801: Develop for Data Repository with Microsoft Power BI

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Sunday, May 15, 1:00-3:30

2022 MUSE Inspire Conference
May 15-18 Gaylord Texan Resort & Convention Center | Dallas, TX

Welcome back! Come see our education sessions:

Day	Date	Time	Room	Session
Monday	May 16	2:30-3:25	Grapevine 6	1007 - Power BI and DR
Tuesday	May 17	10:00-10:55	Austin 4	1062 - Improve Quality Performance
Wednesday	May 18	10:00-10:55	Austin 4	1057 - Microsoft's Power Platform (Northeastern VT)
		11:00-11:55	Grapevine 6	1097 - OR Utilization Analysis (Northwestern Medical Center)

Our Agenda

> Power BI considerations for Data Repository

> Data model concepts and options

> Using SQL Server data sources

> Hands-on: build a report

> Power BI service reports and apps

> Discussion and wrap-up

Power BI tools for today

Then and now

Microsoft SQL Server Reporting Services

1. Write TSQL stored procedures in Management Studio

2. Develop .rdl (report template) in SSDT/Visual Studio

3. Deploy report from SSDT to Report Server

4. Users view reports from web portal (Report Manager)

Power BI

1. Import and transform data, develop visualizations and reports with PBI Desktop (or PBI Report Builder for paginated reports)

2. Publish and share reports to the PBI service (cloud) OR to PBI Report Server (local/on-premises)

3. Users view reports from PBI service, mobile device, or on-premise PBI Server
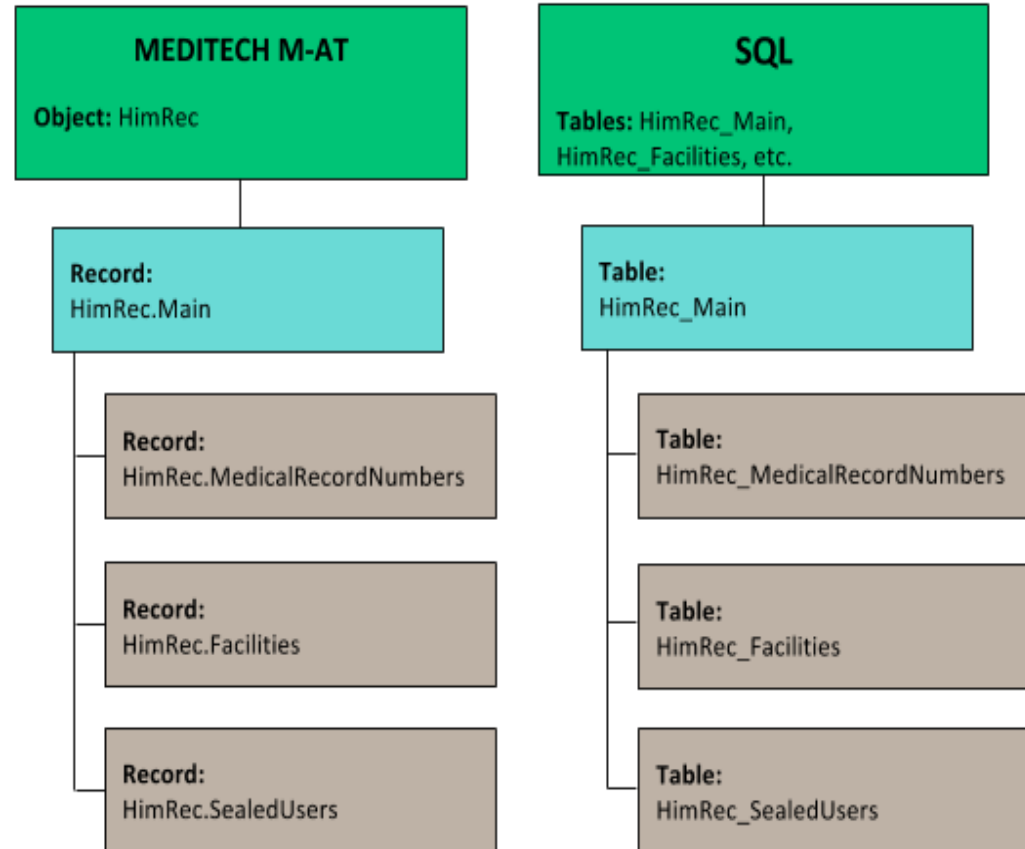
Using Power BI with DR
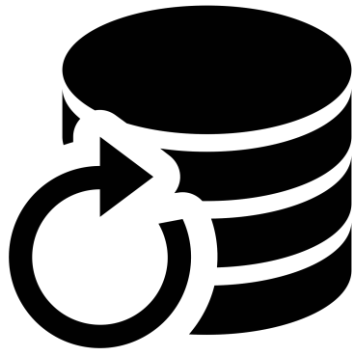
Review of DR design

