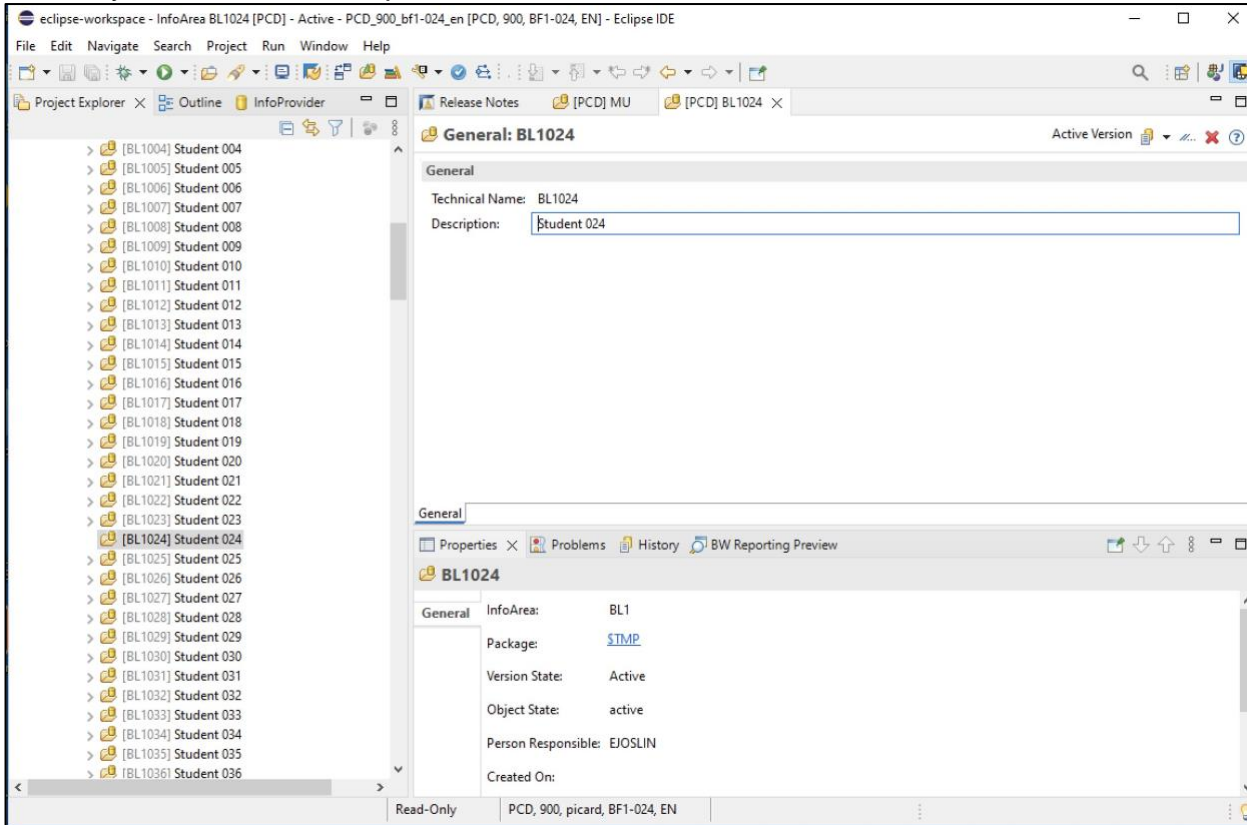


## Benchmark 1

**Question 1: Insert a screenshot of your student InfoArea (folder) for this semester. What is your InfoArea technical name? What is your InfoArea description?**

What is your InfoArea technical name? BL1024

What is your InfoArea description? Student 024



**Question 2: Are you permitted to edit or delete objects in the MU0 InfoArea? NO**

**Question 3: Are you permitted to edit or delete objects in InfoAreas that do not belong to you? NO**

**Question 4: Create a list of all key figures, then the dimensions. Within each dimension, list the characteristics.**

### Key figures:

- Customer: dimensions: Sales Organization(characteristic), Currency Key(Unit), MU0 Customer(characteristic)
- Measures: dimensions: MU0 Net Sales(Key Figure), MU0 Sales Quantity(Key Figure), MU0 Discount(Key Figure), MU0 Revenue(Key Figure), Cost of Goods Manufactured(Key Figure)
- Order: dimensions: OrderNumber(characteristic) , Ordeitem(characteristic)
- Product: dimensions: Unit of Measure(unit), Material(characteristic)

# Benchmark 2

## Question 1: What is a data source?

- 1) as a preparation for the loading process into the data acquisition layer of SAP BW4/HANA 2.0.
- 2) A data source refers to any location or system from which data can be retrieved. It serves as the origin of data for analysis, reporting, or other purposes. Data sources can include databases, files, APIs, web services, spreadsheets, and more.

## Question 2: You have created a data source for sales data. What do you think is the destination of this data in terms of the snowflake schema? Why?

In the context of the snowflake schema, sales data typically flows from the fact table (which contains transactional data) to related dimension tables. By connecting the fact table to these dimension tables, the snowflake schema ensures a normalized and structured representation of sales data.

## Question 3: Go to the Data Preview and toggle the Show data in internal format only flag. Comment on the revenue formats when you toggle.

There are not Thousands of Separators when toggling.

ORDERNUMBER	ORDERITEM	CUSTOMER	PRODUCT	SALESQUANTITY	UNITOFMEASURE	REVENUE	CURRENCY	DISCOUNT	COSTSUSD	SALESDATE
0000100001	000010	0000017000	PRTR1000	4	ST	10,669.84	€	320.10	8,320.00	01/01/2007
0000100001	000020	0000017000	DXTR1000	8	ST	20,005.92	€	600.18	15,600.00	01/01/2007
0000100001	000030	0000017000	DXRD2000	2	ST	2,750.82	€	82.52	2,046.00	01/01/2007
0000100001	000040	0000017000	ORWN1000	5	ST	10,419.75	€	312.59	7,500.00	01/01/2007
0000100002	000010	0000015000	PRTR1000	4	ST	10,669.84	€	533.49	8,320.00	01/03/2007
0000100002	000020	0000015000	ORHT2000	7	ST	9,919.60	€	495.98	7,140.00	01/03/2007
0000100002	000030	0000015000	SHRT1000	6	ST	150.06	€	7.50	90.00	01/03/2007
0000100002	000040	0000015000	RHMT1000	1	ST	41.68	€	2.09	25.00	01/03/2007
0000100002	000050	0000015000	FAID1000	21	ST	700.22	€	35.01	420.00	01/03/2007
0000100002	000060	0000015000	PRRD1000	7	ST	23,340.24	€	1,167.01	17,360.00	01/03/2007

## Question 4: What is the internal format for salesdate?

Salesdata Internal Data Type: CHAR e.g. 20160530

## Question 5: What are the differences of US data as compared to the data from Germany?

The dollar sign is different.

ORDERNUMBER	ORDERITEM	CUSTOMER	PRODUCT	SALESQUANTITY	UNITOFMEASURE	REVENUE	CURRENCY	DISCOUNT	COSTSUSD	SALESDATE
0000200001	000010	0000002000	DXRD1000	7	ST	11900.00	USD	357.00	7000.00	20070101
0000200002	000010	0000005000	PUMP1000	7	ST	196.00	USD	9.80	96.00	20070102
0000200002	000020	0000005000	ORHT2000	1	ST	1700.00	USD	85.00	950.00	20070102
0000200003	000010	0000011000	ORWN1000	7	ST	17500.00	USD	525.00	8750.00	20070102
0000200003	000020	0000011000	FAID1000	18	ST	720.00	USD	21.60	360.00	20070102
0000200003	000030	0000011000	PRRD1000	6	ST	24000.00	USD	720.00	13200.00	20070102
0000200003	000040	0000011000	FAID1000	13	ST	530.00	USD	15.90	260.00	20070102
0000200003	000050	0000011000	PUMP1000	3	ST	84.00	USD	2.52	42.00	20070102
0000200003	000060	0000011000	ORHT1000	5	ST	8000.00	USD	240.00	4500.00	20070102
0000200003	000070	0000011000	DXRD1000	9	ST	15300.00	USD	459.00	9000.00	20070102

## Question 6: Why did we have to create two data sources, one for DE and one for US?

Because the data are different, we need to create a separate DataSource for US.

## Question 7: What is the unit of measure of sales quantity?

ST, Stone.

## Question 8: Are any characteristics mapped to the data source fields yet? Why? Why not?

Only Product used CHAR format because the product name is composed of English letters.

