Setting Up an Azure Data Factory Pipeline

Introduction

This is a complete documentation that provides a step-by-step guide on how to set up an Azure Data Factory pipeline to copy data from Azure Blob Storage to Azure SQL Database and also Blob Storage to Snowflake. By following this guide, you will be able to build a completely seamless integration between blob data, SQL Database, and Snowflake data warehouse.

Objectives & Requirements

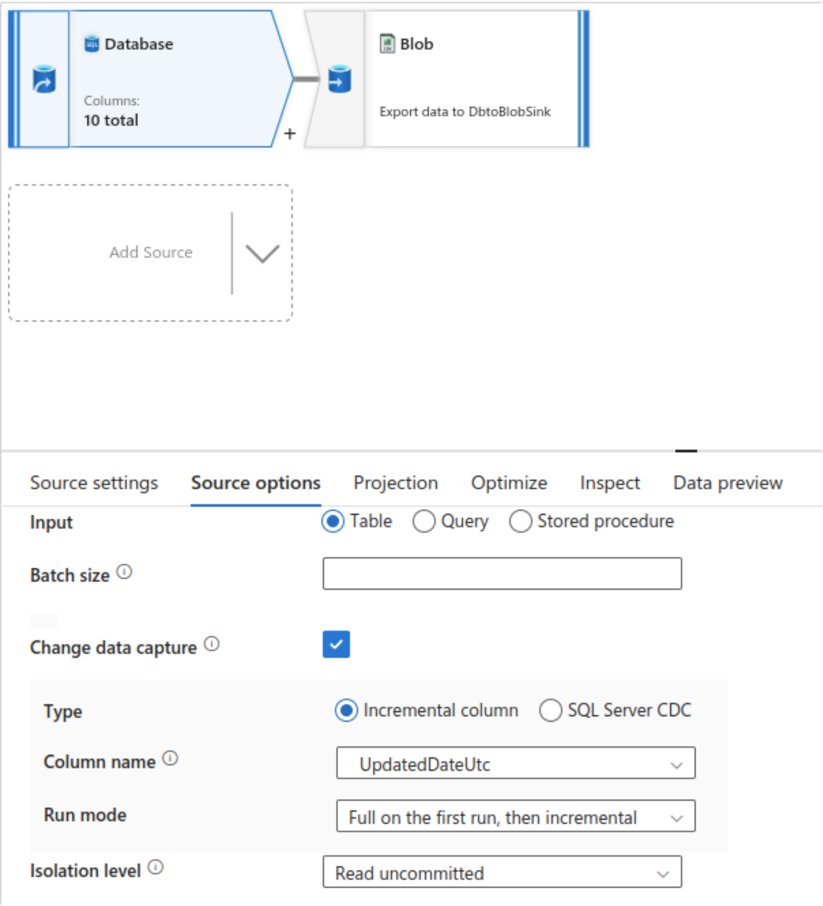
The task focuses on improving how to display the life cycle of a lead. At the moment, each lead's status changes are recorded in a single row. The intention of this task is to migrate to Snowflake's 'LeadEvents' table, where each event in a lead's journey is uniquely recorded. To do this, Azure Data Factory will be used to transfer 100 leads from an Excel data source in SQL to Snowflake. The data will then be transformed by a Python project, offering a detailed, event-by-event snapshot of each lead's evolution. This improved representation attempts to increase the depth and clarity of the analysis.

A tutorial to build and deploy a pipeline into Azure Data Factory. For the complete pipeline, you need to have:

- An **Azure subscription account**, which will help you to build, maintain, and cost optimization.
- A **Blob storage account** is needed for the external data storage and internal transfer procedure.
- And a **Snowflake-privileged** account with all the authorization and authentication.

To complete this whole journey, the following requirements are fulfilled:

1. The pipeline is incremental.



Input ● Table ○ Query ○ Stored procedure

Batch size

Change data capture ☑

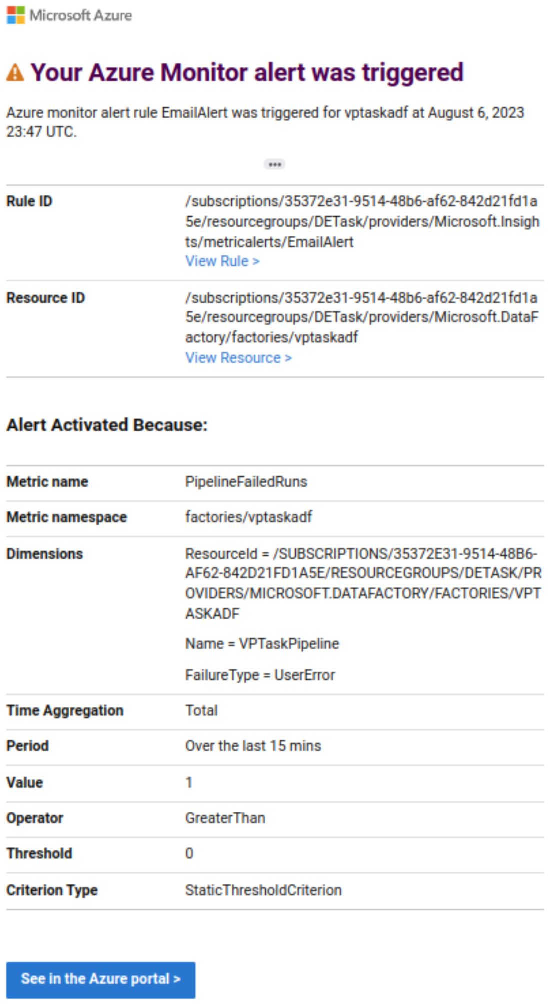
Type ● Incremental column ○ SQL Server CDC

Column name UpdatedDateUtc

Run mode Full on the first run, then incremental

Isolation level Read uncommitted

2. The pipeline is connected to the GitHub
3. The pipeline is easily extensible and maintainable.
4. The pipeline is sending emails on the failure of any activity within the pipeline. Alert:



⚠ Your Azure Monitor alert was triggered

Azure monitor alert rule EmailAlert was triggered for vptaskadf at August 6, 2023 23:47 UTC.

Rule ID	/subscriptions/35372e31-9514-48b6-af62-842d21fd1a5e/resourcegroups/DETask/providers/Microsoft.Insights/metricalerts/EmailAlert View Rule >
Resource ID	/subscriptions/35372e31-9514-48b6-af62-842d21fd1a5e/resourcegroups/DETask/providers/Microsoft.DataFactory/factories/vptaskadf View Resource >

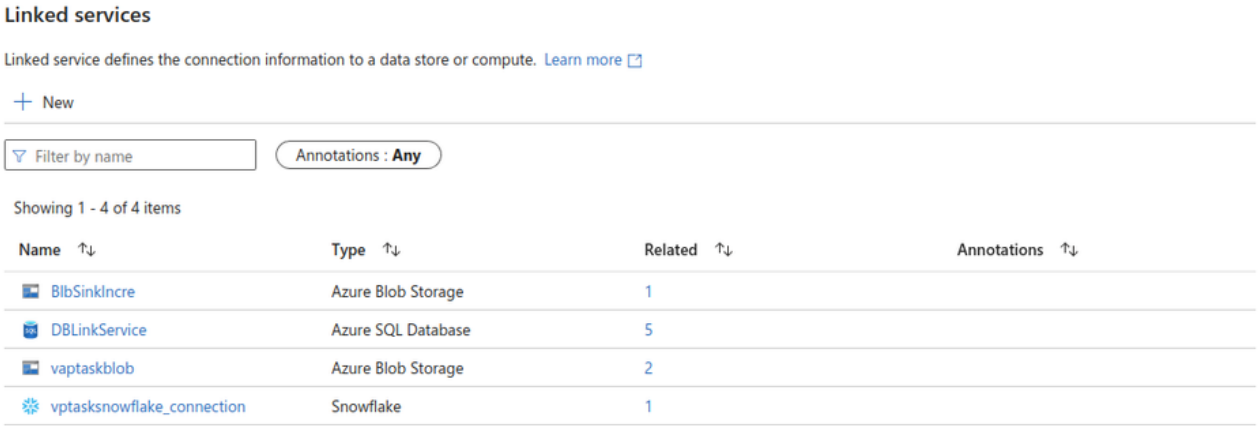
Alert Activated Because:

Metric name	PipelineFailedRuns
Metric namespace	factories/vptaskadf

Dimensions	ResourceId = /SUBSCRIPTIONS/35372E31-9514-48B6-AF62-842D21FD1A5E/RESOURCEGROUPS/DETASK/PROVIDERS/MICROSOFT.DATAFACTORY/FACTORIES/VPTASKADF
	Name = VPTaskPipeline
	FailureType = UserError

Time Aggregation	Total
Period	Over the last 15 mins
Value	1
Operator	GreaterThan
Threshold	0
Criterion Type	StaticThresholdCriterion

