



SAP HANA Database – Hands-on Workshop Labs

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# SAP HANA Hands-on Workshop

# Contents

SAP HANA Hands-on Workshop	3
SAP HANA Introduction	4
What is SAP HANA database?	4
About SAP HANA studio	6
Hands-on Labs	6
Connect to HANA Studio	6
Modeling HANA Views	. 11
Attribute Views	. 11
Hands-on Labs	. 11
Analytic Views	. 19
Hands-on Labs	. 20
Calculation Views	. 33
Hands-on Labs	. 34
Reporting from SAP HANA with SAP Lumira	. 56
SAP Lumira Overview	. 56
Appendix	. 71
TPC-H ERD Diagram	. 71
Weblinks	71



# SAP HANA Introduction

SAP HANA is a modern platform for real-time analytics and applications. It enables organizations to analyze business operations based on large volume and variety of detailed data in real-time, without any delays.

HANA offers endless opportunity for business innovation within all industries and lines of business. The following three dimensions represent a model for understanding the potential of HANA:

- Real-time information and insight into organizational data
   Gain immediate insight from operational or strategic data despite large data volumes, without information delays caused by nightly batch processes.
- Real-time simulation & foresight to optimize business processes
   Simulate and foresee business situations like demand patterns or cash exposures based on current business conditions plus historical data and trends.
- Real-time sense & response to capitalize on streaming data & events
   Process real-time streaming data like energy consumption with smart meters for driving immediate business decisions in an automated fashion.

### What is SAP HANA database?

The SAP HANA database is a relational database that has been optimized to leverage state of the art hardware. It provides all of the SQL features of a standard relational database along with a feature rich set of analytical capabilities and an SAP specific programming language for stored procedures called SQL Script. With these facilities the SAP HANA database is capable of embedding application logic within the database itself. This allows complex queries to be executed directly inside the database, thus reducing the requirement of data transfer to and from the database. This enables SAP HANA based applications to process vast amounts of data whilst operating in a responsive, real-time manner.

From the administrators perspective the SAP HANA Database is conceptually about leveraging modern hardware system landscapes to increase database performance and reliability. Traditionally databases have been designed to operate in a situation where there are limited memory and CPU resources. Currently however, servers can provide in excess of 1TB of memory and up to 80 CPU cores on a single system.

To better understand how the SAP HANA database improves on the traditional database concepts, in the next section we will compare and contrast the two approaches to database systems.



# Impact of Modern Hardware on Database System Architecture

Historically database systems were designed to perform well on computer systems with limited RAM, this had the effect that slow disk I/O was the main bottleneck in data throughput. Consequently the architecture of these systems was designed with a focus on optimizing disk access, e. g. by minimizing the number of disk blocks (or pages) to be read into main memory when processing a query.

Computer architecture has changed in recent years. Now multi-core CPUs (multiple CPUs on one chip or in one package) are standard, with fast communication between processor cores enabling parallel processing. Main memory is no-longer a limited resource, modern servers can have 1 TB of system memory and this allows complete databases to be held in RAM. Currently server processors have up to 80 cores, and 128 cores will soon be available. With the increasing number of cores, CPUs are able to process increased data per time interval. This shifts the performance bottleneck from disk I/O to the data transfer between CPU cache and main memory (see figure. 1).

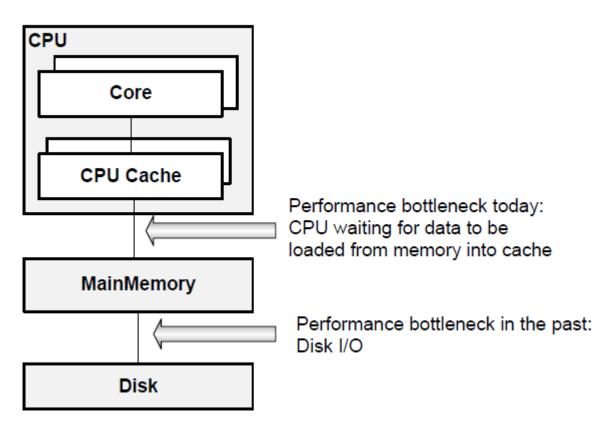


Figure 1: Hardware architecture: Current and past performance bottlenecks

# Modern Database for Modern Hardware

From the discussion above it is apparent that traditional databases might not use current hardware most efficiently. So, what are the ideal characteristics of a database systems running on modern hardware?

**In-memory database.** All relevant data should be available in main memory, which characteristically avoids the performance penalty of disk I/O. To use the advantages of in-memory computation a cache-conscious implementation of data structures and algorithms is necessary.



**Support for parallel execution.** Higher CPU execution speeds are currently achieved by adding more cores to a CPU package. Multiple CPUs call for new parallel algorithms to be used in databases in order to fully utilize the computing resources available. SAP HANA addresses these requirements, by storing all of its data in RAM and also enabling queries to be split and optimized across multiple CPU cores and multiple SAP HANA servers.

**Disk Storage.** Disk storage is still required to ensure the ability to restart in case of power failure and for permanent persistency. This is not a performance issue however, as the required disk write operations can happen asynchronously as a background task. More over SAP HANA database tries to get the performance optimum from the different storage types, like main memory, solid state disks (SSD) and traditional mechanical hard drives (HDD).

### **About SAP HANA studio**

The SAP HANA studio provides an administration console, an information modeler and a lifecycle management perspective. The SAP HANA studio runs on the Eclipse platform (For more information, see also http://www.eclipse.org).

The administration console of the SAP HANA studio allows technical users to manage the SAP HANA database as well as to create and manage user authorizations.

The information modeler allows technical users to create new or modify existing models of data.

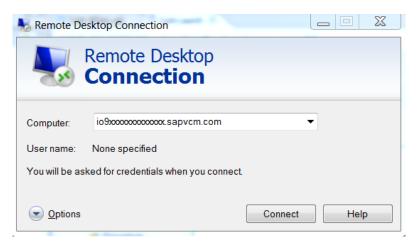
# Hands-on Labs

#### **Connect to HANA Studio**

Your Instructor will provide connection and environment information. Our labs are being run from the Amazon Elastic Compute Cloud (Amazon EC2). It is comprised of two images:

- A Windows-based image that contains the client tools used during the workshop labs. (We will only be connecting to this image directly today)
- A Linux-based image that houses the SAP HANA database environment.

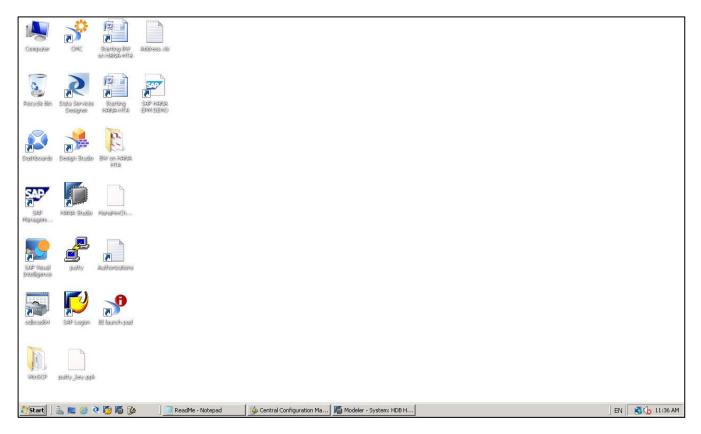
Open the Remote Desktop Connection program (In Windows 7 got to Start => All Programs => Accessories => Remote Desktop Connection), enter the computer name provided by the instructor (it will be in the format as shown below) and then click Connect.



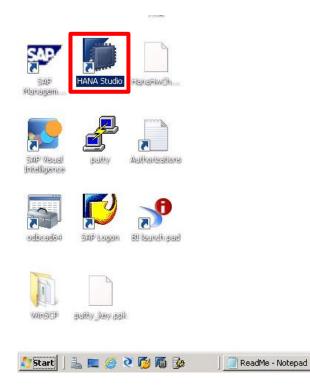
When prompted, log in as Administrator with a password of Welcome1



You will then be on the Windows client image as shown below.



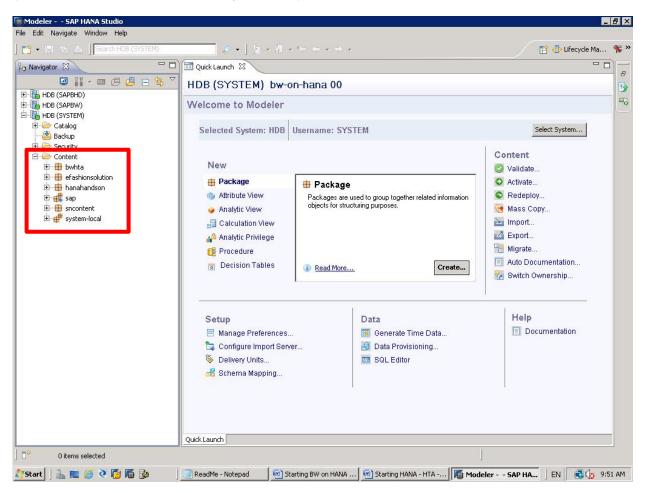
Start SAP HANA studio by double clicking on the hdbstudio.exe shortcut on the Windows desktop



Once SAP HANA studio starts it will look like below with the Navigator on the left panel and the Quick Launch panel on the right. The Navigator shows the systems available at the highest level of the hierarchy. Our environment only shows one SAP HANA system instance setup called HDB. If you



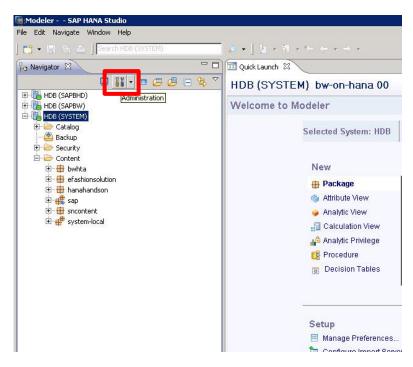
expand HDB you will see the Catalog, which includes such items as authorization information, schemas and schema objects and data. Also under HDB will be Content, which includes the information models (such as Attribute Views and Analytic Views) that we will use to access the HANA database.



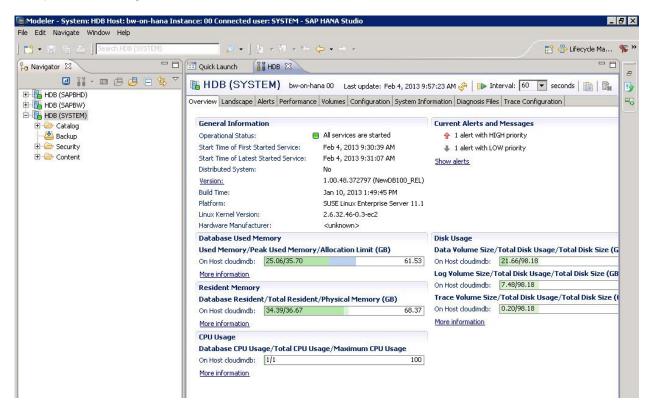
The Quick Launch panel is a good place to find the various objects you can create and actions you can perform on your SAP HANA instance. Before you start creating objects let's take a look at some of the administrative features that SAP HANA studio provides.



Highlight the HDB instance, then find and click the wrench icon on the toolbar right above the instance name.



The panel to the right will show an overview of the SAP HANA instance.



Click the Performance tab.

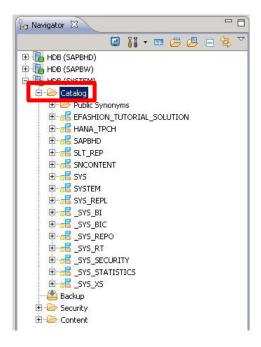
The Performance tab shows current load on such metrics as CPU, Memory, Disk usage, Network etc. The Configuration tab is where you can change the various settings of the environment without having to log into the Linux server to modify OS (Operating System) level configuration files. If you like check the other tabs on this panel before proceeding.



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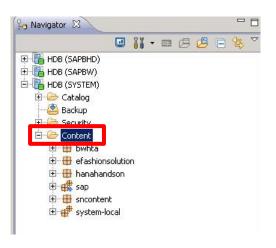
Now let's go back to the Navigator panel on the left and expand the HDB instance node on the hierarchy.

As we learned earlier Catalog contains the Authorization/Security information and the Schemas/Data.





Content is where the Informational Models/Views reside.



#### **Modeling HANA Views**

#### **Attribute Views**

Attribute views are used to give master data tables context. This context is provided by text tables which give meaning to the master data. For example, if our fact table or analytic view only contains some numeric ID for each car dealer then we can link in information about each dealer using an attribute view. We could then display the dealers' names and addresses instead of their IDs thus providing the context for the master data table.

Attribute views are used to select a subset of columns and rows from a data table. As it is of little use to sum up attributes from master data tables there is no need to define measures or aggregates for attribute views.

You can also use attribute views to join master data tables to each other, e. g. joining "Plant" to "Material".

#### Hands-on Labs

For Information Models we need to expand the IM2 instance => Content. Under Content are collections of views, privileges and procedures called Packages. Expand the hanahandson Package => Attribute Views. Right click on Attribute Views and choose New => Attribute View



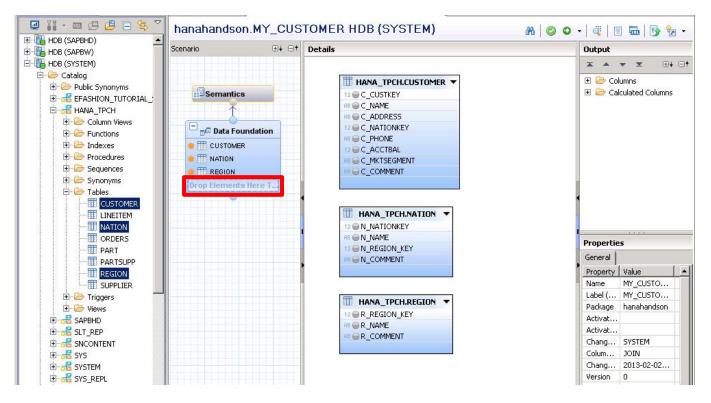
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Name your Attribute View MY\_CUSTOMER and click Finish (description is optional).

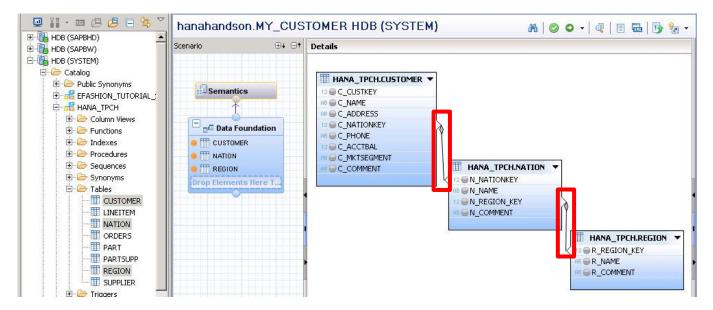
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Choose three tables from the HANA\_TPCH schema: Customer, Nation, Region (you can hold CTRL and select them together) and drag these tables into the Data Foundation area on the canvas. Your screen should now look like this:



Now join the tables by clicking on the key field and dragging to the corresponding keys. So in this example from *Region\_R\_gion\_Key=>Nation.N\_Region\_Key*; *Nation.N\_Nationkey=>Customer.C\_Nationkey*.