> Power BI expects relational data sources to be normalized - the DR is not.

> The DR table schema is hierarchical like MT and lacks foreign keys, making it challenging for report development and data model design.

> The sheer number of tables is also a problem.

Data Repository 101

Primary & foreign keys

> Every table has a single primary key, also known as the clustered index. Primary keys are a physical part of the table structure and should never be modified. In DR primary keys are always two or more columns.

> PatientID defines patient-level data in HIM (or MRI). This internal ID is the equivalent of EMR Number (or Unit Number in NPR).

> VisitID is likely the most important field in the DR. This internal ID defines visit-level data and is represented by the Account Number.

> VisitID is a foreign key in many clinical modules (ITS, LAB, PHA and OM) and allows clinical activity (tests, orders, etc.) to be joined to the patient account.

> Foreign keys are only identified in DR by column naming conventions:
  > PatientID, VisitID, etc.
  > Location_MisLocID, Facility_MisFacID, etc.

A typical example

```sql
SELECT
    HRM.Name AS PatientName,
    HRMRN.PrefixMedicalRecordNumber AS MRN,
    RAM.AccountNumber,
    PR.RxNumber,
    PR.Prescription,
    PRA.AdministrationSeqID,
    PRA.AdministrationDateTime
FROM
    trainfdb.dbo.RegAcct_Main RAM
INNER JOIN trainfdb.dbo.HimRec_Main HRM
    ON RAM.SourceID = HRM.SourceID
    AND RAM.PatientID = HRM.PatientID
INNER JOIN trainfdb.dbo.HimRec_MedicalRecordNumbers HRMRN
    ON HRM.SourceID = HRMRN.SourceID
    AND HRM.PatientID = HRMRN.PatientID
INNER JOIN trainndb.dbo.PhaRx PR
    ON RAM.SourceID = PR.SourceID
    AND RAM.VisitID = PR.VisitID
INNER JOIN trainndb.dbo.PhaRxAdministrations PRA
    ON PR.SourceID = PRA.SourceID
    AND PR.PrescriptionID = PRA.PrescriptionID
```

