



SAPHANA

BI Development

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About the Tutorial

SAP HANA is an in-memory database which also provides HANA Modeling, Data Provisioning, and BI reporting features in a single application. SAP HANA is mostly used as a Data Warehouse for many organizations with Transaction system. BI development is always a challenge for organizations with massive amount of historical data. SAP HANA is an in-memory database that reads data 1 million times faster as compared to traditional systems.

This tutorial teaches how to use SAP HANA with SAP BusinessObjects BI tools.

Audience

This tutorial has been prepared for those who have good knowledge on SAP Basis and HANA system concepts. After completing this tutorial, you will find yourself at a moderate level of expertise in using SAP HANA BI tools.

Prerequisites

Before you proceed with this tutorial, we assume that you are well-versed with basic SAP Basis and HANA concepts. You should have a good exposure to SAP HANA in-memory concepts, HANA Studio, and different options in HANA studio. If you are not aware of these concepts, then we recommend that you first go through our short tutorials on SAP HANA and Basis.

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1. SAP HANA BI Development – Introduction

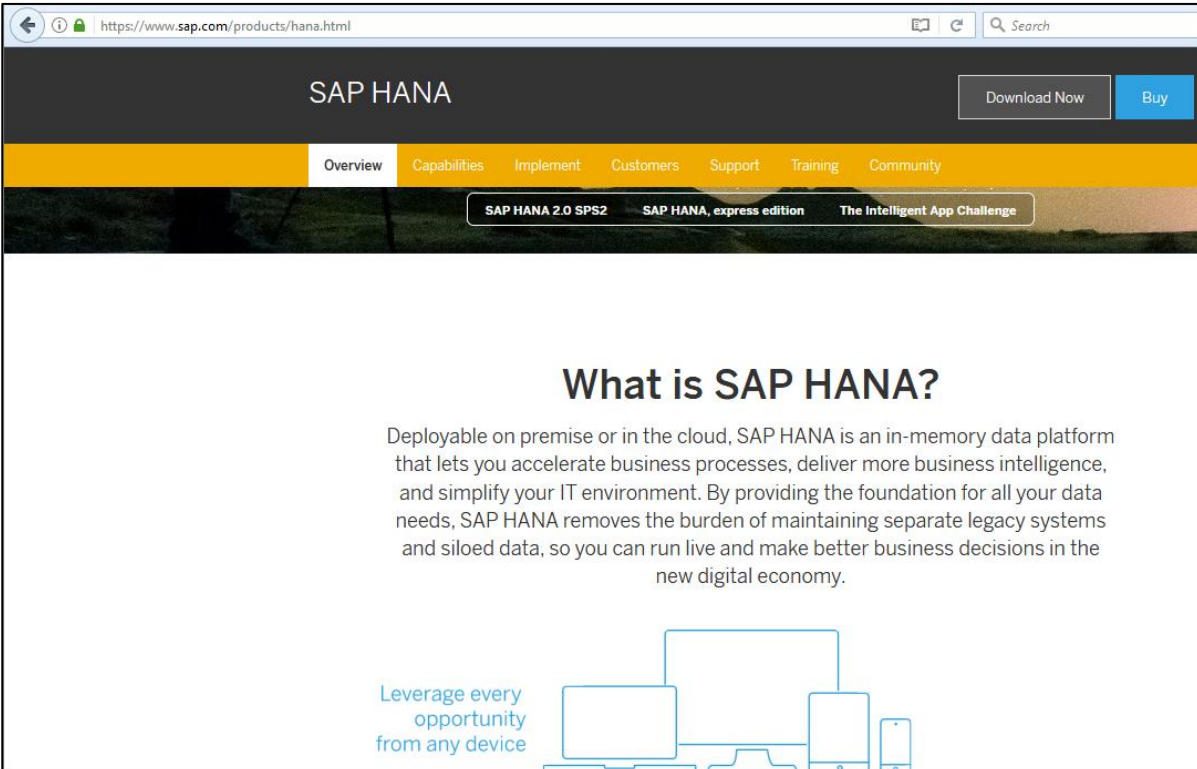
SAP HANA is an in-memory database which also provides HANA Modeling, Data Provisioning, and BI reporting features in a single application. SAP HANA is mostly used as a Data Warehouse for many organizations with Transaction system. SAP is providing HANA as a backend database for various different ERP and CRM based applications.

Following are a few common HANA based modules:

- S/4 HANA (S/4 HANA Finance and Logistics)
- SAP Business One
- SAP Fiori

SAP HANA Data Modeling helps the user to model the application data and perform database functions such as creating schemas, tables, and views at run time. HANA data models are stored in HANA Repository and objects are activated at run time.

This is SAP site link for HANA Product details that shares all key features HANA provides - <https://www.sap.com/products/hana.html>



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What is SAP HANA?

Deployable on premise or in the cloud, SAP HANA is an in-memory data platform that lets you accelerate business processes, deliver more business intelligence, and simplify your IT environment. By providing the foundation for all your data needs, SAP HANA removes the burden of maintaining separate legacy systems and siloed data, so you can run live and make better business decisions in the new digital economy.

Leverage every opportunity from any device

According to SAP - "Deployable on premise or in the cloud, SAP HANA is an in-memory data platform that lets you accelerate business processes, deliver more business intelligence, and simplify your IT environment. By providing the foundation for all your data needs, SAP HANA removes the burden of maintaining separate legacy systems and siloed data, so you can run live and make better business decisions in the new digital economy."

BI development is always a challenge for organizations with massive amount of historical data. Traditional databases or DW systems - SQL Server, BW or Oracle - doesn't support

live reporting, as they are not capable of running the transaction system and Data Warehouse on the same system. In many organizations, transactional system and Data warehouse are kept separate, as running complex OLAP queries affect the performance of the systems significantly. ETL processes are used to perform extraction, transformation, and data load from SAP ECC to Data Warehouse.

When large number of concurrent OLTP transactions are made along with OLAP queries, there is a possibility of the system getting crashed. SAP HANA supports real-time data replication from the transaction system using SLT method, which is a trigger-based approach of data replication.

SAP HANA is an in-memory database, hence the data read is 1 million times faster as compared to traditional systems. Complex OLAP queries in a Business Intelligence report takes less time to run when DW system contains huge amount of historical data. HANA supports all aggregations on fly, and hence, there is no need to save aggregated table in the database. Due to different compression algorithms and column-based storage of table, HANA database requires less space to store more data as compared with other RDBMS systems.

2. SAP HANA BI Development – Reporting & Dashboard Tools

SAP provides BusinessObjects as BI reporting and dashboard tool, used by many organizations who have SAP ERP implemented as the transaction system. SAP BusinessObjects consist of multiple tools for Business Intelligence reporting and dashboard:

- Web Intelligence
- Dashboard Designer (Earlier known as Xcelsius)
- Universe Designer (For Semantic Layer)
- SAP Crystal Reports
- SAP Lumira
- SAP Design Studio
- BusinessObjects Explorer
- Analysis for OLAP

All these tools are closely integrated with SAP BW and SAP HANA and support all data modeling and ETL features of SAP system. **Web Intelligence** is used for detailed reporting and uses Query Panel and Universe Designer as the semantic layer to connect to non-SAP data sources. **Dashboard Designer** is the dashboard tool which provides lot of predefined templates for creating static and dynamic charts.

