



# Pathway Data Lake Integration

## Customer Administrator Guide

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## Purpose of the document

The purpose of this document is to provide a comprehensive overview of the Pathway Data Lake Integration which facilitates the data syncing of nominated Pathway tables (*see Appendix for the list*) into the Infor Data Fabric's Data Lake. This integration is comprised of two applications:

- **Initial Ingestion Application:** Responsible for the initial data synchronisation of nominated Pathway database tables to the data lake. This also prepares the tables for delta processing.
- **Incremental Ingestion Service Application:** Responsible for the ongoing data synchronisation of new or updated Pathway data into the data lake.

## Intended Audience

### Customer Administrator

This document intends to help Council administrators understand the architecture of the Pathway Data Lake Integration, gain insight about its workflow, and the mechanisms that ensure data integrity throughout the workflow. It also details when and how exceptions are captured and routed for notification to the appropriate contacts.

## **Solution Overview**

### **Pathway Database Accessibility**

The Pathway Data Lake Integration enables SaaS Pathway customers (Single-Tenant) with a Infor OS Multi-Tenant (MT) license to securely synchronize their data to the data lake export and analysis. While the data lake itself is not a reporting tool, it can serve as a source of truth, and when curated and semantically modelled, it will enable visualizations, advanced analytics, and reporting needs for customers.

The synced data can be viewed or extracted directly via the Data Fabric's tools or through the API Gateway's Data Lake APIs. In addition, the same can be achieved with the Infor OS Add-in for Excel for a more familiar data management tool.

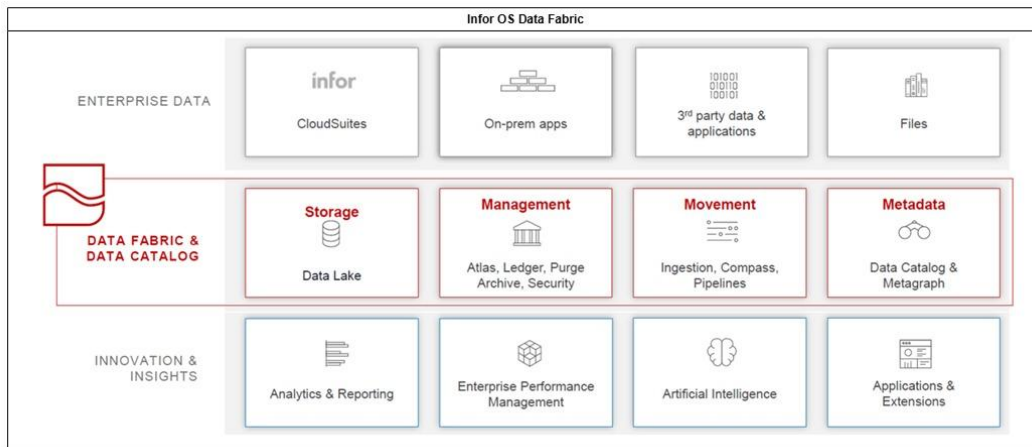
### **Timeliness of Reporting Data**

The Data Lake allows Pathway to eliminate the need for an exposed customer-facing database that must be purged and regenerated daily—an approach that restricts reporting to the previous day's data. With the Incremental Ingestion process in place, once the reporting layer is established, data can be refreshed as frequently as every 15 minutes. This enables near-real-time reporting and supports quicker, more informed business decisions.

### **Interoperability to Different Reporting Layers**

Synchronizing Pathway tables into the Data Lake enables customers to continue using their preferred reporting tools—such as Tableau and Microsoft Office Power Tools including PowerQuery, PowerPivot, and PowerBI—for analytics and visualization. By extracting Data Lake objects through APIs, the user interface, or complementary tools like the Infor OS Excel Add-in, customers can build and enhance their reporting layers directly within the tools and applications they already rely on.

# Infor OS Data Fabric Overview



Infor OS Platform supports several applications including Data Fabric which provides councils with an immutable, long-term storage platform and allows users to query, find trends, and extract data using the Data Lake's Compass SQL platform. To make this happen, Data Fabric has different components which are as follows:

## Storage

- Data Lake – Infor’s central big data storage repository leveraging object storage architecture to provide long-term persistence of data in its raw, original format.

## Management

- Atlas – Data Object Explorer UI experience for viewing and managing data lake objects
- Compass – A suite of tools that provide data consumers with interfaces for connecting to and processing American National Standards Institute Structured Query Language (ANSI SQL) queries against data objects stored within the Data Lake.
- Purge – Removing objects/payloads from the Data Lake
- Archive – To defray costs associated with database storage, Infor CloudSuites can elect to lift & shift transactional data to Data Lake to archive them. Data objects consigned to this zone are afforded additional protection to prevent accidental removal.
- Security – Allows creation of profiles and fine tuning of user access rights up to the table level

## Movement

- Ingestion – the process of data ingress either from an active (applications that takes the initiative to publish data) or passive (on-prem customers, third-party, or legacy applications) producer through database connectors (AnySQL or stored procedure), Intelligent Open Network (ION) Connector, ION API Gateway, ION Infor Messaging Service (IMS), ION Inbox/Outbox (IOBox), or File Transfer Protocol (FTP). Ingestion can be made through the following methods:
  - Batch Ingestion - is a RESTful API available in the Infor Data Fabric suite within API Gateway. This service enables applications to write data objects directly to storage. It allows applications to produce larger payload sizes that can otherwise exceed throughput limitations in ION.
  - Streaming Ingestion - a Data Fabric ingestion method to continuously collect and publish data events to Data Fabric in real time. When you send data events with the Streaming Ingestion method, the micro-batching of data is automatically performed in Data Fabric and data is stored in Data Lake.

## Metadata

- Data Catalog – The Data Catalog stores metadata about data objects that are used within the organization.
- Metagraph – Free-form modeling tool used to describe relationships of data objects stored in Data Lake.

From the perspective of the Pathway Data Lake Integration, Infor utilize the *Batch Ingestion* method that allows direct data synchronisation of large data objects (files) into the data lake. Batch Ingestion is the recommended method for transferring large files or bulk data.

The Infor OS Data Lake uses *Object Storage Architecture* to provide long-term persistence of data in its raw, original format. Any data *Object Type* can be stored in the Data Lake, including data files such as JSON, XML, Data Source View (DSV), and binary objects such as images, MS Office®, and Portable Document Format (PDF) documents. This does not imply that all types of data can be queried using SQL-like commands - only Newline Delimited JSON (NDJSON) and DSV can be queried in this manner. This Data Lake architecture secures data objects with AES-256 bit encryption. Furthermore, data in-transit is secured by TLS version 1.2.

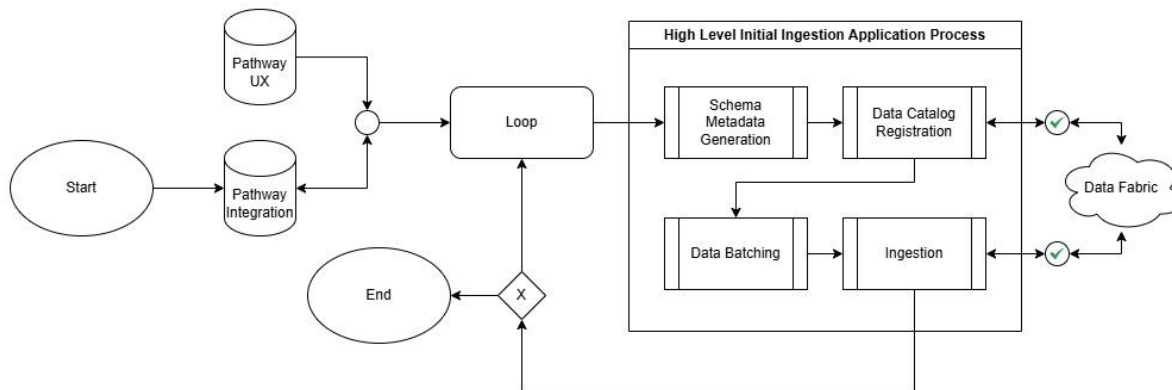
Data lake extraction refers to retrieving or receiving data from the Data Lake for use in analytics, integrations, machine learning, or other applications. There are several methods and tools available for extracting data, each suited to different scenarios and requirements. Data formats supported are DSV (Delimited Separated Values) and Newline-delimited JSON (i.e. a flat structure, except for language-dependent fields).

