SIEMENS

Insights Hub

Integrated Data

System Manual

05/2024

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Lake

Introduction to Integrated Data

1

Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

DANGER

indicates that death or severe personal injury **will** result if proper precautions are not taken.

🛕 WARNING

indicates that death or severe personal injury may result if proper precautions are not taken.

indicates that minor personal injury can result if proper precautions are not taken.

NOTICE

indicates that property damage can result if proper precautions are not taken.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

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The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

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We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

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Introduction to Integrated Data Lake

1.1 Introduction

An Integrated Data Lake is a repository that allows to store structured and unstructured data or objects in its native format as needed. It handles large data pools for which the schema and data requirements are not defined until the data is queried. This offers more agility and flexibility than traditional data management systems. The stored data can be used for further analysis as per the customer's requirement.

Integrated Data Lake provides the following features:

- Import time series data or objects.
- Generate signed URLs to upload, update or download data or objects.
- Delete data or objects.
- Add, update and delete values for data or objects.
- Receive notifications.
- Data access using cross account access.
- Subtenancy support.

User interface Integrated Data Lake

2.1 User interface

Integrated Data Lake application can be accessed from the Insights Hub Launchpad by clicking the following icon:



Home screen

Integrated Data Lake displays the "Data Explorer" navigation tab. The following screenshot shows the different elements of the Integrated Data Lake user interface:

Data Explorer					. ~	<u>^</u>	
Filter	Da data	ata E	Explorer vs1/ [®]	()* Refresh View	w 👚 Upload Objects 🗔 Create	a Folder 🗍 Delete 🥜	Retrieve Objects
datahten=purws1/ istalten=purws1/	• î						
Subtenant Folders	₽.		Name 11	Size †↓	Last Modified 1	Туре †↓	Action
E2E_UI_Event_Subtenant_Deleted			DUL_Folder				
DeletedSubtenantTrial			123 III				
Yebeacdafb607722abcd4cd61d5adc9			D 1Data				
DL_TEST 1790fb6270cd1ec7889031384a3b8e26			ABC IABC				
Do_Not_Delete_Subtenant_2 3cf182848/b473f3b109cb1751d9cb4a			afterIntegDeployment JafterIntegDeployment				
DLTEST 5545ce4005564252c50a43c64b3059b0			analytics				•••
ScheduleToDelete			ArchivalRuleTest IArchivalRuleTest				
edvorresreasees7920265921c015			ashishtest //ashishtest				••
994dr3a6b157256a59903742c9590c01			D bugtest1 /bugtest1				
P135TEST #218af6799df604d1e1d7662a4211d5			CrossAcDemo				
2E_intTestSubtenant			CrossAcDemo1				

Navigation tabs

2.1 User interface

Work area

Navigation tabs

You can access the navigation tabs which are available in the left side of the work area.



- ② Archival and Retrieval
- ③ Data Catalog
- ④ Time Series Import
- ⑤ Event Subscription is to get notifications
- [®] Cross Account is applicable only for Europe 1

Service Principal is applicable for Virtual Private Cloud

⑦ Metadata Management is applicable only for Virtual Private Cloud

Data Explorer

The Data Explorer navigation tab is located on the left side of Integrated Data Lake UI.

0	2			(3)	\mathbb{D}			
Data Explorer		Data data/ten=pu	Explorer	⑦ Refresh View ↑	Upload Objects	Create Folder 📋 🕻)elete _o ⊅ ^o Retriev	ve Objects 📃 Q
data/ten=punvs1/ data/ten=punvs1/		Â						
▼ Subtenant Folders			Name ↑↓		Size ↑↓	Last Modified $\uparrow\downarrow$	Туре ↑↓	Action
E2E_UI_Event_Subtenant_D			OUI_Folder		-			
Oc349387ed45df11654931753			123					
DeletedSubtenantTrai Ofebeacdafb607722abcd4cd61			🗀 1Data /1Data					
IDL_TEST 1790fb6270cd1ec7889031384a3b8e26			ABC /ABC		-			
Do_Not_Delete_Subtenant_2 3cf182848fb473f3b109cb1751d9cb4a			afterIntegDeployment					
IDLTEST 6545cr408556d252c58a43c64b3859b0			analytics /analytics		-		-	
ScheduleToDelete			ArchivalRuleTest					

- ① Filter or search the folders
- List of the folders
- ③ Work area

Time Series Import

The Time Series Import navigation tab is located on the left side of Integrated Data Lake UI.

		4	5 6
Import Time Series Dat	Import Task Details		C Refresh Task
Enter search term and press enter	dide2-test-2021-08-06 Task Name		Success Status
c2c37364e6d344959df71dc9423101b3 dide2-test-2021-08-05 8d39c7256b5d427eaf8cdf9111191c1c	TSI/test/ Destination Path	Aug 6 2021 5-20 AM	
dide2-test-2021-08-04 b91bd83de96e43b487328f22fb864481	From Completed	To O files imported	
dide2-test-2021-08-03 c34e79#8ff1494caeb8b43b9f54d5d5	Progress	File Count	
dide2-test-2021-08-02 0005cb119fd9467ea97c426602e5f3b5	eefc911752634a85aad7bf2a46116f54 Asset lds		
dide2-test-2021-08-03 c34e79#8#1494caeb8b43b9f54d5d5	Aspects		
dide2-test-2021-08-02 0005cb119fd9467ea97c426602e5f3b5	Aspect Name 🁔	Aspect ID ↑↓	
dide2-test-2021-07-30 f39833dfdb7d4cc2b4aeb6a86271001a	connectivityStatus status	connectivityStatus	
dide2-test-2021-07-29			

- ① The Time Series Import creates a job to import time series data to Integrated Data Lake
- 2 Filter or search of the task created for import data
- ③ Task which are created for imported data
- ④ Details of the selected task
- ⑤ Updates the task detail
- [®] Deletes the selected task

Event Subscription

The Event Subscription navigation tab is located on the left side of Integrated Data Lake UI.

2.1 User interface

12	3	4	5	6
Event Subscription	Event Subscrip	otion Overview		
Tenant Subscriptions	Active	Inactive		
Subtenant Subscriptions Sample-Subtenant-UI			J	
2b6b34df1b3219eb561cd2f55cadebe9	Subscription-5800 Storage Path: data/ten=punazdl/EndToEndTes	tNotification		
IDL_AZ_FIT_TENANT 7d598ccft0d82fa826c1b8ce9ce88a4a				
E2E_UI_DelSubtenant-1612189612923				
Sample-Subtenant-UI				
IDL_AZ_FIT_SUB_TENANT_2				

- ① Filter or search the event subscriptions
- 2 Creates new Event Subscription
- ③ Active Event Subscription list
- ④ Inactive Event Subscription list
- S List of event subscriptions
- [®] Redirects to Data Explorer storage path
- ⑦ Deleted Subtenant

Cross Account

The Cross Account navigation tab is located on the left side of Integrated Data Lake UI. You can enable the Cross Account access only for the subscribers of Europe 1.

Cross Account Access A out o 5 remainin	(4) Account Details	5 6 7 8 C Refresh View 2 Edit Cross Account D Delete Cross Account
Filter MyFirstCrossAccountAccess 4b3a6549 2c36-49a72 e412 99937745c8ab8	MyFirstCrossAccountAccess Account Name My First Cross Account Access Description	123456789111 Account Number
	No accessess Add you	are privided on any prefix!

- ① Enable cross account access
- 2 Filter or search the created cross account
- ③ Cross account drop-down list
- ④ Cross account details
- 5 Add Accesses
- [©] Updates the latest changes
- Edit cross account
- ⑧ Delete cross account

Service Principal

The Service Principal navigation tab is located on the left side of Integrated Data Lake UI. You can enable the Service Principal only for the subscribers of Virtual Private Cloud.

(1) (2) (3)	4	
eate Service Princi al	Service Principal	C Refresh View Delete Service Print
	SP-687043204292	Read
27-2c34-4ba8-8f2b-00ea5cddd52f	datalake-rc-punazdl/data/sub=7d598ccff0d82fa826c1b8ce94	ce88a4a/dre
43204292	Storage Path	
401b-acb8-d2c450e4bdc8	idltntprovisioningrc	
	Storage Account	
	7d598ccff0d82fa826c1b8ce9ce88a4a	IDL_AZ_FIT_TENANT
	Subtenant ID	Subtenant Name
	Service Principal Details	
	Secrets	
		~~
		ĘQ.}
	Current	ly, no secret is added.
	Please add	a secret for service principal.
		(Create Secret
L		
		ϕ

- ① Creates new Service Principal
- ② Filter or search the service principal
- ③ Service Principal drop-down list
- ④ Service Principal details
- ⑤ Updates service principal
- ⑥ Deletes service principal
- ⑦ Creates the secret for the service principal

oData Contract

The oData Contract navigation tab is located on the left side of Integrated Data Lake UI.