| PatientName	MRN	AccountNumber	RxNumber	Prescription	AdministrationSeqID	AdministrationDateTime
Test,Abbie M	M000000015	V00000005272	0000264	ACETAMINOPHEN 325 MG TAB	1	2018-05-02 08:09:00.000
Test,Abbie M	M000000015	V00000005272	0000264	ACETAMINOPHEN 325 MG TAB	2	2018-05-02 08:13:00.000
MINTTEST,MEREDITH A	M000000025	V00000005314	0000265	MORPHINE 5 MG/ML VIAL	1	2018-05-02 08:09:00.000
MINTTEST,MEREDITH A	M000000025	V00000005322	0000266	SODIUM CHL 0.9% 1,000 ML	1	2018-05-02 08:05:00.000
Testing,Meg O	M000000002	V00000005330	0000267	TETANUS/DIPHTHERIA TOXOID 0.5 ML VIAL	1	2018-05-02 08:10:00.000
TEST,SUSAN L	M000000074	V00000006197	0000280	ERYTHROMYCIN OPHTH OINT NEON	1	2018-05-03 14:51:00.000
STest,Hayley	M000000014	V00000006213	0000281	HEPATITIS B PEDI VACCINE 0.5 ML VIAL	1	2018-05-03 14:53:00.000
FRIED,CHICKEN	M000000156	V00000006247	0000282	PHYTONADIONE neonatal 1 MG/0.5 ML AMP	1	2018-05-03 14:51:00.000
FRIED,CHICKEN	M000000156	V00000006254	0000283	TETANUS-DIPH-ACELL PERTUSS AD 0.5 ML SYR	1	2018-05-03 14:52:00.000
FRIED,CHICKEN	M000000156	V00000006288	0000284	INFLUENZA VIRUS VACCIN 0.5 ML INJECT	1	2018-05-03 15:10:00.000
FRIED,CHICKEN	M000000156	V00000006312	0000285	GABAPENTIN 300 MG CAP	1	2018-05-04 09:28:00.000
test,meghan	M000000201	V00000006320	0000286	ceFAZolin Piggyback 1 GM/50 ML PIGGYBACK	1	2018-05-04 09:29:00.000
TEST,Snowkitty T	M000000200	V00000006338	0000287	CELECOXIB 200 MG CAP	1	2018-05-04 09:27:00.000

Considerations for DR & PBI

> Connectivity:

>   Import or DirectQuery?

> Data model:

>   star schema or...something else?

> SQL coding:

>   views, stored procedures, or embedded expressions?

> Back-end stuff:

>   Will need on-premises data gateway to connect to DR server
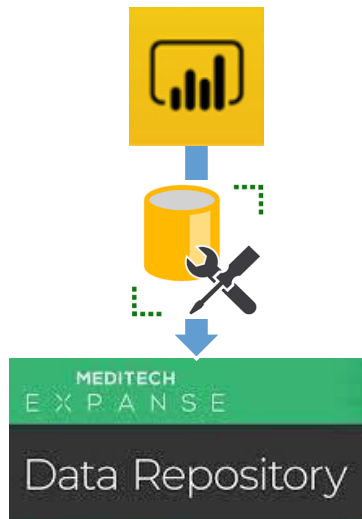
>   How often will data sources need to be refreshed?

Accessing DR data with Power BI

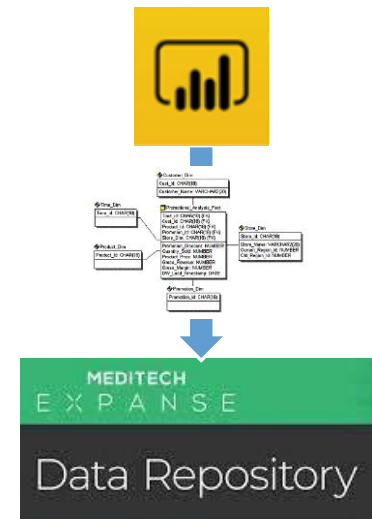How you use Power BI with DR depends on the developer's experience with DR and SQL Server.

Direct to DR tables (Not recommended)
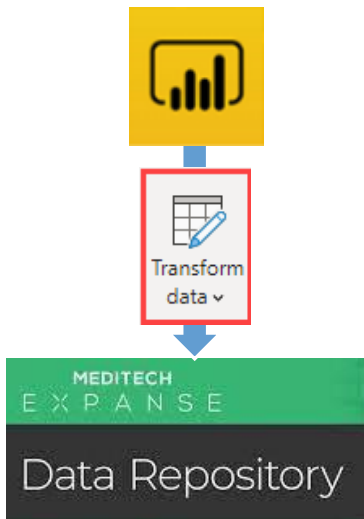
Via SQL object (Yes)

Via data model (Yes)

Getting data from SQL Server

Import

> Data cached on desktop and in Power BI service

> 1 GB limit for non-premium

> Data is compressed for efficiency

> Full use of DAX (data access expressions) function library

> Data sources require periodic refresh

DirectQuery

> Always uses current data

> Scalable, no 1GB limitation

> Significantly slower than data import mode

> Cannot combine data in Power Query

> Many DAX functions unavailable

Using SQL programming objects

> Views (i.e., virtual tables)