Data Fabric components such as Atlas and Compass, APIs, Cloud Suite applications and 3rd party applications, tools, and services can synchronize transactional data and master data from the data lake for subsequent processing and query analysis.

## Data Lake Integration Service Application Overview

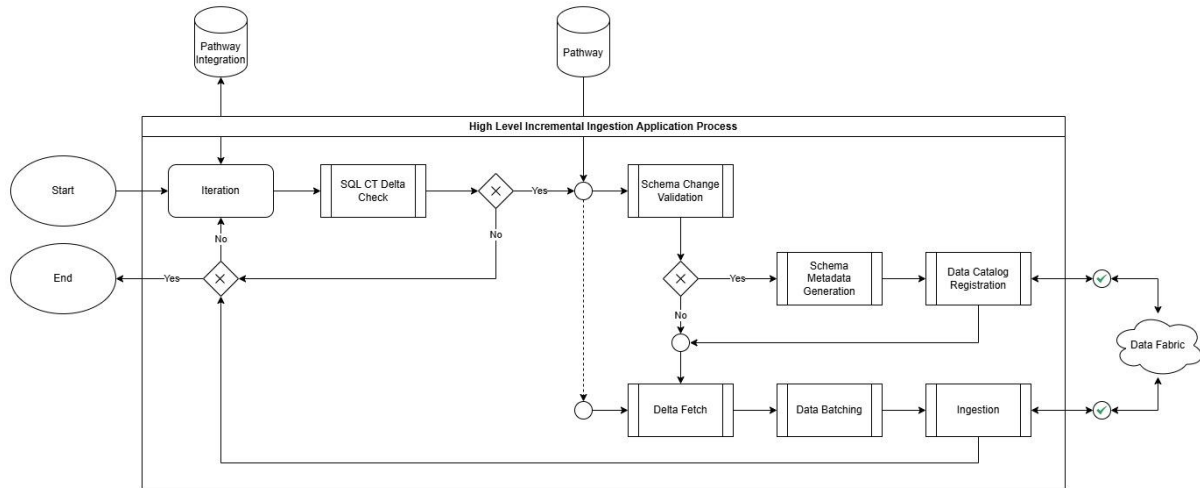
The Pathway Data Lake Integration is made up of two applications: first is the Initial Ingestion Application that provisions Data Lake to the Pathway nominated tables and second is the Incremental Ingestion Service Application that syncs deltas into the data lake. Both utilize the Infor OS Data Fabric Batch Ingestion API to ingest objects (tables and records) to the data lake.

It is strongly advised not to make any changes in the data lake (neither Data Fabric Object Schema nor Data Fabric Data Object) outside the Pathway Data Lake Integration applications, as doing so may disrupt the Data Fabric and application mechanisms that ensure Pathway tables are correctly synced into the data lake.



### Initial Ingestion Application

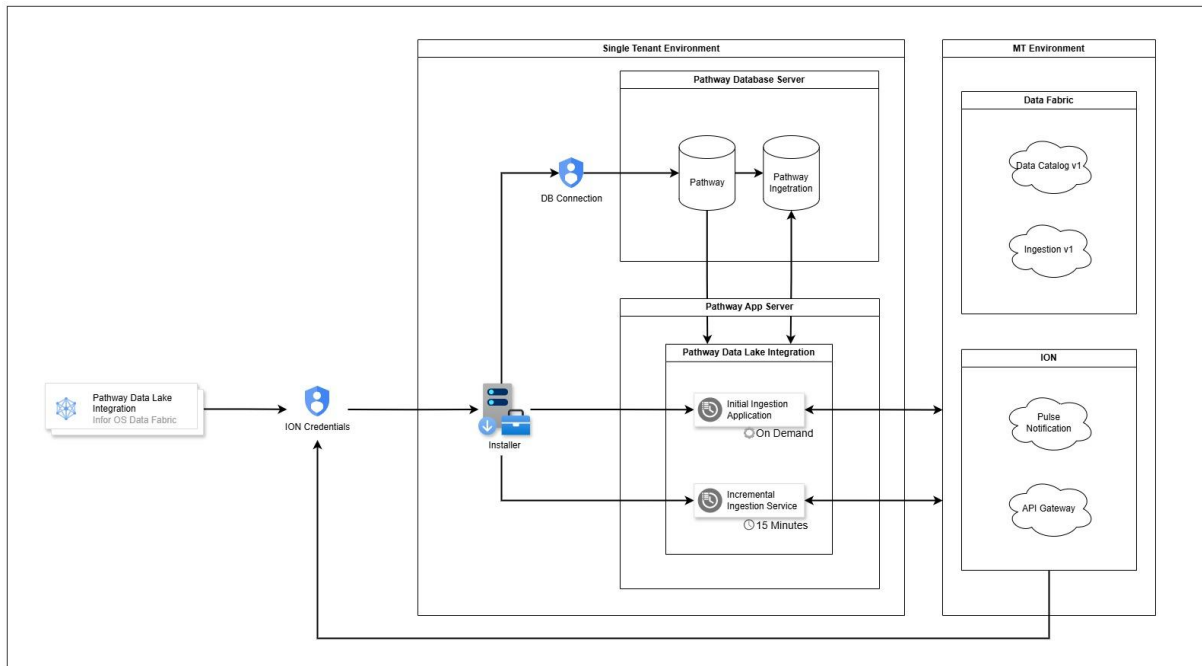
This application syncs all nominated Pathway tables into the Infor Data Lake via an 'on demand' single execution (i.e. all Pathway tables in one go). It is *strongly recommended* to execute the service on the weekend to avoid overlapping with business hours. The application implements a mechanism that processes the provisioning in memory to avoid file management efforts and disk space consumption. It also sections the table into portions of 100MB so that the memory consumption of the service will be controlled and is ingested in chunks of 50MB as recommended by the Infor Data Fabric team. As each table is provisioned, the application enables SQL Change Tracking on the table level to enable tracking of delta updates that will be subsequently managed by the Incremental Ingestion Service Application.



## Incremental Ingestion Service Application

This service syncs updates from all the nominated tables that are provisioned within Infor's Data Lake through the Initial Ingestion service. The service runs every *15 minutes indefinitely* and checks for updates - either schema changes or from the monitoring of SQL Change Tracking. Updates are tracked via the SQL CT Change Number which corresponds to the Version Number of the change for a particular record in the Data Lake. The service also limits itself with a maximum size of 1GB sync limit per table per run to facilitate activities from multiple tables on a single run.

## Deployment Overview



Once a customer informs their Account Manager of their intent to have Data Fabric provisioned for their environment and confirms that they want provisioning to proceed—or if the customer is already in-flight with their SaaS journey and the Account Manager has confirmed the customer’s approval to proceed with Data Fabric provisioning—the Account Manager will then notify the Pathway Services Team to move forward with the deployment.

The following enumerates the requirements prior to the deployment of the application:

### Pre-Deployment Requirements

1. Existing Pathway Single-Tenant (ST) SaaS customer which includes the Infor OS Multi-Tenant (MT) Essentials license.
2. Awareness of Data Fabric updates schedule. To avoid provisioning and processing disruptions, activities should be planned to take place outside of the scheduled Data Fabric updates.

### Pathway Application Requirement

1. Pathway minimum version requirement is 2026.01.

### Pathway Database Requirement

1. SQL Change Tracking (CT) should be exclusively for the Pathway Data Lake Integration purpose only to avoid overlapping the business rules. This means that the enablement of the feature should only be triggered by the installation process of the application.

