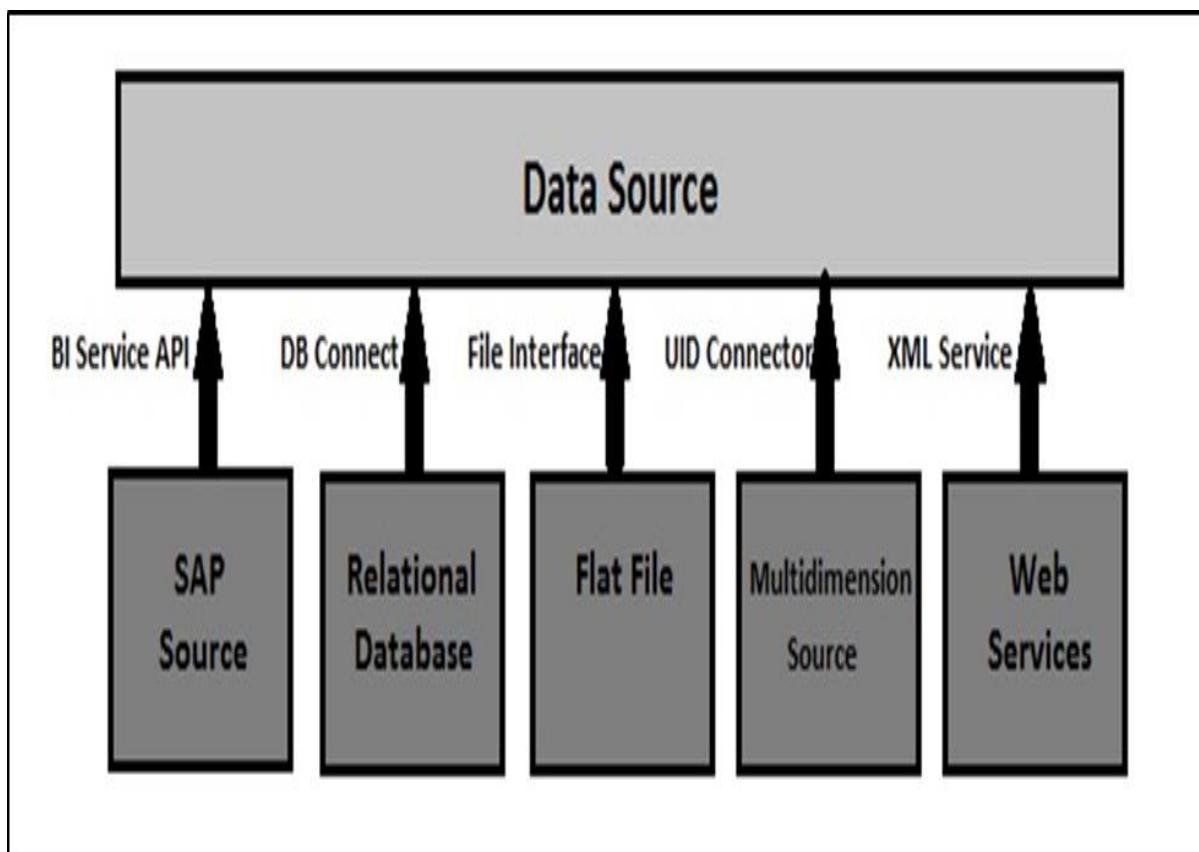
Later, the name was changed from SAP BIW to SAP Business Warehouse (BW). After SAP acquired Business Objects, the name of the product has been changed to SAP BI.

Name	BIW Version	Release Date and Year
BIW	1.2A	Oct 1998
BIW	1.2B	Sep 1999
BIW	2.0A	Feb 2000

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

Data Acquisition in SAP BI

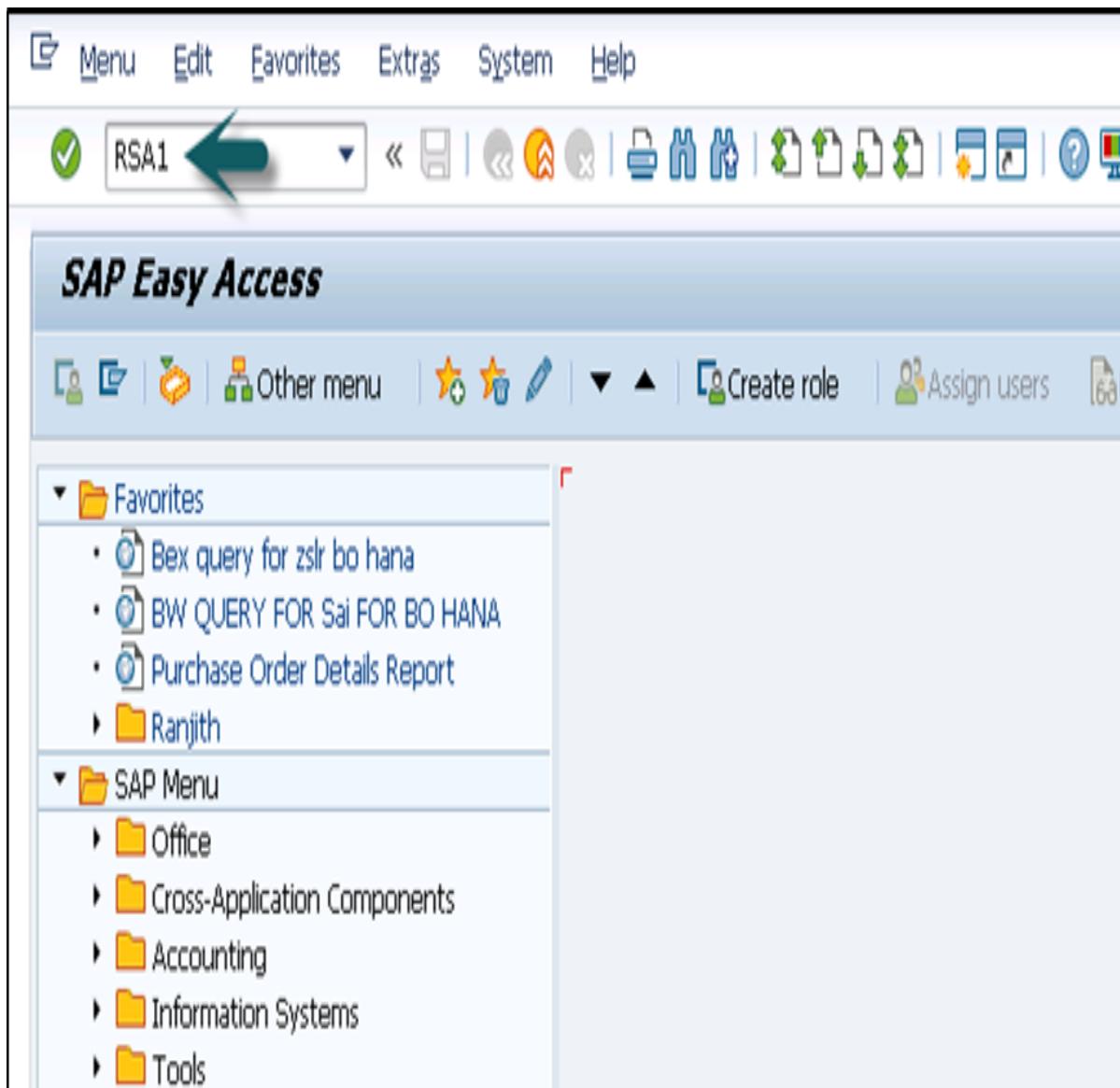
SAP BI allows you to acquire data from multiple data sources that can be distributed to different BI systems. A SAP Business Intelligence system can work as a target system for data transfer or source system for distribution of data to different BI targets.