5. The pipelines is using linked services to transfer the data between the storages. Services:



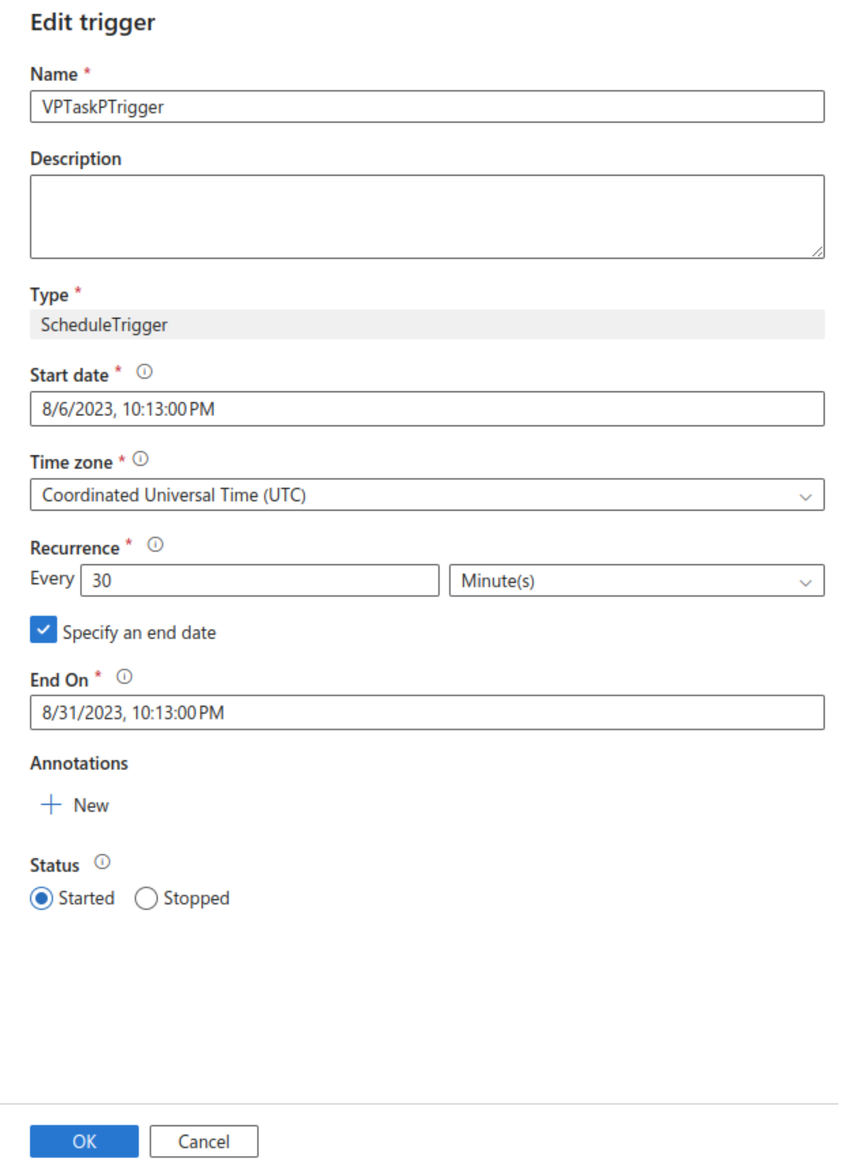
Linked services

Linked service defines the connection information to a data store or compute. Learn more

Showing 1 - 4 of 4 items

Name	Type	Related	Annotations
BlbSinkIncre	Azure Blob Storage	1	
DBLinkService	Azure SQL Database	5	
vaptaskblob	Azure Blob Storage	2	
vptasksnowflake_connection	Snowflake	1	

6. A trigger is attached to the pipelines and will trigger after 30 minutes. Trigger:



Edit trigger

Name *
VPTaskPTrigger

Description

Type *
ScheduleTrigger

Start date *
8/6/2023, 10:13:00 PM

Time zone *
Coordinated Universal Time (UTC)

Recurrence *
Every 30 Minute(s)

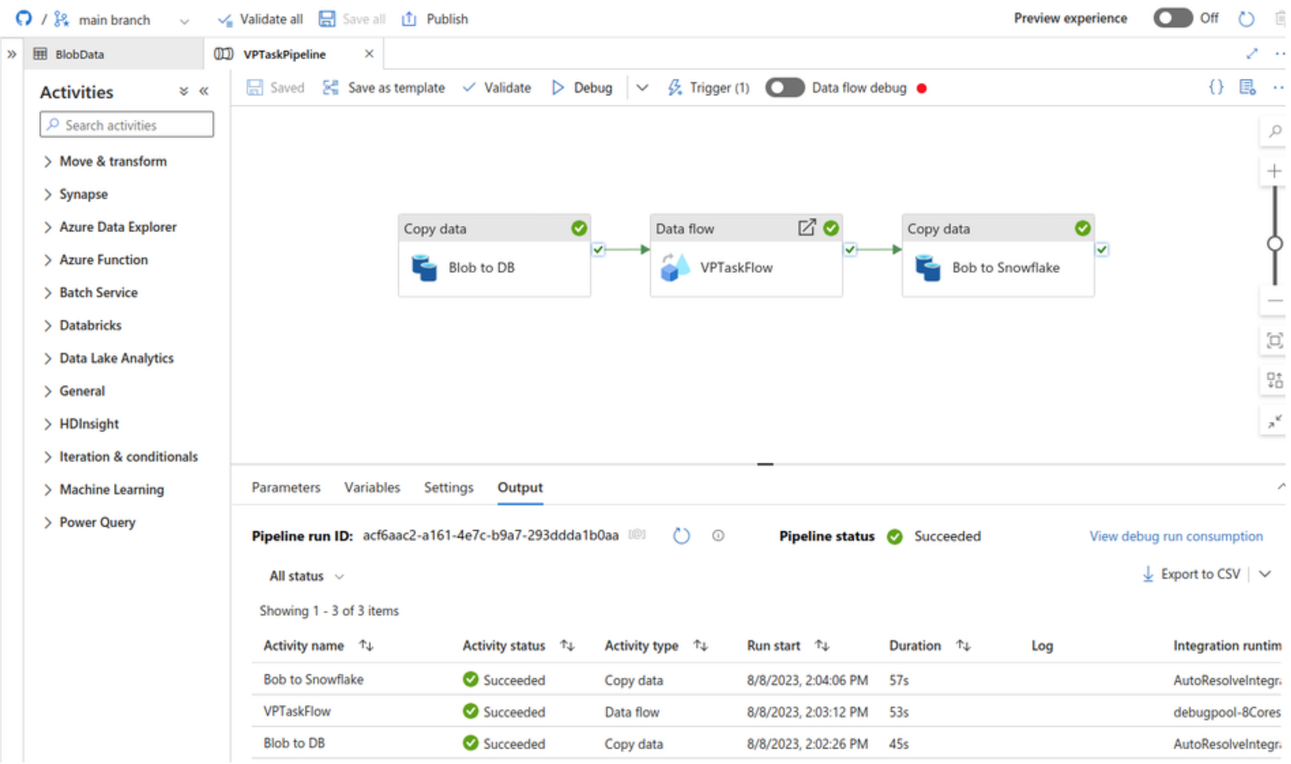
☑ Specify an end date

End On *
8/31/2023, 10:13:00 PM

Annotations

Status
● Started ○ Stopped

In summary, the following image will represent the current condition of the pipeline. And to build the same pipeline with the same architecture in the DB end, the documentation will help you to build a complete ADF pipeline.



Pipeline run ID: acf6aac2-a161-4e7c-b9a7-293ddda1b0aa

Pipeline status ✓ Succeeded

Showing 1 - 3 of 3 items

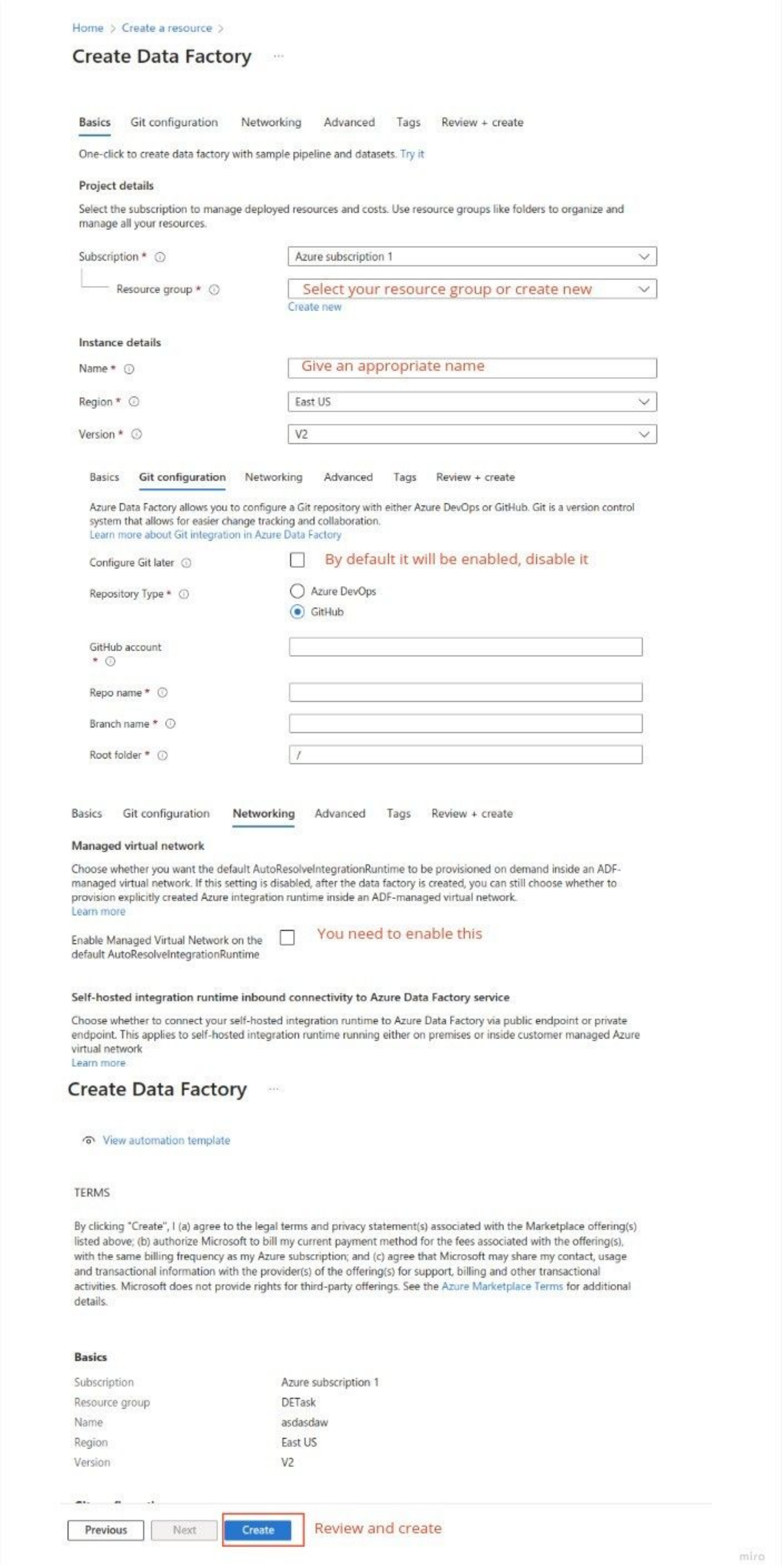
Activity name	Activity status	Activity type	Run start	Duration	Log	Integration runtim
Bob to Snowflake	✓ Succeeded	Copy data	8/8/2023, 2:04:06 PM	57s		AutoResolveIntegr.
VPTaskFlow	✓ Succeeded	Data flow	8/8/2023, 2:03:12 PM	53s		debugpool-8Cores
Blob to DB	✓ Succeeded	Copy data	8/8/2023, 2:02:26 PM	45s		AutoResolveIntegr.