## Question G: How many sales transactions do we have for US? How many for DE?

Based on the CSV file, there are 14,450 sale transactions in US, 18,517 in DE

## Question 10: Insert screenshots of the preview of your data in the two datasources.

The screenshot shows the Eclipse IDE with the 'Extraction: BF1DSDE046' dialog open. The 'Extraction Properties' tab is active, showing settings for Delta Process (No delta, only Full), Direct Access (Not Allowed), Streaming (disabled), and Adapter (Load Text-Type File from Local Workstation). The 'Extractor-Specific Properties' tab shows the File Name as 'I:\adm.suffolk.edu\uem\STD-Redirected\Folders\local\'. The 'Data Format' tab shows Data Format as 'Separated by Separator (Example: CSV)', Data Separator as ';', and Escape Sign as '\'. Below the dialog, a data preview table is shown for 'Data Preview for DataSource BF1DSDE046 (FILE)'. The table has 11 columns: ORDERNUMBER, ORDERITEM, CUSTOMER, PRODUCT, SALESQUANTITY, UNITOFMEASURE, REVENUE, CURRENCY, DISCOUNT, COSTSINUSD, and SALESDATE. The first 10 rows of data are visible.

ORDERNUMBER	ORDERITEM	CUSTOMER	PRODUCT	SALESQUANTITY	UNITOFMEASURE	REVENUE	CURRENCY	DISCOUNT	COSTSINUSD	SALESDATE
000010001	000010	0000017000	PRTR1000	4	ST	10,669.84	€	320.18	8,320.00	01/01/2007
000010001	000020	0000017000	DXTR1000	8	ST	20,005.92	€	600.18	15,600.00	01/01/2007
000010001	000030	0000017000	DXRD2000	2	ST	2,750.82	€	82.52	2,046.00	01/01/2007
000010001	000040	0000017000	ORWN1000	5	ST	10,419.75	€	312.59	7,500.00	01/01/2007
000010002	000010	0000015000	PRTR1000	4	ST	10,669.84	€	533.49	8,320.00	01/03/2007
000010002	000020	0000015000	CRH42000	7	ST	9,919.60	€	495.98	7,140.00	01/03/2007
000010002	000030	0000015000	SHRT1000	6	ST	150.06	€	7.50	90.00	01/03/2007
000010002	000040	0000015000	RH4HT1000	1	ST	41.68	€	2.09	25.00	01/03/2007
000010002	000050	0000015000	FAID1000	21	ST	700.22	€	35.01	420.00	01/03/2007
000010002	000060	0000015000	PRRD1000	7	ST	23,340.24	€	1,167.01	17,360.00	01/03/2007

The screenshot shows the Eclipse IDE with the 'Fields: BF1DSUS046' dialog open. The 'General' tab is active, showing the Name as 'COSTSINUSD' and Description as 'Costs in USD'. The 'InfoObject Template' tab shows the InfoObject as 'COSTSINUSD'. The 'Data Type' tab shows Data Type as 'DEC', Precision as 17, and Scale as 2. Below the dialog, a data preview table is shown for 'Data Preview for DataSource BF1DSUS046 (FILE)'. The table has 11 columns: ORDERNUMBER, ORDERITEM, CUSTOMER, PRODUCT, SALESQUANTITY, UNITOFMEASURE, REVENUE, CURRENCY, DISCOUNT, COSTSINUSD, and SALESDATE. The first 10 rows of data are visible.

ORDERNUMBER	ORDERITEM	CUSTOMER	PRODUCT	SALESQUANTITY	UNITOFMEASURE	REVENUE	CURRENCY	DISCOUNT	COSTSINUSD	SALESDATE
000020001	000010	0000020000	DXRD1000	7	ST	11,900.00	\$	357.00	7,000.00	01/01/2007
000020002	000010	0000025000	PUMP1000	7	ST	196.00	\$	9.80	98.00	01/02/2007
000020002	000020	0000025000	CRH42000	1	ST	1,700.00	\$	85.00	950.00	01/02/2007
000020003	000010	0000011000	ORWN1000	7	ST	17,500.00	\$	525.00	8,750.00	01/02/2007
000020003	000020	0000011000	FAID1000	18	ST	720.00	\$	21.60	360.00	01/02/2007
000020003	000030	0000011000	PRRD1000	6	ST	24,000.00	\$	720.00	13,200.00	01/02/2007
000020003	000040	0000011000	FAID1000	13	ST	520.00	\$	15.60	260.00	01/02/2007
000020003	000050	0000011000	PUMP1000	3	ST	84.00	\$	2.52	42.00	01/02/2007
000020003	000060	0000011000	CRH4HT1000	5	ST	8,000.00	\$	240.00	4,500.00	01/02/2007
000020003	000070	0000011000	DXRD1000	9	ST	15,300.00	\$	459.00	9,000.00	01/02/2007

# Benchmark 3

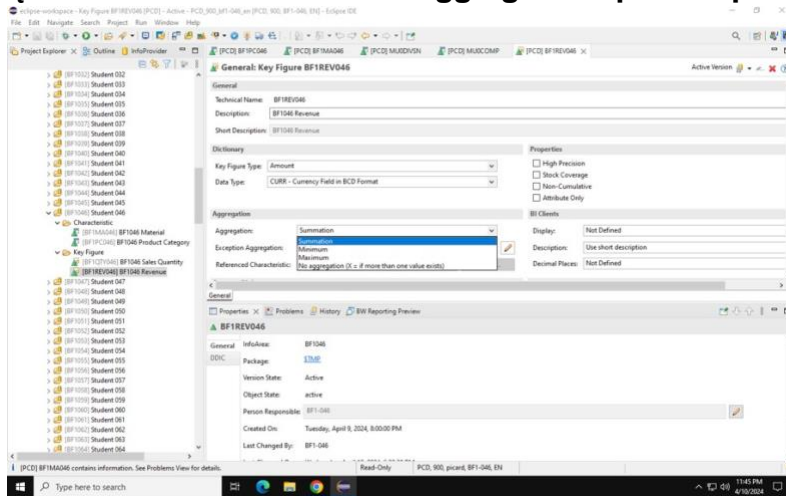
## Question 1: What type of InfoObject is Revenue?

CURR – currency field in BCD Format

## Question 2: Why does revenue not have an Exception Aggregation?

Because they used Aggregation as summation.

## Question 3: What are other Aggregation options apart from summation?



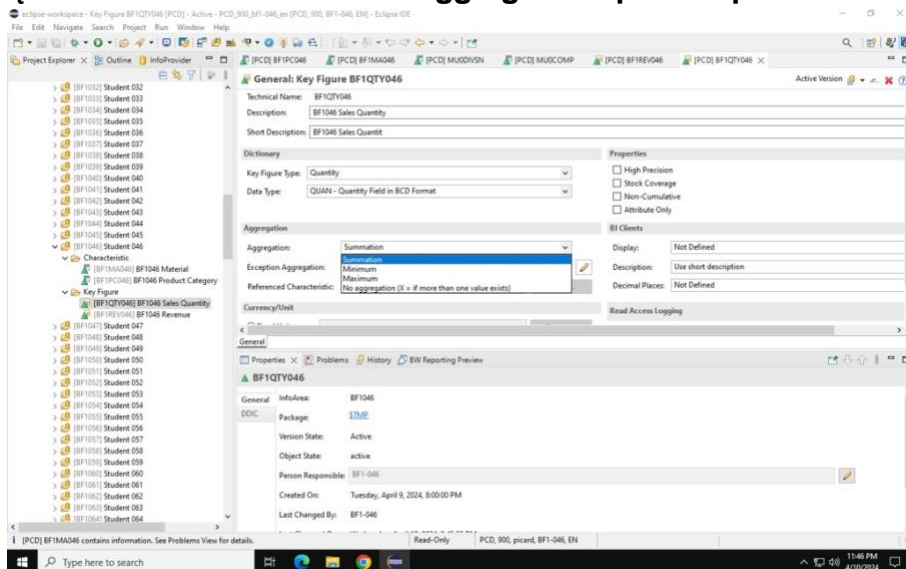
## Question 4: What type of InfoObject is Sales Quantity?

QUAN – Quantity

## Question 5: Why does Sales Quantity not have Exception Aggregation?

Because they used Aggregation as summation.

## Question 6: What are other Aggregation options apart from summation?



## Question 7: What type of InfoObject is Product Category?

Characteristic.

