

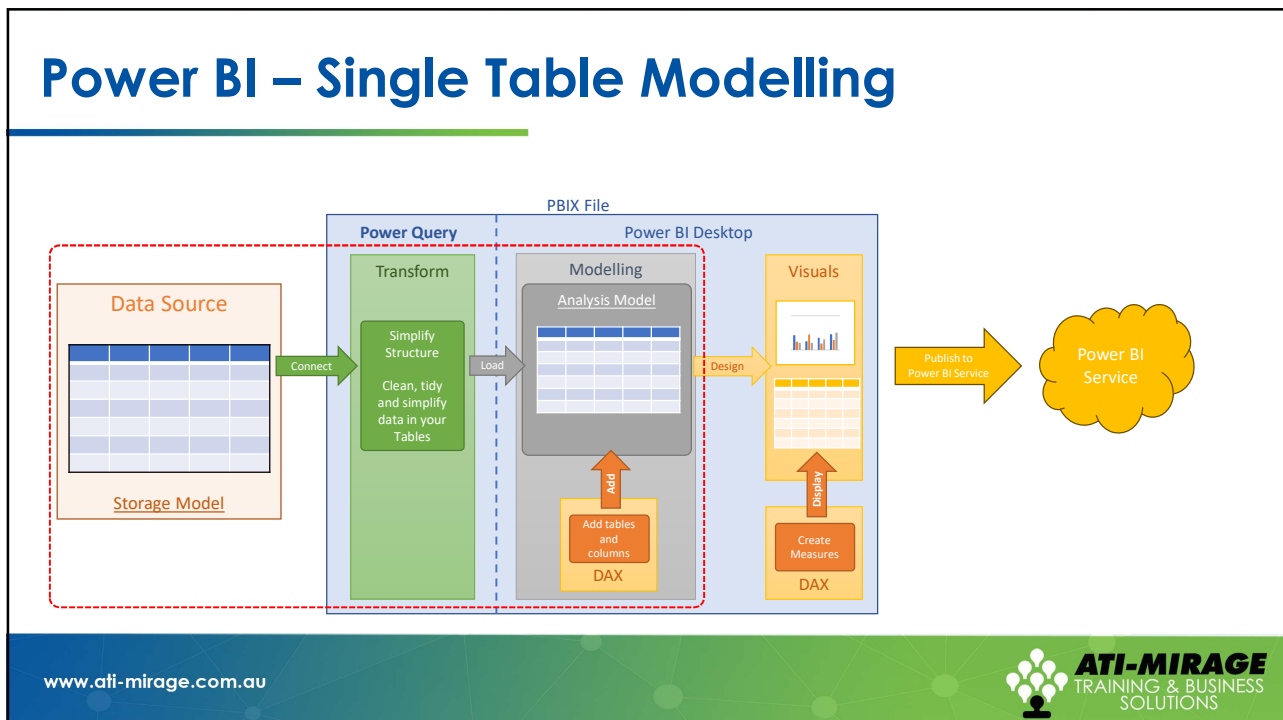


Single Table Modelling

Importing, Tidying and Modelling a Single Table Source

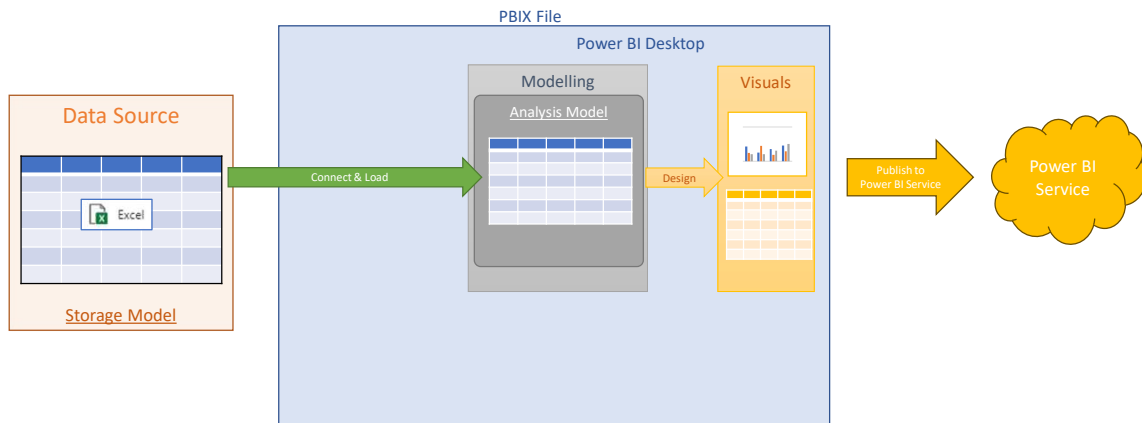
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1



2

Power BI Process: Import and Go!



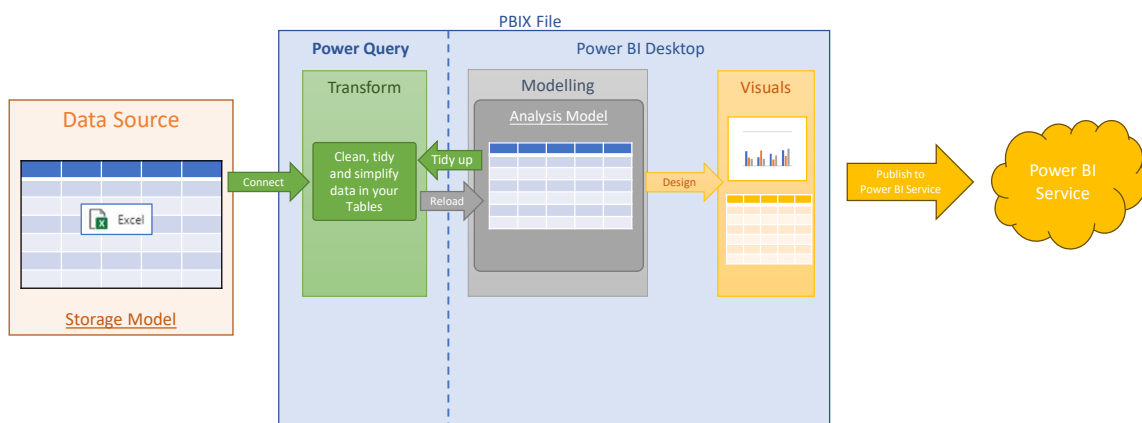
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Power BI Process: Clean & Tidy Data



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Let's go and play ...