Universe Designer (UDT/IDT) is a tool to build the semantic layer for non-SAP data sources as well as to build data models for HANA database objects. Different features such as parameters, filters, creating/deleting objects, business layer views, predefined queries for testing, aggregations and variable mapping can be defined using the semantic layer. When the semantic layer is finalized, it can be published to BO server repository and can be used in different Webi reports and Dashboards.

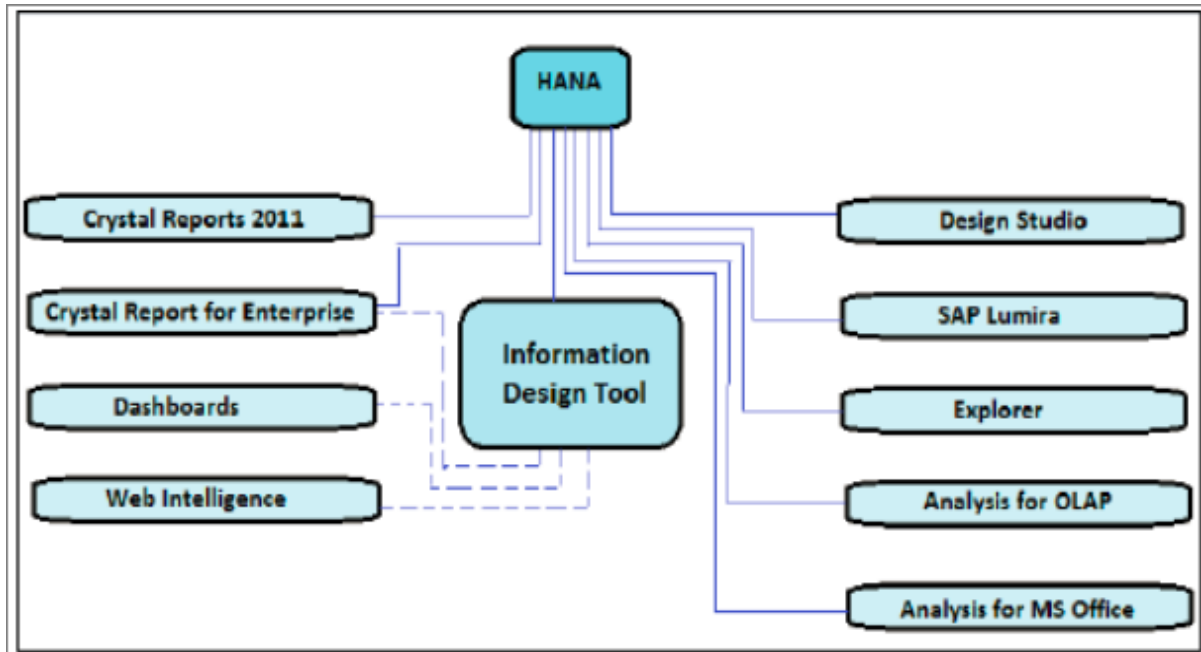
SAP Crystal Reports is used for pixel perfect reporting where users want to take printout of sales invoices, bills, sales orders, etc.

SAP Lumira is one of the emerging data visualization tools that provide the users with an option of ad-hoc dashboarding feature.

SAP Design Studio is also an advanced level dashboard tool and supports server side programming to create interactive dashboards for customers.

SAP BusinessObjects Explorer is a self-service BI tool to create dashboard views and data visualizations, and share them with other users in the team.

Analysis for OLAP is also a self-service multidimensional analysis tool and is suitable for reporting on SAP BW and SAP HANA.



The above picture shows all BI tools with solid lines, which can be directly connected and integrated with SAP HANA using an OLAP connection. The tools that need a relational connection using IDT to connect to HANA are shown with dotted lines.

SAP BusinessObjects was an individual product earlier. In 2008, SAP acquired this product and added it as one of the key tools for SAP BI reporting.

Following is the version history of SAP BO tool in reverse chronology:

- SAP Business Objects Business Intelligence 4.2 Service Pack 04 (Release Date, 2017)
- SAP Business Objects Business Intelligence 4.2 Service Pack 03 (Released Date, September 2016)
- SAP BusinessObjects Business Intelligence 4.2 (Release Date, 18-May-2016)
- SAP BusinessObjects Business Intelligence 4.1 (Release Date, 23- Nov-2013)
- SAP BusinessObjects Business Intelligence 4.0 (Release Date, 16-Sep-2011)
- SAP Business Objects XI R3.0
- SAP Business Objects XI R3.1
- Business Objects XI R1
- Business Objects XI R2
- Business Objects 6.x
- Business Objects 5.x
- Business Objects 4.x
- Business Objects 3.x

Few of these tools can be directly accessed using a web interface known as BI Launchpad. **BI Launchpad** is a Java or HTML based interface of BusinessObjects tool to perform analytical reporting and data analysis. You can set the preference for your BI Launchpad that determines, which tool interface is launched via Launchpad.

Using Web or Internet Application to access Webi interface via BI Launchpad, you can perform the following tasks –

- Create, edit, and refresh all the reports in Web Intelligence.
- Create and edit all the queries in no data source (Universes) but not BEx queries in Web application.

BI Launchpad has the following important tabs –

- Home – Displays the recent messages, alerts, documents, and applications that can be run.
- Documents – Displays the available documents and folders, making it easier to view, organize, and manage the documents.
- Any open Document – Displays each open document.

You can use the Application tab to start an application including Web Intelligence. You can use the Preference tab to define BI Launchpad preferences.

To get the BI Launchpad details and user credentials you can reach the BO Administrator. BI Launchpad has the following URL <http://BOSERVER:8080/BOE/BI>. To login to BI Launchpad, open the web browser and enter the Launchpad URL provided by your administrator. The following screen pops up.

The screenshot shows a web browser window with the address bar containing the URL `http://bods:8080/BOE/BI`. The page content is a login form for SAP BusinessObjects BI launch pad. The form includes the following elements:

- Title:** SAP BusinessObjects BI launch pad
- Instructions:** Enter your user information, and click "Log On". If you are unsure of your account information, contact your system administrator.
- System:** A text input field containing the value `BODS:6400`.
- User Name:** An empty text input field.
- Password:** An empty text input field.
- Log On:** A button with a right-pointing arrow and the text "Log On".
- Logo:** The SAP logo is located at the bottom left of the page.

3. SAP HANA BI Development – Different BO Tools Connection to HANA

In SAP BusinessObjects, different tool connects to HANA using different type of connections. Few of the tools connect to the Database layer - Tables, Views, etc. using a Relational connection to HANA database, however, other tools directly connect to Data Modeling layer using an OLAP connection.

An OLAP connection can be created in the Central Management Console (CMC) or a Relational connection and OLAP connection can also be defined in the Universe Designer.

Relational Connection

A Relational connection is used to connect to the database layer in HANA. You can connect to database objects - tables, views, and design Data Foundation layer in the Information Design tool. You can also import tables and joins from the data source.

OLAP Connection

OLAP is a multidimensional connection that directly points to the business layer in a data model. It allows you to connect to the multidimensional schema directly and later, they can be used with SAP BusinessObjects reporting tools.