Mendix Contract Adu Here you can man ge the contracts of selected f	(ministration olders path to be used in you	2) Mendix app via the Mendix I	Data Hub.	(3) (+) Add contract	(4) Mendix Contract Administration Overview
Name	Version	Environment	Status	Actions	/ 50 possible contracts
Pump_application Pump Raw Data	v1	IDL_pump_applic	Published		
					🕙 Did you know?
					If you like to use the Mendix Data Hub to access your MindSphere IoT data, you have to create contract(s) to allow access based on Asset types. More information about this process can be found at the Data Hub Guide

- ① Filter or search the required oData contract
- 2 Displays the list of added oData Contracts

2.1 User interface

- ③ Creates oData Contract
- ④ Displays the overview of selected oData Contract information

Region deviation

Feature "oData Contract" is supported only for Region Europe 1.

Metadata Management

The Metadata Management navigation tab is located on the left side of Integrated Data Lake UI.

	2	3	4	(5
Metadata collections 18 collections created			🕀 Add Col	llection
► Global 34 keys Default metadata collection			(+ Ac	dd Key
Legacy 2 keys An assortment of metadata labels reminiscent of old-style tagging (Keys cannot be	added to Legacy Collection)			
► Collection_2		C Edit collection	on 🕀 Add Key	
▶ collectionFor_noaddidetailKey		🖉 Edit collectio	on 🕀 Add Key	
► docutest 🕜 Draft		🧷 Edit collectio	on 🕀 Add Key	

- ① Global metadata collection.
- 2 Custom metadata collections.

③ Actions to operate on custom metadata collection ie., edit collection, add key, delete collection.

- ④ Add a new custom metadata collection.
- ⑤ Add a new key in global collection.

User rights in Integrated Data Lake

3.1 User rights in Integrated Data Lake

The Integrated Data Lake application user rights are assigned from <u>Settings</u> application. After the activation of Integrated Data Lake, you will receive all data lake related read and write permissions from the tenant administrator.

User rights

The user rights depend on the following user roles:

- Administrator
- User
- Viewer

The following table shows the permissions:

Permission	Administrator Role	Standard user Role	Subtenant user Role
View all tenant's	\checkmark	\checkmark	\checkmark
Time Series Import	\checkmark	\checkmark	\checkmark
Cross Account	\checkmark		
Event Subscription	\checkmark		
Service Principal	\checkmark		

Data Explorer

4.1 Exploring Data Explorer

Data Explorer feature enables you to explore the folders created by you and other subtenants. From the application, you can use the functionality of breadcrumb, upload, download, create the folder, sort and pagination.

You can view the data in the folders and objects available in Integrated Data Lake. The following screenshots display the folders and objects in Data Explorer screen:

Tenant admin view

a Explorer	Data data/ten=pt	Explorer	C Refresh View 1 Upload Objects	Create Folder Delet	Retrie	eve Objects 📰 Q
<mark>/ten-punvs1/</mark> /ten-punvs1/ ubtenant Folders		Name ĵ↓	Size †↓	Last Modified	Туре ↑↓	Action
E_UI_Event_Subtenant_D		DUI_Folder	-			
kt9387ed45df11654931753		123				
ebeacdafb607722abcd4cd61		🗀 1Data /1Data				•
TEST 00fb6270cd1ec7889031384a3b8e26		ABC /ABC				
Not_Delete_Subtenant_2 82848fb473f3b109cb1751d9cb4a		app-config.json	33.00 bytes	Jan 18, 2023, 9:44:44 AM	JSON	
TEST		Azure-Before15.png	135.26 KB	Aug 25, 2023, 9:31:40 AM	PNG	∎@¥
ISce408556d252c58a43c64b3859b0		Brewery Line Architecture.pd	If 2.26 MB	May 4, 2022, 9:54:57 AM	PDF	l • ±

- ① Refresh the page to get the latest data
- Upload the objects
- ③ Creates the new folder
- ④ Delete the objects
- ⑤ Retrieve the object
- [®] Search objects or files with object name, metadata or both
- ⑦ Copy the object path
- ® Displays Object View details and adds the metadata values to the folder and object
- Download the object
- 10 Deleted subtenant symbol

 \times



4.2 Creating a folder in Data Explorer

To create the folder with metadata values in Data Explorer, follow these steps:

1. In the left navigation, click "Data Explorer". The Data Explorer overview page is displayed.

2. In the Data Explorer overview page, click "Create Folder".

Υľ	Folder	Nan	ne														
	ŵ	t	est							~	×]					
	Metad	ata															
									No metadata kev found								
									Please add metadata key								
									Flease duu metauata key								

3. Enter a folder name and click do save the folder.

4.3 Uploading the files or objects to the folder or Data Explorer

Enter the required details to add metadata values for the created folder.

- 4. Click **C** toggle button to hide optional keys.
- 5. Click "Save".
- - If the folder is added with metadata values, then deleting the folder is not possible.
- Folder name cannot contain '/'.
- Folder name can contain only alphanumeric with * ' & \$ @ : + , < > ~ [] " # | ? { } ^`() _ = - characters.

After creating a folder, you	can view the folder details as	s shown below:
		3 4
Data Explorer Folder View Image: Constraint of the second		Copy Path C Back
0UI_Folder		C Refresh View
Path	/0UI_Folder/	
Storage Account	datalake-integ-punvs1-1585223021741	
		6 5

- ① Folder overview details
- 2 Add the metadata values to the folder
- ③ Copy the folder path
- ④ Navigates to the parent folder or Data Explorer
- S Navigates to the folder
- [®] Refresh to update the folder details

4.3 Uploading the files or objects to the folder or Data Explorer

You can upload the files/objects to the folder or "Data Explorer". It is possible to upload the files or objects with different formats.

Procedure

To upload the files or objects into Integrated Data Lake, follow these steps:

L. In the "Data Explorer	" overview page, click	¹ "Upload Objects".
--------------------------	------------------------	--------------------------------

Upload Objects

		e or Browse file
Upto 100ME	per file • File name without special characters	
ß	Import-datasources-1.png 164.66 KB	Ū
		(🗴) Remove all
constracy		show optional keys
noaddide	tailsobj_enum: *	public 🗸
noaddide page2_ke	tailsobj_enum: * y1: *	public 🗸
noaddide page2_ke productlif	talisobj_enum: * y1: * ecycle_fao: *	public ~ Key COMPLETED ~
noaddide page2_ke productlif UI review	talisobj_enum: * y1: * ecycle_fao: *	public V Key COMPLETED V OWINER V
noaddide page2_ke productlif UI review Collecti	tailsobj_enum: * y1: * ecycle_fao: * :* on_2	public V Køy V COMPLETED V OWNER V

2. In the "Path" section,

- Click Add subfolder(s)
- Enter the subfolder name.
- To save the subfolder name, click <a>[
- 3. In the "Objects" section, select the files or objects to be uploaded.

In the "Metadata" section, enter the details to add metadata values.

- 4. Click **C** toggle button to show optional keys.
- 5. Click "Upload".

- A maximum of 30 files or objects with 5 GB per file can be uploaded.
- If duplicate files or objects are uploaded (with same name or different size with same name), the recently uploaded file or object will overwrite the existing file or object.
- If you refresh the page while ongoing upload operation, the browser will prompt the confirmation message.
- You will be notified with a warning message, when you try to access other pages or module during upload.
- The file size greater than 400mb is recommended to download through API.
- Click 🖉 button to change the path.
- Click ^o button to remove the file from the list.
- Uploading in "Time Series Import" folder will not be allowed in Integrated Data Lake.

Result

Uploading of files or objects is successful and the upload status can be viewed.

Upload Status 0 Ongoing 3 Success 0 Failed		 Clear completed
Object	Progress	Size
OUI_Folder/1-Brewery Line - pump_diagram (1).png2050-ui.png	Succesfully uploaded	134.97 KB
0UI_Folder/1-Brewery Line - pump_diagram (1).png2050-ui.png	Succesfully uploaded	134.97 KB
OUI_Folder/1-Brewery Line - pump_diagram (1).pngagent-settings-ui	Succesfully uploaded	80.02 KB

In Data Explorer, click "Refresh View" button to view the uploaded files or objects in the table.

4.4 Adding metadata values to the object

After creating a folder, upload the objects to the folder. Once the objects are uploaded, you can view the object details and add the metadata values.

View object details

The following image shows the object details window:

	2 e - pump_diagram (1).png a values	Copy Path	Download Object	5 Delete Object	6 C Back	
Last updated: Jan 31, 2024, 9:41:34,	AM			U Kerr	resh view	
Storage Class	Hot					
Path	1-Brewery Line - pump	_diagram (1).png				
Size	9.34 KB					
Туре	PNG					

- Object overview details
- ② Add the metadata values to the object
- ③ Copy the object path
- ④ Download the object
- 5 Delete the object
- [®] Navigates to the parent folder or Data Explorer
- ⑦ Refresh to update the object details

Procedure

To add metadata values to the object, follow these steps:

- 1. In the Data Explorer overview page, select the folder and click 🖻 to view the object details.
- 2. Click "Metadata values" tab.
- 3. Click "Add metadata".