The screenshot shows the Power BI Desktop interface. The 'Queries' pane on the left lists 'Customers'. The main area displays the 'Data' view of the 'Customers' query, which is a table with columns: CompanyName, ContactName, and ContactTitle. The data is as follows:

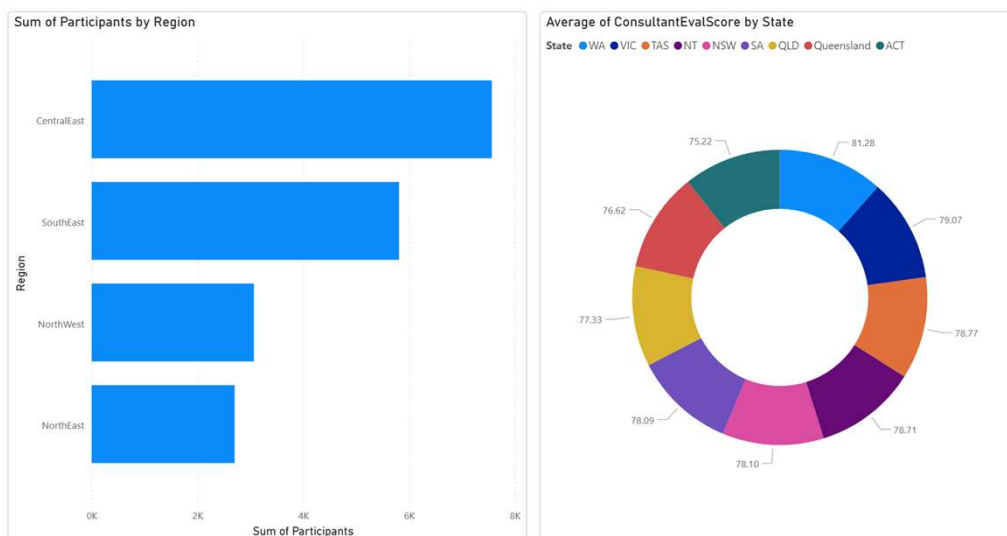
	CompanyName	ContactName	ContactTitle
1	ALFKI	Alfreds Futterkiste	Sales Representative
2	ANATR	Ana Trujillo Emparedados y heladerías	Owner
3	ANTON	Antonio Moreno Taquería	Owner
4	AROUT	Around the Horn	Sales Representative

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Exercise: Create 2 visuals



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What Power Query can do for us

1. Individual tables: simplify, fix, tidy up and add columns.
2. Multi-table related models: Simplify the structure:
 - Append
 - Merge
3. Combine tables from different (non-related) data sources. (Intermediate course)

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Power Query: Typical Single Table Changes

- ♥ **Important:** Check the data types (at the **Change Type** step - if there)
- ♥ Choose your initial columns (**Choose Columns**)
- ♥ Filter / remove rows not required
- ♥ Rename fields (columns) and the table (query name)
- ♥ Fix data issues in columns (**Replace Values**)
- ♥ Optionally:
 - Other column transformations
 - Adding new columns

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Exercise: Check Data Types

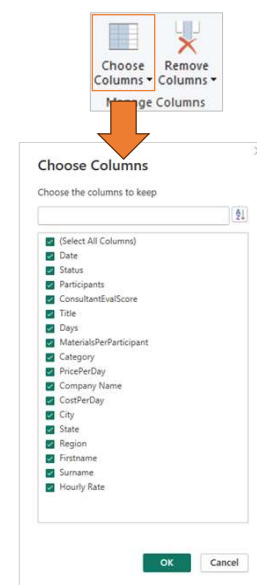
Check the data types for all columns of all tables at the "Changed Type" step:

Field Name	Data Type Change
Days	Decimal
MaterialsPerParticipant	Fixed Decimal
PricePerDay	Fixed Decimal
CostPerDay	Fixed Decimal
PostCode	Text
Hourly Rate	Fixed Decimal

Exercise: Choose Columns

Untick the following fields:

Field Name
StreetAddress
Suburb
PostCode
Capacity
Latitude
Longitude
Population
Region



Exercise: Rename Fields

Rename the following **Old Field Names** to the **New Field Names**:

Old Field Name	New Field Name
ConsultantEvalScore	Consultant Evaluation Score
Title	Course Title
Days	Duration
MaterialsPerParticipant	Materials Cost Per Participant
Category	Course Category
PricePerDay	Course Price Per Day
Company Name	Venue Name
CostPerDay	Venue Cost Per Day
Firstname	Consultant First Name
Surname	Consultant Surname