## Post-Deployment Instructions


Once the Pathway Data Lake Integration was successfully deployed. The following will guide the customers on the next steps before consuming their data in the data lake:

1. Initial bulk data synchronisation to the data lake must only be through the Initial Load to ensure proper synchronisation and table preparation for the Incremental Load process
2. Updates of the synchronized Pathway tables in the data lake must only be through the Incremental Load to ensure accuracy of the data.
  - a. Validations are only done from the Pathway database to the data lake; hence, synchronizing external updates (e.g. through API or Excel Plug-in) will be difficult to detect and may require purging of the affected table in the data lake and re-ingesting the whole table.
3. The customer is *strongly encouraged* to create an Email Group in Infor OS to enable receiving Incremental Ingestion (delta process) issue notifications. These notifications will be sent out by the application through the *PathwayIntegrationGroup* on the Infor OS Inbox application, and their respective email client should an issue occur.
  - a. The Email Group is recommended to be populated with relevant Point-of-Contacts to inform them about the occurrence of the issue and make it their actionable item.
  - b. Email Group members must have at least *either* of the following user Security Roles to have access to the Infor OS Inbox Application:
    - MingleIONEnabled - Users with this role have access to Ming.le Enterprise.
    - MingleEnterprise - Users with this role should be a subset of the users with Ming.le Enterprise role and have access to the ION features.

The steps below show how to assign the necessary Security Role to the user and create the Email Group in the Infor OS:

### Assign User Security Role:

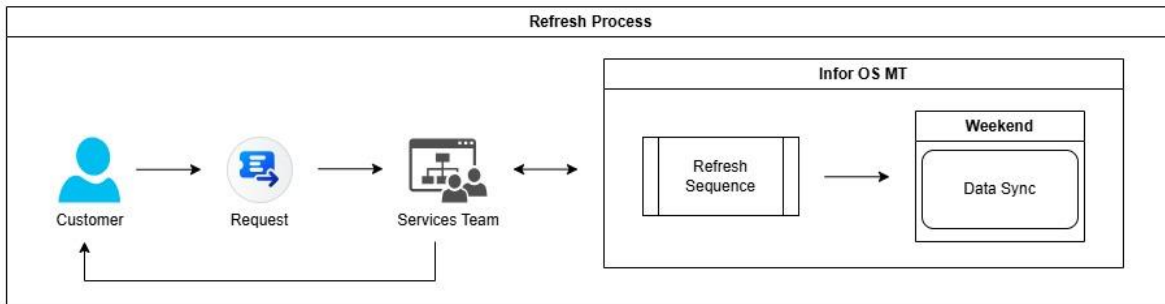
*An Infor OS Administrator with the necessary access (if missing) rights will be able to grant the access*

1. Log in to the Infor OS
2. Open Security
3. On the left panel, click on *Manage > Users*.
4. Search for the user on the search box at the upper right side of the screen
5. Click the  User Details to open the user's profile
6. Then click on the Security Roles tab
7. Click the "+" icon to Add New Item on the role list
8. Search for the MingleIONEnabled or MingleEnterprise role
9. Click on the role's checkbox, then click "+ Add and Close"
10. Click on the Save Icon to complete the process.

### Creation of the Email Group for Infor Inbox Notification:

11. Log in to the Infor OS
12. Open Security
13. On the left panel, click on *Manage > Groups*.
14. Click on the "+" icon to *Add New Item*.
15. Complete the Name: ***PathwayIntegrationGroup*** (use this exact name)
16. And Description: ***Email Group supporting the Pathway's Data Integration Service Notification.***
17. Finally, click the Save icon to complete the creation of the Email Group

## Environment Refresh Process



For cases that an environment refresh is needed, the customer will need to coordinate with the Pathway Services Team to initiate the process. The following must be defined for the request to ensure a smooth process of delivery:

1. Reason for the refresh request
2. Environment that the refresh is requested for

The Services Team will facilitate the request, and it should be noted that the initial data synchronization of Pathway tables must be performed over a weekend. This ensures the process does not compete for environment resources and impact the performance of the Pathway application during standard operating hours.

## Data Lake Integration Outcomes

The following enumerates the output of the Pathway Data Lake Integration and the transformations it implemented to align with the Data Fabric adoption requirements and maintain standardized content for the Pathway's data lake tables

1. The synced Pathway table's name into the data lake will be appended with the prefix `PWY_Pth_[tableName]` as compliance with the Data Fabric requirement for adoption. "PWY" corresponds to the Product Name and "Pth" corresponds to the Pathway database (to indicate difference from Infomart).
2. The integration process trims off leading and trailing whitespaces in the data and replaces blank (not nulled) values and changes it into NULL.
3. Columns `PI_IsDeleted` and `PI_VariationNumber` are programmatically added to each table upon sync to the data lake in compliance with the Data Fabric adoption. These can in turn be tagged to existing columns should their counterpart exist.
  - o `PI_IsDeleted` – pertains to the marking for deletion of a record while the `PI_VariationNumber` pertains to the version control number of a record.
  - o The `PI_VariationNumber` is generated by the SQL CT mechanism that produces the Change Number. Because this Change Number is an auto-incrementing sequence shared across all nominated tables, gaps in record version numbers are expected. The latest version of a record is identified by the highest `PI_VariationNumber` value and is used for the data sync.
4. Date, Time, and Timestamps are formatted according to Data Fabric adoption requirement with `YYYY-MM-DD`, `hh:mm:ssZ`, and `YYYY-MM-DDThh:mm:ssZ` respectively and does not apply any offset calculation to UTC but is only a format conversion.
5. The Data Lake integration does not have any form of localization handling and data will be replicated on an as-is basis apart from the trimming and date-time transformation.
6. Duplicate Pathway table names are restricted in Data Fabric adoption, just as SQL database management does not allow identical names within the same schema. The restrictions from Uniface for table names are also considered for this scenario.
7. Delta updates will be managed by the Incremental Ingestion Service Application, and it will be picking up the latest UPDATE recorded at the 15<sup>th</sup>-minute mark that the ingestion ran. INSERTs will be reflected as is to the data lake, however DELETEs will be reflected by flagging the Primary Key with an `PI_IsDeleted` mark.
8. The Pathway table column order will be aligned based on the Initial Ingestion provisioning and any additional columns introduced after the provisioning process will be appended at the end of the table.

## Data Fabric Data Object Management

Upon data sync, the data objects can be viewed and managed through the different Data Fabric components, APIs, and extensions:

### Data Fabric Atlas

Atlas is the user interface to explore the data that exists in Data Lake. Also, specific actions can be done to manage the data, such as marking an object as corrupt (to suppress usage) or deleting an object. The latter can also be done in bulk through a Purge page.

Atlas can be accessed through Infor OS > Data Fabric > Data Lake > Atlas. For more information, please visit the Infor Documentation [https://docs.infor.com/inforos/2025.x/en-us/useradminlib\\_cloud/default.html?helpcontent=atafabrug/ylr1631199523567.html](https://docs.infor.com/inforos/2025.x/en-us/useradminlib_cloud/default.html?helpcontent=atafabrug/ylr1631199523567.html)

### Data Fabric Purge & Purge API

The Data Fabric Purge component allows removal of data objects or payloads from the data lake within the Infor Data Fabric platform. This is a part of data management and processing, aimed at maintaining the efficiency and accuracy of data storage by eliminating outdated or unnecessary data. Additional steps are required if the purge was initiated via API to synchronize the Data Fabric Compass with the action.

The Purge component can be accessed through Infor OS > Data Fabric > Data Lake > Purge while the documentation can be found in Infor OS > API Gateway > Infor Data Fabric > DATAFABRIC/datalake/v2 for the API. For more information, please visit Infor Documentation [https://docs.infor.com/inforos/2025.x/en-us/useradminlib\\_cloud/default.html?helpcontent=ioncedg\\_cloud\\_osm/wkx1525697361489.html](https://docs.infor.com/inforos/2025.x/en-us/useradminlib_cloud/default.html?helpcontent=ioncedg_cloud_osm/wkx1525697361489.html)

### Data Fabric Metagraph & Metagraph API

Metagraph is a free-form modeling canvas and tool to describe the relationships of Data Objects (Tables) stored in Data Lake. It is an Infor OS Data Fabric capability available for multi-tenant environments.