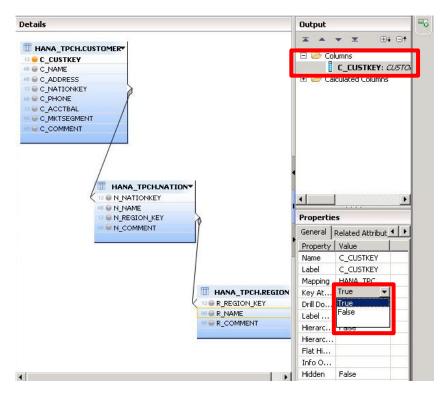
We will now specify the Key Attributes of our View. Select Customer.C\_Custkey and right click 'Add To Output'.



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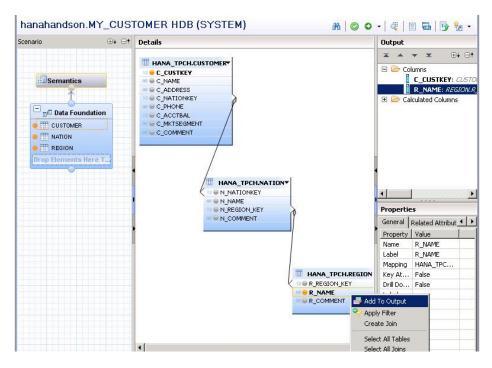
The attribute should now appear in the output on the right hand pane under Columns

The attribute is visible in the Output panel and we now want to make this attribute a key attribute by first selecting it in the columns folder and then in the properties tab selecting the drop down menu and selecting True:

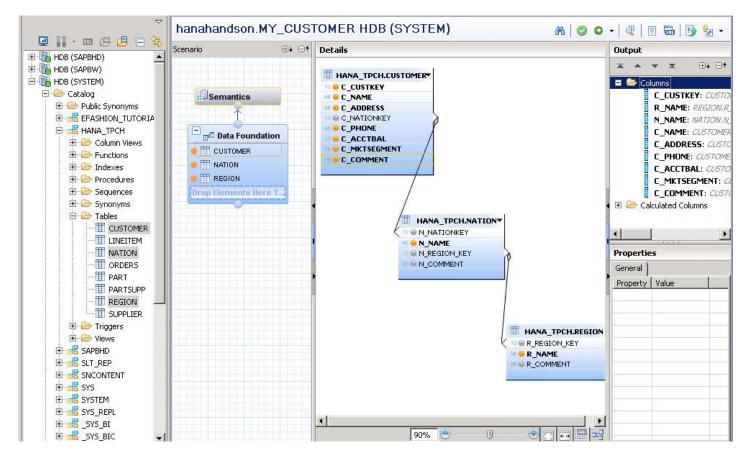




Now add another attribute. Right click on Region.R\_Name and choose *Add as Attribute,* it should now look like the following:

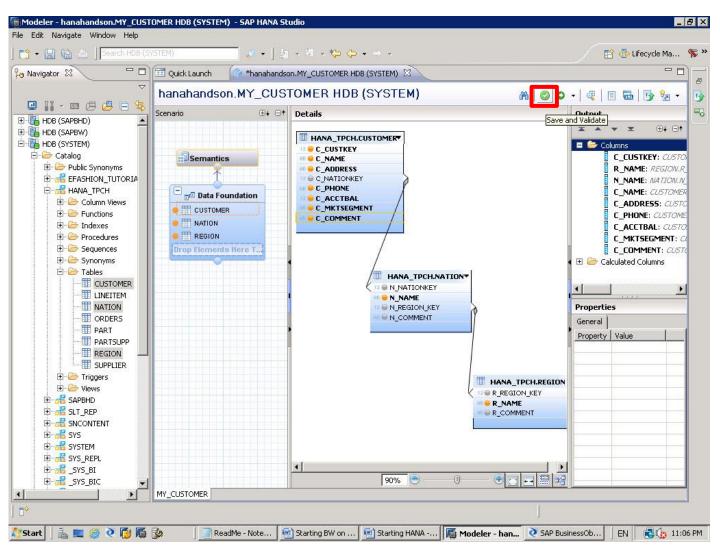


Add the remaining attributes in the same manner as the above: Nation.N\_Name; Customer.C\_Name; Customer.C\_Address; Customer.C\_Phone; Customer.C\_Acctbal; Customer.C\_Mktsegment; Customer.C\_Comment. You should now have the below:





Let us validate the Attribute View - In the top right (above the modeling pane) select the green tick which will *Save and Validate*.



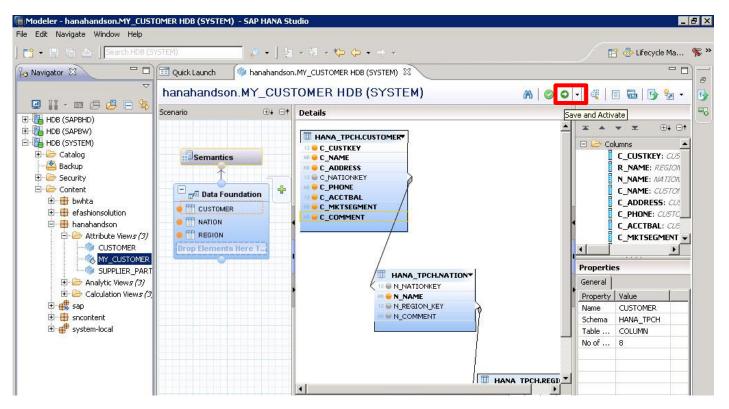
When the validation completes you will see the results in the Validation Log window at the bottom.

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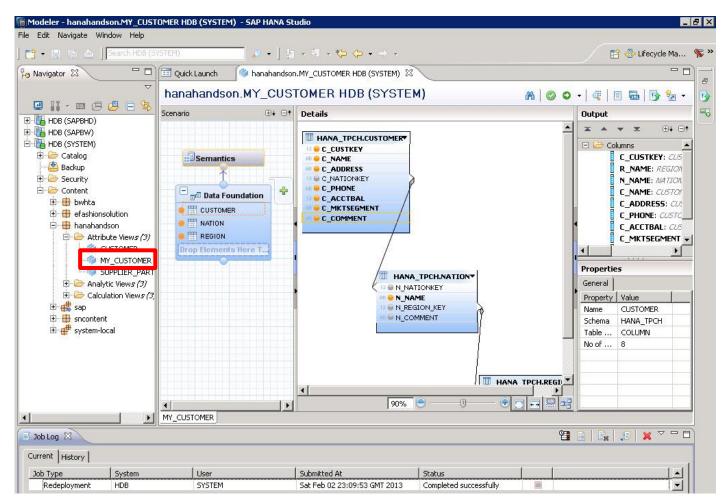
The next step is to activate the View for users to access it. You will notice that the My\_Customer Attribute View has a diamond in its icon in the Navigator Panel. This indicates that you haven't activated the view.



To activate the view select the icon next to where we just validated the view (a right facing arrow), click to activate:

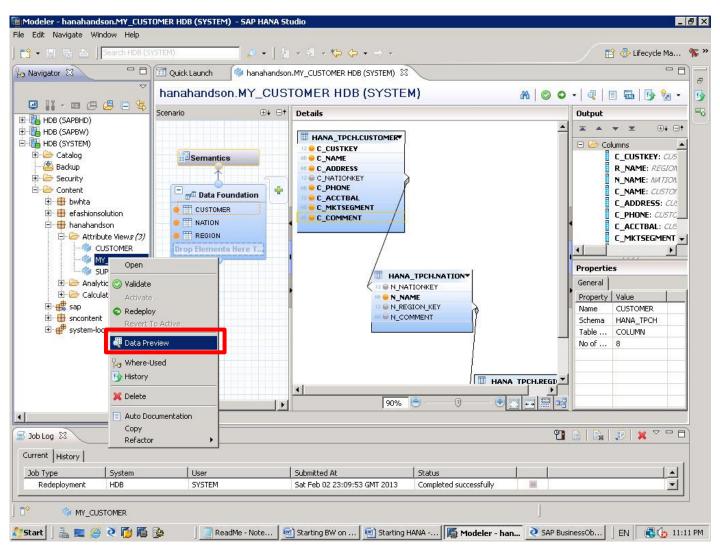


Your Attribute View is now activated:





To test your view, right click on My\_Customer and choose Data Preview

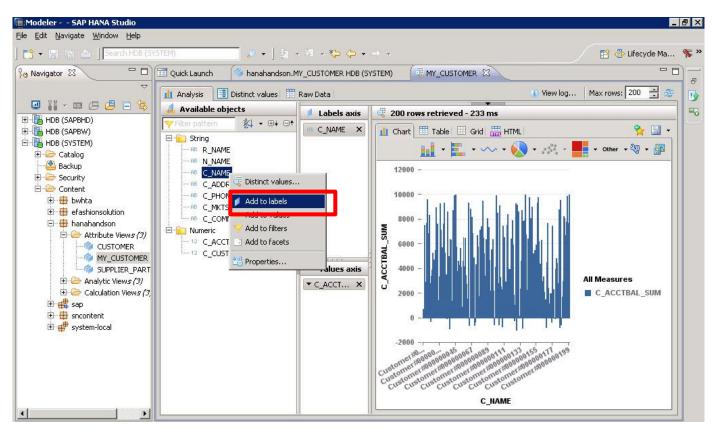


You should now see the data that your attribute view produces in the Raw Data tab.

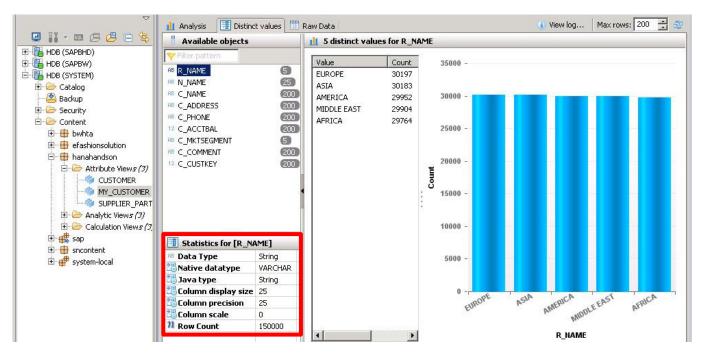
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To further explore the data we could look at the Analysis and Distinct values tabs. We can see the values are separated in to String and Numeric. Select C\_NAME, right click and select 'Add to labels' – this will now appear in the Labels axis. Repeat the same for the C\_ACCTBAL, this should now appear in the Value axis like below:



In the Distinct values tab we can see further details on the attributes stored in the SAP HANA database such as the; data type, column display size, java type and row count.



#### **Analytic Views**

Analytic views are used to build a data foundation based on transactional tables. You can create a selection of measures (sometimes referred to as key figures), add attributes and join attribute views.

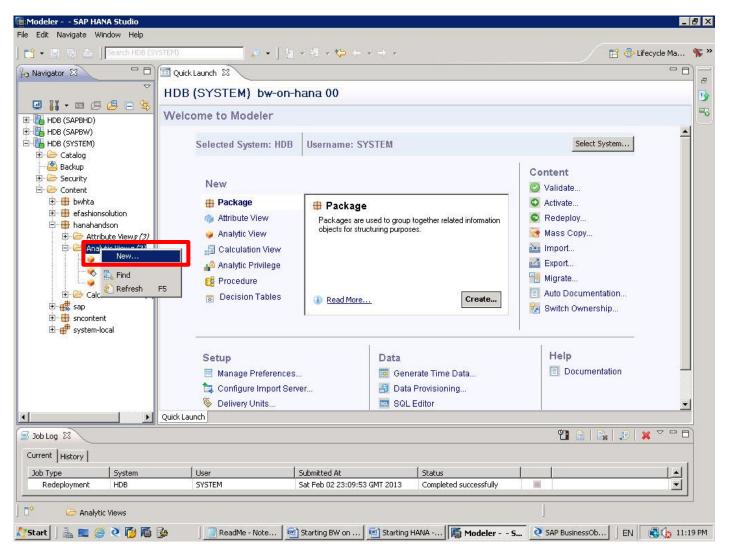


Analytic views leverage the computing power of SAP HANA to calculate aggregate data, e. g. the number of sold cars per country, or the maximum power consumption per day. They are defined on at least one *fact table*, i. e. a table which contains e. g. one row per sold car or one row per power meter reading, or more generally speaking, some form of business transaction records. Fact tables can be joined to allow access to more detailed data using a single analytic view. Analytic views can be defined on a single table, or joined tables.

Analytic views can contain two types of attributes (or columns), so-called *measures* and *normal attributes*. Measures are attributes for which an aggregation must be defined. Normal attributes can be handled as regular columns and there is no need for aggregation.

### Hands-on Labs

Now we will create an Analytic View. Right click on Analytic View under the hanahandson Package and choose New => Analytic View

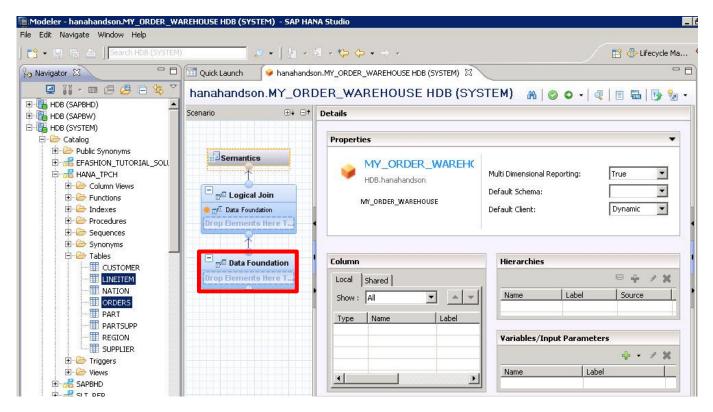




Name your Analytic View MY\_ORDER\_WAREHOUSE and click Next.

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From the HANA\_TPCH schema add the Orders and LINEITEM tables to your view by select either one by one or holding CTRL and then dragging them into the Data Foundation area on the canvas.

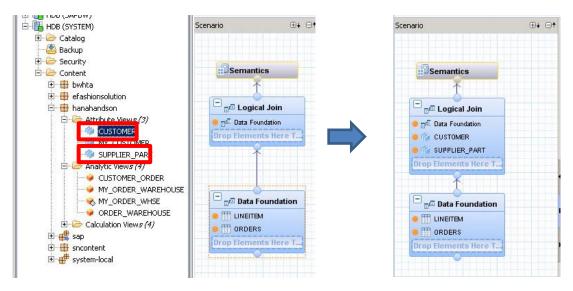


You should now have the below showing tables: ORDERS and LINEITEM:



5cenario ⊕∔ ⊖†	Details		Output	
				• ± ±=+
Constraints	Image: An analysis of the second	HANA_TPCH.LINEITEM Y 12 L_ORDERKEY 12 L_PARTKEY 12 L_SUPPKEY 12 L_INENUMBER 12 L_OUANTITY 12 L_EXTENDEDPRICE 12 L_OISCOUNT 12 L_EXTENDEDPRICE 12 L_TAX 13 L_EXTENDEAG 14 L_INESTATUS 15 L_SHUPDATE 19 L_COMMITDATE 19 L_SHUPDATE 19 L_SHUPDATE 19 L_SHUPDATE 19 L_SHUPMODE 10 L_SHUPMODE 10 L_COMMENT	Colu     Colu     Colu     Colu     Colu     Columnation     Columnation     Columnation     Columnation     Columnation     Columnation     Columnation     Columnation     Columnation     Columnation	ut Parameters
	100% 😑 —			

We will now add two Attribute Views: hanahandson.CUSTOMER and hanahandson.SUPPLIER\_PART. To do this we will follow the same principal by expanding the *content* folder then dragging the Customer and Supplier attributes into logical join area.