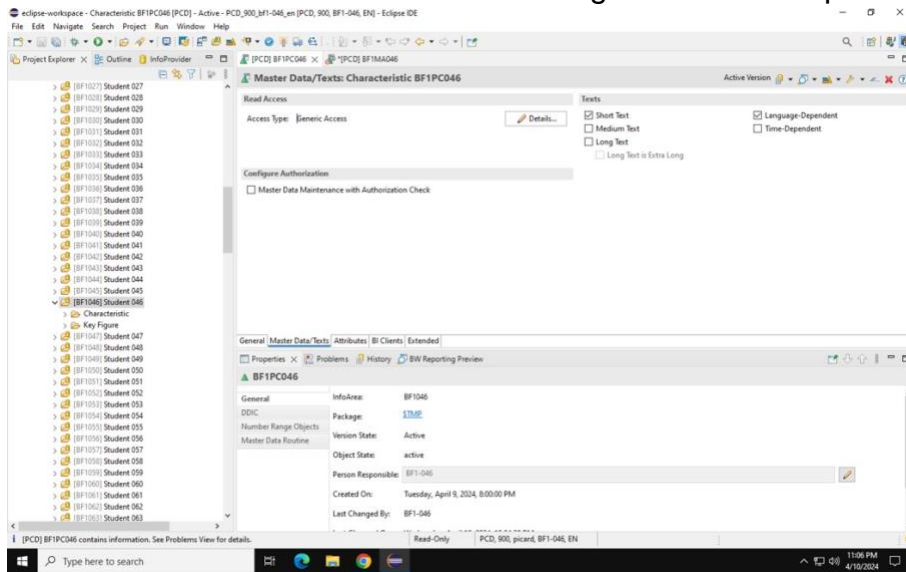


## Question 8: Is the Product category Language Dependent?

Yes, it is.

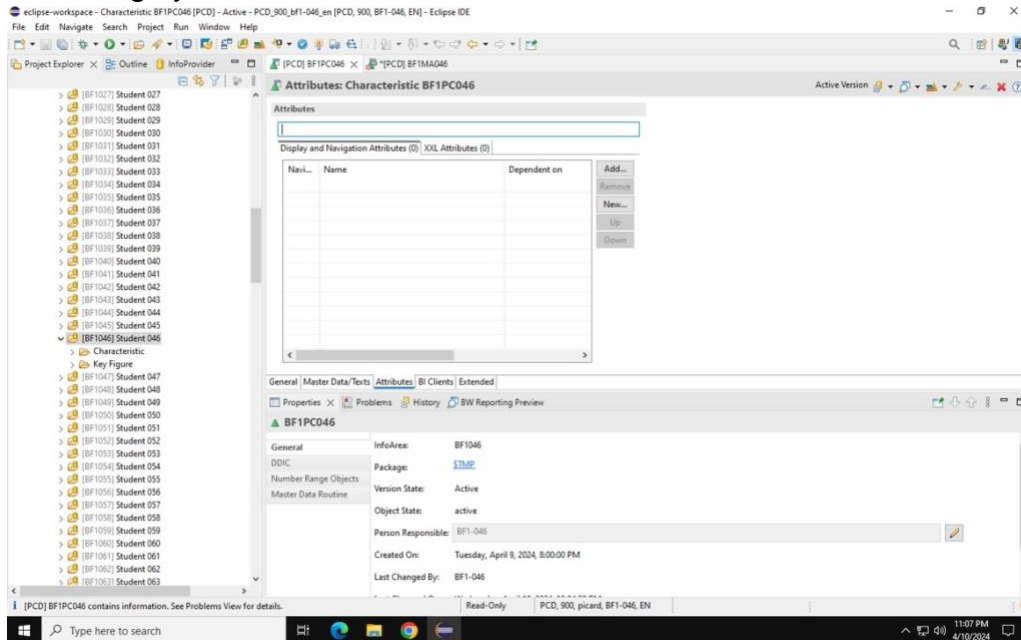
## Question G: Is the Product Category Time Dependent?

No, it is not. The concept of time dependency does not directly apply to the product category. It remains consistent across time and does not change based on temporal factors.



## Question 10: Does Product Category have attributes?

Product category does not have any attributes in our case, this table can be used to ensure referential data integrity.



## Question 11: Why did you enter the Product Category as 3 characters long?

In the preceding step, the product category characteristic was limited to be of type character and length 3.

## Question 12: What type of InfoObject is Material?

The material characteristic should be of type character and be length 18.

### Question 13: Is the Material text Language Dependent?

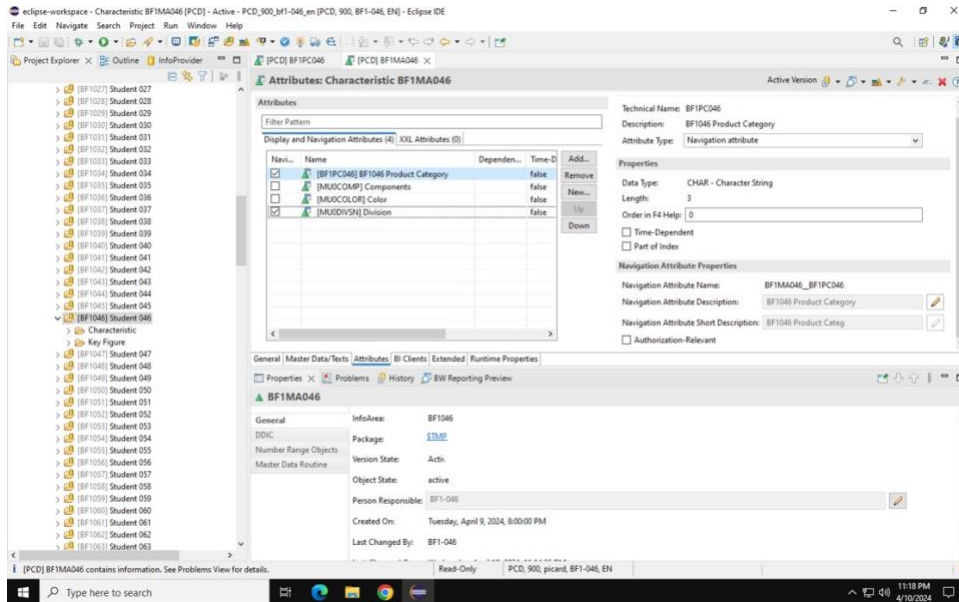
Yes, it is.

### Question 14: Is the Material text Time Dependent?

No, it is not. It is Language Dependent.

### Question 15: Does Material have attributes? If yes, what are they?

Yes, it has.



### Question 16: What is meant by Navigation Attributes?

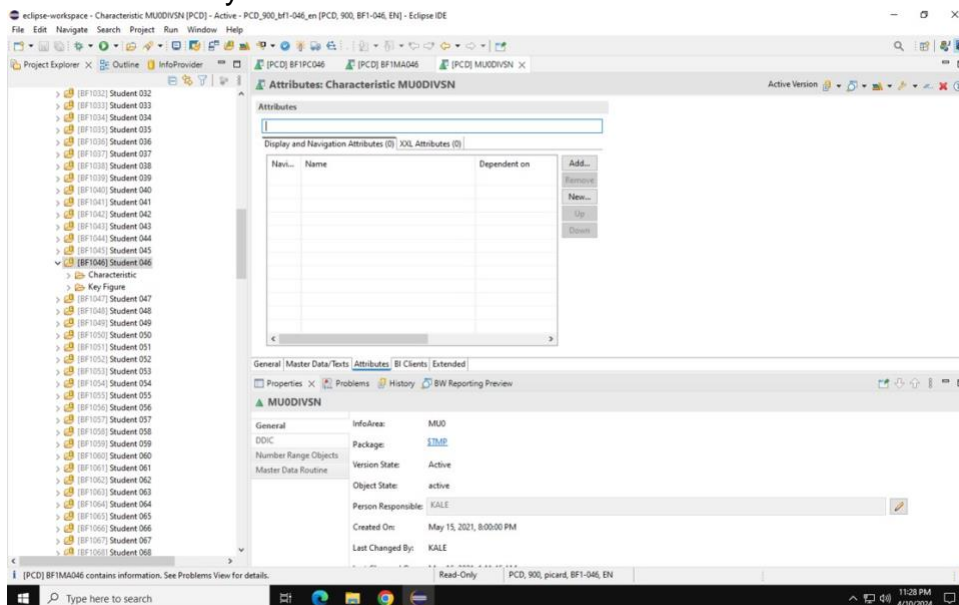
They can be used in the same way as characteristics to define queries. At the InfoObject level (attribute maintenance of the characteristic).

