

Lab 03 - Identifying and extracting text with Document Intelligence in Microsoft Fabric

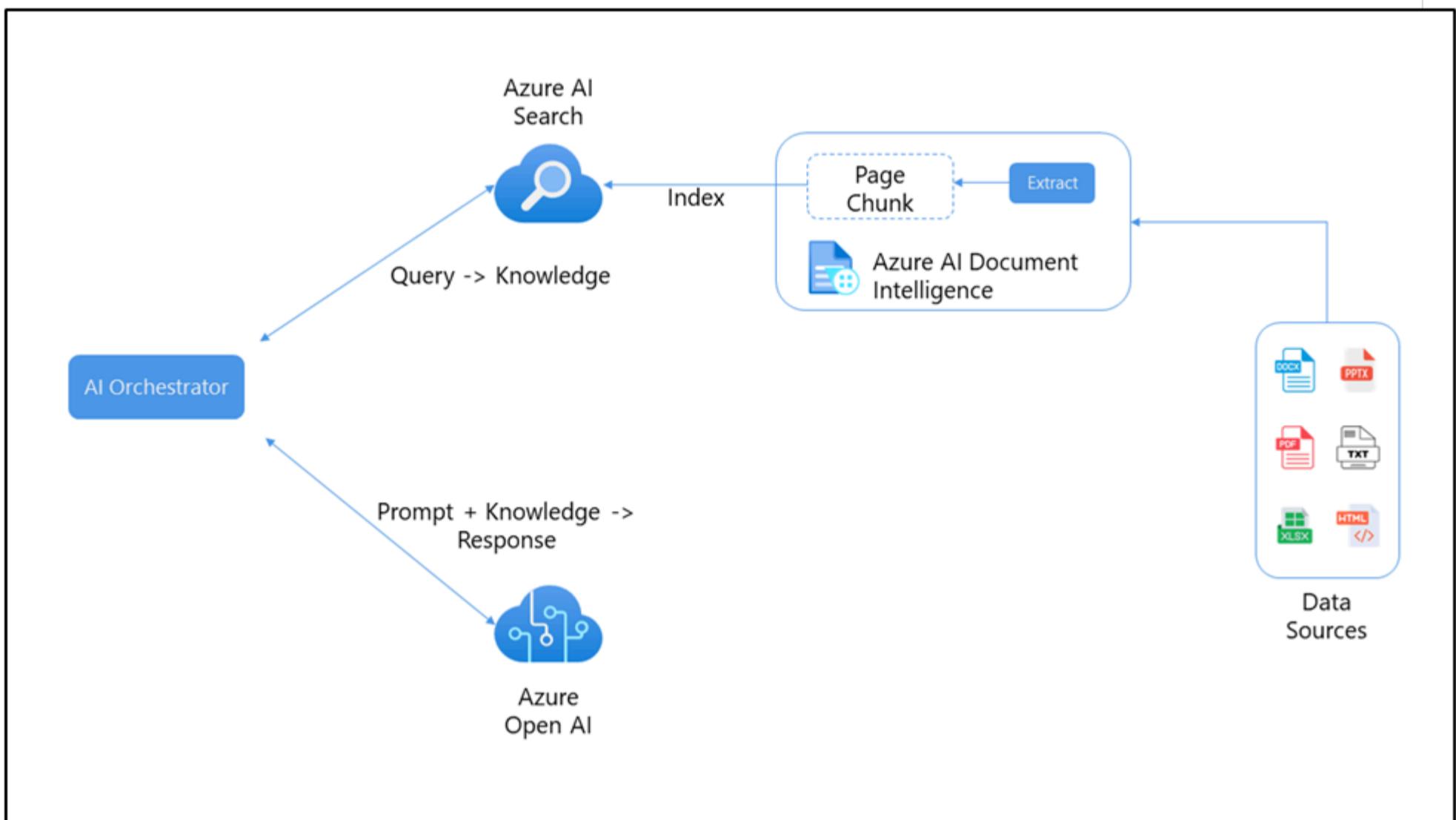
② Introduction

Analyzing structured data has been an easy process for some time but the same cannot be said for unstructured data. Unstructured data, such as text, images, and videos, is more difficult to analyze and interpret. However, with the advent of advanced AI models, such as OpenAI's GPT-3 and GPT-4, it is now becoming easier to analyze and gain insights from unstructured data.

An example of such analysis is the ability to query a document for specific information using natural language which is achievable through a combination of information retrieval and language generation.

By leveraging the RAG (Retrieval-Augmented Generation) framework, you can create a powerful question-and-answering pipeline that uses a large language model (LLM) and your own data to generate responses.

The architecture of such an application is as shown below:



Objective

- Create a multi-service resource for Azure AI services using Azure portal
- To create fabric capacity and workspace, Key vault, and fabric workspace
- Pre-process PDF Documents using Azure AI Document Intelligence in Azure AI Services.
- Perform text chunking using SynapseML.
- Generate embeddings for the chunks using SynapseML and Azure OpenAI Services.
- Store the embeddings in Azure AI Search.
- Build a question answering pipeline.

Exercise 1: Environment Setup

Task 1: Create a multi-service resource for Azure AI services

The multi-service resource is listed under **Azure AI services > Azure AI services multi-service account** in the portal. To create a multi-service resource follow these instructions:

- 1. Select this link to create a multi-service resource: <https://portal.azure.com/#create/Microsoft.CognitiveServicesAllInOne>
- 2. On the **Create** page, provide the following information:

Project details	Description
Subscription	Select one of your available Azure subscriptions.
Resource group	Click on Create new > enter AI-FabricXX (XX can be a unique number, you can add more digits after XX to make the name unique)
Region	Select the appropriate region for your CognitiveServices**. In this lab, we have chosen the East US 2 region.**

Project details	Description
Name	Cognitive-serviceXXX(XXX can be a unique number, you can add more digits after XXX to make the name unique)
Pricing tier	Standard S0

3. Configure other settings for your resource as needed, read and accept the conditions (as applicable), and then select **Review + create**.

Microsoft Azure Search resources, services, and documentation

Home > Create Azure AI services

Basics Network Identity Tags Review + create

Get access to Vision, Language, Search, and Speech Azure AI services with a single API key. Quickly connect services together to achieve more insights into your content and easily integrate with other services like Azure Search.

Learn more

Project Details

Subscription * ① Azure Pass - Sponsorship **1**

Resource group * ① **Create new** **2**

A resource group is a container that holds related resources for an Azure solution.

Region ①

Name * ① **AI-Fabric879** **3**

OK Cancel

Location specifies the region only for in regional services. Click here for more details. **4**

Pricing tier * ① **The value must not be empty.**

View full pricing details

Previous Next **Review + create**

MICROSOFT Azure

Search resources, services, and docs (Q)

Home >

Create Azure AI services

together to achieve more insights into your content and easily integrate with other services like Azure Search.

[Learn more](#)

Project Details

Subscription * ⓘ ④

Resource group * ⓘ ④
[Create new](#)

Instance Details

Region ⓘ ⑤

Name * ⓘ ⑥ ✓

i Location specifies the region only for included regional services. This does not specify a region for included non-regional services. [Click here for more details.](#)

Pricing tier * ⓘ ⑦

[View full pricing details](#)

By checking this box I acknowledge that I have read and understood all the terms below * ⑧

[Previous](#) [Next](#) **Review + create** ⑨

4. In the **Review+submit** tab, once the Validation is Passed, click on the **Create** button.

Microsoft Azure

Search resources, services, and docs

Home > Create Azure AI services ...

Basics Network Identity Tags Review + create

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 Pass - Sponsorship
Resource group	AI-Fabric879
Region	East US 2
Name	Cognitive-service237
Pricing tier	Standard S0

Network

Type All networks, including the internet, can access this resource.

Identity

Previous Next **Create**

5. After the deployment is completed, click on the **Go to resource** button.

Microsoft Azure

Search resources, services, and docs (G+/)

Home > Microsoft.CognitiveServicesAllInOne-20240708121902 | Overview ⚡ ...