> Stored procedures

```
SELECT
        Name,
        AccountNumber,
        Facility,
        Location,
FROM AdmVisits
```

> Embedded queries

Data models
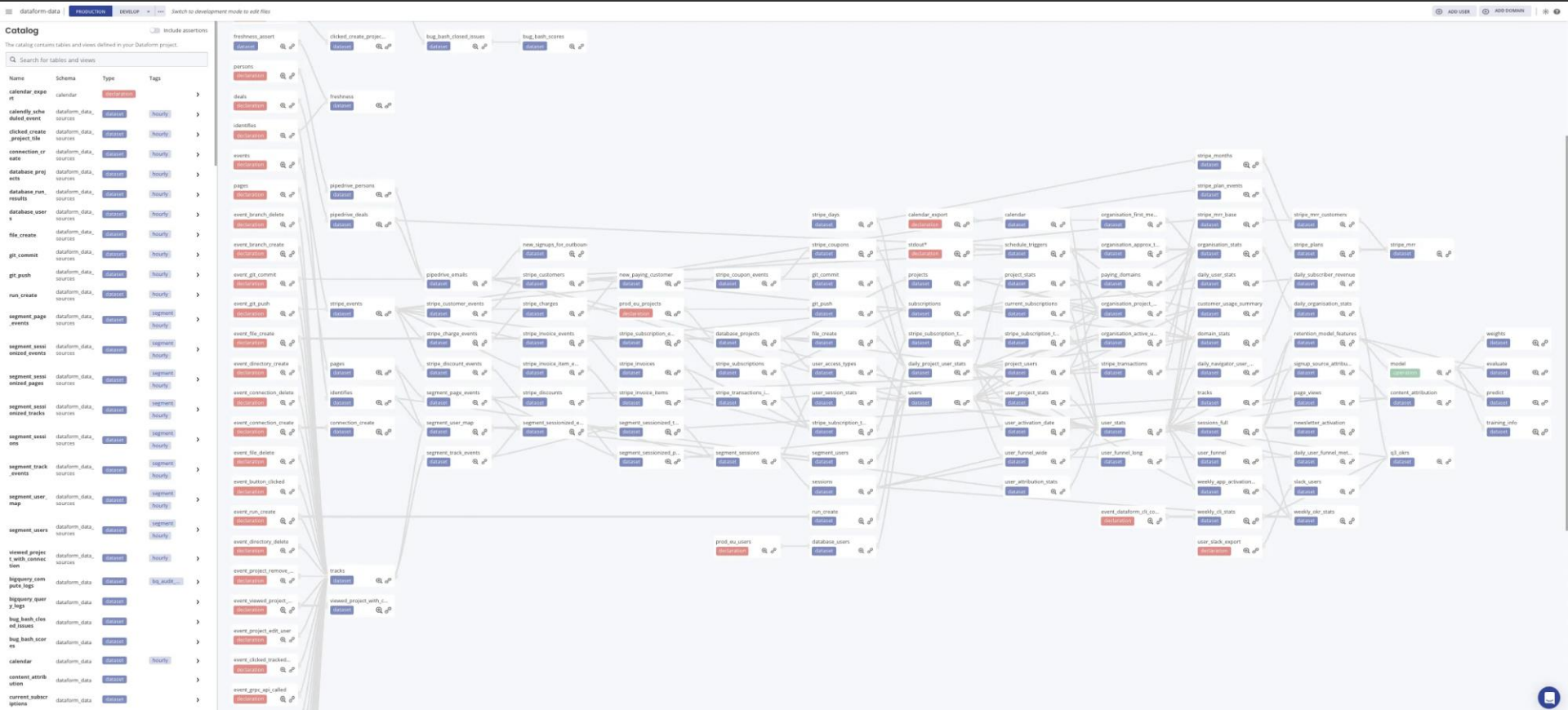
Easy, right?