Enter the required details.

- 4. Click **C** toggle button to hide optional keys.
- 5. Click "Update".

Data Explorer	Copy Path 🗧 Back
Overview Metadata values	
Search key Q	Show optional keys
page2_key1: *	test
productlifecycle_fao: *	COMPLETED
Update	

4.5 Integrating Integrated Data Lake with Monitor

• 1	Maximum 8 multiple	e values can be added to the object.	
• I	f metadata added to it will be considered	the file which contains special characters (incluin in metadata search.	ding space),
• [f metadata values ar second level or subf	re added to folder then only first level files are ta older files will not be tagged with the metadata	agged,
Result			
The			
ine D	Metadata values are ac	CORECTED SUCCESSIUILY TO THE ODJECT.	2
da	talten-punvs1/ ③		
11	COLFORDER CREATERFOIDERWITCHINK		
	Overview Metadata values		
	Overview Metadata values Object metadata	🔿 Refresh View – 🖉 Update metadata keys	
	Overview Metadata values Cbject metadata Object keys noaddidetailsobj_enum	🔿 Refresh Všew 🖉 Update metodata keys public	
	Overview Metadata values Object metadata Object keys noaddidetailsobi_enum productlifecycle_fao	C Refresh View 🖉 Update metadata keys public WP	
	Overview Metadata values Object metadata Object keys noaddidetailsobi_enum productlifiecycle_fao page2_key1 Image: Compare the second secon	O Refresh View O Update metadata keys public WP page2 key	
	Overview Metadata values Object metadata Object keys noaddididetailsobj_enum productililecycle_fao productililecycle_fao	Refresh View Update metadata keys public wrr page2 key OWNER	
	Overview Metadata values Object metadata Object keys neaddidetailsobj_enum productililecycle_feo productililecycle_feo page2_key1 Uil review Propagated from parent folder(s)		
	Overview Metadata values Object metadata Object keys noaddidetailsobj_enum productililecycle_fao productililecycle_fao III review UII review Government folder(s) Government Classification Government Classification	Ø Refresh Všew Ø Update metadata keys public	
	Overview Metadata values Object metadata Object keys noaddidetailsobj_enum productlikecycle_fao page2_key1 Ull review Ull review Government folder(s) Government Classification neaddidetailsobj/ecobj		
	Overview Metadata values Object metadata Object keys noaddidetailsobj_enum productiliecycle_fao page2_key1 Ull review Propagated from parent folder(s) Government Classification noaddidetailsobj/ccebj folder_rule_key		
	Overview Metadata values Object metadata Object keys noaddidetailsobj_enum productilitecycle_fao productilitecycle_fao productilitecycle_fao proge2_key1 Ull review Ull review Government folder(s) Government Classification noaddidetailsobjecebj Tolder_rule_key folder_key		
	Overview Metadata values Object metadata Object keys noaddidetailsobj_enum productfilecycle_feo productfilecycle_feo page2_key1 Uil review Object keys Government Classification noaddidetailsobjeccabj tolder_rule_key folder_key folder_key atting5at key	Peblic wP poge2 key OWNER OFFICAL scbjrecobjnoaddide Value1 test009 2 22	
	Overview Metadata values Object metadata Object keys noaddidetailsobj_enum productillecycle_feo page2_key1 UI review Propagated from parent folder(s) Government Classification noaddidetailsobjecebj folder_rule_key folder_key/2	Peblic peblic wn page2 key OWNER OFFICIAL scbjrccobjnoaddide Value1 test009 Image: I	
	Overview Metadata values Object metadata Object keys noaddidetailsobj_enum productiliecycle_fao page2_key1 UI review Propagated from parent folder(s) Government Classification noaddidetailsobjeccebj toidet_rule_key folder_key2 toidet_key2 folder tags (Wignet)	Peblic peblic wr page2 key OWNER OFFICIAL sebjrecebjneaddide Value1 test009 12 13 14 14 15 16 17 18 19 19 19 19 10 10 10 11 12 13 14 15 16 17 18 19 19 19 19 19 19 19 19 19 19 19 19 19 19 19 19 19 19 19 <	

4.5 Integrating Integrated Data Lake with Monitor

You can add Integrated Data Lake plugin to Monitor and tag the asset related files or objects using Data Explorer. The assetID of an asset in Monitor is used for tagging the files or objects

from Integrated Data Lake.

After tagging, these files or objects of an asset can be viewed in Monitor using Integrated Data Lake plugin extension.

Procedure

To tag the files or objects from Integrated Data Lake to an asset in Monitor, follow these steps:

- 1. Open the Monitor from Insights Hub Launchpad.
- 2. Select an asset.
- 3. Click "Info" extension.

Explore / A	ssets / Test_Reference_Asset_NEW /	Info			
Filter	Eg 📰 III 💿	Test_Reference_Asset_NEW		Create annotation •••	Today 😡
- 5	Test_Reference_As 12 almdev.TestTypePump Test Asset for automated wdio	Test_Referent	ce_Asset_NEW		🏹 Asset Manager 🔿 Refresh
• \$	Test_Reference_Ass	Test for automated wdio test: DO NO	OT DELETE mailto:rene.joubert@siemens.com		
	aircraftengine aimdev.assettype_rul Performance asset of a device typ	✓ Details	b6b61671b0384f13ac32158f89bd4	18b6	
	aircraftengine 🛱 aimdev.assettype_rul Performance asset of a device typ		Asset ID aimdev / aimdevSUB / Test_Reference Hierarchy	nce_Asset_NEW	
	aircraftengine		core.basicdevice Basic Core Type Performance		
	All_Static_Variables				

- 4. Copy Asset ID.
- 5. In Integrated Data Lake, open Data Explorer.
- 6. Click of the file or object and click "Metadata Tags" tab.
- 7. Click "Add Tag", paste the Asset ID.
- 8. Click "Save".

For more information about how to add a plugin to Insights Hub Monitor, refer to <u>Add plugins</u> to <u>Insights Hub Monitor</u>{target="_blank"}.

4.6 Searching the files or objects in Data Explorer

The files or objects can be searched in Data Explorer by providing object name, metadata value or both. You can perform actions such as copying the path to the clipboard, view object details and download the object from the "Search view".

4.7 Deleting the folder or object in Data Explorer

Metadata search is not possible, if metadata added to the file contains special characters (including space).

Procedure to search

To search the files or objects with Object name in Data Explorer, follow these steps:

- 1. In the "Data Explorer" overview page, click 💷 to open "Search view".
- 2. Select object name or metadata value with a condition or both parameters using an operator.
- 3. Enter file or object name or search text.
- 4. Click Search.

If the file or object with the appropriate option is not recognized, then search by selecting both Object name and Metadata value parameters with condition and operator.

Result

The file or object details will be displayed and you can perform the actions from the Search view.

4.7 Deleting the folder or object in Data Explorer

To delete the folder or object in Data Explorer, follow these steps:

1. In the Data Explorer overview page, select the folder or object.

Data data/ten-p	Explorer	C Refresh View	<u>↑</u> Upload Objects	Create Folder 🗍 D	elete 🎤 Retri	eve Objects 📃 🔍
	Name †↓		Size ↑↓	Last Modified	Type ↑↓	Action
	OUI_Folder		-			•••
	123					
	Data /1Data					▯๏⊕
	ABC					
	afterIntegDeployment					[]@⊕
	analytics					∎∞⊕
	C ArchivalRuleTest					•

2. Click 🔍 🚥 .

3. Check to confirm.

Delete Folders/Objects

tior	n: Folders: 53 Objects: 15				
7	Name	Path 11 /testFolder/	Type ∏⊥ ⊨older	Size ↑↓	Action
	🗅 testfolder	itestfolderi	Folder		
	🗅 testing	/testing/	Folder		
	🗅 TSI	/TSI/	Folder		

4. Click "Delete".



- Deleting a folder is allowed only if the folder is empty and no metadata value is added on the folder level.
- You can select single or multiple files.
- Click ^o button to remove the file from the list.

Time Series Import

5.1 Importing data into Integrated Data Lake

The "Time Series Import" service allows the authorized users to import the historical IoT time series data to Integrated Data Lake. This enables an on-demand time series upload for analytics and machine learning tools.

Procedure

To import IoT time series data into Integrated Data Lake, follow these steps:

In the left navigation, select the "Time Series Import" tab and click "One Time Import". The 1. "Import Task Details" screen is displayed.



2. The "Import Time Series Data" screen appears.

nport Time Series Da	ata	
Task Name	Edge Analytics	
Destination Path	TSI/Edge	
rom	Mar 8, 2024, 12:56 PM	
ō	Apr 11, 2024, 12:56 PM	
ssets/Aspects		
bulkDeleteJob2	2e4f27557c24f709d053020eb613143)	
		Close Save

- 3. In the "Basic info" section, enter the "Destination Path" and the "Task Name".
- 4. Expand the "Date/time Range" option to set the date and time.
- 5. Click "Date/Time Range" to select the date and time range and click "Set".