Deployment

Search X <> Delete Cancel Redeploy Download Refresh

Overview Deployment name : Microsoft.CognitiveServicesAllInOne-20240708121902 Start time : 7/8/2024, 12:33:41 PM
Inputs Subscription : Azure Pass - Sponsorship Correlation ID : fa87fa58-12c9-4c3f-bt
Outputs Resource group : AI-Fabric879
Template

Your deployment is complete

Deployment details

Next steps

Go to resource

Give feedback

Tell us about your experience with deployment

6. In your **Azure AI service** window, navigate to the **Resource Management** section, and click on **Keys and Endpoints**.

The screenshot shows the Microsoft Azure portal interface for a resource group named 'Cognitive-service237'. The left sidebar has a 'Resource Management' section with a 'Keys and Endpoint' item highlighted by a red box. The main content area displays essential details about the resource group, including its resource group (AI-Fabric879), status (Active), location (East US 2), subscription (Azure Pass - Sponsorship), subscription ID (0c08b20f-9ce4-4949-80d7-79381006f4ae), and tags (Add tags). Below this, there are tabs for 'Get Started', 'Decision', 'Language', 'Speech', 'Vision', and 'Document Intelli...'. A 'Build intelligent' section on the right features a 'Decision' card with the text: 'The Azure AI service and Applied AI help you understand, and react to, the world around you.' and 'Make smarter decisions faster with Decision service'.

7. In **Keys and Endpoints** page, copy **KEY1**, **KEY 2**, and **Endpoint** values and paste them in a notepad as shown in the below image, then **Save** the notepad to use the information in the upcoming tasks.

Microsoft Azure

Search resources, services, and docs (G+/)

Home > Microsoft.CognitiveServicesAllInOne-20240708121902 | Overview > Cognitive-service237

Cognitive-service237 | Keys and Endpoint

Azure AI services multi-service account

Search Regenerate Key1 Regenerate Key2

- Overview
- Activity log
- Access control (IAM)
- Tags
- Diagnose and solve problems
- Resource Management
 - Keys and Endpoint
 - Pricing tier
 - Networking
 - Identity
 - Cost analysis
 - Properties
 - Locks
- Security
- Monitoring
- Automation

These keys are used to access your Azure AI services API. Do not share your keys. Store them securely—for example, using Azure Key Vault. We also recommend regenerating these keys regularly. Only one key is necessary to make an API call. When regenerating the first key, you can use the second key for continued access to the service.

Show Keys

KEY 1
.....

KEY 2
.....

Location/Region ⓘ
eastus2

Endpoint
<https://cognitive-service237.cognitiveservices.azure.com/>

Copy to clipboard

Task 2: Create a key vault using the Azure portal

1. In Azure portal home page, click on + **Create Resource**.

portal.azure.com/#home

Microsoft Azure

Search resources, services, and docs (G+/)

Azure services

Create a resource

Resource groups Virtual machines Azure OpenAI Cognitive Services Subscriptions Azure Synapse Analytic

Resources

Recent Favorite

Name	Type
MyOpenAIResource123	Azure OpenAI
OAIResourceGroup1	Resource group
Devuser12TFN1	Subscription
CSStorage-RG	Resource group

2. In the **Create a resource** page search bar, type **Key vault** and click on the appeared **Key vault**.

MICROSOFT Azure

Search resources, services, and docs

Home >

Create a resource

Get Started

Recently created

Categories

- AI + Machine Learning
- Analytics
- Blockchain
- Compute
- Containers
- Databases
- Developer Tools
- DevOps
- Identity
- Integration

key vault

key vault

EJBCA SaaS - With Azure Key Vault Managed HSM Backed CA Keys

EZCA PKI SaaS For Azure

Azure Key Vault Managed HSM

Web App

Create | Docs | MS Learn

SQL Database

Create | Docs | MS Learn

Function App

Create | Docs

Key Vault

Create | Docs | MS Learn

Data Factory

Popular M

Windows

Ubuntu

Red Hat

ES

Getting started? Try our Quickstart

3. Click on **Key Vault** section.

Microsoft Azure

Search resources, services, and

Home > Create a resource >

Marketplace

Get Started

Service Providers

Management

Private Marketplace

Private Offer Management

My Marketplace

- Favorites
- My solutions
- Recently created
- Private plans

Categories

- Security (45)
- Databases (24)
- Compute (22)
- Identity (20)
- DevOps (19)

New! Get AI-generated suggestions for your search.

Ask AI to suggest products, articles, and solutions for what you need.

key vault

Pricing : All

Azure services only

Showing 1 to 20 of 127 results for 'key vault'. [Clear search](#)



Key Vault

Microsoft

Azure Service

Safeguard cryptographic keys and other secrets used by cloud apps and services.

Create 



Azure Key Vault Managed HSM

Microsoft

Azure Service

Safeguard cryptographic keys used by cloud apps and services.

Create 



Azure Key Vault solution for Sentinel

Microsoft Sentinel, Microsoft

Azure Application

Azure Key Vault solution for

Price varies

Create 

4. On the **Create a key Vault** page, provide the following information and click on **Review+create** button.

Field	Description
Subscription	Select your Azure OpenAI subscription
Resource group	Select your Resource group(that you have created in Task 1)
Region	EastUS 2
Name	fabrickeyvaultXX (XX can be unique number)
Pricing Tier	Click on change Price Tier>select Standard

5. Once the Validation is passed, click on the **Create** button.



Create a key vault

...

[Basics](#) [Access configuration](#) [Networking](#) [Tags](#) [Review + create](#)

Azure Key Vault is a cloud service used to manage keys, secrets, and certificates. Key Vault eliminates the need for developers to store security information in their code. It allows you to centralize the storage of your application secrets which greatly reduces the chances that secrets may be leaked. Key Vault also allows you to securely store secrets and keys backed by Hardware Security Modules or HSMs. The HSMs used are Federal Information Processing Standards (FIPS) 140-2 Level 2 validated. In addition, key vault provides logs of all access and usage attempts of your secrets so you have a complete audit trail for compliance.

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 Pass - Sponsorship▼

Resource group *

AI-Fabric123▼

[Create new](#)

Instance details

Key vault name * ⓘ

fabrickeyvault23✓

Region *

East US 2▼

Pricing tier * ⓘ

Standard▼

Recovery options

[Previous](#) [Next](#) [Review + create](#)



Home > Create a resource > Marketplace >

Create a key vault

...

Basics

Access configuration

Networking

Tags

Review + create

Review + create

Basics

Subscription	Azure Pass - Sponsorship
Resource group	AI-Fabric123
Key vault name	fabrickeyvault23
Region	East US 2
Pricing tier	Standard
Soft-delete	Enabled
Purge protection during retention period	Disabled
Days to retain deleted vaults	90 days

Access configuration

Azure Virtual Machines for deployment	Disabled
Azure Resource Manager for template deployment	Disabled
Azure Disk Encryption for volume encryption	Disabled
Permission model	Azure role-based access control

Networking

Previous

Next

Create

6. After the deployment is completed, click on the **Go to resource** button.

Microsoft Azure

Home > fabrickeyvault23 | Overview

Deployment

Search Delete Cancel Redeploy Download Refresh

Overview Inputs Outputs Template

✓ Your deployment is complete

Deployment name : fabrickeyvault23
Subscription : Azure Pass - Sponsorship
Resource group : AI-Fabric123

Start time : 7/17/2024, 11:39:54 AM
Correlation ID : ebbec2f8-15d7-4314-8f91

> Deployment details
▼ Next steps

Go to resource

Give feedback
Tell us about your experience with deployment

This screenshot shows the Microsoft Azure Deployment Overview page for a deployment named 'fabrickeyvault23'. The deployment status is 'complete' with a green checkmark. It provides details such as the deployment name, subscription, and resource group. A 'Deployment details' link is available for further information, and a 'Next steps' section includes a 'Go to resource' button. Feedback links are also present at the bottom.

- 7. In your **fabrickeyvaultXX** window, from the left menu, click on the **Access control(IAM)**.
- 8. On the Access control(IAM) page, Click +**Add** and select **Add role assignments**.