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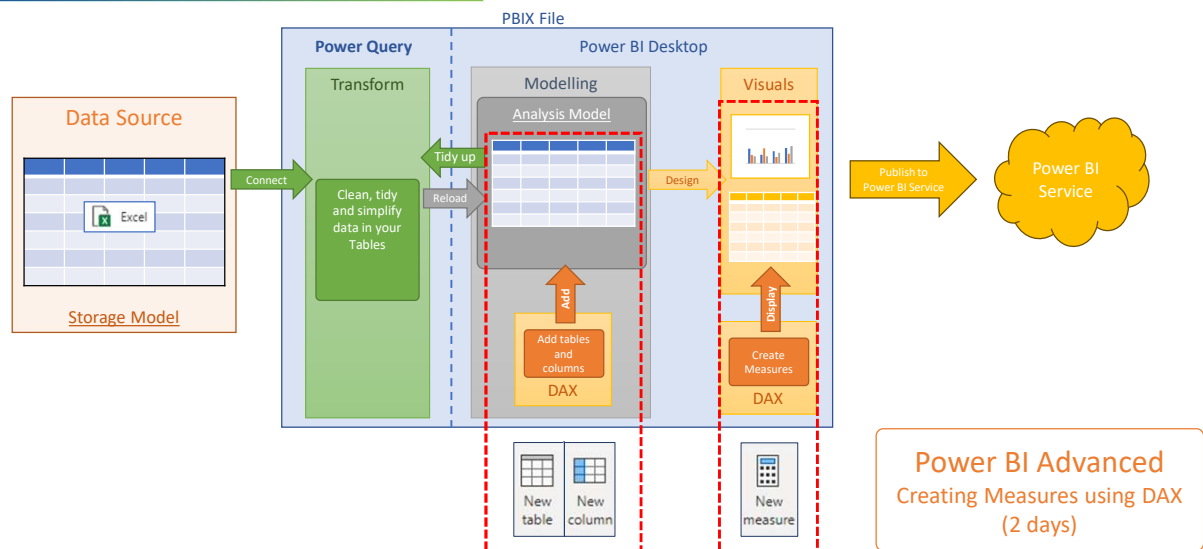
Adding calculations

Using Data Analysis Expressions (DAX)

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Adding calculations using DAX



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Syntax for Tables and Columns

- To refer to a table: `FactSchedule` or `'Fact Schedule'`
- To refer to a column in a table: `FactSchedule[Participants]`
- It is possible to leave out the table name in column formulas if the column is in the same table:

`[Participants]`

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DAX Formula Syntax

To refer to a ...	Use this ...	Notes
Number	24	
Text	"My name is Steve"	
Date	Date(2025,5,10)	Produces the date number for 10 May 2025
Whole Table in the model	FactSchedule	
	'Fact Schedule'	If the name has spaces
A Field in a Table in the model	FactSchedule[Participants]	The Participants field in the FactSchedule table
	[Participants]	Shortcut: The Participants field in the Current Table
Arithmetic	Add: + Subtract: - Multiply: * Divide: /	

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DAX Formula Syntax

Working with table columns:

Column Name = [Field One] * [Field Two]

Working with DAX functions:

Column Name = **FUNCTION**(Input 1, Input 2, ...)

↑
Function name

└──────────┘
Function inputs
[columns], "text", numbers

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Exercise: DAX Gross Margin Calculations

Column Name = [Field One] * [Field Two]

DAX Financial Formulas

Course Price DAX = [Course Price Per Day] * [Duration]

Revenue = [Participants] * [Course Price DAX]

Venue Expense = [Venue Cost Per Day] * [Duration]

Consultant Expense = [Consultant Daily Rate] * [Duration]

Materials Expense = [Materials Cost Per Participant] * [Participants]

Total Expenses = [Venue Expense] + [Consultant Expense] + [Materials Expense]

Gross Margin = [Revenue] - [Total Expenses]

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Exercise: Display Folders

Create display folders as follows:

Properties

General

Name: Calendar Year

Description: Enter a description

Synonyms: calendar year, year

Display folder: 01 Date

Is hidden: No

01 Date

- ☐ Calendar Year
- ☐ Date
- ☐ Day Name Long
- ☐ Day Name Short
- ☐ Day Number
- ☐ Month Name Long
- ☐ Month Name Short
- ☐ Month Number
- ☐ Quarter Name
- ☐ Quarter Number

03 Venue

- ☐ City
- ☐ Region
- ☐ State
- ☐ Venue Name

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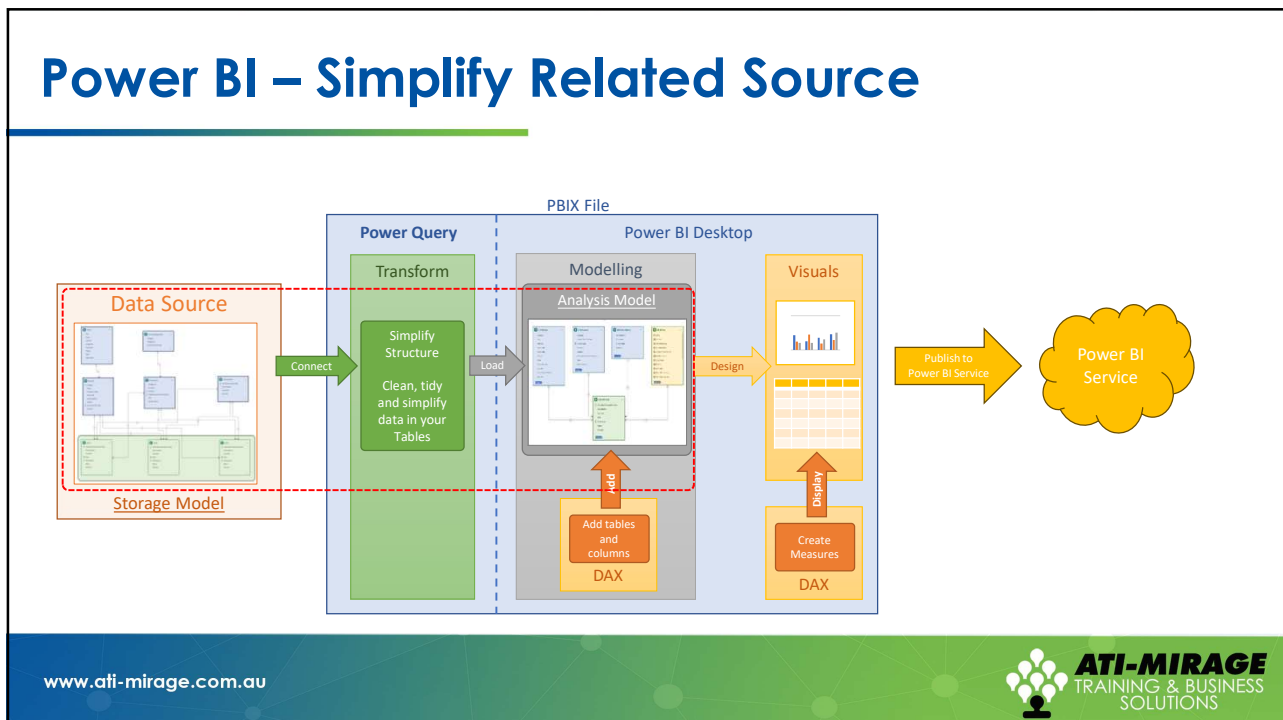