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**



	Tech. Name	Execute Func..
BW	BW	Create...
SAP	SAP	Create...
ODP - BW	ODP_BW	Create...
ODP - SAP (Extractors)	ODP_SAP	Create...
ODP - SAP HANA Information Views	ODP_HANA	Create...
ODP - SLT Queue	ODP_SLT	Create...
ODP - SAP Business ByDesign	ODP_BYD	Create...
ODP - Other Contexts	ODP	Create...
Data Services	BOBJDS	Create...
External System	PARTNERS	Create...
File	FILE	Create...
DB Connect	DB	Create...
UD Connect	UDC	Create...
Web Service	WEB	Create...

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

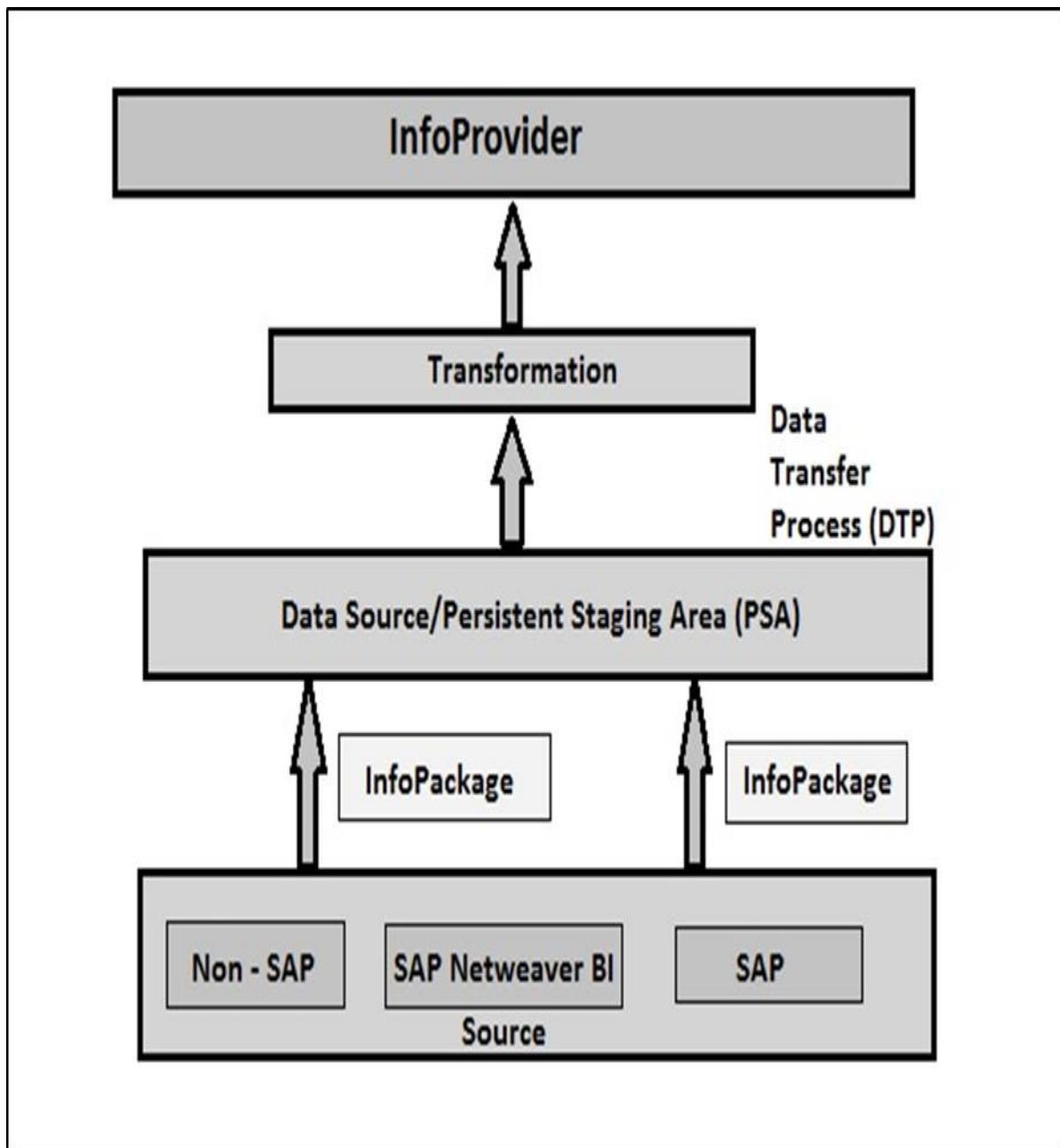
You can load the data from any source in the data source structure into BI with an **InfoPackage**. Target system where the data is to be loaded is defined in the transformation.

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 consist 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.