### Question 17: Are any attributes time dependent?

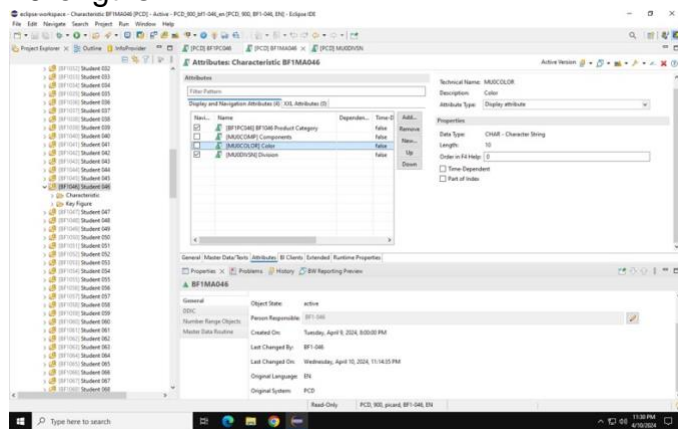
No, there are not any attributes time dependent.

### Question 18: How many attributes does Division have?

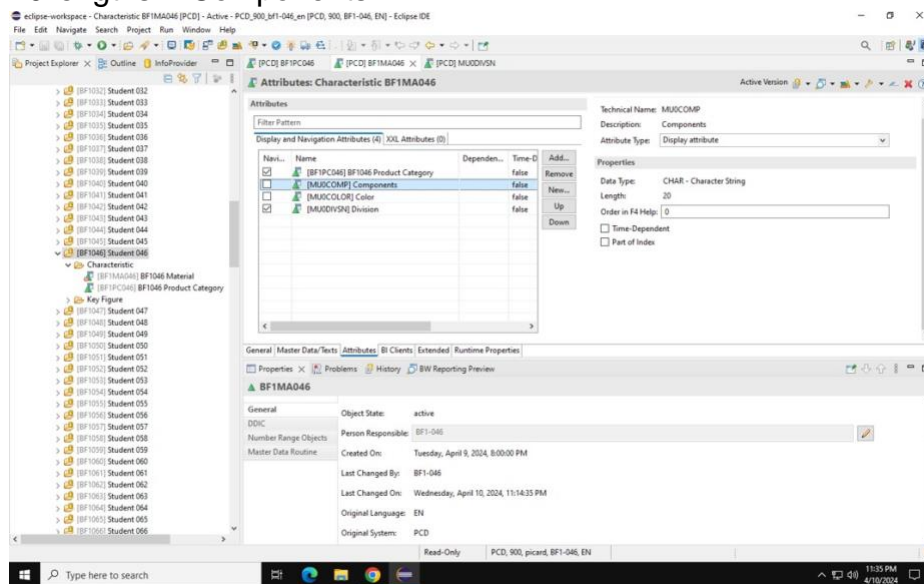
There are not any attributes.



**Question 1G: What is the length of the color attribute?**  
10 lengths.



**Question 20: What is the longest material key can we have in our data warehouse?**  
20 lengths in Components



## Benchmark 4

**Question 1: Explain why we need 6 fields for material (shown above). Hint: Refer to Exercise 3.2 – Modeling Basics.**

The columns are separated by 5 semicolons. Therefore, there are 6 columns in the csv file needing 6 fields.

**Question 2: Why did the system not add a Hierarchy node? Hint: Refer to Exercise 3.2.**

Since all nodes have the same depth, hierarchy nodes would make no sense.

**Question 3: In the mapping (rules) Figure 21 above, explain why the left table and right table have different icons for the fields.**

The left are Data source characteristics while the right is Info Object characteristics.

**Question 4: Explain why the Material Description is not connected to anything.**

There are only 5 characteristics in the info object table so 1 data source characteristic was bound to be left out. In this case, Material Description does not have a counter part, because the material characteristic in the info object table relates to the Material Number.

**Question 5: In this task, what part(s) of the E, T, L did you implement for material? Explain.**

I extracted and loaded the material data into SAP. I loaded the material attribute data into SAP.

**Question 6: Insert screenshot of product.csv file content.**

MaterialDescr	MaterialNumber	ProductCategory	Division	Color	Components
Deluxe Touring Bike (black)	DTR1000	TOU	Bl	Black	Shimano Road
Deluxe Touring Bike (silver)	DTR2000	TOU	Bl	Silver	Shimano Road
Deluxe Touring Bike (red)	DTR3000	TOU	Bl	Red	Shimano Road
Professional Touring Bike (black)	PRTR1000	TOU	Bl	Black	Shimano XT
Professional Touring Bike (silver)	PRTR2000	TOU	Bl	Silver	Shimano XT
Professional Touring Bike (red)	PRTR3000	TOU	Bl	Red	Shimano XT
Men's Off Road Bike Fully	ORMN1000	ORB	Bl	SRAM	XO
Women's Off Road Bike Fully	ORWN1000	ORB	Bl	SRAM	XO
Men's Off Road Bike Hard Tail	(Shimano)	ORHT1000	ORB	Bl	Shimano XT
Men's Off Road Bike Hard Tail	(SRAM)	ORHT2000	ORB	Bl	SRAM XO
Deluxe Road Bike (Shimano)	DXRD1000	ROB	Bl	Shimano	Ultegra
Deluxe Road Bike (SRAM)	DXRD2000	ROB	Bl	SRAM	Force
Professional Road Bike (Shimano)	PRRD1000	ROB	Bl	Shimano	Dura Ace
Professional Road Bike (SRAM)	PRRD2000	ROB	Bl	SRAM	Red
Professional Road Bike (Campagnolo)	PRRD3000	ROB	Bl	Campa	Record
Fixed Gear Bike Plus	FXGR1000	TRE	Bl		
City Bike Max	CITY1000	TRE	Bl		
E-Bike Tailwind	ELBK1000	EB	Bl		
Hoverboard	HVBD1000	EB	Bl		
Elbow Pads	EPAD1000	ACC	AS		
T-shirt	SHRT1000	ACC	AS		
Knee Pads	KPAD1000	ACC	AS		
Off Road Helmet	OHMT1000	ACC	AS		
Road Helmet	RHMT1000	ACC	AS		
Water Bottle Cage	CAGE1000	ACC	AS		
Repair Kit	RKIT1000	ACC	AS		
Air Pump	PUMP1000	ACC	AS		
Water Bottle	BOTL1000	ACC	AS		
First Aid Kit	FAID1000	ACC	AS		



## Question 7: Insert screenshot of your material master data (attributes) from SAP BW/4HANA.

Change Master Data of InfoObject BF1MA046

Display Values without Master Data | Display in Internal Format | Manage | Application Log

BF1046 Material:  Max Rows:

Adapt Filters

Time Independent | Texts

Add Line | Details | Copy Line | Delete | Undo Changes | Change records | Where Used

BF1046 Material	BF1046 Product Category	Components	Color	Division
<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="checkbox"/> BOTL1000	ACC	<input type="text"/>	<input type="text"/>	AS
<input type="checkbox"/> CAGE1000	ACC	<input type="text"/>	<input type="text"/>	AS
<input type="checkbox"/> CITY1000	TRE	<input type="text"/>	<input type="text"/>	BI
<input type="checkbox"/> DXRD1000	ROB	Shimano Ultegra	<input type="text"/>	BI

## Question 8: Click on the Texts tab. Why are there no texts?

They have not been loaded into SAP yet.

## Question G: Why is there medium text but no short or any other text fields?

The Master Data only has medium text length.

## Question 10: In the mapping figure above, why are only material description and material number connected (and not the rest of the fields on the left side)?

They need to be connected for their identifiers. The other connections are not needed.

## Question 11: What rule are we implementing for the language key for material description?

A constant rule (English language)

## Question 12: Are there any non-English material descriptions? Why?

No because of the constant rule.

## Question 13: Why is the description Medium in length?

Length was set to medium.

