

BI4Dynamics AX/NAV Integrate external data sources

Integrate external data sources Last update: January 2020 Version: 2.2

Abbreviation used in this document:

- **EDS**: External Data Source(s) are data that are not a part of Microsoft Dynamics AX/NAV. It can come from any format of SQL, Excel, txt, to any other file format and/or any other data source.
- BI4: BI4Dynamics
- ETL: Extract Transform Load

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1 Introduction

Integration of external data sources comes in two parts:

- **1.** Get data from external sources into BI4Dynamics data warehouse database (usually 80% of effort) As a result, EDS tables are copied/transformed from EDS to BI4
- 2. Create new BI structures with Wizard (usually 20% of effort)

As a result, new data warehouse and cube objects are created within BI4Dynamics DW and SSAS database

In this document, the first part is explained with details and code examples.



1.1 ETL tool vs BI tool

BI4Dynamics has not developed an ETL tool or feature. BI4Dynamics uses free Microsoft tools for SSIS package creation and integrates SSIS packages into the BI4Dynamics process flow.

Note:

- ETL tool is not a part of BI4Dynamics software,
- There are no automatic interactions between the ETL tool and BI4Dynamics,
- Files generated by the ETL tool are added into the BI4Dynamics process flow for execution.

By this approach customer can:

- Use most popular ETL tool from Microsoft (free) SSDT (SQL Server Data Tool for Visual Studio),
- SSDT can cover almost any import-export scenario with robust structure and flexible design, Very useful resources from <u>TechBrothersIT</u> with 200+ videos on SSIS,
- Engage internal resources in ETL part of the project (save costs),
- Takes responsibility for correct data

1.2 Prerequisite

In order to facilitate loading external sources, we recommend using following Microsoft tools. Both Microsoft tools are free of charge, available from the internet:

- 1. SSMS (SQL Server Management Studio)
 - Download the latest version;
 - This tool is not related to target SQL server version.
 - Link: <u>https://docs.microsoft.com/en-us/sql/ssms/download-sql-server-management-studio-ssms?view=sql-server-2017</u>
- 2. SSDT (SQL Server Data Tool for Visual Studio)
 - Download the latest version that is related to target SQL server version.
 Only limitation: SSIS creation on SSDT (VS 2013) & SSIS target execution DB SQL 2008R2
 - Link : <u>https://docs.microsoft.com/en-us/sql/ssdt/download-sql-server-data-tools-ssdt?view=sql-server-2017</u>
- 3. SQL server database engine (target)
 - Install shared features

Select Features The SQL Server features on this	computer are shown below.
Global Rules Select Instance Select Features Feature Rules Ready to Remove Removal Progress Complete	Features: SQL2016STD Database Engine Services Analysis Services Shared Features Integration Services Client Tools SDK SQL Client Connectivity SDK Redistributable Features

1.3 Videos on BI4Dynamics YouTube channel

Use BI4Dynamics videos to show step-by-step data transformation:

https://www.youtube.com/user/BI4Dynamics/

2 Part 1 – Integrate external sources into the DW database

In this document we describe the following scenario:

- 1. The source is LIVE: new data is coming to source on a daily basis
- 2. FULL load: data is always loaded from source to DW in full

We will use ETL tool to get data from an external source into BI4Dynamics data warehouse.

Note:

- ETL tool is not a part of BI4Dynamics software,
- There are no automatic interactions between ETL tool and BI4Dynamics,
- Files that are generated by the ETL tool, are added into the BI4Dynamics process flow for execution.

Table with detailed steps

No	Description	Tool	Comment
Pha	ase 1: ETL		
1	Create an SSIS package	SSDT	Use ETL tool and fine-tune package and scrips for
			execution
	Update SSIS package		
2	Update Drop table	SSDT, SSMS	Example: DROP TABLE IF EXISTS
3	Update Create table	SSDT, SSMS	Depending on the SQL version and selected connector
			you may address some issues like:
			• Replace NON NULL with NULL for all columns (not PK)
			 Replace smalldatetime with datetime
4	Add Primary Key to the table	SSDT, SSMS	For tables used as primary dim or fact tables
5	Test SSIS package (standalone)	SSDT, SSMS	
Pha	ase 2: BI4Dynamics		
6	Keep schema on deploy	BI4Dynamics	Keep schema or tables from being deleted on deploy
7	Add SSIS package to	BIAD upamics	

/	Add SSIS package to	BI4Dynamics	
	BI4Dynamics process flow		
8	Test SSIS package (standalone)	BI4Dynamics	
	in BI4Dynamics		

2.1 Create an SSIS package

Create a package with SQL Server Import and Export Wizard by using SSDT or SSMS.

Select the right Provider:

It is not recommended to use this **SQL server native client (SNAC)** for new development. The new OLE DB provider is called the **Microsoft OLE DB Driver for SQL Server** (MSOLEDBSQL) which will be updated with the most recent server features going forward.

SQL Server Native Client 10.0		 Name Could Service of the service of t
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- Rename Table name and Schema name:

Integration Services Project3 - 1	mport data - Microsoft Visual Studio (Administrator) + 🖬	ljbine _ & X	💭 🔻 2 Quick Launch (CtrH+Q) 🔑 💷 🗙
Container Container	• Satt + * • Developer • Pile NOS Sadif, dax [Devery] NOS Terminal 2.dax POS Store (1).dax. [Developer • Reg. control Prime @ Developer • Post remainal 2.dax Reg. control Prime @ Developer • Post remainal 2.dax Reg. control Prime @ Developer • Post remainal 2.dax Reg. control Prime @ Developer • Post remainal 2.dax Reg. control Prime @ Developer • Post remainal 2.dax Reg. control Prime @ Developer • Post remainal 2.dax Reg. control Prime @ Developer • Post remainal 2.dax Reg. control Prime @ Developer • Post remainal 2.dax Reg. control Prime @ Developer • Post remainal 2.dax Reg. control Prime @ Developer • Post remainal 2.dax Reg. control Prime @ Developer • Post remainal 2.dax Reg. control Prime @ Developer • Post remainal 2.dax Reg. control Prime @ Developer • Post remainal 2.dax Reg. control Prime @ Developer • Post remainal 2.dax Reg. control Prime @ Developer • Post remainal 2.dax Reg. control Prime @ Developer • Post remainal 2.dax Reg. control Prime @ Developer • Post remainal 2.dax <	Very NDS Payments (1).dxx (beopg) Expert Expert Expert Expert	Soldan Explore

Follow the wizard steps to the finish.