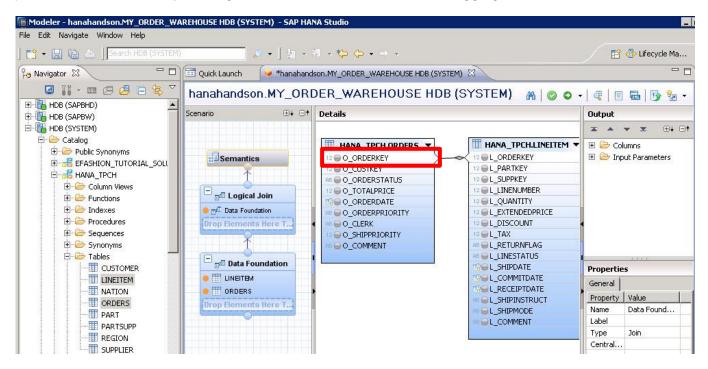
We should now see the following (notice currently the Data Foundation is unpopulated):



#### hanahandson.MY\_ORDER\_WAREHOUSE HDB (SYSTEM)

irio 🗄	9∔ ⊝†	Details			
Semantics		🌾 hanahan	dson.CUSTOMER 🔻	🌾 hanal	andson.SUPPLIER_PART
*		12 😑 C_CUSTKEY		12 - PS_PARTKE	
		AB 😑 R_NAME	Region		Y
- Dia Logical Join			Nation	AB 🥪 S_NAME	Supplier Name
		RE C_MKTSEGMENT	Market Segment	AB 😑 S_ADDRES	Supplier Address
Data Foundation		AB 😑 C_NAME	Customer Name	AB 😑 S_PHONE	Supplier Phone
CUSTOMER		AB 😑 C_ADDRESS	Customer Address		Name
SUPPLIER_PART		AD C_PHONE	Customer Phone	AB 😑 P_MFGR	Manufacturer
Drop Elements Here T		C_ACCTBAL	Customer Account	RE - P_BRAND	Brand
		C_COMMENT	Customer Comment	AB 😑 P_TYPE	Туре
Ť				12 - P_SIZE	Size
		-		P_CONTAIN	ER Container
Data Foundation				P_RETAILP	RICE Retail Price
E TT LINEITEM	1		e 🗉 Data Fo	S_ACCTBAL	Supplier Account B
• T ORDERS			e · Data Fo	PS_AVAILQ	TY Quantity Available
, have well been any two ones not need one way that the two ones not need on				PS_SUPPLY	COST Supplier Cost
Drop Elements Here T	-				

Selecting the Data Foundation area we should now see the tables presented in the canvas. Here we will join the two fact tables by clicking on Orders.O\_ORDERKEY and dragging to Lineitem.L\_ORDERKEY:

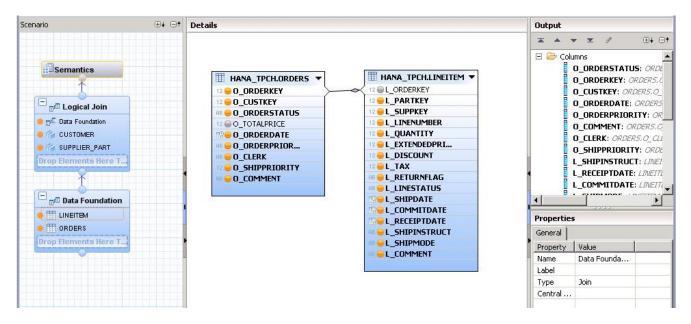


Now add the attributes to the output from Orders: O\_Orderkey, O\_Custkey, O\_Orderstatus, O\_Orderdate, O\_Orderpriority, O\_Clerk, O\_Shippriority, O\_Comment



😭 🔸 🔛 🔞 🛓 🛛 Search HDB (SYSTEM)	📃 🥓 🔹 🔤 🕫	2 <b>• ♥ ↔ •</b> → •		📑 👶 Lifecycle Ma
9 Navigator 🛛 🖓 🖓 🖓 🖓 🖓		SON.MY_ORDER_WAREHOUSE HDB (SYSTEM)	STEM) ALO O -	
HDB (SAPBHD)	Scenario ⊕+ ⊡†	Details		Output
HDB (SYSTEM) Catalog	Semantics	12       0_ORDERKEY       13         12       0_CUSTKEY       13         12       0_ORDERSTATUS       13         12       0_TOTALPRICE       13         12       0_ORDERPRICE       13         12       0_ORDERPRIOR       13         12       0_ORDERPRIOR       13         12       0_ORDERPRIOR       13         12       0_CLERK       13         12       0_COMMENT       14         12       0_COMMENT       14         14       0_COMMENT       14	HANA_TPCH_LINEITEM ▼ L_ORDERKEY L_PARTKEY L_SUPPKEY L_LINENUMBER L_QUANITY L_EXTENDEDPRICE L_DISCOUNT L_TAX L_RETURNFLAG L_LINESTATUS L_SHIPDATE L_SHIPDATE L_SHIPMODE L_COMMENT	Columns O_ORDERKEY: 0 O_ORDERSTAT O_ORDERSTAT O_ORDERSTAT O_ORDERPION O_SHIPPRIORI O_SHIPPRIORI O_CLERK: 0706 O_SHIPPRIORI O_CLERK: 0706 O_SHIPPRIORI O_COMMENT: ( Value Name O_ORDERKEY Data T INTEGER Filter

And repeat the same for the whole of the LINEITEM table apart from L\_ORDERKEY, you should now have the below:



Now we are going to define the attribute type. First select the Semantic level in our scenario:



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🖃 🖃 🛛 Logic	al Join
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😐 🎹 ORDER	s 🚽
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You should then see the following screen where we will define our attributes:

ario	⊕∔⊡†	Details							
		Properti	es					•	
Logical Join	ical Join oundation DMER		Logical Join Data Foundation CUSTOMER SUPPLIER_PART				Multi Dimensional Reporting: True   Default Schema:  Default Client: Dynamic		
Drop Elements Here T		Column					Hierarchies		
		Local	Shared					8 4 / X	
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😑 📅 LINEITEM		Show :	All	]	* <b>v</b> 1	···· 📑	Ivanie Laber	Joarce	
e 🌐 orders		Туре	Name	Label	Aggregation	Variab 🔺			
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			12 O_CUSTKEY	O_CUSTKEY					
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			RB O_ORDERP	O_ORDERPRIO			Variables/Input Paran	neters	
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			RB O_CLERK	O_CLERK			-		
			12 O_SHIPPRI				Name	Label	
			RE L_SHIPINST						
			L_RECEIPT			-			
			L COMMIT	L COMMITDATE					
					1	-			

To change the type we will select the attribute and then a dropdown menu will appear prompting us to either select the field as an Attribute or Measure. Repeat this for the remainder (or alternatively for a faster way we could select multiple attributes by holding the shift key and select the relevant icon marked in the small red box). The fields: L\_TAX, L\_QUANTITY,L\_DISCOUNT and L\_EXTENDEDPRICE are to be selected as measures.



rio	⊕∔⊖†	Details	
		Properties	
Semantics		WIDE.hanahandson	Multi Dimensional Reporting: True   Default Schema:  Default Client:  Dynamic
Drop Elements Here T		Column	Hierarchies
ŢŢ		Local Shared	
Data Foundation			Name Label Source
III LINEITEM		Show : All	
ORDERS		Type Name Label Aggregation Variable	
Drop Elements Here T		✓ AB O_ORDERS O_ORDERSTATUS	
0		Attribute	
		Measure Y	
		TE T	Variables/Input Parameters
		AB         O_ORDERP         O_ORDERPRIO         Y         Y           AB         O_COMMENT         O_COMMENT         Y         Y	
		AB O_CLERK O_CLERK	֥/X
		12 O_SHIPPRI O_SHIPPRIORITY	Name Label
	_	ME L_SHIPINST L_SHIPINSTRUCT	
		L_RECEIPT L_RECEIPTDATE	
		L COMMIT L COMMITDATE	

# You should now have something similar to the below:

Properties         Image: Description of the stress of th	Reporting: True 💌
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Column Hierarchies	
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Type Name Label Aggregation Variable	
Drop Elements Here T 12 L_TAX L_TAX SUM	
12. L_QUANTITY L_QUANTITY SUM	
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12 L_LINENUM L_LINENUMBER	
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RE L_LINESTAT L_LINESTATUS	- / X
12 L_PARTKEY L_PARTKEY V_PARTKEY V_PARTKEY Name	Label
	Laber
RB L_COMMENT L_COMMENT	



Switch to the Logical View so we can see the Attribute Views as well as the Data Foundation (which is the joined fact tables ORDERS and LINEITEM):

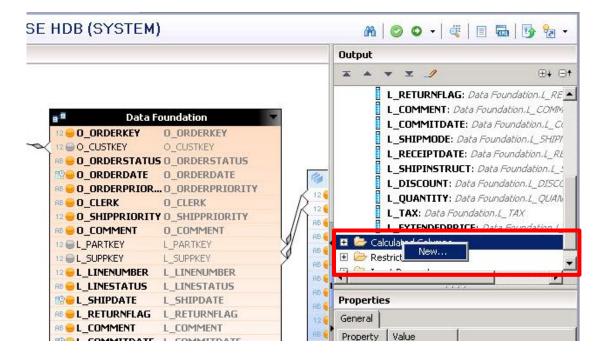
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C_MKTSEGMENT			Se O_ORDERDATE			Supplier Name	
	Customer Name			O_ORDERPRIORITY	RE - S_ADDRESS	Supplier Address	
	Customer Address			O_CLERK	AB 😔 S_PHONE	Supplier Phone	
	Customer Phone					Name	
	Customer Account			O_COMMENT	AB 😑 P_MFGR	Manufacturer	
	Eustomer Comment			L_PARTKEY	AB 😑 P_BRAND	Brand	
	sassing connent			L_SUPPKEY	AB 😑 P_TYPE	Туре	
					12 e P_SIZE	Size	
					P_CONTAINER	Container	
				L_SHIPDATE	P_RETAILPRICE	Retail Price	
				L_RETURNELAG	S_ACCTBAL	Supplier Account B	
					PS_AVAILQTY	Quantity Available	
				L SHIPMODE	PS_SUPPLYCOST	Supplier Cost	
				L DISCOUNT			
				L_QUANTITY			
				L TAX			
			and the second sec	L_EXTENDEDPRICE			
			Latenverter	- L'ESTENDEDENTEE			

Join the Attribute Views to the Data Foundation: Customer.C\_Custkey  $\rightarrow$  Data Foundation.O\_Custkey; Supplier\_Part.PS\_Partkey  $\rightarrow$  Data Foundation.L\_Partkey; Supplier\_Part.PS\_Suppkey  $\rightarrow$  Data Foundation.L\_Suppkey:

ails						
			📲 🛛 Data Fo	undation 🔹		
🖗 hanahan	idson.CUSTOMER	•		O ORDERKEY		
12 😑 C_CUSTKEY				O CUSTKEY		
R - R_NAME	Region		R - O_ORDERSTATUS	CONTRACTOR CONTRACTOR CONTRACTOR OF		
	Nation				hanahands	
	Market Segment		n O ORDERPRIOR			on.SUPPLIER_PART
	Customer Name			O CLERK	S PS_PARTKEY	
RB 😑 C_ADDRESS	Customer Address				A 12 PS_SUPPKEY	-
	Customer Phone					Supplier Name
C_ACCTBAL	Customer Account			L PARTKEY	AB S_ADDRESS	Supplier Address
	Customer Comment				AB S_PHONE	Supplier Phone
				Contraction of the second s		Name
					AB P_MFGR	Manufacturer
			the second s	L SHIPDATE		Brand
				L_RETURNFLAG		Туре
				L_COMMENT		Size
				L_COMMITDATE	P_CONTAINER	Container Retail Price
				L_SHIPMODE	P_RETAILPRICE	Supplier Account B
			19 L_RECEIPTDATE	L_RECEIPTDATE	PS AVAILOTY	Quantity Available
			R - L_SHIPINSTRUCT	L_SHIPINSTRUCT		
			12 - L_DISCOUNT	L_DISCOUNT	PS_SUPPLICUST	supplier cost
			12 - L_QUANTITY	L_QUANTITY		
			12 - L_TAX	L_TAX		
			12 - L_EXTENDEDPRI	L EXTENDEDPRICE		



Now add a Calculated Measure to your Analytic View. From the Output window on the right, right click on Calculated Measures and choose *New*.



Call the new column L\_LINETOTAL and use a SUM Aggregation type, by selecting the 'Calculate before Aggregation' check box and ensure the 'Hidden' box kept unchecked.

🖥 Calculated Co	lumns		×
Calculated C Create a new Ca			
Name:*	L_LINETOTAL		
Label:	L_LINETOTAL		*
Data Type:	DECIMAL	Length: 15 Scale: 2	
Column Type:	Measure		•
Aggregation Type	e: SUM		-
Hidden	Calculate Before Aggregation		

In the Expression Editor type: if(isnull(

Then expand the Columns folder in the Elements box and click on L\_Discount to add it to the expression.

Then type: ),0,((

And add the L\_Extendedprice measure.



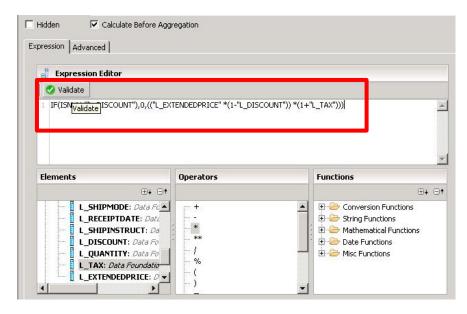
Next click the \* from the Operators window:

xpression Advanced		
Expression Editor		
🤣 Validate		
1 if(isnull("L_DISCOUNT"		
Elements	Operators	Functions
Attribute Views  Attribute Views  Columns  O_ORDERSTATUS: Data  O_ORDERCATE: Data  O_SHIPPRIORITY: Data  O_CLERK: Data Founde	+ - *** / % ( ) V	⊕+ □+     Conversion Functions     ⊕ String Functions     ⊕ Mathematical Functions     ⊕ Date Functions     ⊕ Misc Functions

Continue in this until the formula in the Expression Editor reads:

If(isnull("L\_DISCOUNT"),0,(("L\_EXTENDEDPRICE \* (1 – "L\_DISCOUNT")) \* (1 + "L\_TAX"))).