- Data Relationship Modeling - Metagraph uses the object's registered metadata that is stored within the Data Catalog to define the model relationships.
- Publish Data Lake Views - The view is stored in Data Lake, and its corresponding metadata is registered in the Data Catalog. After creation, the view can be queried using Compass UI.

The Metagraph component of Data Fabric is found in Infor OS > Data Fabric > Metagraphs and Metagraph API documentation is found on Infor OS > API Gateway > Infor Data Fabric > DATAFABRIC/metagraph/v1. For more information, please visit the Infor Documentation [https://docs.infor.com/inforos/2025.x/en-us/useradminlib\\_cloud/default.html?helpcontent=atafabrug/mac1653301114230.html](https://docs.infor.com/inforos/2025.x/en-us/useradminlib_cloud/default.html?helpcontent=atafabrug/mac1653301114230.html)

## Data Fabric Compass & Compass API

Data Lake Services is the overarching term for the set of services used to enable querying of the Data Lake. Data Lake Services consist of methods to reformat the data to make efficient querying possible, and the actual handling of the query. From the user's perspective, the querying capabilities are called Compass. Compass provides:

- A user interface in Data Fabric, providing a query editor that can be used for checking the Data Lake contents through ad-hoc queries and for trying out queries.
- An API which can be used directly in the cloud or through API Gateway from elsewhere
- A JDBC driver to be used in Birst on other analytics products.

Compass can be found in the Infor OS > Data Fabric > Compass for the querying interface and the Compass API documentation can be found through navigating in Infor OS > API Gateway > Infor Data Fabric > DATAFABRIC/Compass/v2. For more information, please visit the Infor Documentation [https://docs.infor.com/inforos/2025.x/en-us/useradminlib\\_cloud/default.html?helpcontent=datafabrug/cmd1639350812542.html](https://docs.infor.com/inforos/2025.x/en-us/useradminlib_cloud/default.html?helpcontent=datafabrug/cmd1639350812542.html)

## Data Fabric Data Lake API

The Data Lake API enables ingestion and data management for the Data Objects ingested or to be ingested into the data lake. The documentation can be found in Infor OS > API Gateway > Infor Data Fabric > DATAFABRIC/datalake/v2. For more information, please visit the Infor Documentation [https://docs.infor.com/inforos/2025.x/en-us/useradminlib\\_cloud/default.html?helpcontent=ioncedg\\_cloud\\_osm/ume1516870178793.html&hl=data%2Cfabric%2Cdata%2Clake%2Capi](https://docs.infor.com/inforos/2025.x/en-us/useradminlib_cloud/default.html?helpcontent=ioncedg_cloud_osm/ume1516870178793.html&hl=data%2Cfabric%2Cdata%2Clake%2Capi)

## Infor OS Add-in for Excel Plugin

The Excel plugin is a product of Infor Labs which enables connectivity with Microsoft Excel directly to an Infor OS Environment. It allows users to securely access and interact with a tenant's data without leaving MS Excel, leveraging the familiar spreadsheet interface for business operations. Below are the capabilities of the plugin:

- **Retrieve Data from Data Lake** - Users can retrieve the data from Data Lake based on the query entered by them. The API used is Data Fabric v2 Compass query API.

This plugin can be downloaded through Microsoft Marketplace with Product Name: **Infor OS Add-In for Excel** by **Infor, US LLC**.

**Note:** Data can be manipulated from excel through the Infor OS Add-in and changes can be synced to the data lake. However, *data syncing from excel is **not recommended** as it will bypass the mechanisms of the Pathway Data Lake Integration* which may result in data sync issues between Pathway Database or record duplicates in the data lake. This option should only be used to retrieve data from data lake.

## Scope & Delimitations

The following defines the scope of the Pathway Data Lake Integration based on the Data Fabric adoption requirements and the mechanisms included within the application. This enumeration complements the *Data Lake Integration Service Requirements* and *Pathway Database Table Requirements*:

### Maximum Deployment to 5 Machines

In accordance with the Data Fabric adoption recommendation, to allow equal access to the API for all the adopters, there should be no more than five concurrent connections to the API. This is only a soft limit however, and connections will not be rejected automatically by our application. This limit is in place to avoid Denial-of-Service attacks potentially caused establishing multiple connections at the same time.

### Selection of Nominated Tables

The total number of nominated tables identified for data lake provisioning totals to **2059** tables as of April 2026, however this number will rise in the future.

To see the complete list of the nominated tables, please refer to the Appendix section of the documentation.

### Omitted Pathway Table Columns Flagged for Security

The following lists the three (3) Table Names and six (6) Columns that are flagged for security purposes and will not be replicated to the data lake:

Table Name	Column Name	Column Description
CNADSYS	APDMSERVER	APDM FTP Server
CNADSYS	APDMPASSWD	E-mail Account Password
CSYSRVR	SERVERNAME	Server Name
CSYSRVR	SERVERNMKY	Server Name Search Key
CRCCCVS	HOSTADDRESS	Host Address
CRCCCVS	CCVSPWD	CCVS Password

The flagged column of the table will be the only information that will not be processed for replication and not the whole table itself.

### Pathway Overflow Tables

This initial version of integration did not scope the Pathway Overflow Tables as this requires additional requirements for data lake syncing. This includes but not limited to merging the overflow tables and the main table into one Data Object when data is synced to the data lake, as well as management in the delta process.

### Pathway Database SQL Change Tracking Retention

The SQL Change Tracking feature requires a retention mechanism where a period must be defined to flag monitoring information that is considered “expired”. The Automatic Cleanup will proceed with the sanitation which for the integration is set to 7 days. Monitoring records greater than the set period will be permanently deleted.

## Troubleshooting Instructions

The following lists the scenarios and expected outcomes should an issue or interruption occur within the runtime of either the Initial Ingestion or Incremental Ingestion Service.

### Initial Load Application Troubleshooting

The Initial Load Application will be executed and monitored by the Deployment Administrator and will be working internally to coordinate and fix any issues encountered within the provisioning period. Upon completion, a successful or failed deployment notice will be communicated to the customer to determine subsequent actions.

### Incremental Load Service Application Troubleshooting

After the successful provisioning of Pathway tables into the data lake, the Incremental Load Service Application will then process delta synchronisation to the data lake. The process will send a notification to the Infor OS Inbox application and to the customer's email client should there be an issue in its runtime. The following lists the possible scenarios where an Incremental Ingestion Notification will be sent out:

Issue Notification Context	Description
API Error 401	The application encountered an Unauthorized Error when calling Data Fabric endpoints. This means that the access token has expired. This notification will be sent out during the following activities: <ol style="list-style-type: none"><li>1. Metadata Registration</li><li>2. Data Object Ingestion</li></ol>
API Error 403	The application encountered a Forbidden Error. This means that the permission to access Data Fabric resources is not valid. This notification will be sent out during the following activities: <ol style="list-style-type: none"><li>1. Metadata Registration</li><li>2. Data Object Ingestion</li></ol>
Application Unhandled Exception	This notification indicates that an unhandled exception has occurred within the service runtime. The service has stopped and will resume during the next scheduled run.
Pathway Database Connectivity	The application has encountered an issue regarding the Pathway database connectivity and was not able to establish database connection.
Data Fabric Endpoint Connectivity	The application has encountered an issue regarding the Data Fabric endpoint connectivity, either from the Data Catalog or Ingestion endpoint and was not able to establish connection. This notification originates from the checking that is done for every table that is to be processed

For the above notifications, a support ticket should be created to investigate the issue; otherwise, the service will continue sending notifications until the problem is resolved. Please raise support ticket with the following details:

- Issue description
- Email notification body (content)
- Timestamp

Relevant Support Teams:

- Pathway Support Team
- Infor OS Support Team
- Pathway ST CloudOps Team

The service also has notifications that are sent only to inform and may optionally be used as a reference should clarifications need to be made:

Notification Context	Description
Circuit Breaker Open State Report	The application encountered failure in syncing the data even after multiple retries. This may be due to Data Fabric endpoint maintenance or downtime. The service will automatically perform wait and resume process for the scenario up until the connectivity is restored. The service will also return to its normal process once connectivity is restored.
Invalid Tables Report	List Pathway tables that failed the Data Lake provisioning requirement. These notifications will be sent out due to the following triggers: <ol style="list-style-type: none"><li>1. API Error (401 or 403)</li><li>2. Application Unhandled Exception</li><li>3. Pathway Database Connectivity</li><li>4. Data Fabric Endpoint Connectivity</li><li>5. Circuit Breaker Open State</li><li>6. End of interval runtime</li></ol> In these cases, please raise a support ticket.

