Managing the “PowerPivot for SharePoint” Environment

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SharePoint Saturday

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About Melissa

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About Intellinett

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Agenda

Managing the PowerPivot for SharePoint Environment
- Definitions
- Overview of Environment
- System Management
- Security
- Data Refresh
- Desktops
- Management Dashboard
- Usage Reporting

Out of scope: installation & configuration
Defining PowerPivot for SharePoint and Managed Self-Service BI
PowerPivot for SharePoint

*PowerPivot for SharePoint* provides server hosting of PowerPivot (Excel) workbooks & Power View reports within SharePoint. Supports Self-Service BI initiatives in an environment which can be monitored and secured.

If PowerPivot data model remains in Excel: referred to as *PowerPivot for Excel*
PowerPivot
Add-in to Excel 2010 and 2013

*In-memory* solution for Self-Service BI data modeling needs

Based on *xVelocity* (Vertipaq)

Large volumes of data

Create “mashups” of data

Data is *embedded*

Introduces *DAX* expressions

Schedule data refreshes in SharePoint

Can do visualization in familiar Excel environment, or another tool

*Security per file* (not row level)
Power View

Unique data discovery

Presentation-ready (like PPT slides)

Silverlight-based

Two design environments:

- SharePoint (requires Reporting Services add-In)
- Excel (2013 only)

More interactive than other MSBI tools
Self-Service BI

Commonly thought of:
“Empower users to create their own reports so users get what they want without having to ask IT.”

Gartner definition:
“End users designing and deploying their own reports and analyses within an approved and supported architecture and tools portfolio.”

Business & IT need to work together for Managed SSBI to succeed!
Corporate BI + Self-Service BI

- Data Feeds, PowerPivot Models, Excel Services, Misc Files
- Corporate Data Warehouse, Cubes
- ETL
- Source Data

Producers

Business Users

Business-Generated Reports, Dashboards, Scorecards, PowerPivot Models

Consumers

A single collaborative environment which is secured & managed (SharePoint Portal)

BI Developer

System Administrator

Business Users
Managed Self-Service BI

Self-Service BI Tools

Producer:
Data Analysts -or- IT
- PowerPivot
- Excel with Excel Services
- Power View
- Report Builder

Delivery:
SharePoint Portal

Corporate BI Tools

Producer:
IT
- PerformancePoint
- Reporting Services
- Visio Services

Managed, Monitored, Secured by:
IT Staff

People > Process > Technology
Overview of the PowerPivot for SharePoint Environment
PowerPivot for SharePoint

1. Admin Mgmt; refreshed by timer jobs
2. Stores reports & models; data refreshes
3. Integrated with Excel Services
4. Handles communications, data refreshes, server health, load balancing (aka “Mid-Tier Service”)
5. xVelocity in-memory columnstore engine
6. Cache stored in OLAP\Backups folder reduces # of trips to Content DB

Relational PowerPivot Database

Default PowerPivot Service Application DB:

Contains data refresh schedules & usage data.

The actual PowerPivot data, however, is stored in the SharePoint Content DB.

Usage info including Loads into memory & unloads out of memory

Scheduled Data Refresh info
SSAS Instance for PowerPivot

If “Sandbox” is displayed in SSMS:
The workbook is actively loaded to memory

User uploads workbook → Added to Content DB
Query issued → Data loaded into memory

All Sandbox DB’s are in memory concurrently
SSAS Instance for PowerPivot

User uploads workbook → Added to Content DB
Query issued → Data is loaded into memory

- Workbook is kept in memory for 48 hours (if no memory pressure & if no data refreshes are executed)
- After 48 hours data is unloaded to the cache where it is kept for another 72 hours
- If 120 hours passes with no activity, cache file is physically deleted

Cache files stored: \Microsoft SQL Server\MSAS11.PowerPivot\OLAP\Backup
PowerPivot Gallery

Specialized SharePoint document library

Silverlight-based

Thumbnail previews of PowerPivot report contents

Manage data refreshes for PowerPivot workbooks

Creation of Power View and Excel reports

- Manage data refresh
- Create Excel or Power View report using this PowerPivot model as data source
- Thumbnails show preview of report (Excel & Power View only)
Demo: PowerPivot Gallery
System Management Considerations
Managing PowerPivot in SharePoint

Memory

• Teach data modelers not to retrieve every field available (it’s all in memory after all!)
• Manage memory availability: all db’s in use are in memory concurrently (leaving ~10%-20% buffer)