**Question 14: Insert a screenshot of the csv file. Highlight the texts part of It.**

The screenshot shows an Excel spreadsheet with the following data:

Material	Language	Medium Text
BF1046 Material	EN	
BOTL1000	EN	Water Bottle
CAGE1000	EN	Water Bottle Cage
CITY1000	EN	City Bike Max
DXRD1000	EN	Deluxe Road Bike (Shimano)
DXRD2000	EN	Deluxe Road Bike (SRAM)
DXTR1000	EN	Deluxe Touring Bike (black)
DXTR2000	EN	Deluxe Touring Bike (silver)
DXTR3000	EN	Deluxe Touring Bike (red)
ELBK1000	EN	E-Bike Tailwind
EPAD1000	EN	Elbow Pads
FAID1000	EN	First Aid Kit
FXGR1000	EN	Fixed Gear Bike Plus
HVBD1000	EN	Hoverboard
KPAD1000	EN	Knee Pads
OHMT1000	EN	Off Road Helmet
ORHT1000	EN	Men's Off Road Bike Hard Tail (Shimano)
ORHT2000	EN	Men's Off Road Bike Hard Tail (SRAM)
ORMN1000	EN	Men's Off Road Bike Fully
ORWN1000	EN	Women's Off Road Bike Fully
PRRD1000	EN	Professional Road Bike (Shimano)
PRRD2000	EN	Professional Road Bike (SRAM)
PRRD3000	EN	Professional Road Bike (Campagnolo)
PRTR1000	EN	Professional Touring Bike (black)
PRTR2000	EN	Professional Touring Bike (silver)
PRTR3000	EN	Professional Touring Bike (red)
PUMP1000	EN	Air Pump
RHMT1000	EN	Road Helmet
RHRT1000	EN	Repair Kit
SHRT1000	EN	T-shirt

**Question 15: Insert a screenshot of your material master data. Highlight the text part of It.**

The screenshot shows the SAP Maintain InfoObject Master Data screen for InfoObject BF1046. The 'Medium Text' column is highlighted with a red circle. The data is as follows:

Material	Language	Medium Text
BF1046 Material	EN	
BOTL1000	EN	Water Bottle
CAGE1000	EN	Water Bottle Cage
CITY1000	EN	City Bike Max
DXRD1000	EN	Deluxe Road Bike (Shimano)

## Benchmark 5

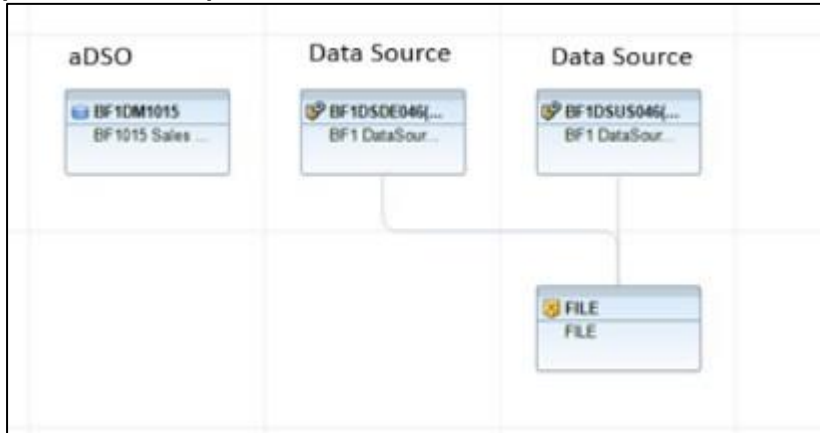
### Question 1: What is the difference between a field and an InfoObject?

Fields hold values that represent specific attributes of an entity while InfoObjects represent characteristics.

### Question 2: What is the advantage of using InfoObjects instead of fields in an aDSO?

Using InfoObjects provides standardized data attributes, ensuring consistency and simplifying maintenance.

### Question 3: Insert a screenshot of your Data Flow and label each box with the type of object it is (not the name).



### Question 4: Why did we choose Direct Assignment for Customer?

To map the customer ID directly to the corresponding InfoObject without any transformation or lookup.

### Question 5: Can one source object be mapped to multiple target objects? Provide an example.

Yes, revenue was mapped to revenue and net sales.

### Question 6: Why does the Cost of Good Manufactured not need a currency key?

It is already in USD.

### Question 7: What will be the final currency of Net Sales?

USD because the currency key is added.

### Question 8: Explain, in detail, the transformation rule for Sales Organization.

Since Sales Organization is a time-dependent attribute of customer, the Lookup rule type is used. By adding customer and salesdate, the lookup rule can accurately transform the sales organization.

### Question G: Why does the Sales Data aDSO need two transformations?

One for each data source.

### Question 10: Why is the ordernumber a field and not an InfoObject?

It is a unique identifier that does not need any attributes that InfoObjects provide.

### Question 11: Why did you have to execute two DTPs?

One for each data source

**Question 12: What would happen if you executed a DTP twice by mistake?**

It can cause duplicate data.

**Question 13: What is the source object of the DTP?**

The source objects are the DE and US sales data.

**Question 14: What is the target object of the DTP?**

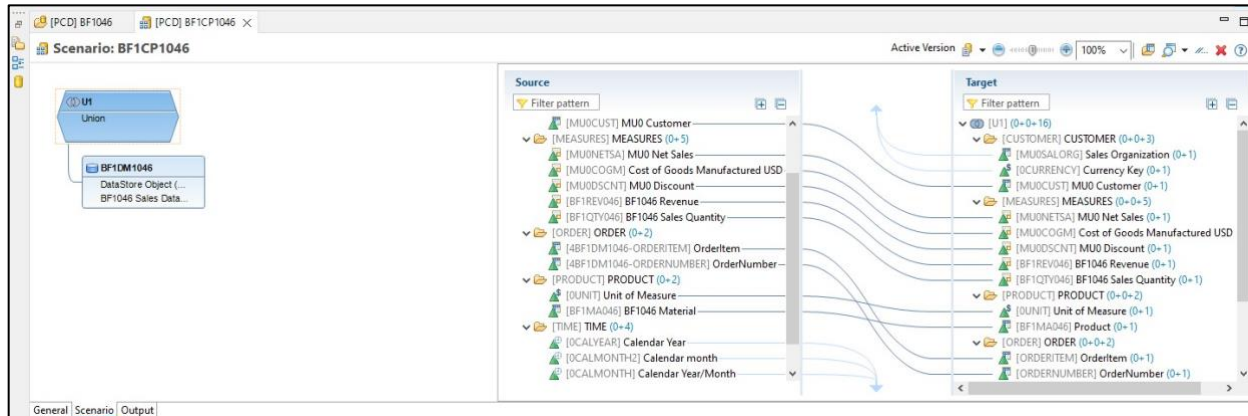
The target object is the aDSO

**Question 15: In these DTP, what type of data are we loading (in the context of the snowflake schema)?**

Structured data

# Benchmark 6

## Screenshot1-



## Screenshot2-

The screenshot displays the SAP BW Data Grid for BF1046 Sales Data CP(Actuals). The table shows various key figures and their values for different customers and time periods. The columns are: Key Figures, BF1046 Sales Quantit, BF1046 Revenue, Cost of Goods Manufa, MUO Discount, and MUO Net Sales. The rows list various customers and their corresponding values.

Key Figures	BF1046 Sales Quantit	BF1046 Revenue	Cost of Goods Manufa	MUO Discount	MUO Net Sales
MUO Customer					
Airport Bikes	35,049 PC	55,210,387.75 EUR	\$ 37,152,220.20	1,656,311.81 EUR	53,554,075.94 EUR
Alster Cycling	33,931 PC	53,269,462.40 EUR	\$ 35,489,583.65	1,598,084.22 EUR	51,671,378.18 EUR
Bavaria Bikes	85,864 PC	145,144,849.15 EUR	\$ 96,447,372.41	7,257,248.95 EUR	137,887,600.20 EUR
Beantown Bikes	47,658 PC	\$ 79,570,909.34	\$ 42,025,141.63	\$ 3,978,546.63	\$ 75,592,362.71
BigApple Bikes	29,014 PC	\$ 50,383,396.99	\$ 26,556,729.41	\$ 1,511,502.27	\$ 48,871,894.72
Capital Bikes	51,719 PC	80,959,818.07 EUR	\$ 53,853,966.12	2,428,795.29 EUR	78,531,022.78 EUR
Cruiser Bikes	35,108 PC	55,540,898.99 EUR	\$ 37,126,315.76	1,666,227.54 EUR	53,874,671.45 EUR
DC Bikes	23,974 PC	\$ 40,970,548.32	\$ 21,663,561.57	\$ 1,229,116.84	\$ 39,741,431.48
Drahtesel	27,588 PC	44,656,137.94 EUR	\$ 30,057,258.50	0.00 EUR	44,656,137.94 EUR
Fahrradt	29,707 PC	45,481,283.36 EUR	\$ 30,702,209.66	0.00 EUR	45,481,283.36 EUR
Furniture City Bikes	12,687 PC	\$ 22,032,176.15	\$ 11,565,035.13	\$ 0.00	\$ 22,032,176.15
Motown Bikes	24,905 PC	\$ 42,933,577.80	\$ 22,698,558.19	\$ 1,288,007.32	\$ 41,645,570.48
Neckarad	40,133 PC	65,774,654.60 EUR	\$ 43,644,036.95	1,973,240.88 EUR	63,801,413.72 EUR
Northwest Bikes	25,167 PC	\$ 43,976,038.60	\$ 23,252,965.35	\$ 1,319,281.21	\$ 42,656,757.39
Ostseerad	17,335 PC	27,504,089.40 EUR	\$ 18,524,057.46	0.00 EUR	27,504,089.40 EUR
Peachtree Bikes	23,583 PC	\$ 39,726,334.83	\$ 21,067,645.35	\$ 1,191,790.07	\$ 38,534,544.76
Philly Bikes	24,230 PC	\$ 40,547,223.35	\$ 21,396,378.67	\$ 1,216,416.64	\$ 39,330,806.71
Radelland	53,315 PC	83,449,979.15 EUR	\$ 55,820,599.33	2,503,500.10 EUR	80,946,479.05 EUR
Red Light Bikes	42,081 PC	66,405,427.32 EUR	\$ 44,614,434.55	1,992,163.32 EUR	64,413,264.00 EUR
Rocky Mountain Bikes	27,849 PC	\$ 51,676,282.57	\$ 27,065,663.07	\$ 1,550,288.67	\$ 50,125,993.90
Silicon Valley Bikes	40,510 PC	\$ 67,945,308.77	\$ 35,910,700.41	\$ 3,397,265.98	\$ 64,548,042.79
SoCal Bikes	24,069 PC	\$ 41,940,864.02	\$ 22,069,851.60	\$ 1,258,225.87	\$ 40,682,638.15
Velodrom	25,715 PC	39,934,430.37 EUR	\$ 26,663,484.67	0.00 EUR	39,934,430.37 EUR
Windy City Bikes	25,286 PC	\$ 43,967,392.46	\$ 23,294,633.36	\$ 1,319,022.01	\$ 42,648,370.45
Overall Result	806,477 PC		\$ 808,662,403.00		