Once you have the below written correctly, check to validate it by selecting the validate icon:

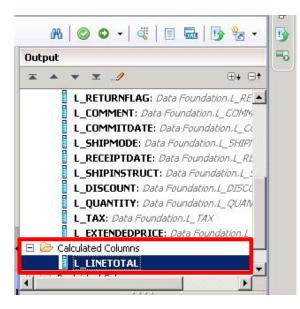




alculated Co	imns		
<b>arcurated Co</b> Treate a new Calc			
lame:*	L_LINETOTAL		
abel:	L_LINETOTAL		
ata Type:	DECIMAL		Length: 15 Scale: 2
olumn Type:	Measure		
ggregation Type:	SUM		
Hidden	Calculate Before Angregat	ion	X
1 IF(ISNULL(			
			<u> </u>
Elements	0p	erators	Functions



The Calculated Measure will now appear in the Output Window:



Save and Validate your view:



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🔟 Quick L	aunch 🛛 😺 han	ahandson.MY_ORDER_WAREH	HOUSE HDB	B (SYSTEM)					- E
hanah	andson.MY_	ORDER_WAREH	OUSE	HDB (SYSTEM	)		28	🔘 🗸 🖌 🔘 🔘	🗉 🖬 📑 🈼 -
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AB 🦷	C_MKTSEGMENT C_NAME C_ADDRESS	Market Segment Customer Name Customer Address			O_ORDERPRIORITY O_CLERK	R		L_DISCOUNT: Data L_QUANTITY: Data	Foundation.L_DISCC Foundation.L_QUAN
AB 🦷	C_PHONE C ACCTBAL	Customer Phone Customer Account			COMMENT		Propertie	5	
RO		Customer Comment			L_SUPPKEY	9	General	1	
				Image: Contract of the second seco	L_LINESTATUS L_SHIPDATE		Property Name Label	Value L_LINETOTAL L_LINETOTAL	
					L_COMMENT		Formula Aggreg	IF(ISNULL(" SUM	
					L_SHIPMODE		Measur Hidden	Simple False	

#### Confirm that it validated

Job Log 🛛		<b>1</b>				
urrent History	System	User	Submitted At	Status		
Job Type						

Activate your view – Click Activate and Confirm Activation:

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	AA   ©	<b>0</b> - 🥨	- 8 🔂   🗗 🗉	8 13	
Ou	ltput	Save and Ac	tivate	-0	
bLog 🕱	* *	¥ _1	⊕∔⊝†		 <b>■ ■ ×</b> <sup>~</sup>

Test your view by previewing the data. Right click My\_Order\_Warehouse  $\rightarrow$  Data Preview



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		🐺 Data Preview
Job Log 🛛		B History
Job Log X Current History		
	System	B History
Current History	System HDB	History

# Data Preview of your Analytic View:

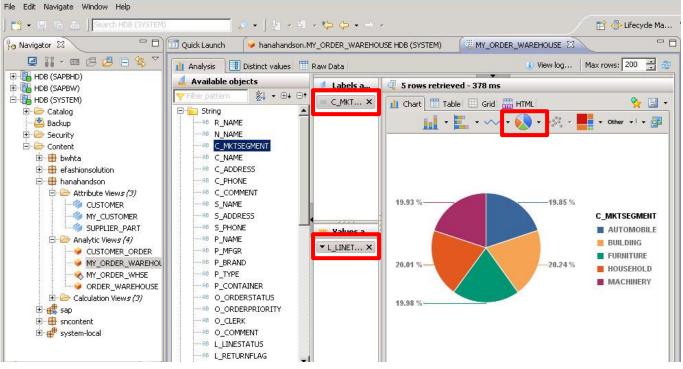
e Edit Navigate Window Help							
📬 🗣 📓 📳 📤 🗍 Search HDB (SYSTEM)		😺 • 🛛 🖢 •	8 • <b>* ⇔ ↔</b> • + •				📑 👶 Lifecycle Ma
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HDB (SAPBHD)	Filter pattern		rows retrieved - 8 sec,	24E mc		0	🗸 Add filter 🔹 🔚
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HDB (SYSTEM)	R_NAME	AR N_NAME	C_MKTSEGMENT	R C_NAME	AB C_ADDRESS	C_PHONE	12 C_ACCTBAL
🗄 🧁 Catalog	AMERICA	UNITED STATES	FURNITURE	Customer#00	BAtPLC5,5xYbtVF	34-450-272-7724	4573.19
🐣 Backup	MIDDLE EAST	EGYPT	MACHINERY	Customer#00	,uvxWwH3joE	14-169-307-3770	6966.28
🗄 🗁 Security	AMERICA	ARGENTINA	BUILDING	Customer#00	H7fGzj0KfKP×V0doU	11-140-334-3187	3234.98
🖻 🗁 Content	EUROPE	GERMANY	HOUSEHOLD	Customer#00	EAc7c8eOVQO86	17-154-767-4182	8064.76
🗄 🌐 bwhta	MIDDLE EAST	IRAQ	BUILDING	Customer#00	WuRVUNePUd,8m	21-359-914-4821	1844.92
🗄 🖶 efashionsolution	AMERICA	ARGENTINA	HOUSEHOLD	Customer#00	2L yfq04x0UH6zFl	11-744-367-7926	8100.02
🗄 🌐 🖶 hanahandson	EUROPE	GERMANY	AUTOMOBILE	Customer#00	oBStri 1P0DPu7ut	17-535-410-3476	1200.98
🗄 🗁 Attribute View <i>s (3)</i>	EUROPE	UNITED KING	BUILDING	Customer#00	lkAQu4mZq9M7kF	33-545-693-4672	1232.68
CUSTOMER	AFRICA	ALGERIA	BUILDING	Customer#00	ZGnmXBytBmxnD	10-379-154-7742	4650.39
MY_CUSTOMER	MIDDLE EAST	IRAQ	FURNITURE	Customer#00	0J89ViUEgQfj3FD	21-369-652-4623	2003.76
SUPPLIER_PART	EUROPE	UNITED KING	AUTOMOBILE	Customer#00	8Bz5d1tO6JwjcNX	33-802-441-1448	2435.7
🗄 🗁 Analytic View <i>s (4)</i>	MIDDLE EAST	JORDAN	FURNITURE	Customer#00	AtSJ16zTBVUP9c	23-397-655-3573	1151.11
CUSTOMER_ORDER	EUROPE	RUSSIA	HOUSEHOLD	Customer#00	CWu6243T PBZKV,B	32-999-997-7602	5768.21
MY_ORDER_WAREHOL	AFRICA	ALGERIA	HOUSEHOLD	Customer#00	3LQGEmUtLSON, V	10-528-518-8995	-434.64
MY ORDER WHSE	ASIA	CHINA	MACHINERY	Customer#00	Kw2lqFcz6bn0h5A	28-908-257-2723	4249.36
ORDER WAREHOUSE	AMERICA	ARGENTINA	BUILDING	Customer#00	NoodOxrl,ZEWLkF	11-492-784-3384	3749.7
	ASIA	JAPAN	MACHINERY	Customer#00	dp2KsbzGt4aFzne	22-655-913-4127	1348.2
🗄 🌐 🏥 sap	MIDDLE EAST	EGYPT	MACHINERY	Customer#00	amKKa8NzVZgn4b	14-664-340-7479	-289.75
	MIDDLE EAST	IRAN	HOUSEHOLD	Customer#00	cZIxABhEKUWbf0	20-636-431-2847	1125.24
🗄 🕂 system-local	AFRICA	ETHIOPIA	FURNITURE	Customer#00	teozk9fZJm8OVp9	15-567-575-4330	4290.47
andra 🗰 e e e assanna 77713	ASIA	INDONESIA	BUILDING	Customer#00	iPjKQeh8YgQFy6	19-225-613-2648	2086.79
	EUDIODE	DOMANITA	MACUTHEDY	Cuchomor#00	Incofelmun 1 TM-	00 000 000 0100	1200 20

We can do some analysis on the data by selecting the Analysis tab. Click and drag C\_MKTSEGMENT into the label axis and repeat the same for L\_LINEITEM then drag the numeric attribute into the Value axis:

To see a different visulatisation select the pie chart symbol.



# Modeler - - SAP HANA Studio



#### **Calculation Views**

Calculation views are used to provide composites of other views. They are essentially a view which is based on the result from SQLScript. These scripts can join or union two or more data flows or invoke built-in or generic SQL functions.

Calculation views are defined as either *graphical views* or *scripted views* depending on how they are created. They can be used in the same way as analytic views, however, in contrast to analytic views it is possible to join several fact tables in a calculation view. Calculation views always have at least one measure.

Graphical views can be modeled using the graphical modeling features of the SAP HANA Information Modeler. Scripted views are created as sequences of SQLScript statements. In essence they are SQLScript procedures with certain properties.



# Hands-on Labs

Modeler - - SAP HANA Studio \_ E <u>File Edit Navigate Window H</u>elp | 🔎 • | 🖢 + 🕅 + 🏷 🗘 • 🔿 + 📘 📑 👻 🔛 🕼 🖻 🖉 Search HDB ( 📑 🚳 Lifecycle Ma... - 0 🗖 🗖 🔟 Quick Launch 🕅 🔒 Navigator 🕄 🖳 🚺 • 💷 🖪 🥵 🏱 HDB (SYSTEM) bw-on-hana 00 E HDB (SAPBHD) Welcome to Modeler 🗄 🚹 HDB (SAPBW) 🗄 📳 HDB (SYSTEM) . 🗄 🗁 Catalog Select System... Selected System: HDB Username: SYSTEM 🖄 Backup 🗄 🗁 Security E- Content Content New 🗄 🔠 bwhta 📀 Validate... 🗄 🜐 efashionsolution 🖶 Package Activate... 🖶 Package 🖻 🌐 hanahandson C Redeploy... 🍘 Attribute View Packages are used to group together related information objects for structuring purposes. 🗄 🗁 Attribute Views (3) 😼 Mass Copy... 🤪 Analytic View 🗄 🗁 🗁 Cal Laboration (20) 🚵 Import... New.. Calculation View 🏥 sap ÷ Z Export... 📫 Analytic Privilege 🕂 🖽 sncont 🔝 Find E Brefresh 💾 Migrate... 🕵 Procedure F5 Auto Documentation... 👿 Decision Tables (1) Read More ... Create... 🚼 Switch Ownership... Help Setup Data Documentation 🗉 Manage Preferences... 🥫 Generate Time Data... .....

Right click on Calculation View and choose New => Calculation View

Name it MY\_ORDERS\_CY\_PY. We will be making this as a graphical view so make sure that Graphical is the View Type. Click Next.



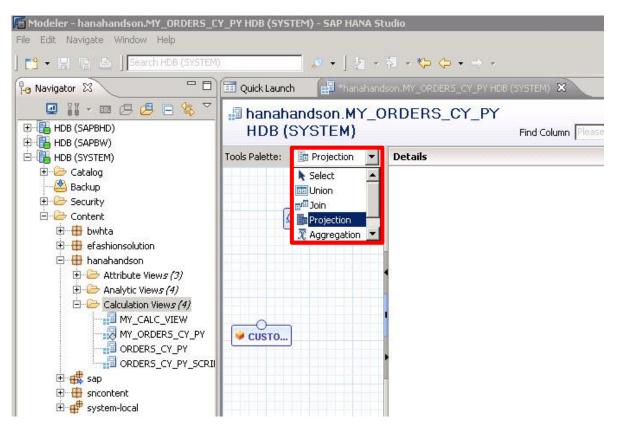
🖥 New Calcu	lation ¥iew	
C <b>alculatio</b> This wizard cr	<b>n View</b> reates a calculation view in the specified package.	
Name:*	MY_ORDERS_CY_PY	
Description	MY_ORDERS_CY_PY	
Package:*	hanahandson	Browse
• Create Ne	W	
C Copy Fron	n	Browse,,,
View Type Graphi CSQL Sc Schema for c		×
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Expand the Content Folder. Expand the hanahandson Package and Analytic Views and add the Customer\_order analytic view. Click Finish.



ilable			Selected
Content			
Attribute Views (3)	DER	Add	
→ MY_ORDER_WH → ORDER_WAREH ⊕ ← Calculation View <i>s (3)</i> ⊕ ⊕ sncontent	OUSE	Remove	
⊞-∰ system-local			

We need to add a Projection Component to our view.

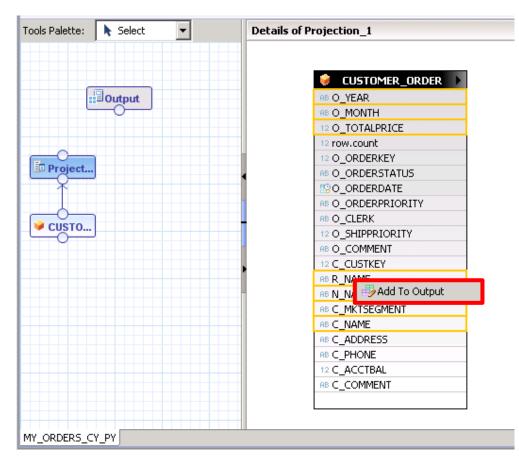


Link the Customer\_Order to the Projection. Mouse over Customer\_order and click and hold Create Connection and drag to the Projection component



Tools Palette: 📐 Select 💌	Details of Projection_2
①Output ■ Project	CUSTOMER_ORDER
CUSTO	AB O_CLERK 12 O_SHIPPRIORITY AB O_COMMENT 12 C_CUSTKEY AB R_NAME AB N_NAME
	AB C_MKTSEGMENT AB C_NAME AB C_ADDRESS AB C_PHONE 12 C_ACCTBAL AB C_COMMENT

Click the Projection Component and add the following fields to the output: R\_Name, N\_Name, C\_Mktsegment, C\_Name, O\_Year, O\_Month, O\_Totalprice



Apply a filter to O\_Year so that Year = 1998. Right click on Customer\_Order. O\_Year  $\rightarrow$  Apply Filter



HDB (SYSTEM)	Tools Palette: 📐 Select 🗸 👻	Details of Projection_1	Output of Projection_1
🔁 🗁 Catalog			🏦 🔺 🎾 🖽 Of
- 🐣 Backup			
🗄 🗁 Security		🗧 CUSTOMER_ORDER 🕨	🗉 🗁 Columns
🖻 🗁 Content	Output	RE O_YEAD	AB R_NAME: CUSTO
😟 🖶 bwhta		AB O_MON 🖶 Add To Output	RE N_NAME: CUSTO
🗄 🖶 efashionsolution		12 0_TOT	RE C_MKTSEGMENT
🗄 🖶 hanahandson		12 row.cou 🦖 Apply Filter	RE C_NAME: CUSTO
🗄 🗁 Attribute Views (3)	I Project →	12 O_ORDERKEY	RB O_YEAR: CUSTON
😟 🗁 Analytic Views (4)		RE O_ORDERSTATUS	RB O_MONTH: CUST
E-Calculation Views (4)		C_ORDERDATE	12 O_TOTALPRICE:
MY_CALC_VIEW		I RE O_ORDERPRIORITY	l 🛛 🗁 Calculated Columns
MY_ORDERS_CY_PY	v custo	AB O_CLERK	🗁 Input Parameters
ORDERS_CY_PY	C0510	12 O_SHIPPRIORITY	🖻 🗁 Filters
ORDERS_CY_PY_SCRI		AB O_COMMENT	Expression
		12 C_CUSTKEY	
E B sncontent		RE R_NAME	
sitentent     system-local		AB N_NAME	
🗄 🖶 system-local		RB C_MKTSEGMENT	
		AB C_NAME	
		AB C_ADDRESS	
		AB C_PHONE	
		12 C_ACCTBAL	2
	MY_ORDERS_CY_PY		•

Operator:	Equal		
alue:	1998		
	1		

Create a Calculation Column for the Current Year. Right click on Calculation Column => New

Fools Palette:	▶ Select	Details of Projection_1	Output of Projection_1
			▲ ▲ 🔎 ⊕+ ⊖†
		CUSTOMER_ORDER	🖂 🗁 Columns
1	Output	RE O YEAR	AB R_NAME: CUSTOM
			RB N_NAME: CUSTOM
		12 O TOTALPRICE	AB C_MKTSEGMENT:
		12 row.count	AB C_NAME: CUSTOM
Project	-	12 O_ORDERKEY	▲ PE O_YEAR: CUSTOME
Q		AB O ORDERSTATUS	AB O_MONTH: CUSTO
	1	1 O ORDERDATE	
		I RE O_ORDERPRIORITY	Calculati
0	1	AB O_CLERK	Carloret Party Toput Party Top
VCUSTO	]	12 O_SHIPPRIORITY	🗉 🗁 Filters
		RE O_COMMENT	Expression
		12 C_CUSTKEY	
		AB R_NAME	
		AB N_NAME	
		RB C_MKTSEGMENT	
		RB C_NAME	
		RB C_ADDRESS	
		RB C_PHONE	
		12 C_ACCTBAL	



