End-to-End SQL Server Master Data Services
Presenter Introduction

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Presenter Introduction

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Session Outline

Introducing Master Data Management
Introducing Master Data Services
Developing Master Data Services Solutions
Managing Master Data Services Solutions
Summary
What’s New in SQL Server 2016 MDS
Introducing Master Data Management
Introducing Master Data Management

“Master Data Management (MDM) comprises a set of processes, governance, policies, standards and tools that consistently defines and manages the master data (i.e. non-transactional data entities) of an organization (which may include reference data).”

– Wikipedia

MDM is about taking control of data, and making data work to the organization’s advantage

- A successful MDM solution delivers a master data hub that provides access to authoritative, standardized, and validated versions of data
Introducing Master Data Management (Continued)

MDM can address several problems:

- No authoritative source of data
  - Reports may not be trusted
  - Poor decision making
- Systems with different versions of the same data
- Data spread across multiple systems can lack integrity and consistency
- Mergers and acquisitions that involve integrating data contribute to different versions
- No formal dimension maintenance capability
- Multiple stakeholders for the same record
- Inability to enable, monitor and enforce data stewardship processes
Introducing Master Data Services
Introducing Master Data Services
SQL Server Enterprise Information Management

- Primarily designed to implement ETL processes
- Provides a robust, flexible, fast, scalable and extensible architecture

- Master data management
- Manages reliable, centralized data
- Broadens its reach with a new Excel Add-in that can leverage Data Quality Services

- Knowledge-driven data cleansing
- Corrects and de-duplicates data
- Integrates with Integration Services

Complete, Clean, Consistent and Current Data
Introducing Master Data Services

Master Data Services (MDS) is a product for master data management delivered with SQL Server

- V1: First released with SQL Server 2008 R2
- V2: The SQL Server 2012 release included many new features and enhancements
- V3: The SQL Server 2014 release included no new capabilities or features
- V4: The SQL Server 2016 release, currently in preview

Delivers credible, consistent data with user-centric data governance

Available only with Business Intelligence and Enterprise editions
Introducing Master Data Services

Architecture

MDS is implemented as a WCF Data Service
- Internet Information Services (IIS) is required for the Master Data Services web application and web service
- MDS can be programmatically manipulated

The repository for metadata and data is a SQL Server database
- The Master Data Services database can be created on either the local or a remote computer

Microsoft provides two user interfaces:
- Master Data Manager web application
- Excel add-in
Introducing Master Data Services

User Interfaces: Master Data Manager

The MDM web application requires Silverlight Capabilities and features:

- Work with master data:
  - Query, add, modify, delete, annotate master data
  - Manage hierarchy relationships

- Administrative tasks:
  - Build models, create business rules and deploy model packages
  - Import data into MDS
  - Create subscription views to export data from MDS
  - Create versions of master data to manage consistent snapshots
  - Assign permissions to master data
Introducing Master Data Services
User Interfaces: Excel Add-in

Available for Excel 2007 or later

Capabilities and features:

- Connect to an MDS repository
- Create new entities and manage attribute properties
- Load filtered sets of master data into Excel tables
- Store and share queries to load master data
- Make changes to master data, and even work offline
- Publish and annotate changes
Introducing Master Data Services
Sample Implementation
Developing Master Data Services Solutions
Models are the unit of development, management, version, security and deployment, and are usually domain specific

- E.g. Customer, Product, Geography, etc.