Disk Space

• Monitor disk space & file uploads as PowerPivot files are far larger than typical Excel files (data is embedded in workbook)
• Files are cached to avoid round trips to the Content DB
Managing PowerPivot in SharePoint

Naming & Versioning

• Teach producers of data to continue using same name for the model (i.e., avoid habit of V1, V2 or dates in name)
• Consider minimal versioning in document library (Content DB size concerns since data is embedded in workbook – up to 2GB per file)

Metadata

• Requiring certain metadata fields for reports & models will aid with Search
• Cannot see custom fields in the PowerPivot Gallery view (need to use “All Documents” view)
Securing PowerPivot in SharePoint
Securing PowerPivot in SharePoint

Permissions to Publish

- Limit number of people who are permitted to publish data for others to consume
- Consider using workflows for approval of new models

Access to Models & Reports

- Access to the document library
  - Based on content
  - Based on security
- Permissions to individual models
- Permissions to individual reports (preferably same as underlying model – inherit from parent)
Securing PowerPivot in SharePoint

Thumbnail Previews

Starting with SQL Server 2012 SP1:

1. Report & workbook must reside in same PowerPivot Gallery
2. Both must inherit permissions from the parent

If both rules aren’t met: instead of preview

Until SP1 is in place, to avoid the potential of showing a preview for data the user doesn’t have permission to see:

- Ensure permissions on reports are same as its underlying model
- Use a regular document library (instead of PowerPivot Gallery) if preview is of concern
Securing PowerPivot in SharePoint

Access to Data in the Workbook

**View Only** permissions (Viewers): user will get a “snapshot” only; no data is exposed

**Contribute** permissions (Members): user can download full workbook & access all data stored within the PowerPivot model

*Starting with SQL Server 2012 SP1:*

**Read** permissions will be required to connect to a PowerPivot workbook from a client application
Managing Data Refreshes
## Data Refreshes – 2 Approaches

<table>
<thead>
<tr>
<th>PowerPivot for Excel</th>
<th>PowerPivot for SharePoint</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual refreshes.</td>
<td>User refreshes while the workbook is open. This technique does NOT refresh data in the PowerPivot database.</td>
</tr>
<tr>
<td></td>
<td>OR User sets up scheduled data refreshes. This method does refresh both the Excel workbook &amp; the PowerPivot database.</td>
</tr>
<tr>
<td></td>
<td><em>(It actually sets the “Refresh on Open” flag in the Excel workbook to make the Excel file update itself when the user opens it.)</em></td>
</tr>
</tbody>
</table>
Managing Data Refreshes

Data Refresh

- Data modelers set up their own data refreshes
- Anyone with **Contribute** permissions can modify
- Data is refreshed **in full** based on query
- Individual credentials typically used for data access
- Challenging: terminations, transfers, **PW changes**
Demo: Data Refresh Settings

Auto Sales PowerPivot Model
Last Modified By: System Account, Date: 11/3/2012
Created By: System Account

Sheet1

Warning: this page is not encrypted for secure communication. User names, passwords, and any other information will be sent in clear text. For more information, contact your administrator.

Schedule Information
Name: Auto Sales PowerPivot Model.xlsx
Schedule Last Updated By: CONTOSO\administrator
Schedule Last Updated: 1/13/2013 8:07:33 PM
Current Status: Succeeded
Last Successful Refresh: 1/13/2013 8:06:38 PM
Next Scheduled Refresh: 1/13/2013

History

<table>
<thead>
<tr>
<th>Started</th>
<th>Duration</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/13/2013 8:08:06 PM</td>
<td>00:00:31</td>
<td>The schedule settings have been altered by user CONTOSO\administrator.</td>
</tr>
<tr>
<td>1/13/2013 8:07:33 PM</td>
<td>-</td>
<td>The schedule settings have been altered by user CONTOSO\administrator.</td>
</tr>
<tr>
<td>11/13/2012 12:08:16 PM</td>
<td>00:01:07</td>
<td></td>
</tr>
<tr>
<td>11/13/2012 12:07:53 PM</td>
<td>-</td>
<td>The schedule settings have been altered by user CONTOSO\administrator.</td>
</tr>
<tr>
<td>11/12/2012 2:42:22 PM</td>
<td>00:00:00</td>
<td>The data refresh job failed because it did not run within the time period allotted for running this schedule.</td>
</tr>
</tbody>
</table>
Managing Data Refreshes