The rest of the scripts, python projects, and queries are available in the GitHub repository.

Table of Contents

Let's jump into the hands-on experience to build a pipeline from scratch to deployment.

1. Setting up an Azure Data Factory
   a. Data factory Creation
      - Proceed to the Azure Data factory portal
      - Click on "+ Create a resource" > "Search Services" > enter "Data Factory".
      - Click on " Create", it will take you to the data factory to create a resource page
      - Fill in the necessary fields (Subscription, Resource Group, Instance details, Git configuration etc.)
      - For the Resource Group, Click on "+ Create a resource" > "Search for resource group" > “Give an appropriate name“ > "Review + Create" to create the group
      - Click "Review + Create", review your settings, and then click "Create".
      - Follow the image for the clarification



Home > Create a resource >

Create Data Factory ···

Basics | Git configuration | Networking | Advanced | Tags | Review + create

One-click to create data factory with sample pipeline and datasets. Try it

Project details

Select the subscription to manage deployed resources and costs. Use resource groups like folders to organize and manage all your resources.

Subscription * : Azure subscription 1

Resource group * : Select your resource group or create new

Create new

Instance details

Name * : Give an appropriate name

Region * : East US

Version * : V2

Basics | Git configuration | Networking | Advanced | Tags | Review + create

Azure Data Factory allows you to configure a Git repository with either Azure DevOps or GitHub. Git is a version control system that allows for easier change tracking and collaboration.
Learn more about Git integration in Azure Data Factory

Configure Git later □ By default it will be enabled, disable it

Repository Type * : ○ Azure DevOps ● GitHub

GitHub account * :

Repo name * :

Branch name * :

Root folder * : /

Basics | Git configuration | Networking | Advanced | Tags | Review + create

Managed virtual network

Choose whether you want the default AutoResolveIntegrationRuntime to be provisioned on demand inside an ADF-managed virtual network. If this setting is disabled, after the data factory is created, you can still choose whether to provision explicitly created Azure integration runtime inside an ADF-managed virtual network.
Learn more

Enable Managed Virtual Network on the default AutoResolveIntegrationRuntime □ You need to enable this

Self-hosted integration runtime inbound connectivity to Azure Data Factory service

Choose whether to connect your self-hosted integration runtime to Azure Data Factory via public endpoint or private endpoint. This applies to self-hosted integration runtime running either on premises or inside customer managed Azure virtual network
Learn more

Create Data Factory ···

View automation template

TERMS

By clicking "Create", I (a) agree to the legal terms and privacy statement(s) associated with the Marketplace offering(s) listed above; (b) authorize Microsoft to bill my current payment method for the fees associated with the offering(s), with the same billing frequency as my Azure subscription; and (c) agree that Microsoft may share my contact, usage and transactional information with the provider(s) of the offering(s) for support, billing and other transactional activities. Microsoft does not provide rights for third-party offerings. See the Azure Marketplace Terms for additional details.

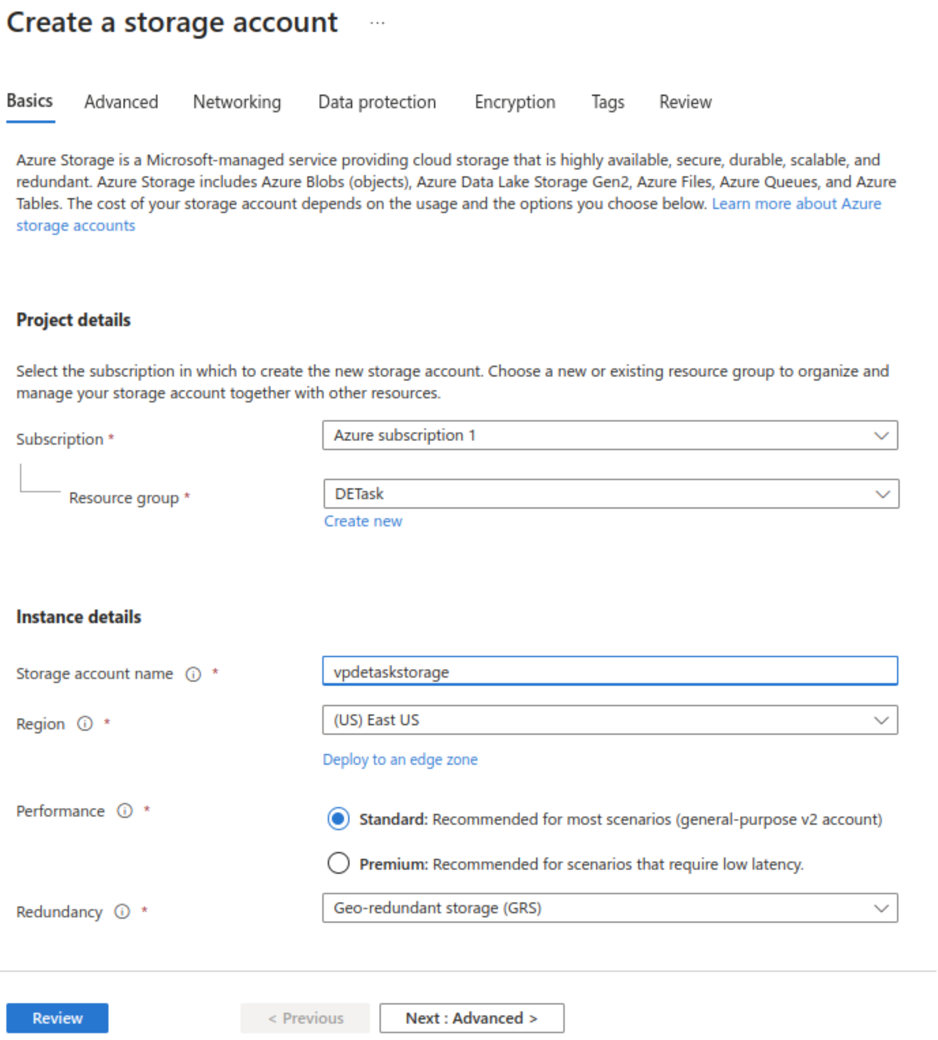
Basics

Subscription	Azure subscription 1
Resource group	DETask
Name	asdasdaw
Region	East US
Version	V2

Review and create

b. Setting up a storage account

- Click on "+ Create a resource" > "Search for Storage Account" > "Create".
- Your resource group and subscription will be automatically added.
- Give your storage account an appropriate name (lowercase).
- Depending on your necessity, you can update “Advance“, “Networking“, “Data Protection“, “Encryption“, and “tags“ or else use the default setup.
- Finally hit “Create“.
- Follow along with the given image.



Azure Storage is a Microsoft-managed service providing cloud storage that is highly available, secure, durable, scalable, and redundant. Azure Storage includes Azure Blobs (objects), Azure Data Lake Storage Gen2, Azure Files, Azure Queues, and Azure Tables. The cost of your storage account depends on the usage and the options you choose below. Learn more about Azure storage accounts

Project details

Select the subscription in which to create the new storage account. Choose a new or existing resource group to organize and manage your storage account together with other resources.

Subscription *: Azure subscription 1

Resource group *: DETask

Create new

Instance details

Storage account name ⓘ *: vpdetaskstorage

Region ⓘ *: (US) East US

Deploy to an edge zone

Performance ⓘ *:

● **Standard:** Recommended for most scenarios (general-purpose v2 account)

○ **Premium:** Recommended for scenarios that require low latency.

Redundancy ⓘ *: Geo-redundant storage (GRS)

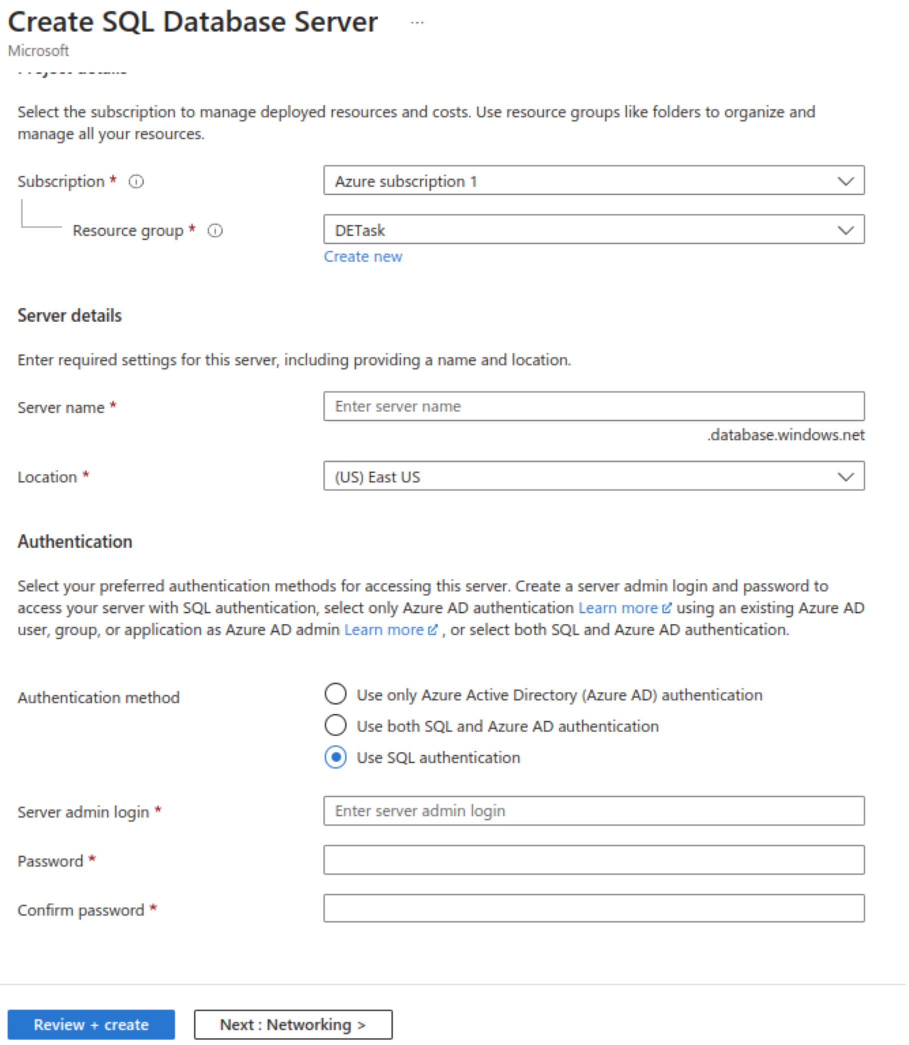
- You need to set up a container also to hold your data in the storage account.
- Look for “Containers“ under “Data Storage“ > hit “+Container“.
- Give an appropriate name for the container and hit “Create“
- Your container will create shortly.
- Go back to your storage account, select your newly created container, hit “Upload“ from the top and upload your data file here

2. Configure SQL server and Database

a. Setting Up SQL Server in Azure

- Click on "+ Create a resource" > "Search for SQL Server" > "Create".
- Subscription: Choose your Azure subscription. By default, one will be selected.
- Resource Group: Select your existing resource group.
- Server Name: Choose a unique name for the server.
- Location: Select the nearest or preferred region.