Name it CY\_ORDERS, Data Type is Decimal Length 10 Scale 2, add O\_TOTALPRICE to the Expression Editor.

te a new Calculated Column			
lame:* CY_ORDERS			
UNION J CT_ORDERS			
ata Type: DECIMAL	Length: 10	icale: 2	
Expression Editor			
🕑 Validate			
1 "O_TOTALPRICE"			
			<b>•</b>
Elements	Operators		Functions
Elements ⊕∔ (		±+ =†	Functions ⊕+ ⊖*
E-B-Columns			⊕+ ⊖* ⊕- 🗁 Conversion Functions
⊕+ ( ⊡⁄Ə Columns	ot		⊕+ ⊖*     Conversion Functions     ⊕-
	ot		⊕+ ⊖* ⊕- 🗁 Conversion Functions
€+ ( Columns R_NAME B N_NAME C_MKTSEGMENT C_NAME	■+ 		<ul> <li>⊕+ ⊖<sup>n</sup></li> <li>⊕- </li> <li>⊖- </li> <li>⊖- </li> <li>⊖- </li> <li>⊖- </li> <li>⊖- </li> <li>⊖- </li> <li>→- <!--</td--></li></ul>
Columns     R_NAME     N_NAME     C_MKTSEGMENT     C_NAME     C_NAME     C_NAME     O_YEAR			<ul> <li>⊕+ ⊖<sup>*</sup></li> <li>⊕- </li> <li>Generations</li> <li>⊕- </li> <li>⊕- </li> <li>Bathematical Functions</li> <li>⊕- </li> <li>⊕- </li> <li>⊕- </li> <li>Date Functions</li> </ul>
Columns     R_NAME     R_NAME     C_MKTSEGMENT     C_NAME     C_NAME     C_NAME     O_YEAR     O_MONTH	■+ 		<ul> <li>⊕+ ⊖<sup>*</sup></li> <li>⊕- </li> <li>Generations</li> <li>⊕- </li> <li>⊕- </li> <li>Bathematical Functions</li> <li>⊕- </li> <li>⊕- </li> <li>⊕- </li> <li>Date Functions</li> </ul>
Columns     Columns     R_NAME     SOUTHERS     COMKTSEGMENT     COMKTSEGMENT     COMKE     OYEAR	■+ 		<ul> <li>⊕+ ⊖<sup>*</sup></li> <li>⊕- </li> <li>Generations</li> <li>⊕- </li> <li>⊕- </li> <li>Bathematical Functions</li> <li>⊕- </li> <li>⊕- </li> <li>⊕- </li> <li>Date Functions</li> </ul>

Validate the expression:

🤣 Validate 🛛 🛐	Valid expression	X
"O_TOTALPF	Valid expression	OK

Create another Calculated Column for the Prior Year. Right click on Calculation Column → New



tails of Projection_1	Output of Projection_1
	🔺 🏥 🔺 💉 🖉 🖽 Ot
🜻 CUSTOMER_ORDER 🕨	🖂 🗁 Columns
	R_NAME: CUSTOM
	RE N_NAME: CUSTOM
	AB C_MKTSEGMENT:
12 row.count	AB C_NAME: CUSTOM
12 O ORDERKEY	A RE O YEAR: CUSTOM
	AB O MONTH: CUSTO
130 ORDERDATE	
	🗖 🗖 🗁 Calculate
RE O CLERK	12 CY New
12 O SHIPPRIORITY	🗁 Input Parameters
	🕨 🖃 🤛 Filters
12 C CUSTKEY	Y Expression
12 C_ACCTBAL	

Name it PY\_Orders, Decimal Length 10 Scale 2 and add the number 0 to the Expression Editor. (We need this field so that the union will function properly. All queries in a union need the same number of fields)

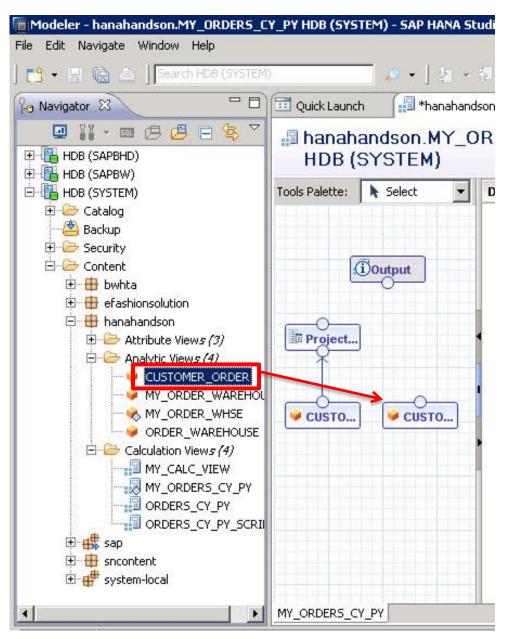
Calculated Column	
alculated Column	
Create a new Calculated Column	
N	
Name:* PY_ORDERS	
Data Type: DECIMAL Length: 10 5	Scale: 2
Expression Editor	
Validate	
1 0	
	-

Validate expression and OK to close the editor:



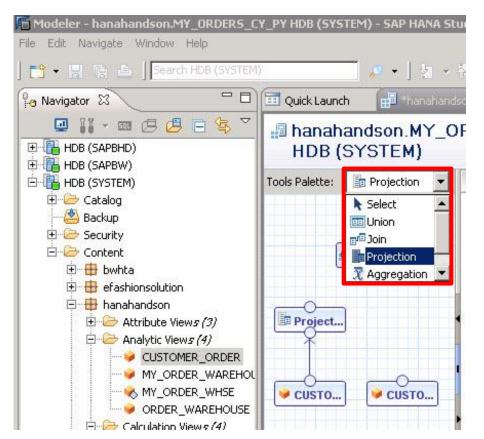


Now we will add the Prior Year to the Calculation View. Expand Analytic Views on the Navigator and drag Customer\_Order onto the pallet.

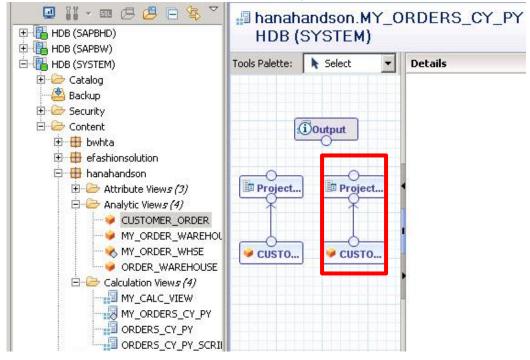


Add a Projection Component:



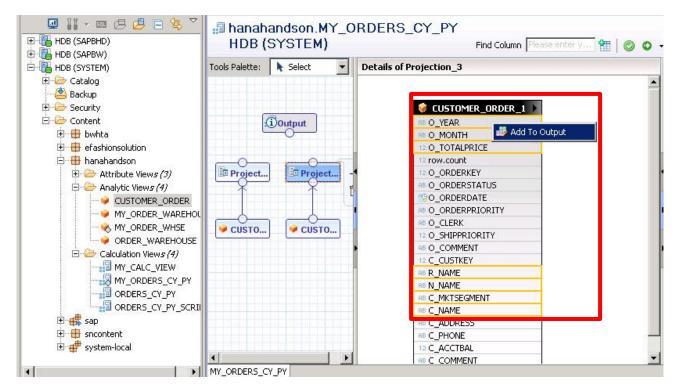


Link the new Customer\_Order to the new Projection.

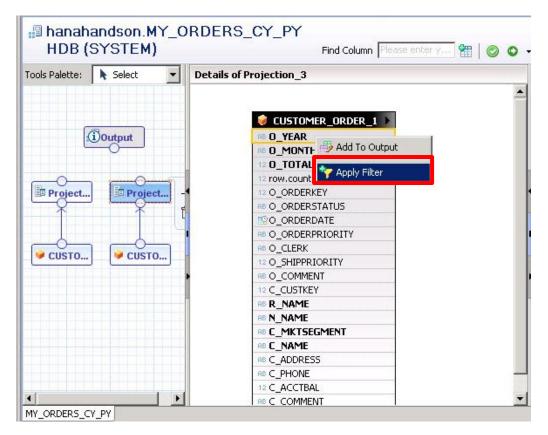


Select the new Projection Component and add the following fields to the output: R\_Name, N\_Name, C\_Mktsegment, C\_Name, O\_Year, O\_Month, O\_Totalprice:





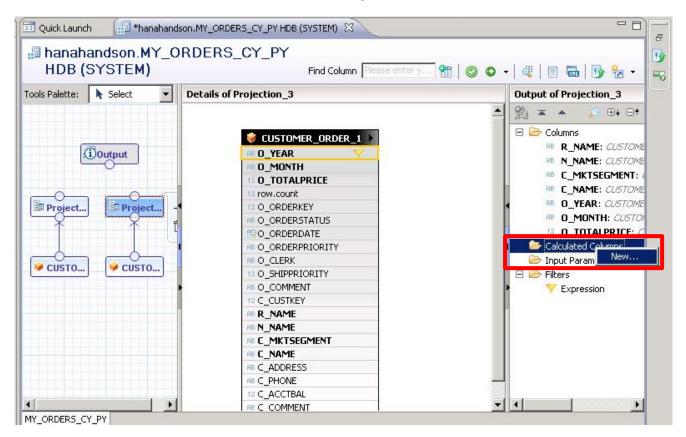
Apply a filter to O\_Year so that Year = 1997. Right click on Customer\_Order. O\_Year  $\rightarrow$  Apply Filter:





	r		
Operator:	Equal	•	
Value:	1997		111
	l.		
		K 📘	Cancel

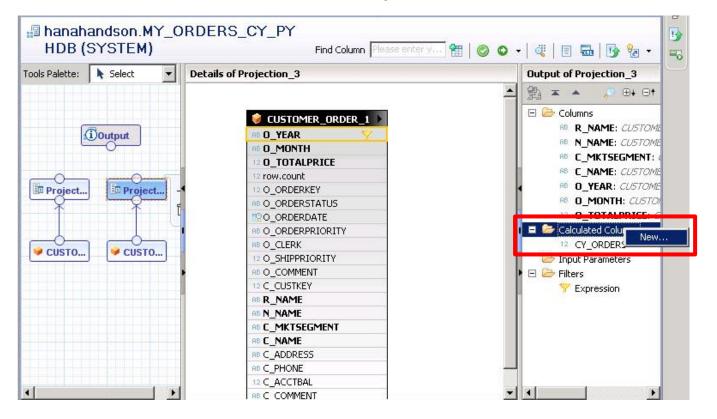
Create a Calculation Column for the Current Year. Right click on Calculation Column → New



Name it CY\_Orders, Data Type Decimal Length 10 Scale 2 and add the number 0 to the Expression Editor.

alculated Column culated Column				
ate a new Calculated Col	חמו			
Name:* CY_ORDERS				
, _				
Data Type: DECIMAL		▼ Length: 10	Scale: 2	
🚽 Expression Edito	r.			
🛛 🧭 Validate 🛛 🕅 🗸 Val	id expression			×
Validate	id expression Valid expressio	n		×
		n		×
		n		×
		n		
		obclaroiz		
1.0			@+ @†	OK y
1 0 Elements	Valid expressio ⊕+ ⊡+		⊕+ ⊖† ▲	
I 0 Elements Columns Calculated Colur	Valid expressio ⊕+ ⊡+	operators	⊕+ ⊖+	OK
1 0 Elements	Valid expressio ⊕+ ⊡+	operators	±+ =+	
I 0 Elements Columns Calculated Colur	Valid expressio ⊕+ ⊡+	<b>Operators</b> 	•••	OK Conversion Functions Conversion Functions Conversion Functions Mathematical Functions
I 0 Elements Columns Calculated Colur	Valid expressio ⊕+ ⊡+	<b>Operators</b>	•••	OK Conversion Functions Conversion Functions Mathematical Functions Date Functions
I 0 Elements Columns Calculated Colur	Valid expressio ⊕+ ⊡+	<b>Operators</b> 	•••	OK Conversion Functions Conversion Functions Mathematical Functions Date Functions

Create another Calculated Column for the Prior Year. Right click on Calculation Column → New



Name it PY\_Orders, Data Type Decimal Length 10 Scale 2, and add O\_Totalprice to the Expression Editor:



#### algulated C

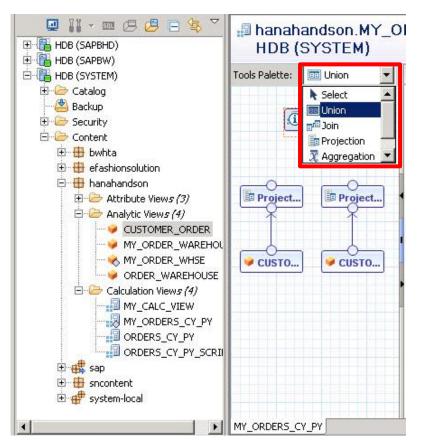
🖀 Calculated Column	×
Calculated Column	
Name:* PY_ORDER5	
Data Type: DECIMAL   Length: 10 Scale:	2
Expression Editor	
Validate       I     "O_TOTALPRICE"	A
	*

# Validate the expression:

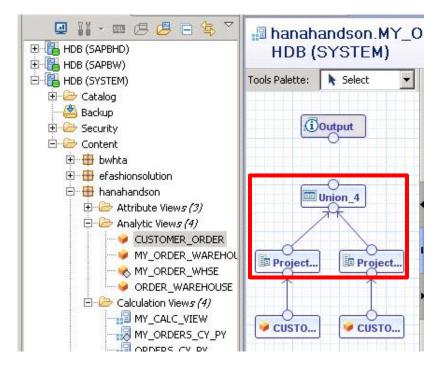
📅 Calculated Column	×
Calculated Column	
Create a new Calculated Column	
Name:* PY_ORDERS	
Data Type: DECIMAL   Length: 10 Scale: 2	
Lenguit, 110 Scale, 12	
Expression Editor	
Validate Valid expression	×
Valid expression	
2	ОК
2	

Now we will union the two Projections by adding a Union Component:





Connect the links from both Projections to the Union.

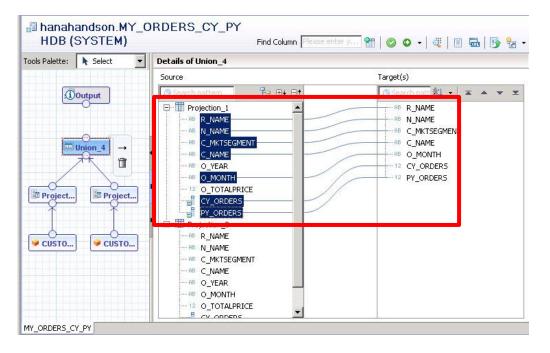


Select the Union Component and add all fields with the exception to O\_Year and O\_Totalprice from the Projection 1.