 \times

Assets 🔿	Aspects		Pre	view
Filter		Q	Assets: 4 Aspects: 3	🗮 Clear Selection
✓ bulkDeleteJob1	DL_AspectType		TestAsset200	
> Z TestAsset200	DIL_TSI_ASPECT		IDL_TSI_ASPECT (Id: e2e4f27)	557c24f709d053020eb61314
bulkDeleteJob2	neweaspect		TestAsset300	
TestAsset300			E2E_IDLUI_Aspect (Id: E2E_ID	LUI_Aspect)
E2E_IDLUI_Asset			IDL_Asset	
E2E_IDLUI_Asset_FM			neweaspect (ld: a9d171dd68	754831b9d58942d7045a83)
E2E_IDLUI_PluginNoData				
IDL_Asset				

6. Expand the "Assets/Aspects" option to select the assets and corresponding aspects.

To refresh the asset list, click \bigcirc .

7.Select tenant or subtenant to get the respective assets from the "Assets" list and corresponding aspects from the "Aspects" list.

8.Click "Preview & Save".

Import Time Series Data

Task Name	Edge Analytics	
Destination Path	TSI/Edge	
From	Mar 8, 2024, 12:56 PM	
То	Apr 11, 2024, 12:56 PM	
Assets/Aspects		
bulkDeleteJob2	2e4f27557c24f709d053020eb613143)	
		Close Save

9.Click "Save".

10.The "Import Task Details" status "Success" screen appears.

5.2 Importing the scheduled Time Series data

Import Task Details

14		Province and
0	Nefresh Task	U Delete lask

Edge Analytics Task Name		Success Status
TSi/Edgel Destination Path		
Jan 6, 2021, 3:44 PM From	Jan 14, 2021, 3:44 PM To	
Completed Progress	104 files imported File Count	
eefc911752634a85aad7bf2a46116f54 Asset lds		
Aspects		
Aspect Name 1h	Aspect ID 1	
connectivityStatus	connectivityStatus	
firmwareStatus	firmwareStatus	
status	status	

11.Click "Refresh Task" button to get the latest status of the import task. Click "Delete Task" button to delete the task from the "Task Schedule" pane.

Integrated Data Lake application will not allow the user to import the duplicate data based on "Date/Time Range", "Assets" and "Aspects" information. The application will provide the information about the existing bulk imports with the "Asset ID".

- A user is not allowed to select more than 3 months data to import.
- The Time Series data (parquet files) transferred to cold storage (typically within 7 days) and will be available in the Data Lake.
- There is a change in the namespace of the Time Series data imported into Integrated Data Lake.

Result

The historical IoT time series data will be imported to Integrated Data Lake and success status will be displayed with the number of file count.

5.2 Importing the scheduled Time Series data

In Time Series Import, you can schedule the import data. The import data can be scheduled with the frequency of "Daily", "Weekly" or "Monthly". Based on the frequency selection, your data will be imported as per the scheduled task.

User Interface

The "Schedule Import" is accessible from the Time Series Import tab.

Schedule Import Create Schedule Import	Schedule Import Details
Filter	Currently, no schedule import is created for time series data. Please create schedule import

- ① Create Schedule Import jobs
- 2 Filter or search the list of Schedule Import jobs
- ③ Displays the selected Schedule Import Details

Procedure

To create the scheduled IoT time series job, follow these steps:

In the left navigation, select the "Time Series Import" tab and click "Schedule Import". The

1. "Schedule Import Details" screen is displayed.

Click Create Schedule Import

- 2. The "Import Time Series Data" screen is displayed.
- 3. In "Basic Info" section, enter the "Destination Path" and the "Task Name".



- 4. In "Schedule Details" section, choose any one "Frequency" to schedule the import:
 - Daily: This will schedule the job to run every day.

▼ Schedule Details		
Frequency: * (?)		
Daily Weekly Monthly		
5/1/24		

Weekly: This will schedule the job to run once in a week on selected day of the week. Ensure the end date of the job is far enough to execute the at least 1 execution of

• the job.

▼ Schedule Details	
Frequency: * ⑦ Daily Weekby Monthly	
Day of the Week: * Monday	
End Date: *	
5/1/24	

Monthly: This will schedule the job to run once every month. Ensure the end date of the job is far enough to execute the at least 1 execution on the job. There are two

• option available in monthly schedule:

Schedule Details
 Frequency: * ?
 Daily Weekly
 Day of the Month: *

2 End Date: * 5/1/24

- On the selected day of the month
- On the last day of every month.

Last date of the Month

/

Job runs on the scheduled time and fetch the data one day prior to the execution date.

5.In "Assets/Aspects" section, select the Asset and Aspect.

Assets 🕜	Aspects	Preview
Filter	Q	Clear Selection E2E_IDLUL_Asset LE2E_IDLUL_Aspect (dd: E2E_IDLUL_Aspect) buikbeletsiob1 L newwaspect (dd: a9d171dd68754831b9d58942d7045s83) IDE_Asset L newwaspect (dd: a9d171dd68754831b9d58942d7045s83)
/		

6.Click "Preview and Save".

7. Check the job preview and click "Save".

The status of the created job is described below:

- Active It is the status of the job after creation. In "Active" status, you can extend "End Date" of the job.
- Inactive It is the status of the job if any of "Asset/Aspect" from the job is deleted.
- Expired It is the status of the job after "End Date" is met. You have to delete the job and create a new one after it expires.
- Maximum limit to schedule the jobs is 10 for all users (tenant + subtenant).
- Only "Success" and "Failed execution" jobs can be cleared.

Result

Overview

The scheduled Time Series job is created successfully.

Schedule Import Details

Executions

	🗍 Dele	te Ta
Edge	(LEINO)	
Name	Status	
Edge		
Destination Path		
data/ien=punvs1/TSI/Edge/		
Storage Path		
Apr 14, 2024 📝 🤕	On day 2 of the month Scheduled	
End Date		
prathibha.bellary@siemens.com	Apr 12, 2024, 2:38:00 AM	
Created By	Last updated	
datalake-integ-punvs1-1585223021741		
Storage Account		
Assets & Aspects		
√ Asset Name ↑ ⊾	Asset ID ↑↓	
> bulkDeleteJob2	06cfe2fa151a4cc8b7a8c94302f0a586	
> E2E_IDLUI_Asset	1c00ab11f2ee472ab2e5f433e1f9eb8f	

In "Schedule Import Details", click "Executions" tab for the outputs.

5.2 Importing the scheduled Time Series data

Schedule Import Details

Executions					
s and Failed execution(s) jobs can be cle	ared.		Û	Clear Execution Job	() Refresh
	From†↓	To↑↓	Files †↓	Status↑↓	
t data_CreatedOn_2022-05-06	2022-05-05	2022-05-06	10	Success	
	s and Failed execution(s) jobs can be cle	s and Failed execution(s) jobs can be cleared. From 1↓ rt data_CreatedOn_2022-05-06 2022-05-05	s and Failed execution(s) jobs can be cleared. From 1 To 1 t data_CreatedOn_2022-05-06 2022-05-05 2022-05-06	Executions Image: Total State St	Executions Image: Clear Execution Job s and Failed execution(s) jobs can be cleared. Image: Clear Execution Job From 1 To 1 Files 1 Status 1 Status 1 rt data_CreatedOn_2022-05-06 2022-05-06 10 Success

Cross Account Access

6.1 Enabling Cross Account access

Environment administrator can enable or revoke the cross account access for the AWS account. The administrator can also modify the relevant access to the specific prefixes for the folders in Integrated Data Lake. For more information, refer to <u>User rights in Integrated Data Lake</u>.

Region deviation

Cross account access is applicable only for Region Europe 1.

Procedure

To enable cross account access for the AWS account, follow these steps:

1. In the left navigation, click "Cross Account". The Account Details screen is displayed.



2. The "Cross Account Access" screen appears.

Edit Cross Account Details

, -	ccount Name: *
	565037524705
4	ccount Number: *
	565037524705
(iccount Number must be 12 digit number only.)
C	Select Subtenant
c	escription: *
	test
2	51 characters left.

3. Enter the "Account Name".

Save Cancel

4. Enter the valid AWS "Account Number" and "Description".

1

- Account name field is user defined.
- A user should have a valid 12 digit AWS account to enable the "Cross Account".
- Description field is mandatory to enable the cross account.

5.The subtenant option can be selected, if the AWS cross account access is for a subtenant.6.From the "Select Subtenant" drop-down list, "Choose a subtenant" as per the requirements.7.Click "Save" button.

🔿 Refresh View 🖉 Edit Cross Account 📋 Delete Cross Account

The "Account Details" enabled screen appears.

Account Details

8.Click "Edit Cross Account" button to edit the cross account.9.Click "Delete Cross Account" button to delete the cross account.

Result

Cross Account access for a specific Europe 1 will be created. You can now create Cross Account Accesses to give access to specific folders.