Models consist of entities, and entities are defined by attributes

- Each entity must have a **Code** and **Name** attribute
- The **Code** attribute must contain unique values
- The **Name** attribute usually defines a friendly name for the member
- Attributes can constrain data by data type or by a domain-based lookup to another entity (like a foreign key)
Demonstration

Developing a Master Data Solution with Master Data Services
Business rules are defined at entity level to enforce integrity

- Rules use an IF... THEN structure
  - When TRUE, an action is performed
  - Without an IF condition, the action is always performed

Can launch external workflows
Can notify users by email when business rules are violated
Hierarchies define relationships between, or within, entities

**Derived** hierarchies span multiple entities and exploit domain-based relationships
- Recursive hierarchies are supported

**Explicit** hierarchies:
- Are based on a single entity
- Can define consolidated members
- Can be ragged (i.e. leaf members can appear at different levels of the hierarchy)
- Can be mandatory, in which case all leaf members must form part of the hierarchy
Demonstration

Enhancing a Master Data Solution with Master Data Services
Managing Master Data Services Solutions
Managing Master Data Services Solutions

Data stewards and administrators can:

- Manage permissions to control access to functionality and data
- Programmatically load members and hierarchy relationships
- Manage model versioning to ensure consistent snapshots of master data are made available to subscribers
- Create subscription views to enable the retrieval of master data
MDS permissions can be assigned to Windows users and groups to enable, or deny, access to:

- **Functionality**
  - Explorer, Version Management, Integration Management, User and Group Permissions, System Administration
- **Model objects**
  - Entities and attributes
- **Hierarchy members** (equivalent of row-level security)

The combination of model object and hierarchy member security can achieve cell-level security.

Administrative privileges can be assigned at instance, and model levels.
Managing Master Data Services Solutions

Entity-Based Staging

Entity members can be programmatically loaded by using Entity-Based Staging

- Each entity has three tables in the MDS repository to load members, including consolidated members, and hierarchy relationships
  - stg.<EntityName>_Leaf
  - stg.<EntityName>_Consolidated
  - stg.<EntityName>_Relationship

Only available if the entity defines an explicit hierarchy

Data can be loaded into these tables by any method. MDS stored procedures can then be used to load and validate master data
Model versions allow managing snapshots of master data

Versions, or version flags, can be used to control the data that is surfaced to subscribers

- Models can include multiple versions
- Users can update data in an Open version only
- Useful for the consistent publication of master data, including point-in-time reporting and auditing scenarios
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Version Management: Phases

- **Open**
  - Default status
  - Authorized users can make changes

- **Lock**
  - Only administrators can make changes

- **Validate**
  - Business rules must be applied
  - All members must be validated before the version can be committed

- **Commit**
  - No user can make changes
  - Optionally, a validation flag can be assigned

- **Copy**
  - New version is available for users to continue managing the master data
Subscription views are the only supported way to publish master data to subscribers

- They are database views in the MDS repository
- ETL processes can use these views to source master data

Each view can expose a particular version (or version flag) for an entity, derived hierarchy or explicit hierarchy
Managing Master Data Services Solutions

Subscription Views (Continued)

The subscription views can include:

- Attributes
- Hierarchy levels
- VersionName, VersionFlag
- EnterDateTime, EnterUserName, LastChgUserName
- ValidationStatus

If using the Power BI, these views can be easily published to the Data Catalog as discoverable OData data feeds.
Demonstration

Managing a Master Data Solution
with Master Data Services
Summary
MDS Development Methodology

1. Create a model
2. Create entities and attributes
3. Define business rules
4. Define hierarchies
5. Import data to initialize/populate entity memberships
6. Create subscription views to export master data
7. Configure permission requirements
8. Manage model versioning
MDS Opportunities and Strengths

Create master data hubs to standardize data for key business entities across the enterprise

Key capabilities and features:
- Import data from any source of data
- Use business rules to validate imported/entered data
- Use notifications to alert data stewards of data problems
- Empower business users to manage master data
  - Excel is a familiar tool to retrieve and manage master data
  - Authorized business users can maintain master data directly (enter, update, validate, publish) without IT intervention
  - All changes to master data are treated as transactions, are logged, and can be reversed
What’s New in SQL Server 2016 MDS
What’s New in SQL Server 2016

Focus Areas

Performance and Scale

Modeling and Management

Customer Feedback
Massive improvements to performance and scale!

