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SUBJECT, MATERIAL & VIDEOS

VIDEOS PROVIDED

SSAS

1.Create Basic Cube and Model Phase

Tabular solution, project, and model

Import data, friendly names, filter columns

Providing relationships and create model

Create Hierarchies

Consider DimDate as date table

Deploy cube and browse / report for testing.

2.Apply Logics on the cube for decision making

Create calculated columns

Create calculated measures

Create KPIs

3.Create better loading of data and loading options

Create partitions

Process partitions

4.Apply Security [required people can access]

Create Perspective

Create Role and Row Level Security (RLS)

5.Deploy cube for browsing and reporting

6.DAX queries at SSMS and DAX Studio

Trainings:

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PROJECT TRAINING

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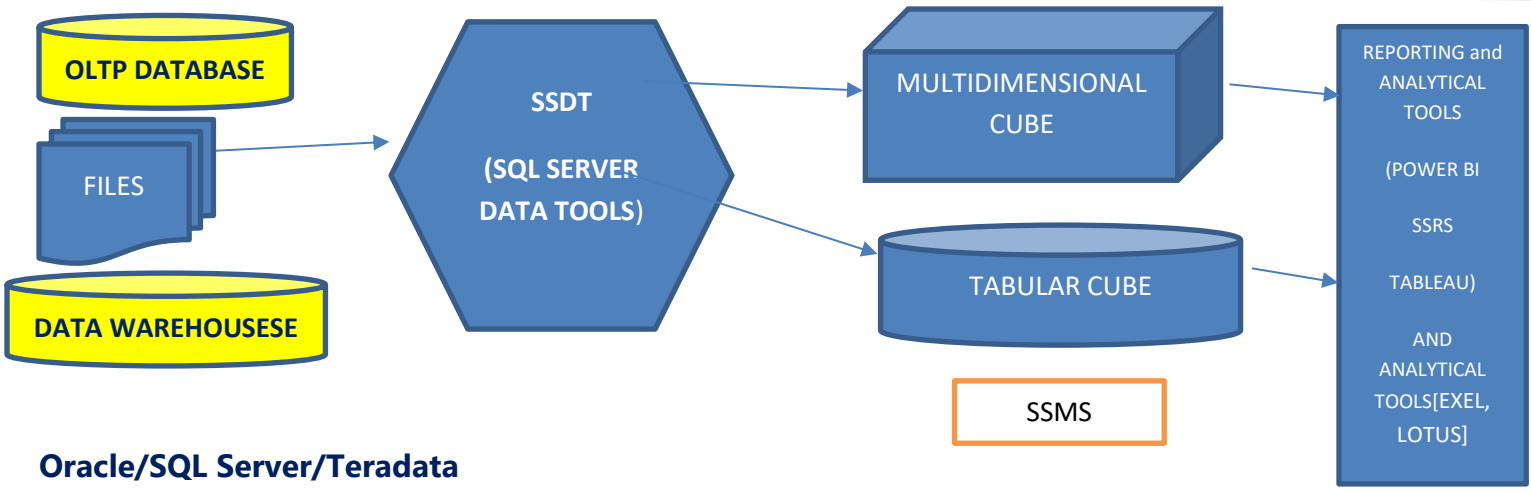


Oracle/SQL Server/Teradata

Note:

This is synopsis of theory and practical, for more information use the given detailed materials

What is Cube and why do we require?

Cube is a special kind of database design [which holds less memory when compared to DWH]

Suitable to store data, aggregations, and provide easy analysis and browsing.

What is Multidimensional Cube and why do we require?

Cube is multidimensional object suitable to provide analysis on multiple dimensions easily.

What is Tabular Cube and why do we require?

Tabular Cube is suitable to store tables of data with in-memory process for better analysis and browsing.

What is SSAS?

It is Microsoft Analysis Services and part of MSBI.

Why do we require SSAS?

SSAS is to provide analysis and mining solution to the customers.

a) For analysis using Tabular and Multidimensional models

b) Mining using Data Mining Models

Difference between Tabular and Multidimensional model?

Tabular Model [2012 onwards]:

- Two-dimensional relationship model
- Simple model
- Suitable for **less storage**
- Best fit **for faster analysis and easy aggregates creation**
- **SSDT** (SQL Server Data Tools) required to create tabular model
- **DAX** is the language required to work with tabular model
- Uses **Vertipaq engine** for the data processing and **in-memory management**

Multidimensional Model [2005 onwards]:

- More than two dimensions relationship model
- **Complex model [Cube Model]**
- **Suitable for more storage**
- Best fit for **detailed analysis and complex aggregates creation**
- **SSDT** (SQL Server Data Tools) required to create multidimensional model
- **MDX is the language required** to work with this model [DAX, XMLA, DMX, ASSL, and TSML also supported]
- Uses **Multidimensional engine** for the data processing.

Why Power BI and Tabular Model are best fit?

Power BI Process [ET + Storage+ Modeling + Reporting]:

Extract Data→ Transform→ Model Data→ Report Data→ Present Data

Tabular Model Process [Limited ET + more Storage + Modeling]:

Extract Data→ Transform→ Model Data→

- Tabular model uses **vertipaq engine** [Import Mode] **for in memory process**, **DAX** for calculations, KPIs etc...
- Tabular model uses **import and direct query** modes.
- Tabular Model support **Row -Level security**

==========

- Power BI uses **vertipaq engine** [Import Mode] for in memory process, DAX for calculations, KPIs etc...
- Power BI model uses **import and direct query modes.**
- Power BI support **Row -Level security**
- Power BI has **many-many relationship**, visualizations, and Extract Transform process [Power Query]
- Power BI Service, REST API, Embedding etc... **not possible** in tabular model.

Power BI and Tabular Model commonality

Power BI [2013] is an inspired BI solution on top of Tabular Model [2012].

Both use the below

a) Vertipaq engine [in-memory process engine]

b) DAX Language for business logics and communication [New Measure, Column, Table]

c) Row-level security

d) Extract and Transform operation process

e) Direct Query and Import Modes

f) Full support to Excel level data display and browsing

g) Both can use Azure cloud storage

What is Direct Query and Import Mode?

Import Mode:

Gets data into SSDT along with structure.

Support Limited Data Only.

Faster aggregations and analysis [as in-memory we are maintaining]

Direct Query:

Gets structure into SSDT.

Supports more volumes of data.

Little slow when compared to Import Mode [as it hits every time to the source]

What we do in the Tabular Model?

a) Use **SSDT to**

1) Extract data from Data Warehouse [OLTP or other applications also]

2) Model data [table relationships established]

3) Tabular model [.bim model with storage]

4) Calculated measures, calculated columns, KPIs, Hierarchies, Partitions

5) Perspectives, Security [Row-Level Security] etc...

b) We Deploy [publish] to create a tabular database at **SSMS--> SSAS [Tabular Instance]**

What is the advantage of Tabular Cube database available at Tabular Instance?

SSAS-Tabular Instance cube database used for

a) Reporting tools to connect and generate report

b) Excel resources to connect and browse

c) Third party analytical tool resources connect and analyze

Etc...

What we do in the Power BI?

a) Extract data

b) Transform data

c) Model data

d) DAX calculated columns, measures and tables

d) Visuals creation

e) Security

f) Publish

g) Reports management and dash board creations

h) Share and subscription

i) Scheduled refresh / Data flow refresh

j) Power BI Embedding

k) Access providing through apps in mobile

Note: REST API, API, Applications communication is additional

MY PROJECT FLOW:

OLTP-->STAGE-->EDW-->DW-->CUBES---> REPORTING

DW (VINAYTECH_DEV_BUSINESS_DETAILS) DB/Excel ----->SSDT----> TABULAR CUBE

(SSMS--DATABASE ENGINE) ---------->SSDT---> (SSMS--SSAS--TABULAR INSTANCE)

Installation Process and components

To work with current model, we need SSDT and SSMS components.

a)SSDT INSTALLATION [SQL SERVER DATA TOOLS]:

SQL Server Data Tools used to create SSIS, SSAS [Tabular and Multi], SSRS applications.

Three ways to get

a)http://www.vinaytechhouse.com/MSBI-Software-Link.html for link and installation steps

b) Google it and install

c) Trainer will send you

b) Tabular Instance creation and Browser Service creation

Tabular Instance to keep the created cube and make it accessible to others [reporting people, excel data browsers, third party analytical tool analysis users etc...]