### Question 1: What is the difference between an aDSO and a composite provider?

An aDSO is primarily used for storing and managing detailed transactional data in an SAP BW environment. It allows for the storage, retrieval, and updating of transactional data. On the other hand, a Composite Provider is a virtual object that combines data from various sources, including aDSOs, and is used mainly for reporting and analytics purposes. It allows for complex data modeling, integrating data from multiple objects into a unified structure for analysis and reporting.

### Question 2: Is the data in a composite provider persistent?

No, the data in a Composite Provider is not persistent. A Composite Provider in SAP BW is a virtual object that does not store data physically. Instead, it integrates and harmonizes data from different sources in real-time or on-demand for reporting and analysis. This approach allows for flexibility and up-to-date reporting without the need for physical data storage within the Composite Provider itself.



**Question 4: List the process (at least 10 steps) of building and populating a BW/4HANA 2.0 data warehouse. Refer to all previous exercises in Chapters 3 and 4.**

The process of building and populating a BW/4HANA 2.0 data warehouse involves several steps, such as:

- Defining the data model.
- Creating InfoObjects for characteristics and key figures.
- Loading transactional and master data.
- Building and using Advanced DataStore Objects (aDSOs) for data storage.
- Developing Composite Providers for data integration.
- Implementing data transformation and transfer processes.
- Configuring and using extraction, transformation, and loading (ETL) processes.
- Setting up virtualization layers for data reporting.
- Activating and validating the loaded data.
- Using tools like Analysis for Excel for data analysis and reporting.

These steps encompass the comprehensive process of organizing, storing, and preparing data for effective business intelligence and reporting in SAP BW/4HANA.

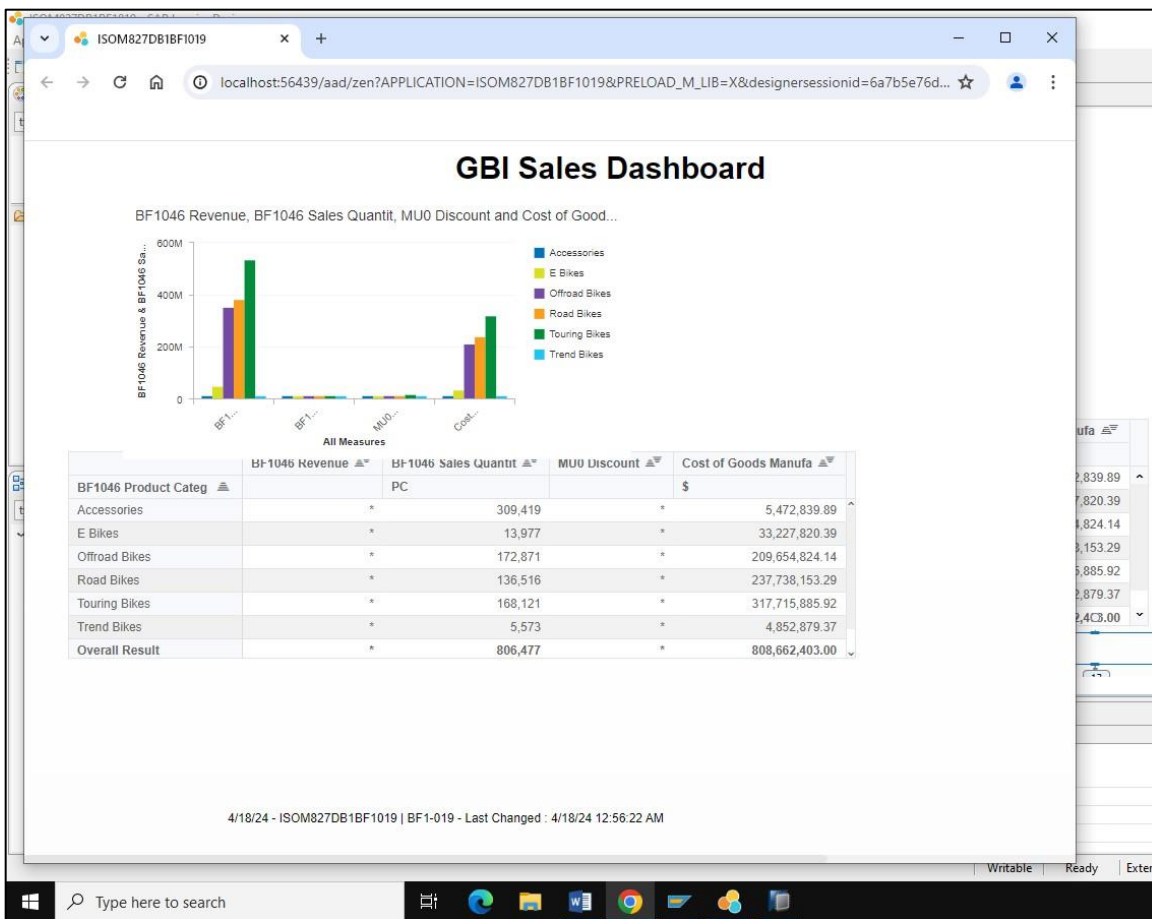
**Question 5: Now that you have modeled, built, and populated a data warehouse in SAP BW/4HANA 2.0, list one advantage to snowflake schemas that we had discussed in class but did not implement in our data warehouse.**

One advantage to snowflake schemas discussed in class but not implemented in our data warehouse is the normalization of data. This reduces redundancy and improves data integrity. In a snowflake schema, data is divided into additional tables through normalization, leading to less duplication and a clear structure. This can enhance query performance and data quality.

**Benchmark 6 Reflection:**

In benchmark 6, we gained insights into Composite Provider-based reporting in SAP BW. The goal was to merge various data sources for reporting. The process involved using data from aDSOs and others, with the outcome being detailed reports. Challenges included data integration and mastering Composite Providers. My experience was positive, reflecting the comprehensive and powerful nature of SAP tools for data integration and analytics.

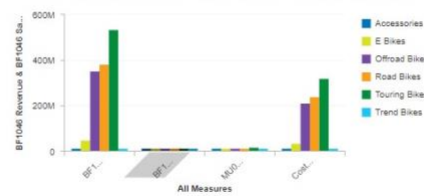
# Benchmark 7





## GBI Sales Dashboard

BF1046 Revenue, BF1046 Sales Quantit, MU0 Discount and Cost of Good...



BF1046 Product Categ	BF1046 Revenue	BF1046 Sales Quantit	MU0 Discount	Cost of Goods Manufa
Accessories	*	309,419	*	5,472,839.89
E Bikes	*	13,977	*	33,227,820.39
Offroad Bikes	*	172,871	*	209,654,824.14
Road Bikes	*	136,516	*	237,738,153.29
Touring Bikes	*	168,121	*	317,715,885.92
Trend Bikes	*	5,573	*	4,852,879.37
Overall Result	*	806,477	*	808,662,403.00

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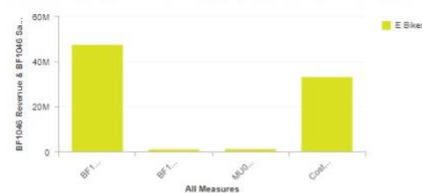


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## GBI Sales Dashboard

BF1046 Revenue, BF1046 Sales Quantit, MU0 Discount and Cost of Good...