Relational Database sources

Connecting to and simplifying a Relational Database data source

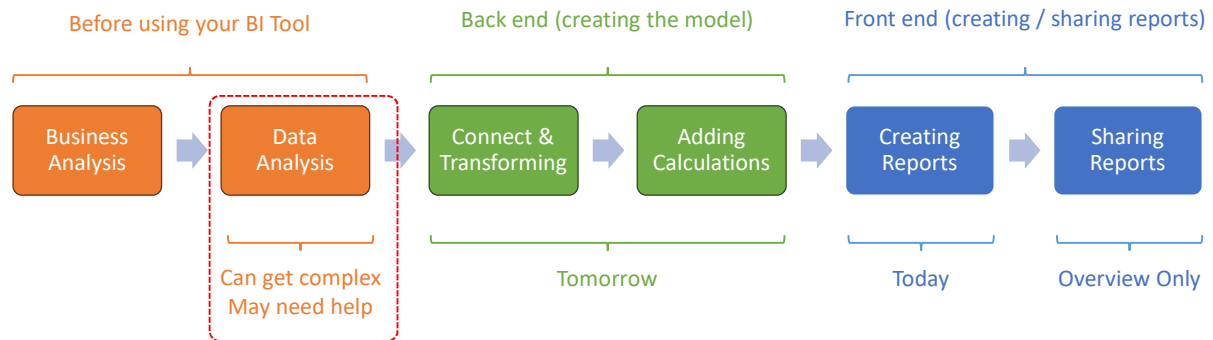
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Business Intelligence Process



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Database table structures

What Database Designers do and why

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Expenses: Single (flat) table version

Employee Id	Name	Department	Phone No	Expense Date	Amount
1	Julianne Kerr	Executive	60001	2/01/2015	\$145.00
2	Augustine Millson	Administration	61022	2/01/2015	\$125.50
9	George Samuelson	Administration	61024	2/01/2015	\$7.72
12	Vivienne Clark	Administration	61027	2/01/2015	\$154.50
58	Elizabeth Dangaard	Research & Development	62022	2/01/2015	\$48.39
2	Augustine Millson	Administration	61052	16/01/2015	\$155.60
20	Belinda Moore	Sales & Marketing	63034	2/02/2015	\$5.73
34	Syed Ali	Sales & Marketing	63014	2/02/2015	\$49.23
2	Augustine Millson	Administration	61022	4/02/2015	\$239.10
12	Vivienne Clark	Administration	61027	4/02/2015	\$295.81
2	Augustine Milson	Administration	61022	6/02/2015	\$60.13
9	George Samuelson	Administration	61024	6/02/2015	\$13.77
53	Victoria McDonald	Research & Development	62029	6/02/2015	\$154.11
2	Augustine Millson	Administration	61022	18/02/2015	\$267.48
1	Julianne Kerr	Executive	60001	2/03/2015	\$349.54

Not great because:

- Lots of repetition (Augustine Millson)
- Easy to make mistakes (Millson Vs Milson)

Database Designers would design the storage structure better than this

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Expenses: Related table version

(Child Table)

many Expenses

one-to-many

Expense Date	Amount	Employee Id
2/01/2015	\$145.00	1
2/01/2015	\$125.50	2
2/01/2015	\$7.72	3
2/01/2015	\$154.50	4
2/01/2015	\$48.39	8
16/01/2015	\$155.60	2
2/02/2015	\$5.73	5*
2/02/2015	\$49.23	6
4/02/2015	\$239.10	2
4/02/2015	\$295.81	4
6/02/2015	\$60.13	2
6/02/2015	\$13.77	3
6/02/2015	\$154.11	7
18/02/2015	\$267.48	2
2/03/2015	\$349.54	1

one Employee

(Parent Table)

Id	Name	Department	Phone No
1	Julianne Kerr	Executive	60001
2	Augustine Millson	Administration	61022
3	George Samuelson	Administration	61024
4	Vivienne Clark	Administration	61027
5	Belinda Moore	Sales & Marketing	63034
6	Syed Ali	Sales & Marketing	63014
7	Victoria McDonald	Research & Development	62029
8	Elizabeth Dangaard	Research & Development	62022