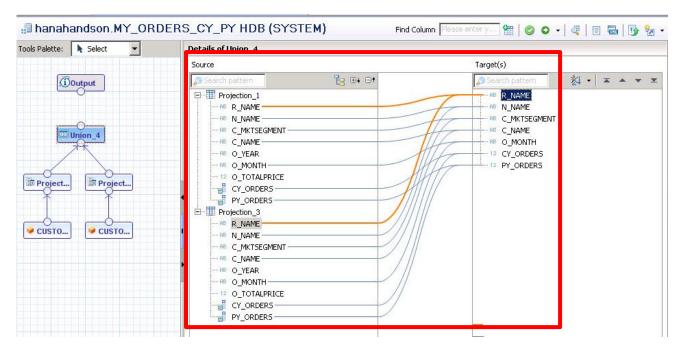
Tools Palette:	k Select	Details of Union_4
		Source
(Ē	Output	Search pattern 🗧 🕀 ↔ 🕞
		Projection_1
		R_NAME
Union_4 →		AB N_NAME
		RB C_MKTSEGMENT
		AB C_NAME
/		RB O_YEAR
-0-		O_MONTH     O_TOTALPRICE
Project	Project	
- Y		PY_ORDERS
		Ereit Projection Add To Target
		- AB R_NAI Map To Target
VCUSTO	V CUSTO	AB N_NAI Remove Mapping
		BR C METSECMENT
		AB C_NAME
		AB O_YEAR
		AB O_MONTH
		- 12 O_TOTALPRICE

You should then see the below:

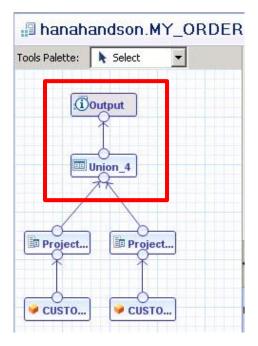




Map the corresponding fields from Projection 2 by dragging them to the target fields from projection 1:



Link the Union Component with the Output Component





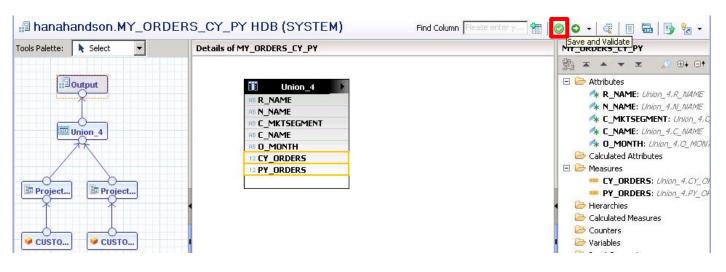
Click on Output and add the Attributes: R\_Name, N\_Name, C\_Mktsegment, C\_Name, O\_Month:

Tools Palette:	🔭 Select 💌	]	Details of MY_ORDERS_CY_PY
	Output		B R_NAME
	Union_4		AB C_MKTSEGMEN New Hierarchy > AB C_NAME AB O_MONTH 12 CY_ORDERS 12 PY_ORDERS
Project	Project		
CUSTO	CUSTO		

Add the Calculation Columns as the Measures. CY\_Orders, PY\_Orders:



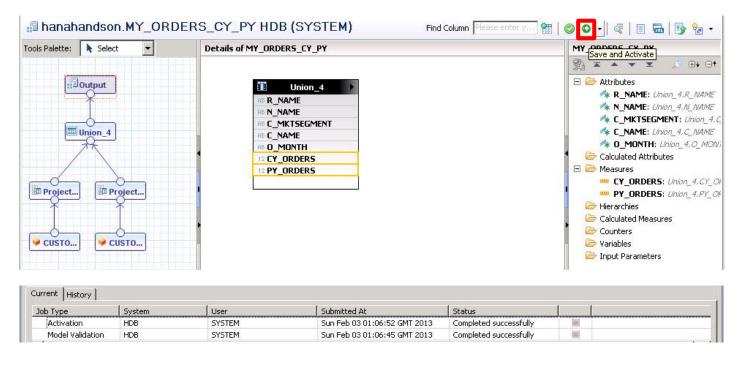
Save and Validate the Calculation View:



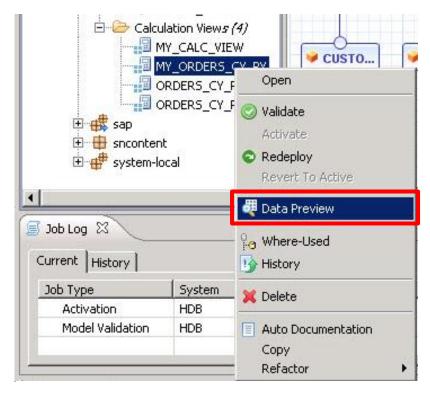


ов Туре	System	User	Submitted At	Status	
Model Validation	HDB	SYSTEM	Sun Feb 03 01:06:45 GMT 2013	Completed successfully	

#### Save and Activate the Calculation View:



Test the Calculation View by seeing the Data Preview – Right click the view and select Data Preview:

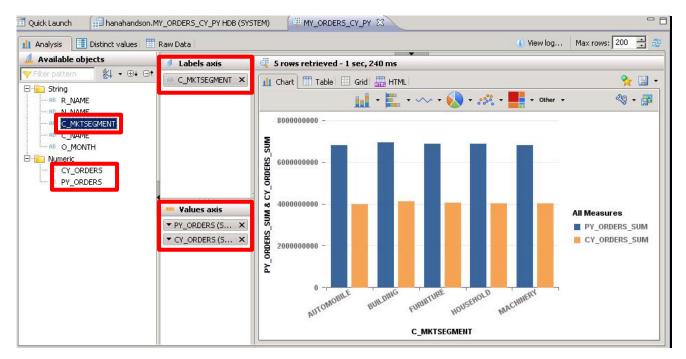


Output from the Data Preview:



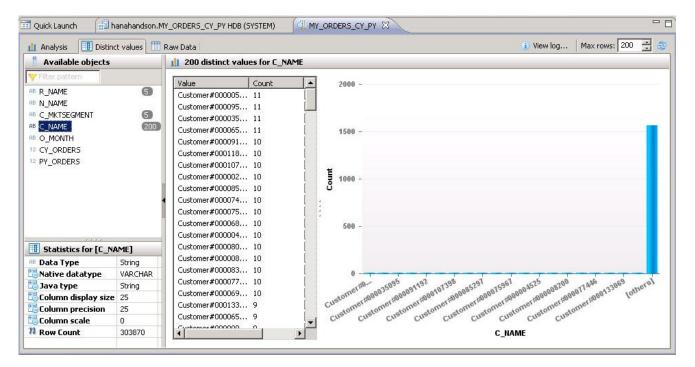
👖 Analysis 🛛 [	Distinct values	III Raw Data				4	View log Max rows: 200
Y Filter pattern	🥰 200	rows retrieved - 1 sec,	645 ms				👇 Add filter 👻
R_NAME	N_NAME	C_MKTSEGMENT	66 C_NAME	0_MONTH	CY_ORDERS	PY_ORDERS	
AMERICA	CANADA	AUTOMOBILE	Customer#00	03	0	90246.29	
EUROPE	RUSSIA	FURNITURE	Customer#00	01	0	225313	
MIDDLE EAST	EGYPT	FURNITURE	Customer#00	07	0	164964.02	
ASIA	CHINA	AUTOMOBILE	Customer#00	08	0	244073.77	
ASIA	INDONESIA	HOUSEHOLD	Customer#00	10	0	233397.47	
EUROPE	GERMANY	HOUSEHOLD	Customer#00	11	0	83310.23	
AFRICA	MOZAMBIQUE	BUILDING	Customer#00	11	0	82950.71	
EUROPE	FRANCE	HOUSEHOLD	Customer#00	05	371561.8	0	
MIDDLE EAST	SAUDI ARABIA	FURNITURE	Customer#00	06	78194.43	77529.98	
EUROPE	RUSSIA	BUILDING	Customer#00	06	74523.59	0	
EUROPE	FRANCE	MACHINERY	Customer#00	03	366480.06	0	
AMERICA	BRAZIL	AUTOMOBILE	Customer#00	02	135889	0	
EUROPE	RUSSIA	AUTOMOBILE	Customer#00	08	0	233558.06	
ASIA	VIETNAM	BUILDING	Customer#00	05	0	58538.44	
AMERICA	BRAZIL	AUTOMOBILE	Customer#00	07	0	78079.77	
ASIA	CHINA	MACHINERY	Customer#00	02	23864.7	0	
AMERICA	ARGENTINA	BUILDING	Customer#00	04	53981.76	0	
MIDDLE EAST	EGYPT	AUTOMOBILE	Customer#00	10	0	312888.39	
EUROPE	FRANCE	BUILDING	Customer#00	06	0	72347.07	
AFRICA	ALGERIA	HOUSEHOLD	Customer#00	03	184280.26	182430.92	
ASIA	JAPAN	HOUSEHOLD	Customer#00	04	0	48089.12	
EUROPE	ROMANIA	FURNITURE	Customer#00	11	0	168342.63	

Now let's take a different look at the data preview. Click on the Analysis tab and add C\_MKTSEGMENT to the Label axis. With the same process add CY\_ORDERS and PY\_ORDERS to the Value axis:



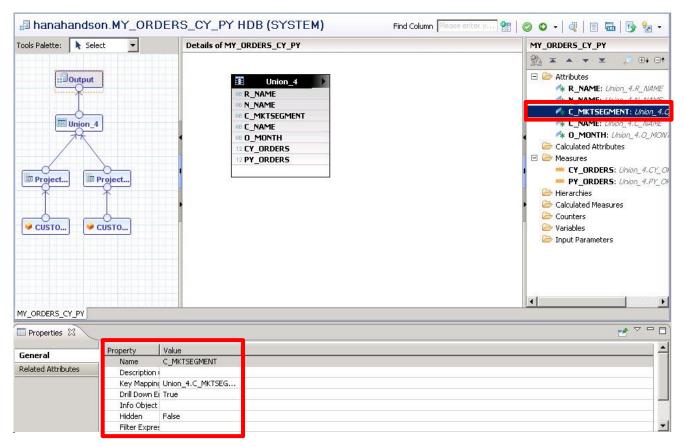


Now with Data values tab you can see further details on the fields in the table.



As you can see from the above some object names could be clearer and more meaningful so let's change one.

Ensure you have the properties tab opened and then click on the C\_MKTSEGMENT object on the right from the attributes folder:

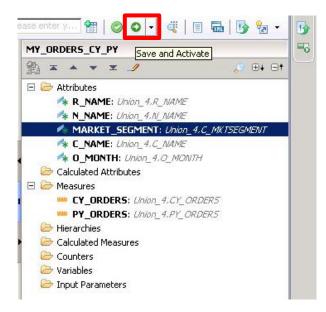


Change the Name and Description to MARKET\_SEGMENT and click Save.

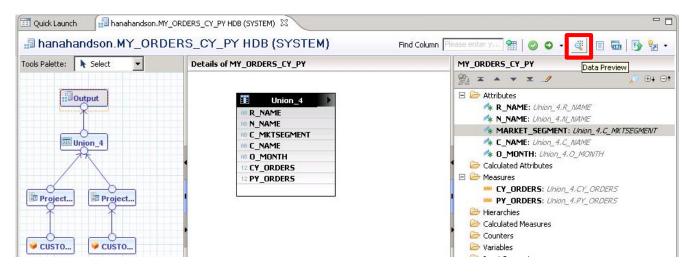


🗆 Properties 🛛			
General	Property	Value	
	Name	1ARKET_SEGMENT	
Related Attributes	Description (	MARKET_SEGMENT	
	Key Mapping	Union_4.C_MKTSEG	
	Drill Down Ei	True	
	Info Object		
	Hidden	False	
	Filter Expres		

The modified name should now appear in the attributed folder - Validate and Activate it again:

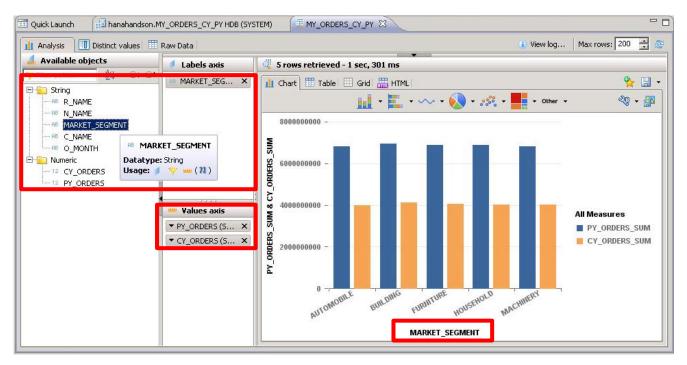


Go to the Data Preview and the Analysis tab. You will now see the change you made to C\_MKTSEGMENT:





We can now see the change is clearly displayed in the new data preview:





### Reporting from SAP HANA with SAP Lumira

### SAP Lumira Overview

SAP Lumira is the latest innovation in the SAP BusinessObjects Explorer solution family. It is a desktopbased visualization and data manipulation solution that allows business analysts to acquire data from a variety of corporate and personal data sources and manipulate without scripting. SAP Lumira produces beautiful visualizations and allows users to analyze data and quickly discover unique insight that can be easily shared throughout the organization.

Despite not carrying the portfolio brand BusinessObjects, SAP Lumira is part of the SAP BusinessObjects portfolio and extends the value of SAP BusinessObjects Explorer. With the web and mobile experiences of Explorer, business users can quickly explore their data and build their own dashboards. SAP Lumira complements these two experiences while offering Business Analysts the ability to perform more advanced data transformation and analysis.

**For business analysts:** SAP Lumira is the fastest, most engaging way to find answers from data. With its engaging and easy-to-use interface, SAP Lumira redefines the notion of self-service information allowing users to bring together corporate information, their own personal data and enriched semantics from SAP to create new ways of viewing the business.

**For IT:** SAP Lumira allows IT to provide analysts a data discovery solution, enabling business users to work with both corporate information and personal data sources to answer the questions they are asked everyday without assistance from IT.

Further, SAP Lumira enables users to perform these functions without having to create predefined query, report, or dashboard and with the ability to manage SAP Lumira as part of their enterprise BI standard. From powerful data discovery to beautiful visual analytics, SAP Lumira is about bringing life to your data, finding the key information for better decisions.

With SAP Lumira you can:

- Consume data the way you process thoughts:
  - fast, interactive, and visual
- Connect, access and visualize data without a single line of code
- Get real-time answers on any volume of data
- View the big picture and drill down to details
- Share your findings instantly with others

#### Hands-On Lab:

Open Lumira by double-clicking icon on your desktop:



Computer	<b>CANC</b>	Skaffing BW an HANA-HTA	Address als
Racyola Bin	R Data Sarvices Designar		SAP HANA ERM DENO
Lasilizards	Design Studio	E BW an FARMA	
SAP Paragam	KANA SUJO	Handhuudite	
SAP Visual Intelliger Run	ELLING TAP Visual Intell		
		<b>Stillinger</b>	
E.	nuliv key adk		

Look up the SAP HANA server name and server instance in the modeling studio. Open the SAP HANA studio and in your modeling screen and look up the server and instance.

In Visual Intelligence select New Document and choose option "HANA Online":

SAP Visual Intel	ligence
Select a Source We'll keep track of where you've been so you can directly connect next	t time Recent Data Sources
New Data Source            CSV         Upload a document and work with it in SAP Visual Intelligence             Where the second se	"_SYS_BIC"."hanahandson/CUSTOMER_ORDER" bw-on-hana - (00)



Enter credentials to the SAP HANA server: HANA Server: bw-on-hana HANA Server Instance: 00 User Name: SYSTEM User Password: Hana20!2

Then select Analytical View "MY\_ORDER\_WAREHOUSE" using following log in information, once selected click the connect button.