BF1046 Product Categ

E Bikes (EBI) X

BF1046 Product Categ	BF1046 Revenue	BF1046 Sales Quantit	MU0 Discount	Cost of Goods Mani
E Bikes	*	13,977	*	33,227,820.39
Overall Result	*	13,977	*	33,227,820.39

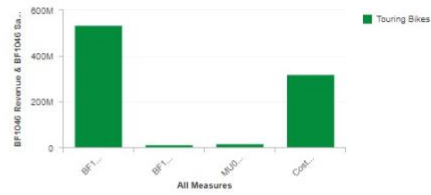
## GBI Sales Dashboard



BF1046 Product Categ

ring Bikes (TOU) x |

BF1046 Revenue, BF1046 Sales Quantit, MU0 Discount and Cost of Good...



BF1046 Product Categ ▲▼	BF1046 Revenue ▲▼	BF1046 Sales Quantit ▲▼	MU0 Discount ▲▼	Cost of Goods Mani
		PC		\$
Touring Bikes	*	168,121	*	317,715,885.92
Overall Result	*	168,121	*	317,715,885.92

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Q1 G2 - As shown in the screenshot, the highest Revenue is for the product category “Touring Bikes” and the lowest discount is for “Trends Bike”.

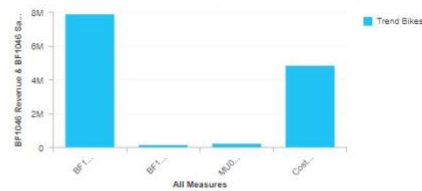
## GBI Sales Dashboard



BF1046 Product Categ

end Bikes (TRE) x |

BF1046 Revenue, BF1046 Sales Quantit, MU0 Discount and Cost of Good...



BF1046 Product Categ ▲▼	BF1046 Revenue ▲▼	BF1046 Sales Quantit ▲▼	MU0 Discount ▲▼	Cost of Goods Mani
		PC		\$
Trend Bikes	*	5,573	*	4,852,879.37
Overall Result	*	5,573	*	4,852,879.37

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## GBI Sales Dashboard



BF1046 Product Categ

0

BF1046 Revenue

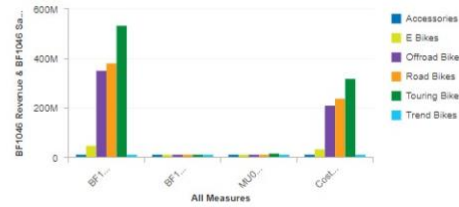
BF1046 Revenue

BF1046 Sales Quantit

MU0 Discount

Cost of Goods Manufa

BF1046 Revenue, BF1046 Sales Quantit, MU0 Discount and Cost of Good...



BF1046 Product Categ	BF1046 Revenue	BF1046 Sales Quantit	MU0 Discount	Cost of Goods Mani
		PC		\$
Accessories	*	309,419	*	5,472,839.89
E Bikes	*	13,977	*	33,227,820.39
Offroad Bikes	*	172,871	*	209,654,824.14
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Touring Bikes	*	168,121	*	317,715,885.92
Trend Bikes	*	5,573	*	4,852,879.37
Overall Result	*	806,477	*	808,662,403.00

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## GBI Sales Dashboard



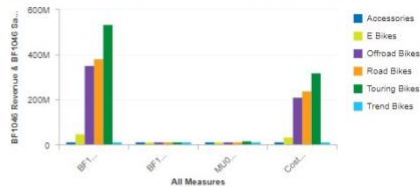
BF1046 Product Categ

0

BF1046 Revenue

Reset All

BF1046 Revenue, BF1046 Sales Quantit, MU0 Discount and Cost of Good...



BF1046 Product Categ	BF1046 Revenue	BF1046 Sales Quantit	MU0 Discount	Cost of Goods Mani
		PC		\$
Accessories	*	309,419	*	5,472,839.89
E Bikes	*	13,977	*	33,227,820.39
Offroad Bikes	*	172,871	*	209,654,824.14
Road Bikes	*	136,516	*	237,738,153.29
Touring Bikes	*	168,121	*	317,715,885.92
Trend Bikes	*	5,573	*	4,852,879.37
Overall Result	*	806,477	*	808,662,403.00

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## Benchmark 8

**Question 1: Based on the results, it appears that Triple Exponential Smoothing was able to fit the data well as well as make a good forecast. Why do you think it worked this well?**

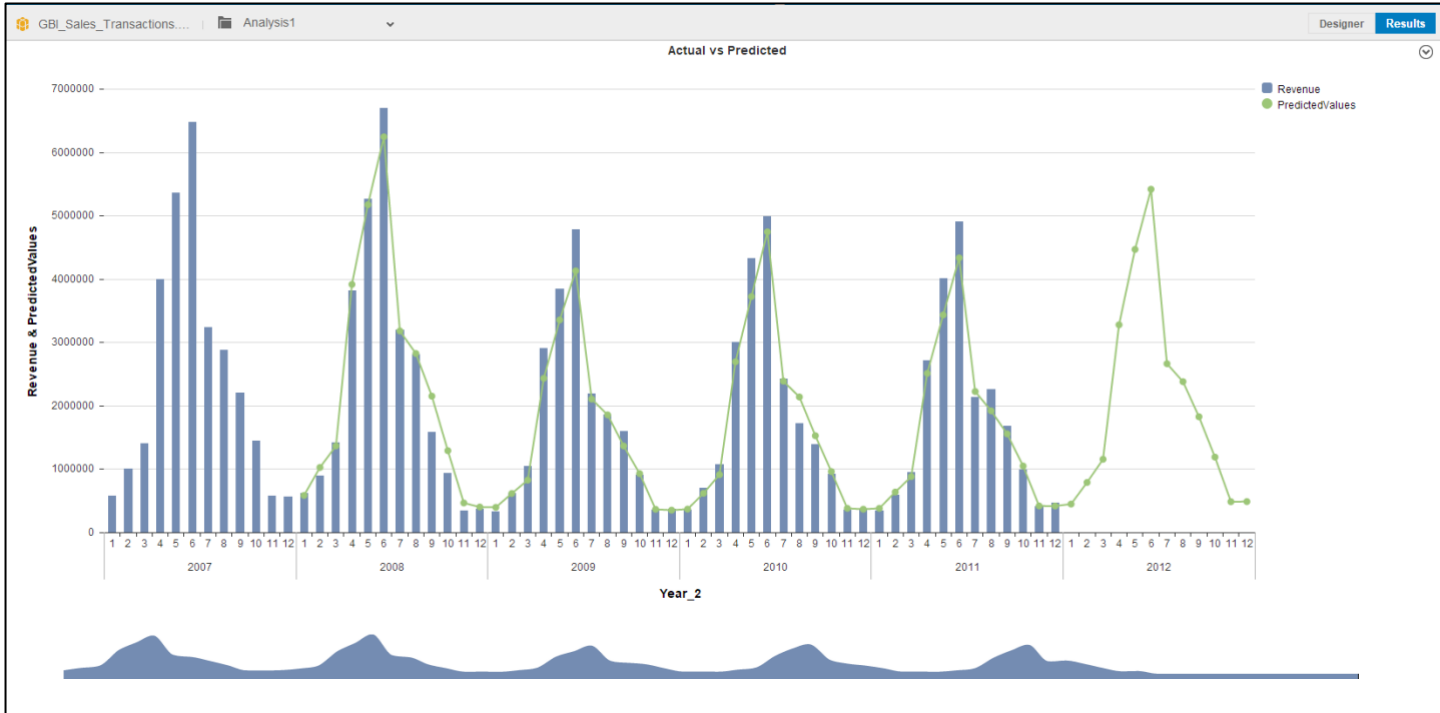
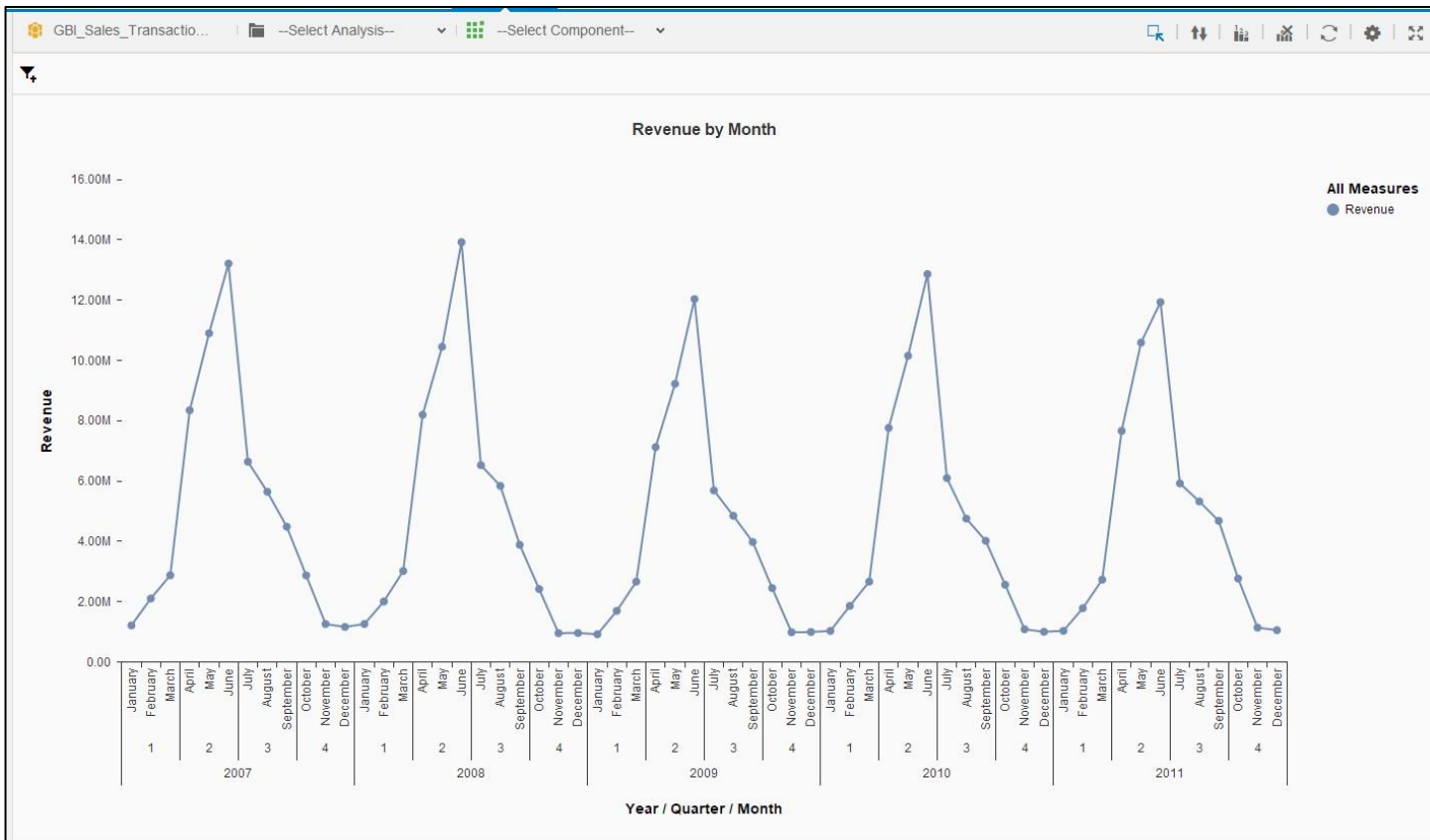
Triple Exponential Smoothing was able to fit the data to make a good forecast because it was able to take the previous data we had attributed to USD revenue and forecast it based of monthly values in previous years/months. Thus, we are seeing a similar trend line that gradually rises to the summer months, when people are most likely to buy bicycles, and then decrease afterword.