2. SAP BW – Data Warehousing

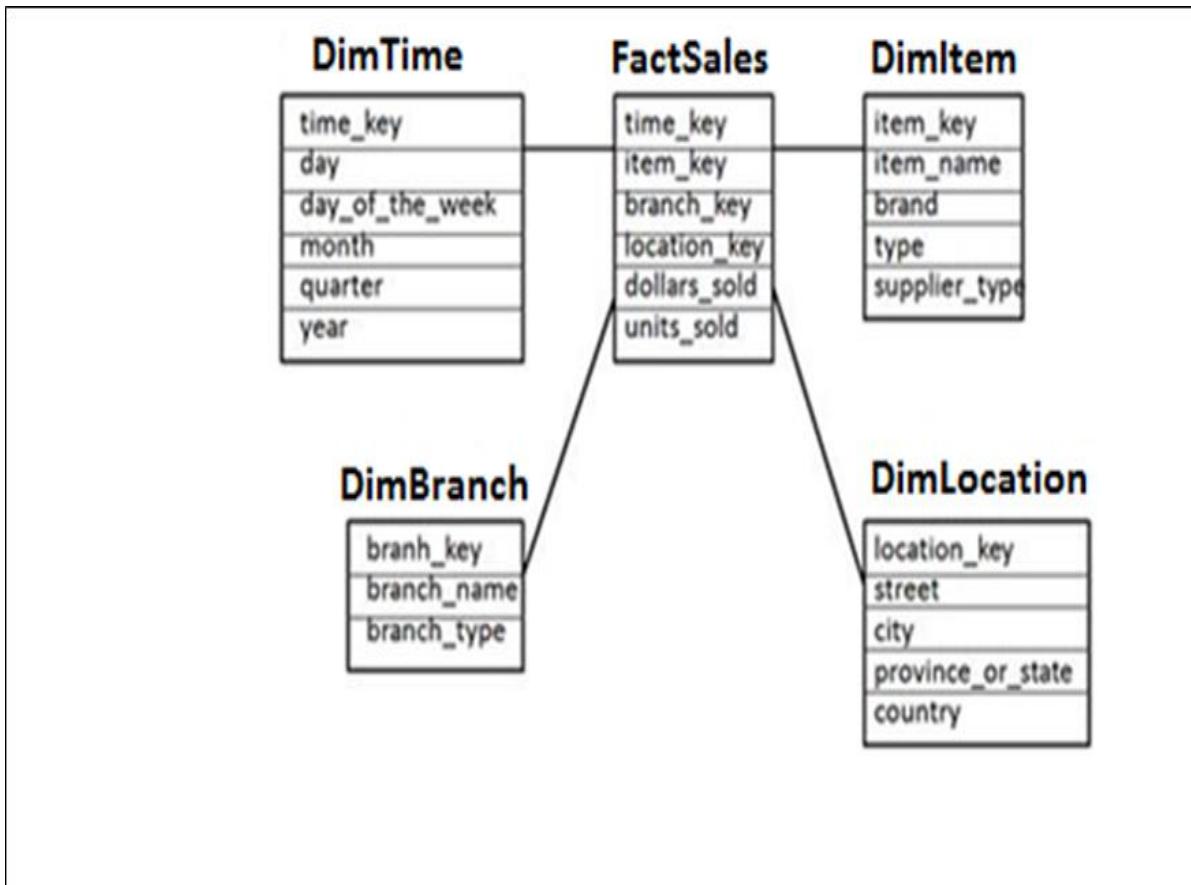
In this chapter, we will discuss about Star and Extended Star Schema. We will also understand what InfoArea and InfoObjects are.

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

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.

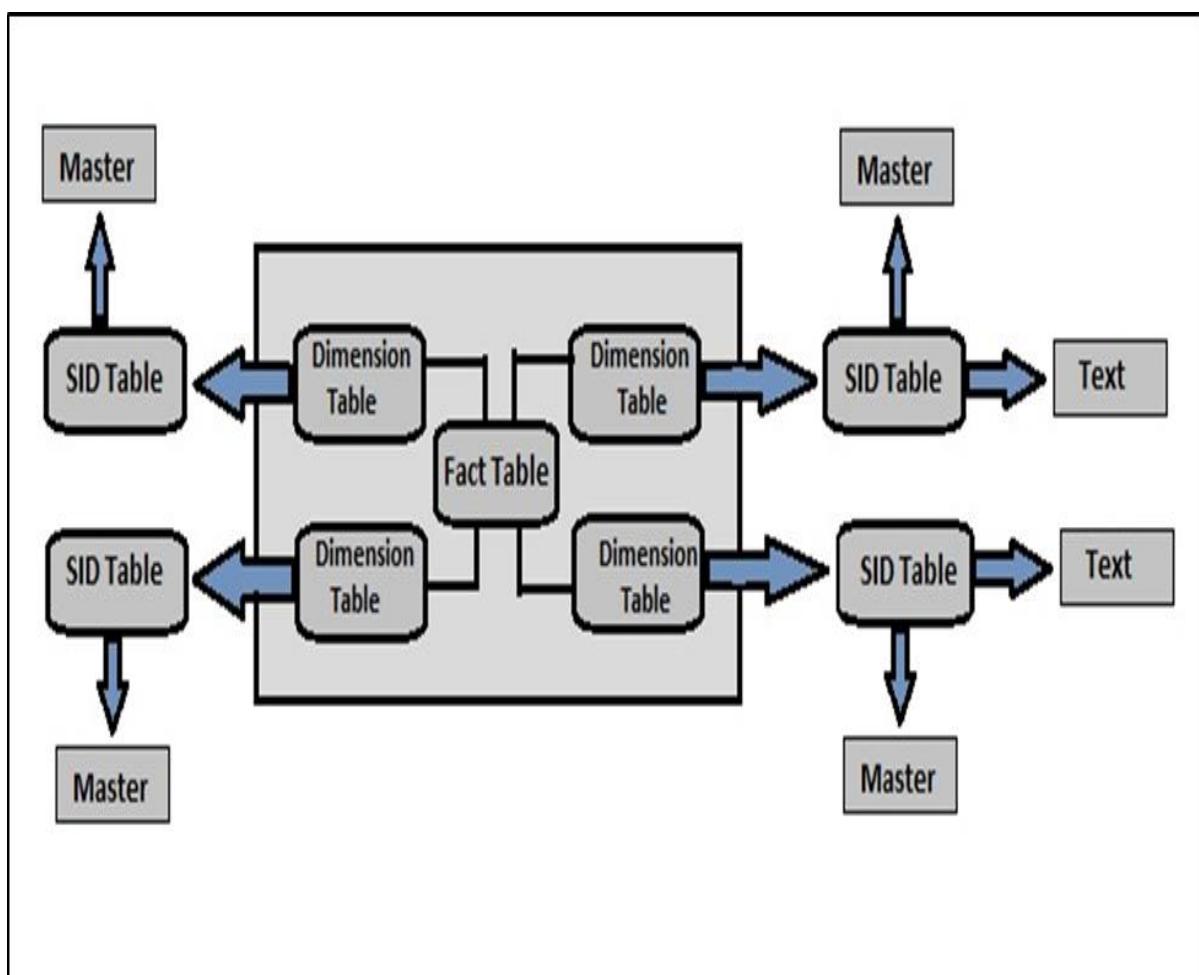
Facts/Measures in the Fact Table are used for analysis purpose along with the attribute in the dimension tables.