Browser service is required to allow browsing on cube

ENSURE THE BELOW BEFORE PRACTICE

1.SSDT installed and having Analysis Services Template [File menu→ new project→template]

2.SSMS→ Database engine having Vinaytech_Dev_Business_Details database

3.SSMS→ SSAS→ Tabular instance is available (connect and see blue colored table icon)

Tabular Instance Creation and Observing

Collect SQL Server BI software

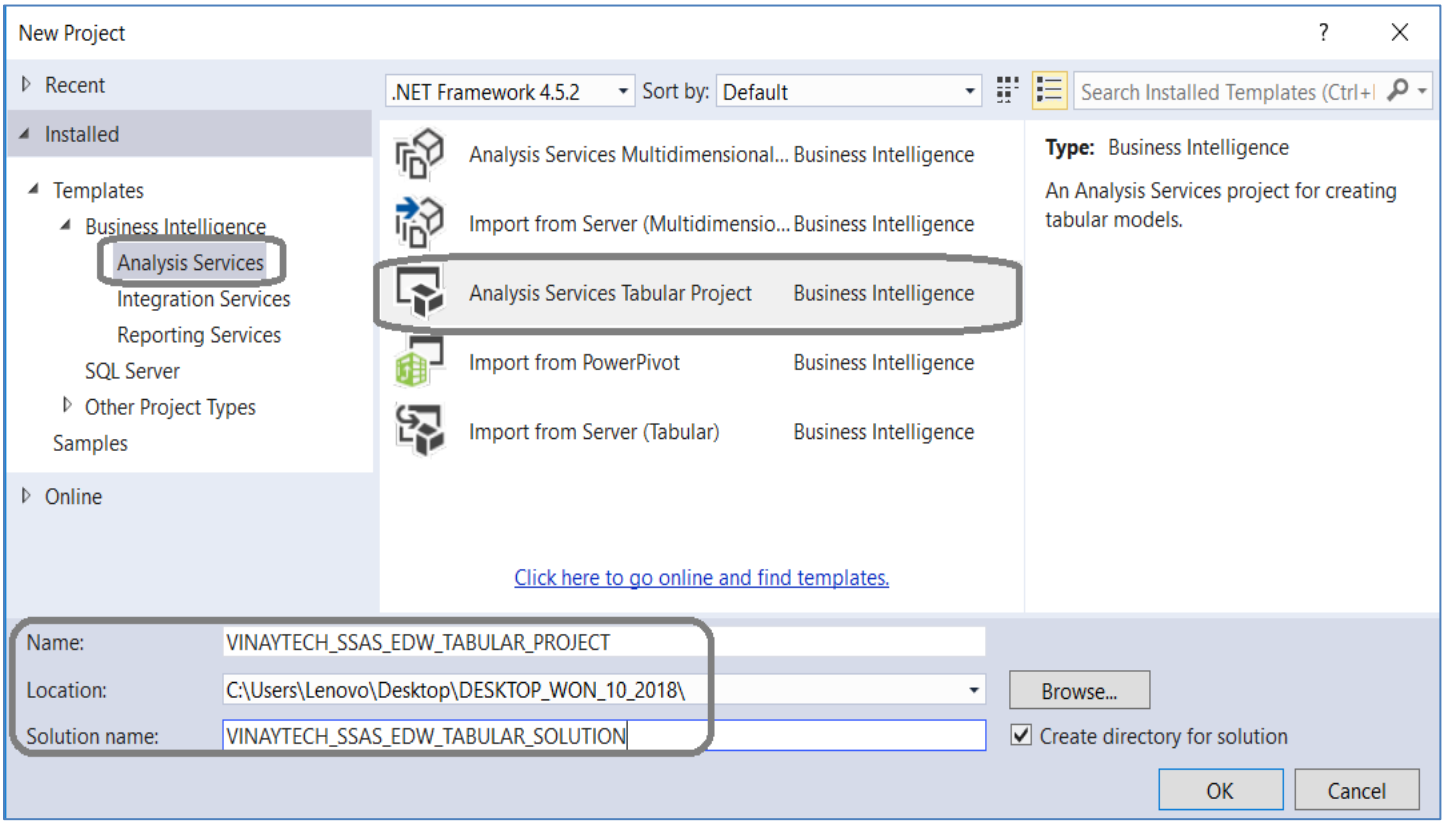
Go to Setup.exe→ Follow the instruction document

PRACTICAL

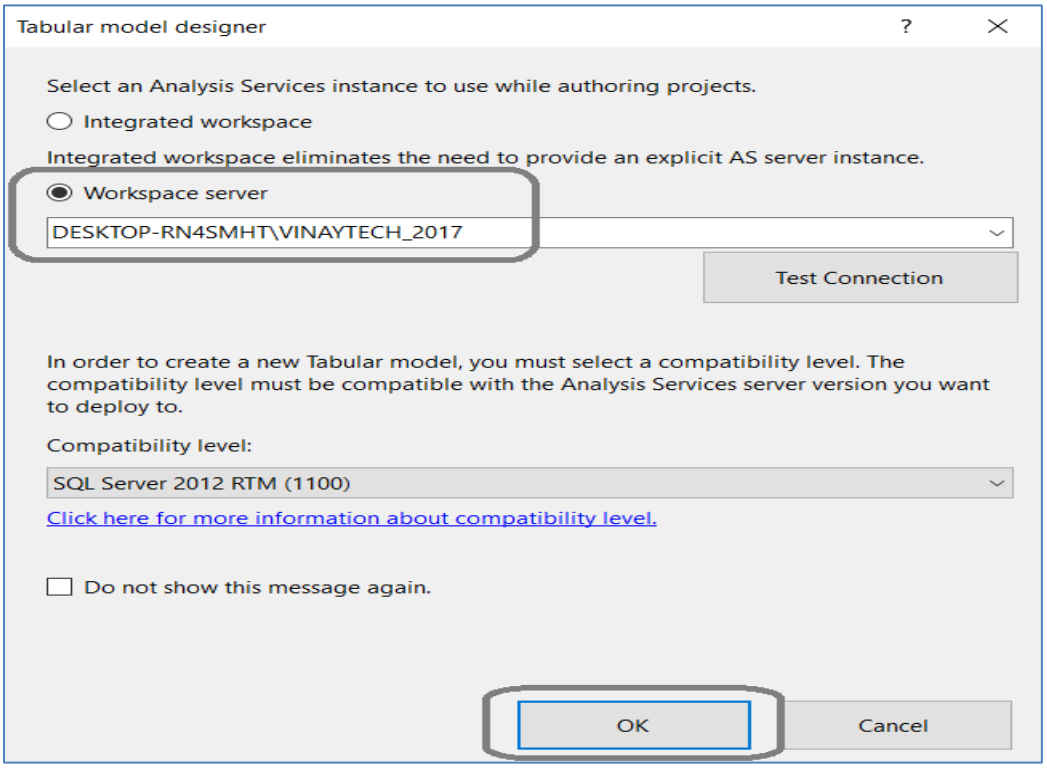
1. CREATE SOLUTION, PROJECT, AND MODEL

OPEN SSDT, FILE MENU-->NEW PROJECT--> SELECT ANALYSIS SERVICES TEMPLATE--> TABULAR MODEL, PROVIDE PROJECT NAME, DIRECTORY NAME, SOLUTION NAME