BICS Client

To connect to SAP NetWeaver BW, you can use SAP BICS client middleware to provide access to BEx query. Connections in IDT can be locally saved or they can be secured and published in a central repository.

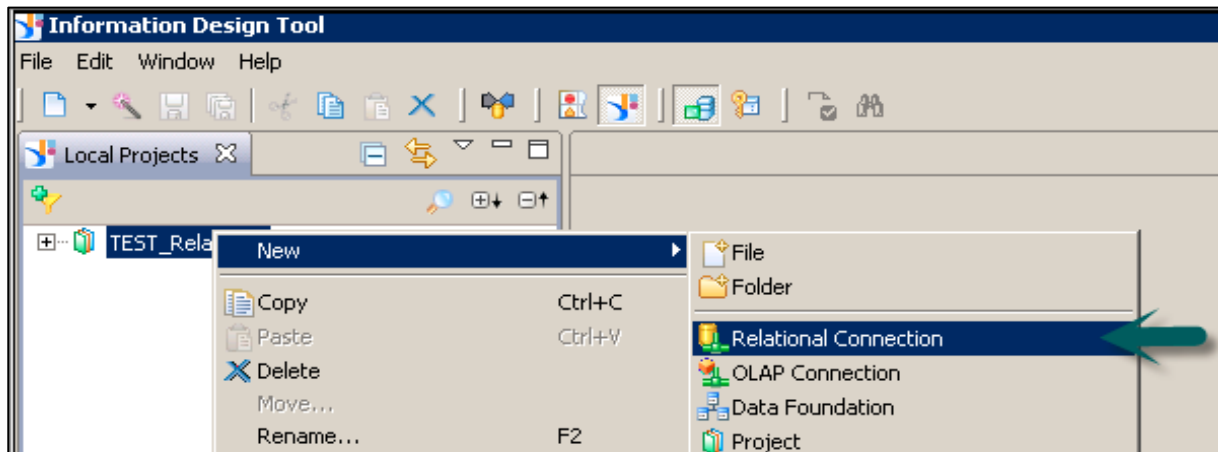
Local connections are saved as **.cnx** files and they can be accessed by any user who is running IDT. Once you publish the connection to the repository, they are changed to a secured connection.

A secured connection is published into the repository and saved in the Connection folder. You can also create secured connections using Insert Relational and Insert OLAP connection commands from the repository resource view.

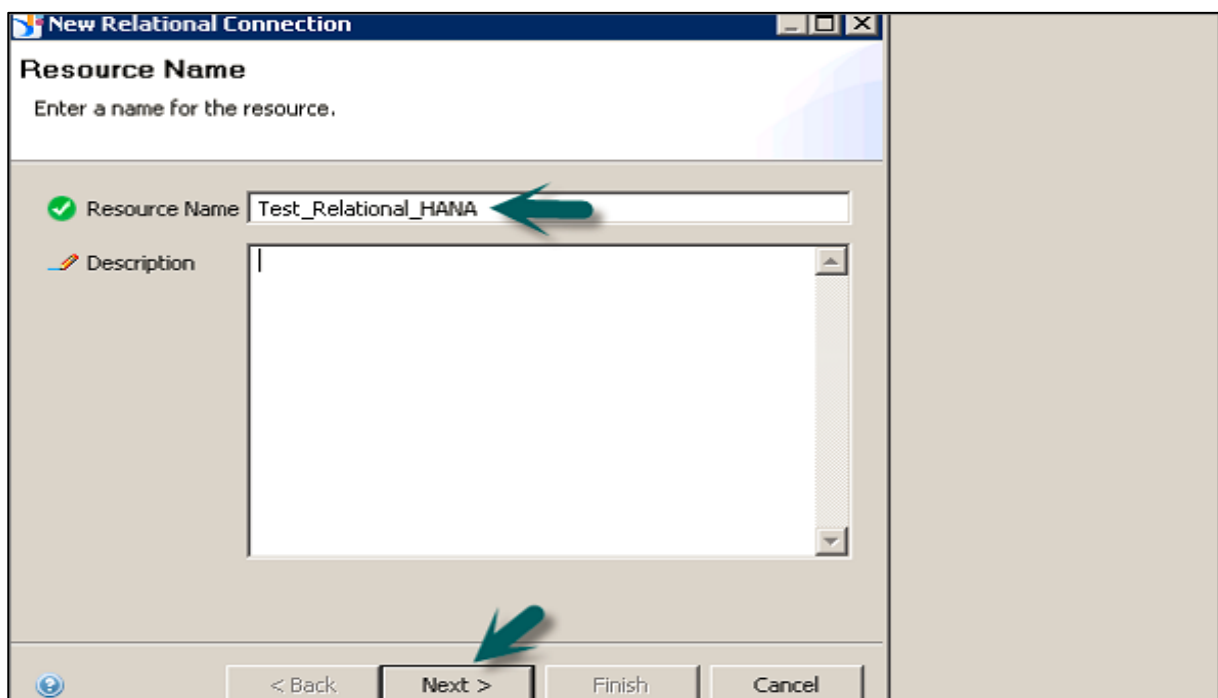
4. SAP HANA BI Development – Creating a Relational Connection

Let us see how to create a Relational connection that can be used to connect to HANA database layer to design Data Foundation layer for BOBJ reporting in a Universe.

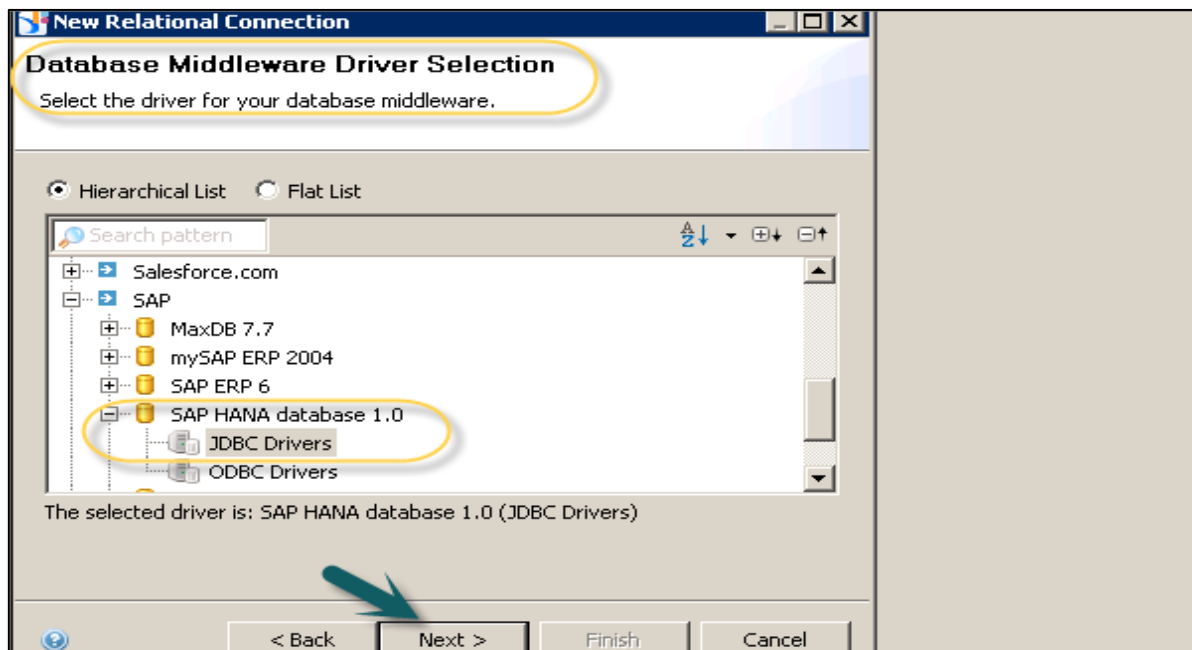
Navigate to Information Design Tool -> Click New -> Project -> Enter the Project Name -> Finish. Right-click the Project name -> New -> Relational Connection.