## Best Practice

### Data Fabric Security Management

Data Fabric includes a security component located in Infor OS > Data Fabric > Security, which enables fine-grained control over access to specific Data Fabric components and tables. It allows the creation of security profiles or group permissions by module and access level. These profiles can then be assigned to users through Infor OS > Security > User configuration.

For more details on the Data Fabric Security Documentation, please visit the Infor Documentation found in [https://docs.infor.com/inforos/2025.x/en-us/useradminlib\\_cloud/default.html?helpcontent=datafabrug/zjt1679041136212.html&hl=data%2Cfabric%2Csecurity](https://docs.infor.com/inforos/2025.x/en-us/useradminlib_cloud/default.html?helpcontent=datafabrug/zjt1679041136212.html&hl=data%2Cfabric%2Csecurity)

# Pathway Data Lake Integration Components

## Metadata Generation

The Initial Ingestion will generate the *Object Schema* (metadata) of the Pathway table with a UTF-8 JSON format which will hold table details such as Table Name, Description, Column Descriptions, Data Types, and Path Indicators for the Data Fabric Data Catalog Registration.

The Incremental Ingestion will regenerate the said metadata should it detect changes in the table schema for the re-registration.

## Metadata Registration

Both Initial and Incremental Ingestion will register the generated metadata to the Data Fabric Data Catalog to enable data querying and ensure compliance as the prerequisite of the data sync process. Additionally, it provides context for consuming applications to understand the information stored within the data objects.

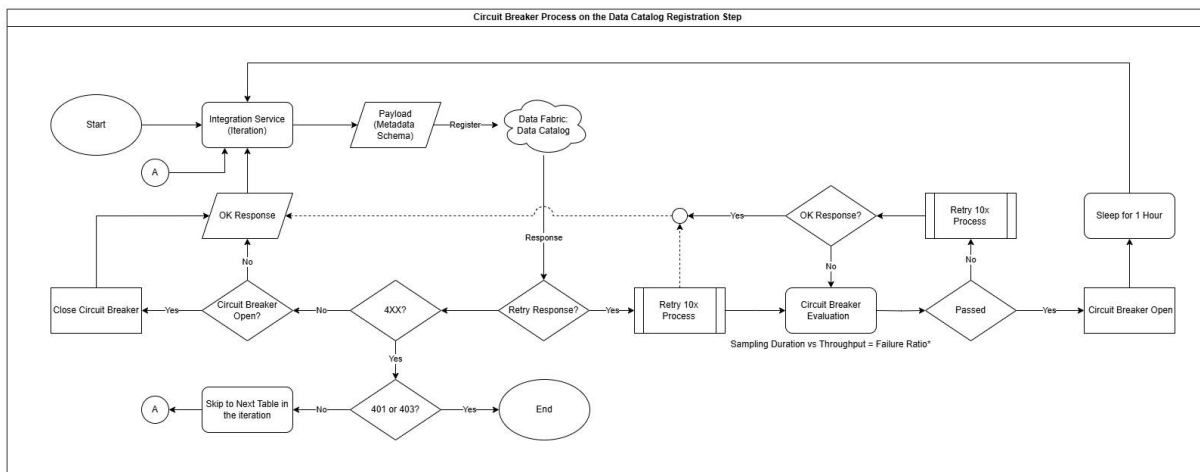
## Data Object Ingestion

Both Initial and Incremental Ingestion utilizes the Data Fabric Batch Ingestion as a method of syncing the Pathway tables into the data lake. Each table processed will be sectioned into 50MB each with its own Data Object ID and all sections will be referenced to the registered Object Schema. The Initial Ingestion will process the bulk initial loading or provisioning of the Pathway tables into the data lake, while the Incremental Ingestion will sync its delta updates.

## Retry & Jitter

Both Initial and Incremental Ingestion have ten times (10x) retry policy. In cases of unsuccessful API Calls (except for error response codes) with every retry, Jitter is applied with 100ms linear incrementation for the delay. This covers API responses for retry such as response code 408: Request timeout, 429: Too Many Requests and 5XX: Server error (Data Fabric Endpoint)

## Circuit Breaker



To prevent cascading API call failures, after exhausting the 10x retry with Jitter, the service will open the Circuit Breaker and break for a period. The service will terminate itself and re-execute itself to resume after an interval. The service will continue to retry and when an API call has been successful, then the service will close the Circuit Breaker and resume with the normal traffic.

The pattern assumes that the Data Fabric endpoints are down or in maintenance mode and with this, long timeouts that drag down the application are avoided. An email notification to the *Data Lake Integration Group* together with the enrolled users (if any) will be sent and received through Infor OS Inbox and to the users' email client upon opening, retry, and exit of the Circuit Breaker pattern.

### Circuit Breaker Failure Ratio

The Circuit Breaker's failure ratio is set to **10%**. This means that within each sampling window, the pattern evaluates the collected requests and calculates the percentage of failures. Once the failure rate reaches or exceeds 10%, the Circuit Breaker is triggered and transitions to the open state where the application will take a break for the defined Break Duration that is 1-hour.

### Circuit Breaker Minimum Throughput

The Circuit Breaker's Minimum Throughput is set to **2**, meaning the pattern will only evaluate the collected sample if at least two requests have been recorded. Throughput is calculated as a rolling value based on the Sampling Duration and is evaluated anytime a call finishes.

### Circuit Breaker Break Duration

Break Duration defines how long the Circuit Breaker remains open before allowing requests again. In this configuration, the application uses a break period of **1 hour**.

### Circuit Breaker Sampling Duration

The Sampling Duration defines the time window in which the Circuit Breaker calculates the Failure Ratio to evaluate the current error rate. The configuration for the application is defined as **30 seconds**.

## Cancellation Token

Both Initial and Incremental Ingestion application implements a Cancellation Token to allow the application to exit gracefully in specific phases to make sure that the data has been managed and logged successfully and completely before termination.