OK

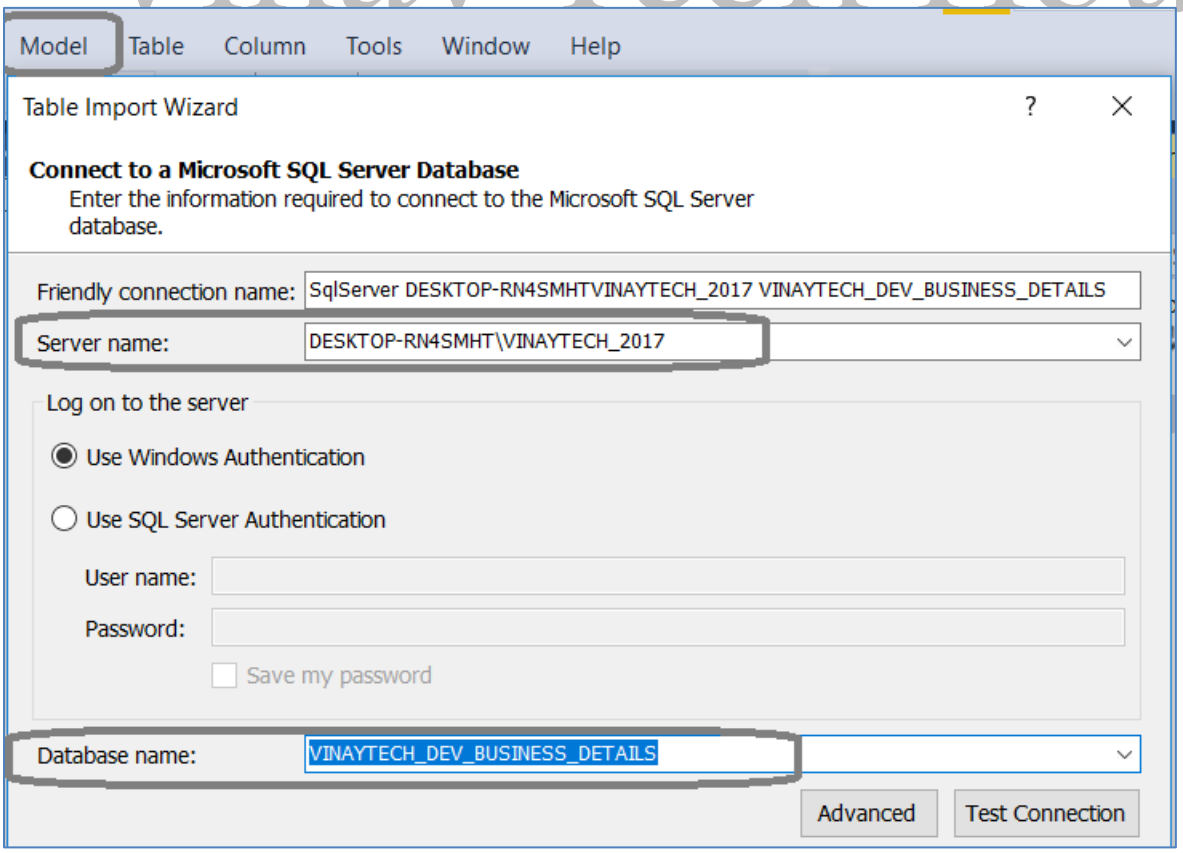


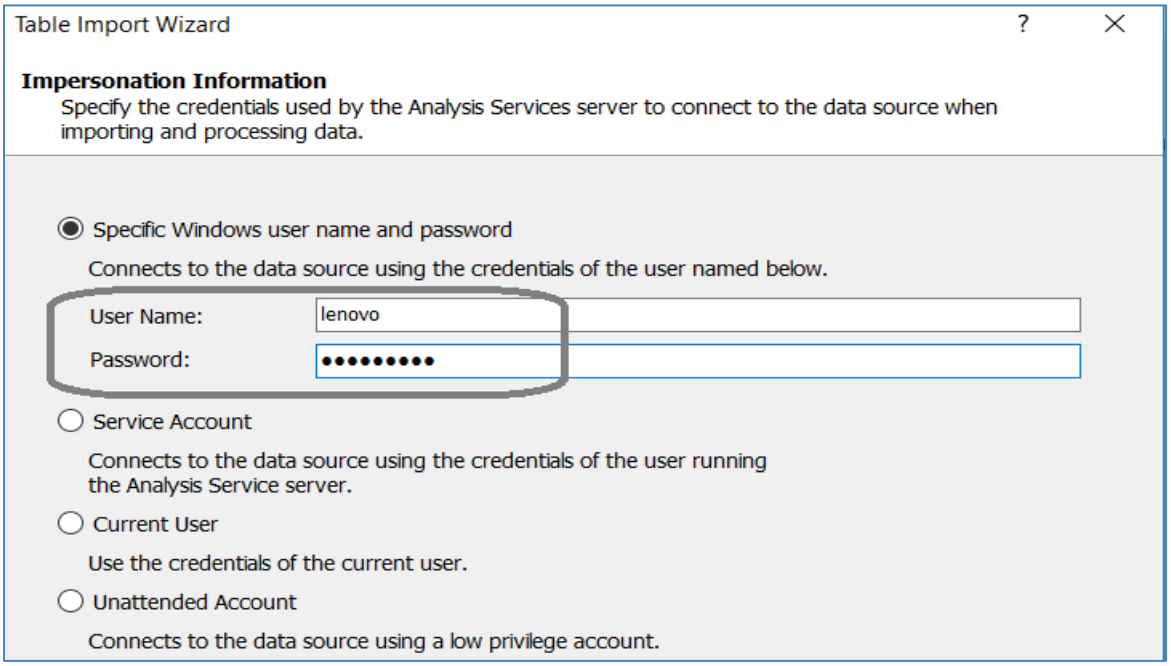
PROPMPTS FOR WORKSPACE SERVER (IN-MEMORY), SPECIFY ANY TABULAR INSTANCE IN SSMS-->SSAS



2. ADDING DATA TO THE MODEL

Model menu--> Import from data source--> select SQL Server--> Specify Server name, database name (Vinaytech_Dev_Business_details)-->

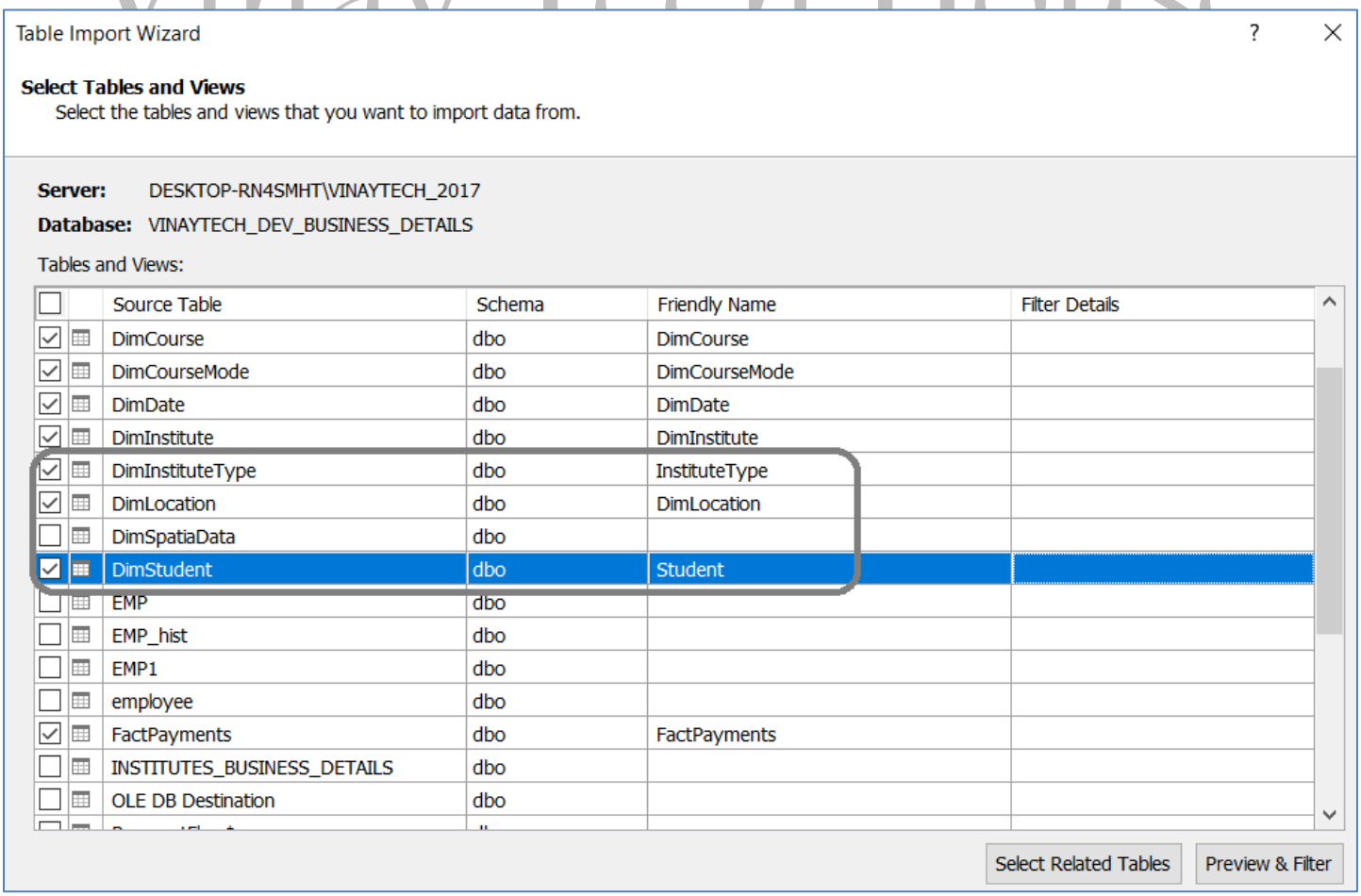




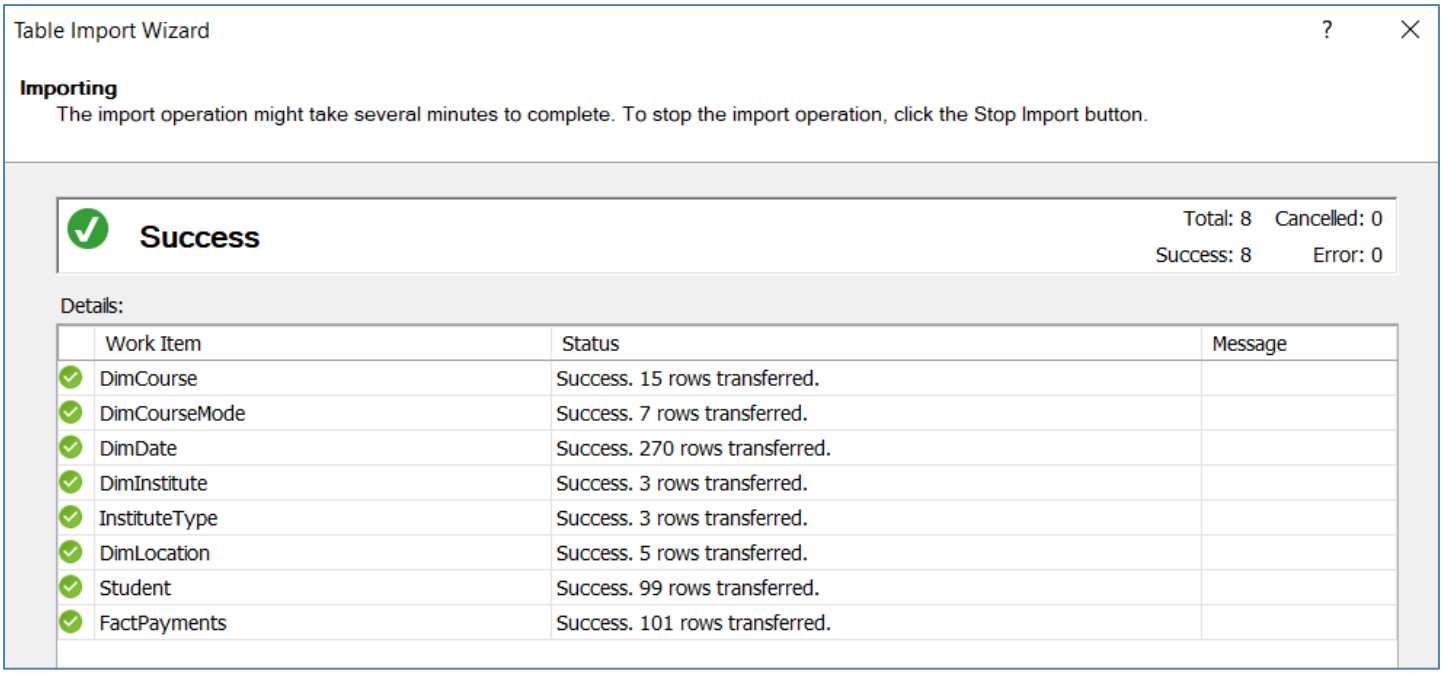
Choose tables [DimStudent, DimInstitute, DimLocation, DimCourse, DimCourseMode, DimUsers, and FactPayments]