Build your "model" with SQL code

```sql
SELECT
    RAM.AccountNumber
    ,HRM.Name
    ,HRA.City
    ,HRM.Sex
    ,HRM.Birthdate
    ,MLM.Name AS Location
    ,RAM.AdmitDateTime
    ,RAM.RegistrationStatus
    ,RAM.ArrivalDateTime
    ,RAM.ServiceDateTime
    ,AAD.DiagnosisUrnID
    ,AAD.DiagnosisCode_MisDxID
    ,AAD.DiagnosisName
    ,AAD.DiagnosisSource
FROM
    trainfdb.dbo.RegAcct_Main RAM
INNER JOIN trainfdb.dbo.HimRec_Main HRM
    ON RAM.SourceID = HRM.SourceID
    AND RAM.PatientID = HRM.PatientID
INNER JOIN trainfdb.dbo.HimRec_Address HRA
    ON HRM.SourceID = HRA.SourceID
    AND HRM.PatientID = HRA.PatientID
INNER JOIN trainfdb.dbo.AbsAcct_Diagnoses AAD
    ON RAM.SourceID = AAD.SourceID
    AND RAM.VisitID = AAD.VisitID
INNER JOIN trainfdb.dbo.MisLoc_Main MLM
    ON RAM.SourceID = MLM.SourceID
    AND RAM.Location_MisLocID = MLM.MisLocID
WHERE
    RAM.RegistrationType_MisRegTypeID = 'IN'

ORDER BY
    RAM.VisitID,
    AAD.DiagnosisUrnID
```

Demo: Connecting to SQL Server

Questions and discussion

> About data models, Data Repository, etc?

Let's build a report

Hands-on with Power BI Desktop

Build a [BAR Balance Report](#)

Time check

Power BI online - user experience

> Workspaces
>> share the ownership and management of dashboards, reports, and datasets
>> Use roles to determine permissions (manage, edit, view)

> Apps
>> Package related workspace content (dashboards, reports, and datasets)
>> Can use workspace permissions or be different

> Dashboards
>> Single-page canvas of tiles used to "tell the story"

Power BI Workspace

Power BI Apps

Power BI Dashboard

Power BI online – admin notes

> Refreshing datasets

> Gateways

> The deployment pipeline

Refreshing datasets

General Alerts Subscriptions Dashboards **Datasets** Workbooks

▸Gateway connection

▸Data source credentials

▸Parameters

◢Scheduled refresh

Keep your data up to date

🔵 On

Refresh frequency

Daily

Time zone
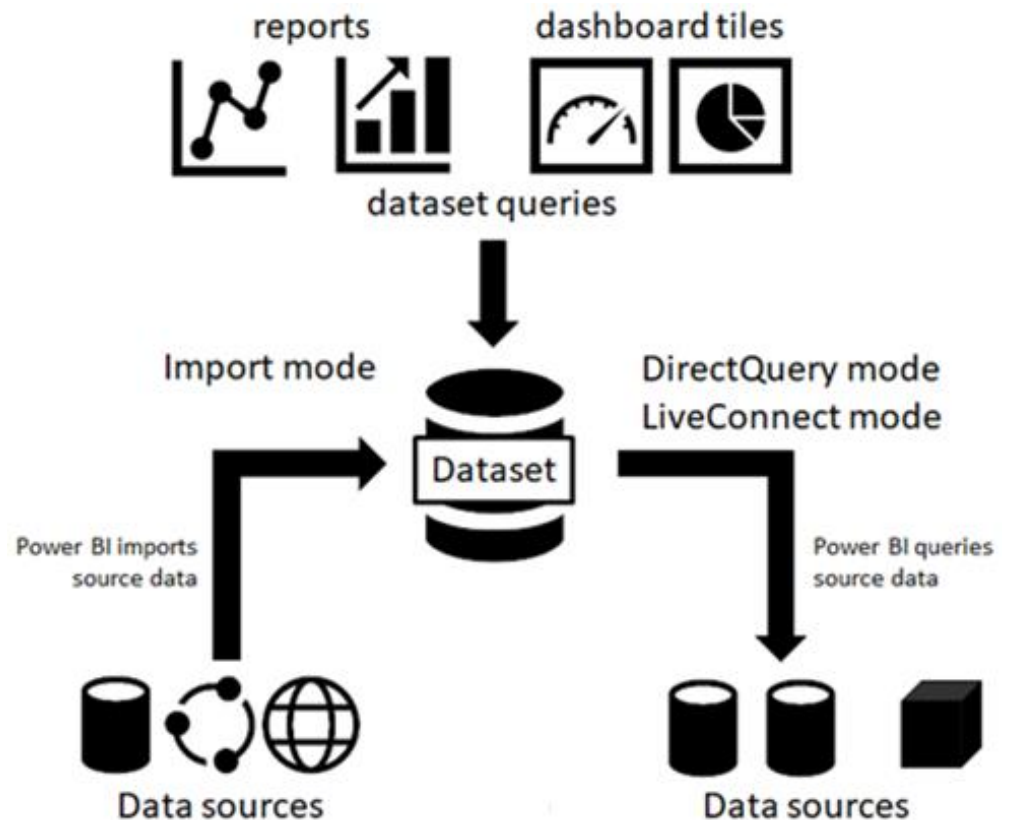
(UTC-05:00) Eastern Time (US and Ca