Microsoft Azure

Home > fabrickeyvault23

fabrickeyvault23 | Access control (IAM)

Key vault

Search Add Download role assignments Edit columns Refresh

Overview Activity log **Access control (IAM) 1** Tags Diagnose and solve problems Access policies Events

Objects Keys Secrets Certificates Settings Access configuration

+ Add Add role assignment 3 assignments Roles Deny assignments

Add co-administrator

My access
View my level of access to this resource.
View my access

Check access
Review the level of access a user, group, service principal, or managed identit
Check access

Grant access to this resource
Grant access to resources by assigning a role.
Learn more

View access to this resource
View the role assignments assigned to this and other resources.
Learn more

Add role assignment View

This screenshot shows the Microsoft Azure Access control (IAM) page for a key vault named 'fabrickeyvault23'. The 'Access control (IAM)' tab is selected, indicated by a red box and a '1' notification. The 'Add' button is highlighted with a red box. A dropdown menu shows 'Add role assignment' highlighted with a red box and a '3' notification. The page displays sections for 'My access', 'Check access', 'Grant access to this resource', and 'View access to this resource'.

- 9. In **Job function roles**, type the ****Key vault administrator**** in the search box and select it. Click **Next**

[Home](#) > [fabrickeyvault23 | Access control \(IAM\)](#) >

Add role assignment

[Role](#) [Members *](#) [Conditions](#) [Review + assign](#)

A role definition is a collection of permissions. You can use the built-in roles or you can create your own custom roles. [Learn more](#)

[Job function roles](#) [Privileged administrator roles](#)

Grant access to Azure resources based on job function, such as the ability to create virtual machines.

× Type : All Category : All

Name ↑↓

Name	Description
Key Vault Administrator 2	Perform all data plane operations on a key vault and all objects in it, including certificates, keys, and secrets.
Key Vault Data Access Administrator	Manage access to Azure Key Vault by adding or removing role assignments for the Key Vault Admin.

Showing 1 - 2 of 2 results.

[Review + assign](#) [Previous](#) [Next 3](#)

10. In the **Add role assignment** tab, select Assign access to User group or service principal. Under Members, click **+Select members**

Microsoft Azure

Search resources, services, ar...

Home > fabrickeyvault23 | Access control (IAM) >

Add role assignment

Role Members* Conditions Review + assign

Selected role Key Vault Administrator

Assign access to User, group, or service principal Managed identity

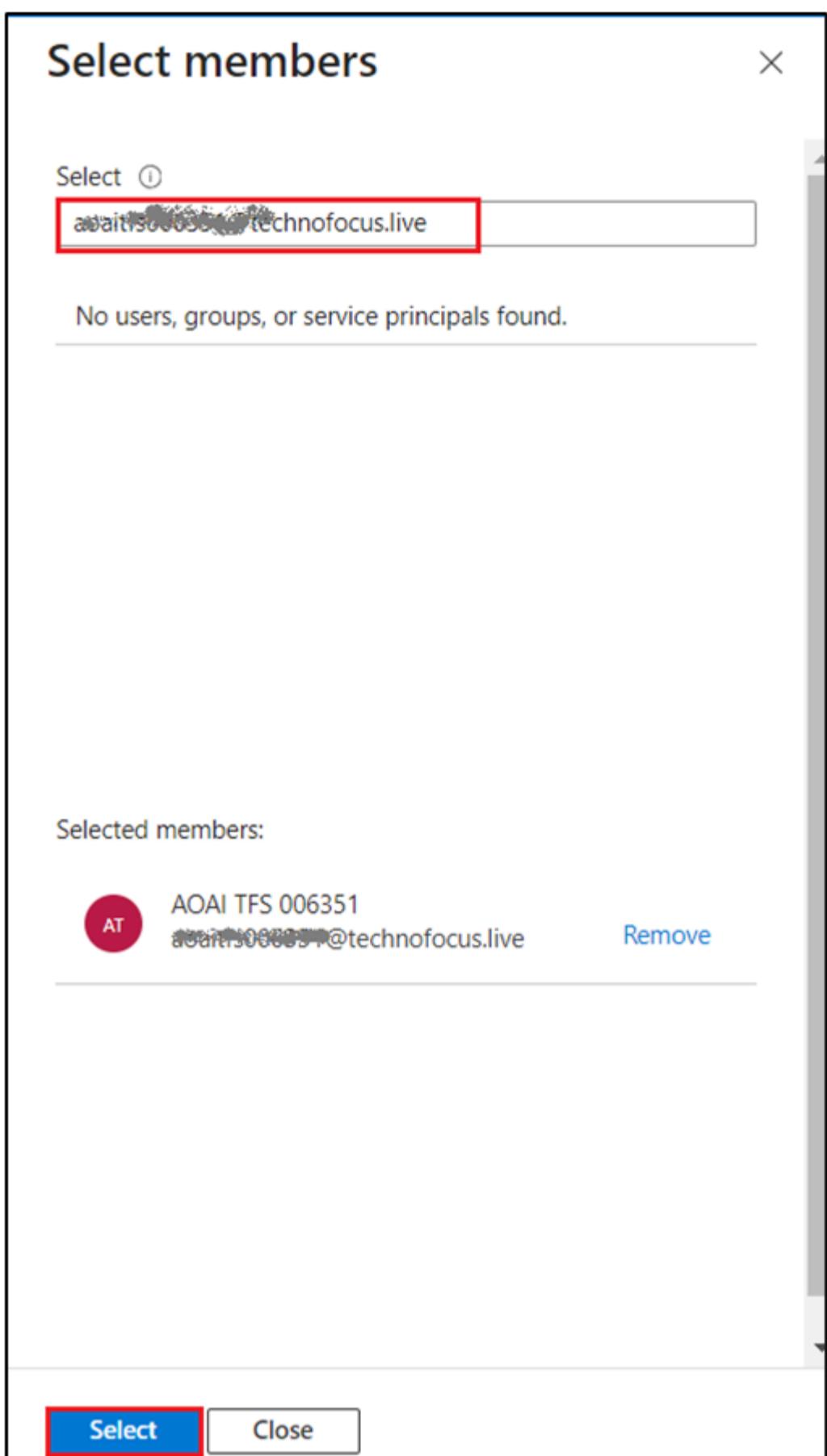
Members [+ Select members](#)

Name	Object ID	Type
No members selected		

Description Optional

Review + assign Previous Next

11. On the Select members tab, search your Azure OpenAI subscription and click **Select**.



12. In the **Add role assignment** page, Click **Review + Assign**, you will get a notification once the role assignment is complete.

[Home](#) > [fabrickeyvault23 | Access control \(IAM\)](#) >

Add role assignment

[Role](#) [Members](#) [Conditions](#) [Review + assign](#)**Selected role** Key Vault Administrator**Assign access to**
 User, group, or service principal
 Managed identity**Members** [+ Select members](#)

	Name	Object ID	Type
	AOAI TFS 006351	8d4494d4-5ed3-488c-b19c-c6c4ae7214...	User

Description [Review + assign](#)[Previous](#)[Next](#)

Add role assignment

Role	Members	Conditions	Review + assign
Role	Key Vault Administrator		
Scope	/subscriptions/d537203e-85c0-49d6-918f-f5043757f718/resourceGroups/AI-Fabric123/providers/Microsoft		
Members	Name		Object ID
	AOAI TFS 006351		8d4494d4-5ed3-488c-b19c-c6c4ae7214e7
Description	No description		

Review + assign

Previous

Next

13. You will see a notification -- added as Azure AI Developer for Azure-openai-testXX

More events in the activity log →

Dismiss all ▾

✓ Added Role assignment

X

AOAI TFS 006351 was added as Key Vault Administrator for
fabrickeyvault23.

a few seconds ago

Task 3: Create a secret using Azure Key vault

1. On the Key Vault left-hand sidebar, select **Objects** then select **Secrets**.

2. Select + **Generate/Import**.

The screenshot shows the Microsoft Azure Key Vault Overview page for a vault named 'fabrickeyvault23'. The left sidebar contains links for Overview, Activity log, Access control (IAM), Tags, Diagnose and solve problems, Access policies, Events, Objects (Keys, Secrets, Certificates), Settings (Access configuration, Networking), and Metrics. The main content area displays vault details: Resource group (move) : AI-Fabric123, Location : East US 2, Subscription (move) : Azure Pass - Sponsorship, Subscription ID : d537203e-85c0-49d6-918f-f5043757f718. Below this, there's a 'Tags (edit)' section with a link to 'Add tags'. At the bottom, tabs for Get started, Properties, Monitoring, Tools + SDKs, and Tutorials are present. A 'Manage keys and secrets' section with a note about using a vault per application is also shown.