2.2 Create SCHEMA if not there

```
IF NOT EXISTS (SELECT name FROM sys.schemas WHERE name = N'TEST')
BEGIN
EXEC('CREATE SCHEMA [TEST] AUTHORIZATION [dbo]')
END
```

IMPORTANT NOTE: The name of the schema must not be/must not contain the word 'stage'

2.3 Update DROP TABLE

As script "Create table" will run many times, we should make sure the table is always deleted before created.



Script example

Step	Description		Comment
Drop	<pre>IF OBJECT_ID('[POS].[Store]', 'U')</pre>	IS NOT NULL	More code with older
table	DROP TABLE [POS].[Store];		SQL versions
	DROP TABLE IF EXISTS [POS].[Store]		Less code in SQL 2016
Note	Object type can be one of these object types	5:	
	C = CHECK constraint	RF = Replication filter stored	procedure
	D = Default or DEFAULT constraint	S = System table	
	F = FOREIGN KEY constraint	TF = Table function	
	L = Log	TR = Trigger	
	FN = Scalar function	U = User table	
	IF = Inlined table-function	UQ = UNIQUE constraint (typ	be is K)

P = Stored procedure PK = PRIMARY KEY constraint (type is K)	V = View X = Extended stored procedure

2.4 Update CREATE TABLE

FILE EDIT VIEW PROJECT BUILD	O DEBUG TEAM FORMAT SSIS TOOLS	TEST ARCHITECTURE	ANALYZE WINDOW HELP		🔥 Mladen Gvozdenovic 👻
SSIS Toolbox - 4 ×	POS Terminal.dtsx [Design] POS Staff.dtsx [Design]* → × POS Payments rs 孫 Event Handlers 🚡 P	s.dtsx [Design] POS Store.dtsx [Design] Package Explorer 🜔 Execution Results	POS Tender.dtsx [Design]	Solution Explorer - 부 × ⓒ ⓒ 🏠 🔞 - 같 🗇 🔞 🖋 🗕
Bit Execute SQL Task	Competion Connection Create TABLE Data Flow Task 1	Configure the pro	tor operties required to run SQL statements and stor	ed procedures using the selected connection.	Search Solution Explorer (CH+C) Solution Thegration Services Project3 - Import data (Lt project) Project, paramis Control to Managers Source Connection OLEDB.commgr Source Connection O
., JJ XML I Jask ▲ Containers □ For Loop Container □ Foreach Loop Container □ Sequence Container		General Parameter Mapping Result Set Expressions	General Name Description Options TimeOut CodeD use	Create TABLE	🖬 Miscellaneous
Other Tasks Tosks Analysis Services Execute DD D ^{III} Back Up Database Task GI Control Task GI Check Database Integrity Task DI Check Database Integrity Task DI Data Mining Query Task	Add Primary key R Enter SQL Query REATE TABLE (POS) (Stan) DI Invarchag(20) NOT NULL,		Courrage TypeConversionMode Result Set Result Set SQL Statement ConnectionType Connection	Los Allowed None OLE DB DestinationConnectionOLEDB	
E Execute SQL Server Agent 10	Password Invite 14 active to the second provide the comparison of the second provided	5	SQLSourceType SQLStatement IsQueryStoredProcedure BypassPrepare	Direct input Direct input CREATE TABLE [POS].[Staff] ([1D] nvarchar(20) f Palse True	. 4
 Rebuild Index Task Reorganize Index Task Shrink Database Task Transfer Database Task Transfer Error Messages Task Transfer Error Messages Task 	Price Override) int NULL Max. Discourt to Give_1 decome/39:2 Susparet Transaction int NULL Max. Total Discourt 1 decimal(33:20) Open Draw, without Sale) int NULL Discourt Inton Pem, Concup int NULL Comp. Trait Name() warchat(30) NULL	0) NULL, NULL,	Specifies the query to be run by the task. Browse.	. Build Query Parse Query	
Transfer Logins Task Transfer Sol, Server Objects Transfer SQL Server Objects Update Statistics Task	Destri	Cancel		OK Cancel Help	
🛱 WMI Event Watcher Task			lale similar		

As there are various ways (SQL version, database connectors, ETL tools) to do the "Create table" step, check and fix following issues (in case occurred):

- 1. Replace NOT NULL to NULL for all fields except the Primary Key (you must know which field is a table primary key!)
- 2. Replace column format of smalldatetime to datetime

Before	After
CREATE TABLE [POS].[Store](CREATE TABLE [POS].[Store](
[No_] [nvarchar](10) NOT NULL,	[No_] [nvarchar](10) NOT NULL,
[Name] [nvarchar](30) NOT NULL,	[Name] [nvarchar](30) NULL,
[City] [nvarchar](30) <mark>NOT</mark> NULL,	[City] [nvarchar](30) NULL,
[Post Code] [nvarchar](20) NOT NULL,	[Post Code] [nvarchar](20) NULL,
[Country Code] [nvarchar](10) NOT NULL,	[Country Code] [nvarchar](10) NULL,
[Last Date Modified] [<mark>smalldatetime</mark>] NOT	[Last Date Modified] [<mark>datetime</mark>] NULL,
NULL,	

2.5 Add Primary Key to the table



Primary key is needed (only) for tables used as:

- Base or primary table in data warehouse fact
- Base or primary table in data warehouse dimension

Based on primary key columns an index for fact or dimension table will be generated. Table would still load into DW without primary keys, but script generated by BI4Dynamics will not be correct and execution of such script will cause an error.