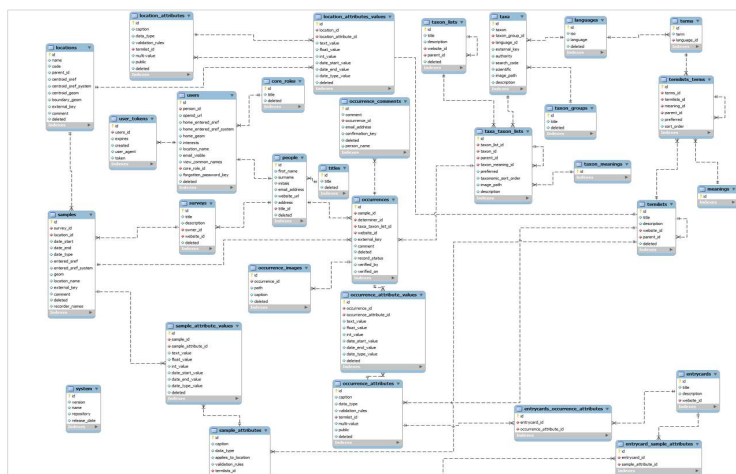
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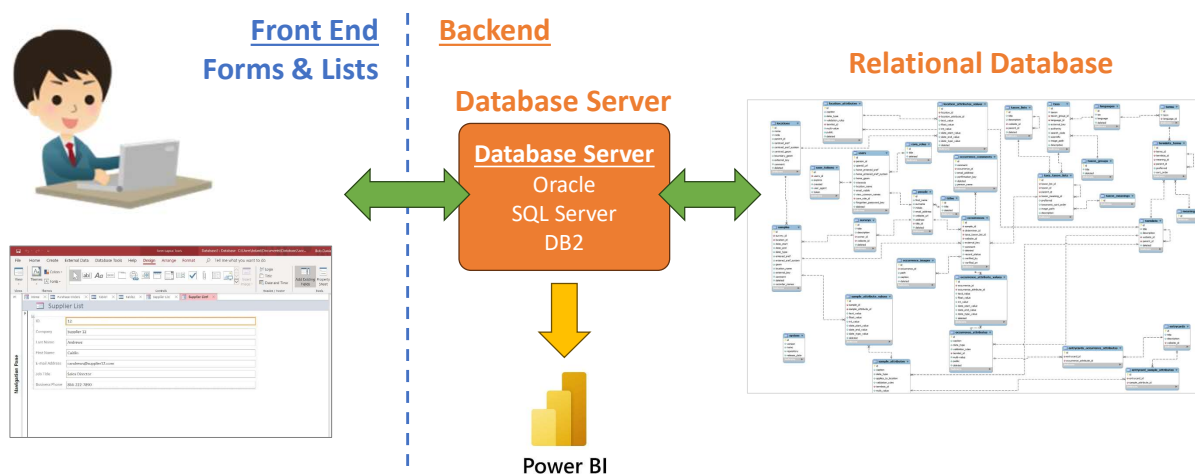
End up with lots of tables with relationships

This is great for data storage, but not great for analysis and reporting



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Databases and Database Servers



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Training Management System (TMS)

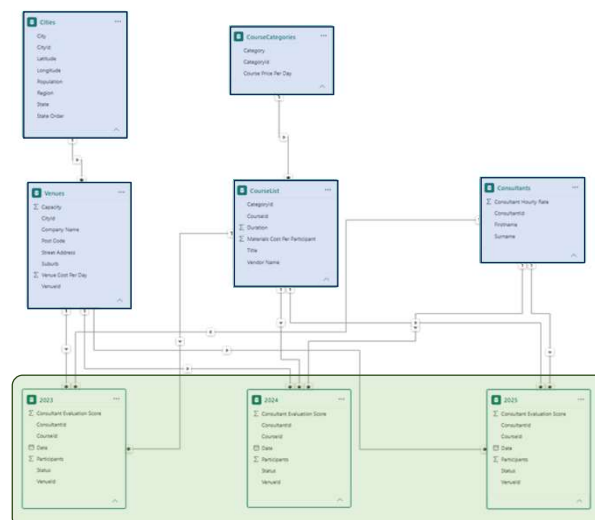
Connecting to and simplifying our TMS Related Table model

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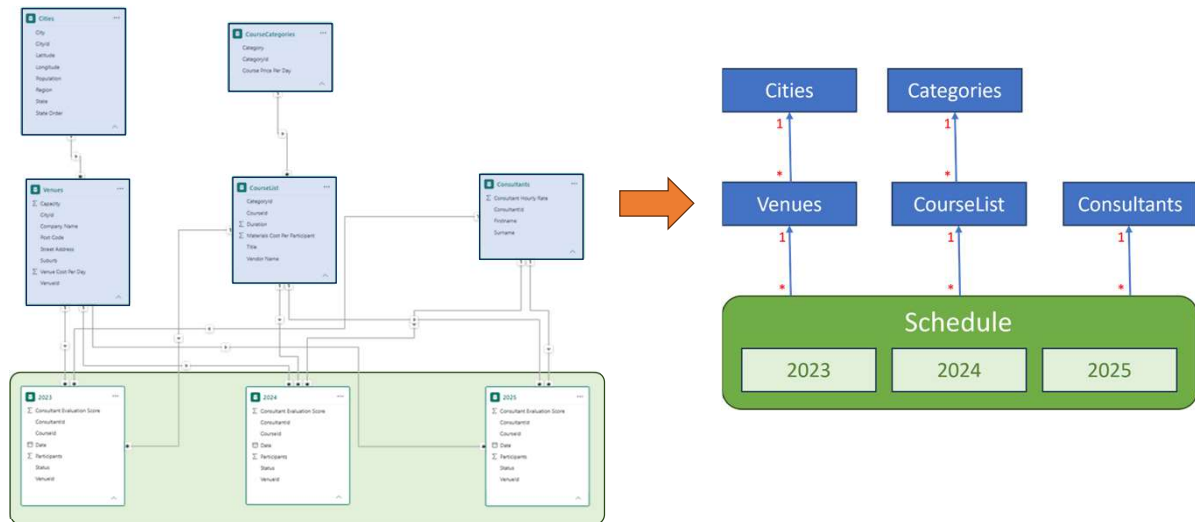
29

TMS: Original Storage Model



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TMS: Simplified Diagram

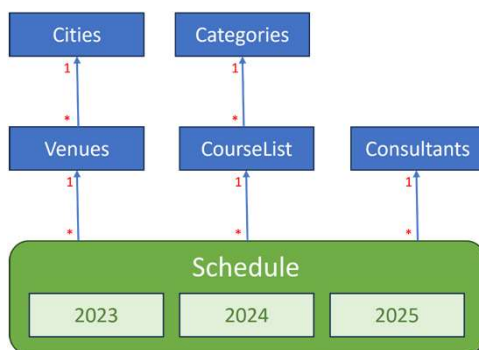


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TMS: Storage to Analysis Model