3. On the **Create a secret** page, provide the following information and click on **Create** button .

The screenshot shows the Microsoft Azure Key Vault Secrets page for the same vault. The left sidebar is identical to the previous screenshot. The main content area shows a table with columns Name, Type, and Status. A message at the top states: 'The operation is not allowed by RBAC. If role assignments were recently changed, please wait several minutes for role assignments to become effective.' Below this, a table lists contents with a single row: 'Name' (You are unauthorized to view these contents), 'Type' (Secret), and 'Status' (Unknown).

Upload options	Manual
Name	Enter the name <input type="text" value="aisearchkey"/>
Secret Value	password321

[Home](#) > [fabrickeyvault231 | Secrets](#) >

Create a secret

Upload options

Manual

Name * ⓘ

aisearchkey

Secret value * ⓘ

Content type (optional)

Set activation date ⓘ

Set expiration date ⓘ

Enabled

Yes

No

Tags

0 tags

Create

Cancel

4. Select + **Generate/Import**.



Home > fabrickeyvault231

fabrickeyvault231 | Secrets

Key vault

 Search

◇ <<

[+ Generate/Import](#)[⟳ Refresh](#)[↑ Restore Backup](#)[</> View sample](#)[☰ Overview](#)[Activity log](#)[Access control \(IAM\)](#)[Tags](#)[Diagnose and solve problems](#)[Access policies](#)[Events](#)[Objects](#)[Keys](#)[Secrets](#)[Certificates](#)[Settings](#)[Monitoring](#)[Automation](#)

Name

Type

aisearchkey

5. On the **Create a secret** page, provide the following information and click on **Create** button .

Upload options	Manual
Name	Enter the name <input type="text"/> aiservicekey
Secret Value	password321

[Home](#) > [fabrickeyvault231](#) | [Secrets](#) >

Create a secret

Upload options

Manual

Name * ⓘ

aiservicekey1

Secret value * ⓘ

Content type (optional)



Set activation date ⓘ



Set expiration date ⓘ



Enabled

Yes

No

Tags

0 tags

[Create](#)[Cancel](#)

Microsoft Azure

Home > fabrickeyvault231

fabrickeyvault231 | Secrets

Key vault

Search Generate/Import Refresh Restore Backup View sample code Manage deleted secrets

Overview Activity log Access control (IAM) Tags Diagnose and solve problems Access policies Events Objects Keys Secrets Certificates Settings Monitoring Automation Help

Name	Type	Status
asearchkey		✓ Enabled
aiservicekey		✓ Enabled

6. In Key vault page, copy **Key vault** name, and **Secrets** values and paste them in a notepad as shown in the below image, then **Save** the notepad to use the information in the upcoming tasks.

Home > fabrickeyvault231

fabrickeyvault231 | Secrets

Key vault

Search Generate/Import Refresh Restore Backup View sample code Manage deleted secrets

Overview Activity log Access control (IAM) Tags Diagnose and solve problems Access policies Events Objects Keys Secrets Certificates Settings Monitoring Automation Help

Name	Type
asearchkey	
aiservicekey	

Task 4: Create an Azure AI Search service in the portal

1. In Azure portal home page, click on + **Create Resource**.

The screenshot shows the Microsoft Azure portal homepage at portal.azure.com/#home. At the top, there's a search bar labeled "Search resources, services, and docs (G+/-)". Below the search bar, there's a section titled "Azure services" with several icons: "Create a resource" (highlighted with a red box), "Resource groups", "Virtual machines", "Azure OpenAI", "Cognitive Services", "Subscriptions", and "Azure Synapse Analytics". Underneath this, there's a "Resources" section with tabs for "Recent" (which is selected) and "Favorite". A table lists recent resources: "MyOpenAIResource123" (Azure OpenAI), "OAIResourceGroup1" (Resource group), "Devuser12TFN1" (Subscription), and "CSStorage-RG" (Resource group). The entire screenshot is enclosed in a black border.

2. In the **Create a resource** page search bar, type **Azure AI Search** and click on the appeared **azure ai search**.

The screenshot shows the "Create a resource" page in the Microsoft Azure portal. At the top, there's a search bar with the placeholder "Search resources, services, and docs (G+/-)". Below the search bar, the text "Azure AI Search" is typed into it and highlighted with a red box. To the left, there's a sidebar with sections for "Get Started" and "Recently created". Below that is a "Categories" section with links for "AI + Machine Learning", "Analytics", "Blockchain", "Compute", "Containers", "Databases", and "Developer Tools". On the right, there's a "Popular Markets" section with links for "Windows", "Web App", "SQL Database", and "Function App", each with "Create" and "Docs" buttons. The entire screenshot is enclosed in a black border.

3. Click on **azure ai search** section.

Microsoft Azure Search results for 'azure cognitive search'.

Showing 1 to 20 of 33 results for 'azure cognitive search'. [Clear search](#)

Category	Product Name	Provider	Description
BA Insight	BA Insight for Azure Cognitive Search	BA-Insight - Global HQ (Boston)	SaaS
Microsoft	Azure Cognitive Search solution for Sentinel	Microsoft Sentinel, Microsoft Co...	Azure Application
Microsoft	Azure Cognitive Search solution for Sentinel	Microsoft Sentinel, Microsoft Co...	Azure Application
Microsoft	Azure AI Search	Microsoft	AI-powered cloud search service for mobile and web app development (formerly Azure Search)

4. In the **Azure AI Search** page, click on the **Create** button.

Azure AI Search - Microsoft | Azure Service

Plan: Azure AI Search

Create (button highlighted with a red box)

Overview Plans Usage Information + Support Ratings + Reviews

5. On the **Create a search service** page, provide the following information and click on **Review+create** button.

Field	Description
Subscription	Select your Azure OpenAI subscription
Resource group	Select your Resource group(that you have created in Lab 1)
Region	EastUS 2

Field	Description
Name	mysearchserviceXX (XX can be unique number)
Pricing Tier	Click on change Price Tier > select Basic

Home > Azure AI services | AI Search >

Create a search service

Basics Scale Networking Tags Review + create

Project details

Subscription * Azure Pass - Sponsorship 1

Resource Group * AIFabrikendev01 2

[Create new](#)

Instance Details

Service name * mysearchservice859 3

Location * East US 2 4

Pricing tier * Standard2 5

512 GB/Partition, max 12 replicas, max 12 partitions, max 36 search units

[Change Pricing Tier](#)

Select Pricing Tier

Browse available skus and their features

Sku	Offering	Indexes	Indexers	Storage	Search units	Replicas	Partitions
F	Free	3	3	50 MB	1	1	1
B	Basic	15	15	2 GB	3	3	1
S	Standard	50	50	25 GB/Partition*	36	12	12
S2	Standard	200	200	100 GB/Partition*	36	12	12
S3	Standard	200	200	200 GB/Partition*	36	12	12
S3HD	High-density	1000	0	200 GB/Partition*	36	12	3
L1	Storage Optimized	10	10	1 TB/Partition*	36	12	12
L2	Storage Optimized	10	10	2 TB/Partition*	36	12	12

Select Prices presented are estimates in your local currency that include only Azure infrastructure costs and any discounts for the subscription and any applicable software costs. Final charges will appear in your local currency in cost analysis and billing views. [View Azure pricing details](#)

[Home](#) > [Azure AI services | AI Search](#) >

Create a search service

...