Example	Comment
Example 1: generated by SSMS one column	<pre>IF NOT EXISTS (SELECT * FROM INFORMATION_SCHEMA.TABLE_CONSTRAINTS WHERE CONSTRAINT_TYPE = 'PRIMARY KEY' AND TABLE_SCHEMA = 'POS' AND TABLE_NAME = 'Store') </pre>
	ALTER TABLE [POS].[Store] ADD CONSTRAINT [Store PK 1] PRIMARY KEY CLUSTERED ([No_] ASC) END
Example 2	IF NOT EXISTS (SELECT * FROM sys.indexes WHERE object_id =
Generated by SSMS	OBJECT_ID(N'[POS].[Tender Type]') AND name = N'PK_Tender Type')
Two columns	<pre>BEGIN ALTER TABLE [POS].[Tender Type] ADD CONSTRAINT [PK_Tender Type] PRIMARY KEY CLUSTERED ([Store No_] ASC, [Code] ASC) END</pre>

If you do not add primary key to table, BI4Dynamics will report an error:

Log • × Ma	anage Dimensions X				
Dimension Name: GLA Source Schema Source Tables UK 20095G_L Account UK 20095G_L Entry	ccount NAV	Selected Tables Schema Table	Related Te	able Error	Error or Code: RROR_W52 sscription: iannot add selected table as primary! Detailed description Code: ERROR_W52 Method name: SelectDimensionTableViewModelAddTableToFact Source: BI4Dynamics.Common BI4Message: Source table without primary key defined cannot be added as primary table on dimension. One or more errors occurred.
Add Table Ed	it PK Columns	Show Related Tables Rem	ove Table		

2.6 Add new field to result set

When we want to add a column, we add this object between source and destination:



The object is used to add column when column is:

- not available in the source;
 Example: CompanyID, Count
- calculated join on existing columns
 Example: "First name"+" "+"Last name" = Name



2.7 Add measure "No of Transactions"

An absolute must to control input and output:

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	base medsures						
	Table Name	Field Name	Name	Operation Fi	ormat	Visible Opposite Sign	Display Folder
	Payment Entry	Amount Tendere	d Amount Tendered	T Sum 💌 #	r,#0.00	×	
ana Maasuras							
	Custom Measures	;					
	Name	Ope	ration Format	Visible Custom SQL	Expression D	Display Folder	
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			BI4Nav				
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2.8 Test SSIS package (standalone in SQL Server Data Tools)

Run SSIS package in ETL tool many times and check (SELECT TOP 1000 in destination table) that correct data are available in the destination table:

POS Payments.dtsx [Design]	POS Terminal.dtsx [Design] PO	S Staff.dtsx [Design] 👎	× POS Store.dtsx [Design]	Ŧ	Solution Explorer 🗸	Ψ×
0 🏪 Control Flow 📬 Data Flow	🤪 Parameters 🛛 🖪 Event Handlers	🚊 Package Explorer	Progress	🤗 🖽	○ ○ ☆ 'o - ≠ 司 ⓑ / ዶ -	
9					Search Solution Explorer (Ctrl+č)	ρ-
Drop table(s) SQL Task 1	2 3 dd Primary key			100%	 Solution Integration Services Project3 - Import data' (1 project.params Connection Managers SourceConnectionOLEDB.conmgr DestinationConnectionOLEDB.conmgr SSIS Packages POS Tender.dtsx POS Staff.dtsx POS Staff.dtsx POS Staff.dtsx POS Staff.dtsx POS Staff.dtsx Miscellaneous 	ject)
Connection Managers						
DestinationConnectionOLEDB	SourceConnectionOLEDB					
Package execution completed wi	th success. Click here to switch to desig	n mode, or select Stop De	bugging from the Debug menu.		1	

And results in SQL server (destination):

SQLQ	uery1.sql	- LOUP\r	ngvozden (52))	+ ×			
	/****	* Script	t for Select	TopNRows command from	SSMS **	****/	
E	SELECT	TOP (10	300) [No]				
		,[Store	No]				
		,[Termin	nal Type]				
		,[Descri	iption]				
		,[Placer	nent]				
		,[Stater	nent Method]	_			
		,[Termin	hal Statemen	t]			
		,[Defau.	lt Price Gro	up]			
		,[Not Ad	tive	701			
		,[lermin	Network				
		,[lermin	nal IP Addre	·SS]			
		,[rermin	tar connecti	onj			
		[Show]	tom Utmll				
		[Disn]	av Terminal	Closed]			
		.[Displa	av Linked It	eml			
		Fraud	Sort Field]				
		, [Manage	er Key on Re	turn]			
		, [KeyLoo	k Staff Per	m_ Group]			
		,[Slip :	if Return]				
		,[Open [Drawer at LI	_L0]			
		,[Only 1	Fotal in Sus	p_ Trans_]			
		,[Exit /	After Each T	rans_]			
		,[AutoLo	ogoff After	(Min_)]			
		,[Return	n in Transac	tion]			
104 %							
	Results n	Message	8				
	No	Store No	Terminal Type	Description	Placement	Statement Method	Terminal State
1	P0001	\$0001	0	The POS at the entrance		0	0
2	P0002	50001	0	The POS by the stock room		0	0
3	P0003	50002	0	The POS at the entrance		1	0
4	P0004	\$0002	0	The POS next to aisle 3		1	0
5	P0005	50003	0	The POS at the entrance		0	0
6	P0006	50003	0	The POS next to escalator		0	0
7	P0007	50004	0	The POS next to the entrance		0	0
8	P0008	\$0004	0	Second POS from the entrance		0	0
9	P0009	50004	0	Leo POS		0	0
10	P0010	50004	0	Leo POS - Black and white		0	0
11	P0011	\$0005	0	Restaurant Downstairs		0	0
		00000	~	riestaaran semiatara		•	~