Capabilities:
- Heavy performance optimizations for the MDS backend system
- Scale entities to >100 million members

Benefits:
- 15x performance increase in Excel
- Faster entity-based staging
- Reduced impact of row-level security
- Smarter caching of security rules
MDS transaction log retention settings
- Configurable settings for retaining the MDS transaction history table to easily enable automatic truncation and cleanup

Multiple administrator roles
- MDS now allows multiple system administrators as well as distinct roles for model admins and super users

Granular MDS security permissions
- Allows read, modify, create, and delete permissions to be set at
  - Attribute (column) level, and
  - Hierarchy member (row) level
What’s New in SQL Server 2016
In Response to Customer Feedback

Modeling improvements
- Increased attribute name length limit
- Added **Display Name** property for attributes
- Allows special characters in model names
- The Excel add-in now lets you hide name or code values for domain based attributes

Simplified hierarchies
- Simplified hierarchy types - now just Derived
- Made it easier to find and manage unused members

Improved model deployment
- Faster deployment
- Removed size limitations when deploying models with data
# What’s New in SQL Server 2016

## Public Preview at a Glance

<table>
<thead>
<tr>
<th>Performance and Scale</th>
<th>Modeling and Mgmt</th>
<th>Security and Admin</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Excel add-in</strong></td>
<td><strong>Transaction log retention</strong></td>
<td><strong>Granular security permissions</strong></td>
</tr>
<tr>
<td>4-8x performance increase in the January release of the MDS Excel add-in for SQL Server 2012 and SQL Server 2014</td>
<td>Configurable settings for retaining the MDS transaction history table to enable automatic truncation</td>
<td>Allows permissions to be set around read, write, create, and delete</td>
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<tr>
<td>Up to 15x increase in SQL Server 2016</td>
<td><strong>Simplified hierarchies</strong></td>
<td><strong>Multiple administrator roles</strong></td>
</tr>
<tr>
<td><strong>Entity-based staging</strong></td>
<td>Simplified the various hierarchy types, and made it easier to find and manage unused members</td>
<td>Support for Super User and Model Admin roles allows for multiple system administrators, and model level admins</td>
</tr>
<tr>
<td>Loading data into MDS is now 15-200% faster than SQL Server 2014</td>
<td><strong>Display Name for attributes</strong></td>
<td><strong>Smarter caching of permissions</strong></td>
</tr>
<tr>
<td><strong>Model deployment</strong></td>
<td>Gives more control over the names displayed for a given attribute – including the Code and Name attributes.</td>
<td>Reduces the overhead of adding member and attribute level security settings</td>
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<td>Faster deployment, and removed size limitations when deploying models with data</td>
<td><strong>API optimization</strong></td>
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<td>Overall performance increase of 60% or more on MDS web service API calls</td>
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What’s New in SQL Server 2016
Post-Public Preview

Entity sharing-sync
- Allows entities to be reused across models within the instance

Merge conflict resolution
- Features to help solve merge conflict when multiple users are attempting to modify the same member

Support for custom indexes
- Allows configuring which attributes should be indexed, based on your application workloads

Subscription views for historical data
- Facilitates processing Type 2 Slowly Changing Dimension attributes
Resources

Microsoft website: Modern Data Warehouse

Book: “Microsoft SQL Server 2012 Master Data Services”
- Publisher: McGraw-Hill Osborne Media
- Author: Tyler Graham

Videos: “Master Data Services Videos”

Microsoft website: SQL Server 2016
Microsoft Ignite Conference:
- Session: What’s New in MDS and SSIS in SQL Server 2016 (6 May, 2015)
- Presenter: Matt Masson
Peter Myers provides training in SQL Server BI and Power BI

All training courses in the Microsoft BI Academy program have been specifically designed to enable students to quickly commence developing and maintaining state-of-the-art integrated Business Intelligence (BI) solutions developed by using Microsoft products.

Training courses can be delivered remotely, or in-person

[Links to courses]

Thank You