In the next window, enter the name of Relational connection -> Click the Next button.



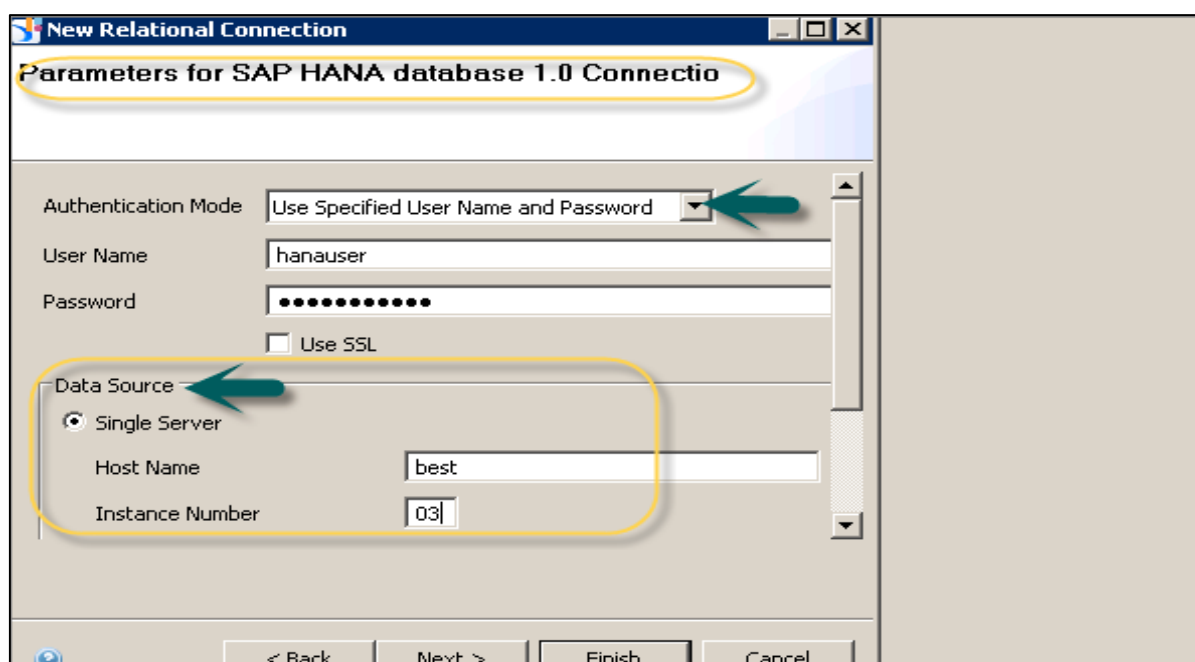
To set up a connection to HANA database, select SAP HANA database 1.0 from the driver selection screen. In the following snapshot, we have selected SAP HANA -> JDBC Drivers -> Next.



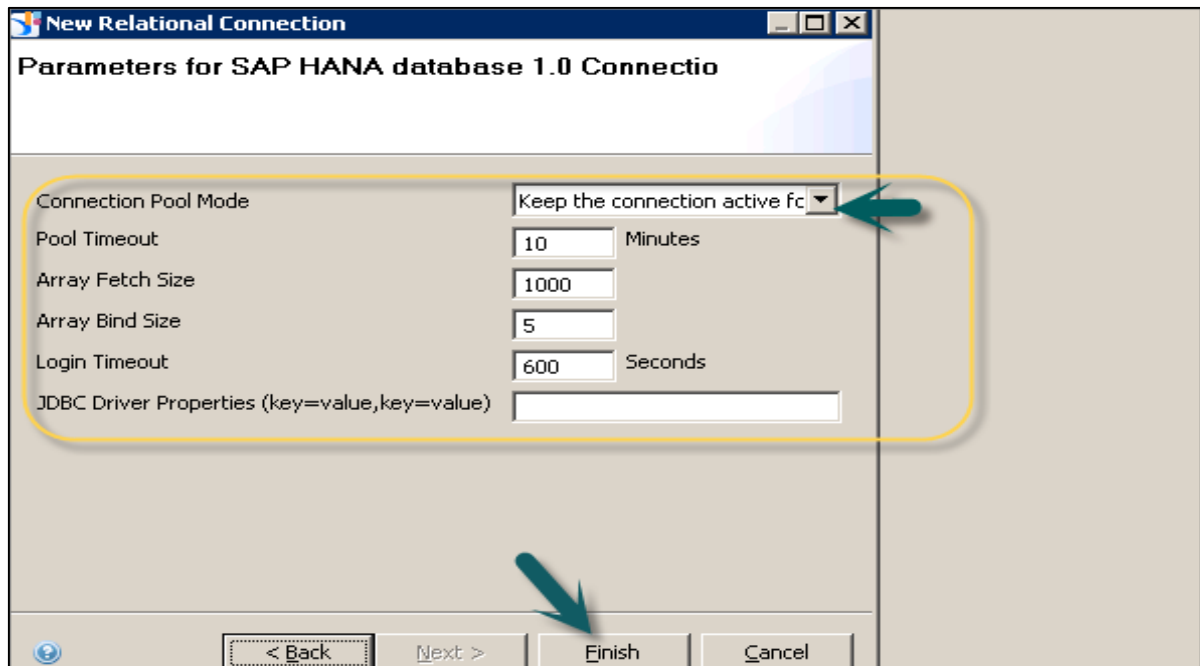
Note that to connect to HANA database, you should have the following information:

- Host Name
- Instance Number
- User Name
- Password

You can also select from different authentication modes such as LDAP or any other mode, which is configured for HANA system login. Click the Next button.