6.2 Managing Cross Account accesses

You can manage the "Cross Account Accesses" by providing access to the specific folders based on the requirement and grant the permission to read, write or delete access as per the requirements.

Procedure

To manage the cross accounts accesses, follow these steps:

1. In the left navigation, click "Cross Account". The Account Details screen is displayed.

- In the "Account Details" screen, click the "Add Accesses" button.
- 2. The "Add Access Details" screen appears.

dd Access Details	\times
Prefix Path: *	
Brewery/Lobrau/Europe/Netherlands/Amsterdam	
Permission: *	
Read Delete Write	
195 characters left.	
Status	
Enabled	

- 3. Enter the "Prefix Path" to specific account access path on which the accesses to be provided.
- 4. Select the "Access Permission" (Read, Delete or Write).
- 5. Enter the "Description" regarding the access details.
- 6. Click "Status" button to enable or disable the "Access Permission".

Click "Save".

7. The account access details will added to the list.

Add Accesses						
Prefix/Path 1	Storage Path ↑↓	Permission	Status	Description	A¢ţions	Ļ
Brewery/Lobrau/Europe/Netherlands/Amsterdam	datalten=punvs1/BreweryILobrau/Europe/Netherlands/Amsterdam	Read	Enabled	Path for the file to be accessed from the Native AWS account	Ø	

- 8. Click the 🖉 icon to edit the account access permission.
- 9. Click the 🔟 icon to delete the account access.
- A maximum of 5 prefixes can be enabled across one or multiple cross accounts.
- A maximum 10 cross account accesses can be created in a disabled state.
- Cross Account is set to be accessed from the native AWS tools.

6.3 Integrating AWS Athena tool with Integrated Data Lake

To integrate AWS Athena tool with Integrated Data Lake after enabling cross account access, follow these steps:

- 1. Open AWS Athena tool.
- 2. Create the table in Athena

		Services -	Resource Group	• •	• (۵.	OPS_CloudAdminEngineer/Purs.	Freek	let -	Support =	
	Athena	Query Editor	Saved Queries H	istory	AVVS Clue Data Catalog (2 Wongroup : primary		Settings	Tutorial	нер	What's ne	0
() (2	Database Interveny Filter toles and via interveny The selected database Viewei (2) Viewei (2) Viewei (2) Viewei (2)	ers	Course table	¢) a	New query 1 New query 2 O New query 3 O New query 4 O New query 5 O New query 5 1 (200° 1451.2 "production"; Constance in Child and a constance in	0	•	Form	at query	Char	•

- Click to create table
- ② Choose the option "from S3 bucket data"
- 3. Add the details related to database, table and input data.
 - Database: Select the existing database or create a new by selecting "Create a new database".
 - Table Name: Enter the table name.
 - Location of Input Data Set: Path provided to access while configuring the cross account accesses.

Location of input data set would look like "s3://+<<storage account>> + <<storage path>> and path should end with '/'. For example:

- Storage Account = datalake-prod-a-starter-576071197214
- Storage Path =

data/ten=starter/Brewery/Lobrau/Europe/Netherlands/Amsterdam

 Location of Input Data Set = s3://datalake-prod-a-starter-57607119 7214/data/ten=starter/Brewery/Lobrau/Europe/Netherlands/Am sterdam/

4.Click "Next".

5.Select "Data Forma	t".		
Athena Query Editor Saved Queries History	AVIS Give Data Catalog (2 Workproxp : primary	Settings Tutorial Help What's new	
ACTOR © Active	Databases > Add table Mar 1 Starte Katarata Mar 2 Starte Mar 2 Starte Mar 2 Starte Kata		
1			
File uploaded in t	he Data Explorer should be .csv	file.	
5.Add column name 7.Click "Next".	and column type corresponding to	the data in the .csv file.	

8.Click "Create Table".

Result

The table is created successfully and now you can query the data in AWS Athena.

6.4 Integrating Aliyun OSS Web Console with Integrated Data Lake

To integrate Aliyun OSS Web Console with Integrated Data Lake after enabling cross account access, follow these steps:

1. Open Aliyun OSS Web Console.



- 3. Click on the "+" to add the details related to access path and input data.
 - Region: The region of Integrate Data Lake Storage Account, default is cn-shanghai.
 - Bucket: Integrate Data Lake Storage Account name.
 - File Path: Storage Path provided to access while configuring the cross account accesses.

添加自定义路径	2	×
* 地域	华东2 (上海) ン 选择已授权 Bucket	
* Bucket	datalake-integ-cdiot0-1627437476734 35/63	
文件路径	data/ten=cdiot0/NativeAliyunAccount	
1		
For example:		
Storage Acco	unt=datalake-integ-cdiot0-16274374767	34
• Storage Path	= data/ten=cdiot0/NativeAliyunAccount	
4.Click "OK". 5.Select your adde	d path.	_
对象	存储	
概览		

Buc	ket	列	表
000			100

我的访问路径	鐐	+	^
--------	---	---	---

datalake-integ-cdiot0-162743...

资源包管理

There may some "Access Denied" pop up, as we only granted the Read Permission for this account.

Result

The data in Aliyun OSS Web Console is displayed and also user can access files under the Integrated Data Lake path using the account credentials through Aliyun OSS SDK or other Aliyun Native tools.



Service Principal

7.1 Creating Service Principal

You can create a Service Principal to configure the native tools of Microsoft Azure to access the files or objects in Integrated Data Lake. By using the Service Principal, you can call Azure Data Lake Storage (ADLS) APIs directly. You can generate Service Principal for each environment with the specific access limited to your own data.

The Service Principal's ClientId or Secret can be managed as per the guidelines.

Region deviation

Service Principal is available for Virtual Private Cloud.

Procedure

To configure the native tools of Microsoft Azure with Service Principal, follow these steps:

1. In the left navigation, click "Service Principal". The Service Principal screen is displayed.

2. In the "Service Principal" screen, click G Create Service Principal.

Create Service Principal

Name: *	
Enter Service Principal Name	
50 characters left.	
Path: *	
1024 characters left.	
Permission: *	
Read Write	
Please choose at least one permission.	
Select Subtenant	

Save Cancel

- Enter the "Name".
- Enter the path for "Service Principal".
- Specify the access permission (Read, Write or Read and Write)

The subtenant option can be selected, if the Service Principal is for a subtenant.

7.2 Managing Service Principal

Name		Permission	
datalake-rc-punazdl/data/ten=punazdl/Data Storage Path			
idItntprovisioningrc Storage Account			
Service Principal Details			
Service Principal Details			
Secrets	۲. ۲.		
	503		
Current	ly, no secret is added.		
Please add	a secret for service principal.		

Maximum of 5 Service Principals can be created in Integrated Data Lake.

A secret is created for the Service Principal to access the files or objects from the specified path. To create a secret, refer to <u>Managing Service Principal</u>.

7.2 Managing Service Principal

You can manage the "Service Principal" by adding a secret to configure with Microsoft Azure Native tools.

Procedure

To manage the service principal, follow these steps:

1. In the left navigation, click "Service Principal". The Service Principal screen is displayed.

2. In the "Service Principal" screen, click "Add Secret".

Duration days: 90 *		
Description: *		
Secret for Service Principal to integrate with Powe	er Bl	
100 sharester left		

- Select the duration from minimum 1 to maximum 90 day.
- Enter the description.
- 3. Click Save.
- 4. Click 🛅 to copy the generated secret and confirm the secret is copied.
- 5. Click Close.

- Maximum 2 Secrets can be added for each Service Principal in Integrated Data Lake.
- If the Secret is added, the Service Principal cannot be deleted.
- The duration of the secret is left with 30 to 10 days, then symbol will appear.
- The duration of the secret is left with 10 to 1 days, then symbol will appear.

Result

The secret for the Service Principal is successfully generated. The Service Principal can now be configured with Microsoft Azure Native tools.

7.3 Configuring Azure Power BI tool with Integrated Data Lake

To configure Azure Power BI tool with Integrated Data Lake, follow these steps:

7.3 Configuring Azure Power BI tool with Integrated Data Lake

7 N		Untitled - Power BI Desktop		Signi	• • -
Re Home Home	Insert Modeling View Help Get Excel Bacel Power BL datasets Server data sources Power BL datasets SEX Server Analysis Services SEX Server Analysis Services SEX Server More. More.	Danform Richards data- Garrier Tearrier Carrier	New Oack Shee Catalones Shee Catalones Shee Shee > Ø Fritters > Add data fields here Fitters on all pages Add data fields here	Visualizations > Le Li Li Li Li Li Li Visualizations Composition Visualizations Composition Visualizations Composition Visualizations Composition Coss report Coss repo	Fields ,P Search

- 2. In Power BI tool, open "Get data" and select "More".
- 3. In Get Data screen, search for "python" and choose "Python script".