Data Refresh Options in PowerPivot Gallery

> 1x per day cannot be scheduled

Actual start time is controlled by:
(1) **Business Hours** defined by Administrator,
(2) How often the **Power Pivot Data Refresh Timer Job** is scheduled to run,
(3) Sufficient **system resources**, and
(4) How many **concurrent refresh jobs** are allowed to run

<table>
<thead>
<tr>
<th>Data Refresh</th>
<th>Schedule Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specify if you would like to turn Data Refresh on or off. Click here to learn more about this page.</td>
<td>Daily, Weekly, Monthly, Once</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Schedule Details</th>
<th>Early Start Time</th>
<th>E-mail Notifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Define the frequency (daily, weekly, monthly or once) and the timing details for the refresh schedule.</td>
<td>Specify the earliest start time that the data refresh will begin</td>
<td>Specify e-mail address of the users to be notified in the event of data refresh failures.</td>
</tr>
</tbody>
</table>

- **Enable**
- **Data Refresh Options**
- **Schedule Details**
- **Earliest Start Time**
- **E-mail Notifications**
Managing Data Refreshes

Data Refresh Options in Central Admin

Business Hours represent when priority is given for querying rather than refreshes. (*Considerations: international users; timeframes to query source systems; need at least a small window or the “After Business Hours” option will cause a failure.*)

By default, PowerPivot will discontinue refreshing workbooks that continue to fail, or don’t get queried often.

May want to increase
Managing Data Refreshes

Data Refresh Options in PowerPivot Gallery

3 Options:

- Use the data refresh account configured by the administrator
- Connect using the following Windows user credentials
- Connect using the credentials saved in Secure Store Service (SSS) to log on to the data source. Enter the ID used to look up the credentials in the SSS ID box

Considerations:
- What account is executing the process on the server?
- What account is being used to query the underlying data sources?
- Account must be from same domain, or from a trusted domain

Further details:
Managing Data Refreshes

Data Refresh Options in PowerPivot Gallery

1. **Data Queries**
   - Refresh operation performed by PowerPivot
   - Unattended Account
     - If Windows Auth: uses “current user” (security considerations)
     - If ID/PW in connection string: user specified

<table>
<thead>
<tr>
<th>Pros</th>
<th>Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simple for workbook owner to use</td>
<td>Not suitable when row level security is implemented on the source system being queried (only 1 Unattended Account per service app – needs broad permissions to satisfy refresh for all workbooks)</td>
</tr>
<tr>
<td>Few concerns with password changes, terminations &amp; transfers</td>
<td></td>
</tr>
</tbody>
</table>

---

*Image:* Use the data refresh account configured by the administrator
- Connect using the following Windows user credentials
- Connect using the credentials saved in Secure Store Service (SSS) to log on to the data source. Enter the ID used to look up the credentials in the SSS ID box.
## Managing Data Refreshes

### Data Refresh Options in PowerPivot Gallery

<table>
<thead>
<tr>
<th>Data Queries</th>
<th>Pros</th>
<th>Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refresh operation performed by <strong>Windows user</strong> specified</td>
<td>Less complication with source system permissions&lt;br&gt;Retain same security upon refresh as when set up</td>
<td>Management of terminations, transfers, and password changes&lt;br&gt;PW changes: user needs to update Data Refresh Schedule in every workbook</td>
</tr>
</tbody>
</table>
## Managing Data Refreshes

**Data Refresh Options in PowerPivot Gallery**

![Screenshot of PowerPivot Gallery](image)

### Data Queries

- Refresh operation performed by Windows user associated to the **SSS ID** specified

(Similar to Option 1, but not limited to one acct per svc app)

### Pros

- No name or password shared with users
- Few concerns with password changes, terminations & transfers

### Cons

- If being used to “simulate” user security, need to carefully manage which ID goes with which user account
### Managing Data Refreshes

#### Workbook Size Limits
- If a data refresh will force the workbook to exceed the 2GB size limitation, the refresh will fail.