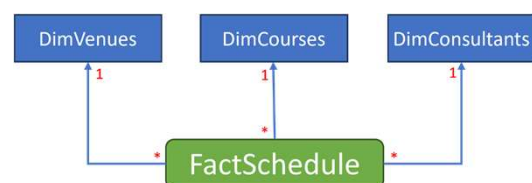
Storage Model (on Disk)

- ✓ Great for storage
- ✗ No good for Report Design



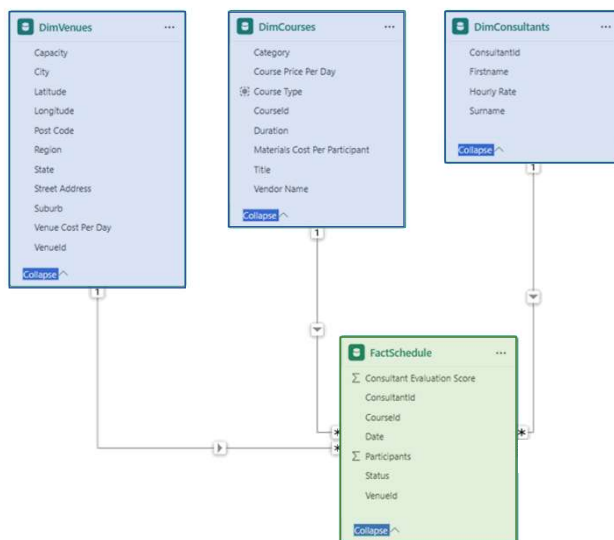
Analysis Model (in PBIX file)

- ✓ Ok for storage
- ✓ Good for Report Design



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TMS: Desired Analysis Model – Why?



Model Best Practices

- ✓ Less tables is better
- ✓ Less relationships is better
- ✓ Less Levels of relationships is better
- ✓ One-to-many relationships only
- ✓ Single direction Filter Propagation

Where is DimDates?

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Date Tables

What are they and where do they come from?

34

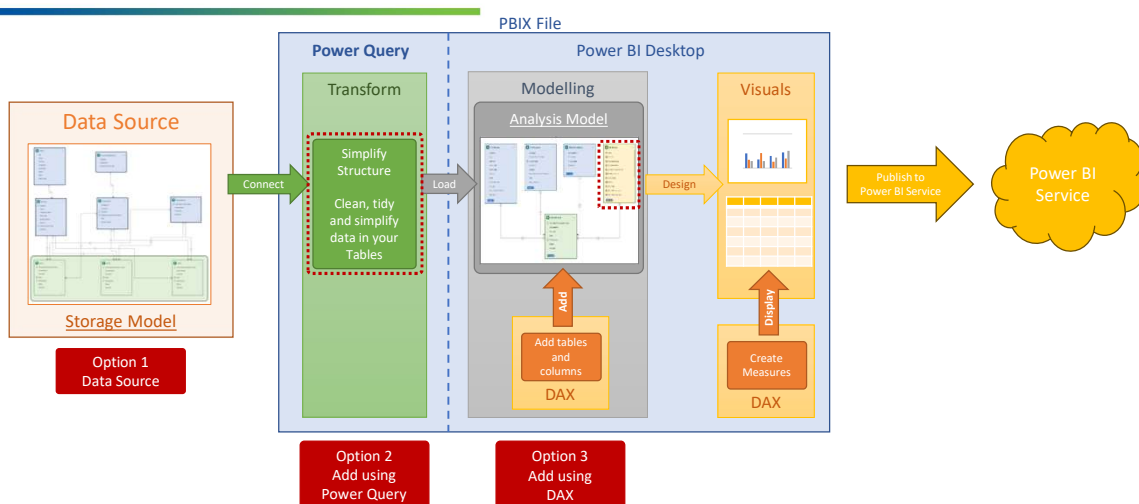
Date Tables



- ♥ Date tables are very useful for related data models containing dates.
- ♥ Having a date table allows you to:
 - Categorise based on date components (year, quarter, month, etc)
 - Create timelines more easily
 - Create 'time intelligence' functions (YTD, MoM, etc)
- ♥ Where do you get them from?

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Power BI – Simplify Related Source

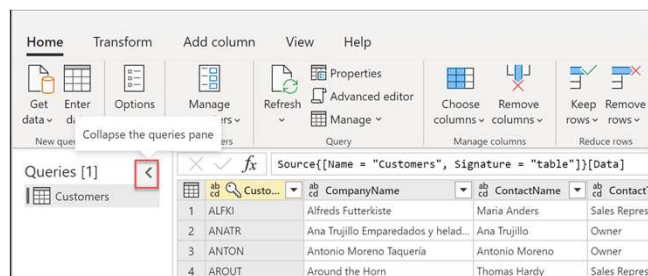


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Suggestion: Template PBIT files

- ♥ Pre-created date table (may need to adjust the dates)
- ♥ Your standard Theme and defaults
- ♥ Your standard Page setup, background images, etc
- ♥ Downloaded 3rd Party Visuals
- ♥ Any other standard reference tables, visuals, etc

Let's create the starting PBIX from a template



	CompanyName	ContactName	ContactTitle
1	ALFKI	Alfreds Futterkiste	Sales Representative
2	ANATR	Ana Trujillo Emparedados y heladerías	Owner
3	ANTON	Antonio Moreno Taquería	Owner
4	AROUT	Around the Horn	Sales Representative