Choose the tables, change names **in the friendly name area** (if required),

Specify friendly name like below



Highlight DimStudent--> Preview and Filter--> **Uncheck columns not required**--> Finish



MODELING CUBE OBJECTS AND HIERARCHIES CREATION

Model Menu--> Model View--> Diagram View

a) Establish relationships

If tables not connected, identify master and child, and establish 1:1,1:Many, Many:Many [single or both] relationships.

Provide relationship between dimension to fact (1:Many) like below.

DImLolcation→FactPayments **[Provide Single Direction relationship, Active]**

DImStudent→FactPayments **[Provide Single Direction relationship, Active]**

DimInstitute→FactPayments **[Provide Single Direction relationship, Active]**

DImCourse→FactPayments **[Provide Bidirectional relationship, Active]**

DImCoursseMode→FactPayments **[Provide Single Direction relationship, Active]**

DimUsers→FactPayments **[Provide Single Direction relationship, Active]**

The below DimDate table connected to FactPayments with three foreign keys

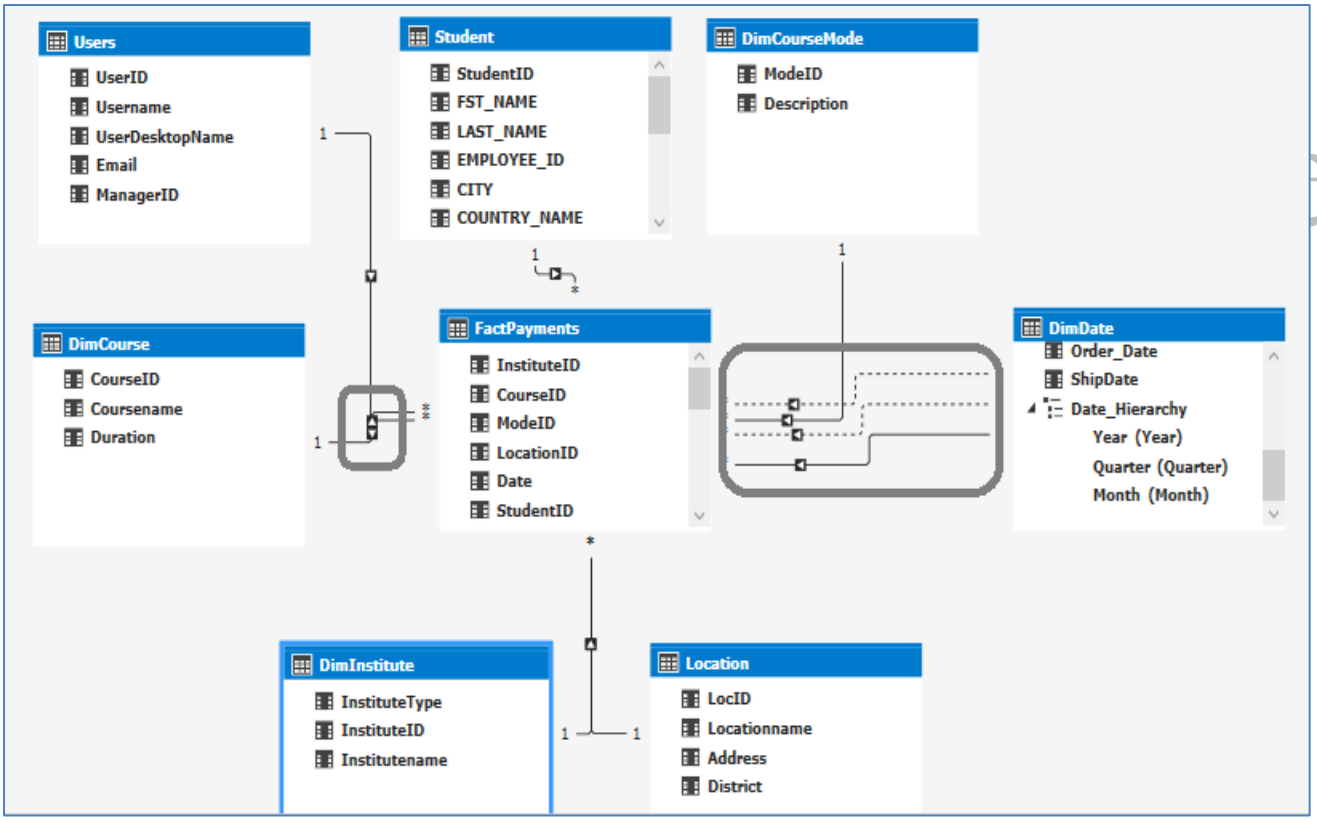
DimDate(Date)→FactPayments(Date) **[Provide Single Direction relationship, Active]**

DimDate(ShipDate)→FactPayments(Date) **[Provide Single Direction relationship, InActive]**

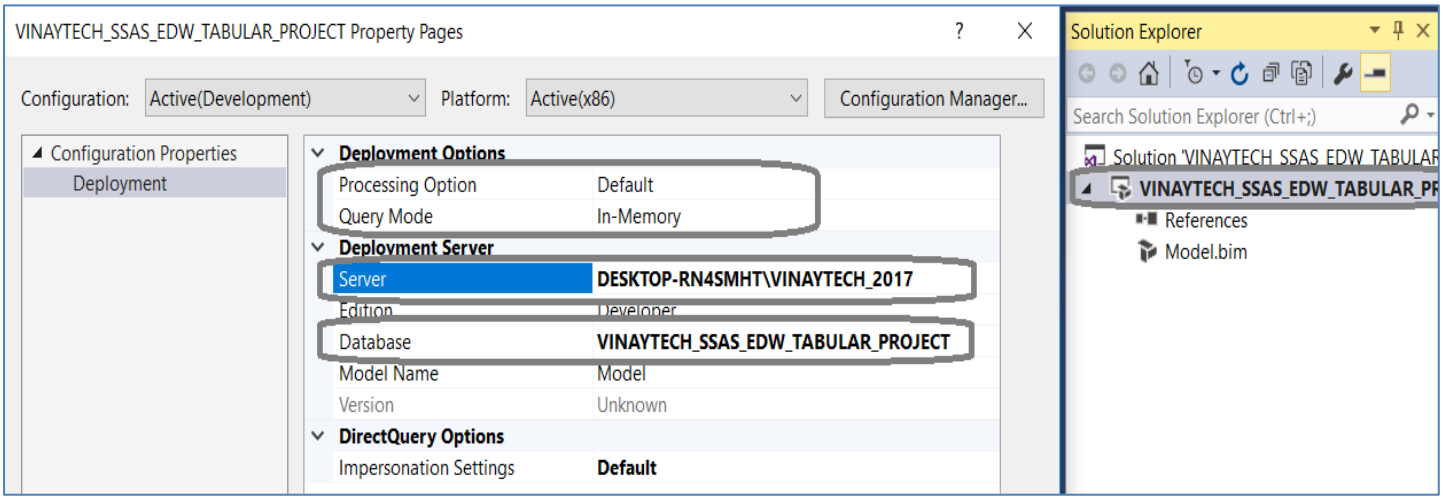
DimDate(OrderDate)→FactPayments(Date) **[Provide Single Direction relationship, Inctive]**

Note: Verify only one relationship is active

You can control relationship activeness [active –tick mark checkbox]



View Menu→Solution Explorer→ Project Properties→



Build Menu--> Deploy

Go to SSMS--> SSAS (Tabular Instance)--> Verify Cube Database

3. DEPLOYING CUBE

DEPLOYING THE CURREBT CUBE (WITHOUT ANY OPERATIONS ON THE CUBE)

BUILD→DEPLOY, GO TO SSMS→SSAS→ OBSERVE THE CUBE DATABASE

*****THE BELOW ARE CUBE CONCEPTS TO CONSTRUCT PROPER ANALYTICAL CUBE DATABASE **********

4. ADDING COLUMNS [TRANSFORM DATA USING CALCULATED COLUMNS]

Go to DimDate table, right click on Date column→ Insert Column→

Specify the below expression at expression bar, rename the column to ShipDate.