#### Write Access
- If workbook is open or being edited, refresh will fail.

#### Drivers & Versions
- If data modeler used a custom driver on their machine that doesn’t exist on the server, the refresh will fail.
- If version of PowerPivot on user’s desktop differs from the server (ex: 32-bit instead of 64-bit or Excel 2010 vs. 2013), the refresh will fail.
Managing PowerPivot on Desktops
Managing PowerPivot on Desktops

**RAM**
- RAM upgrades may be needed on user machines
- Minimum 4GB. Give 6-8GB or more if possible

**64-bit vs. 32-bit**
- 32-bit cannot handle data volumes > ~1M rows
- 64-bit may not be compatible with all Office add-ins

**Installation – Office 2010**
- Requires .NET 3.5 SP1 and Office Shared Features

**Installation – Office 2013**
- Much easier install – just enable it in COM add-ins
- Available in “Professional Plus” versions only
- File size limitation is gone (SPS still a consideration)
PowerPivot
Management Dashboard
PowerPivot Management Dashboard

1. Five server health reports
2. # of Queries and # of Users, by Workbook, by Day
3. Data Refresh Activity & Failures
4. Report links
5. Workbook Activity
6. Admin links

Data Source: Management Data Sandbox (an SSAS Tabular Model)
PowerPivot Management - Reports

Visibility into:
- Queries
- CPU
- Memory
- Connections
- Workbook Sizes
- Users & Authors
- Usage Increase & Decrease
- Data Refresh

Data Source: Management Data Sandbox (an SSAS Tabular Model)
Demo: Management Dashboard

Data Refresh - Recent Activity

<table>
<thead>
<tr>
<th>Workbook</th>
<th>End Time</th>
<th>Duration (seconds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auto Sales PowerPivot Model.xlsx</td>
<td>1/13/2013 8:08:38 PM</td>
<td>32</td>
</tr>
<tr>
<td>TruCare Sales Analysis.xlsx</td>
<td>1/13/2013 7:37:54 PM</td>
<td>110</td>
</tr>
</tbody>
</table>

Workbook Activity - List

<table>
<thead>
<tr>
<th>Workbook</th>
<th>Users Queries Size (Mb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TruCare Sales Analysis.xlsx</td>
<td>2 1641 63.04</td>
</tr>
<tr>
<td>Reseller Sales PowerPivot Model.xlsx</td>
<td>1 60 4.70</td>
</tr>
<tr>
<td>Auto Sales PowerPivot Model.xlsx</td>
<td>2 3066 3.68</td>
</tr>
<tr>
<td>PowerPivot Management Data.xlsx</td>
<td>2 18413 2.55</td>
</tr>
</tbody>
</table>
PowerPivot
Usage
Reporting
Usage Reporting

PowerPivot Management Data:

SQL Server database
PowerPivot Service Application

SSAS Tabular Model
Management Data Sandbox

Central Admin: PowerPivot Management Dashboard

Ad-hoc reporting via Excel or other reporting tools

Customizable dashboard

Requires Central Admin Access
Usage Reporting – Refreshing Data

Refreshing Data in the Management Data Sandbox

<table>
<thead>
<tr>
<th>Component</th>
<th>Default schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>SharePoint 2010 Timer Service (SPTimerV4)</td>
<td></td>
</tr>
<tr>
<td>Microsoft SharePoint Foundation Usage Data Import timer job</td>
<td>Every 30 minutes</td>
</tr>
<tr>
<td>Microsoft SharePoint Foundation Usage Data Processing timer job</td>
<td>Daily at 3:00 A.M.</td>
</tr>
<tr>
<td>PowerPivot Data Management Dashboard Processing timer job</td>
<td>Daily at 5:00 A.M.</td>
</tr>
</tbody>
</table>

Relies on 3 timer jobs

Usage Reporting - Options

**PowerPivot Settings**
(General Application Settings Central Admin):

**Query Reporting Interval**
The number of seconds to gather query response statistics before reporting it as a usage event.

- 300

Valid values: must be >=1 (in seconds).

**Usage Data History**
The number of days to retain a history of usage data and server health statistics. Setting this value to zero keeps all history indefinitely.

- 365

Valid values: must be >=0 (in days).

**Trivial Response Upper Limit**
An upper limit (in milliseconds) that sets the threshold for completing a trivial request, such as server-to-server communications that establish a user connection to PowerPivot data. Trivial requests are excluded from report data.

- 500

Valid values: must be > 0 and < Quick Response Upper Limit (in milliseconds).

**Quick Response Upper Limit**
An upper limit (in milliseconds) that sets the threshold for completing requests quickly. For reporting purposes, a quick request might include querying a small dataset.

- 1000

Valid values: must be > Trivial Response Upper Limit and < Expected Response Upper Limit (in milliseconds).