2.9 Setup BI4Dynamics deploy and keep schemas on deploy

If you are integrating historical data that do not change, then one-time import should be enough. With this setup, you select schemas or tables that you want to keep (do not want to be deleted) during deploy data warehouse:

	BI4Dynamics NAV 6.3.0.2123 Instance: BI4NAV_External Data	Sources 101			
File 🔻	Deploy Process Customize Stage				
Add	Edit UBINC Remove Cronus Demo 2017 Conus G.O., NPS-GROUPym	Companies Modules D	O Stage	Setup ☑ Delete Data Warehouse ☑ Deploy □ Delete Analysis Database	Name: BI4NAV_Extern Start: 16-10-2018 00:
	Data Sources	Settings	Deploy Solution	Setup Deploy	
Log	X Setup Deploy X				
Mana	age schemas				
Tables re	lated to schemas that will be kept on deploy are listed in »Keep schemas	. Other tables (structures and co	ontent) will be deleted on deploy.		
Schema			Keep schema		
			metadata		
		Add	POS		
		Demen			
		Kelliow	C		
Mana	age Tables				
Individua	al table that will be kept on deploy are listed in »Keep tables«. Other table	s (structures and content) will be	e deleted on deploy.		
Tabl	٩		Table	Q	
Tabl	e •		Table	r	
Schema	Tables		Schema Keep tables		
stage	ResponsibilityCenter		setup ExecutionLog	•	
stage	ValueEntry				
setup	DataSource				
stage	ReturnShipmentHeader	Add			
dim	DateTool	Remen			
stage	ReturnShipmentLine	Remove	e		

If no setup is applied then all tables in the data warehouse are deleted on deploy.

2.10 Add SSIS package to the BI4Dynamics process flow

You can create one or several Object groups to store SSIS packages for execution. We recommend creating one Object group for each data source (schema):

bin	BI4Dynamics	NAV 6.3.0.2123 Ins	tance: BI4	4NAV_Exter	rnal Data Sources 1	01						
FI	Deploy Proce	ess Customize	Stage									
Ec	BI4Dynamics it	▼ Remove •••Re Add へRe	iset C) Full Increment	al Process	ⓒ Stage Sata Warehous Z Analysis Databa	Load POS t	able 🔻 R	emove Add	Remove Add	/	
	Process Fl	ow SSIS	_	Update	Process All	Process one	Obje	ct group	_	SSIS package		
Log	• x	Edit Proc Flow SSIS	x									
C	bject group		Proce	ess steps	S						F	Rename
No	Name	Custom	🔽 Include	e Order	Process Object Nar	ne	Object subgroup	Executed	Custom	Last exec time (s	ec)	Object subgroup
1	Load POS tables	_ ~	~	1	Run [POS Te	rminal 2].[dtsx]	Load POS tables	<u> </u>	~	0	Cu	rrent
2	SnapshotDate		-	2	Run [POS Te	nder].[dtsx]	Load POS tables	G.		0	Ne	W
3	Snapshot		V	3	Run [POS ST	aff].[dtsx]	Load POS tables	G.	~	0		Update
4	DimDate		•	4	Run [POS St	ore (1)].[dtsx]	Load POS tables	Q	~	0		
5	DimHelp		V	5	Run [POS Pa	yments (1)].[dtsx]	Load POS tables	G.	~	о 🌙		
6	DimLoadBefore											
7	DimLoad											

2.11 Test SSIS package (standalone) in BI4Dynamics

bin	BI4Dynamics	NAV 6.3.0.2123 In	stance: Bl	I4NAV_Ext	ernal Data	Sources 1	01					
FI	Deploy Proce	ess Customize	Stage									
C SS	BI4Dynamics dit SIS	▼ Remove ••••R	eset (eload (⊖ Full ම Incremer	ital Pro	ocess ✓	ⓒ Stage Sata Warehous ☑ Analysis Databa	Load POS t	table 🔻 🤻	emove Add	Remove Add	
	Process Fl	ow SSIS		Update	Pro	ocess All	Process one	Obje	ect group		SSIS package	
Log	• x	Edit Proc Flow SSI	s x									
C	bject group		Proc	cess step)S							Rename
No	Name	Custom	🔽 Include	e Order	Process	Object Na	ne	Object subgroup	Executed	Custom	Last exec time (sec)	Object subgroup
1	Load POS tables	 Image: A second s	V	1 🖣	Run	[POS Te	erminal 2].[dtsx]	Load POS tables		~	0	Current
2	SnapshotDate		V	2 🥌	Run	[POS Te	nder].[dtsx]	Load POS tables	-	~	0	New
3	Snapshot		V	3 🥑	Run	[POS ST	aff].[dtsx]	Load POS tables	~	~	0	Update
4	DimDate		V	4	Run	[POS St	ore (1)].[dtsx]	Load POS tables	G.	~	0	
5	DimHelp		N	5	Run	[POS Pa	yments (1)].[dtsx]	Load POS tables	G.	~	0	
-	D' I ID (1									

After running each process in the process flow, the Executed flag should be checked:

When Job Agent runs BI4Dynamics process flow, these packages are executed as a part of that process flow.

