Dynamics 365 FastTrack Tech Talk

Power Platform integration with Dynamics 365 Finance and Supply Chain Management (CDS Virtual Entities)

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About this Tech Talk

Objectives of this Tech Talk
✓ Basic understanding of CDS VirtualEntity concept
✓ Enabling VirtualEntities for Finance and Supply Chain Management apps
✓ Overview and architecture
✓ Demo
✓ Understanding implementation considerations

What it doesn’t cover
• Power Apps and Power Portal development
• Deep dive into Application Lifecycle Management (ALM)
• Troubleshooting
• Licensing
Contents

01  Why Virtual entities
02  Potential scenarios
03  Architecture
04  Authorization and Authentication
05  Installation and configuration
06  Demo
07  Performance considerations
08  Implementation considerations
09  Q&A
Context – Previous state - Power Platform & Finance and Supply Chain Management

Analyze
Power BI

Know
Power Apps

Automate
CDS

Learn
AI Builder

Act

Dual Write
Data Integrator
Operations Connector
Virtual entities for Finance and Supply Chain Management apps

- Finance and Supply Chain Management is now available as virtual data source in Common Data Service
- Supports full CRUD operations from Common Data Service and Microsoft Power Platform
- All Finance and Supply Chain Management ‘public’ entities are natively available in Common Data Service as virtual entities
- Allowing synchronous execution of Finance and Supply Chain Management business logic
- Consistent behavior across Power Platform & Finance and Supply Chain Management
- Doesn’t copy or store data into Common Data Service
- Dual-write continues to address specific scenarios where data needs to be physically copied between apps.
Set the stage for Microsoft Power Platform

- Finance and Supply Chain Management Entities available in Common Data Service
- No code/low code approach
- Leverage full potential of Power Platform
- Bring feature parity for Finance and Operations apps
Uncover Potential scenarios

**Finance and Supply Chain Management Users**
- Create a Power App to make data entry more simplified
- Enhance app experiences with barcode scanning and picture taking on a device
- Create various portal experience

**CDS Users**
- Access Finance and Supply Chain Management data with-in CDS
- Act on Finance and Supply Chain Management data with-in CDS
- For example, View asset maintenance information or fixed asset details etc.
Supported version

- Feature is GA since August 2020

- *Finance and Supply Chain Management App*: 10.0.12 or later

- *Common Data Service*: Service update 189 or later
Architecture

Common Data Service
- Virtual Entities
  - CRUD
  - Virtual entities plug in
- Native Entities
  - CRUD
- Database
- 6 Messages:
  - Create
  - Update
  - Delete
  - Retrieve
  - RetrieveMultiple
  - PerformAction
- Power Apps / Power Automate / UCI / Odata / etc
- Translates entity names to Finance and Operations public entity/field names based on metadata, also translates some well-known concepts like Company into native Common Data Service references

Finance and Supply Chain Management
- Entities
- Tables
- Database
- OData API
- Web API
- SSL/TLS 1.2
- JSON web service
- CDSVirtualEntityAdapterService
  - Custom WebAPI translates Common Data Service QueryExpression into QueryBuildDataSource, common buffer, etc, and back into EntityCollection/EntityReference
- Standard IsPublic=Yes entities, persistence goes through standard persistence stack, meaning methods on the backing tables, eventually to SQL
- CDSVirtualEntityAdapterService Custom WebAPI translates Common Data Service QueryExpression into QueryBuildDataSource, common buffer, etc, and back into EntityCollection/EntityReference
- Translates entity names to Finance and Operations public entity/field names based on metadata, also translates some well-known concepts like Company into native Common Data Service references
Authorization & Authentication

Power Apps/Power Portal

Authenticated Access
- CDS Configurations – Power Portal only*
  - Contact and D365 User mapping in msdyn_externalportalusermapping
- D365 Configurations
  - Security role assignment in D365
  - No System Administrator role
  - No Security Administrator role

Power Portal

Anonymous Access
- CDS Configurations
  - None
- D365 Configurations
  - Create “Anonymous portal access user id”
  - Assign role to “Anonymous portal access user id”
  - No System Administrator role
  - No Security Administrator role
Anonymous access from Power Apps portals

• A user in Finance and Supply Chain Management must be designated as the user who is used for anonymous access

• This designation is configured in the **Anonymous portal access user ID**

• The designated user can then be assigned to duties and security roles to control access
Installation