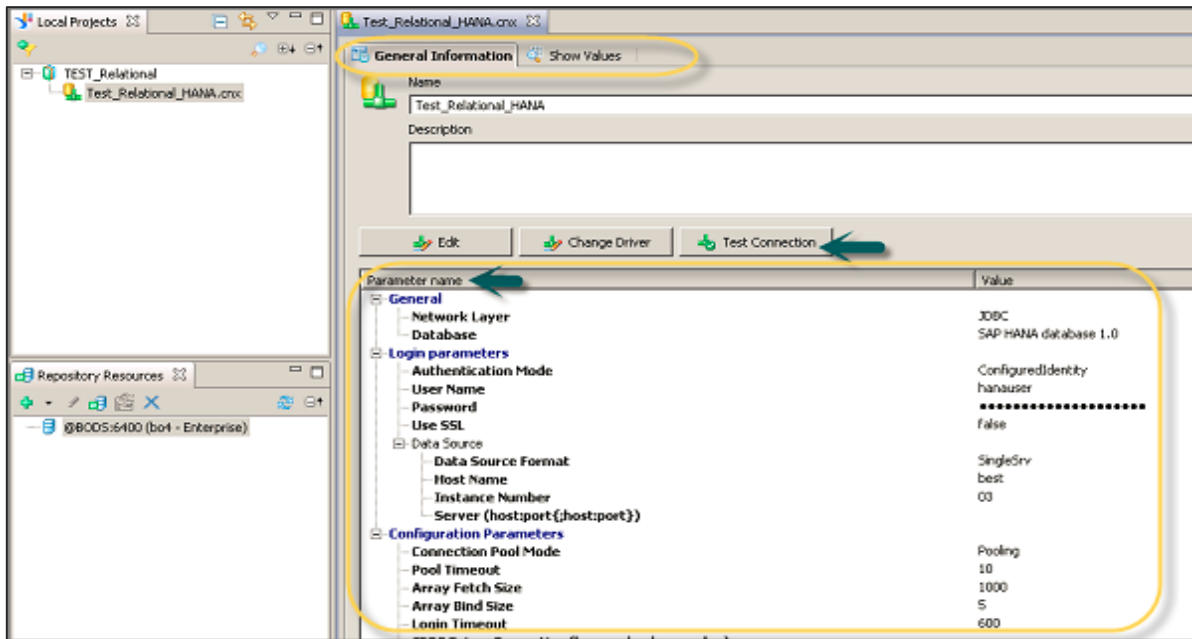
In the next window, you will be prompted to enter Connection Parameters - Connection Pool Mode, Pool Timeout, Array Fetch Size, Array Bind Size, Login Timeout, etc. Once you pass this information, click the Finish button.



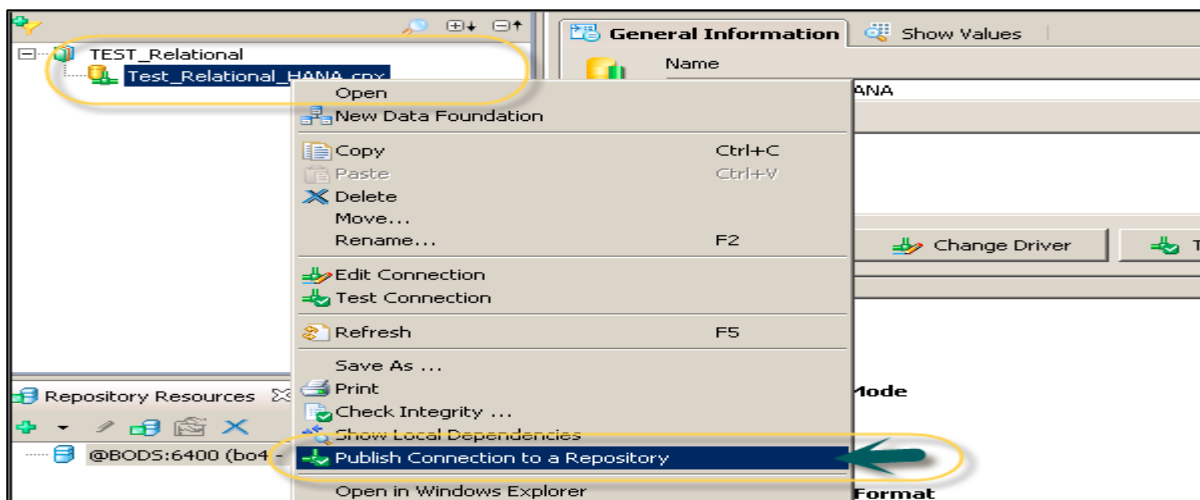
This will create a Relational connection to source HANA database and it can be used to connect to Database layer objects for reporting. You can see the following information on the Connection parameter screen:

- General
- Login Parameter
- Configuration Parameter

You can also edit any of the parameter value by the click of the edit button. When this connection is used in the Universe Designer, this will point to all database objects in HANA database. You can import tables, views from HANA database to build a data foundation layer of a Universe. To test the connection, click the Test Connection and you will get a message that the Connection is successful.



To publish this connection to BO repository so that it can be used by any tool, right-click the connection name and select Publish Connection to a Repository. This will create a new object in the project tab with **.cns** extension.



.cns - Secured Repository connection

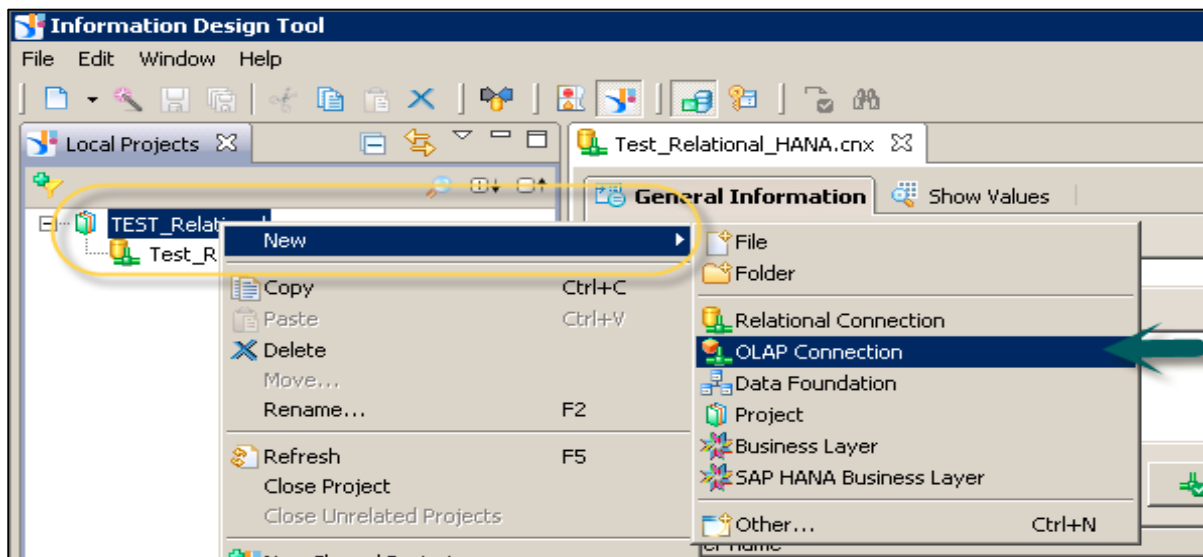
.cnx-local unsecured - If you use this connection, it will not allow you to publish anything to the repository.

Note: In SAP BusinessObjects, most of the tools support Universe as the data source for reporting. Using a Relational connection, you can connect to any HANA database system, and import tables and views for Data Foundation Layer. Once **.dfx** is defined, it is required to develop a Business Layer on the top of this layer. When the Universe is published to BO server repository, it can be used by any BOBJ tool for reporting purpose.