3 Part 2 – Create new BI structures with Wizard

Working with tables from EDS only slightly differs from working with AX/NAV tables. The only difference is that AX/NAV tables always have CompanyID, while EDS may or may not have this information.

Please refer to videos on BI4Dynamics YouTube channel:

https://www.youtube.com/user/BI4Dynamics

4 Final results

4.1 SSIS packages

We have a scenario with 5 tables loading from an external data source (SQL). We created 5 separate packages

1 Control flow for table POS.Terminal

POS Payments.dtsx [Design] POS Terminal.dtsx [Design] POS Staff.dtsx [Design] ෫ 🗙 POS Store.dtsx [Design]		₹	Solution Explorer	▼ ₽×
🎚 Control Flow 📸 Data Flow 🥪 Parameters 🖪 Event Handlers 🔚 Package Explorer 🜔 Progress	6	囲	◎ ◎ ☆ '◎ - ≠ 副 🗿 👂 🗕	
Completion Completion Create TABLE Create TABLE			Search Solution Explorer (Ctrl+£) Solution Integration Services Project3 - Import data' (The Integration Services Project3 - Import data' Project.params Connection Managers SourceConnectionOLEDB.commgr DestinationConnectionOLEDB.commgr DestinationConnec	ہم - I project) a
Connection Managers				

2 Data flow for table POS.Terminal

POS Payments.dtsx [Design] POS Terminal.dtsx [Design] POS Staff.dtsx [Design] - + X POS Store.dtsx [Design]	Ŧ	Solution Explorer 🗸 🗸
🖁 Control Flow 🔂 Data Flow 🧇 Parameters 🛐 Event Handlers 🦙 Package Explorer 🜔 Progress	🤗 🖽	© © ☆ ĭo - ≠ ฮ ⓑ ≯ <mark>-</mark>
Data Flow Task:	-	Search Solution Explorer (Ctrl+č)
Source - CRONUS LS 1101 W1 Demo\$Staff	100%	 Solution 'Integration Services Project3 - Import data' (1 proje Integration Services Project3 - Import data Project.params Connection Managers SourceConnectionOLEDB.commgr DestinationConnectionOLEDB.commgr SSIS Packages POS Tender.dtsx POS Staff.dtsx Miscellaneous
Connection Managers		
DestinationConnectionOLEDB SourceConnectionOLEDB		

4.2 SSIS package files

These files are saved in project development folder:

BI projects 🔹 SSIS projects 👻 Integration Services Project3 - Import data 👻 Integration Services Project3 - Import data 👻

amo *	Date modified	Type	Size
		1700	5420
📙 bin	2.10.2018 19:20	File folder	
📙 obj	2.10.2018 19:20	File folder	
DestinationConnectionOLEDB.conmgr	2.10.2018 19:02	CONMGR File	1 KB
🏠 Integration Services Project3 - Import data	1.10.2018 9:31	Analysis Services D	2 KB
🖬 Integration Services Project3 - Import data	17.10.2018 13:32	Integration Service	72 KB
🗿 Integration Services Project3 - Import data.dtproj.user	17.10.2018 13:32	Per-User Project Op	1 KB
🕄 POS Payments	17.10.2018 13:32	Integration Service	117 KB
🕄 POS STaff	15.10.2018 12:21	Integration Service	221 KB
🕄 POS Store	17.10.2018 13:32	Integration Service	374 KB
🕄 POS Tender	15.10.2018 13:33	Integration Service	236 KB
🕄 POS Terminal	17.10.2018 13:32	Integration Service	272 KB
SourceConnectionOLEDB.conmgr	2.10.2018 19:02	CONMGR File	1 KB

4.3 SSIS packages imported into the BI4Dynamics process flow

b (7	BI4Dynamics I	AV 6.3.0.2123 In	stance: BI4	INAV_Exte	rnal Data	Sources 1	.01						
- 11	Deploy Proces	is Customize	Stage										
E	BI4Dynamics Sit	Remove ••••R	eset C eload ©	Full Incremen	tal Pro	ocess	ⓒ Stage Sata Warehous ∑Analysis Databa	Load POS t	able 🔻 R	emove Add	Remove Add		
	Process Flo	ow SSIS		Update	Pro	ocess All	Process one	Obje	ct group		SSIS package		
Lo	у• х	Edit Proc Flow SSI	; x										
(bject group		Proce	ess step	S							Rena	ame
No	Name	Custom	🔽 Include	Order	Process	Object Na	me	Object subgroup	Executed	Custom	Last exec time (sec)	Ob	oject subgroup
1	Load POS tables	×	v	1 🗨	Run	[POS Te	erminal 2].[dtsx]	Load POS tables	3	~	0	Current	
2	SnapshotDate		v	2 🥌	Run	[POS Te	nder].[dtsx]	Load POS tables	~	~	0	New	
3	Snapshot		ঘ	3 🥖	Run	[POS ST	aff].[dtsx]	Load POS tables	L	~	0		Update
4	DimDate		v	4	Run	[POS St	ore (1)].[dtsx]	Load POS tables	G.	 Image: A second s	0		
5	DimHelp		V	5	Run	[POS Pa	yments (1)].[dtsx]	Load POS tables	G.	~	0		
1	D. 1 10 4												

4.4 SSIS package files imported into the BI4Dynamics process flow

When files are added into the process flow, they are automatically copied from SSIS development environment to BI4Dynamics instance folder.