## Last Synced ID & Variation Number

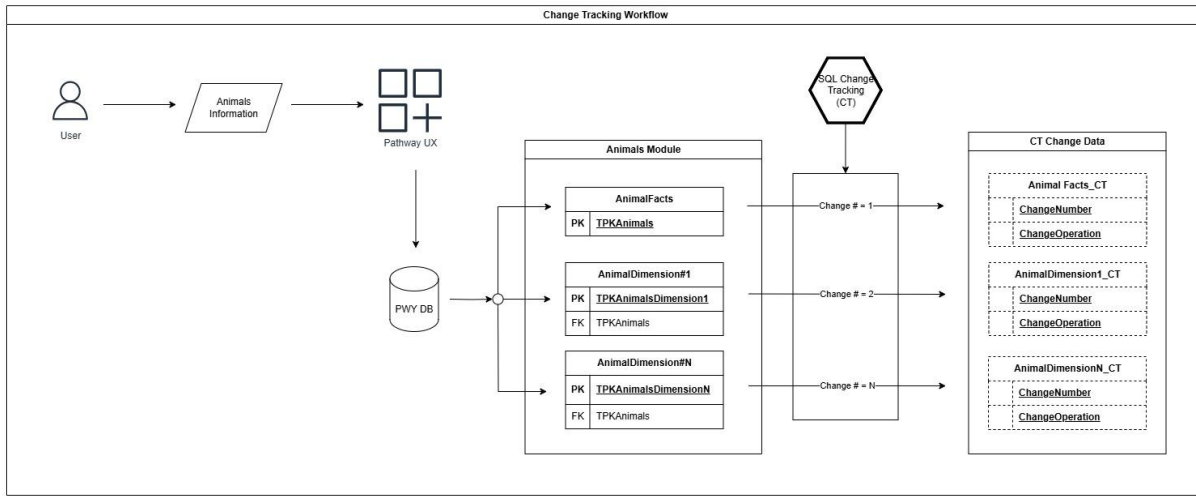
In the Initial Ingestion application, at the ingestion phase of the process, a Pathway table is ingested by section and for each section ingested, the maximum value for the Primary Key is saved as the Last Synced ID. This helps the application to keep track of the ingested records and as a safeguard for interruptions should occur and will be the basis of the application once the interruption has been resolved and the application has been re-executed.

For the Incremental Ingestion application, it utilizes the Last Synced ID and in addition to the Variation Number. The Variation Number is a numbering system generated by the SQL Change Tracking feature when changes have been tracked. This is to ensure that in the sectioning of the table, and with the caveats if implementing the SQL CT, keeping track of the ingested records is possible and interruptions can be managed upon resolution and re-run.

## SQL Change Tracking Retention Policy and Cleanup

The SQL CT has a retention feature that, when enabled for the Pathway database, is set to *7 days* from the deployment date. The Automatic Cleanup will be managed by SQL CT itself and will delete tracked manipulation activities that are 7 days old or older to ensure smooth operation and performance of the database.

## SQL Change Tracking (CT)



SQL Change Tracking (CT) is a lightweight, built-in feature of Microsoft SQL Server that allows applications to identify which rows in a table have changed—inserts, updates, or deletes—since a given version, without capturing full historical details. It is used to identify changes in the Pathway database, especially for tables that do not support lastmodified timestamps or harddelete tracking. Each change is logged with an Operation Type and a Change Number, enabling the Data Fabric Integration Service to efficiently determine deltas for the Incremental Ingestion workflow.

### Maximum Data to Send

The mechanism is applied only to the Incremental Ingestion service to enable faster table processing for bulk updates to the Pathway tables. This restricts the process to ingest up to 1GB of data for a table to open the machine, allowing it to process other tables' deltas. The remaining data will be ingested in subsequent cycles of the process, which runs every 15 minutes indefinitely.

## References and Appendices

### Glossary

Terminology	Definition
Data Fabric Object Schema	It is a collection of metadata stored in the Data Catalog that defines the properties, structure, and relationships of data objects within the Data Lake.
Infor OS Platform	Infor's cloud-based operating platform that hosts various enterprise applications and services, including Data Fabric, integration tools, security services, and workflow automation capabilities.
Data Fabric Object ID	Or Table Identifier in Infor Data Fabric refers to the unique identification and metadata configuration of a data object stored within the Data Lake.
Data Fabric Data Object	A single stored data file or chunk that lives inside a data lake and serves as a standalone, retrievable piece of raw or curated data
Object Storage Architecture	A method of storing data as objects rather than as files in folders that also support different media types and is given with a unique identifier to retrieve the object.
Infor Data Lake	Infor's central big-data storage repository that uses object storage architecture to store large volumes of data in its raw, original format for long-term persistence.
AES-256 Encryption	A cryptographic encryption standard used by the Data Lake to secure stored data.
TLS 1.2	A network encryption protocol used by Data Fabric to secure data while in transit.
Semantic Modeling	The process of organizing, structuring, and assigning meaning to data in the Data Lake to support analysis, reporting, and visualization.
Ingestion (Data Ingestion)	The process of bringing data into the Data Lake from applications or external systems. Ingestion can originate from active producers (cloud applications) or passive producers (on-premise, legacy, or third-party systems).

### Infor Documentation for Data Fabric

Data Fabric Component	Infor Documentation
Introduction to Data Fabric	<a href="https://docs.infor.com/inforos/2025.x/en-us/useradminlib_cloud/default.html?helpcontent=datafabrug/jbz1631199517376.html">https://docs.infor.com/inforos/2025.x/en-us/useradminlib_cloud/default.html?helpcontent=datafabrug/jbz1631199517376.html</a>

Atlas	<a href="https://docs.infor.com/inforos/2025.x/en-us/useradminlib_cloud/default.html?helpcontent=atafabrug/ylr1631199523567.html">https://docs.infor.com/inforos/2025.x/en-us/useradminlib_cloud/default.html?helpcontent=atafabrug/ylr1631199523567.html</a>
Metagraph	<a href="https://docs.infor.com/inforos/2025.x/en-us/useradminlib_cloud/default.html?helpcontent=atafabrug/mac1653301114230.html">https://docs.infor.com/inforos/2025.x/en-us/useradminlib_cloud/default.html?helpcontent=atafabrug/mac1653301114230.html</a>
Compass	<a href="https://docs.infor.com/inforos/2025.x/en-us/useradminlib_cloud/default.html?helpcontent=atafabrug/cmd1639350812542.html">https://docs.infor.com/inforos/2025.x/en-us/useradminlib_cloud/default.html?helpcontent=atafabrug/cmd1639350812542.html</a>
Data Lake API	<a href="https://docs.infor.com/inforos/2025.x/en-us/useradminlib_cloud/default.html?helpcontent=ioncedg_cloud_osm/ume1516870178793.html&amp;hl=data%2Cfabric%2Cdata%2Clake%2Capi">https://docs.infor.com/inforos/2025.x/en-us/useradminlib_cloud/default.html?helpcontent=ioncedg_cloud_osm/ume1516870178793.html&amp;hl=data%2Cfabric%2Cdata%2Clake%2Capi</a>
Data Catalog	<a href="https://docs.infor.com/inforos/2025.x/en-us/useradminlib_cloud/default.html?helpcontent=atafabrug/hjc1757383258255.html">https://docs.infor.com/inforos/2025.x/en-us/useradminlib_cloud/default.html?helpcontent=atafabrug/hjc1757383258255.html</a>
Querying Data Lake	<a href="https://docs.infor.com/inforos/2025.x/en-us/useradminlib_cloud/default.html?helpcontent=atafabrug/uip1631199549530.html">https://docs.infor.com/inforos/2025.x/en-us/useradminlib_cloud/default.html?helpcontent=atafabrug/uip1631199549530.html</a>
Extracting from Data Lake	<a href="https://docs.infor.com/inforos/2025.x/en-us/useradminlib_cloud/default.html?helpcontent=atafabrug/zkp1631199544812.html">https://docs.infor.com/inforos/2025.x/en-us/useradminlib_cloud/default.html?helpcontent=atafabrug/zkp1631199544812.html</a>
Security	<a href="https://docs.infor.com/inforos/2025.x/en-us/useradminlib_cloud/default.html?helpcontent=atafabrug/zjt1679041136212.html&amp;hl=data%2Cfabric%2Csecurity">https://docs.infor.com/inforos/2025.x/en-us/useradminlib_cloud/default.html?helpcontent=atafabrug/zjt1679041136212.html&amp;hl=data%2Cfabric%2Csecurity</a>

## Infor & Amazon Web Services Documentation

Article	Link
Infor + Amazon Web Services	<a href="https://www.infor.com/partners/aws">https://www.infor.com/partners/aws</a>
Infor Cloud Security	<a href="https://trust.infor.com/">https://trust.infor.com/</a>
(AWS) Integrating with Infor ION Over REST API	<a href="https://aws.amazon.com/blogs/apn/strategies-patterns-and-security-measures-for-integrating-infor-cloudsuite-with-aws/">https://aws.amazon.com/blogs/apn/strategies-patterns-and-security-measures-for-integrating-infor-cloudsuite-with-aws/</a>