Simplifying the Data Model

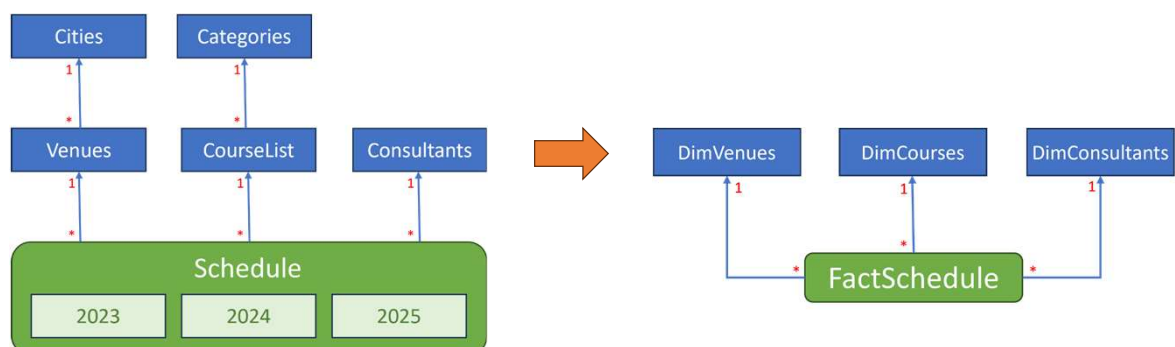
Using Power Query to simplify a relational Data Model

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Storage to Analysis Model – How do we do this?

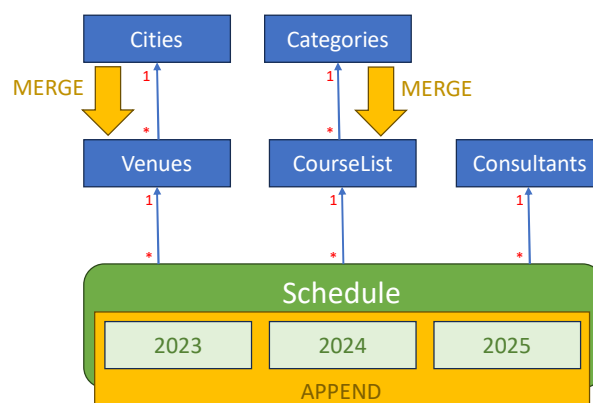


40

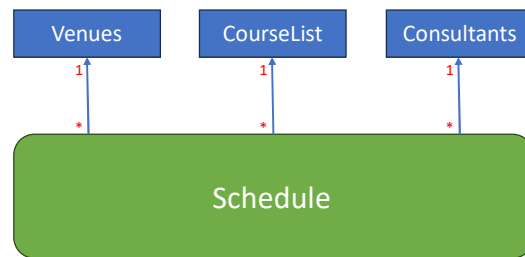
What Power Query can do for us

1. Individual tables: simplify, fix, tidy up and add columns.
2. Multi-table related models: Simplify the structure:
 - Append
 - Merge
3. Combine tables from different (non-related) data sources. (Intermediate course)

Power Query: Append and Merge

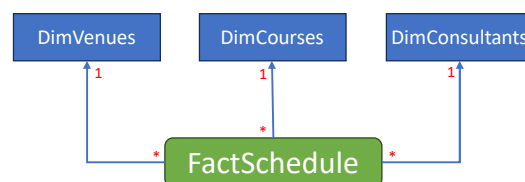


Power Query: Append and Merge



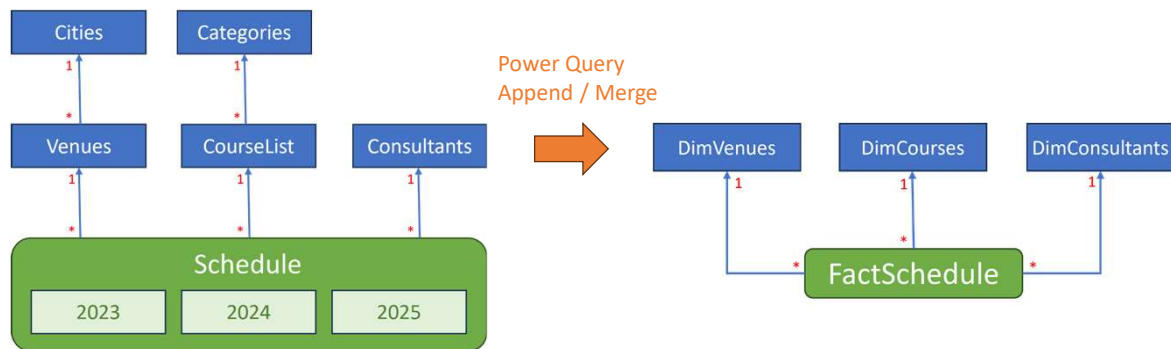
43

Power Query: Rename



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TMS: Storage to Analysis Model



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Let's simplify our model

The screenshot shows the Power Query Editor interface. The 'Home' tab is active, displaying various transformation options. The 'Queries [1]' pane on the left shows the 'Customers' query. The main area displays the data for the 'Customers' query, which is sourced from a table named 'Customers'.

	ab cd	ab cd	ab cd	ab cd
	Custo...	CompanyName	ContactName	Contact1
1	ALFKI	Alfreds Futterkiste	Maria Anders	Sales Repres
2	ANATR	Ana Trujillo Emparedados y helad...	Ana Trujillo	Owner
3	ANTON	Antonio Moreno Taquería	Antonio Moreno	Owner
4	AROUT	Around the Horn	Thomas Hardy	Sales Repres

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Finalising the model

After using Power Query to simplify and tidy the imported files, the following work also needs to be completed in the Model:

- ♥ Set the relationships in the Model View
- ♥ Add any DAX calculations for new tables, new columns or measures
- ♥ Check the formatting for each field in the model
- ♥ Sort any text fields by number fields as required (eg Months)
- ♥ Perform some testing using visuals in the front end

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Using DAX with Related Tables

Gross Margin calculations across related tables

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Gross Margin Calculations - Formula Logic

Gross Margin = Revenue (FactSchedule) - Expenses (FactSchedule)

Revenue (FactSchedule)

= Participants (FactSchedule)
x Course Price (DimCourses)

Course Price (DimCourses)

= Course Price Per Day (DimCourses)
x Duration (DimCourses)

Venue Expense (FactSchedule)

= Venue Cost Per Day (DimVenues)
x Duration (DimCourses)

+

Materials Expense (FactSchedule)

= Materials Cost Per Participant (DimCourses)
x Participants (FactSchedule)

+

Consultant Expense (FactSchedule)

= Daily Rate (DimConsultants)
x Duration (DimCourses)



Getting values from a Parent table

Revenue = Course Price x the number of Participants

FactSchedule

DimCourses

FactSchedule

Formulas don't automatically get access to the fields in parent tables.