[Basics](#) [Scale](#) [Networking](#) [Tags](#) [Review + create](#)

Project details

Subscription *

Azure Pass - Sponsorship

Resource Group *

AI Fabric RG

[Create new](#)

Instance Details

Service name * ⓘ

mysearchservice859



Location *

East US 2



Pricing tier * ⓘ

Basic

15 GB/Partition, max 3 replicas, max 3 partitions, max 9 search units

[Change Pricing Tier](#)[Review + create](#)[Previous](#)[Next: Scale](#)

6. Once the Validation is passed, click on the **Create** button.

[Home](#) > [Azure AI services | AI Search](#) >

Create a search service

Validation Success

[Basics](#) [Scale](#) [Networking](#) [Tags](#) [Review + create](#)

Basics

Subscription	Azure Pass - Sponsorship
Resource Group	AI-FabricRG891
Location	East US 2
Service name	(new) mysearchservice859
Pricing tier	basic (15 GB/Partition, max 3 replicas, max 3 partitions, max 9 search units)
Estimated cost per month	\$75.14

Scale

Replicas	1
Partitions	1

Networking

Endpoint connectivity (data)	Public
------------------------------	--------

[Create](#)

[Previous](#)

[Next](#)

[Download a template for automation](#)

7. After the deployment is completed, click on the **Go to resource** button.



Home >



search-service-mysearchservice21 | Overview

Deployment

 Search X « Delete Cancel Redeploy Download Refresh Overview Inputs Outputs Template

✓ Your deployment is complete

Cloud Deployment name : search-service-mysearchservice21
Subscription : Azure Pass - Sponsorship
Resource group : AI-Fabric879

> Deployment details

▽ Next steps

Go to resource

Give feedback

Tell us about your experience with deployment

8. copy **AI search name** and paste them in a notepad as shown in the below image, then **Save** the notepad to use the information in the upcoming lab.

mysearchservice21

Search service

Search

Add index Import data Import and vectorize data Search

Resource group (move) : AI-Fabric879

Location (move) : East US 2

Subscription (move) : Azure Pass - Sponsorship

Subscription ID : 85677dc1-5950-436b-9280-7c7f9306d95c

Status : Running

Tags (edit) : Add tags

Get started Properties Usage Monitoring

Task 5: Create Fabric Capacity and Workspace

Microsoft Fabric is deployed to an Azure Active Directory tenant. Within each Fabric tenant, Fabric capacities can be created to group resources for various purposes -- this might be done organizationally (sales, marketing, development), geographically, or other logical grouping.

If a Fabric Trial is available, we recommend taking advantage of that opportunity to try Microsoft Fabric for a period of time (currently 60 days) with no commitment. To see if you are in a trial or eligible for a trial, visit the [Fabric portal](#). If you are able to log in or presented the option to start a trial, you should be all set!

To create a Fabric capacity outside of a trial environment, create a new resource from the Azure portal, and search for Fabric.

1. From the Azure portal home page, click on **Azure portal menu** represented by three horizontal bars on the left side of the Microsoft Azure command bar as shown in the below image.

The screenshot shows the Microsoft Azure portal homepage. At the top left, there is a red box highlighting the 'Create a resource' button, which is represented by a blue plus sign icon. The page features a navigation bar with links like 'Microsoft Azure', 'Search resources, services, and docs (G+)', and icons for 'Cloud', 'Help & support', and 'Sign out'. Below the navigation bar, there's a section titled 'Azure services' with icons for 'Create a resource', 'Subscriptions', 'Quickstart Center', 'Virtual machines', 'App Services', 'Storage accounts', 'SQL databases', 'Azure Cosmos DB', 'Kubernetes services', and 'More services'. A 'Resources' section follows, showing a table with a single item: 'Azure Pass - Sponsorship' (Type: Subscription, Last Viewed: 40 minutes ago). There are tabs for 'Recent' and 'Favorite'. Below this is a 'Navigate' section with links for 'Subscriptions', 'Resource groups', 'All resources', and 'Dashboard'. At the bottom, there's a 'Tools' section.

2. Navigate and click on + **Create a resource**.

The screenshot shows the 'Create a resource' page. On the left, a sidebar lists various service categories: Home, Dashboard, All services, Favorites (with a star icon), All resources, Resource groups, App Services, Function App, SQL databases, Azure Cosmos DB, Virtual machines, Load balancers, and Storage accounts. The 'Create a resource' button, located at the top left of the main content area, is highlighted with a red box. The main content area is titled 'Azure services' and contains a large blue plus sign icon and the text 'Create a resource'. Below this is a 'Resources' section with tabs for 'Recent' and 'Favorite', showing a table with one item: 'Azure Pass - Sponsorship' (Type: Subscription, Last Viewed: 40 minutes ago). There is also a 'See all' link.

3. On **Create a resource** page, in the **Search services and marketplace** search bar, type+++ **Fabric++**, then select **Microsoft fabric**.

[Home > Create a resource >](#)

Marketplace

[Get Started](#)[Service Providers](#)

Management

[Private Marketplace](#)[Private Offer Management](#)

My Marketplace

[Favorites](#)[My solutions](#)[Recently created](#)[Private plans](#)

Categories

 Fabric XPricing : All X

fabric

fabrication

Microsoft Fabric

Service Fabric Cluster

Service Fabric Managed Cluster

Fivetran Data Pipelines

SendGrid

SaaS

Reliable email delivery, at scale.

INFRONT SYSTEMS PTY LTD

Managed Services

Infront's Monitoring-as-a-Service;
observe every network, every app, at
any scale, anywhere.

Rawworks

Privileged Identity Management i...

RawWorks

SaaS

Met deze tool is het mogelijk PIM op bestaande systemen te implementeren en uit te voeren

Starts at
Free[Subscribe](#) ▼[Create](#) ▼[Subscribe](#) ▼

4. In the **Marketplace** page, navigate to the **Microsoft Fabric** section, click on the Create button dropdown, then select **Microsoft Fabric** as shown in the image.

Home > Create a resource >

Marketplace

Get Started

Service Providers

Management

Private Marketplace

Private Offer Management

My Marketplace

Favorites

My solutions

Recently created

Private plans

Categories

Analytics (23)

Networking (19)

Security (14)

Databases (9)

AI + Machine Learning (5)



New! Get AI-generated suggestions for your search.

Ask AI to suggest products, articles, and solutions for what you need.

Microsoft Fabric

Pricing : All

Operating System : All

 Azure services onlyShowing 1 to 20 of 57 results for 'Microsoft Fabric'. [Clear search](#)

Microsoft Fabric

Microsoft

Azure Service

Fabric delivers an end-to-end analytics platform from the data lake to the business user



Service Fabric Cluster

Microsoft

Azure Service

Create a customized Service Fabric cluster to host your service fabric micro services.



Service Fabric Managed Cluster

Microsoft

Azure Service

Create a customized Service Fabric managed cluster to host your service fabric micro services.

WADE

WADE Micro

WADE In

SaaS

Automate OneLake Orchestra

Starts at Free

Subscribe

Copilot

 Create 1 Microsoft Fabric 2 Create Create

5. In the **Create Fabric capacity** window, under the **Basics** tab, enter the following details and click on the **Review+create** button.

Subscription	Select the assigned subscription
Resource group	Select your Resource group(that you have created in Task 1)
Capacity name	<input type="text"/> fabriccapacity45 (XXX can be a unique number, you can add more digits after XXX to make the name unique)
Region	Select West US 3
Size	Click on Change size > select F4 SKU and click on Select button

Create Fabric capacity

* Basics Tags Review + create

Create Fabric capacity that you can use with your Fabric workspaces.

Project details

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

Subscription *	<input type="text" value="Azure Pass - Sponsorship"/>
Resource group *	<input type="text" value="AI-Fabric879"/> Create new

Capacity details

Name your Capacity and select a location.

Capacity name *	<input type="text" value="fabriccapacity45"/>
Region *	<input type="text" value="West US 3"/>
Size	F64 64 Capacity units Change size
Fabric capacity administrator *	<input type="text" value="admin@LODSA066984.onmicrosoft.com"/> Select

[Review + create](#)

< Previous

Next: Tags >

Select the resource size

SKU	Capacity Units	COST (ESTIMATED/MONTH)
F2	2	₹21,863.56
F4	4	₹43,727.12
F8	8	₹87,454.25
F16	16	₹174,908.49
F32	32	₹349,816.98
F64	64	₹699,633.96
F128	128	₹1,399,267.92
F256	256	₹2,798,535.85
F512	512	₹5,597,071.70
F1024	1024	₹11,194,143.40
F2048	2048	₹22,388,286.79

[Select](#)

Prices presented here are estimates in your local currency that include only Azure infrastructure costs and any subscription or location discounts. Final charges will be provided in your local currency, in cost analysis and billing views. [View the Azure pricing calculator.](#)

Create Fabric capacity ...

* Basics Tags Review + create

Create Fabric capacity that you can use with your Fabric workspaces.

Project details

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

Subscription * ⓘ

Azure Pass - Sponsorship

Resource group * ⓘ

AI-Fabric879

[Create new](#)

Capacity details

Name your Capacity and select a location.