## Infor U Data Fabric Trainings

Training	Infor U Training Link
Infor OS: Data Fabric Overview	<a href="https://education.infor.com/course-list/course/01_9952311_eeen0061_ion">https://education.infor.com/course-list/course/01_9952311_eeen0061_ion</a>
Infor OS: Using Data Fabric	<a href="https://education.infor.com/course-list/course/01_9952502_eeen0095_ion">https://education.infor.com/course-list/course/01_9952502_eeen0095_ion</a>
Infor OS Platform: Training Guide - Advanced Data Fabric	<a href="https://education.infor.com/course-list/course/01_9952406_den0072_ion">https://education.infor.com/course-list/course/01_9952406_den0072_ion</a>

## Infor YouTube Training Materials

Training	YouTube Training Link
Data Management with Infor Data Fabric	<a href="https://youtube.com/playlist?list=PLbZqMzjIWI2ZQG8Lp0NP3Wve0uGEIdI-U&amp;si=7R-CnYMkDGNV6igi">https://youtube.com/playlist?list=PLbZqMzjIWI2ZQG8Lp0NP3Wve0uGEIdI-U&amp;si=7R-CnYMkDGNV6igi</a>

## Pathway Nominated Table List

This lists the following tables as part of the nominated tables for Data Fabric – Data Lake provisioning:

abkacat	abkexcl	abkrqar	acrexcp	acrpgrp	cardbtr	cbtkill	ccpcnat
abkacfa	abkexta	abkrqfe	acrfrur	acrpgrt	cardtrn	cbtmthr	ccpcnvl
abkactp	abkfaat	abkrqft	acrhlap	acrques	carledg	cbtprat	ccpfnap
abkafpr	abkfaca	abkrqhd	acrhlde	acrquna	cartran	cbtprnt	ccpfnat
abkarea	abkfacl	abkrqnt	acrhllog	acrqval	cauases	cbtqlof	ccpfnav
abkasso	abkfada	abkrqnx	acrmodu	acreqt	cauaset	cbtqlog	ccpmdfn
abkattb	abkfana	abkrqrp	acrnfrm	acrequ	cauautd	cbtsjer	ccpmfat
abkchac	abkfare	abkstat	acrnfrs	acrrole	cbtajob	cbtsjob	ccpmfav
abkchdc	abkfata	abktlin	acrnfrt	acrrolt	cbtakil	cbtstat	ccpparm
abkchfc	abkfatp	abkltre	acrnote	acrtrmt	cbtcald	cclcald	ccppfav
abkchge	abkfeac	abktqhd	acrnreq	acrtoft	cbtfent	ccldays	ccppfrn
abkchhc	abkfecd	acransw	acrntyp	acrtror	cbtfila	ccllink	ccpprmf
abkclac	abkntus	acraset	acrpabf	acrsefn	cbtfild	cclparm	ccpprof
abkclas	abkntyp	acrasso	acrparm	acrsfrt	cbtform	cclterm	ccpprop
abkclnx	abkresc	acrbfuc	acrpdoc	acrstat	cbtfper	cclyear	ccptemp
abkclsa	abkretp	acrcont	acrpdpq	acrstrt	cbtfrpm	ccpapfn	ccptfty
abkcust	abkrilin	acremal	acrpdrq	acrudlb	cbtftth	ccpatrn	ccptpfn
abkdcrs	abkrilre	acresdn	acrpesc	caracct	cbtjobq	ccpatvl	ccptype
abkdsrs							

cdcappl	cimsqls	cnabenf	cnainfx	cnantpi	corstcp	crcbfmt	crcrolt
cdcatfp	cimtle	cnabenh	cnamcom	cnantpn	corstru	crcbuld	crcspdr
cdcatfx	cmnaudt	cnabnpm	cnamerg	cnaparm	coruopt	crcbulh	crctrxa
cdcattp	cmnauto	cnabnty	cnanace	cnapcom	corussc	crcccvs	crctrxg
cdcdlnk	cmnbtch	cnacase	cnanacl	cnapcor	cqybrco	crcsdr	crctrxt
cdcenap	cmncldf	cnacatg	cnanacm	cnapers	cqybrkt	crcdrap	crcudpt
cdcenat	cmnfavo	cnacom	cnanacn	cnapinf	cqycond	crcdraw	crcudra
cdcenty	cmngrup	cnaccor	cnanacp	cnapinr	cqyenty	crcdref	crcudtl
cdcpth	cmnhotm	cnacinf	cnanacr	cnauqual	cqyflds	crcdrtr	crcufmt
cdcvext	cmnhoto	cnacinr	cnanact	cnareln	cqyform	crceftp	crcwarn
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cemrole	cmnlogl	cnacnab	cnancai	cnarole	cqylink	crcerrs	crfclas
cemrolt	cmnlogp	cnacntc	cnancat	cnarolt	cqymodl	crcline	crfenty
cemtmlp	cmnnode	cnacom	cnandli	cnarolx	cqypair	crcmref	crfibat
cfiacct	cmnoptn	cnacomt	cnandlm	cnatcom	cqypali	crcnxbn	crfifmt
cfibdep	cmnparm	cnacomv	cnandln	cnatemp	cqyparm	crcnxt	crfiref
cfifinp	cmntran	cnacomx	cnanema	cnatinf	cqypath	crcnxtn	crfirff
cfifpeo	cmnuser	cnacpny	cnaneme	cnatitl	cqyqupa	crcoalc	crfirfr
cfifpgn	cmoapen	cnadapp	cnanemh	cnatmpl	cqyqupl	crcobat	crfirt
cfiledg	cmoappr	cnadbox	cnanemt	cnaxrol	cqyqury	crcobct	crfnxt
cfijn	cmodyp	cnaddoc	cnanemx	cnaxseq	cqyrslt	crcolin	crfrefr
cfipost	cmoftyp	cnadevt	cnangag	cnaxtmp	cqytemp	crcopay	crfrole
cfipper	cmogrup	cnadmsg	cnangat	corcopl	cqytest	crcorct	crfrolt
cfiproj	cmomem	cnadsub	cnangrp	corcopt	cqyxfld	crcpara	crftycl
cfirfap	cmomref	cnadsys	cnanhst	corlook	cqyxfmt	crcparm	crftype
cfirfnd	cmomtpa	cnacom	cnanlte	corlopt	cqyxvff	crcpayg	crgacti
cfirfpm	cmomtpu	cnacinf	cnanltx	cornoco	cqyxvfv	crcpayl	crgfcal
cfitrn	cmomtpu	cnacnam	cnante	coropte	crcacct	crcpayt	crgfald
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cimfixs	cmoprod	cnaidtc	cnanttx	coroptn	crcalct	crcraa	crgimag
cimindx	cmotypa	cnaidth	cnanpai	corpscm	crcallc	crcrcap	crgntry
cimjobs	cmotype	cnaidty	cnanpat	corrgrp	crcaltr	crcrcpt	crgnxtn
cimmart	cnaaddr	cnainft	cnanprm	corrole	crcaper	crcrcr	crgracc
cimparm	cnaadr	cnainfv	cnantpc	corrolt	crcbank	crcrole	crgrdar