Model.bim* Variables

[ShipDate] =[Date]

	Datekey	ShipDate	Date	Year	Quarter	Monthname	Month	Week_Of_Month	Day
1	20180101		01/01/...	2018	1	January	1	1	1
2	20180102		01/02/...	2018	1	January	1	1	2
3	20180103		01/03/...	2018	1	January	1	1	3
4	20180104		01/04/...	2018	1	January	1	1	4
5	20180105		01/05/...	2018	1	January	1	1	5
6	20180106		01/06/...	2018	1	January	1	1	6
7	20180107		01/07/...	2018	1	January	1	1	7
8	20180108		01/08/...	2018	1	January	1	2	8
9	20180109		01/09/...	2018	1	January	1	2	9

Implement the same process for OrderDate column creation.

Now the DimDate table has three Date columns [Date, ShipDate, OrderDate]

New columns creation [Calculated columns creation]

Two ways

a) Right click at any column--> Insert Column

b) Column menu--> Add Column

Go to FactPyments, right click Actual Fee column→Insert column and

Write the formula

= [Actual-Fee]+[Discount_Fee]

Go to FactPayments, add new column, and perform the below logic

Model.bim* Variables

[Paid Fee] =[Discount_Fee]+[Tax amount]

	InstituteID	CourseID	ModeID	LocationID	Date	StudentID	Actual_Fee	Discount_Fee	Tax amount	UserID	SpatialID	Paid Fee
1	Power BI Tech	Power BI-F	Customized	HYD	03/18/...	1098	15000	13500	270	1000	1	13770
2	Power BI Tech	MSBI-C	Classroom	HYD	03/17/...	1097	14000	12600	252	1000	2	12852
3	Power BI Tech	MSBI-N	Online	HYD	03/16/...	1096	15000	13500	270	1001	3	13770
4	Power BI Tech	Power BI-N	Customized	HYD	03/15/...	1095	13000	11700	216	1002	4	11916
5	Power BI Tech	Power BI-F	Classroom	HYD	03/14/...	1094	15000	13500	216	1003	5	13716
6	Power BI Tech	MSBI-C	Online	HYD	03/13/...	1093	13000	11700	234	1000	6	11934
7	Power BI Tech	MSBI-N	Customized	HYD	03/12/...	1092	15000	13500	270	1001	7	13770
8	Power BI Tech	Power BI-N	Classroom	HYD	03/11/...	1091	10000	9000	180	1002	8	9180

b) Create Hierarchies

DimDate--> right click--> New Hierarchy-->Name: Date Hierarchy

Go to Year, Quarter, Month

Right click→Add to hierarchy

c) Rename columns

To go back to data view

Model menu→model view→data view

6. New measures creation [Calculated measures]

Two ways

a) Highlight column--> click the aggregation in the menu bar

b) Highlight cell in the measure grid--> write the formulas

(sum of discount fee, avg of discount fee, year over year growth, TYD, MTD etc...)

Write in one cell

Sum of Discount_Fee := sum([Discount_Fee])

VINAYTECH_BUSIN...ETAILS_MODEL.bim* | Variables

[InstituteID] | fx Sum of Actual_Fee:=SUM([Actual_Fee])

	Instit...	Cou...	Mo...	Locati...	D..	Stud...	Actual_Fee
1	Power BI Tech	Power BI-F	Customized	HYD	03/18/...	1098	15000
2	Power BI Tech	MSBI-C	Classroom	HYD	03/17/...	1097	14000
3	Power BI Tech	MSBI-N	Online	HYD	03/16/...	1096	15000
4	Power BI Tech	Power BI-N	Customized	HYD	03/15/...	1095	13000
5	Power BI Tech	Power BI-F	Classroom	HYD	03/14/...	1094	15000
6	Power BI Tech	MSBI-C	Online	HYD	03/13/...	1093	13000
7	Power BI Tech	MSBI-N	Customized	HYD	03/12/...	1092	15000
8	Power BI Tech	Power BI-N	Classroom	HYD	03/11/...	1091	10000
9	Vinay Tech	Power BI-F	Online	HYD	03/10/...	1090	16000
	Sum of Actual_Fee: 1344000	Avg of Actual Fee:	Last Year Fee: 831000	Growth: 513000	Growth Percentag		

Write in another cell

Last Year Discount Fee: = calculate(sum([Discount_Fee]), sameperiodlastyear(DimDate[Date]))

VINAYTECH_BUSIN...ETAILS_MODEL.bim* | Variables

[ModeID] | Last Year Fee:=calculate(sum(FactPayments[Actual_Fee]),SAMEPERIODLASTYEAR(DimDate[Date]))

	Instit...	Cou...	Mo...	Locati...	D..	Stud...	Actual_Fee	Discount_Fee	Tax amount
1	Power BI Tech	Power BI-F	Customized	HYD	03/18/...	1098	15000	13500	
2	Power BI Tech	MSBI-C	Classroom	HYD	03/17/...	1097	14000	12600	
3	Power BI Tech	MSBI-N	Online	HYD	03/16/...	1096	15000	13500	
4	Power BI Tech	Power BI-N	Customized	HYD	03/15/...	1095	13000	11700	
5	Power BI Tech	Power BI-F	Classroom	HYD	03/14/...	1094	15000	13500	
6	Power BI Tech	MSBI-C	Online	HYD	03/13/...	1093	13000	11700	
7	Power BI Tech	MSBI-N	Customized	HYD	03/12/...	1092	15000	13500	
8	Power BI Tech	Power BI-N	Classroom	HYD	03/11/...	1091	10000	9000	
9	Vinay Tech	Power BI-F	Online	HYD	03/10/...	1090	16000	14400	

Sum of Actual_Fee: 1344000 | Avg of Actual Fee: 13306.93069 | Last Year Fee: 831000 | Growth: 513000 | Growth Percentag 61.73285

Write in another cell

Growth:=[Sum of Actual_Fee]-[Last Year Fee]

VINAYTECH_BUSIN...ETAILS_MODEL.bim* | Variables

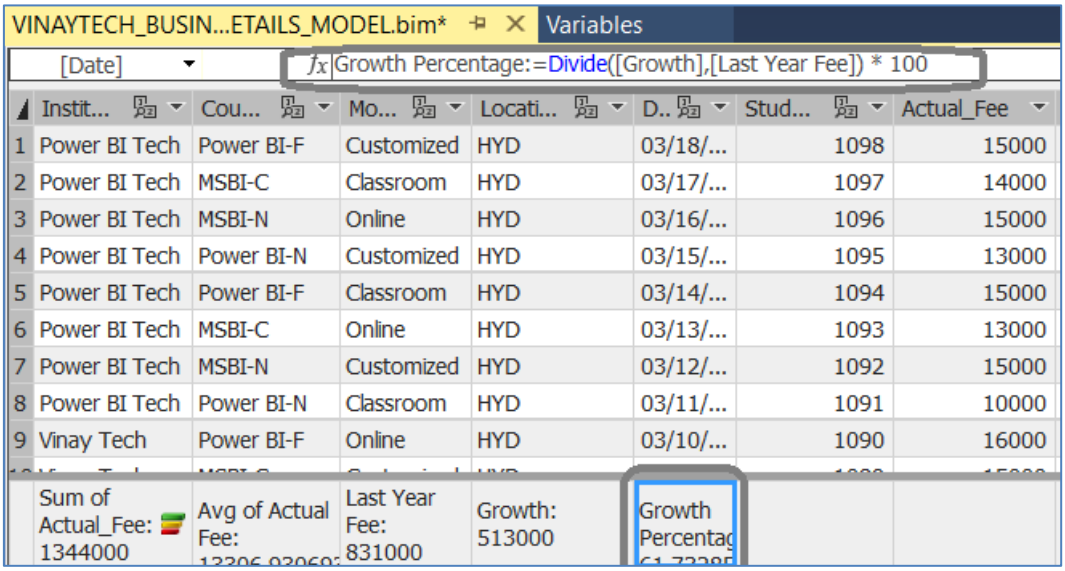
[LocationID] | Growth:=[Sum of Actual_Fee]-[Last Year Fee]

	Instit...	Cou...	Mo...	Locati...	D..	Stud...	Actual_Fee
1	Power BI Tech	Power BI-F	Customized	HYD	03/18/...	1098	15000
2	Power BI Tech	MSBI-C	Classroom	HYD	03/17/...	1097	14000
3	Power BI Tech	MSBI-N	Online	HYD	03/16/...	1096	15000
4	Power BI Tech	Power BI-N	Customized	HYD	03/15/...	1095	13000
5	Power BI Tech	Power BI-F	Classroom	HYD	03/14/...	1094	15000
6	Power BI Tech	MSBI-C	Online	HYD	03/13/...	1093	13000
7	Power BI Tech	MSBI-N	Customized	HYD	03/12/...	1092	15000
8	Power BI Tech	Power BI-N	Classroom	HYD	03/11/...	1091	10000
9	Vinay Tech	Power BI-F	Online	HYD	03/10/...	1090	16000