- In the Authentication, select “Use SQL authentication“.
- Server Admin Login & Password: Create an admin username and password for the server. Make sure to remember this; you'll need it to manage the server and databases.
- In the Networking tab, Allow Azure services and resources to access this server set to "Yes".
- You can keep the rest of the tabs on default settings. After that hit “Create“ to deploy your server



Create SQL Database Server ...

Microsoft

Select the subscription to manage deployed resources and costs. Use resource groups like folders to organize and manage all your resources.

Subscription * : Azure subscription 1

Resource group * : DETask

Create new

Server details

Enter required settings for this server, including providing a name and location.

Server name * : Enter server name .database.windows.net

Location * : (US) East US

Authentication

Select your preferred authentication methods for accessing this server. Create a server admin login and password to access your server with SQL authentication, select only Azure AD authentication Learn more using an existing Azure AD user, group, or application as Azure AD admin Learn more , or select both SQL and Azure AD authentication.

Authentication method
○ Use only Azure Active Directory (Azure AD) authentication
○ Use both SQL and Azure AD authentication
● Use SQL authentication

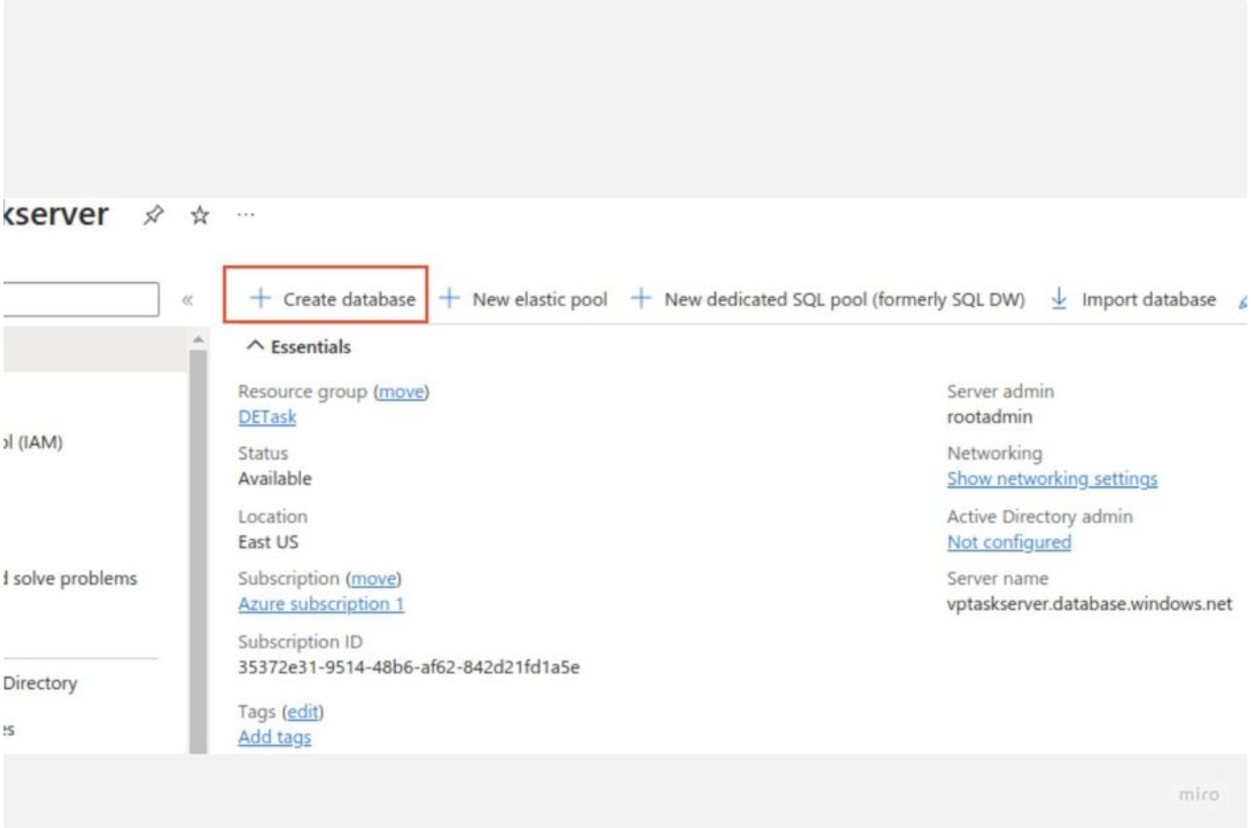
Server admin login * : Enter server admin login

Password * :

Confirm password * :

b. Configure your SQL Database

- Go to your newly created SQL Server.
- Click on "+ Create database".



Resource group (move)
DETask

Status
Available

Location
East US

Subscription (move)
Azure subscription 1

Subscription ID
35372e31-9514-48b6-af62-842d21fd1a5e

Tags (edit)
Add tags

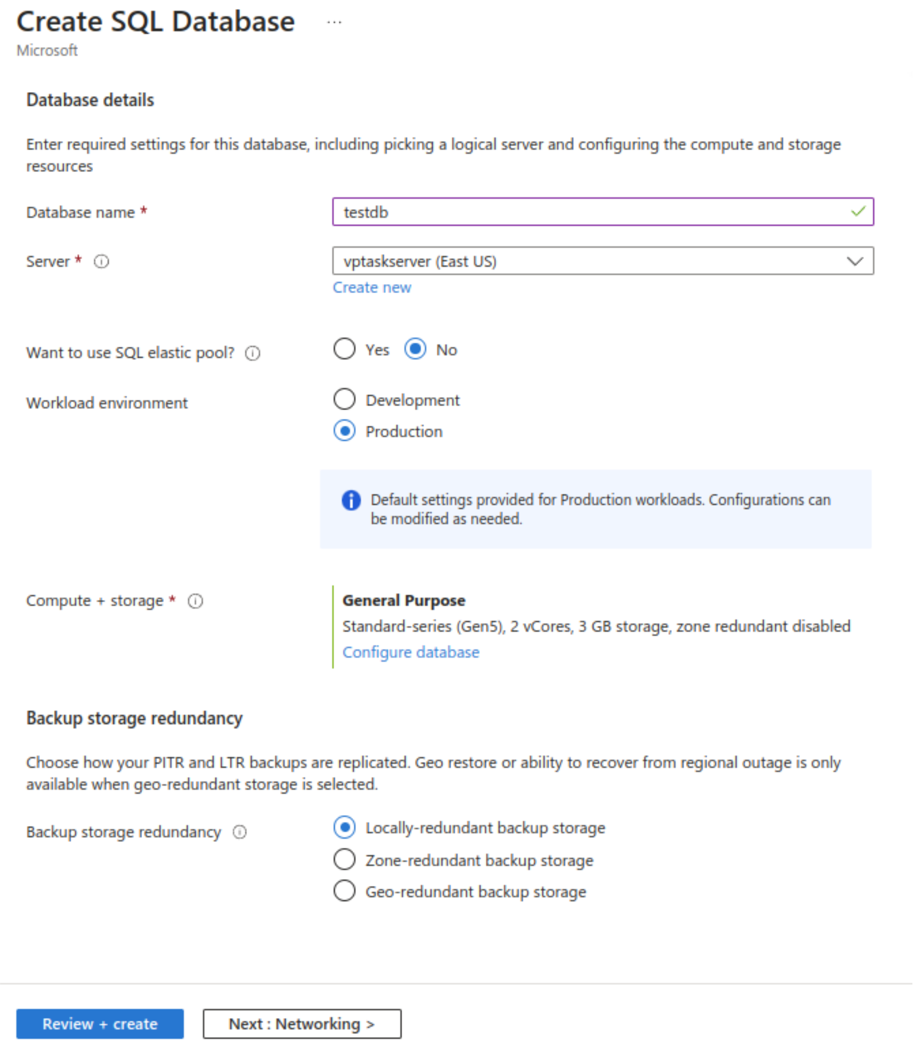
Server admin
rootadmin

Networking
Show networking settings

Active Directory admin
Not configured

Server name
vptaskserver.database.windows.net

- **Fill out the following:**
  - Database Name: Provide a name for your database.
  - Server: Select the SQL server you created in the previous steps.
  - Compute + storage: Choose the appropriate configuration based on your needs. For testing purposes, you can select "Standard." Although make sure to change the size of the Data max size depending on your need. Depending on your size, you will be billed monthly.
  - Networking, Security, Additional settings, and Tags tabs can be kept as default
  - Finally hit create and wait to finish the process.



Create SQL Database ...

Microsoft

Database details

Enter required settings for this database, including picking a logical server and configuring the compute and storage resources

Database name * : testdb

Server * : vptaskserver (East US)

Create new

Want to use SQL elastic pool? : ○ Yes ● No

Workload environment : ○ Development ● Production

Default settings provided for Production workloads. Configurations can be modified as needed.