- **Finance and Supply Chain Management App:** 10.0.12 or later

- **Common Data Service:** Service update 189 or later

- Install Finance and Operations Virtual Entity Solution from admin center
  - Dynamics365Company
  - MicrosoftOperationsVESupport
  - MicrosoftOperationsERPcatalog
  - MicrosoftOperationsERPVE
  - MicrosoftOperationsVEAnchor
Connect the apps

- Finance and Operations is now available as virtual data source in Common Data Service
- Setup Azure Active Directory (AAD) application
  - The AAD application must be created on the same tenant as Finance and Operations.
  - Register this application in Finance and Operations
- Setup service user e.g. ‘cdsintegration’ in Finance and Operations
- Setup Finance and Operations Virtual Entity data-source
Demo

Virtual Entities Configurations
Company

- Entity can be bound to a company or it can be global
- Relationship to cdm_company entity in CDS
- Lookup field is named as Company
## Entity modeling – Entity Fields

Each entity field is created based on Finance and Supply Chain Management data entity.

<table>
<thead>
<tr>
<th>Data type in Finance and Supply Chain Management</th>
<th>Modeled data type in CDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real</td>
<td>Decimal (consider mismatch in precision and scale between two data types)</td>
</tr>
<tr>
<td>Long</td>
<td>Decimal (where the precision equals 0)</td>
</tr>
<tr>
<td>String (non-memo)</td>
<td>String – single line of text</td>
</tr>
<tr>
<td>String (memo)</td>
<td>String – multiple lines of text</td>
</tr>
<tr>
<td>UtcDateTime</td>
<td>DateTime (DateTimeFormat.DateAndTime, DateTimeBehavior.TimeZoneIndependent)</td>
</tr>
<tr>
<td>Date</td>
<td>DateTime (DateTimeFormat.DateOnly, DateTimeBehavior.TimeZoneIndependent)</td>
</tr>
<tr>
<td>ENUM</td>
<td>PickList</td>
</tr>
</tbody>
</table>
Entity modeling – Entity Fields

Following data types in Finance and Supply Chain Management are not supported in CDS

- AnyType
- BLOB
- Class
- Container
- Record
- Time
- UserType
- VargArg
- Void (Void return types on OData actions are supported.)
**Entity modeling – EntityKey/PrimaryKey**

<table>
<thead>
<tr>
<th>Finance and Supply Chain Management</th>
<th>CDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>EntityKey can have one or more fields</td>
<td>Always globally unique identified (guid)</td>
</tr>
<tr>
<td>EntityKey can have fields of various data types</td>
<td></td>
</tr>
</tbody>
</table>

Primary key of a virtual entity in CDS = DataEntityId (first 4 bytes)+RecId (last 8 bytes)
Entity modeling – Primary field

<table>
<thead>
<tr>
<th>Finance and Supply Chain Management</th>
<th>CDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entity key can have multiple fields of various data types</td>
<td>Each entity must have a single string primary field</td>
</tr>
</tbody>
</table>

Primary field of a virtual entity in CDS = strfmt of entitykey1|strfmt of entitykey2|strfmt of entitykey3… (max length of 255 characters)
Relations

- Relations in Finance and Supply Chain Management are modeled as one-to-many (1:n) or many-to-one (n:1)

- Schema name of relationship in CDS = \texttt{mserp\_FK\_<source entity name>\_<relation name>}

- This naming convention has a maximum string length of 120 characters
Relations

- Native entity-to-native entity relationships
  - Standard CDS concept
  - Relationships are resolved by using the GUID of the related entity

- Virtual entity-to-virtual entity relationships
  - The relationships between two Finance and Supply Chain Management virtual entities are driven by the relation metadata in the Finance and Supply Chain Management entities
    - These relations are generated as relationships in CDS when the virtual entity is generated.
  - In the background, uses GUID i.e. primary key (generated by entityid+recid)
Relations

- Virtual entity–to–native entity relationship & Native entity–to–virtual entity relationships

- Consider an example of showing Free Text Invoice from Finance and Supply Chain Management for Account e.g. ‘A’ in CDS

- Define such relationship on data entity in X++
Scenario

Model driven app and Virtual Entities

Free Text Invoices

- Authenticated Access
- Create/Update
- Delete a line
- Post a Free Text Invoice – Dynamics 365 Finance & Supply Chain Management/Odata actions
Demo