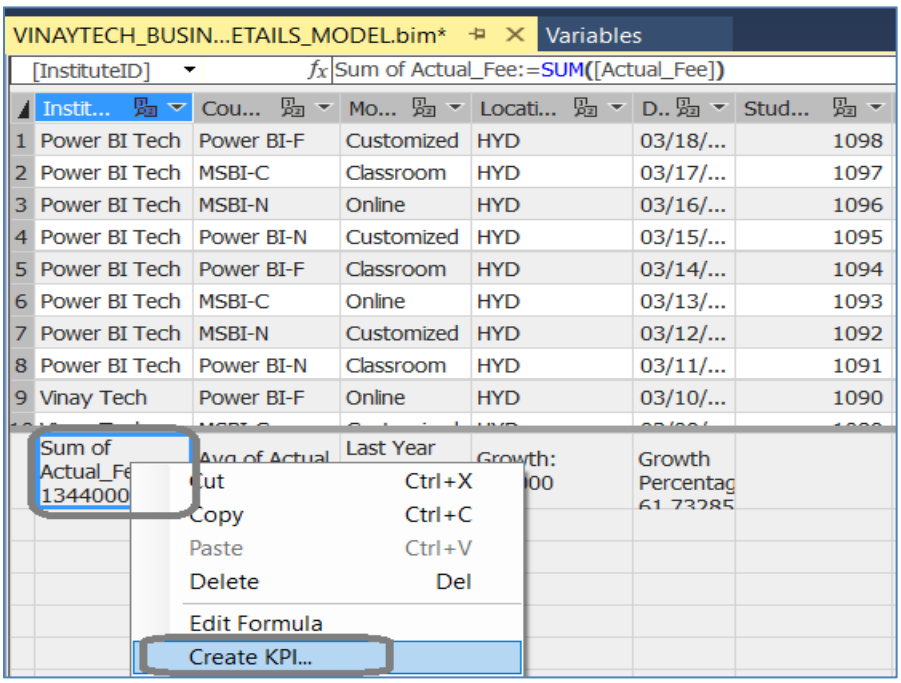
Sum of Actual_Fee: 1344000 | Avg of Actual Fee: 13306.93069 | Last Year Fee: 831000 | Growth: 513000 | Growth Percentag 61.73285

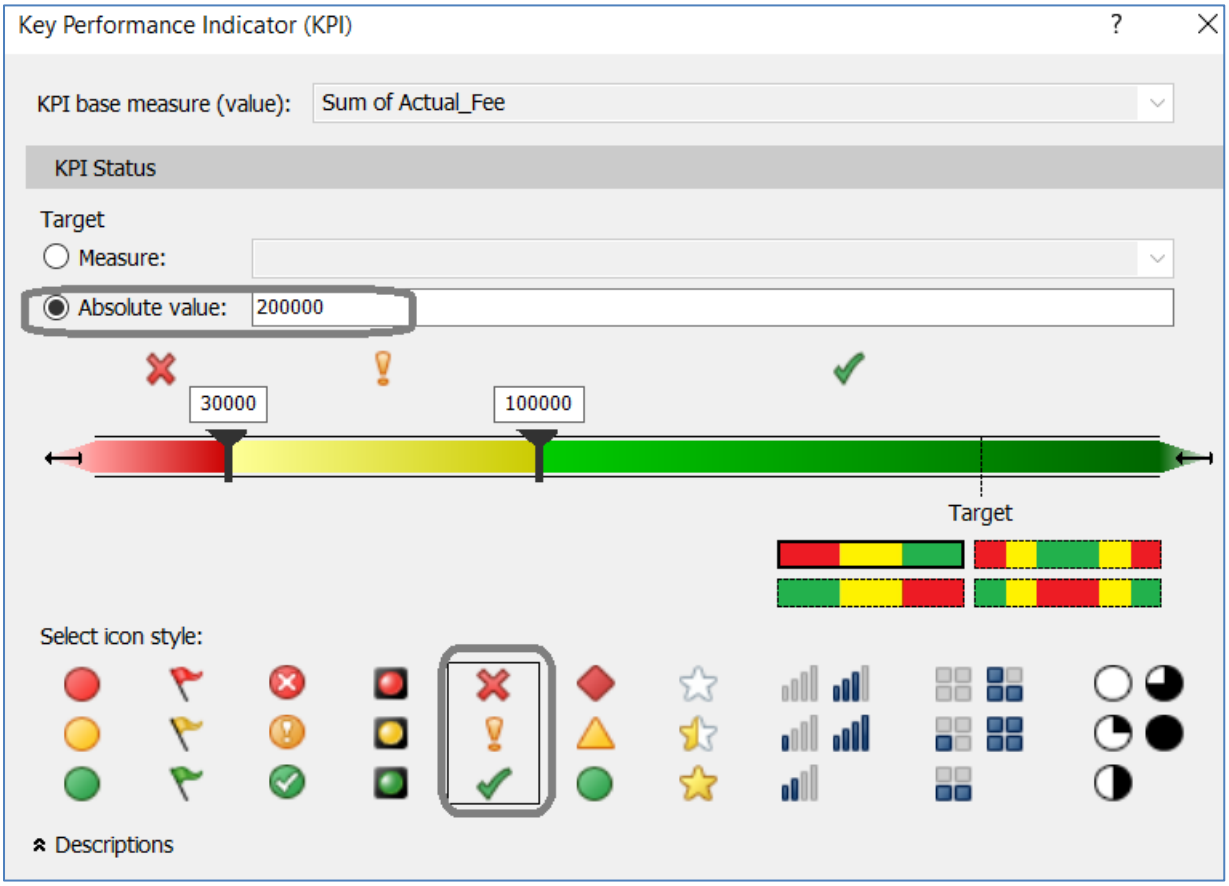
Write in another cell

Growth Percentage:=Divide([Growth],[Last Year Fee]) * 100



7. KPIs creation

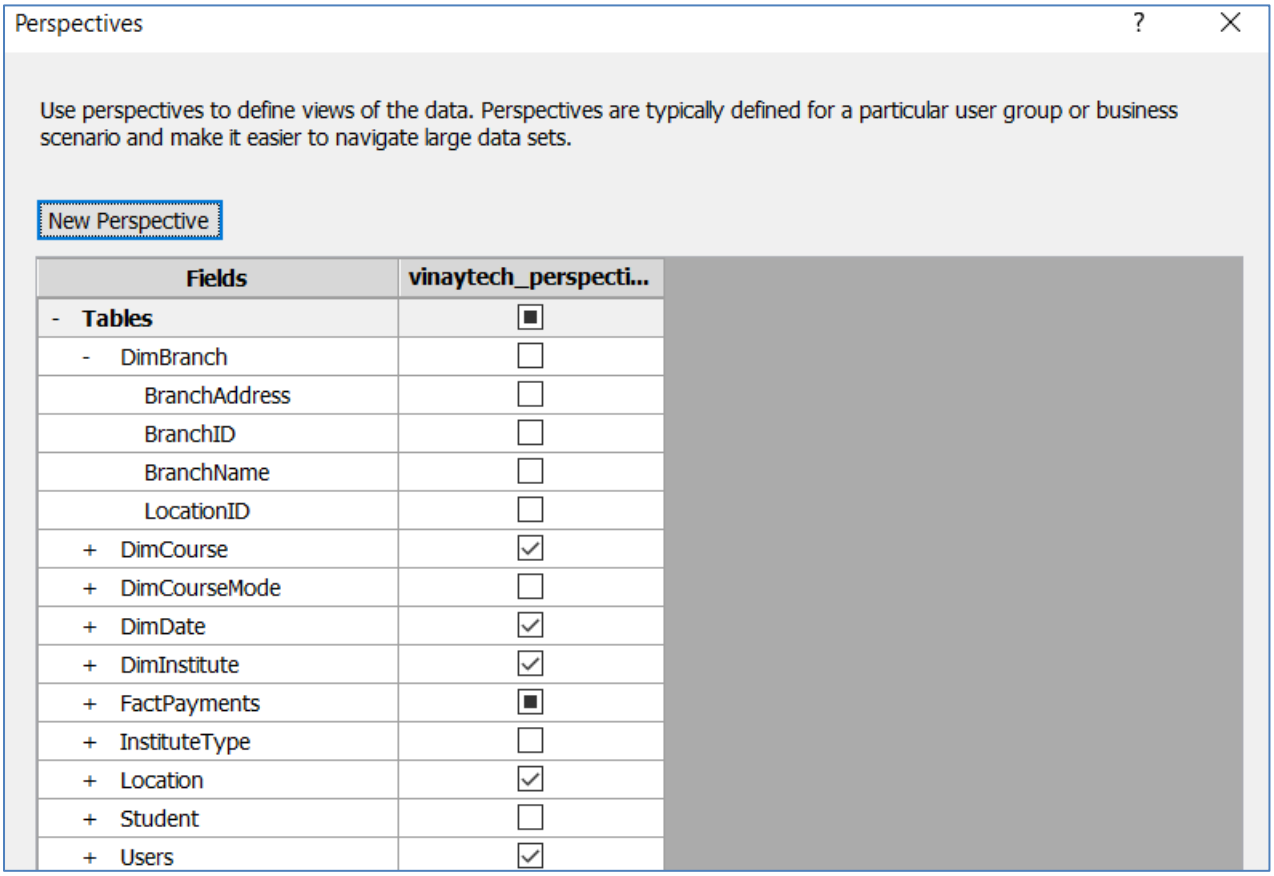




8.Create perspective [Showing required calculations, kpis, objects and columns]

User feels by connecting to this that is this is their cube.