Within the FactSchedule table, this won't work:

Revenue = [Participants] * [Course Price]

We need to use a special function to get access to the Parent table.

Revenue = [Participants] * RELATED(DimCourses[Course Price])



Gross Margin calculations

DimCourse table

Course Price = [Duration] * [Course Price Per Day]

FactSchedule Table

Revenue = [Participants] * RELATED(DimCourses[Course Price])

Venue Expense = RELATED(DimVenues[Venue Cost Per Day]) * RELATED(DimCourses[Duration])

Consultant Expense = RELATED(DimConsultants[Daily Rate]) * RELATED(DimCourses[Duration])

Materials Expense = [Participants] * RELATED(DimCourses[Materials Cost Per Participant])

Expenses = [Consultant Expense] + [Materials Expense] + [Venue Expense]

Gross Margin = [Revenue] - [Expenses]

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Example DAX Measure

Power BI Advanced
Creating Measures using DAX
(2 days)

Gross Margin YTD =

```
CALCULATE(
    [Gross Margin],
    FILTER(
        ALL( DimDates ),
        DimDates[Year] = MAX( DimDates[Year] )
        && DimDates[Date] <= MAX( DimDates[Date] )
    )
)
```

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Course Wrap Up

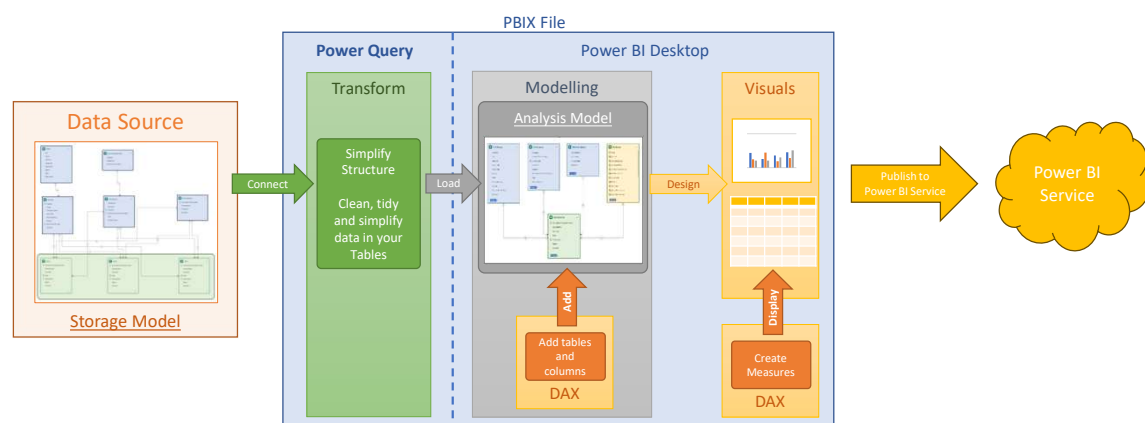
Thanks for paying attention

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Power BI – Components and Process

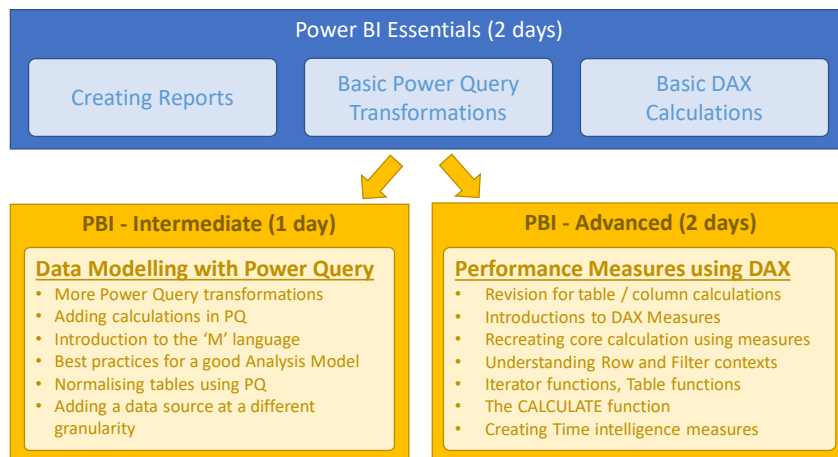


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Power BI Courses

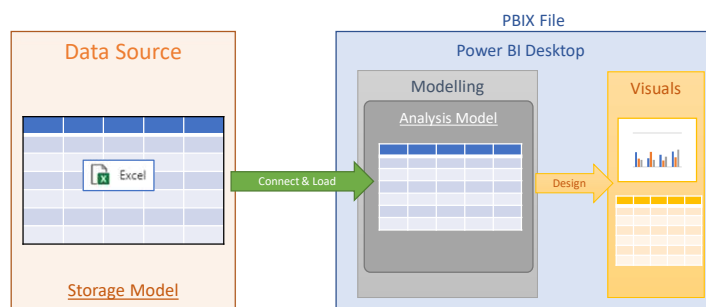


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What's next? Start here ... tomorrow!



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Before you go ...

1. Copy your files using the USB key.
2. Fill out the feedback form:
3. Shut down the computer.
4. Thanks, and don't forget to use the Help Desk



Course Id
199389



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