Capacity name * ⓘ

fabriccapacity45

Region * ⓘ

West US 3

Size ⓘ

F4

4 Capacity units

[Change size](#)

Fabric capacity administrator * ⓘ

admin@LODSA066984.onmicrosoft.com

[Select](#)

[Review + create](#)

[< Previous](#)

[Next: Tags >](#)

6. In the **Review+submit** tab, once the Validation is Passed, click on the **Create** button.

Home > Microsoft Fabric >

Create Fabric capacity ...

✓ Validation succeeded

Welcome to Microsoft Fabric

Fabric delivers an end-to-end analytics platform from the data lake to the business user.



[Find out more](#)

* Basics Tags Review + create

Product Details

Microsoft Fabric

COST (ESTIMATED/MONTH) ⓘ

by Microsoft

[Terms of use](#) | [Privacy policy](#)

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. For additional details see [Azure Marketplace Terms](#).

Basics

[Create](#)

[< Previous](#)

[Next >](#)

[Download a template for automation](#)

Microsoft Azure

Home >

Microsoft.Fabric-20240304211856 | Overview

Deployment

Search Delete Cancel Redeploy Download Refresh

Overview Inputs Outputs Template

Deployment is in progress

Deployment name : Microsoft.Fabric-20240304211856
Subscription : Azure Pass - Sponsorship
Resource group : RealtimeFabric354

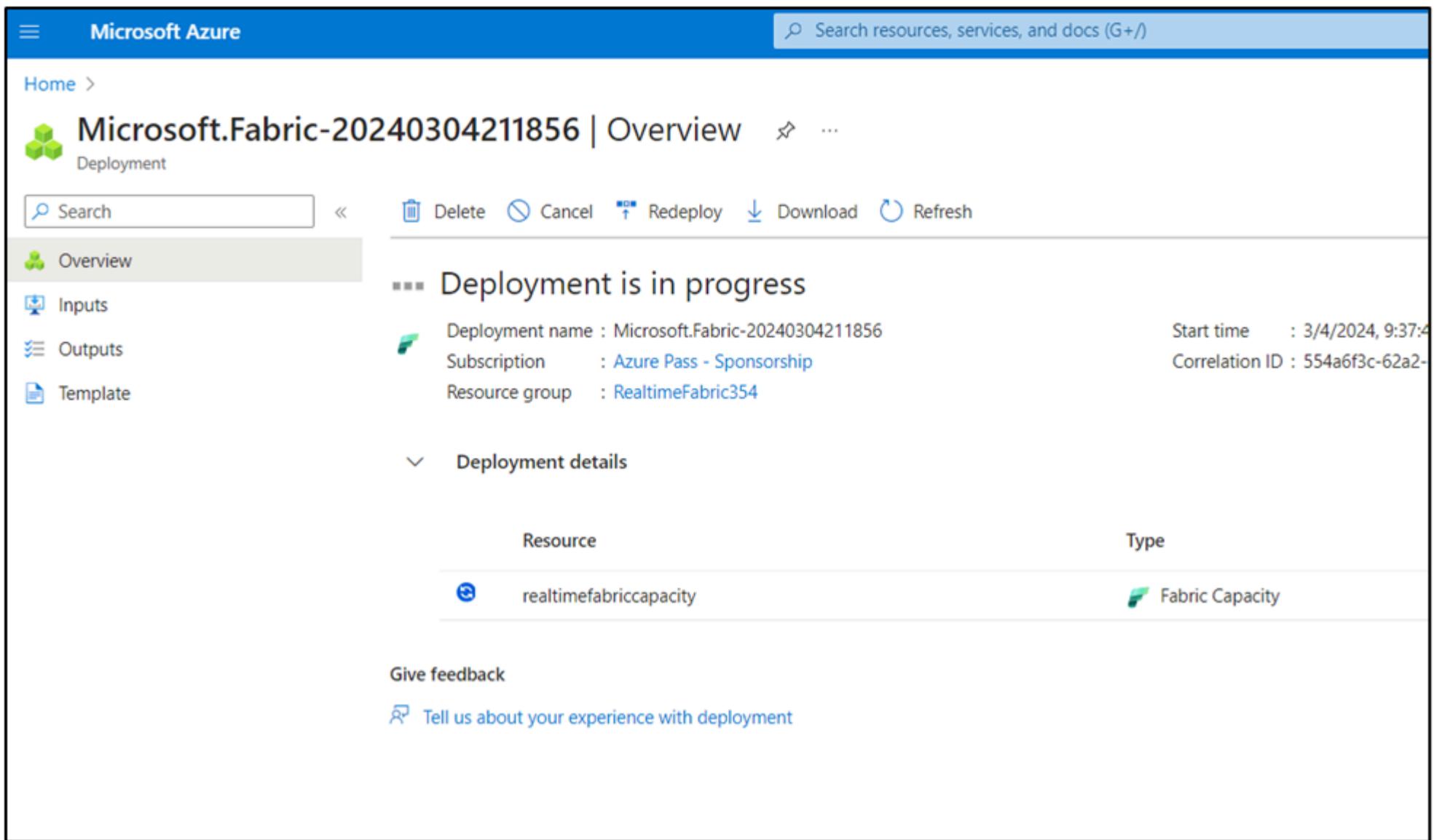
Start time : 3/4/2024, 9:37:43 AM
Correlation ID : 554a6f3c-62a2-46db-bcde

Deployment details

Resource	Type
realtimefabriccapacity	Fabric Capacity

Give feedback

Tell us about your experience with deployment



7. After the deployment is completed, click on the **Go to resource** button.

Microsoft Azure

Home >

Microsoft.Fabric-20240304211856 | Overview

Deployment

Search Delete Cancel Redeploy Download Refresh

Overview Inputs Outputs Template

Your deployment is complete

Deployment name : Microsoft.Fabric-20240304211856
Subscription : Azure Pass - Sponsorship
Resource group : RealtimeFabric354