crgregs	csyesbi	csyest	cwfcext	cwpappl	cwsparm	ecrqval	egestyp
crgregv	csyesbk	csyseti	cwfcchis	cwpbcfl	cwspdty	ecrrequ	egetype
crgrole	csyesbn	csyseto	cwfcchld	cwpbcsc	cwswsdb	ecrtyfl	elcfls
crgrolt	csyesbo	csysetr	cwfcchl	cwpelfl	eanbred	ecrtyif	elcflvl
crgtran	csyesbp	csysign	cwfcloc	cwpexfl	eanclas	ecrtyna	elcnafl
csyapps	csyesbr	csysrvr	cwfccter	cwpexls	eanclfl	ecrtypa	elctyfl
csyappt	csyesbs	csysrvs	cwfccthr	cwpextp	eanclfv	ecrtype	elctyfv
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csyathf	csyesbu	csytagl	cwfcextd	cwpidoc	eanclor	eetacfl	elctype
csyathi	csyesbv	csytagt	cwflink	cwplexd	eanflds	eetacfs	elctyus
csybedb	csyesbx	csytape	cwfcproc	cwplink	eanflvl	eetatyp	enamyap
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csybedo	csyffav	csytext	cwfcrole	cwpmgtp	eantyus	eetflvl	epafvl
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csychcr	csyfprf	csyufl	cwfcctacc	cwpmctt	eaptyfl	eetttyp	ercaptp
csychiv	csyfuna	csyuing	cwfcctask	cwpmnosc	eaptyfv	eettype	ercflds
csychrt	csyfunc	csyulay	cwfcctime	cwppdfp	eaptyna	egeappl	ercflvl
csychtp	csyfunu	csyuser	cwfcctimp	cwppdoc	eaptype	egeattp	ercfmfl
csychus	csyhelp	csyuval	cwfcctrcp	cwpprap	eaptyus	egeavfl	ercparm
csytda	csylich	csyvers	cwfcctrer	cwpprod	ebkactp	egefart	ercpast
csydtff	csylicu	ctxacct	cwfcctrrt	cwppreqs	ebkattb	egeflds	ercpays
csydtts	csynfes	ctxcode	cwfcctskt	cwppresp	ebkclas	egelist	ercpayt
csyeadr	csynftc	ctxparm	cwfccttua	cwpprstp	ebkfacl	egelius	ercrcap
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csyectp	csynprv	ctxrole	cwfccttua	cwppsfpf	ebkresc	egemtrt	ercrtpus
csyeitp	csynttp	ctxrolt	cwfcctusr	cwppslx	ebkretp	egeresp	esycont
csyemal	csyparm	cwfactv	cwfcuact	cwppslfl	ecrfls	egerfld	esydesc
csyesbb	csypart	cwfappl	cwfcuasc	cwppsltp	ecrflvl	egermgt	esyemal
csyesbc	csypaus	cwfatsk	cwfcuafvl	cwpptdoc	ecrparm	egertyp	esyexpm
csyesbd	csyreque	cwfcapp	cwfcuapbc	cwsafpr	ecrques	egesrch	esylink
csyesbe	csyreqt	cwfcexr	cwfcuapmc	cwsmgtp	ecrquna	egestke	esymsga

esymsgq	langend	lapacon	lapbbbd	lapcspc	lapextd	laphiem	laplcn
esyrequ	lanhsts	lapacty	lapbbbi	lapcspm	lapextr	laphier	laplcty
esyufld	lannzbr	lapafpg	lapbbbm	lapctpg	lapfcal	laphist	laplimc
esyufvl	lannzcl	lapafpr	lapbbbp	lapctrl	lapfdrr	laphppm	laplocn
esyuser	lannzcs	lapallo	lapbbbr	lapctyp	lapfdrt	laphprt	laplodg
esyusnt	lannzdc	lapamnd	lapbbbt	lapdbcm	lapfebc	laphptp	laplost
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esyutyp	lannzds	lapapcc	lapbtwk	lapdcio	lapfecb	laphsta	lapmajc
esyvalu	lannzge	lapapdc	lapcacf	lapdcnc	lapfecd	laphstm	lapmajt
ewpmgat	lannzim	lapapfc	lapcact	lapdcnh	lapfect	laphsts	lapmanx
ewpmgtp	lannzoc	lapapfe	lapccot	lapdcnx	lapfeet	laphvtp	lapmapc
ewpmgus	lannzod	lapapmc	lapcded	lapdcta	lapfegp	laphwsp	lapmapd
ewsflds	lannzst	lapapno	lapcdet	lapdcty	lapfein	lapindc	lapmapp
ewsfvl	lanparm	lapappl	lapcdev	lapddl	lapfelk	lapinds	lapmapr
ewmgrps	lanperd	lapappr	lapcdin	lapddoc	lapfepd	lapindt	lapmaps
ewmgrtp	lanques	lapapur	lapcfin	lapdecn	lapfepi	lapindv	lapmapt
ewснаfl	lanquna	lapasap	lapcfor	lapdevc	lapfesa	lapindx	lapmapx
ewsqreqx	lanqval	lapatcl	lapcgrp	lapdevd	lapfesp	lapinfa	lapmdta
ewstpfl	lanrata	lapatdt	lapclas	lapdevt	lapfett	lapinnc	lapmdtt
ewstpfv	lanrego	lapatpm	lapcmgt	lapdims	lapffee	lapinnx	lapmidt
ewstpna	lanrfnd	lapatyp	lapcmin	lapdimt	lapflrs	lapioaa	lapmidv
ewstpus	lanrfnx	lapbcmp	lapcnat	lapdoid	lapfpas	lapioal	lapmifc
lananml	lanrfvr	lapbdct	lapcomp	lapdpcg	lapfsid	lapioir	lapmifd
lanansw	lanrole	lapbgen	lapcomt	lapdrdt	lapfsil	lapioit	lapmifi
lanarea	lanrolt	lapbgtp	lapcont	lapdrng	lapfsim	lapiona	lapminc
lanatra	lanrtty	lapbgua	lapcplt	lapdtcc	lapfsip	lapionh	lapminp
lanatrn	lansefn	lapbgud	lapcpol	lapdtrt	lapfst	lapionx	lapmint
lanatya	lanseur	lapbguh	lapcpyp	lapdtst	laphccm	lapiopa	lapmipt
lanatyp	lanstus	lapbgut	lapcrty	lapdtyp	laphcct	lapiopl	lapmods
lanbank	lantran	lapbgux	lapcsap	lapdtzn	lapheac	lapiorf	lapmtrl
lanbred	lanttyp	lapbldc	lapcshc	lapedah	laphetp	lapiorl	lapmunc
lanclas	lapacdc	lapblld	lapcsnx	lapedal	laphfof	lapiorr	lapneda
lancolr	lapacec	lapbltd	lapcspa	lapefrc	laphfsm	laplang	lapnett
lancost	lapacen	lapbpba	lapcspb	lapegel	laphfsp	laplapp	lapnext

lapnfas	lappros	laptrfr	ldracr	ldrccac	lifbetw	lifhht	lifiplt
lapnfat	lappurp	laptxfa	ldracs	ldrccgp	lifbook	lifhmr	lifipoi
lapnote	lapques	laptxfc	ldracs	ldrrole	lifboty	lifhmrz	lifippp
lapntct	lapqval	laptxfr	ldracs	ldrrolt	lifbtit	lifhmvt	lifipst
lapnumc	laprata	laptxft	ldracs	ldrsrc	lifcjo	lifhwpc	lifirai
lapnunx	lapregm	lapyco	ldracs	ldrterm	lifcnla	lifidtp	lifirde
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lappcrr	laprisk	lapvehc	ldrctg	lerqual	lifcyjb	lifinmc	lifish6
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lappprn	laptdcm	ldrbrd	ldrmana	lifalsf	liffeta	lifipac	lifitpo
lapppr	laptdwt	ldrbrl	ldrmanp	lifanbr	lifetp	lifipae	lifitss
lappprs	laptnk	ldrbrn	ldrnext	lifanco	lifett	lifipat	lifitst
lapprci	laptmaj	ldrbrt	ldrnote	lifangn	lifftoi	lifipct	lifitul
lapprcr	laptmtd	ldract	ldrnxtn	lifarmk	lifhfmt	lifipin	lifitvt
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lvyear	lvleum	lvpotr	lvtabc	lvyrbi	lvzfadj	lvzroun	lvzydcl
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lwbnext  
lwbnthd  
lwbnthh  
lwbparm  
lwbperd  
lwbpwcc  
lwbreas  
lwbmet  
lwbrole  
lwbrolt  
lwbbrunn