Compute + storage * : **General Purpose**

Standard-series (Gen5), 2 vCores, 3 GB storage, zone redundant disabled

Configure database

Backup storage redundancy

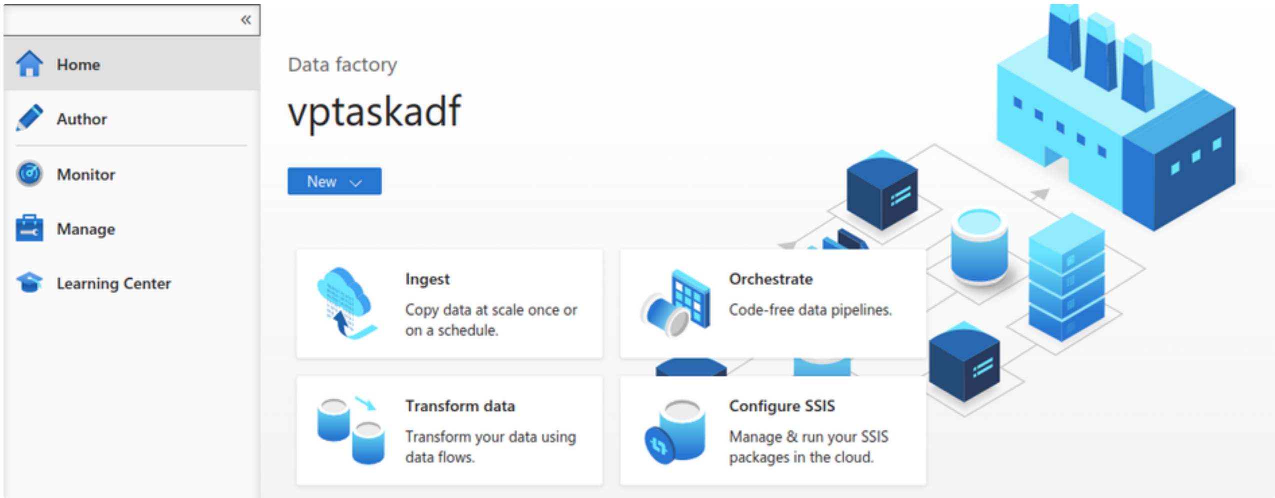
Choose how your PITR and LTR backups are replicated. Geo restore or ability to recover from regional outage is only available when geo-redundant storage is selected.

Backup storage redundancy : ● Locally-redundant backup storage ○ Zone-redundant backup storage ○ Geo-redundant backup storage

- Additional Tips about Firewall: add it later

Since we have configured most of the necessary configuration in the Azure portal, we are good to go to build our first pipeline. Go to your created Data factory and click **“Launch Studio“**

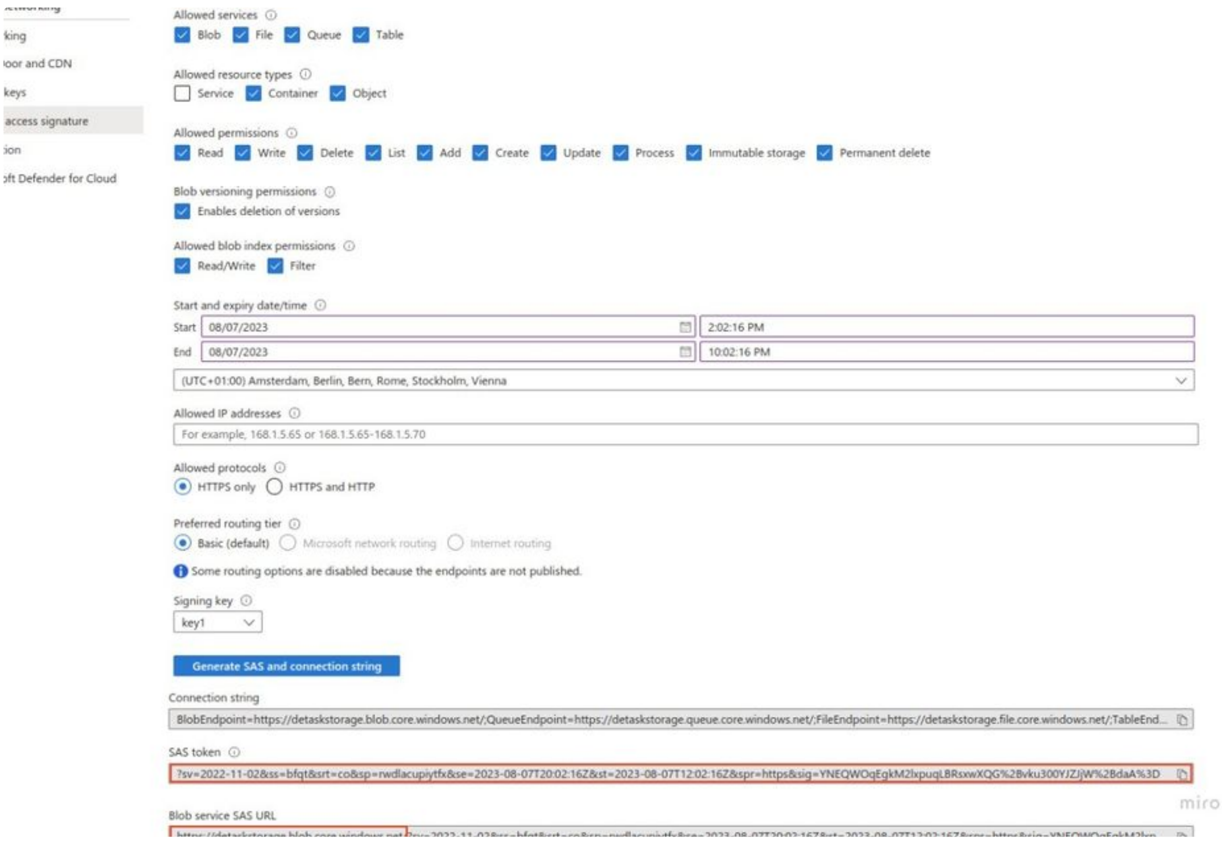
3. Configure the Linked services In the ADF Studio
   a. Azure Data Factory Studio will look like this,



Home
Author
Monitor
Manage
Learning Center
Data factory
vptaskadf
New
Ingest
Copy data at scale once or on a schedule.
Orchestrate
Code-free data pipelines.
Transform data
Transform your data using data flows.
Configure SSIS
Manage & run your SSIS packages in the cloud.

   b. From the left side panel, click “Manage“ > “Linked Services“ > “+New“ from the top. You need multiple linked services for the pipeline. For the exampled pipeline I have created 3 linked services, one for Blob Storage, one for SQL database, and one for Snowflakes
   c. To configure Blob Storage linked service,

- Click “+New“ > Search “Azure Blob Storage“ > “Continue“.
- Add a suitable name and description.
- In the Authentication Type, select “SAS URI“. You have to provide “SAS URL“ AND “SAS Token”.
- To generate the SAS URI, go to your Azure portal. See the following,



Allowed services
☑ Blob ☑ File ☑ Queue ☑ Table

Allowed resource types
□ Service ☑ Container ☑ Object

Allowed permissions
☑ Read ☑ Write ☑ Delete ☑ List ☑ Add ☑ Create ☑ Update ☑ Process ☑ Immutable storage ☑ Permanent delete

Blob versioning permissions
☑ Enables deletion of versions

Allowed blob index permissions
☑ Read/Write ☑ Filter

Start and expiry date/time
Start 08/07/2023 2:02:16 PM
End 08/07/2023 10:02:16 PM
(UTC+01:00) Amsterdam, Berlin, Bern, Rome, Stockholm, Vienna

Allowed IP addresses
For example, 168.1.5.65 or 168.1.5.65-168.1.5.70

Allowed protocols
● HTTPS only ○ HTTPS and HTTP

Preferred routing tier
● Basic (default) ○ Microsoft network routing ○ Internet routing

Some routing options are disabled because the endpoints are not published.

Signing key
key1

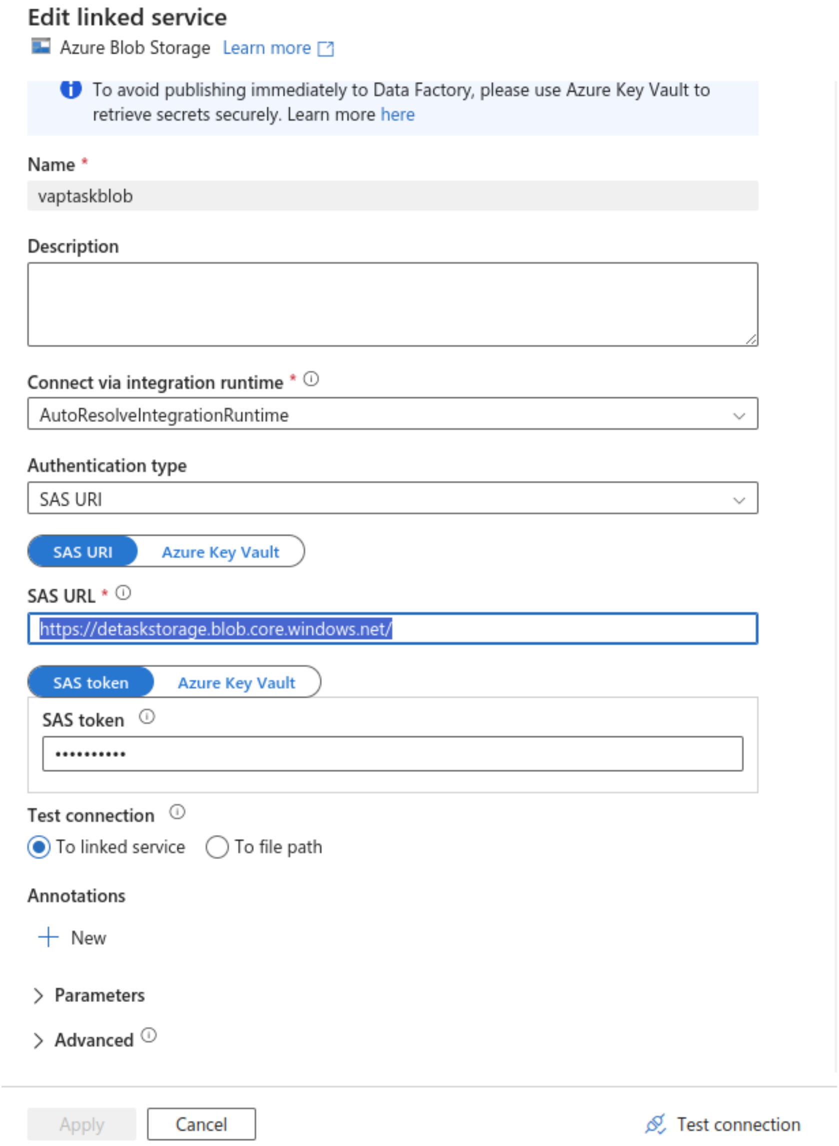
Generate SAS and connection string

Connection string
BlobEndpoint=https://detaskstorage.blob.core.windows.net/;QueueEndpoint=https://detaskstorage.queue.core.windows.net/;FileEndpoint=https://detaskstorage.file.core.windows.net/;TableEnd...