5. SAP HANA BI Development – Creating an OLAP Connection

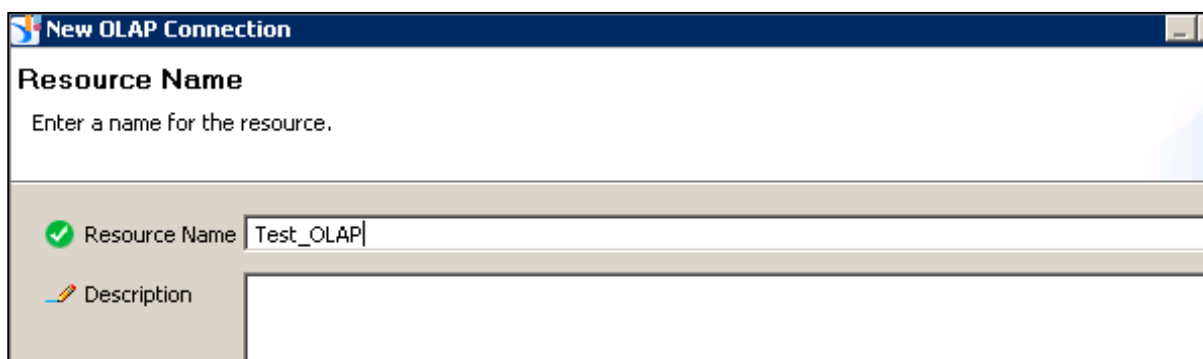
An OLAP connection is used to connect to HANA Information view or a data model and to directly import all the business objects defined in the Business Layer for reporting.

To create a new OLAP connection, right-click the Project name -> New -> OLAP Connection.



In the next window, enter the Connection name, Description (Optional) and click Next.

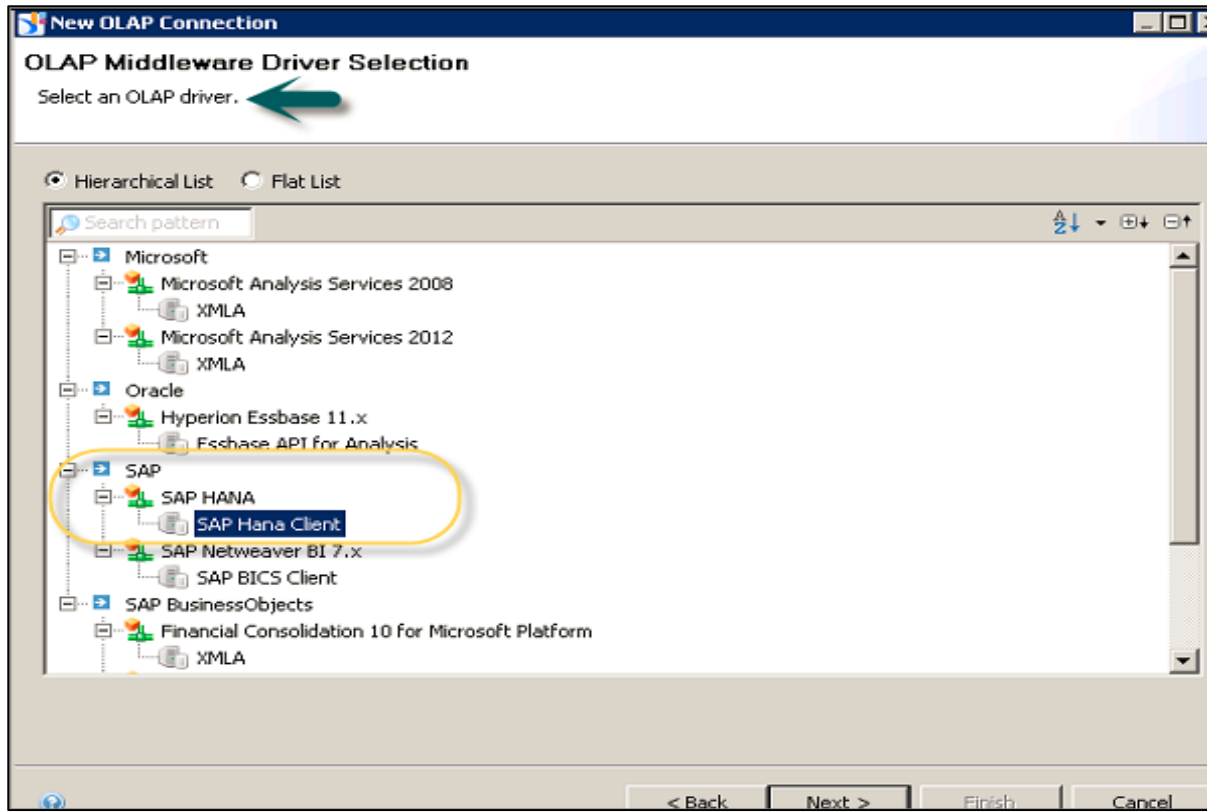
Note: You point an OLAP connection to a specific cube or to complete HANA repository. When this connection is used in any BO Reporting tool, you can directly import all objects in HANA Modeling view or can also view all published information views in the repository and select any of them for reporting.



Next, select an OLAP middleware driver. It shows a list of all available OLAP data sources. You can select any OLAP data source as per requirement.

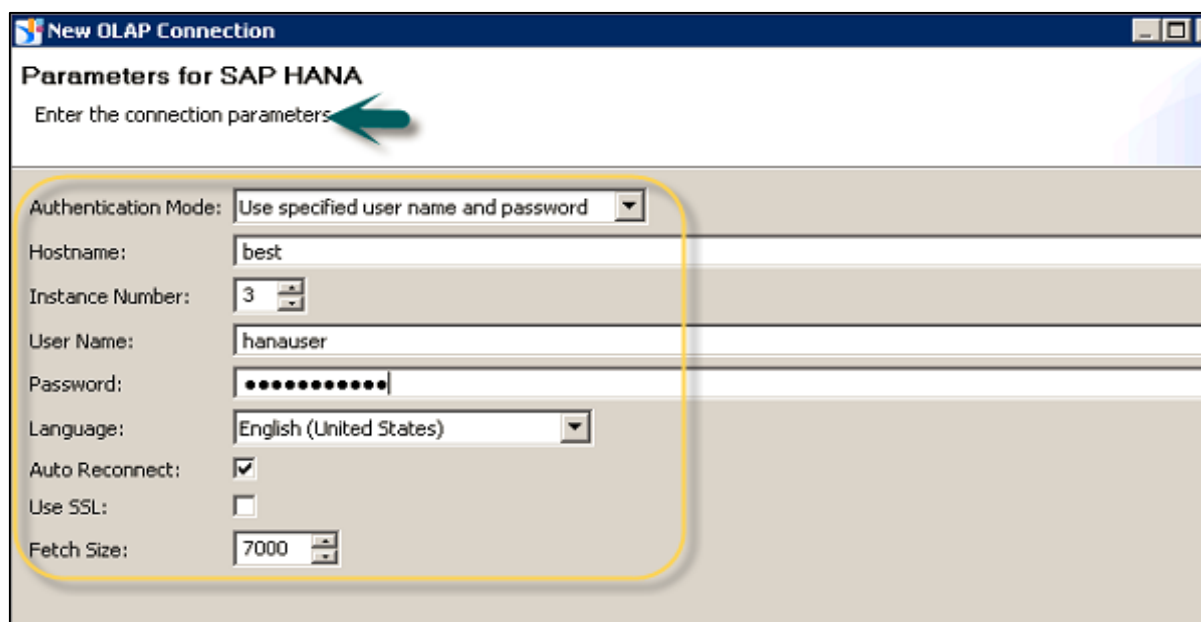
Note: You don't need to create a Data Foundation, as an OLAP directly hits the Business Layer. You can define dimensions, measures, and other properties at the Business Layer.