Get Data		<
python X	All	
All Other	YTTNON SCHOT	

4. Click Connect.

×

5. Configure the python script connector

Python script Script #plt.show() #import matplotlib.pyplot as plt #ax = plt.gca() #dataset.plot(kind='line',x='File',y='File Size', ax=ax) #dataset.plot(kind='line',x='File',y='Difference', color='red', ax=ax) #dataset.plot(kind='bas',x='File',y='Difference', color='green', ax=ax) #jlt.show() #import matplotlib.pyplot as plt #dataset.plot(kind='bas',x='File',y='Difference') #jlt.show() The script will run with the following Python installation C(Python38. To configure your settings and change which Python installation you want to run, go to Options and settings.

• Sample Python Script to be used as given below:

```
??? SamplePythonScript
 ```python
 from pprint import pprint
 import os, uuid, sys
 from azure.identity import ClientSecretCredential
 from azure.storage.filedatalake import DataLakeServiceClient
 import pandas as pd
 import matplotlib.pyplot as plt
 from io import StringIO
 def load_file_in_powerbi(file_system_client):
 try:
 directory client = file system client.get directory clien
t(sampledata_directory)
 file client = directory client.get file client(sampledata
filename)
 download = file client.download file()
 downloaded_bytes = download.readall()
 bytes string = str(downloaded bytes, 'utf-8')
 data_stringio = StringIO(bytes_string)
 global data
 data = pd.read_csv(data_stringio)
 print(data)
 except Exception as e:
 print(e)
 def initialize_storage_account_ad(storage_account_name, client_i
d, client_secret, tenant_id):
 try:
 global datalake_service_client
 credential = ClientSecretCredential(tenant id, client id,
client_secret)
```

```
datalake_service_client = DataLakeServiceClient(account_u
rl="{}://{}.dfs.core.windows.net".format("https",
 storage_account_name), credential=credential)
 except Exception as e:
 print(e)
 def get file system client(file system name):
 try:
 file system client = datalake service client.get file sys
tem_client(file_system_name)
 return file system client;
 except Exception as e:
 print(e)
 def get_directory_client(file_system_client, directory_path):
 trv:
 directory_client = file_system_client.get_directory_clien
t(directory_path)
 return directory_client;
 except Exception as e:
 print(e)
 def upload_file_to_directory(directory_client, src_file_path,file
name):
 try:
 file client = directory client.create file(file name)
 local_file = open(src_file_path, 'r')
 file contents = local file.read()
 file_client.append_data(data=file_contents, offset=0, len
gth=len(file_contents))
 file_client.flush_data(len(file_contents))
 except Exception as e:
 print(e)
 def list_directory_contents(file_system_client, directory_path):
 try:
 paths = file_system_client.get_paths(directory_path)
 return paths
 except Exception as e:
 print(e)
 def download_file_from_directory(directory_client, file_name):
 try:
 local_file = open(file_name, 'wb')
 file_client = directory_client.get_file_client(file_name)
 download = file_client.download_file()
 downloaded bytes = download.readall()
 # bytes_string = str(downloaded_bytes,'utf-8')
```