Model menu→perspective, new perspective, tick mark tables, cals, kpis you want to show



9. Security [role and row –level security]

Role based security

Admin role--> Full privilege

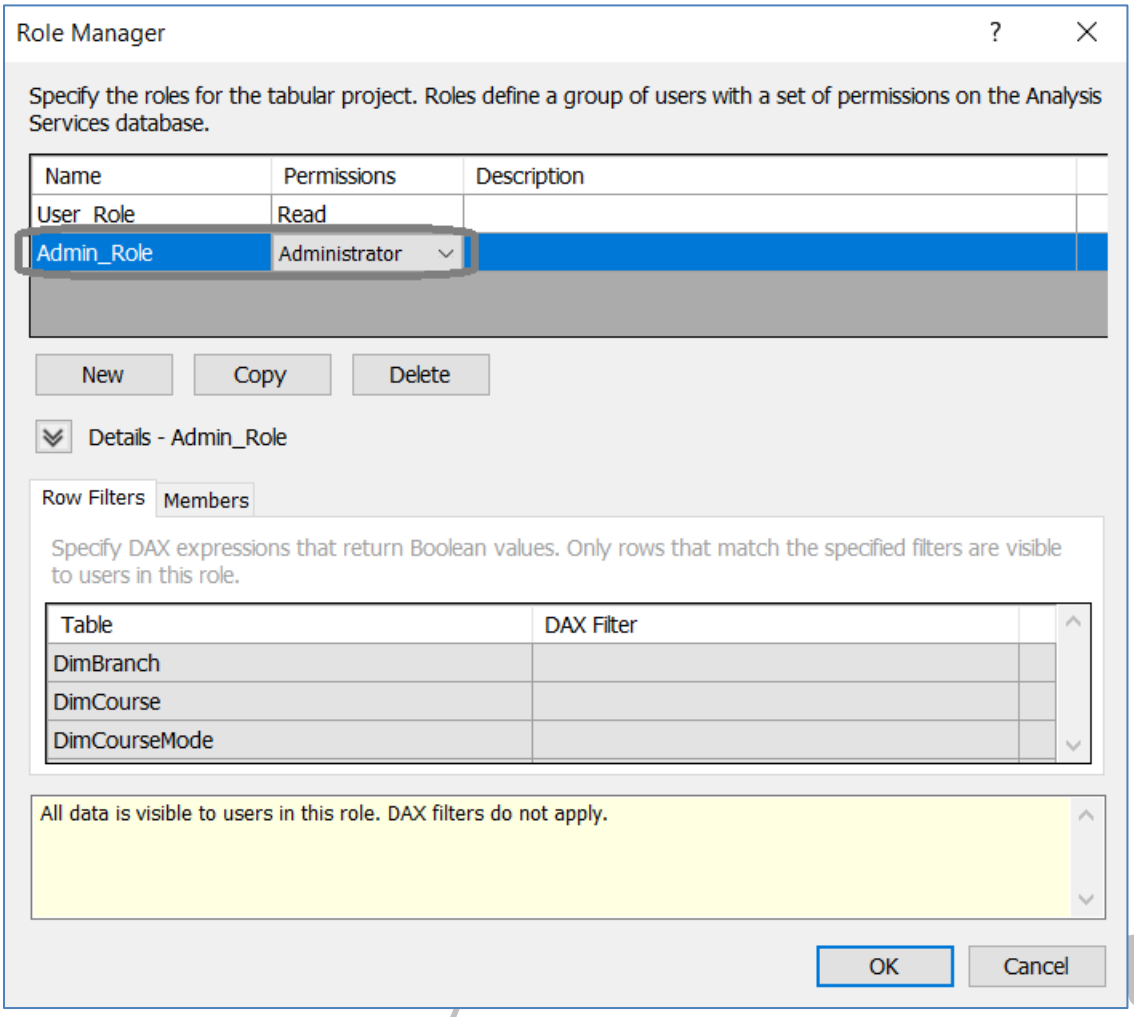
Customized--> None, Read, Process, Read and Process

Read: Cube data reading

Process: Cube tables loading

a)Admin role creation:

Model menu→ roles→ add new role, name it and select permission as Adminsistrator

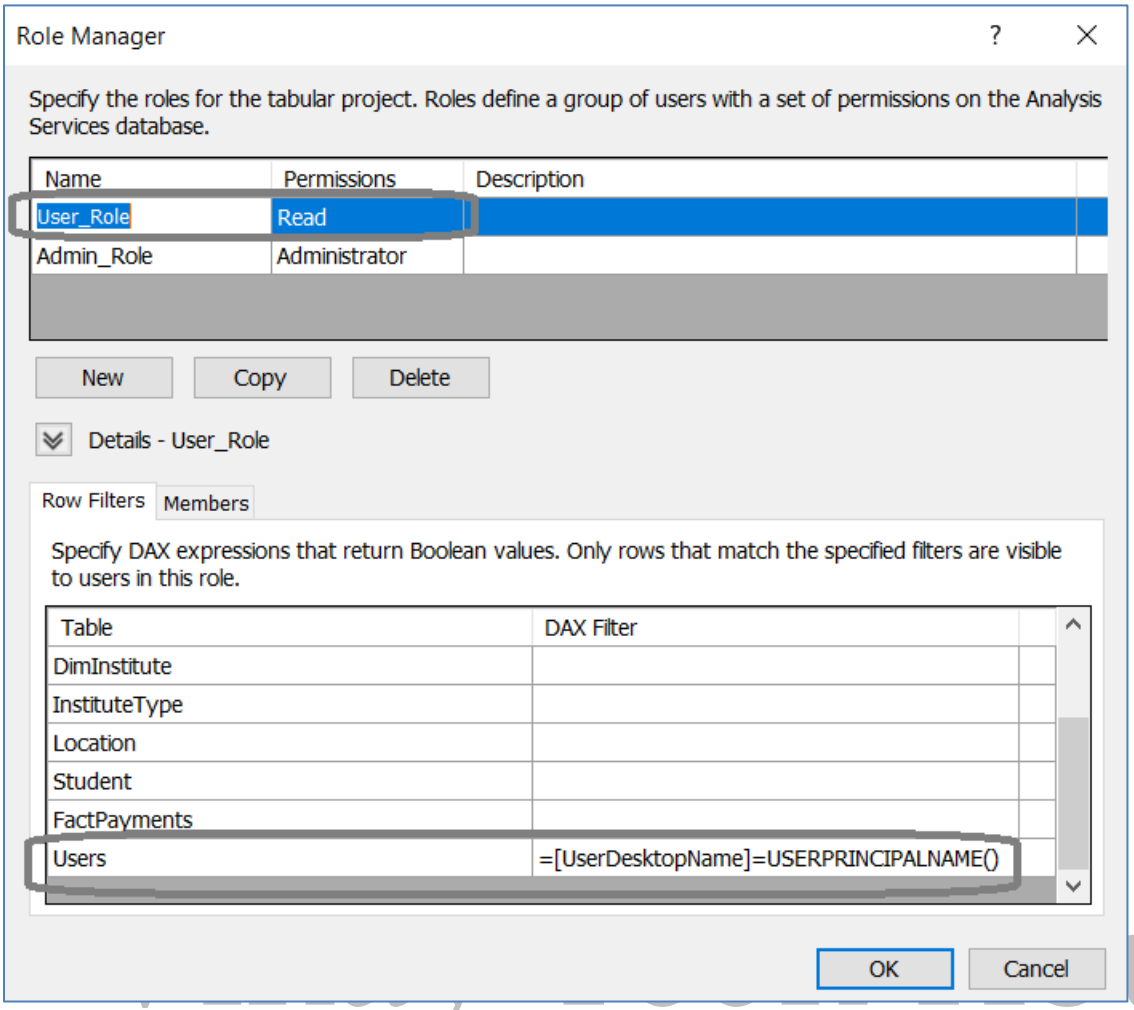


b)**Row level security with read access:**

Model menu-->Roles--> Add New--> Give a name--> Permission [Read]

Go to the user table in the down and specify the below expression in the DAX filter area