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.



Extended Star Schema

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.

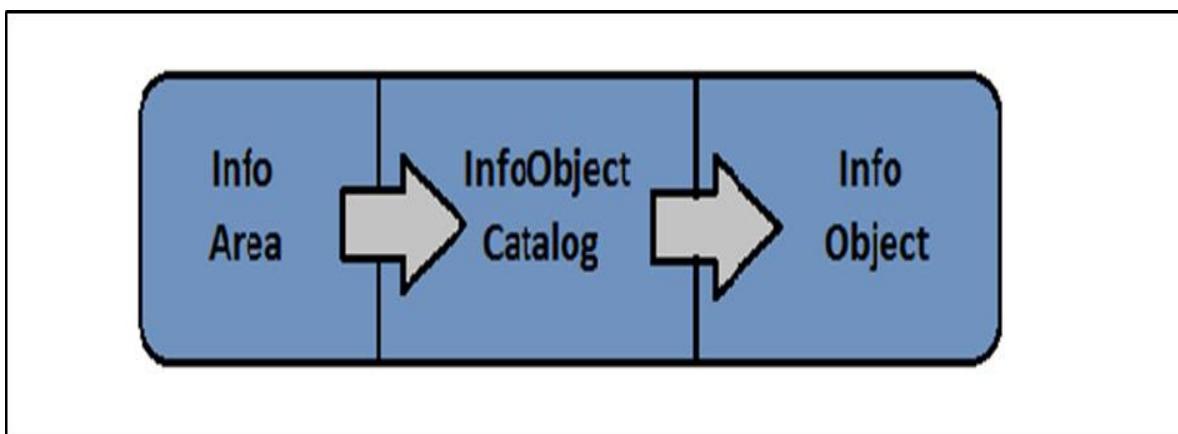
InfoObjects are used in reports to analyze the data stored and to provide information to decision makers. InfoObjects can be categorized into the following categories:

- 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.



3. SAP BW – Data Flow

In this chapter, we will discuss about data flow and data acquisition in SAP BW.

Overview of Data Flow

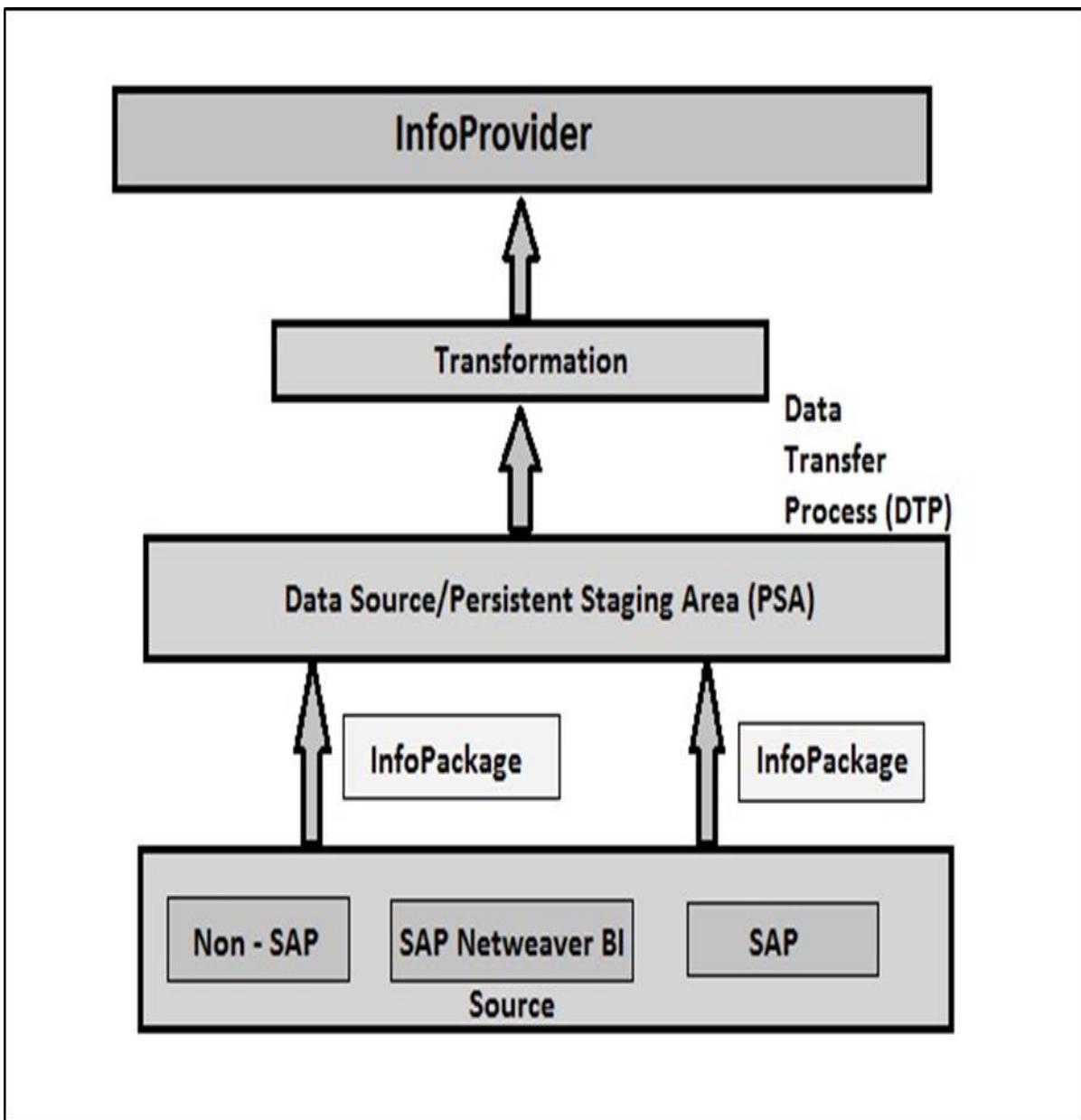
Data flow in data acquisition involves transformation, info package for loading to PSA, and data transfer process for distribution of data within BI. In SAP BI, you determine which data source fields are required for decision making and should be transferred.