**Question 2: Would single or double exponential smoothing have worked for this GBI sales data? Why or why not?**

Single Exponential Smoothing would not have helped us in determining a predictive model for the following year for GBI sales as it does not take into account trends or seasonal factors that Triple Exponential Smoothing does so precisely. Arguably, Double Exponential Smoothing can be used for GBI sales as it is looking at a trend analysis about the data we are providing. However, it would not be as accurate compared to Triple Exponential due to the seasonal factor that is so heavily prevalent in GBI sales.

**Question 3: Explore the results tab to find the R-square factor. What is the R-square factor telling you about the model? Also look for Goodness of Fit. Comment on it as well.**

The R-square factor is based on a scale of 0-1, explaining the variability of the data. We see that the R-square factor of 0.84257 run by the Triple Exponential Smoothing model is on the higher end. Helping us determine that the data we are being shown is reliable and a more accurate forecasting model. Also, the Goodness of Fit we observed is 0.973036, using an alpha of 0.03. This determines how our actual values compare to the predicted values the model had predicted.



# Algorithm Summary

Information of the columns used in the algorithm

Dependent Column  
Revenue : Double

Triple Exponential Smoothing Summary

Period : 12

StartYear : 2007

StartPeriod : 1

Alpha : 0.3

Beta : 0.1

Gamma : 0.1

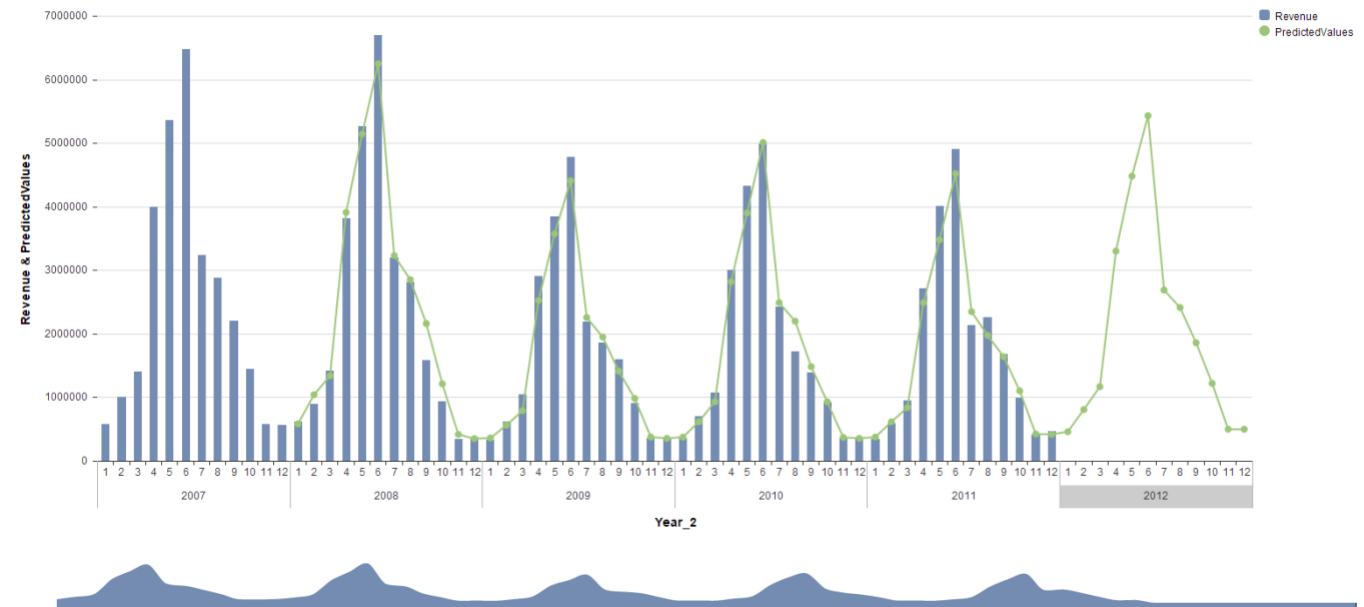
The Base : 1902838.4857853544

The Trend : 19001.296622608526

The Seasonal Indices : 0.2321837877420534 0.4058865723725826 0.5886409047277339 1.6560310418645698 2.236279574920722 2.686543074842494 1.3078446620758855 1.1579901456044255 0.8800887293112638 0.5675605472495979 0.22885018309047217 0.22766025201840417

R-square factor : 0.8425744548506843  
Mean Squared Error : 5.549953574592698E10  
Root Mean Squared Error : 235583.39446112706  
Mean Absolute Percent Error : 7.902717753255688  
Goodness of fit : 0.9730361312632307  
fvalue : 1843.6468770743482

## Actual vs Predicted



# Algorithm Summary

Information of the columns used in the algorithm

Dependent Column  
Revenue : Double

Triple Exponential Smoothing Summary

Period : 12

StartYear : 2007

StartPeriod : 1

Alpha : 0.5

Beta : 0.1

Gamma : 0.1

The Base : 1937367.481496153

The Trend : 19796.687382668722

The Seasonal Indices : 0.234138121338436 0.4082855093772983 0.5844055666146899 1.6374859051018928 2.2010737645189975 2.6424195040269334 1.295173079854366 1.1513074543744466 0.8785463032397061 0.5714019813605214 0.2311343852746699 0.22871599168581674

R-square factor : 0.8915533801155566  
Mean Squared Error : 3.791985225127544E10  
Root Mean Squared Error : 194730.20374681335  
Mean Absolute Percent Error : 7.1825935824144285  
Goodness of fit : 0.9815770365484913  
fvalue : 2855.2219389280717