Select the suitable middleware driver to connect to OLAP data source and click Next. To connect to HANA views, select SAP HANA -> SAP HANA Client.

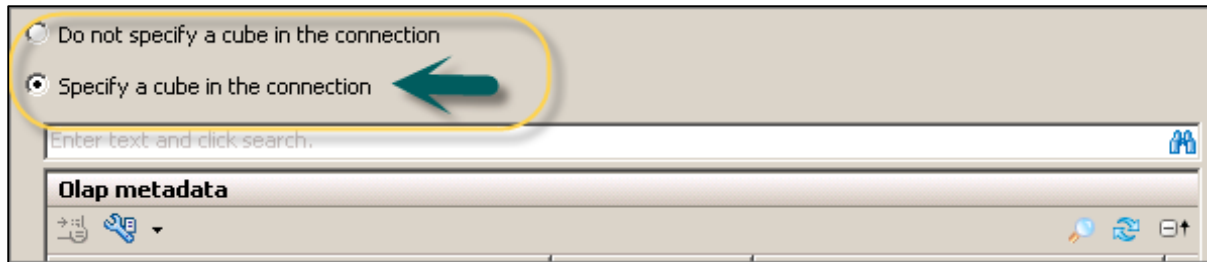


To connect to HANA system, you need the following information:

- Server Name
- Instance Number
- Authentication Details

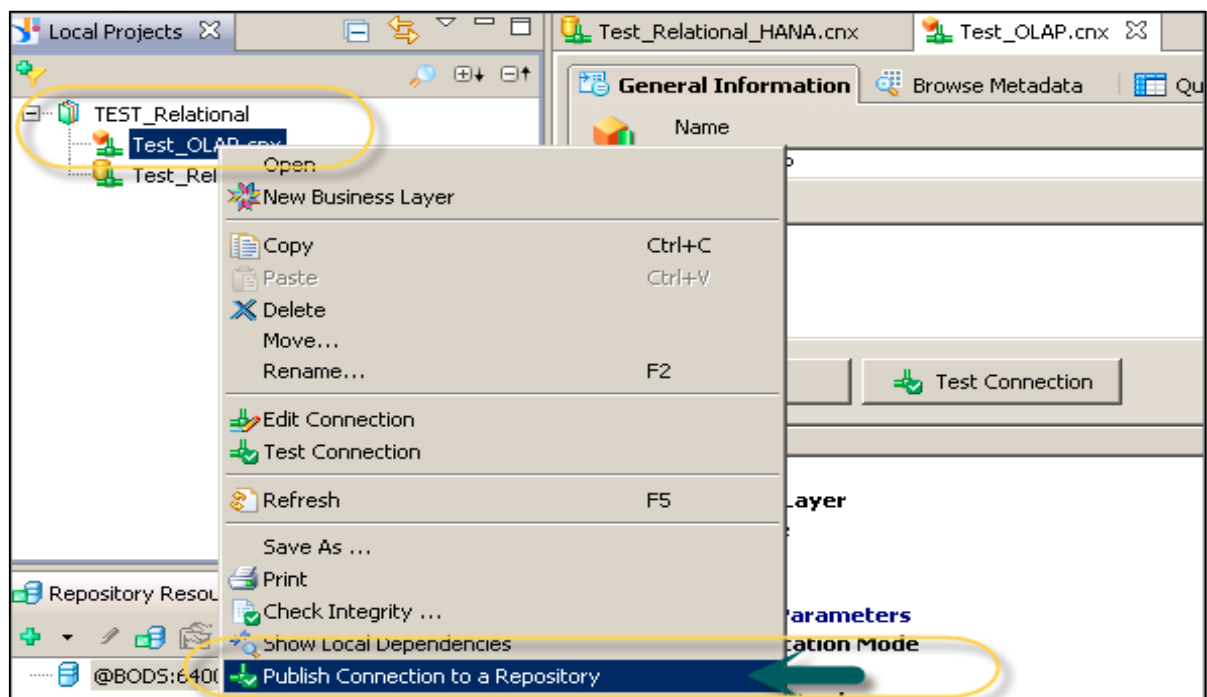


When you fill the above details and click the Next button, you have an option asking if you want this connection to point to a specific cube or to all cubes in HANA repository.



Once this option is selected, click the Finish button at the bottom of the screen.

Now, you need to publish the connection to the Repository. Right-click Connection -> Publish the Connection to the Repository.



When a new connection is created using Information Design tool, you have the following connection parameters that can be defined:

- **Connection Pool Mode:** This is used to keep the connection active.
- **Pool Timeout:** When you set the Connection Pool Mode to Keep the connection active for, it is the length of time in minutes to keep the connection open.
- **Array Fetch Size:** This tells the maximum number of rows that can be fetched from the database.

Example

Let us consider an example. You enter a value of 25 and your query returns 150 rows. Hence, it will be fetched with 6 fetches of 25 rows each.

Array Bind Size: This field is not required for designing the Universe in IDT.

Login Timeout: It determines the minutes a connection attempts timeout and an error message is displayed.

There are various custom parameters that can also be defined such as ConnectInit, Hint.

6. SAP HANA BI Development – HANA Modeling Views

SAP HANA Modeling is one of the key capabilities of HANA system. This allows to create multidimensional objects on top of HANA database objects to meet the business requirements for reporting. You can implement complex business logic using HANA information models to create a meaningful report for analysis.

Features of HANA Modeling

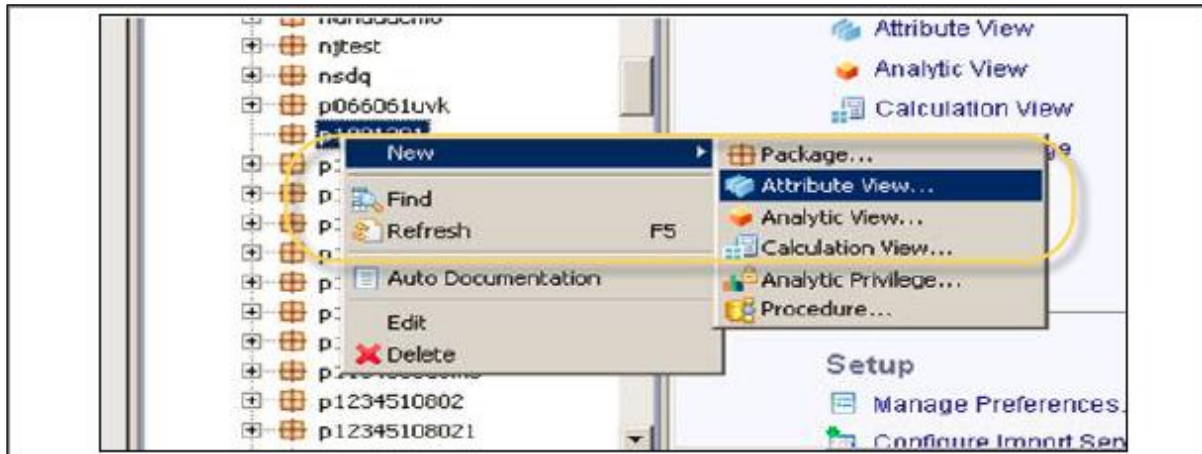
SAP HANA Modeling is one of the key concepts in HANA BI reporting.