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:

- VirtualProviders based on DTP
- VirtualProviders with function modules
- VirtualProviders based on BAPI's

VirtualProviders Based on DTP

These VirtualProviders 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.

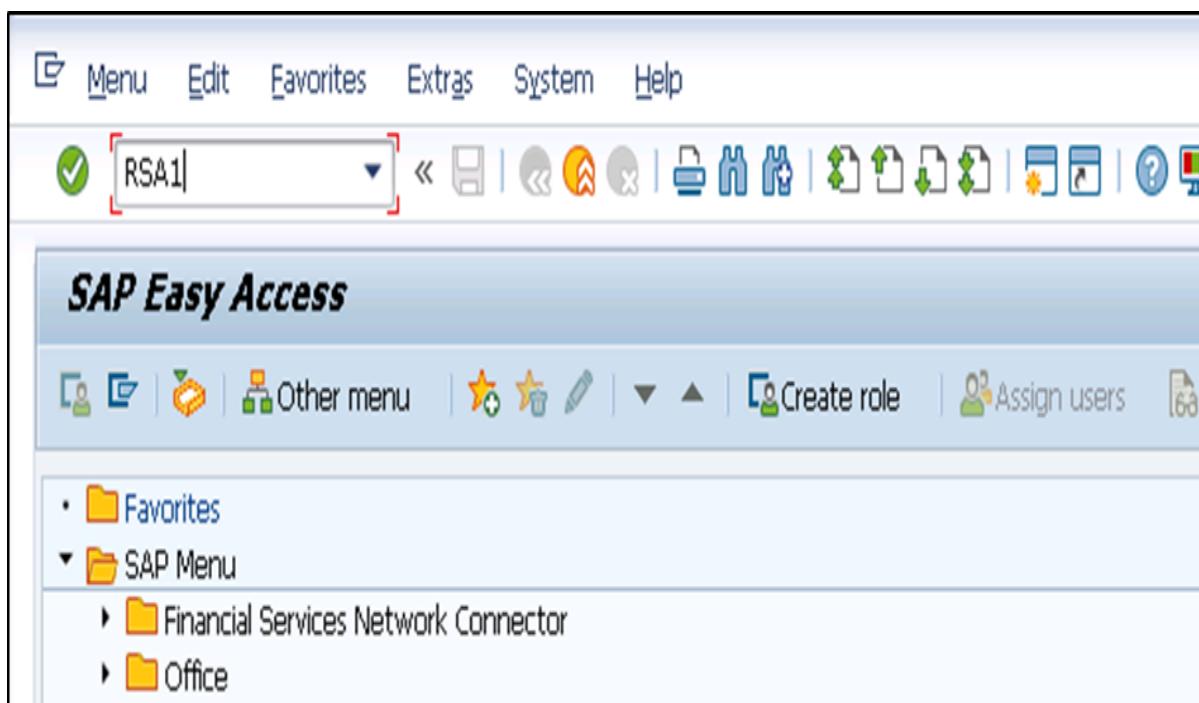
- When are Virtual Providers based on DTP?
- When only some amount of data is used.
- You need to access up to date data from a SAP source system.
- Only few users execute queries simultaneously on the database.

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 VirtualProvider 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

The screenshot shows the SAP BW Data Warehousing Workbench interface. The title bar reads "Data Warehousing Workbench: Modeling". The left sidebar has a "Modeling" tab highlighted with a yellow arrow. Below it is a list of navigation items: Favorites, Find, Data Flows, InfoProvider (which is also highlighted with a yellow arrow), InfoObjects, InfoSources, DataSources, Source Systems, Open Hub Destinations, Planning Sequences, and Process Chains. The main area shows a tree view of objects under "InfoProvider": Unassigned Nodes, RFID Standalone Solution, Project Issue and Change Management Analytic/PICM/AVR, and Business Information Warehouse. The "Business Information Warehouse" node is selected and highlighted with a red box. A context menu is open for this node, listing options like Change, Delete, Display Metadata, Display Data Flow, Create InfoArea..., Create InfoCube..., Create DataStore Object, Create MultiProvider..., Create VirtualProvider... (which is highlighted with a yellow box and a yellow arrow), Create InfoSet..., Create HybridProvider..., Create Aggregation Level, and Create CompositeProvider... .

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**.