**Expected Response Upper Limit**
An upper limit (in milliseconds) that sets the threshold for completing a query in an expected amount of time. For reporting purposes, most queries for PowerPivot data should fall into this category.

- 3000

Valid values: must be > Quick Response Upper Limit and < Long Response Upper Limit (in milliseconds).

**Long Response Upper Limit**
An upper limit (in milliseconds) that sets the threshold for completing a long running request. Relatively few requests should fall into this range. Long running requests are acceptable as long as their overall number is small relative to the total number of processing requests.

- 10000

Valid values: must be > Expected Response Upper Limit (in milliseconds).

By default, usage data is retained for 1 year.

Limits defined for Trivial/Quick/Expected/Long query times affect the Management Data reports.
Demo: Usage Reporting

![Excel Workbook Activity](image-url)

- **Workbook Author**
  - System Account
  - SelfService BI/Auto Sales PowerPivot Model.xlsx
  - SelfService BI/TruCare Sales Analysis.xlsx
  - PowerPivot Management/41660935-7fb1-4e51-beae-9bda4e61c9dc/PowerPivot Management Data.xlsx
  - SelfService BI/Reseller Sales PowerPivot Model.xlsx
  - SelfService BI/Extrusion Operations.xlsx
  - SelfService BI/Emmy Awards PowerPivot Model.xlsx

- **Users**
  - Melissa ContributeUser

- **Total Queries**
  - 23,800

- **Load Size Max (MB)**
  - 60

![PowerPivot Management Data](image-url)

- **Type**
  - Server Health
  - Workbook Activity
  - PowerPivot Management Data
Conclusion
Recap

Managing the PowerPivot for SharePoint Environment

- Definitions
- Overview of Environment
- System Management
- Security
- Data Refresh
- Desktops
- Management Dashboard
- Usage Reporting

People > Process > Technology
Working Together: Business & IT

People > Process > Technology
- People: Mutual respect & understanding
- Process: Achieving balance between flexibility & rigidity
- Technology: Insight to activities & opportunities

Utilization of business expertise
- Validation; Active & Passive Prototyping

Liaisons between Business & IT
- Technical SMEs within business units
- Support & training within business units

Personal BI > Team BI > Corporate BI
Support from influencers, evangelists & executives
“PowerPivot for SharePoint” Projects

Good candidates
- Small projects
- Infrequent or one-time analysis
- Rarely used data
- Unpredictable analysis
- Prototyping

Poor candidates
- Large sets of data
- Incremental data loads are required
- Refresh of data more often than once per day is required
- Complex requirements
- Row-level security is required
Challenges

Training of data producers on data & tools

- Need to understand the data and how to use the tools and how to be analytical and derive insights

Adequate IT support

- Some IT staff have the “users can’t handle it” syndrome
- Less of an IT backlog for report development; different demands: data, training, support, documentation

Access of questionable data sources

Non-standard data definitions, calculations, & interpretations

Duplication of effort

Potential for chaotic, unorganized environment

Lack of testing & validation

Lack of governance & change management
Keys to Success

Figure out how Business & IT can support each other

Work with strengths & limitations of Self-Service BI

Find where SSBI complements Corporate BI in your org

Create a population of “savvy” power users

User support, training, and documentation

Executive support & evangelists

Balance of governance and flexibility for business users

Change management

People > Process > Technology
Further Reading

Increasing Productivity by Empowering Business Users with Self-Serve BI
Choose the Right Business Intelligence Technology to Suit Your Style
Self Service Key to Creating Enterprise Business Intelligence Heroes
A Primer on PowerPivot Topologies and Configurations
Self-Service BI: Remember to Plan for the Back-End Infrastructure
Enabling Data as a Service for Self-Service Business Intelligence
PowerPivot Management Dashboard
Customizing the PowerPivot Management Dashboard
The State of Self-Service Reporting
Book Recommendation

Currently, most PowerPivot books available focus on creation of the data model and DAX formulas.

More than half of this Wrox book focuses on management & configuration.
Thanks for attending!

Managing the “PowerPivot for SharePoint” Environment

Slides at sqlchick.com
(Presentations page)

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Appendix
Central Admin

Common places to find PowerPivot management settings
Central Admin (cont’d)

Common places to find PowerPivot management settings

- **Timer Job Definitions & Job Status**
- **Analysis Services Services on Server**