- Using HANA Modeling, you can create complex data models as per business requirement to provide multiple views of transactional data stored in physical tables of HANA database.
- SAP HANA Modeling can only be done for column-based storage tables.
- HANA Modeling views can be used directly by SAP BusinessObjects reporting tools such as Crystal Reports or Lumira using an OALP or HTTP connection.
- HANA supports different types of Modeling views such as - Attribute view is used to model characteristics, Analytic view is used to implement Star schema and Calculation view is used to implement complex logics, which are not possible with other type of views (Galaxy schema).
- SAP HANA Modeling views can also be directly connected to third party tools such as MS Excel using HANA MDX Provider.
- SAP HANA Modeling supports various features of Business Layer - Creating new calculated columns, new measures, input parameters, hierarchies, etc.

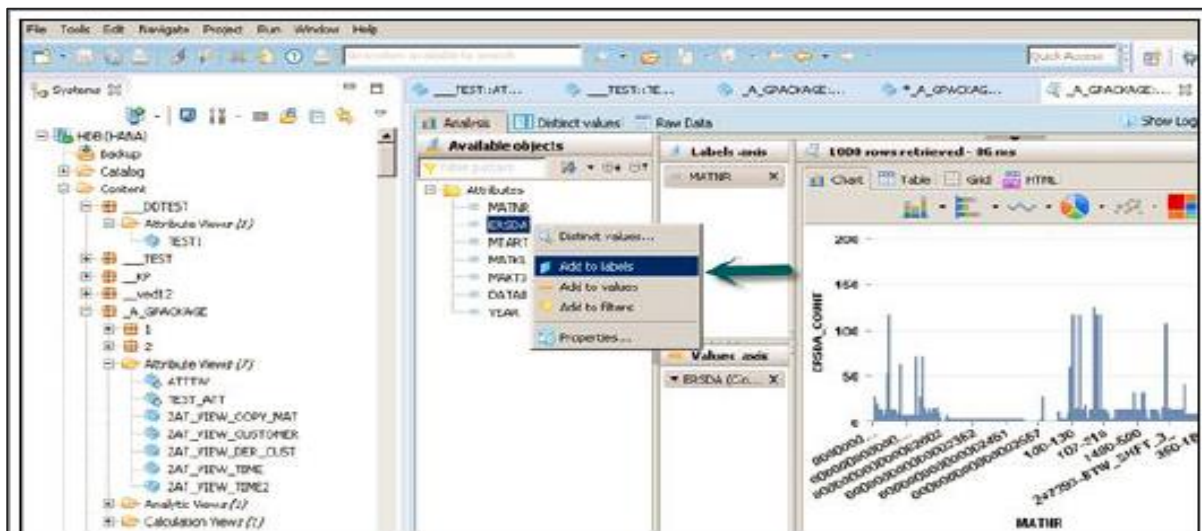
SAP HANA provides following three types of Information Views:

- Attribute View
- Analytic View
- Calculation View

All HANA Modeling objects are stored in HANA Repository and it can be directly accessed using any BI tool via proper authentication. When these objects are imported in any of the reporting tools using an OLAP or HTTP connection, it also imports all the custom properties of that model.



SAP HANA suite also offers basic BI reporting functionalities, where you can create interactive charts using data in HANA models.



Like other BI reporting tools, you can add dimension and measure values to Label and Value axis. HANA provides the following options for BI analysis:

- **Analysis:** This tab is used to add different dimension and measure values to different label axis. Filters can be applied as per business requirement.
- **Distinct Values:** This tab is used to see distinct values in data analysis for each of dimension.
- **Raw Data:** This tab shows all raw data coming from data model as per Business Layer parameters.

In a BI report, you can select from the following options: Chart, Table, Grid, or HTML.

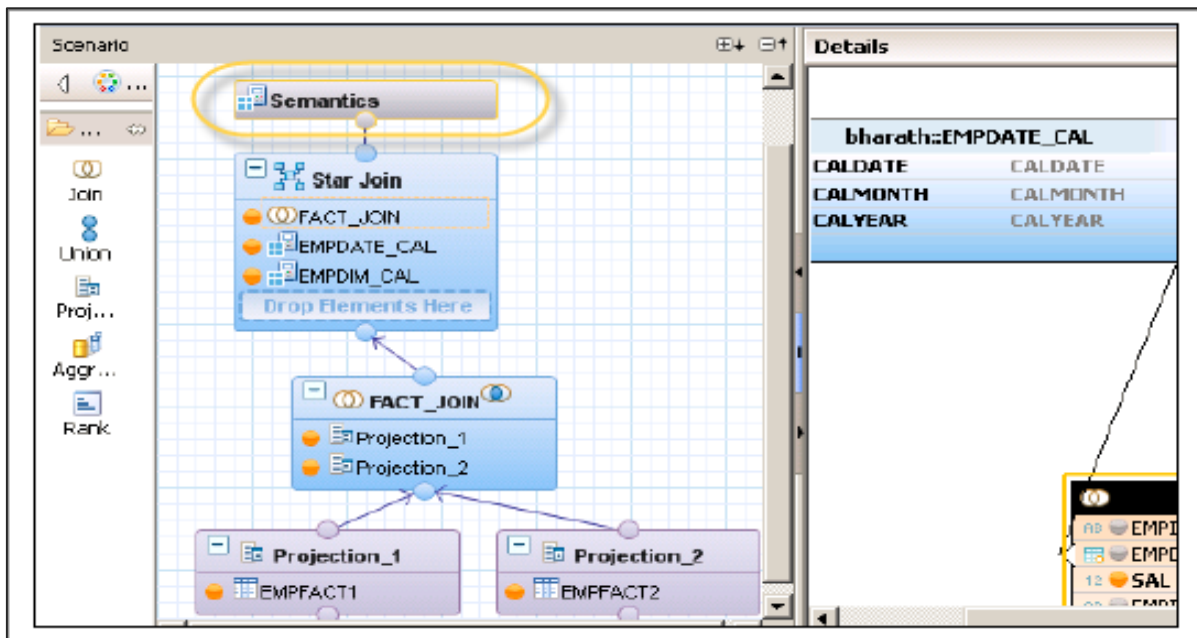
7. SAP HANA BI Development – Input Parameters in HANA

In SAP HANA, input parameters are used to filter the data by passing an input from the user and to perform additional calculations at run time. The data is fetched based on the input value, when a view is executed.

Example

Consider a scenario where an Input parameter is applied on the "Sold_Qty", i.e. when the Sold_Qty is greater than 20, then there is 10% discount on Total_Price. Otherwise, it remains the same.

Input parameters are created in HANA Modeling views using SAP HANA Studio. When these views are used in any BO reporting tool and the report is refreshed, users are prompted to pass an input value for a particular view. To create a new parameter, navigate to the Semantic section of HANA Modeling view.



Navigate to Parameters/Variables tab in the Semantic layer and click the "+" sign. Select Create Input Parameter as shown in the following screenshot.

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