Start time : 3/4/2024, 9:37:43 PM
Correlation ID : 554a6f3c-62a2-46db-bcde

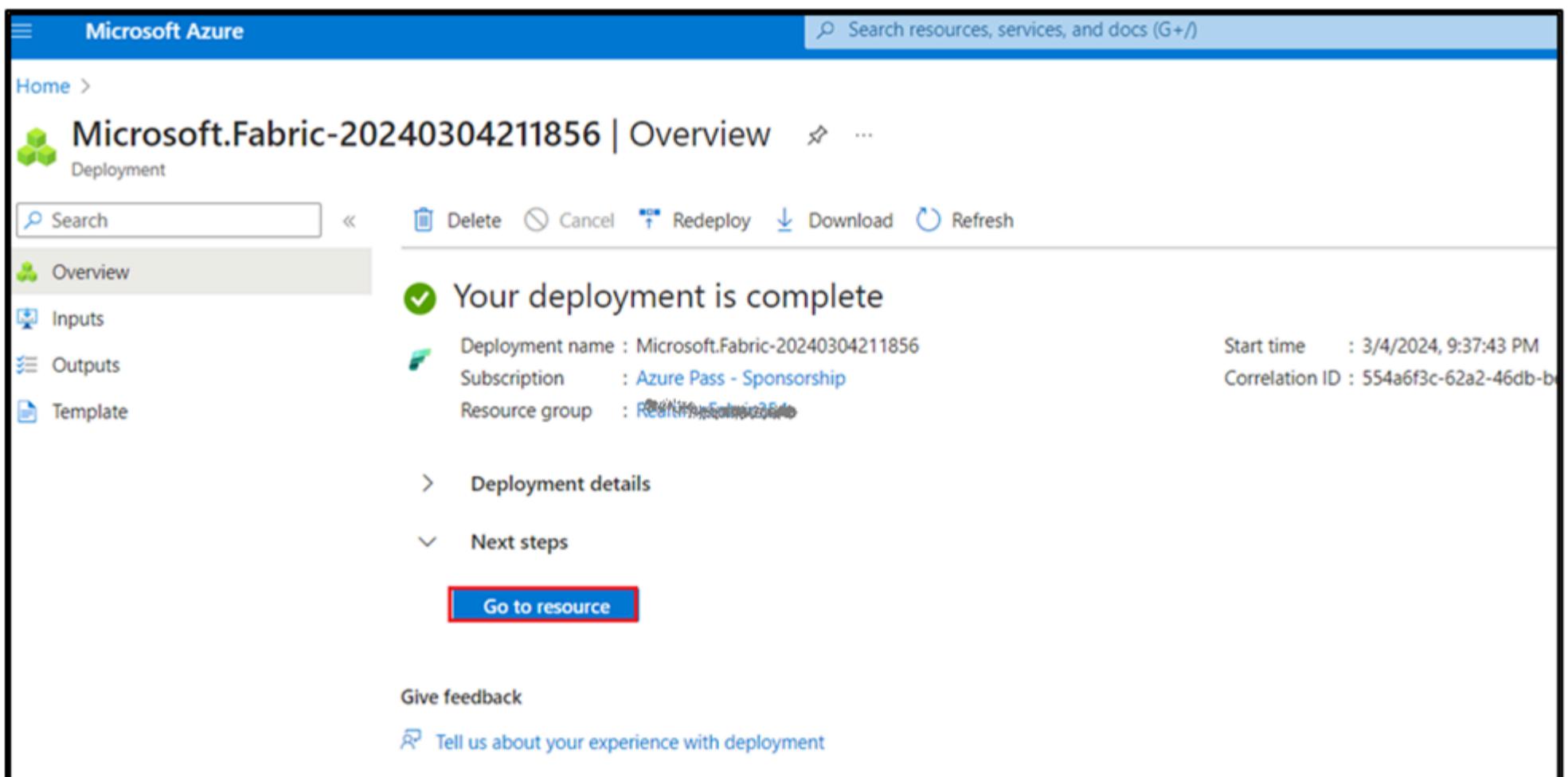
Deployment details

Next steps

Go to resource

Give feedback

Tell us about your experience with deployment



Microsoft Azure

Search resources, services

Home > Microsoft Fabric >

fabriccapacity45

Fabric Capacity

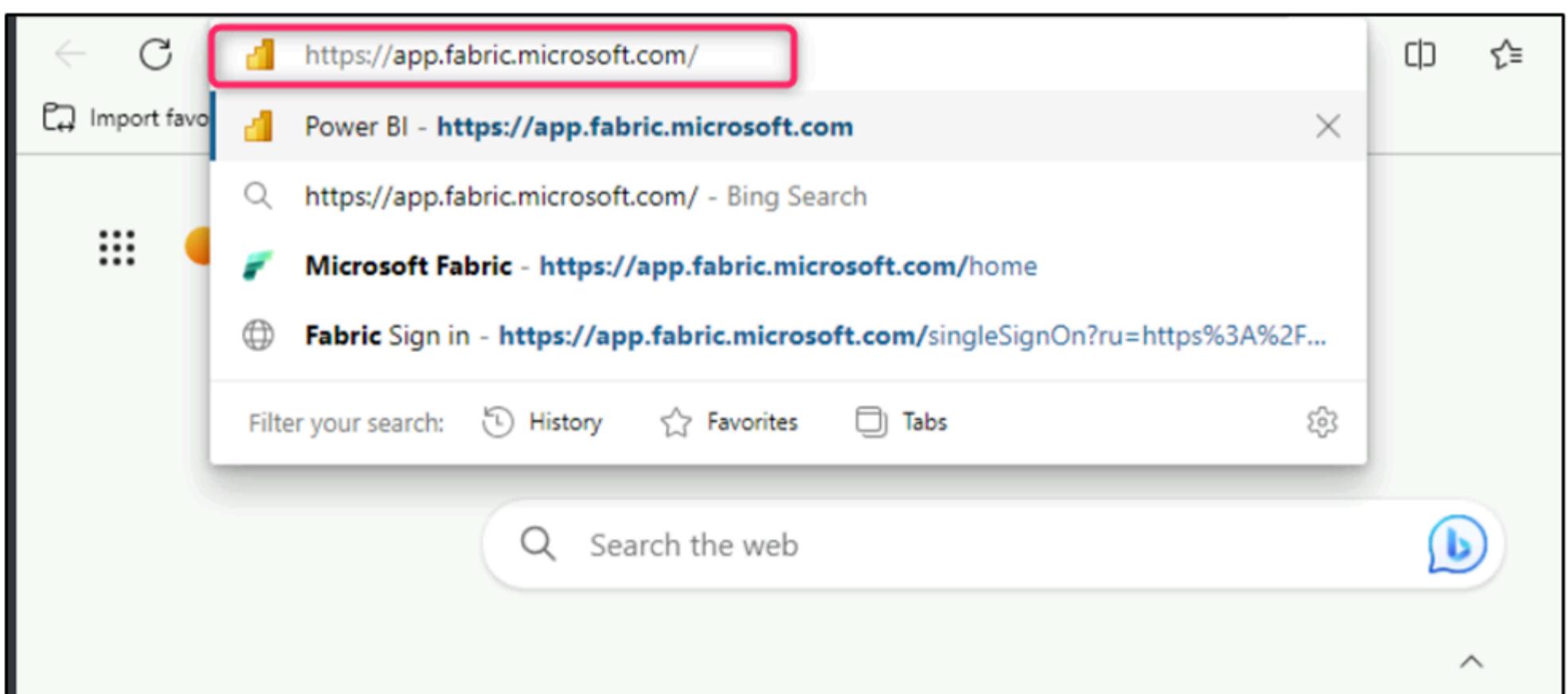
Search Pause Refresh Move Delete

Overview Activity log Access control (IAM) Tags Diagnose and solve problems Scale Settings Monitoring Automation Help

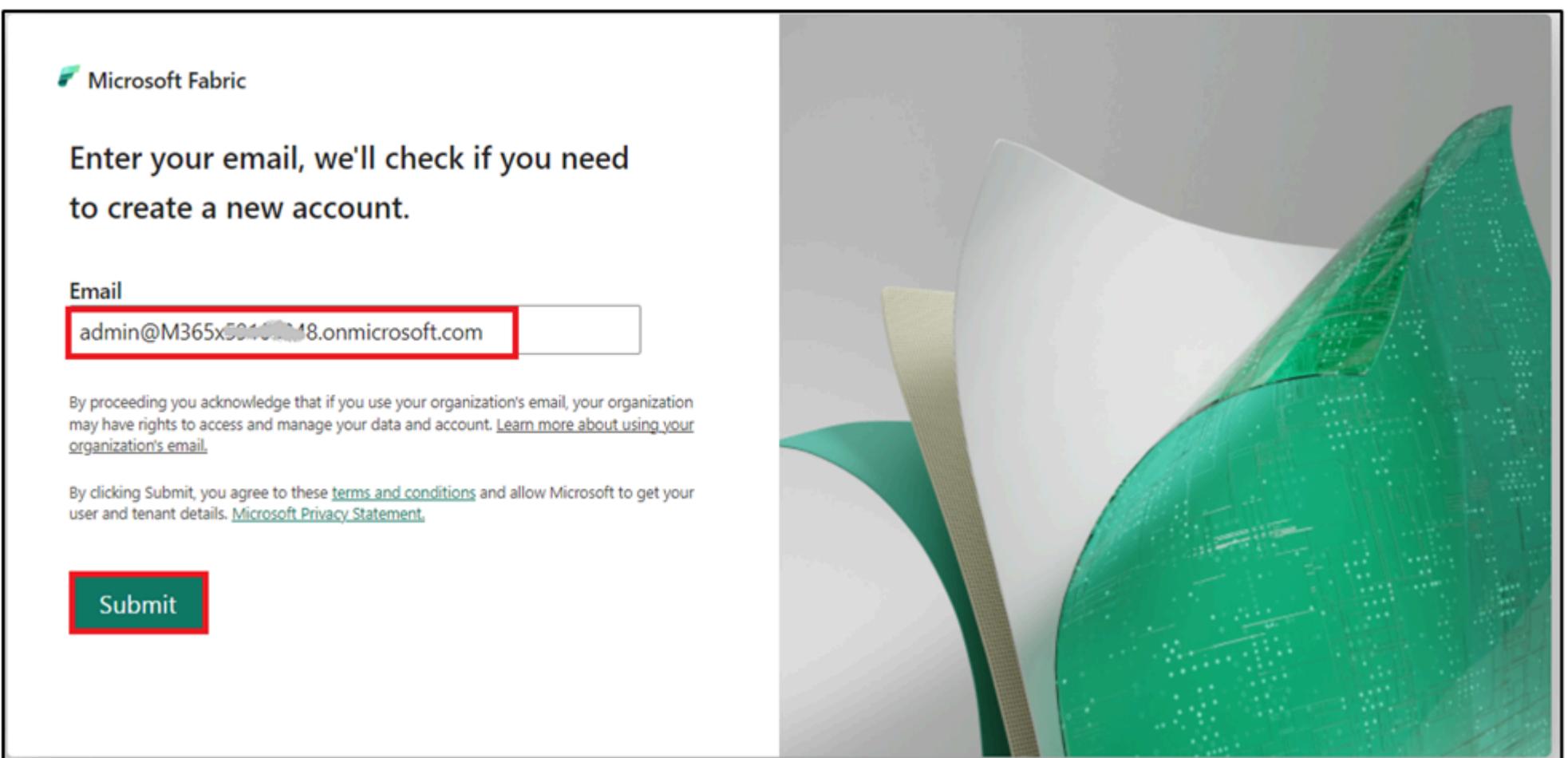
Resource group (move) : AI-Fabric879
Status : Active
Location : West US 3
Subscription (move) : Azure Pass - Sponsorship
Subscription ID : 85677dc1-5950-436b-9280-7c7f9306d95c
Tags (edit) : Add tags