G v Local Disk (C:) • Pro	gram Files (x86) + BI4Dynamics NAV + BI4NAV_Externa	al Data Sources 101 👻 0	Setup + SSIS + Custom + BI4Dynamics	👻 🙀 Seard
Organize 🔻 🔄 Open 👻 New folder				
🗉 🚖 Favorites	Name ^	Date modified	Туре	Size
* Favorites * * Favorites *	None - BIHOynamics_DWH_01_DimDate.BI4AXssis BI4Oynamics_DWH_01_FactLoad.BI4AXssis BI4Oynamics_DWH_02_FactCreateConstrain BI4Oynamics_DWH_02_FactCreateConstrain BI4Oynamics_DWH_04_DimLoadAfter.BI4AXsis BI4Oynamics_DWH_05_FactHole.BI4AXsis BI4Oynamics_DWH_05_FactHole.BI4AXsis BI4Oynamics_DWH_06_FactHole.BI4AXsis BI4Oynamics_SDH_07_FactLoad.BI4AXsis BI4Oynamics_SDH_07_FactLoad.BI4AXsis BI4Oynamics_SDH_07_BactLoad.BI4AXsis BI4Oynamics_SDH_07_BactLoad.BI4AXsis BI4Oynamics_SDH_07_BactLoad.BI4AXsis BI4Oynamics_SSIS_Analysis_01_ProcessIm BI4Oynamics_SSIS_Analysis_01_ProcessIm BI4Oynamics_SSIS_Analysis_01_ProcessIm BI4Oynamics_SSIS_Analysis_01_ProcessIm BI4Oynamics_Stage_01_Delete.BI4AXsis BI4Oynamics_Stage_02_propindex.BI4AXsis BI4Oynamics_Stage_01_Delete.BI4AXsis BI4Oynamics_Stage_01_Delete.BI4AXsis BI4Oynamics_Stage_01_Delete.BI4AXsis BI4Oynamics_Stage_01_Delete.BI4AXsis BI4Oynamics_Stage_02_propindex.BI4AXsis BI4Oynamics_Stage_03_load.BI4AXsis BI4Oy	14.10.2018 19:29 12.10.2018 16:49 14.10.2018 19:29 12.10.2018 16:49 14.10.2018 19:29 14.10.2018 19:29 5.10.2018 19:29 5.10.2018 19:29 5.10.2018 19:29 5.10.2018 19:29	IVpe IP BI4AXSSIS File BI4AXSSIS File Integration Services Package Integration Services Package Integration Services Package Integration Services Package Integration Services Package Integration Services Package	348 11 KB 6 KB 29 KB 8 KB 10 KB 37 KB 6 KB 10 KB 6 KB 12 KB 13 KB 13 KB 13 KB 13 KB 12 KB 13 KB 22 KB 24 KB 24 KB 24 KB 25 KB 25 KB 25 KB 25 KB 25 KB 25 KB 25 KB 25 KB 26 KB 27 KB 2
	POS Terminal	15.10.2018 15:02	Integration Services Package	275 KB

4.5 SQL tables imported to the Data warehouse

When filtering schema, apply filter 'POS' and imported tables will be listed below:



🍸 Filter Settings		
Server:	LJBINC	
Database:	BI4NAV_External Data Sources 10	1
Filter Criteria:		
Property	Operator	Value
Property Name	Operator Contains	Value
Property Name Schema	Operator Contains Contains	Value POS
Property Name Schema Owner	Operator Contains Contains Equals	Value POS

4.6 Dimensions created by Wizard

BI4Dynamics NAV 6.3.0.2123 Instance: BI4NAV_External Data Sources 101		
Deploy Process Customize Stage		
Anage Marage Virtual Manage Virtual Manage Partitions Get MetaData		
g X Manage Dimensions X		
Wizard Dimensions P		
Dimension	Update N	ow
FA Class W	T	
FA Depreciation Book W	Т	
FA Location W	T	
Fixed Asset W	Τ	
POS Store	Т	
POS Terminal	T 🗖	
Reason Code W	T	
Source Code W	Т	
Total number of witard dimensions: 8		
New Dimension Edit Dimension Edit Hierarchies		
Delete Save Generate		
Update Now		

Log × Manage Dimensions	•	
Dimension Name: POS Terminal		
Source Schema Pos 👻	Selected Tables	
Source Tables	Schema Table	Related Table
Number Name	POS Terminal	
Payment Entry		
Staff		
Store		
Tender Type		
Terminal		
Add Table	Show Related Tables Remove Table	
Total number of tables: 5		

4.7 Facts created by the wizard

Log X Create C	ube X				
1 Manage Cubes 🗸	Cubes	Fact Tables	M	DX Measures	
2 Select Source Tables	Cube Name	Fact Name	Calculat	ion Name	Туре
3 Select Fields	GL Analysis Fixed Assets Analysis W	POS Payments	T		
4 Manage Dimensions	POS Analysis EDS				
5 Manage Measures					
	New Save	Generate Add Edit	Delete Ad	dd Edit	Delete
	Delete Clear				

