

STEP BY STEP DATA TRANSFORMATION



Step-by-step explanation of what BI4Dynamics does in a process of delivering business intelligence content to End-users

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1. STEP: CREATING A STAGING DATABASE



A staging database is a separate storage area created for the purpose of providing continuous access to application data. Data converters are written to access business data sources and then cleanse them to be written into the staging database. It is updated daily with new or changed data from AX (Microsoft Dynamics Axapta) or NAV (Microsoft Dynamics Navision), so that the whole BI (Business Intelligence)* process takes less time. Main function of staging database is to provide data access for BI process, but these structures are NOT optimized for analytics. This step is in compare to other steps rather faster in BI process as it contains a copy function.

Example: If you change a sales quote or post an invoice today, changes will be written to the staging database during the night.

BI4Dynamics copies AX or NAV business data which include:

- All main tables (Customer, Vendor, Item, GL Account, Locations, etc.),
- Ledger entries (Item ledger, Customer ledger, Purchase ledger, GL ledger, etc.),
- Live and posted documents (Quotes, Orders, Posted Invoices, Production Order, etc.),
- Other tables (actually much more than 100, etc.).

FOR BETTER UNDERSTANDING

Can we analyze data in staging database?

No. It makes no sense.

Is this a part of data warehouse?

No. Data warehouse is created in next step.

2. STEP: CREATING DATA WAREHOUSE



A data warehouse is a place where data is stored for archival, analysis, and security purposes. Usually a data warehouse is either a single computer or many computers (servers) tied together to create one giant computer system. Data consists of raw data or formatted data. It can be on various types of topics including the organization's sales, salaries, operational data, summaries of data including reports, copies of data, human resource data, inventory data, external data to provide simulations and analysis, etc.

On this step of BI* (Business Intelligence) process, data are structured in a special "BI (Business Intelligence) way", that is the key and most important part of BI* (Business Intelligence) solution. Data in AX ([Microsoft Dynamics Axapta](#)) or NAV ([Microsoft Dynamics Navision](#)) aren't made for analysis in matter of speed and analytical features and need to be processed.

Example: Receivable balance is calculated from customer ledger:

- for every customer and customer grouping,
- for all dates from first posting date until usually 1 year in advance on a daily basis,
- for every other dimension such as Salesperson, Department, Sales Area

This step is the most time consuming in the BI process and depends on a quantity of Microsoft Dynamics data, like customers, documents, dates and other dimensions. But for end-users these pre-calculated data are a great benefit, as the analysis could be done immediately.

New data will be created and written to new database inside SQL server*. The main piece of data warehouse is a fact table, which can be equal to "super ledger" in AX (Microsoft Dynamics Axapta) or NAV (Microsoft Dynamics Navision). Simplified, entries from AX or NAV are copied, processed and written to fact table inside of data warehouse.

In this step structures are prepared, but not fully optimized for analytics.

FOR BETTER UNDERSTANDING

Can we see data in data warehouse?

Yes. It is a part of SQL server database

Can we analyze data in data warehouse?

Yes, but the transformation process isn't finished yet. Data are also transformed for the OLAP cubes.

Could we speed up calculations by calculating on a weekly or monthly basis?

Yes, we could speed up calculations considerably, but these calculations aren't accurate and new measures that are calculated based on data warehouse measures would be even less accurate.

3. STEP: CREATING OLAP CUBES



OLAP stands for Online (OL) Analytical (A) Processing (P). An OLAP cube (for online analytical processing) is a data structure that allows fast analysis of data. It can also be defined as the capability of manipulating and analyzing data from multiple perspectives. An OLAP cube is a multidimensional database that is optimized for data warehouse.

In OLAP cubes, data (measures) are categorized by dimensions and they are often pre-summarized across dimensions to drastically improve query time over relational databases.

Dimensions vs. Measures

Dimensions are those things you want to track. They're companies, dates, locations and other items whose attributes are often non-numerical. Common dimensions are companies - you can specify multiple, eight global dimensions, two additional currencies for measures, analyze specific posting through source and reason code and analyze specific documents through multiple measures or dimensions.

Measures are the quantities you want to measure, common measures are average, minimum and maximum of stock value or quantity and other items that can be quantified numerically.