```
data_stringio = StringIO(bytes_string)
 # data = pd.read_csv(data_stringio)
 # completedData = data.fillna(method='backfill', inplace=
False)
 # data["completedValues"] = completedData["SMI missing va
lues"]
 # pprint(data)
 # pprint(vars(data))
 # pprint(data.head())
 # data.plot(kind='bar', x='Day', y='completedValues', col
or='red')
 # plt.show()
 local_file.write(downloaded_bytes)
 local file.close()
 except Exception as e:
 print(e)
 def download_hierarchy_directory(file_system_client, directory_pa
th):
 try:
 directory_client = get_directory_client(file_system_clien
t, directory path)
 paths_list = list_directory_contents(file_system_client,
directory_path)
 for path in paths_list:
 if path.is directory == True:
 download_hierarchy_directory(file_system_client,
path.name)
 else:
 # print(path.name + '\n')
 # pprint(vars(path))
 path_split = path.name.rsplit("/", 2)
 if path_split[1] == directory_path.rsplit("/", 1)
[1]:
 file name = path split[2]
 print(file name + '\n')
 download file from directory(directory clien
t, file_name);
 except Exception as e:
 print(e)
 `if __name__ == "__main__":`
 tenant_id = "xxxxxxxx-xxxx-xxxx-xxxx-xxxx-xxxx"
 client_secret = "xxxxxxx-xxxx-xxxx-xxxx-xxxx-xxxx"
```

<pre>storage_account_name = "idltntprovisioningrc"</pre>
file_system_name = "datalake-rc-punazdl"
directory_path = "data/ten=punazdl/powerbi"
sampledata_directory = "data/ten=punazdl/powerbi/sampledata"
sampledata_filename = "file-size-upload.csv"
initialize_storage_account_ad(storage_account_name, client_i
d, client_secret, tenant_id)
file_system_client = get_file_system_client(file_system_name)
<pre>paths = list_directory_contents(file_system_client, directory</pre>
_path)
directory_client = get_directory_client(file_system_client, d
<pre>irectory_path)</pre>
<pre>load_file_in_powerbi(file_system_client)</pre>

Application ID	Location
tenant_id	Tenant ID will be available on the Service Principle page in Data Lake.
client_id	This is the application ID that can be copied from the Service Principle page in Data Lake.
client_secret	This is the Service Principle secret that was generated and copied.
sampledata_directory	Path on which Service Principle is generated.
sampledata_filename	File to be pulled into Azure Power BI.

#### 6.Click OK to load data into Azure Power BI.

	Q	data				
splay Options *	G	File	Type	File Size	Updated File Size	Difference
Python [1]		C1	Binary	2882	3648	267
Z 🔲 data		C2	Code	8977	12032	3055
- LD 000		C3	Text	5423	7717	2294
		C4	Image	3242	4146	904
		C5	Video	6277	8202	1925
		C6	Audio	6950	7471	522
		C7	Binary	5504	7547	2043
		CB	Code	1189	1373	2.84
		C9	Text	4505	5232	726
		C30	image	5250	6437	1187
		C11	Video	5491	6532	1041
		C12	Audio	621	890	269
		C13	Binary	7993	20489	2496
		C14	Code	1168	1353	185
		C15	Text	852	925	74
		C16	image	9669	12864	3295
		C17	Video	983	1324	342
		C18	Audio	1301	1465	264
		C19	Binary	8215	9514	1299
		C20	Code	8008	11399	3392
		C21	Text	7849	9557	1708
		C22	image	2677	3185	508
		C23	Video	1650	2361	711
		C24	Audio	6315	6926	622

7.Click "Load".

# Result

The data is successfully loaded in Azure Power BI. You can now visualize your data in Azure Power BI.



# **Event Subscription**

# 8.1 Creating an Event Subscription

Event Subscription allows you to subscribe the events to get notifications. You can register the destination Service Bus for Azure and Simple Notification Service for AWS to get notifications, which will be published by Integrated Data Lake service. These notifications include object events like create, update or delete in the environment prefix. You can add, view, edit and delete event subscriptions.

If the permission to send notification to the Service Bus or Simple Notification Service topic is removed or if there is any misconfiguration, the tenantAdmin is notified via email to check and respond. Even the status of the subscription will be changed to "Inactive" on the user interface. You can change the status to "Active" by resolving the configuration in the user interface.

Subscription name is not mandatory. Incase the name is not provided, default name for the subscription will be chosen as (subscription\_<<unique\_ident ifier>>).

# Procedure

3. Click Create Event Subscription

Cancel

To subscribe the events with the notifications, follow these steps:

1. In the left navigation, click "Event Subscription". The Event Subscription screen is displayed.

2. In the "Event Subscription" screen, select the Tenant Subscriptions and click  $\bigodot$ .

Name:	
Subscription	
38 characters left. Event name will be generated automatically in case not provided.	
Path: *	
Demo	
496 characters left.	
Destination: *	
Planning	

- Enter the "Name".
- Enter the path for storage.
- Enter the path for destination.
- 4. Click "Save".
  - You can only change the status from "Inactive" to "Active".
  - Maximum 15 Event Subscriptions can be created for each environment.
  - If the subtenant is deleted, you can only view its existing event subscriptions and delete them if not required.

# oData Contract

# 9.1 Adding and managing oData Contract

The oData Contract allows you to add and manage the contracts of selected folders path to be used in the Mendix app via the Mendix Data Hub.

To access the data using Mendix Data Hub, you need to create oData contract(s) to allow access based on selected folder. For more information about this process, refer to <u>Data Hub</u>

<u>Guide</u>{target="\_blank"}.

oData Contract Status

Status	Description
Published	Contract is published to Mendix Data hub
Publishing	Contract is not published due to network issue while Publishing to Mendix Data hub
Not published	Contract is ready to be published to Mendix Data hub

# Procedure

To add and manage the oData contract, follow these steps:

#### 1. In oData Contract, click "Add contract".

**Create mendix contract** 

▼ Metadata	
Description: *	
Pump Raw Data	
2.62 zharaztere left	
Contract Names 1	Mandan I
Contract Name: *	version: *
Pump_appication 184 characters left. Used for searching the contract.	VI 198 characters left. Used for searching on Mendix Datahub
Environment name: *	
IDL ourse ansistion	
184 characters left. Used for searching on Mendix Datahub ('idl_' will be added as prefix it different	tiate it from other apps)
Environment type: * Sandbox Non-Production Production	
▼ Folder Selection	
Available folders Available folders	Selected folders These folders are published into your contract 2 of 20 selected
Search	Search Q
□ <u>□</u> ABC >	-> Pumo E1
	→ PumpF1 ×
	Pump-F2 ×
	ruprz
C LongfoldernameLongfoldername_LongfoldernameLongfoldername?	
Summary Pump_application will be created with 2 folders.  Download Contract Download contract, to store it at your place and to use it within different syste Mondo.  Publish contract to Mendix Data Hub Course this option to establish your contract with the Mendix Data Hub.	mi as
Only users within same e-mail domain as the creator of first contract More information can be found at the MindSphere lioT for Makers docum	t can see the contracts on Mendix Data Hub mentation

- 2. In "Create mendix contract" screen, configure the following sections:
  - In "Metadata" section, enter the contract details for the application.
  - In "Folder Selection" section, select the required folders for the contract. **Note**:

Maximum 20 possible folders can be selected for a single contract.

In "Summary" section, select "Download" and "Publish contract to Mendix Data Hub".
 Note:

Downloading a contract is optional.

- 3. Click "Submit".
- 4. In Mendix "Authorize access to account" screen, confirm and accept the agreement.

9.1 Adding and managing oData Contract

Maximum 50 possible contracts can be created in oData Contract.

# Result

The oData Contract is successfully added and you can also view the contract in Mendix data hub.

# Metadata Management

# 10

# 10.1 Exploring Metadata Management

Metadata Management is a key element of the data management in the Integrated Data Lake application. It involves the systematic organization, storage, retrieval and maintenance of metadata. Metadata Management includes information on the characteristics, origin, usage and connections of the actual data stored in the Integrated Data Lake.

In Integrated Data Lake, metadata is available in the form of values and can be provided in folders or objects. Metadata values provides a way to categorize content, focus on key concepts or themes. Integrated Data Lake introduces the structured approach of metadata by utilizing key-value pairs. Users can configure metadata keys, metadata collections, and define rules that control the behavior of these collections.

Metadata Management is a well-organized and functional behavior Integrated Data Lake, which serves as a fundamental framework and plays an important role in enhancing user decision, data quality and contributing to the overall success of data-driven initiatives.

Metadata Management is available only for Virtual Private Cloud.

Metadata Management offers the following benefits:

- Metadata Management enables efficient data exploration by providing detailed information about the contents of the Integrated Data Lake. User can easily search and locate relevant datasets based on the attributes such as file type, creation dates or keywords.
- Metadata Management enhances raw data by providing insights into its structure, format and meaning. In the large and complex Integrated Data Lake environments, it is essential for users to understand the context of the data to ensure precise interpretation and effective utilization.
- Metadata Management is required for enforcing access control policies and ensuring restricted access. It plays an important role in providing conditional access permissions within the access control policies, which are essential for data security.
- Metadata Management enables connecting various consumer applications to the data storage, enabling Integrated Data Lake as a single source of data storage.

The following image shows the user interface of the metadata collection screen:

10.2 Overview

bal 34 keys					🕀 Add Key	(?
ault metadata collection				Filter	by: Draft Published	
enumkey_ui_longvalue Enum + Rule Enabled UKML_ML22enumval1enumval1enumva UKML_ML24enumval2	💽 🗸 🖉 🗍	Mds_581875555555555555 🗡 🛛	raft 💽 🗸 🖉 🗍	A2 stringlist key 🛞 StringList	ØŪ	
A3 stringlist key Stringlist	ÛÛ	A4 stringlist key StringList	Ø Û	<b>a_stringList key</b> StringList	ØÛ	
<b>alphabetic key</b> String	Û	Apha Numeric key String	Û	emummaxiistmax 🔇 EnumList 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,	2 Ū	-4
emummaxmax Enum * Rule Enabled 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14	/ D	folder_rule_key Enum • Rule Enabled Value1, Value2	00	Government Classific (*) Enum * Rule Enabled OFFICIAL, OFFICIAL_SENSITIVE, SECRET	ØÛ	
<b>key_stringlist</b> (C) StringList	ÛŪ	keyvsm String	ÛÛ	noaddidetailsobj String	ØŪ	
		K < 1 2 3	k <			
lection_2				Edit colle Filte	r by: Draft Published	5
key2	Ø Û					

- ① Adds a new custom collection.
- 2 Adds a new key in global collection.
- ③ Filters the keys available in global collection by draft or published status.
- ④ Displays the list of keys available in global collection.
- ⑤ Edits a custom collection.
- 6 Adds a new key in custom collection.
- Displays the list of keys available in custom collection.

## 10.2 Overview

Metadata collection is the systematic process of collecting metadata keys that manage all the relevant metadata information associated with the specific dataset or system. In custom metadata collection, metadata keys acts as identifiers for a specific attributes, characteristics or properties of the data by providing a structured overview of the dataset. This approach enables the user for efficient retrieval and management of the metadata, contributing to the enhanced data understanding and overall system functionality.

Metadata collections are classified into three categories.

**Global collection**: Global collection is a default collection created by the system when the initial key is defined in the metadata collection. By default, the global collection is always in published status. Users can directly use this collection to define <u>Metadata keys</u>.

**Custom collection**: Custom collections are user created collections to define metadata keys. Admin can create up to 50 custom collections in the system. By default, any custom collection created by users are in draft status and it is changed to published once the collection is published.

In the metadata collection screen, select a custom collection and click **\*\*\*** to view the following options.

► docutest  Praft	🖉 Edit collection 🕀 Add Key 🗰
▶ gukteyukteyk <mark>∕ Draft</mark>	⊘ Edit coll
► MKV_Collection	

- ① View the details of the collection.
- ② Adding a rule to the collection.
- ③ Publish the collection.
- ④ Delete the collection.
- When the collection is in draft status, "View details", "Add Rule", "Publish" and "Delete" options are enabled.
- When the collection is in published status, only "View details" and "Add Rule" are enabled.

**Reserved collection**: Reserved collections are created, managed and are used by the system for the metadata like file type, file size, created date etc. This collection is always in published status. For more information on adding a new collection, refer to <u>Adding a collection</u>.

# 10.3 Adding a collection

It is only possible for the user to create custom collections to define the keys. To add a new custom collection, follow these steps:

In the left navigation, click "Metadata Management". The Metadata collection overview

- 1. page is displayed.
- 2. Click "Add Collection".
- 3. In the "General" section,
  - Enter the "Display Name" and "Description".