4.8 Excel report

A	В	с	D	E F	G	н	J J J	K L	м	N O	Р	Q		
1												PivotTable Fields		T
2 Store & Terminal				Date		Tender Ty	pe	Currency		Receipt		Choose fields to add to report	8 v	Drag fields between areas below
4 Row Labels	* Amount Tendered	Amount in Ourrency	Quantity	Change Line	All	Change Line	All Y	Change Line	All 🔻	Change Line	All Y			
5 @ GB	100.778.0	100.802.17	256.00	Company	All	Company	All	Company	All	Company	All			▼ FILTERS
6 Bedford	79.090.0	79.090.01	185.00									Amount in Currenc	/	Change Line 👻
7 S0002 - Cronus Food Market North SM	2,323.1	2,323.12	4.00	Row Labels	T Amount Tendered	Row Labels	Amount Tendered	Row Labels *	Amount Tendered	Row Labels	Amount Tendered	Amount Tendered		Company
8 P0003	323.1	323.12	3.00	· 2013	98,642.44	1	70,916.08		100,724.25	00000P0001000001562	5.53			
9 P0004	2,000.0	2,000.00	1.00	2014	0.00	15	-1,023.87	EUR	53.75	00000P0001000001563	3.88	Quantity		
0 S0003 - Cronus Fashion Store North	76,766.8	76,766.89	181.00		2,135.56	3	8,800.44	Grand Total	100,778.00	00000P0001000001564	2,040.00	h 🖂 shinki Massus Taalii		
11 P0005	76,766.8	76,766.89	181.00	Grand Total	100,778.00	4	22,031.60			00000P0001000001565	175.00	P E HMulti-Measure Tooli		
2 Brighton	0.0	0.00	4.00			6	53.75			00000P0001000001577	600.00	A Change Line		
I3 S0007 - Cronus Electronics Store South	h 0.0	0.00	4.00			Grand Total	100,778.00			00000P0001000001579	-600.00	Change Line		
14 P0022	0.0	0.00	4.00							00000P0001000001588	8.80			
5 BLondon	21,687.9	21,712.16	60.00							00000P0001000001589	108.00	Company		
6 S0001 - Cronus Super Market South	3,213.2	3,237.46	20.00							00000P0001000001590	154.75			
7 P0001	3,202.9	3,227.08	18.00							00000P0001000001591	142.25	Currency		III COLUMNS
18 P0060	10.3	3 10.38	2.00							00000P0001000001592	2.08	Currency		
19 S0004 - Cronus Fashion Store South	18,438.3	5 18,438.35	37.00							00000P0001000001593	5.69			
20 P0007	18,438.3	5 18,438.35	37.00							00000P0001000001595	3.88	Date 📃 Date		
1 S0005 - Cronus Restaurant	36.3	5 36.35	3.00							00000P0001000001596	149.30	4 🔲 Date Carted		
2 P0011	36.3	5 36.35	3.00							00000P0001000001597	77.50	Date Casted		
8 Manchester	0.0	0.00	7.00							00000P0001000001598	58.75			
14 S0009 - Cronus Home Furniture	0.0	0.00	7.00							00000P0001000001599	213.75	4 Receipt No.		
25 P0023	0.0	0.00	7.00							00000P0001000001600	53.75	✓ Receipt No		
26 Grand Total	100,778.0	100,802.17	256.00							00000P0003000001603	146.25			
27										00000P0003000001604	78.75	⊿ 🔲 Store		
18										00000P0003000001605	98.12	Country - City - Sto	e	
19										00000P000400000003	2,000.00	Store Type - Store		ROWS
10										00000P000500000002	698.43			Receipt No ·
1										00000P000500000003	1,056.75	A More Helds		
2										00000P000500000004	316.75	Address		
13										00000P000500000005	547.68	Address 2		
4										00000P000500000006	680.99	City		
5										00000P000500000007	575.31	Country Code		
6										00000P000500000008	1,173.18			
7										00000P000500000009	405.00	Store		
8										00000P000500000010	80.00	Store Name		
19										00000P000500000011	674.06	Store No		
0										00000P000500000012	157.50	Stere Tune		_
1										00000P000500000013	253.00	store Type		> VALUES
2										00000P000500000014	73.00	4 🖂 Tender Type		Amount Tendered
3										00000P000500000015	303.75	Tender Type		
4										00000P000500000016	420.00			
5										00000P000500000017	389.25	A 🔲 Terminal		
6										00000P000500000018	179.06	Store No		
7										00000P000500000019	80.00	Terminal No.		
8										00000P000500000020	174.37	Terminal No		
9										00000P000500000021	381.87	4 Transaction Status		
										UU000P000500000022	949.06	Transaction Status		
51										00000P000500000023	169.06	Hensection Status		
52										00000P000500000027	809.06			

5 Scenario # 1: Mapping master file values old to new

In this scenario, we will join general ledger from AX and NAV:

- 1. Create BI project based on AX
- 2. Add GL Entries from external source Microsoft Dynamics NAV (SQL) into BI4Dynamics AX
- 3. Map GL accounts from NAV to GL Accounts in AX
- 1 Add Excel with mapping old to new master:

	А	В						
1	NAV Account	AX Account						
2	10	110110						
3	100	110130						
4	1000	110160						
5	1005	112100						
6	1100	112110						
7	1110	112120						
8	1120	112140						
9	1130	112160						
10	1140	130100						
11	1190	140200						
12	1200	200100						
13	1210	200140						
14	1220	202100						
15	1230	202110						
16	1240	202140						
17	1290	202150						
18	1300	202160						

2 Create an SSIS package:



3 Join as new table to FACT.

Fact Name: GL History								
NAV 👻	Sele	cted Tables		Relation Conditions				
Q	Schema	Table	Related Table	Column	Related Column			
	NAV	UK 2009\$G_L Entry		NAV Account	= G_L Account No			
	NAV	GL Account Mapping	UK 2009\$G_L Entry X					

6 Scenario #2: Creating job for processing only external data

In the following scenario, we want to separate all procedures and SSIS packages related to external data source as new Process flow in BI4Dynamics and create an Agent job that is updating external data with a different frequency (for example hourly) as the main process flow (usually daily).

