IntelliTect

Building a Modern Data Warehouse in Azure for Power BI
About Us

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1. Why build a **Data Warehouse** solution
2. Walk through building **Modern Data Warehouse** solution in the **cloud**
3. Wrapping up
Power BI, a Data Analytics Solution ... in a box

- Out-of-the-box SaaS content packs
- Real time dashboards & interactive reports
- Natural Language query
- Custom visualizations
- Native Office 365 integration

Cloud data → Power BI → Web

On-premises data → Power BI → Mobile, Excel, Embedded, Cortana, "....."
Power BI lets you experience your data.
When is a Data Warehouse Solution not needed?

1. Not an enterprise use case or scenario
2. Simple model, few reports
3. Very few users
4. Short term use
Why is Power BI not a Data Warehouse solution

1. Performance
2. Data Quality
3. Reliability
4. Access and Updates
So you decided you do need a Data Warehouse solution... now what?

Build a modern Data Warehouse solution in the cloud...
Demo Scenario

- Project Tracking System
- Reports and Analysis on hours and services by customer and service type
- Transactional system reports from remote devices to an on premise system
Ingest

Azure Data Factory to Azure SQL
Azure Data Factory

- Azure cloud service for cloud scale ingestion and transform pipelines
- Built in monitoring and management
- SSIS support in V2
- **Currently 67 data sources**
- **Designed to move large amounts of data**

<table>
<thead>
<tr>
<th>Components</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pipelines</td>
</tr>
<tr>
<td>Activities</td>
</tr>
<tr>
<td>Triggers</td>
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<tr>
<td>Data sets</td>
</tr>
<tr>
<td>Linked Services</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Data Sources</th>
<th>Throughput</th>
</tr>
</thead>
<tbody>
<tr>
<td>Azure SQL Data Warehouse</td>
<td>1.2 GBps</td>
</tr>
<tr>
<td>Azure Blob storage</td>
<td>1.0 GBps</td>
</tr>
<tr>
<td>Azure Data Lake Store</td>
<td>1.0 GBps</td>
</tr>
</tbody>
</table>

**Diagram:**
- **DATA SET** (e.g. table, file)
  - Consumes
  - Produces
- **ACTIVITY** (e.g. hive, stored proc., copy)
  - Is a logical grouping of
- **PIPELINE** (schedule, monitor, manage)
• It’s just SQL Server, managed by Azure
• Good for databases up to about 2 TB to 4 TB though your mileage may vary
• Managed instances for SQL Agent and Cross DB joins now available
and then ... Prepare and Transform

Transform and Load using Azure Functions
Azure Functions

• Serverless compute
• Build with PowerShell, Node.js, C#, ...
• Easy access to Azure resources
• Hybrid connectivity as needed
• Scale as needed
and then ... Publish with Analysis Services

- Common names
- Standard business calculations
- Pre build joins
Azure Analysis Services

- SQL Server Analysis Services Tabular, but deployed to Azure
- Same as data model in Power BI, Excel (Power Pivot)
- Get Data with “M” (Power Query)
- Develop and deploy with SSDT or web designer (in preview)
- If you have a Power BI Desktop file model (pbix), you can import it
- Connects to *many* data sources
- Async refresh with REST API
and then ... Consume with Power BI

<table>
<thead>
<tr>
<th>Total Stores</th>
<th>This Year's Sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>104</td>
<td>$22.05M</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>New Stores Opened This Year</th>
<th>This Year's Sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>$2.43M</td>
</tr>
</tbody>
</table>
• Power BI Reports are easily created off of a well structured data model
• Direct Query eliminates refreshes
• Reports easily added, updated, extended
Support hybrid data

LIVE POWER BI REPORTS & DASHBOARDS

Cloud

Gateway Cloud Service
Data source connection credentials are encrypted

On-premises

Azure Service Bus

LIVE CONNECTION OR SCHEDULED REFRESH

SSAS tabular/multidimensional model

Application Gateway
Data source connection credentials can only be decrypted by the gateway

Data source
Data Warehouse and BI Process Flow

1. Source
2. Extract Load
3. Azure Data Factory
4. Staging
5. Transform
6. Azure Function
7. Azure SQL DB
8. Transform & Analyze
9. Azure SQL DB
10. Master/Reference
11. Azure SQL DB
12. Model
13. Analysis Services
14. PUBLISH
15. DATA CONSUMPTION
16. INGEST
17. PREPARE
18. DATA SOURCES
Scaling Up and Out

- Azure Data Factory handles Enterprise and Big Data scale
- Azure SQL can go to 4 TB
- Azure Data Warehouse starting at 1 TB to Petabytes scale
- Azure Analysis Services
- Power BI Premium with dedicated
- Azure Resource Manager (ARM)
- Azure Active Directory
- VPN from point to site to Express Route dedicated
Azure Data Warehouse

- Scale to **Azure Data Warehouse** as requirements grow
- MPP
- Polybase
- Potentially better cost model: scale cpu separate from size
- 1 TB generally the minimum
Power BI Premium Licensing Requirements

Publishing BI with Power BI Premium

**Create**
Pro users publish BI into one or more Power BI Premium nodes

**Read**
Users who only need to read BI are served by the Power BI Premium node capacity

Required Licensing

- **Authors**
  - Power BI Pro

- **Nodes**
  - **Power BI Premium**
    - Power BI Premium is sold in preconfigured nodes with different v-core capacities
    - EM nodes can only be used for embedded deployments
    - P nodes can be used for embedded or service deployments
    - Power BI Premium includes the right to run Power BI Report Server on-premises on a number of cores equal to the v-cores
    - Customers with SQL EE SA also have access to Power BI Report Server as a SA benefit

- **Basic**
  - No per-user licenses are required for people **reading** BI published via Power BI Premium
<table>
<thead>
<tr>
<th>Reference</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>docs.microsoft.com</td>
<td><strong>The</strong> place to go first for documentation on Azure and Microsoft technologies</td>
</tr>
<tr>
<td>Azure Essentials</td>
<td>Recently published site</td>
</tr>
<tr>
<td>Data Modelling and Analytics in Azure</td>
<td>Part of the Essentials program, quick overview of this entire presentation... without the demos</td>
</tr>
<tr>
<td>Azure Data Warehouse</td>
<td>Good review of the platform and recommended practices</td>
</tr>
<tr>
<td>Power BI</td>
<td>Home of Power BI on the web and a great place to get started</td>
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