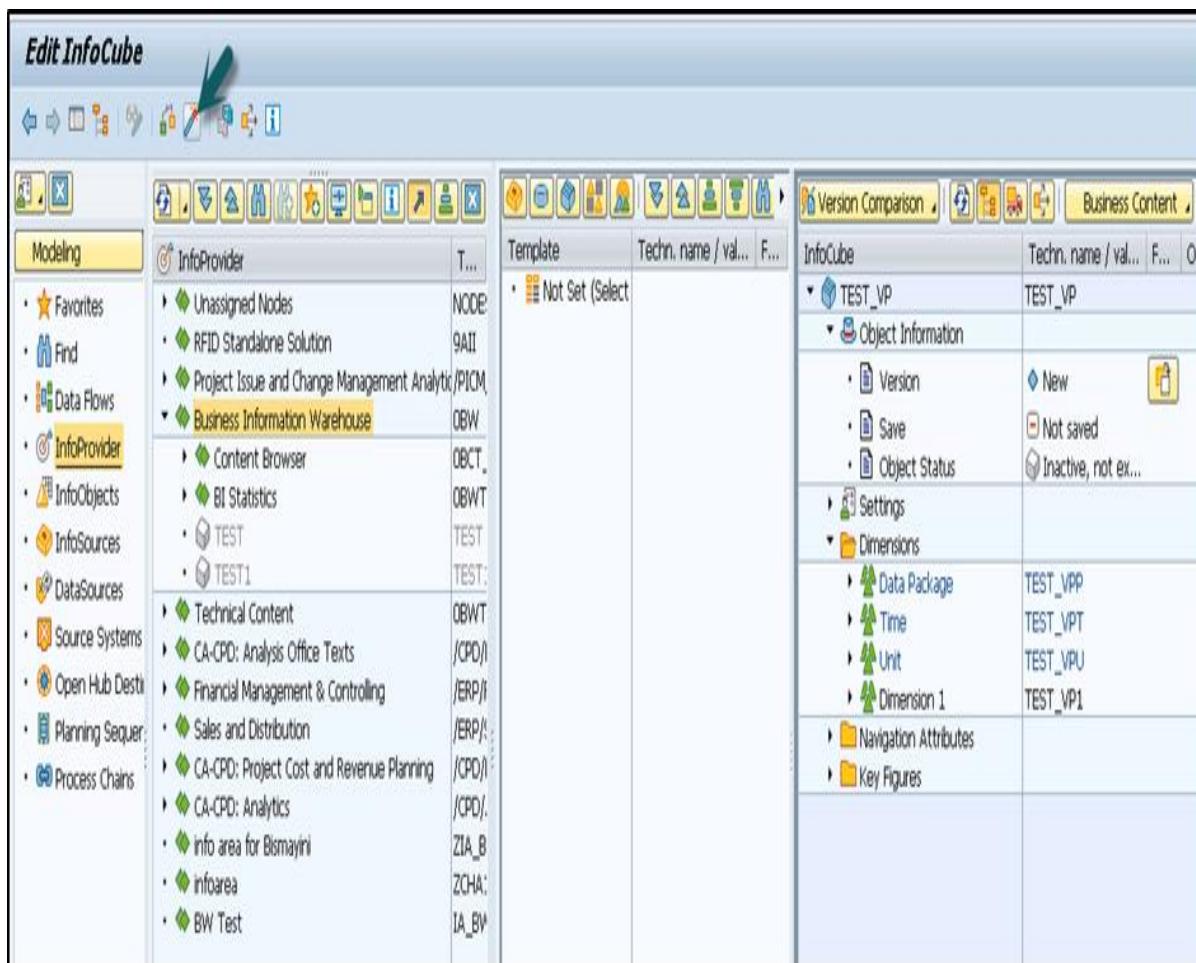
Edit InfoCube

InfoCube	<input type="text" value=""/>	
InfoArea	OBW	Business Information Warehouse
ObjectType	InfoCube	
Template	<input type="text"/>	
InfoProvider Type <ul style="list-style-type: none"> <input type="radio"/> Standard InfoCube <input type="checkbox"/> Real Time With Physical Data Store BWA Status: <input type="text" value="InfoCube stores its data in the database"/> <input checked="" type="checkbox"/> VirtualProvider Without Physical Data Store <input checked="" type="radio"/> Based on Data Transfer Process for Direct Access <ul style="list-style-type: none"> <input type="checkbox"/> With 3.x InfoSource <input type="checkbox"/> Unique Source System Assignment <input type="radio"/> Based on BAPI With Source System <input type="text"/> <input type="checkbox"/> Execute Conversion Exit(s) <input type="radio"/> Based on Function Module Details 		
System Type (Namespace) <ul style="list-style-type: none"> <input type="radio"/> SAP (Delivered by SAP) <input type="radio"/> CUS (Generated by User) <input type="radio"/> PAR (Partner) Namespace <input type="text"/> 		
Delta Capability <ul style="list-style-type: none"> Name of Delta Cache Class <input type="text"/> 		
Property <ul style="list-style-type: none"> <input type="checkbox"/> Semantically Partitioned 		

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.

InfoProvider Type		System Type (Namespace)
<input type="radio"/> Standard InfoCube <input type="checkbox"/> Real Time		<input type="radio"/> SAP (Delivered by SAP <input type="radio"/> CUS (Generated by User) <input type="radio"/> PAR (Partner) Namespace <input type="checkbox"/>
With Physical Data Store BWA Status <input type="text" value="InfoCube stores its data in the database"/> ▾		
<input checked="" type="checkbox"/> VirtualProvider Without Physical Data Store <ul style="list-style-type: none"> <input checked="" type="radio"/> Based on Data Transfer Process for Direct Access <ul style="list-style-type: none"> <input checked="" type="checkbox"/> With 3.x InfoSource <input type="checkbox"/> <input checked="" type="checkbox"/> Unique Source System Assignment <input type="checkbox"/> <input type="radio"/> Based on BAPI <input type="radio"/> With Source System <input type="text"/> <input type="checkbox"/> Execute Conversion Exit(s) 		Delta Capability <input type="text"/>
<input type="radio"/> Based on Function Module		
 Details		

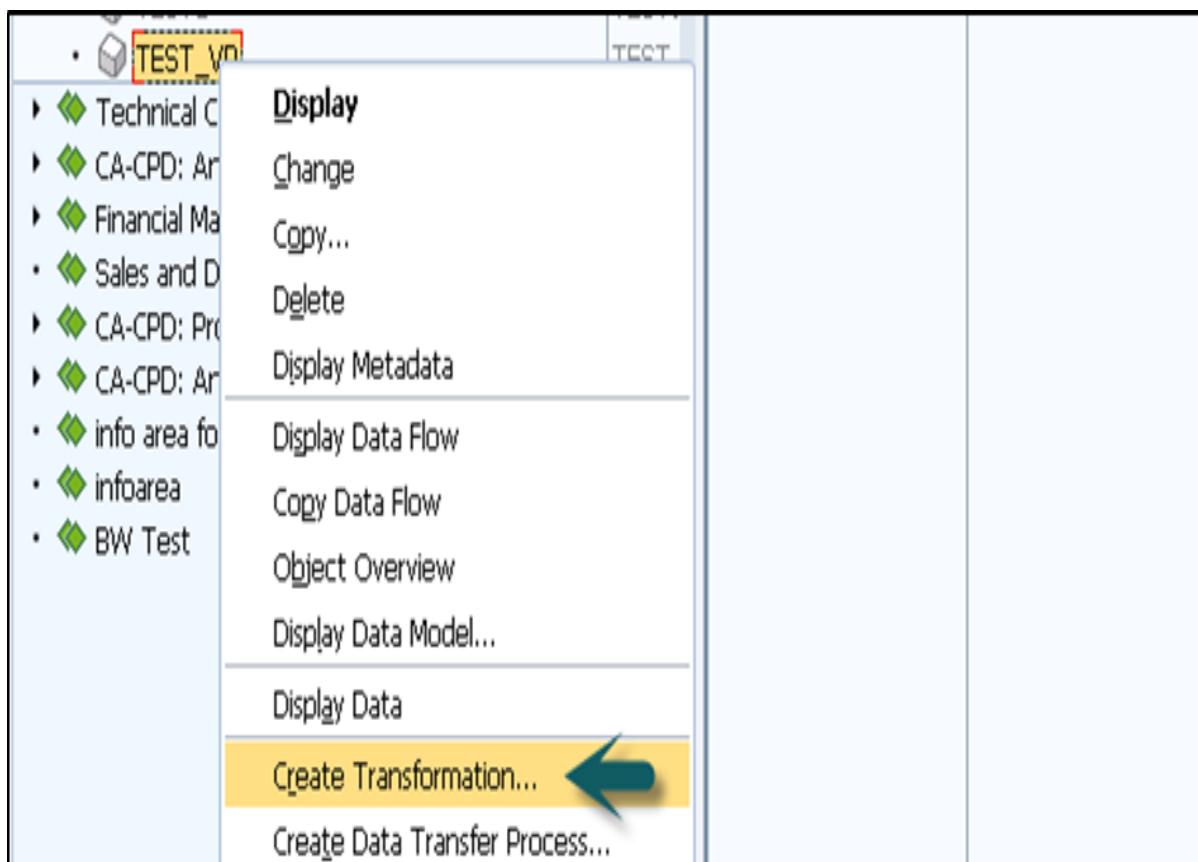
Click on **Create (F5)** at the bottom. You can define the virtual provider by copying objects. To Activate the Virtual Provider, click as shown in the following screenshot.