SAS token
?sv=2022-11-02&ss=bfqt&srt=co&sp=rwdlacupiytfx&se=2023-08-07T20:02:16Z&st=2023-08-07T12:02:16Z&spr=https&sig=YNEQWOqEgkM2lxpuqLBRsxwXQG%2Bvku300YJZJjW%2BdaA%3D

Blob service SAS URL

- Your SAS URL will be like this: https://example.blob.core.windows.net/
- Copy your token and save it somewhere. Before applying the changes, make sure to test your connection.



Edit linked service

Azure Blob Storage Learn more

To avoid publishing immediately to Data Factory, please use Azure Key Vault to retrieve secrets securely. Learn more here

Name * vaptaskblob

Description

Connect via integration runtime * AutoResolveIntegrationRuntime

Authentication type SAS URI

SAS URI | Azure Key Vault

SAS URL * https://detaskstorage.blob.core.windows.net/

SAS token | Azure Key Vault

SAS token ••••••••••

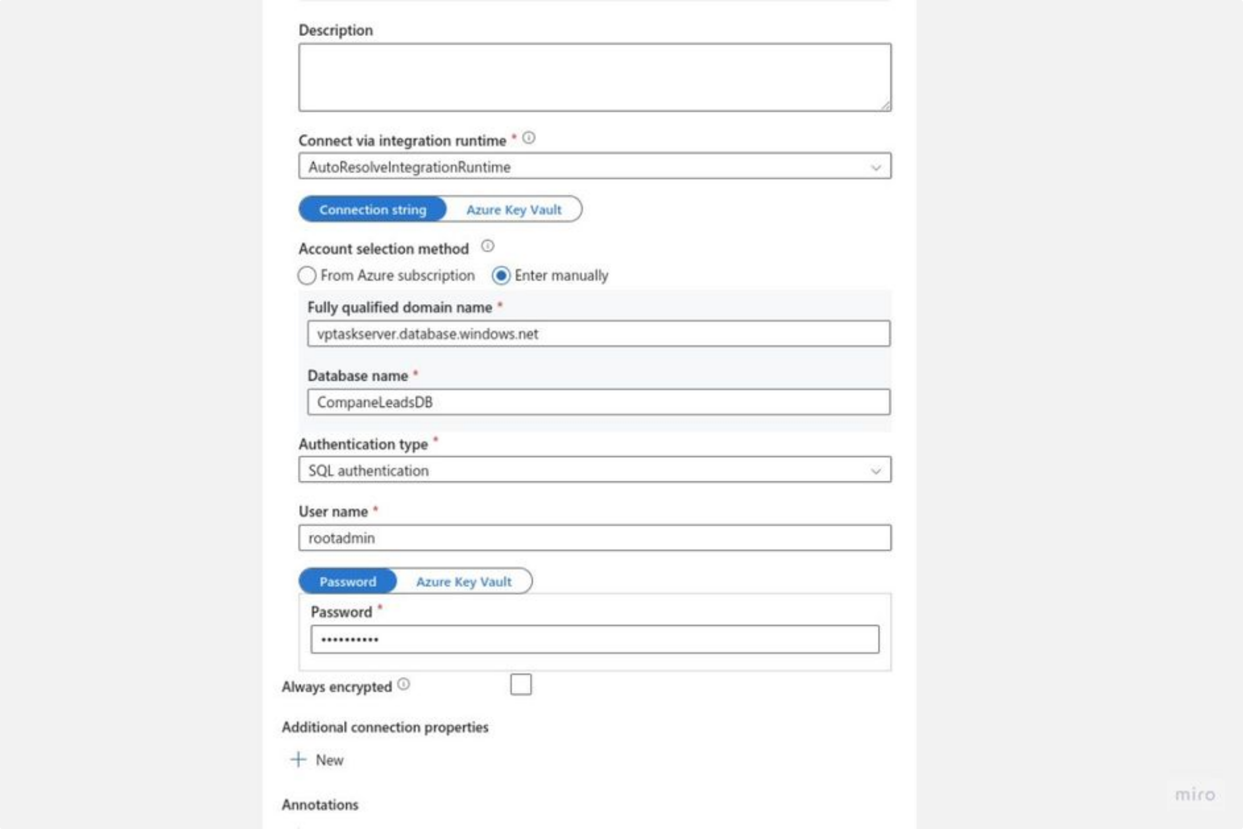
Test connection ● To linked service ○ To file path

Annotations

- If the connection is successful, click apply. Linked services will be created.

d. Configure your SQL Database linked service

- Click “+New“ > Search “Azure SQL Database“ > “Continue“.
- Fill up the Name, and add a description if needed.
- Select “Enter manually“ from the Account selection method, and give your created Database name, and your admin user name and password (you set it up when you configured your SQL server and setup your SQL authentication)
- Test your connection and apply the changes.



Description

Connect via integration runtime * ⓘ

AutoResolveIntegrationRuntime

Connection string | Azure Key Vault

Account selection method ⓘ

○ From Azure subscription ● Enter manually

Fully qualified domain name *

vptaskserver.database.windows.net

Database name *

CompaneLeadsDB

Authentication type *

SQL authentication

User name *

rootadmin

Password | Azure Key Vault

Password *

••••••••••

Always encrypted ⓘ □

Additional connection properties

+ New

Annotations

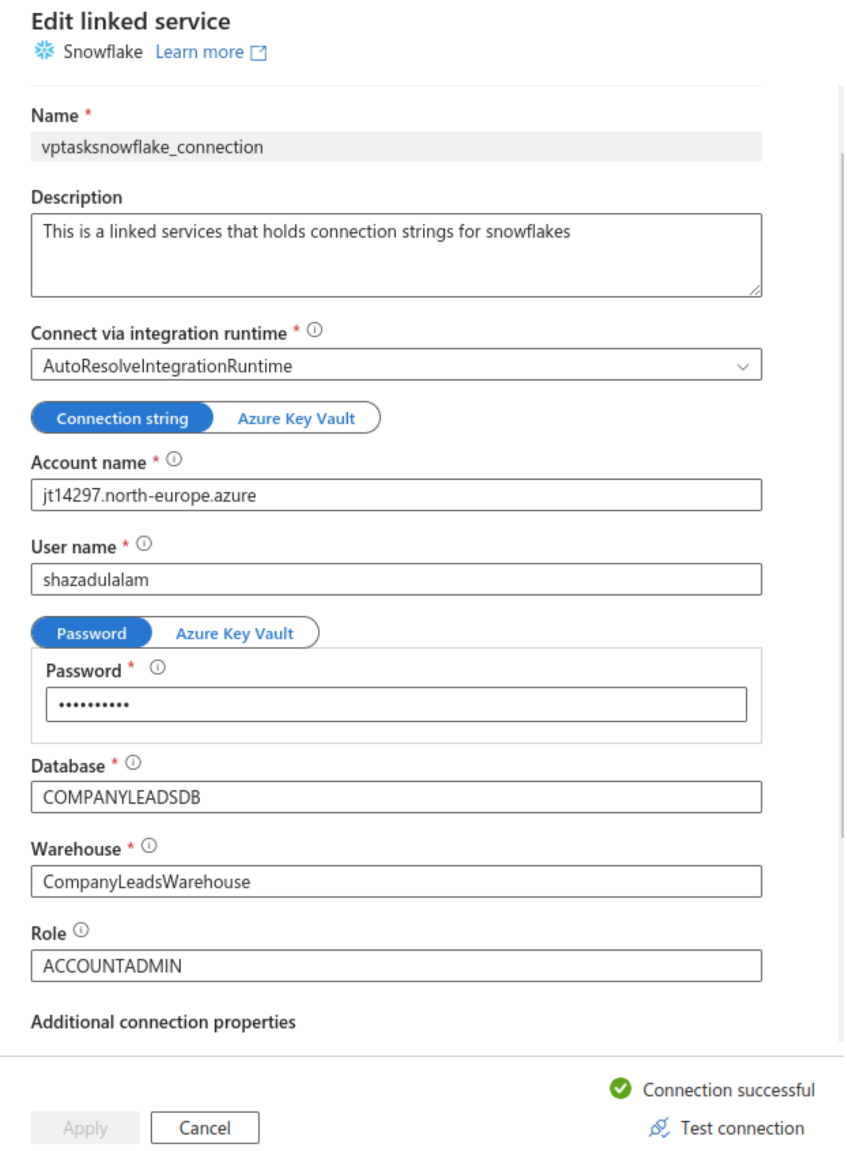
4. Configure Snowflakes linked service and build a connection
    - Create an account in the Snowflake portal.
    - Create a warehouse, database, and table to hold the data. You can execute these queries in the worksheet and your warehouse, database, and table will be created. Note down your Snowflake user id, user name, and password. You need this for later use

```
CREATE WAREHOUSE IF NOT EXISTS YourWareHouseName
  WAREHOUSE_SIZE = 'XSMALL'
  AUTO_SUSPEND = 600
  AUTO_RESUME = TRUE;

CREATE DATABASE IF NOT EXISTS YourDbName;

CREATE TABLE YourDbName.PUBLIC.YourTableName (
    Id INT,
    Name STRING,
    LikeThis VARCHAR(20)
);
```

    - Once you have created everything, go back to your ADF Studio > Manage > Linked services
    - Click “+New“ > Search “Snowflake“ > “Continue“.
    - Follow the image for the later steps,



Edit linked service

Snowflake Learn more

Name *
vptasksnowflake_connection

Description
This is a linked services that holds connection strings for snowflakes

Connect via integration runtime *
AutoResolveIntegrationRuntime

Connection string | Azure Key Vault

Account name *
jt14297.north-europe.azure

User name *
shazadulalam

Password | Azure Key Vault

Password *
••••••••••

Database *
COMPANYLEADSDB

Warehouse *
CompanyLeadsWarehouse

Role
ACCOUNTADMIN

Additional connection properties

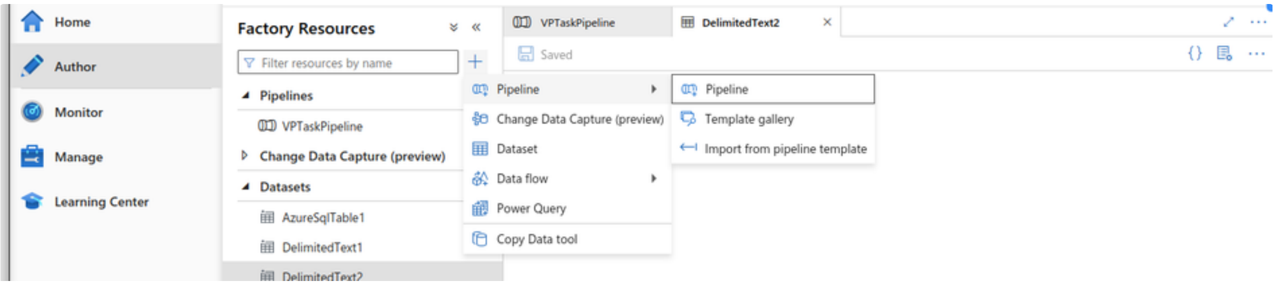
Connection successful

Apply | Cancel | Test connection

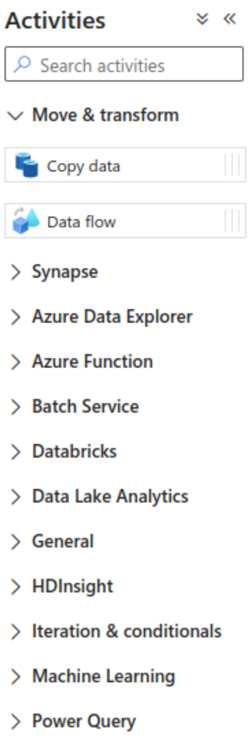
- Your account name will be like this: {user_id}.north-europe.azure

Now the most exciting part of this tutorial documentation. You are good to go since you have configured all the necessary services.