- N Debug Team Format SSIS Tools Window Hel C - Develops - Default - Start - B View 0-0 8-0 8 9-0 AS:dtsx [Design]* • × POS Payment Entry.dtsx [Design] SSIS Toolbox 0 3 000 0-500 /-Data Flow Task ٢ Bulk Insert Task 0 Analysis Services Processing Task 🔞 P. Execute Packag 8 Configure the pro required to pro MLADENW10\NAV.BI4NAV_External Sou ~ New... ces 101 ñ Object list: Settings D Foreach Loop Con 9 Sequ 🛃 Add Analysis Services Object All in one transaction on errors: (Default) OK Cancel
- 1 Create an SSIS package to process cube

2 Create new process flow

Select the corect SSIS packages, load procedures and a SSIS package for processing cube:

	Deploy Process Custom	ize Stage		arbource								
E	POS Remove	⊷Reset ⊂ ¥Reload ●) Full	nental	✓ Stage ✓ Otata Warehouse Process ✓ ✓ Analysis Database	POS process S: Remove Add	Add	re				
	Process Flow SSIS Update Process All Process on Object group SSIS package											
Lo	Log * X Edit Proc Flow SSIS X											
0	Object group Process steps											
No	Name Custor	n 🔽 Include	Order	Process	Object Name	Object subgroup	Executed	Custom	Last exec time (sec)			
1	POS import data 🛹 Ź 乄	✓	64	Run	[POS process SSAS].[dtsx]	POS process SSAS	~	~	0			
2	SnapshotDate											
3	Snapshot											
4	DimDate											
5	DimHelp											
6	DimLoadBefore											
7	DimLoad											
8	DimLoadAfter											
9	FactDropConstraintIndex											
10	FactHelp											
11	FactLoadBefore											
12	FactLoad 🕳 📜											
13	FactLoadAfter											
14	FactCreateConstraintIndex											
15	POS process SSAS 🗸 🗸	4										

3 Creat and set up a new Job

Object Explorer 👻	<mark>Р ×</mark>					Properties
Connect +		Job Properties - BI4NAV Ext	ternal Sources 101 - POS	- 0 ×		
🖃 🐻 MLADENW10\NAV (SQL Server 13.0.5216.0 - 1	NPS-C	Select a nane				🔡 💱 🖌
🗉 📁 Databases		General	L[Script ▼ (2) Help			
🗉 💼 Security		🖉 Steps				
🗉 🛑 Server Objects	_	Schedules	Job step list:			
Replication		Alerts	St Name	Type On Success On Failure		
🗉 📫 PolyBase		Tarriete	1 BI4Dynamics Auto Process Step	Operating Quit the j Quit the job		
Always On High Availability		- Tulgeta	learness of the second s			
Management Management						
B COL Services Catalogs						
Solution Solution						
BI4DynamicsNAV BI4NAV						
I BI4NAV						
BI4NAV 1-Stage						
BI4NAV 2-DW						
BI4NAV 3-Cubes						
BI4NAV Forecast						
BI4NAV_External Sources 101 - PO	s	Connection				
🗃 Job Activity Monitor	Job Step Properties - BI4Dyr	namics Auto Process Step			- 0	×
Alerts	Select a page					
Operators	🔑 General	🔟 Scopt 👻 😲 Help				
Proxies	& Advanced	_				
Error Logs		Step name:				
Acvent Profiler		BI4Dynamics Auto Process Ste	p			
		Туре:				
		Operating system (CmdExec)				~
		Run as:				
		SQL Server Agent Service Acc	ount			~
					Process exit code of a successful command: 0	
		Command: boxp	maram Files (v9C)\ PI4Dunamics NA\() PI4DunamicsNA\(eve"	"C-\Pmaram Files (r96)\PI4Dunamics NA\/\PI4	NAV, External Sources 101\PI4NAV, External Sources 101 bi4pay," "POS"	
		Open			2	
		Select All				
	Connection					
	Server:	Сору				
	MLADENW IU/NAV	Parte				
	Connection: NPS-GROUP/movozden	1 Gard				

Test by executing manually:

Start Jobs - MLADENW10\NAV		-	-		×
Success	2 Total 2 Succes	s	0 0	Error Warning	
Details:					
Action	Status	Message			
Start Job 'BI4NAV_External Sources 101 - POS'	Success				
Execute job 'BI4NAV_External Sources 101 - POS'	Success				
				Close	•
			_		

7 Scenario #3: Loading data

1 Load historical data only once

bin 🕒 🖆 📗	BI4Dvnamics NAV 6.4.0.2187 In	tance: BI4NAV Exte	rnal Sources 100								
File 🔻 De	eploy Process Customiz	e Stage						-			
Add	dit emove		Com	ipanies Modules	D eploy All	 ☆ Stage ⇒ Data V ☆ Analys 	Varehouse iis Database	Setup Deploy	 Keep Data Warehouse Keep Analysis Databas 	Name: e Start:	BI4NAV_External Sou
	Data Source	s		Settings	[Deploy Solu	ution		Setup Deploy		SQL A
Log	× Setup Deploy	x									
Mana Tables rela	ge schemas ated to schemas that will be kept o	n deploy are listed in	»Keep schemas«. Other	tables (structures ar	nd content) '	vill be delete	ed on deploy.				
Schema						Keep sche	ma				
					2	POS					
						metadata					
					aa						
				Rem	hove						
Mana	ge Tables										
Individual	table that will be kept on deploy a	e listed in »Keep tabl	ies«. Other tables (struct	ures and content) w	ill be delete	d on deploy.					
Table		p									
Schema	Tables					Schema	Keep tables				
stage	CustomerPostingGroup										
stage	VendorPostingGroup										
help	Dimension8										
stage	GLBudgetName				dd						
stage	GLBudgetEntry			A	aa						
stage	SalesShipmentHeader			Rem	nove						
stage	SalesShipmentLine										

2 Full load

Select "DROP TABLE IF EXISTS" in first SSIS object for loading table. It will delete table before loading and is considered as a safest approach if data size is not too big (table size > X 100 million rows).

Example:

- Loading 5 million rows = 2 minutes
- Loading 500 million rows?

```
3 Load by partitions
```

```
Archive partition = up to this year
Current partition = this year +
```

4 Incremental load

Custom project, depending on the source.