  - By default, "Unique Identifier" is automatically filled with the same name as "Display Name".

10.3 Adding a collection

Display Name: *	Unique Identifier: *
NewCollection	newcollection
87 characters left.	87 characters left.
Description: This is for demo	

In the "Metadata Keys" section, click "Add Key". For more information to add a key, refer to

5. Adding a Key.

Click "Next".

6. To return back to the "General" section, click "Back".

0	General	
ſ	Label: *	Key: *
	NewKeyLabel	newkeylabel
	89 characters left.	89 characters left.
	Description:	
	This is for demo	
	239 characters left.	
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0	Data type for value          Data type: *         Enum values         Values 1 of 300         140         47 characters left.            • Add value    Additional details          Searchable If checked, key and its value can be used to parts on the searchable	xerform search
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0	Data type: *         Enum values         Values 1 of 300         140         47 characters left.            • Add value    Additional details           Searchable If checked, key and its value can be used to point         Apply on: • ③         • Objects       Folders	xerform search
0	Data type for value          Data type: *         Enum values         Values 1 of 300         140         47 characters left.            • Add value    Additional details          Searchable It checked, key and its value can be used to point the checked, key and its value can be used to point the checked, key and its value can be used to point the checked, key and its value can be used to point the checked, key and its value can be used to point the checked, key and its value can be used to point the checked, key and its value can be used to point the checked, key and its value can be used to point the checked, key and its value can be used to point the checked, key and its value can be used to point the checked, key and its value can be used to point the checked, key and its value can be used to point the checked, key and its value can be used to point the checked, key and its value can be used to point the checked, key and its value can be used to point the checked, key and its value can be used to point the checked, key and its value can be used to point the checked, key and its value can be used to point the checked, key and its value can be used to point the checked, key and its value can be used to point the checked, key and its value can be used to point the checked, key and its value can be used to point the checked, key and its value can be used to point the checked, key and its value can be used to point the checked, key and its value can be used to point the checked, key and its value can be used to point the checked, key and its value can be used to point the checked, key and its value can be used to point the checked, key and its value can be used to point the checked, key and its value can be used to point the checked, key and its value can be used to point the checked, key and its value c	perform search

7. In the "Rules" section, click "Add Rule".

- In the "General" section, enter the "Rule Name". Rule name should be unique, the same rule name cannot be re-used.
- In the "Value" section, select the "Key" and the corresponding "Value" of your choice.

- In the "Key" dropdown, only the keys defined in the global collection with Enum data types are listed.
- The rule name defined with the key and its value can be used only once.

Click "Save".		
✓) General		
🗸 Metadata Keys		
I		
Rules		
RuleName	Key: Value: OFFICIAL_SENS	00
Add Rule		
General		
Rule Name *		
RuleName		
92 characters left.		
O Value		
Key *		
folder_rule_key		$\sim$
Value *		
O Value1		
<ul> <li>Value2</li> </ul>		
O Save Cancel		
Cancel		Publish 🗸
Lick "Publish".		



• When a metadata collection is in published status, the defined "Rules" and the defined "Data Type" in "Metadata Keys" section cannot be modified.

By default, the collection created is automatically saved in draft status until the collection is published.

# 10.4 Editing the collection

The user can edit the metadata collection in both draft and published status. To edit the metadata collection, follow these steps:

In the left navigation, click "Metadata Management". The Metadata collection overview 1. page is displayed.

2. Select the metadata collection to edit.

Click 🖉 and modify the details. For more information to edit the details, refer to Adding a

3. <u>collection</u> . General Metadata Keys • Rules			
RuleName	Key: government_classification	Value: OFFICIAL_SENS	Ø Û
RuleNameValue	Key: folder_rule_key	Value: Value2	Ø Û
Add Rule			
Sack Cancel			Publish 🗸

4. Click "Publish".

# 10.5 Deleting the collection

It is possible to delete the metadata collection only if it is in the draft status. To delete the metadata collection, follow these steps:

In the left navigation, click "Metadata Management". The Metadata collection overview

- 1. page is displayed.
- 2. Select the metadata collection to be deleted.

10.6 Overview



4. Click "Delete".

# 10.6 Overview

Metadata keys are the unique identifiers used to represent key-value pair structure, representing specific attributes or characteristics linked to data. They are a part of a global or custom collection and are used to create rules in a custom collection. Metadata key is a reference point for a specific metadata information to categorize and describe the specific metadata information to various aspects of the data.

For global collection, the Integrated Data Lake admin is not required to create the collection to add the metadata key and can directly use the global collection ID. For custom collection, the Integrated Data Lake admin should create a custom collection and then add a metadata key to the collection. To include metadata in Integrated Data Lake resources, users should define metadata keys either in the global or custom collection.

The key in a global or custom collection is shown below:



- 1 Publish the key.
- 2 Edit the key.
- 3 Delete the key.
- When the selected key is in draft status, publish, edit and delete options are enabled.
- When the selected key is in published status, only edit option is enabled.

# Key parameters

Consider the following parameters when adding a key to metadata collection.

#### Data type values

Metadata key should be defined with a data value type as mentioned in the below table:

Data type	Field Name	Field Values
Enum values	options	The values accepted for the "Enum values" data type are in capitals and separated by commas.
Enum list values	options	The values accepted for the "Enum list values" data type are in capitals and separated by commas.
	Minimum Size	The minimum number of values that are selected from the enum list should be greater than 0 and less than the total number of options.
	Maximum Size	The maximum number of values that are selected from the enum list should be greater than minimum size and less than or equal to number of options.
String values	options	The values accepted for the "String values" data type are in capitals and separated by commas.
	Minimum length	The minimum length of character set in the list that is accepted as value should to be greater than 0.
	Maximum Length	The maximum length of character set in the list that is accepted as value should to be greater than or equal to minimum length.
List of String	options	The values accepted for the "List of String" data type are in capitals and separated by commas.
	Minimum Size	The minimum number of values are selected from the list of string has to be greater than 0 and less than number of options.
	Maximum Size	The maximum number of values are selected from the list of string should to be greater than minimum size and less than or equal to number of options.

# 10.7 Adding a key

The user can add keys in global and custom collections. To add a new key, follow these steps:

In the left navigation, click "Metadata Management". The Metadata collection overview 1. page is displayed.

10.7 Adding a key

In the Metadata collection overview page, choose the collection of your choice, click "Add

2. Key".

- 3. In the "General" section,
  - Enter the "Label" and "Description".
  - By default, "Key" field is automatically filled with the same name as "Label". Label name should be unique, the same label name cannot be re-used.
  - Enable "Mandatory" toggle button to define a key as "Required Field" in metadata input.

O General

Caben	Key: *	
NewKey	newkey	
94 characters left.	94 characters left.	
Description		
This is for demo		
222 1 1 1 1 1		
239 characters left.		
239 characters left.		
Mandatory	where d Photol Research data for each	

In the "Data type for value" section, select the "Data type" and enter the values. For more information on data types, refer to <u>Data type values</u>.

- 4. For example, to select "Enum values", follow these steps:
  - Select "Enum values" from the "Data type" dropdown.
  - Click "Add values".
- Data type for value

Enum list values	
Values 2 of 300	
250	6
47 characters left.	
190	(m)
47 characters left.	
Add value	
Minimum number of strings	Maximum number of strings
1	200

- 5. In the Additional details,
  - Enable "Rules" toggle button to include this key and its values in the "Rules" section while creating a custom collection.

!!! note This toggle button is available only while creating a key for global collection, and can be enabled only for Enum values data type.

- Enable "Searchable" toggle button to perform search with authorized set of keys.
- Select "Objects", "Folders" or "Folders and Objects" radio button to apply on defined keys.

$\sim$	Rules If checked, key and its values can be used in collection to create rule
$\overline{\mathbf{C}}$	Searchable If checked, key and its value can be used to perform search
Apply	on:* (1)
O Ob	jects 🔿 Folders 🔿 Objects and Folders

!!! note - Objects: Metadata is applied on objects.

- Folders: Metadata is applied on folders.

- Folders and Objects: Metadata is applied on both folders and objects. This radio button is available for only global collection.

6. Click "Save and Publish" to publish the key or click "Save as Draft" to save the key as draft.

• When a key is in draft status, the defined "Data type" cannot be modified.

• When a key is in published status, the defined "Data type" and their "Values" cannot be modified.

# 10.8 Editing the key

The user can edit the key in both draft and published status. To edit the key, follow these steps:

In the left navigation, click "Metadata Management". The Metadata collection overview

- 1. page is displayed.
- 2. Select the key to edit from global or custom collection.

Click  $\checkmark$  and modify the details. For more information to edit the details, refer to <u>Adding a</u> 3. <u>key</u>.

Edit	key	in	global	col	ection

enumkey_ui_longvalue enumkey_ui_longvalue 0 characters left. 80 characters left. Description 55 characters left. Mandatory If checked, key becomes 'Required Field' in metadata input tatus: > Draft type for value bata type: * Enum values Values 2 of 300 UKML_ML22enumval1enumval1enumval1 9 characters left. UKML_ML24enumval2enumval2enumval2enumval2 1 characters left. + Add value	label: *	Key: *				
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4. Click "Save and Publish" to publish the key or click "Save as Draft" to save the key as draft.

# 10.9 Deleting the key

It is possible to delete the key only if it is in the draft status. To delete the key, follow these steps:

In the left navigation, click "Metadata Management". The Metadata collection overview

1. page is displayed.

2. Select the key to be deleted from the desired metadata collection.

A	Delete key Do you really want to delete 'enumkey_u	ii_longvalue' key?
		Cancel Delete
1 Click "Dolo	to"	

# 10.10 Metadata Rule

Metadata Rule is a set of predefined conditions that determines the metadata associated with a custom collection that applies for the Integrated Data Lake resources. A metadata collection rule is associated with two functions:

**Rule key**: The rule key is characterized as a metadata key with an enum data type in the global collection, facilitates the implementation of custom collection attributes in the system. By choosing a value for the rule key, users can activate specific keys in the

• custom collection to their unique requirements.

**Custom collection attributes**: Custom collection attributes are only accessible when a particular value for the rule key(Enum values) is selected. This selection ensures the

• availability of accurate metadata information for Integrated Data Lake resources.

### **Rules Status**

Rules are created to trigger custom metadata collection and provide metadata for the keys defined within the collection. They are applicable only when the metadata collection is defined with a rule which should be in published status. Following are the rules scenarios:

Scenarios	Create a collection	Adding Keys to collection	Keys in draft status	Keys in published status	Rule creation	Result
Scenario 1	⊘	0	8	<b>&gt;</b>	⊘	Collection is created.

Metadata Management

10.10 Metadata Rule

Scenarios	Create a collection	Adding Keys to collection	Keys in draft status	Keys in published status	Rule creation	Result
Scenario 2	⊘	8	8	8	⊘	Collection is saved only in draft status as there are no keys added to it.
Scenario 3	0	0	0	8	0	Collection is saved only in draft status as none of the keys are published.
Scenario 4	♦	0	0	<	8	Collection is saved only in draft status as rule is not created.
Scenario 5	♦	8	8	8	8	Collection is saved only in draft status as keys are not published and rules are not created.