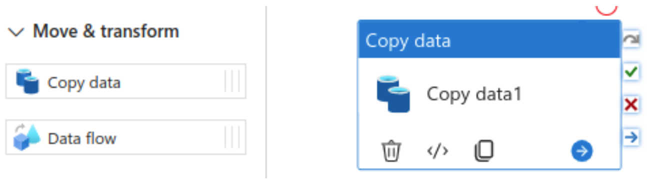
5. Build and Deploy the pipeline
   a. Click Author from the left side panel of the studio, and click “+“ > “Pipeline“ > “Pipeline“.



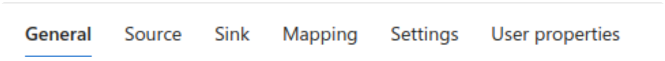
   b. Give a suitable name and click on it.
   c. You will see a panel like this,



d. Drag “Copy data“ to the right-side edit panel.

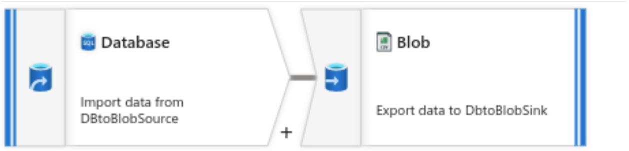


e. Click on it, give an appropriate name, and select your service on the source side and sink side.

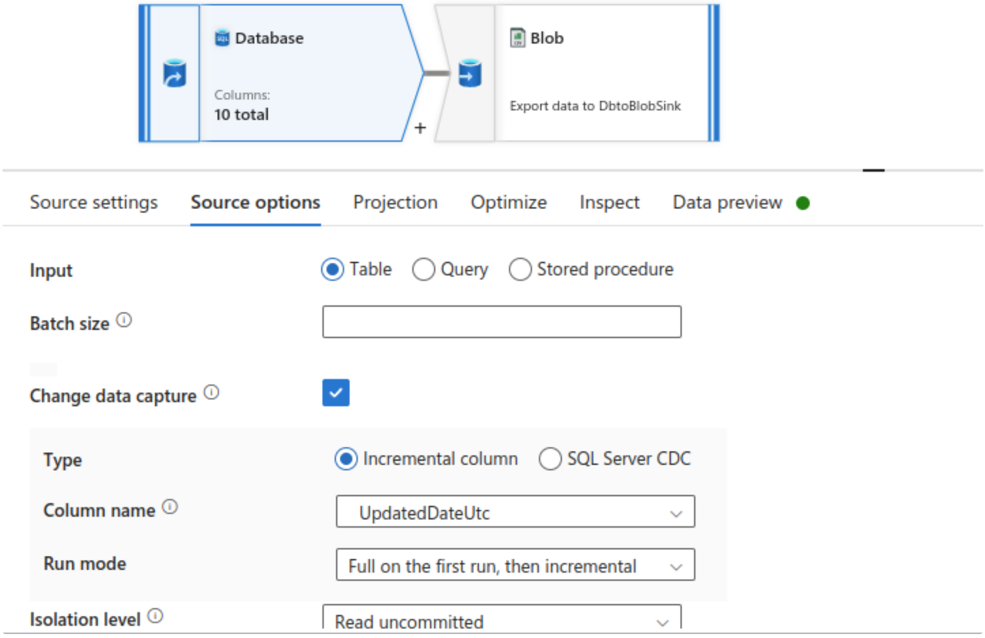


f. Mapp your data and save it

g. Add an additional DataFlow in the panel and double-click it. It will be like this:



The source and sink setup will be the same as copy data, the only difference will be on the source side. In the source option add these changes:



Input ● Table ○ Query ○ Stored procedure

Batch size

Change data capture ☑

Type ● Incremental column ○ SQL Server CDC

Column name UpdatedDateUtc

Run mode Full on the first run, then incremental

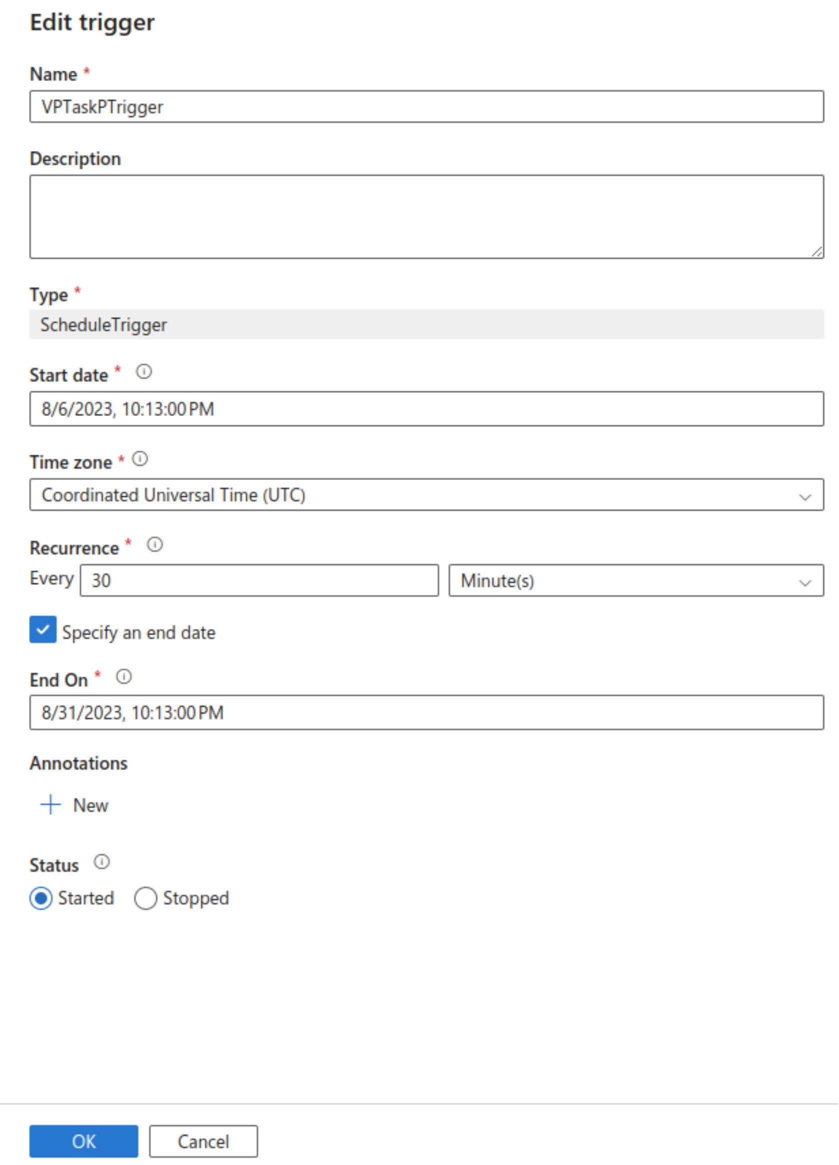
Isolation level Read uncommitted

h. Now go back to the main panel. Add another copy of data for Snowflake

i. Debug your pipeline, if there is no error, publish it. Some error might occur due to the firewall, which addressed in the constraints and solutions

6. Add trigger and alert services

a. After publishing your pipeline add a trigger. To add a trigger click “Trigger“ > “New or Edit“ > add name and time (when should the trigger will be triggered)



Edit trigger

Name * VPTaskPTrigger

Description

Type * ScheduleTrigger

Start date * 8/6/2023, 10:13:00 PM

Time zone * Coordinated Universal Time (UTC)

Recurrence * Every 30 Minute(s)

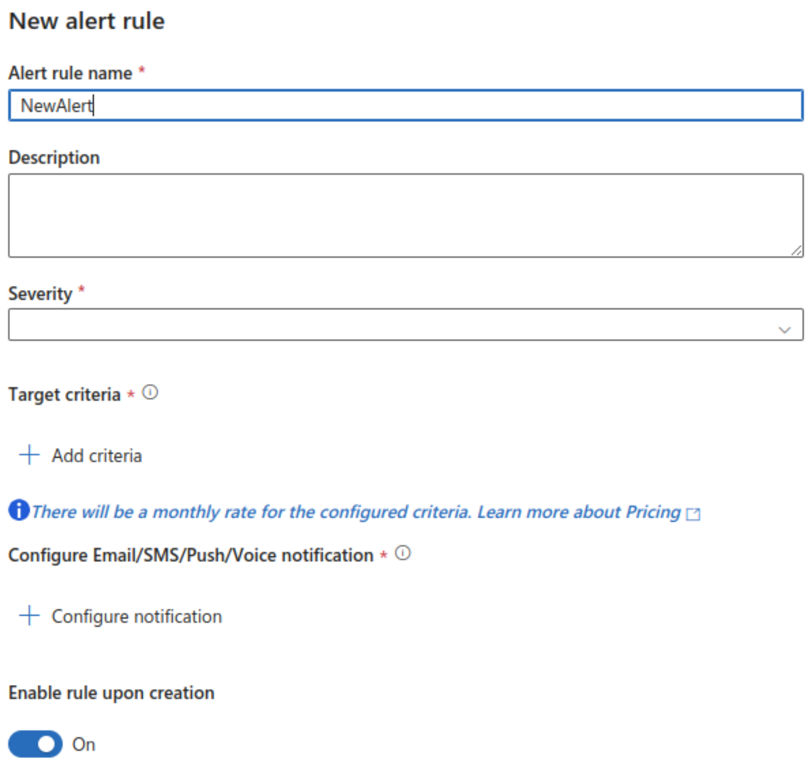
☑ Specify an end date

End On * 8/31/2023, 10:13:00 PM

Annotations

Status ● Started ○ Stopped

7. Monitor
   a. From the left side panel, click on the Monitor tab. Here you can monitor if your pipeline is running successfully or not. If there is any failure you can see from here. You can also add alerts and matrices from here.
   b. To add an email alert on failure, click “⚠ Alerts & metrics” > “New Alert Rule“.