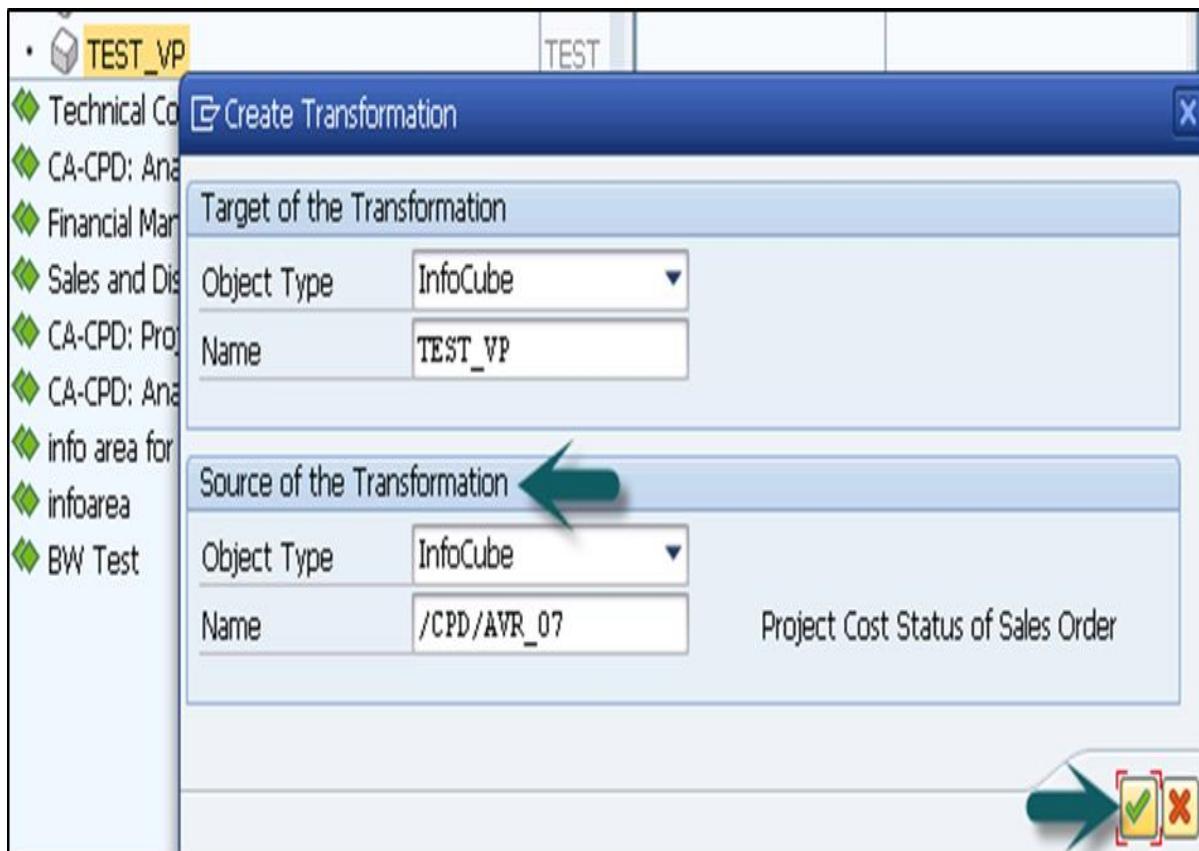
The screenshot shows the SAP BW InfoCube editor interface. The left sidebar has 'Modeling' selected, with various options like Favorites, Find, Data Flows, and InfoProvider. The main area shows a tree view under 'InfoProvider' with nodes like Unassigned Nodes, RFID Standalone Solution, Project Issue and Change Management Analytic/PICM, Business Information Warehouse, Content Browser, BI Statistics, TEST, TEST1, Technical Content, CA-CPD: Analysis Office Texts, Financial Management & Controlling, Sales and Distribution, CA-CPD: Project Cost and Revenue Planning, CA-CPD: Analytics, info area for Bismayini, infoarea, and BW Test. The 'Business Content' tab is open on the right, showing a table with columns for InfoCube, Techn. name / val..., F..., and O. A row for 'TEST_VP' is selected, showing details like Version (New), Save (Not saved), Object Status (Inactive, not ex...), Settings, Dimensions (Data Package, Time, Unit, Dimension 1), Navigation Attributes, and Key Figures.

InfoCube	Techn. name / val...	F...	O...
TEST_VP	TEST_VP		
Object Information			
Version	New		
Save	Not saved		
Object Status	Inactive, not ex...		
Settings			
Dimensions			
Data Package	TEST_VPP		
Time	TEST_VPT		
Unit	TEST_VPU		
Dimension 1	TEST_VP1		
Navigation Attributes			
Key Figures			