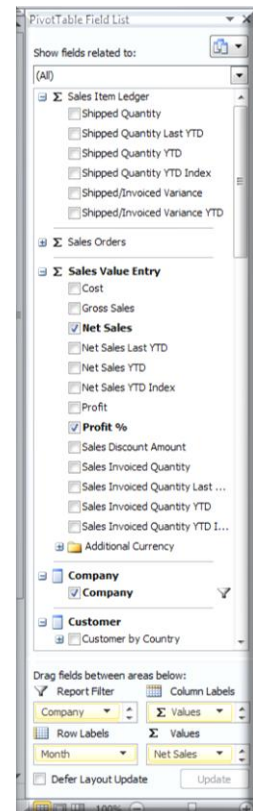
In this step are data from data warehouse copied and structured again.

Example: Calculations in Receivables cube create new measures or dimensions:

- Average Receivable Balance,
- Average Due Days,
- Average Open Days,
- Receivables Coefficient (in days),
- Don't forget, this is a data warehouse transformation: Receivables Age (Before due, Overdue 30-60-90-150-180-1y-2y).

This step takes some time, but much less than data warehouse calculations.

A new database is created, this time in SQL* Analysis Services, which is also a part of SQL server*. Analysis services database has usually the same name as data warehouse database. Main pieces are known as OLAP cubes and one OLAP cube is equals one application area (sales cube = sales area). Some BI* solutions have only one OLAP cube, but we find this is



very confusing and difficult to use, because there are too many combinations available and many will naturally not work.

These structures are fully optimized for analytics.

FOR BETTER UNDERSTANDING

Can be the OLAP cubes connected in BI4Dynamics?

Yes, cubes can be easily connected into new virtual cubes, because all cubes come from the same data warehouse;

Example: a new virtual cube named Logistics is created as connection of Sales, Purchase and Inventory.

Are all BI4Dynamics data balanced?

Yes. They are balanced as they come from one data warehouse.

Example: Sales information in sales cube are balanced with sales information in receivables or General Ledger cube

Are all OLAP cubes balanced?

No, there is no assurance. In the case the OLAP cubes were created directly from business data without processed to data warehouse or if a solution has a bad technical design is option that data may not be balanced.

4. STEP: ANALYSING



In this step we connect to OLAP cube with any front-end BI* product. Most of our customers use Excel as a front end tool as it is difficult to beat the affordability and power of windows based product such as Excel. Analytical part of Excel is called Pivot table*. As whole process is standardized, we offer also predefined Excel sheets for each application area.

OLAP delivers the simplest form of analysis, allowing anyone to slice and dice interrelated subsets of data or "cubes" with the click of a mouse. You can analyze data using standard OLAP features such as page-by, pivot, sort, filter and drill up/down to flip through a series of report views. OLAP Analysis offers you primary access to their data warehouses in lieu of more advanced analysis functionality required by power users and analysts.

Of course, these sheets can later be changed according to end-users need. There predefined Excel sheets give you many ideas of how to analyze your data.

FOR BETTER UNDERSTANDING

Can an end-user see a BI4Dynamics as a solution?

No, as BI4Dynamics is a so called back-end solution. BI4Dynamics is a program, a set of scripts that run inside SQL server. You can see the results of BI4Dynamics, but not the program. You can manage BI4Dynamics through BI4Dynamics interface.

How long does it take the whole BI process?

For a very small AX or NAV database it can take few minutes to more than 12 hours if database is larger than few hundred GB and has many dimensions (customers, items, vendors, etc.).

LEGEND

* **BI** (Business Intelligence) is the process of making better decisions in an environment that provides data and reporting that is timely, reliable, consistent and understandable in a useful format or presentation.

* **SQL** (often referred to as Structured Query Language) is a programming language designed for managing data in relational database management systems (RDBMS).

* **SQL server** is a Microsoft product used to manage and store information. Technically, SQL Server is a relational database management system (RDMS).

* **FACT TABLE** is the central table in a star schema of a data warehouse. A fact table stores quantitative information for analysis. Fact table contains the measurements or metrics or facts of business process. If your business process is Sales, then a measurement of this business process such as "monthly sales number" is captured in the Fact table.

* **PIVOT TABLE** is a data summarization tool found in data visualization programs such as spread sheets (for example, in Microsoft Excel) or business intelligence software.