New alert rule

Alert rule name *

NewAlert

Description

Severity *

Target criteria * ⓘ

+ Add criteria

ⓘ *There will be a monthly rate for the configured criteria. Learn more about Pricing*

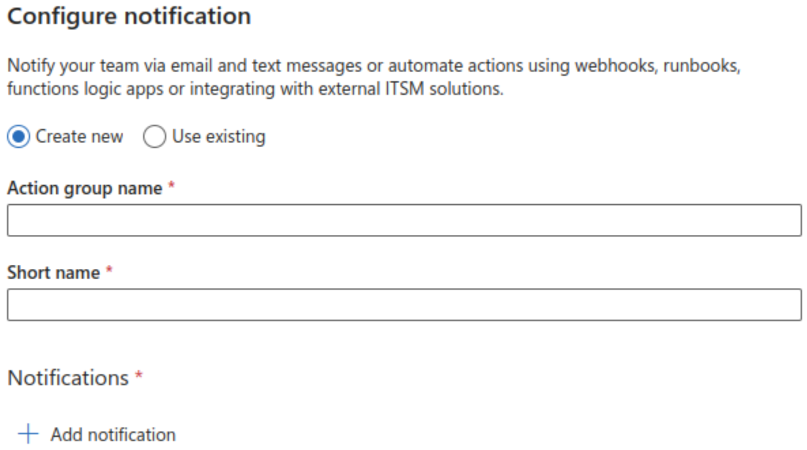
Configure Email/SMS/Push/Voice notification * ⓘ

+ Configure notification

Enable rule upon creation

● On

c. Fill up the details and click > “+Configure Notification“



Configure notification

Notify your team via email and text messages or automate actions using webhooks, runbooks, functions logic apps or integrating with external ITSM solutions.

● Create new ○ Use existing

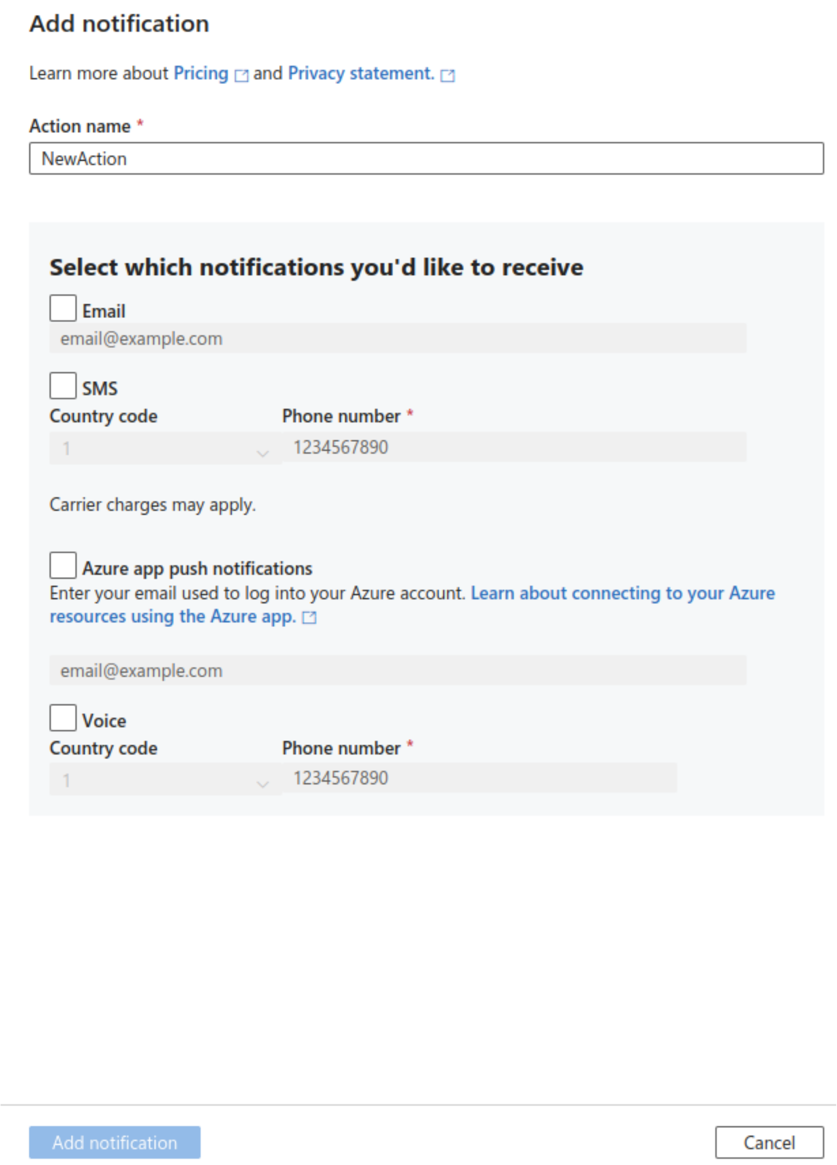
Action group name *

Short name *

Notifications *

+ Add notification

d. Click “+Add notification“ > select “Email“ > add your email address. Ther alert service will be created.



Add notification

Learn more about Pricing and Privacy statement.

Action name *

NewAction

Select which notifications you'd like to receive

□ Email

email@example.com

□ SMS

Country code: 1

Phone number *: 1234567890

Carrier charges may apply.

□ Azure app push notifications

Enter your email used to log into your Azure account. Learn about connecting to your Azure resources using the Azure app.

email@example.com

□ Voice

Country code: 1

Phone number *: 1234567890

You need SAS URI to connect from Blob to Snowflake. The default selected authentication type “Account key“ will work only when you are copying data from Blob storage to SQL Database.

Constraints & Solutions

One of the biggest constraints will be when you will try to copy your data from Blob storage to your Snowflake database. You need to configure **Snowflake Integration Object.** To configure it, execute this query

```
CREATE STORAGE INTEGRATION azure_blob_integration
TYPE = EXTERNAL_STAGE
STORAGE_PROVIDER = AZURE
ENABLED = TRUE
AZURE_TENANT_ID = '<Azure_Active_Directory_Tenant_ID>'
AZURE_CLIENT_ID = '<Azure_Application_ID>'
AZURE_CLIENT_SECRET = '<Azure_Application_Secret>'
STORAGE_ALLOWED_LOCATIONS = ('azure://<your_storage_account>.blob.core.windows.net/<your_container>/');
```

Replace the placeholder “< >“ with your Blob storage information. You need Azure tenant_id, client_id, client_secret, storage_allowed_locations. These steps will provide you with the necessary information:

- Azure Active Directory (Azure AD) Application Registration

- Navigate to the Azure Portal.
- In the left-hand navigation pane, click on "Azure Active Directory".
- Then, click on "App registrations" and then on "New registration".
- Fill in the name for the application, and under "Redirect URI", you can select "Web" and put a placeholder URL (like `http://localhost`), unless you know the specific URI you need.
- Click "Register".
- Within the application you just registered, on the "Overview" page, you can find:
  - **Application (client) ID**: This is your `Client ID`.
  - **Directory (tenant) ID**: This is your `Tenant ID`.
- In the application you registered, click on "Certificates & Secrets" in the left-hand menu.
- Click on "New client secret".
- Add a description for the client secret (e.g., "Snowflake Integration").
- Choose an expiration that fits your needs (e.g., 1 year, 2 years, or never).
- Click "Add".
- And for the storage-allowed locations, it will be your Blob SAS URL, like `<your_storage_account>.blob.core.windows.net/<your_container>/`, you don't need to use `https:` in here.
- After adding everything executes the query.
- You also need to create a stage that will refer to Azure Blob Storage in the Snowflake integration. Edit and run this query:

```
CREATE STAGE my_stage
URL = 'azure://<your_storage_account>.blob.core.windows.net/<your_container>/'
STORAGE_INTEGRATION = azure_blob_integration;
```

After you might stumble upon another error issue related to your client’s IP address. Errors will look like this:

Cannot connect to SQL Database. Please contact SQL server team for further support. Server: 'vptaskserver.database.windows.net', Database: 'CompaneLeadsDB', User: 'rootadmin'. Check the linked service configuration is correct, and make sure the SQL Database firewall allows the integration runtime to access. Cannot open server 'vptaskserver' requested by the login. Client with IP address '20.42.3.136' is not allowed to access the server. To enable access, use the Azure Management Portal or run sp_set_firewall_rule on the master database to create a firewall rule for this IP address or address range. It may take up to five minutes for this change to take effect., SqlErrorNumber=40615,Class=14,State=1, Activity ID: af71423e-7e57-4403-be0b-3b1c42852bf9.

To avoid this issue, you need to add a range of IP addresses. For that use Azure CLI and execute this:

`az sql server firewall-rule create --resource-group {Your Resource Group Name} --server {Your SQL Server name} --name AllowAzureDataFactoryRange --start-ip-address 20.42.2.100 --end-ip-address 20.42.2.200`

Note that, the IP Address range should start from the IP address shown in the error message. Upon execution, you are good to go for the pipeline deployment.

> Another way to add IP range is to add it from your **Azure Portal Firewall Rules**. This was the initial approach, where you add a rule directly via the Azure Portal interface. Ensure you're adding the rule at the SQL server level and not just the database level. Go to the SQL server's settings (the server that houses your `DATABASE`) in the Azure portal. Find the "Firewalls and virtual networks" option there. You should be able to add a rule for an IP address by giving the start IP and end IP.

Hopefully you will be able to build and deploy Azure Data Factory pipeline in no time.