	C Browse HANA views
bw-on-hana 🔹	Connected to : bw-on-hana:30015
00	Q- Type here to filter views
SYSTEM Connect HANA Instance	<ul> <li>Available Views (9)</li> <li>bwhta.customer(1)</li> <li>ONLINE_SALES</li> <li>efashionsolution(1)</li> <li>AN_EFASHION</li> <li>hanahandson(7)</li> <li>MY_ORDER_WAREHOUSE</li> <li>OKDER_ORDER</li> <li>OKDER_ORDER</li> <li>MY_CALC_VIEW</li> <li>MY_ORDERS_CY_PY</li> <li>ORDERS_CY_PY (Caption)</li> <li>ORDERS_CY_PY_SCRIPT</li> </ul>
	Preview And Select Data
	00 SYSTEM

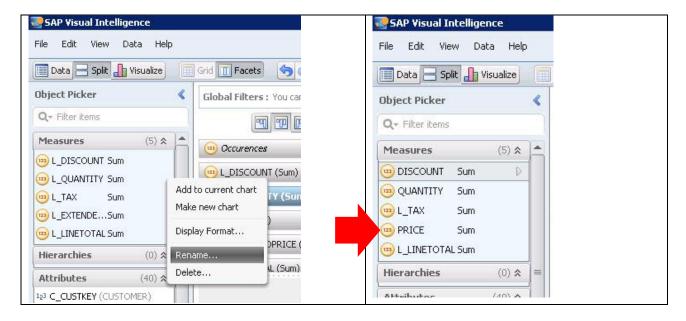
# Select option "Split" so you can see all facets as well as the work area:

🌏 SAP Visual Intelligence			
<u>File E</u> dit <u>View D</u> ata <u>H</u> e	lp		Prepare 🛄 Share
🔲 Data 📙 Split 🔒 Visualize		Grid 🔲 Facets 🧑 🥏	
Object Picker	<	Global Filters : You can add a filter by	clicking on the filtering button in th
Q- Filter items			ABC 🗢
Measures (5) 🛠		Dccurences	Region (CUSTOMER)
L_DISCOUNT Sum     L_QUANTITY Sum     L_TAX Sum		L_DISCOUNT (Sum)	EUROPE         1212077           ASIA         1206514           AMERICA         1198439           AFRICA         1196335
L_EXTENDESum		U_TAX (Sum)	MIDDLE EAST 1187850
Hierarchies (0) 🛠		L_EXTENDEDPRICE (Sum)	
Attributes (40) 🛠	-	💬 L LINETOTAL (Sum)	
123 C_CUSTKEY (CUSTOMER) 123 Customer Account Bala R6 <sup>C</sup> Customer Address (CUS R6 <sup>C</sup> Customer Comment (CU		۲ Axis 1 کو	x • 🔕 • 📰 • 勰



Rename your measures by right-clicking on each measure in the Measures area and choosing "Rename" option.

- $L_QUANTTITY = QUANTITY$
- L\_EXTENDED PRICE = EXTENDEDPRICE
- L\_DISCOUNT = DISCOUNT



Select QUANTITY, EXTENDEDPRICE, DISCOUNT measures and drag and drop them one by one to Measures - Y Axis 1.

SAP Visual Intelligence				
🔲 Data 🚍 Split 🔒 Visualize	Grid 🔲 Facets 🥱 🔗			
Object Picker 🛛 🔇	Global Filters : You can add a filter by c			
Q Filter items				
Measures (5) 🛠 📥	Occurences			
DISCOUNT Sum     DISCOUNT Sum     OUANTITY Sum	😐 DISCOUNT (Sum)			
PRICE Sum     LINETOTAL Sum	QUANTITY (Sum) L_TAX (Sum)			
Hierarchies (0) 📚 =	PRICE (Sum)			
Attributes (42 123 C_CUSTKEY (CUSTOMER) 123 Customer Account Bala 166 Customer Address (CUS	Y Axis 1			
ABC Customer Comment (CU	QUANTITY 🙆 🕶 😒			
AB© Customer Name (CUST AB© Customer Phone (CUST	PRICE 🔞 🕶 🔕			
#80 Market Segment (CUST         #80 Nation (CUSTOMER)         #80 Region (CUSTOMER)				
State Comment (Private At  L_COMMENT (Private At  L_COMMITDATE (Private  La L_LINENLIMBER (Private	Y Axis 2			
ABC L_LINESTATUS (Private				

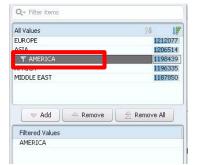
Create a filter for Region. Start by selecting Region in the attributes pane on the left and then select the small arrow to the right of the name:



Attributes	(40) 🛠
123 C_CUSTKEY (CUSTOMER)	
123 Customer Account Balance (CL	JSTOMER)
ABC Customer Address (CUSTOMER	۲)
ABC Customer Comment (CUSTOME	ER)
ABC Customer Name (CUSTOMER)	
ABC Customer Phone (CUSTOMER)	
Market Segment (CUSTOMER)	
Re Nation (CUSTOMER)	
is: Region (CUSTOMER)	D
ABC L_COMMENT (Private Attribute	es)
📆 L_COMMITDATE (Private Attrib	outes)
<sup>1</sup> 2 <sup>3</sup> L_LINENUMBER (Private Attrib	utes)
ABC L_LINESTATUS (Private Attribu	utes)
👼 L_RECEIPTDATE (Private Attril	butes)
MC L_RETURNFLAG (Private Attrib	outes)
👼 L_SHIPDATE (Private Attribute	es)
ABC L_SHIPINSTRUCT (Private Attr	ributes)

Once the arrow has been selected, navigate to 'The Filter Is' and select AMERICA from the list of values and Add to filterer values:

QUANTITY Sum		DISCOUNT (Sum)     OUANTITY (Sum)	All Values EUROPE	1212077
Image: Sum         Sum           Image: Sum         Sum	Þ	(B) QUANTITY (Sum)	AMERICA	1198439
L_LINETOTAL Sum     Hierarchies     (0)	*	EXTENDEDPRICE (Sum)	MIDDLE EAST	1196555
Attributes     (40)       123 C_CUSTKEY (CUSTOMER)       123 Customer Account Balance (CUSTOMER)       Ap6 Customer Address (CUSTOMER)       Ap6 Customer Comment (CUSTOMER)	*	Y Axis 1	Filtered Values	e 🚖 Remove All
#80 Customer Name (CUSTOMER)         #80 Customer Phone (CUSTOMER)         #80 Market Segment (CUSTOMER)         #80 Nation (CUSTOMER)         #80 Region (CUSTOMER)				
ABC L_COMMENT (Private Attributes)         Image: L_COMMITDATE (Private Attributes)         123 L_LINENUMBER (Private Attributes)         ABC L LINESTATUS (Private Attributes)		Add to current chart Make new chart with The filter is	C Kee	p Only O Exclude Values
CELINESTITIOS (Invite Adhedes)  L_RECEIPTDATE (Private Attributes)  L_RETURNFLAG (Private Attributes)  L_SHIPDATE (Private Attributes)  L_SHIPINSTRUCT (Private Attributes)  L_SHIPMODE (Private Attributes)	8 2 8	Create a Measure Create a Geographic hierarchy Create a Time hierarchy	0	TITY DISCOUNT EXTER
0 semantic element detected	¥	Rename Delete Merge this column		All Measures
"_SYS_BIC"."hanahandson/MY_ORDER_W4	RE	Hide in Data View		

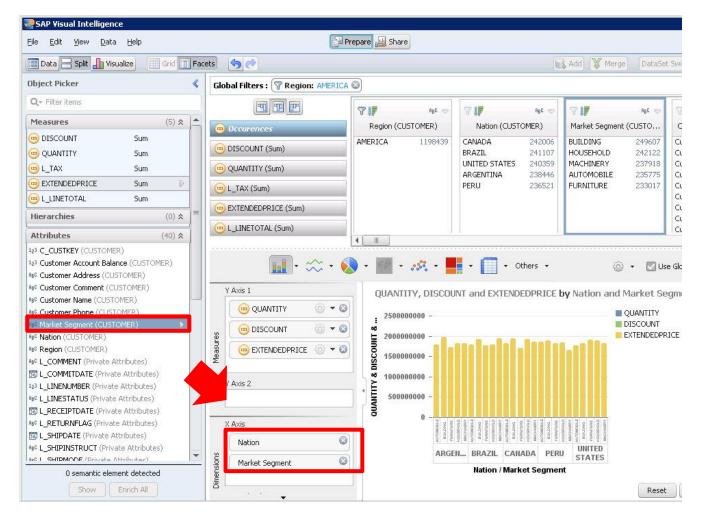




Once added, click away from the window to return back to the main screen, you should now have the below:

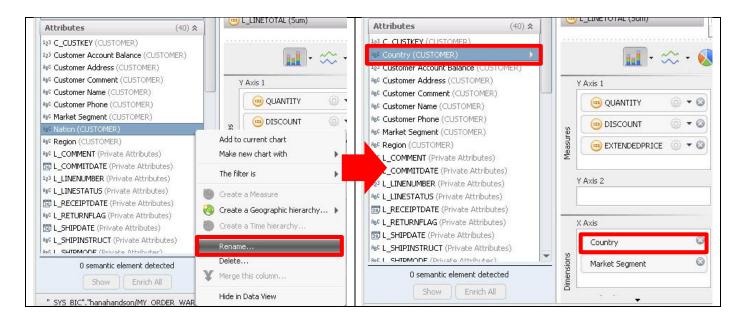
SAP Visual Intelligence							
Eile Edit <u>V</u> iew Data E	<u>t</u> elp		Prepare 📖 Share				
Data 📑 Split 🕕 Visualiza	e Grid 🔳	Fac	ets 🥱 🥐		(		
Object Picker		<	Global Filters : 💎 Region: AMERICA 🖗	3]	_		
Q- Filter items				9 📭 ABC 🗢	₩ ABC ↔		
Measures	(5) 🛠	-	Dccurences	Region (CUSTOMER)	Nation (CUSTOMER)		
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B L_TAX	Sum		(2) QUANTITY (Sum)		UNITED STATES 240359 ARGENTINA 238446		
	Sum 👂		👜 L_TAX (Sum)		PERU 236521		
B L_LINETOTAL	Sum		EXTENDEDPRICE (Sum)				
Hierarchies	(0) 🛠	=					
Attributes	(40) 🛠		ULLINETOTAL (Sum)		)		
123 C_CUSTKEY (CUSTOMER)				• • • • • • • • • • • • • • • • • • • •			
123 Customer Account Balance			📊 • 🗯 • 🚺	) - 🔛 - 💏 - 📕	🔹 🗖 🔹 Others 👻		
ABC Customer Address (CUSTON ABC Customer Comment (CUSTO					al a carte		
ABC Customer Name (CUSTOME		_	Y Axis 1	QUANTITY, DISCOU	NT and EXTENDEDPRICE		
ABC Customer Phone (CUSTOME			QUANTITY 💿 🔻 🕥	6000000000 -			

Select Nation and Market Segment and drag and drop these to the Dimensions area:





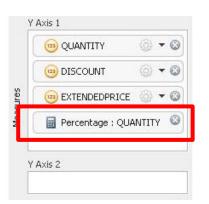
Rename Nation to Country, by right-clicking on Nation and then the small arrow to Rename:



Create a calculated column which displays Percentage of Total for Quantity. Select the Quantity measure in Y Axis 1, select the triangle icon and choose Add calculation  $\rightarrow$  Percentage.

Attributes (40) \$		9	L_LINE (OTAL (SUII)		III	
123 C_CUSTKEY (CUSTOMER)						
ng® Country (CUSTOMER)			📊 - 🇠	: - 🔊		.** - 📕 - [
123 Customer Account Balance (CUSTOMER)					and the second second	
ABC Customer Address (CUSTOMER)		Y	Axis 1			TY, DISCOUNT and
ABC Customer Comment (CUSTOMER)		T	<u> </u>		QUANT	TT, DISCOUNT and
ABC Customer Name (CUSTOMER)			(1) QUANTITY	≥ <b>-</b> ⊗	250070	0000 -
ABC Customer Phone (CUSTOMER)			DISCOUNT	SURC AS	cending	
Rec Market Segment (CUSTOMER)	Meachrec	6		Sort De	escending 0	0000 -
ABC Region (CUSTOMER)	Dag Dag		🛛 🎯 EXTENDEDPRICE 🍟	Add as	culation	
Rec L_COMMENT (Private Attributes)	Ž	Ĕ		AUU La		Running_Sum
DI L_COMMITDATE (Private Attributes)			1.022	Rank V	alues (	Running_Min
<sup>1</sup> 2 <sup>3</sup> L_LINENUMBER (Private Attributes)		Y	Axis 2		* E	Running_Max
ABC L_LINESTATUS (Private Attributes)		4			50000 SUD	Running Count
L_RECEIPTDATE (Private Attributes)					on on	Running_Count_NE
ABC L_RETURNFLAG (Private Attributes)		X	Axis		1.1.1.1	
DI L_SHIPDATE (Private Attributes)			Country	8		Running_Avg
ABC L_SHIPINSTRUCT (Private Attributes)			Country			Running_Avg_NE
AND I SHIDMODE (Drivata Attributae)	- eione	5	Market Segment	0		Percentage

The new calculation should now be added below the exisiting measures:





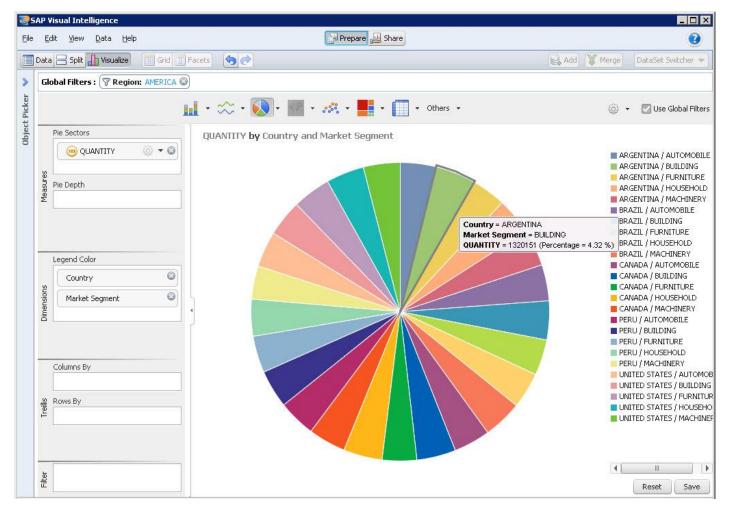
#### Select Visualize:

SAP Visual Intelligence		
Eile Edit View Data Help	Prepare 🔐 Share	0
Data Spli I Visualize Grid II Facets	🛃 Add 🛛 💥 Merge	DataSet Switcher 👻

Then select the Pie Chart Icon and enlarge the window by hiding the left pane:

<u> E</u> dit <u>V</u> iew <u>D</u> ata <u>H</u> elp	Prepare 🔟 Share	3
🗐 Data 🚍 Split 🚹 Visualize 🛛 🗐 Grid 🔟 Facets	<b>(9)</b>	🔒 Add 🛛 💥 Merge 🛛 DataSet Switcher
Dbject Picker 🚺 Gla	bal Filters : 🗑 Region: AMERICA 🕲	
Q- Filter items	📊 • ☆ • 💽 • 🕅 • 🦟 • 🜉 •	📕 🔹 Others 🔹 🙆 🔹 🔽 Use Global Filt

You should now see the below pie chart with the attributes arranged in alphabetical order:

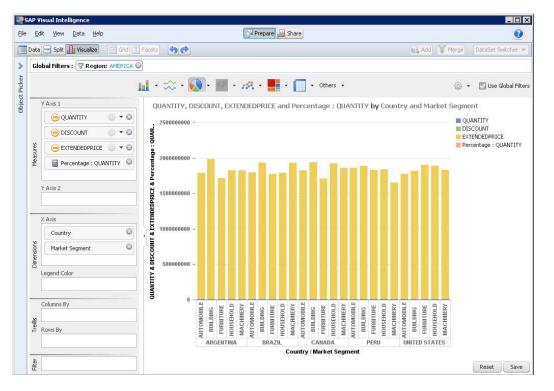


Now we are going to undo this to return to the previous state by selecting the undo icon:

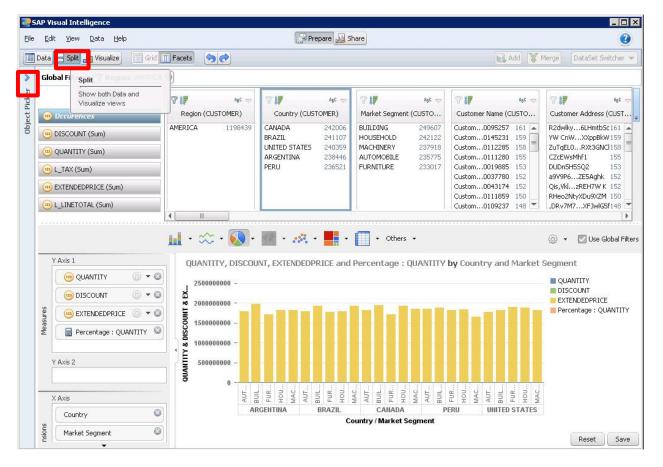
SAP Visual Intelligence			
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You should now see this:



Select the Split Icon to see a more detailed view and expand the left pane by selecting the right pointing arrow:





### You should now have the following:

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🔲 Data 🖃 Split 🚹 Visualize 🛛 🔲 Grid 🔟 I	acets 🥱 🥏		6	🕻 Add 🛛 💥 Merge 🔹 DataSe	: Switcher 👻
Dbject Picker	Global Filters : TRegion: AMERICA	0			
Q- Filter items Measures (5) *		<b>₩</b> ABC ↔	₩ ABC ↔		71
DISCOUNT Sum     QUANTITY Sum	Docurences     DISCOUNT (Sum)	Region (CUSTOMER) AMERICA 1198439	Country (CUSTOMER) CANADA 242006 BRAZIL 241107	Market Segment (CUSTOBUILDING249607HOUSEHOLD242122	Custome Custom., Custom.,
L_TAX Sum     EXTENDEDPRICE Sum	QUANTITY (Sum) U_TAX (Sum)		UNITED STATES         240359           ARGENTINA         238446           PERU         236521	MACHINERY         237918           AUTOMOBILE         235775           FURNITURE         233017	Custom Custom Custom
BL_LINETOTAL Sum     Hierarchies     (0)      Attributes     (40)      (40)	EXTENDEDPRICE (Sum)				Custom Custom Custom
Igit Country (CUSTOMER)         Igit Country (CUSTOMER)         Igit Customer Account Balance (CUSTOMER)         Igit Customer Address (CUSTOMER)         Igit Customer Comment (CUSTOMER)	Y Axis 1	🔊 • 📰 • 🚜 • 📕 QUANTITY, DISCOL	• • • • Others •	÷ -	e Global Filte <b>by</b> Cou
Customer Name (CUSTOMER)  Customer Name (CUSTOMER)  Customer Phone (CUSTOMER)  Customer Phone (CUSTOMER)  Customer  Customer	Image: Constraint of the second se	250000000 - 200000000 - 1500000000 - 1500000000 -		QUANTITY DISCOUNT EXTENDEDPR Percentage :	
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0 semantic element detected	Market Segment	2	Country / Market Segme	nt Reset	Save

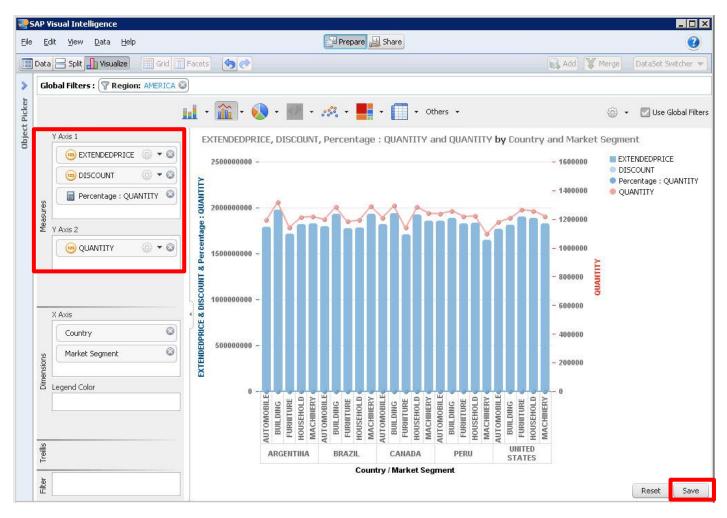
Switch to the Line Chart by selecting the icon and Combined Column and Line Chart with Dual Value Axes option.

Object Picker	< C	Global Filters : 🖓 Region: AMERICA	8				
Q- Filter items			9 📕 ABC 🗢	71	ABC 🤝	ABC 🗢	817
Measures (5) ♠	6	Decurences	Region (CUSTOMER)	Country (CUST	OMER)	Market Segment (CUSTO,	Custome
DISCOUNT Sum     QUANTITY Sum		DISCOUNT (Sum)	AMERICA 1198439	CANADA BRAZIL	242006 241107	BUILDING 249607 HOUSEHOLD 242122	Custom Custom
		😕 QUANTITY (Sum)		UNITED STATES ARGENTINA	240359 238446	MACHINERY237918AUTOMOBILE235775	Custom Custom
EXTENDEDPRICE Sum     LLINETOTAL Sum		BL_TAX (Sum)		PERU	236521	FURNITURE 233017	Custom
Hierarchies (0) ♠		EXTENDEDPRICE (Sum)     LLINETOTAL (Sum)					Custom Custom Custom
Attributes (40) \$		<u> </u>	<	- Fr			) Cascolini
123 C_CUSTKEY (CUSTOMER) 123 Customer Account Balance (CUSTOMER) 126 Customer Address (CUSTOMER) 126 Customer Comment (CUSTOMER) 127 Age Customer Name (CUSTOMER)	_	Y Axis 1	💽 🔹 📷 🔹 🚓 🔹 🗖 Chart a Chart	• 🗍 • 0		@ ▼ ☑ Us Percentage : QUANTITY ■ QUANTITY	e Global Filte <b>by</b> Cou
As <sup>©</sup> Customer Phone (CUSTOMER) As <sup>©</sup> Market Segment (CUSTOMER)			bined Column and Line Chart		in the	DISCOUNT EXTENDEDPR Percentage :	1.000
<ul> <li>Region (CUSTOMER)</li> <li>L_COMMENT (Private Attributes)</li> <li>L_COMMITDATE (Private Attributes)</li> </ul>	Mascing	e EXTENDEDPRICE Con	Chart with Dual Axes	th Dual Value Axes			

65



Switch to the Visualize tab to analyze your chart, and re-arrange the measures so that EXTENDEDPRICE is first in the list followed by DISCOUNT and Percentage QUANTITY. Select the individual bars to view details about the data points.



You can also double click on each data bar to zoom in to detail chart for each Country and Market Segment.

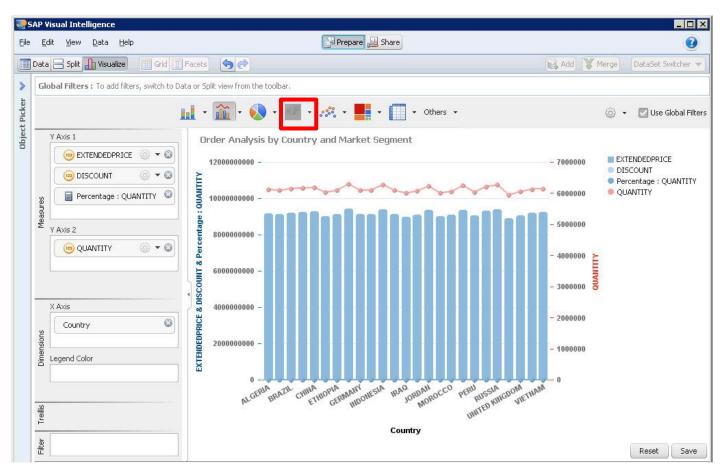
Rename your chart by double clicking on the title. Type "Order Analysis by Country and Market Segment":



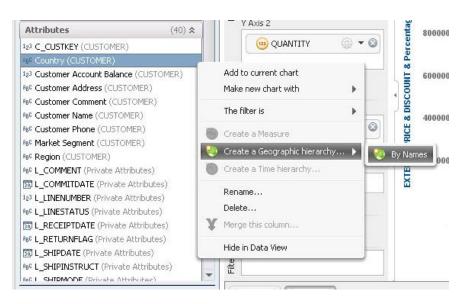
Save your Visualization.



Notice that the Geographic Map is disabled. Clear all the selections by clicking on "X" (except Country):



Create a geographic visual map by categorizing geographic dimension first. Select "Country" attribute and click on the arrow to the right. Click on "Create a Geographic hierarchy":





Select from the drop down Country:



Confirm the elements identified are correct - This will create the geographic dimension. Click OK:

ter: All 💌		
Country	Propositions	
ALGERIA	🔵 Algeria [100%]	1
ARGENTINA	🔵 Argentina [100%]	
BRAZIL	🔴 Brazil [100%]	
CANADA	🔵 Canada [100%]	
CHINA	😑 China [100%]	
EGYPT	🔵 Egypt [100%]	
ETHIOPIA	😑 Ethiopia [100%]	
RANCE	France [100%]	
SERMANY	🔵 Germany [100%]	
NDIA	🔵 India [100%]	
INDONESIA	🔵 Indonesia [100%]	

# Select "Geographic Bubble Chart":

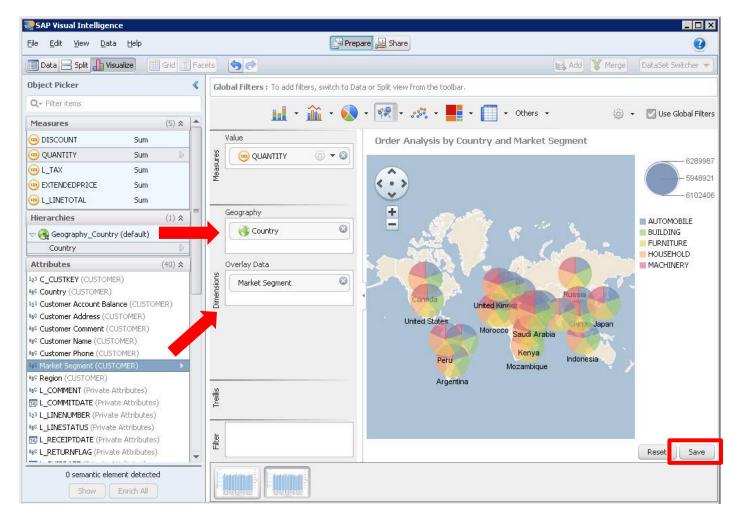
SAP Visual Intelligence			
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Data 🖴 Split 🔒 Visualize 🛛 📰 Grid	🔟 Facets 🧑 🥏	R Add	🐺 Merge 🛛 DataSet Switcher 👻
Object Picker	Global Filters : To add filters, switch to Data	or Split view from the toolbar.	
Q- Filter items		😪 + 🤐 + 📕 + T + Others +	🐵 🔹 🔽 Use Global Filters
Measures (5) \$			
DISCOUNT Sum	Y Axis 1	Geographic Bubble Chart and Market Segment	
2 QUANTITY Sum	🖂 EXTENDEDPRICE 🚳 🕶 🚳	Choropleth Chart - 700000	
Bum Sum			DISCOUNT
BXTENDEDPRICE Sum		Geo Pie Chart	Percentage : QUANTITY



Delete EXTENDEDPRICE using the delete icon and replace with QUANTITY by dragging it across.

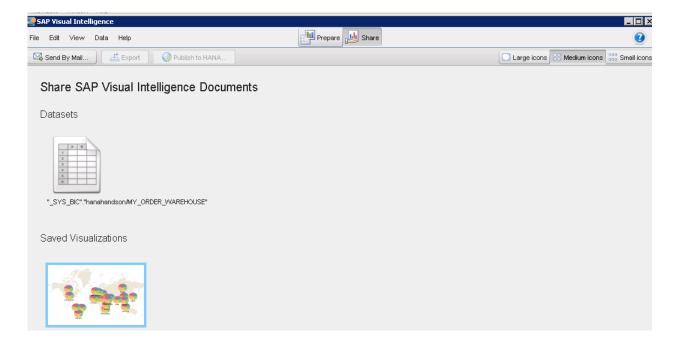
SAP Visual Intelligen	ice		🔜 SAP Visual Intelligence		
<u>File E</u> dit <u>V</u> iew <u>D</u> ata	a <u>H</u> elp	Pre;	<u> Eile E</u> dit <u>V</u> iew <u>D</u> ata <u>H</u> elp		Pre:
🛅 Data 금 Split 🔒 Vis	sualize Grid 🔟 Fac	ets 🥱 🥏	Data 🕂 Split 🚹 Visualize 🛛 🗐 Gri	id 🔟 Fac	ets 🧑 🥏
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Q- Filter items		ul - 🛍 - 🔕	Q- Filter items		📊 - 🏦 - 🚫
Measures	(5) 🛠 📥		Measures (5	5) 🖈 📥	
1 DISCOUNT	Sum	Value	DISCOUNT Sum		Value
QUANTITY	Sum	🖉 💮 EXTENDEDPRICE 🛞 🔻 😒	QUANTITY Sum	Ð	ğ 😡 QUANTITY 🚳 🕶 😒
🐵 L_TAX	Sum		U_TAX Sum		Measu
	Sum	~	EXTENDEDPRICE Sum		Σ
L_LINETOTAL	Sum	Geography	Bun L_LINETOTAL Sum		
	1000	Geography		1000	Companyable

Select "Country" under hierarchies and drag it to Geography (if it is not there). Select "Market Segment" under attributes and drag it over to Overlay data. Click Save.





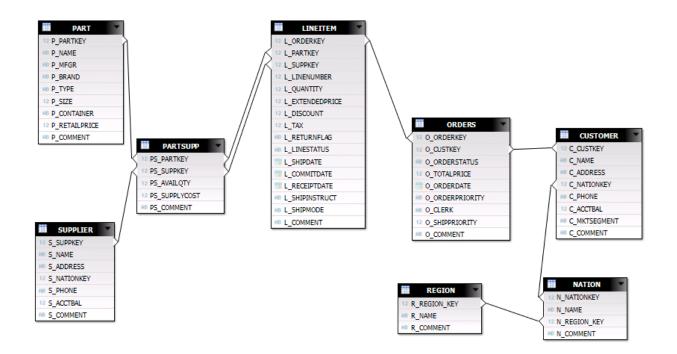
You can then share your charts with others via email or Streamwork, click "Share".





# Appendix

# **TPC-H ERD Diagram**



# Weblinks

http://www.saphana.com

http://www.sap.com/hana

http://www.sap.com/pc/tech/in-memory-computing-hana.html

http://www.sdn.sap.com/irj/sdn/in-memory

http://help.sap.com/hana