Model driven app and Virtual Entities
Scenario

Power Portal and Virtual Entities

View Tracking number

• Anonymous Access
• Order number
Demo

Power Portal and Virtual Entities
Scenario

Power Portal and Virtual Entities

Review Sales order invoices

- Authenticated Access
- Order number/Invoice number
Demo

Power Portal and Virtual Entities
Debugging

- CDSVirtualEntityAdapter - is the first class that is called and it only serialization/deserialization the payload

- CDSVirtualEntityController – adapter class delegates to controller class to do actual queries
Performance of Virtual Entities

Key performance considerations when using Virtual Entities:

- **Network latency** – The query results are retrieved from Dynamics 365 Finance and Supply Chain Management & displayed in Common Data Service; therefore it is recommended to deploy the environments together.

- **Query execution time** – The query will need to be executed on the Dynamics 365 Finance and Supply Chain Management environment therefore ensure it is optimal.

- **Query execution time for related entities** – Entities that are related to the main Virtual Entity will also be executed and thus their execution time should also be considered.

- **All queries from Virtual Entity are paged, with a default page size of 50 records. With proper indexing, this means that the response time of the query should not be impacted by how much data exists in the table.**
Implementation Considerations

Instance strategy – Supporting 1-1 Link between Finance and Supply Chain Management apps & Common Data Service

DO:
• Recommendation is to have Finance and Supply Chain Management apps & Common Data Service instance in the same tenant.
• Reduce the latency between Finance and Supply Chain Management apps & Common Data Service instance, preferably host them in the same Azure region.
• Finance and Supply Chain Management apps instance can only be linked to a single Common Data Service instance, and vice versa.
• It can work with Common Data Service instance without “Dynamics 365 app”

DON’T:
• Host Finance and Supply Chain Management apps & Common Data Service instances in different regions with higher latencies.
• Link one Common Data Service instance to multiple Finance and Supply Chain Management apps instances.
Implementation Considerations

Entity modelling

DO:
• Use Virtual Entity where your business logic resides in F&SCM
• Use Virtual Entity when you plan to leverage F&SCM business logic in a Power App or Power Automate
• Analyse data types parity
• Define relationship with dependent data entity in Finance and Supply Chain Management app
• Define relationship in between CDS native and CDS virtual entity in Finance and Supply Chain Management app with X++ extensions

DON’T:
• Relate one VE to another VE in the CDS
• Use VE as data copy mechanism
Implementation Considerations

Understand the performance considerations and conduct performance testing

DO:
• Understand the factors that can impact the performance of virtual entities
• Conduct appropriate performance testing and optimize as needed

DON’T:
• Ignore performance until after Go-Live
# Implementation Considerations

## The comparison – Choose the right technology

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Dual-write</th>
<th>F&amp;SCM Virtual entities</th>
<th>Data Integrator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scenario</td>
<td>Near real-time</td>
<td>Real-time CRUD</td>
<td>Scheduled recurrence</td>
</tr>
<tr>
<td>Method</td>
<td>Synchronous</td>
<td>Not applicable</td>
<td>Asynchronous</td>
</tr>
<tr>
<td>Direction</td>
<td>Bi-directional</td>
<td>Not applicable</td>
<td>Uni-directional</td>
</tr>
<tr>
<td>Data</td>
<td>Data is duplicated</td>
<td>Data remains in source</td>
<td>Data is duplicated</td>
</tr>
<tr>
<td>Logic</td>
<td>Auto business logic execution</td>
<td>Auto business logic execution Can call Odata actions</td>
<td>Auto business logic execution</td>
</tr>
<tr>
<td>Offline scenario</td>
<td>Catch-up capability</td>
<td>Not applicable</td>
<td>Supports</td>
</tr>
</tbody>
</table>
Thank you.
Resources

Microsoft Power Platform integration with Finance and Operations
https://docs.microsoft.com/en-us/dynamics365/fin-ops-core/dev-itpro/power-platform/overview

Entity modelling
https://docs.microsoft.com/en-us/dynamics365/fin-ops-core/dev-itpro/power-platform/entity-modeling

Finance and Operations virtual entities FAQ
https://docs.microsoft.com/en-us/dynamics365/fin-ops-core/dev-itpro/power-platform/faq

Virtual Entity Solution on AppSource