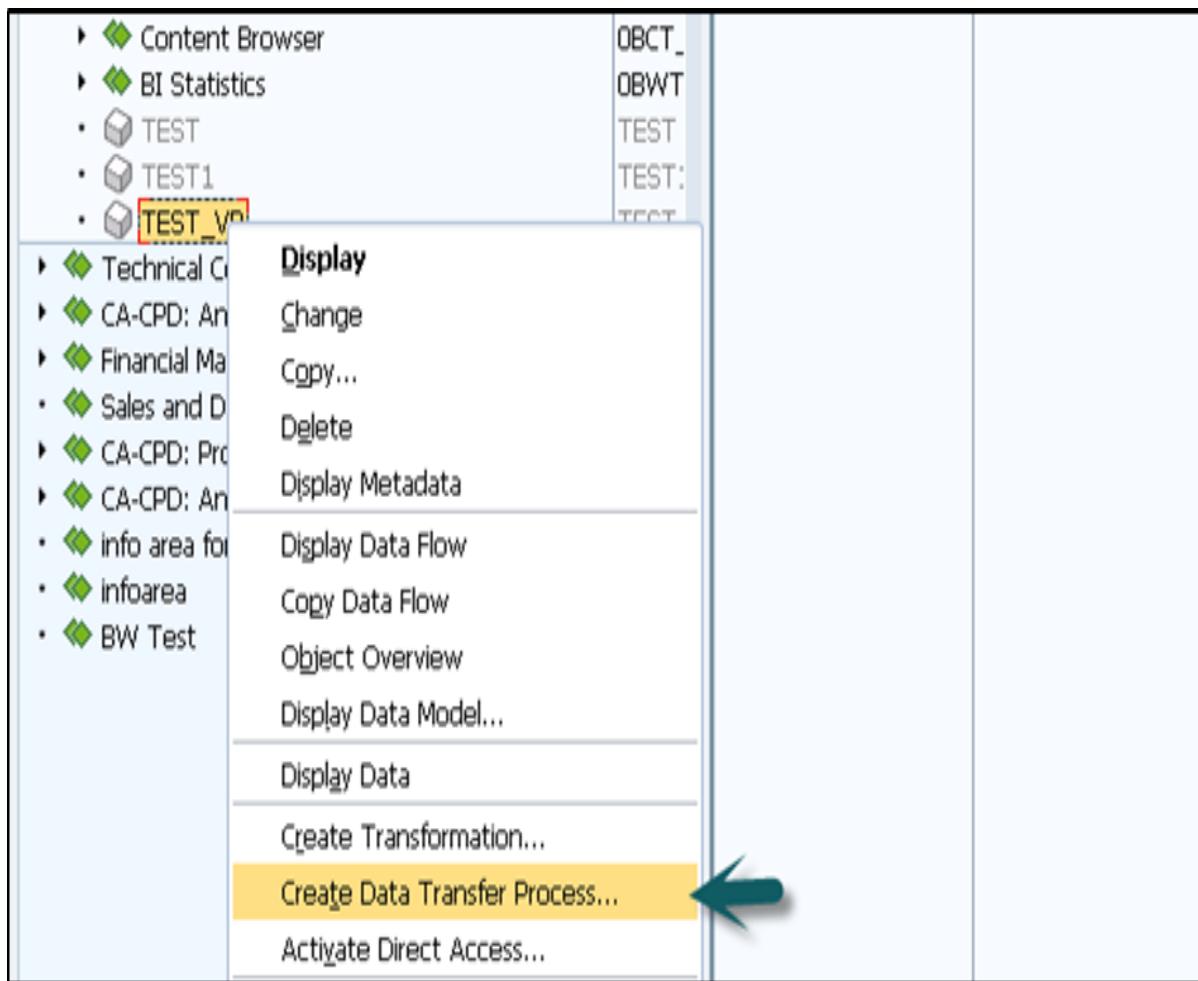
To define Transformation, right click and go to Create Transformation.



Define the Transformation rules and activate them.

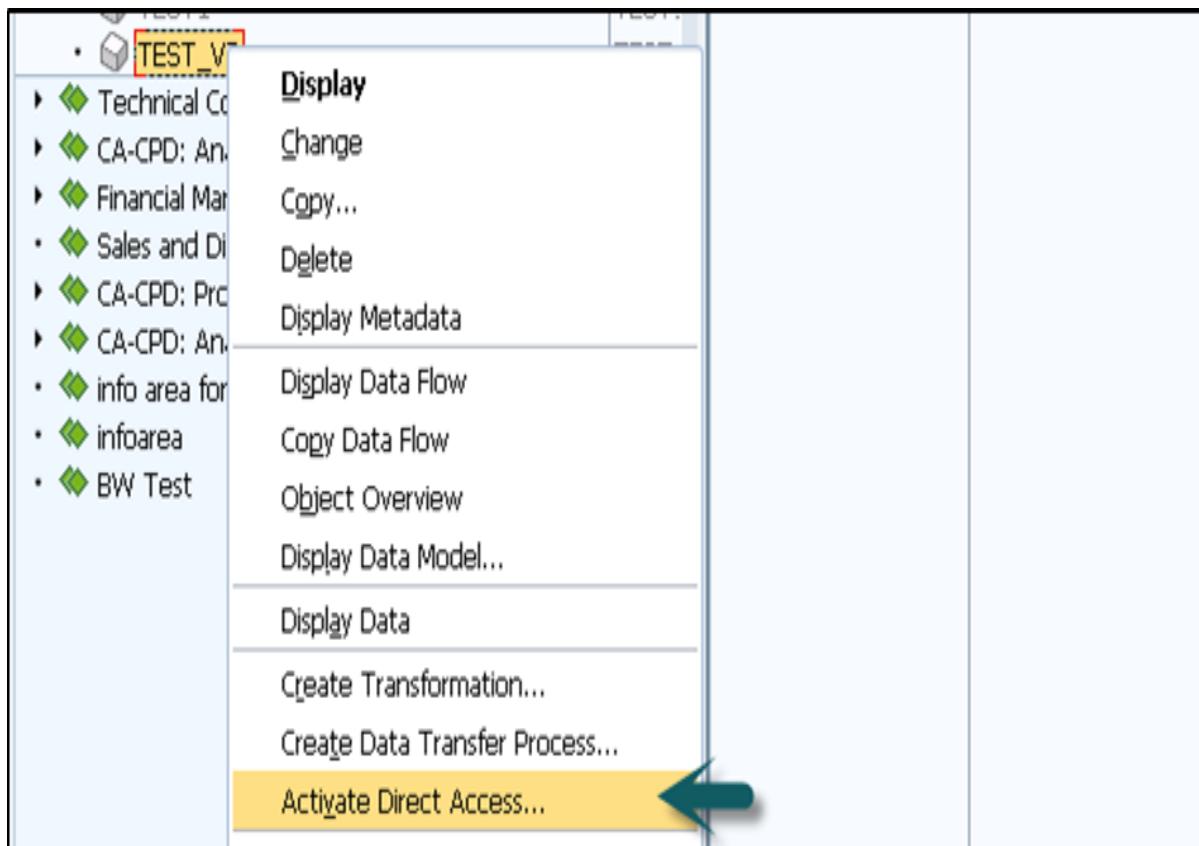


The next step is to create a Data Transfer Process. Right click -> Create Data Transfer Process



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

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