Time

8 ⌄ 00 ⌄ AM ⌄ ✕

Add another time

Send refresh failure notifications to

☑ Dataset owner

☐ These contacts:

Enter email addresses

reports   dashboard tiles

dataset queries

Import mode   DirectQuery mode
LiveConnect mode

Dataset

Power BI imports
source data

Power BI queries
source data

Data sources   Data sources

Power BI Service access to the DR

> Power BI can connect to many local and cloud-based databases and online services, from SQL Server to Google Analytics and Salesforce

> Access to DR on-premises or in a private cloud (e.g. CloudWave) requires Power BI Gateway

> Power BI Gateway is installed on your network allowing access to the DR
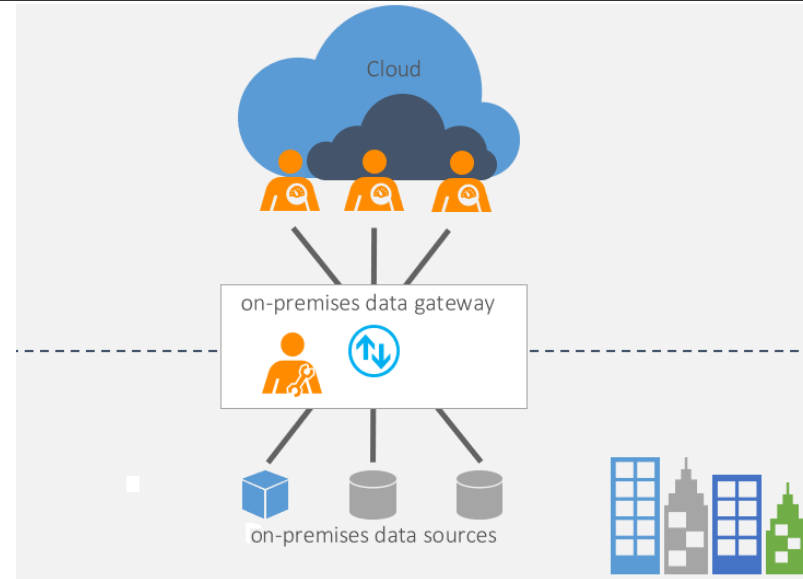
◢ Gateway connection

To use a data gateway, make sure the computer is online and the data source is added in Manage Gateways. If you're using an On-premises data gateway (standard mode), please select the corresponding data sources and then click apply.

Use an On-premises or VNet data gateway

⬤ On

Gateway	Department	Contact information	Status	Actions
⦿ Personal Gateway			⊘ Running on GDABATE-DT2	🗑
○ ⟳ GDABATE-DT Gate…		gdabate@acmeware.c…	⊘ Running on GDABATE-DT, select all datasources to use	⚙ ▶

Using the deployment pipeline

Open discussion

> What questions do you have?

Microsoft Power BI

Keep in touch!
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    Our website: https://acmeware.com