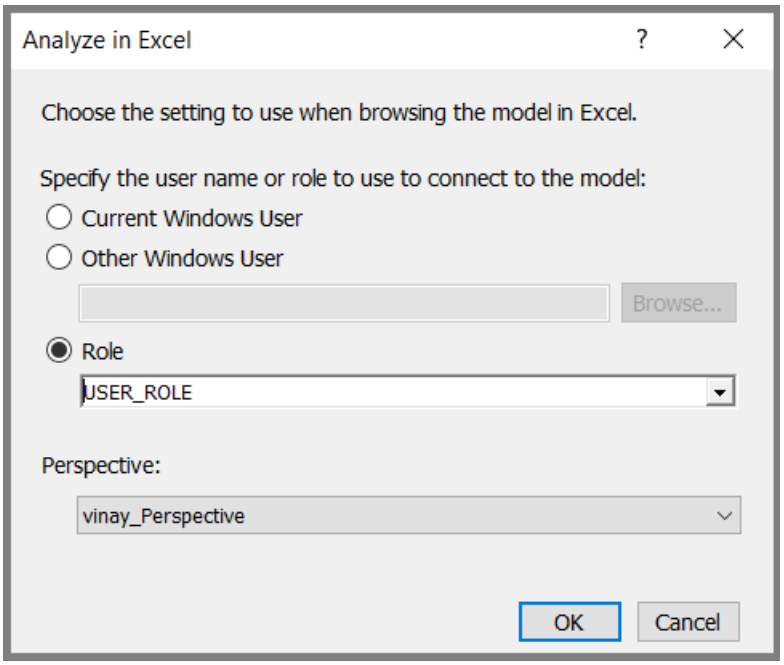
=[UserDesktopName]=USERPRINCIPALNAME()



Build--> Deploy [To take the above effects]

10.Browse data

Model Menu--> Analyze in excel--> Specify Role (User_Role) and perspective

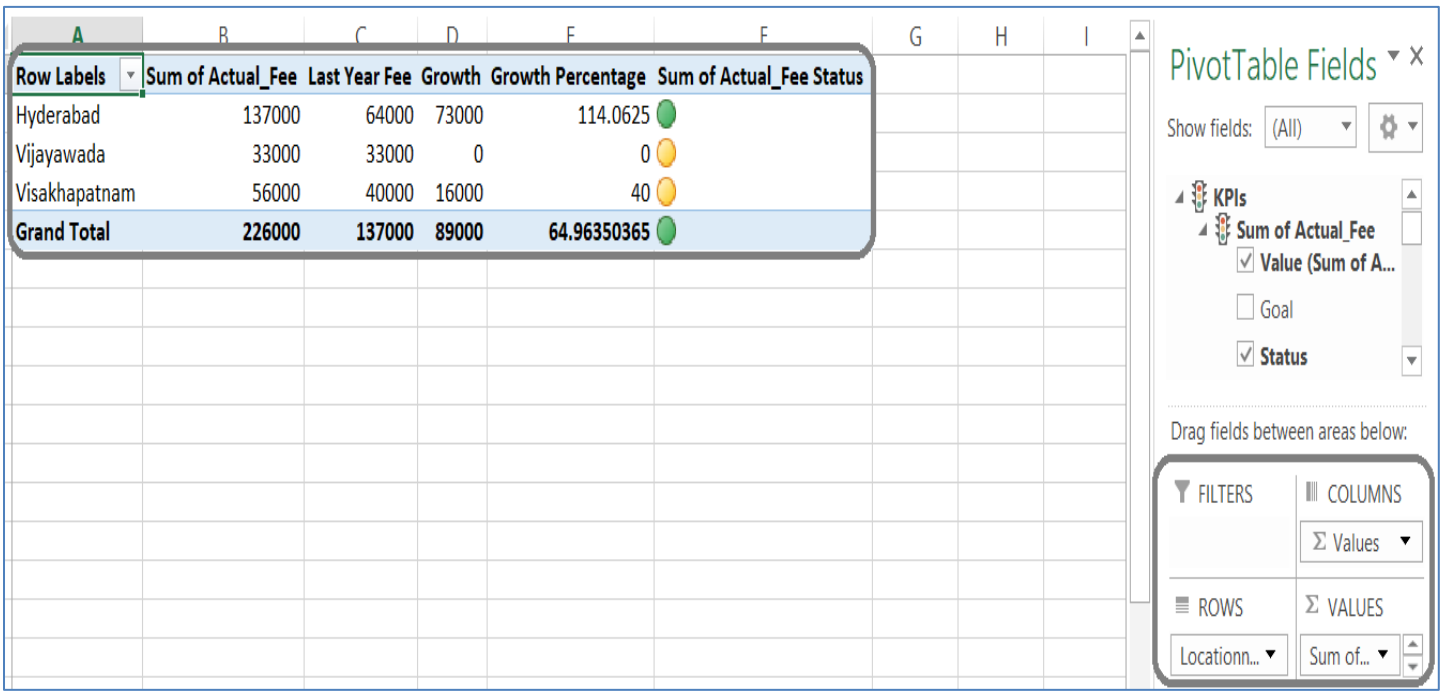


Ok

Case Study 1:

Drag and drop the columns in excel and see the user data.

Take Locationname row wise, Sum of Actual Fee, Last Year Fee, Growth, Growth Percentage in column wise, Choose Status from KPI and see like below

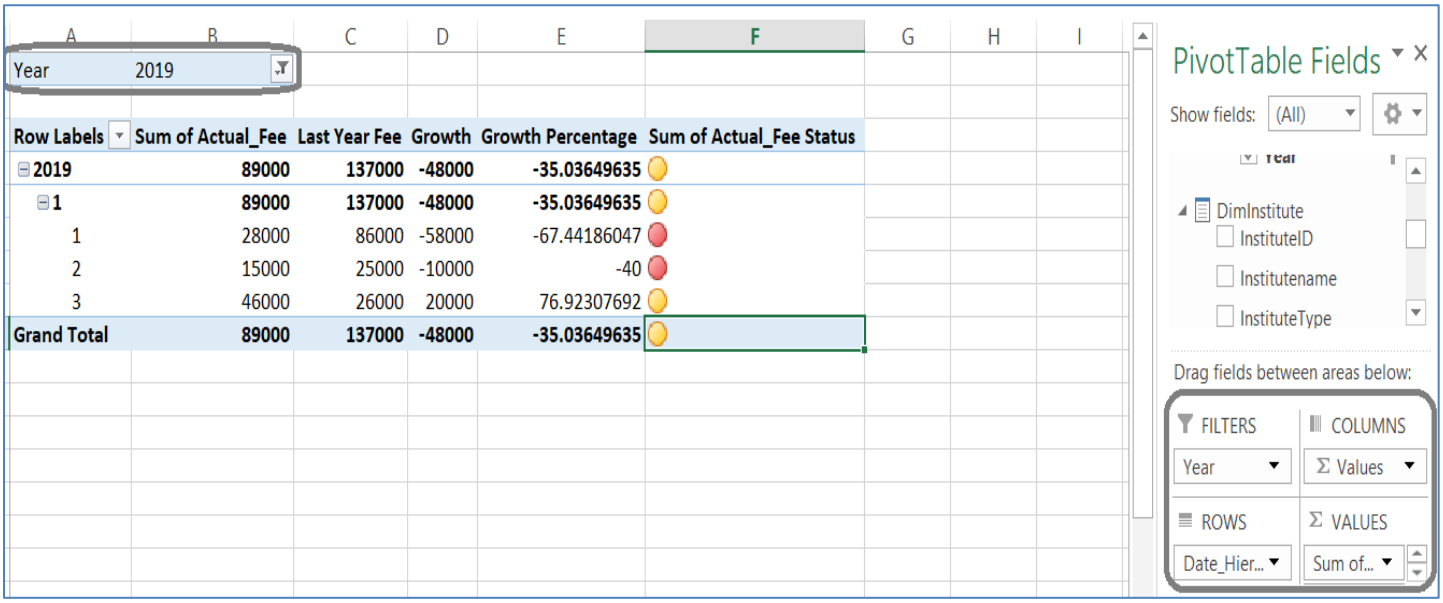


Row Labels	Sum of Actual_Fee	Last Year Fee	Growth	Growth Percentage	Sum of Actual_Fee Status
Hyderabad	137000	64000	73000	114.0625	
Vijayawada	33000	33000	0	0	
Visakhapatnam	56000	40000	16000	40	
Grand Total	**226000**	**137000**	**89000**	**64.96350365**	

Case Study 1:

Drag and drop the columns in excel and see the user data.

Take **Date Hierarchy** row wise, Sum of Actual Fee, Last Year Fee, Growth, Growth Percentage in column wise, Choose Status from KPI, **Year at Filter** section and see like below



Year	2019				
Row Labels	Sum of Actual_Fee	Last Year Fee	Growth	Growth Percentage	Sum of Actual_Fee Status
2019	89000	137000	-48000	-35.03649635	
1	89000	137000	-48000	-35.03649635	
1	28000	86000	-58000	-67.44186047	
2	15000	25000	-10000	-40	
3	46000	26000	20000	76.92307692	
Grand Total	89000	137000	-48000	-35.03649635	

USING IN POWER BI:

Remember the instance name and database name

Get Data--> Analysis Services--> import / direct query [recommended]→specify server name and database name

Now the model appears with all columns from all tables including calculated measures.

THIS IS BASIC TO MEDIUM LEVEL SESSION ONLY

FOR DETALED CALCULATIONS, KPIs, SECURITY, PARTITIONING AND PROCESSING READ CLASS ROOM FOUR PDF DOCUMENTS OF ANALYSIS SERVCES.