Task 6: Create a Fabric workspace

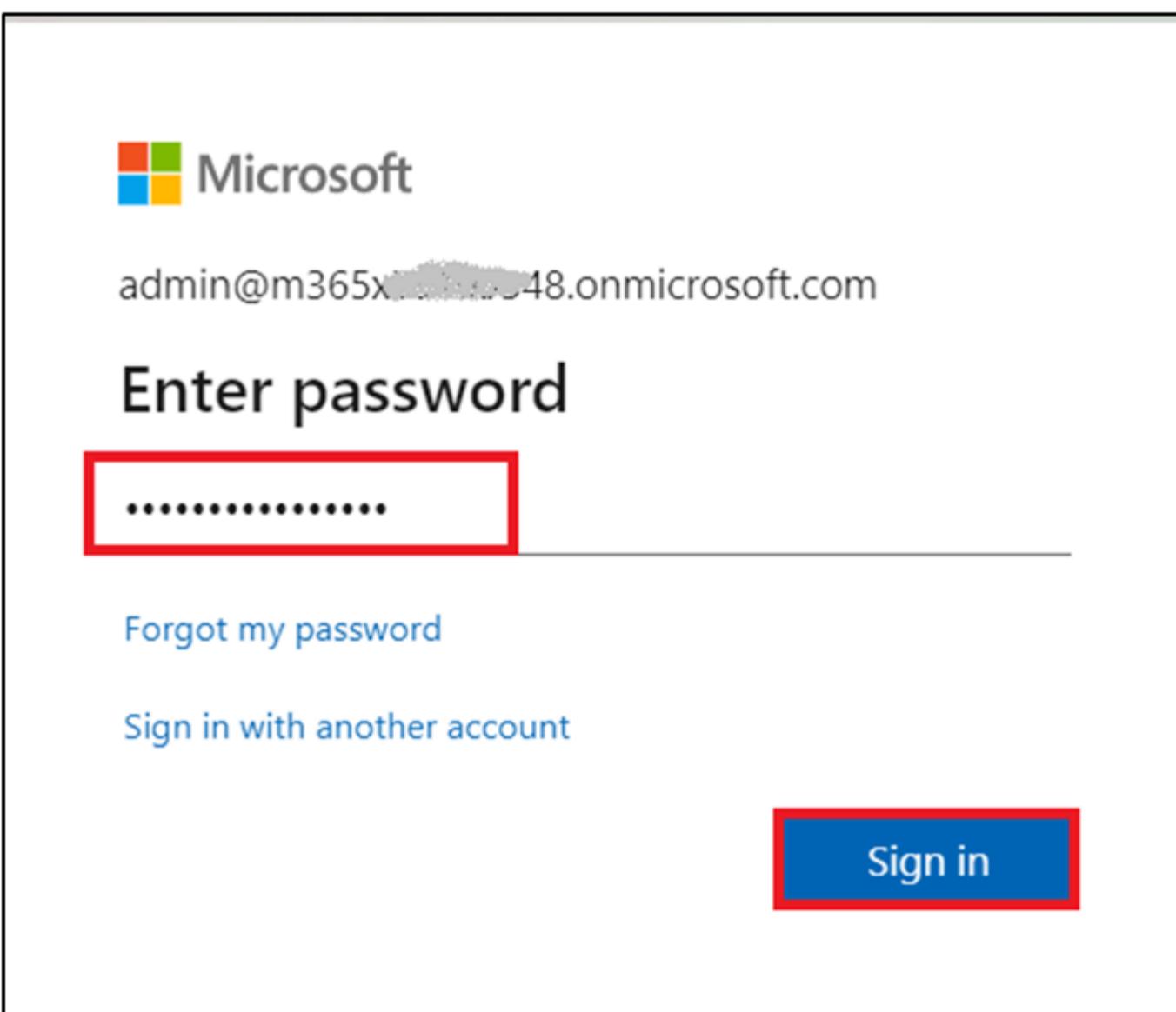
1. In this task, you create a Fabric workspace. The workspace contains all the items needed for this lakehouse tutorial, which includes lakehouse, dataflows, Data Factory pipelines, the notebooks, Power BI datasets, and reports.
2. Open your browser, navigate to the address bar, and type or paste the following URL: <https://app.fabric.microsoft.com/> then press the **Enter** button.



2. In the **Microsoft Fabric** window, enter your **Microsoft 365** credentials, and click on the **Submit** button.



3. Then, In the **Microsoft** window enter the password and click on the **Sign in** button**.**



4. In **Stay signed in?** window, click on the **Yes** button.



admin@m365x55105348.onmicrosoft.com

Stay signed in?

Do this to reduce the number of times you are asked to sign in.

Don't show this again

No

Yes

5. You'll be directed to Power BI Home page.

The screenshot shows the Microsoft Fabric Home page. At the top, there's a navigation bar with 'Microsoft Fabric' and 'Home'. Below it, the title 'Microsoft Fabric' and the tagline 'All your data. In one location. Organize. Collaborate. Create.' are displayed. A central heading 'Explore the experience' is followed by six cards arranged in a grid:

- Power BI**: Find insights, track progress, and make decisions faster using rich visualizations. This card is highlighted with a red border.
- Data Factory**: Solve complex data ingestion, transformation, and orchestration scenarios using cloud-scale data movement and data transformation services.
- Data Activator**: Detect patterns and conditions in your Power BI reports and streaming data, and then take actions such as alert users or kick-off workflows.
- Synapse Data Engineering**: Create a lakehouse and operationalize your workflow to build, transform, and share your data estate.
- Synapse Data Science**: Unlock powerful insights using AI and machine learning technology.
- Synapse Data Warehouse**: Scale up your insights by storing and analyzing data in a secure SQL warehouse. Benefit from top-tier performance at petabyte scale in an open-data format.

6. Go back to **Power BI** window. On the left side navigation menu of Power BI Home page, navigate and click on **Workspaces**.

Power BI Home

Join us at FabCon Europe in Stockholm, Sweden, from September 25 to 27, 2024

+ New report

Recommended

Explore basic Power BI concepts
Getting started with Power BI

The diagram illustrates the data pipeline in Power BI. It starts with a green icon representing a data source (e.g., database), which feeds into a yellow bar chart icon representing data processing or transformation. This then feeds into a blue cylinder icon representing storage or a data model. Finally, it feeds into an orange square icon representing a report or visualization.

Open

Explore the 100 most useful productivity tips

Explore this data story

THE DEFINITIVE 100 MOST USEFUL PRODUCTIVITY TIPS

Discover all of the 100 practical productivity tips shared by the folks over in their PDF report. And what's more... we converted the 100 pages of the PDF into an interactive Power BI report! Check out the project to learn more: [here](#).

DiscoverIt's Top 5 Tips for visualizing quantitative data in Power BI:

1. Use filters to filter your data
2. Use Card Visuals instead of tables for creating a nice readable gallery
3. Use icons, images, and video to illustrate everything to bring text to life!

1. Productivity tools 2. Data sources 3. Data types

Open

Recent

Favorites

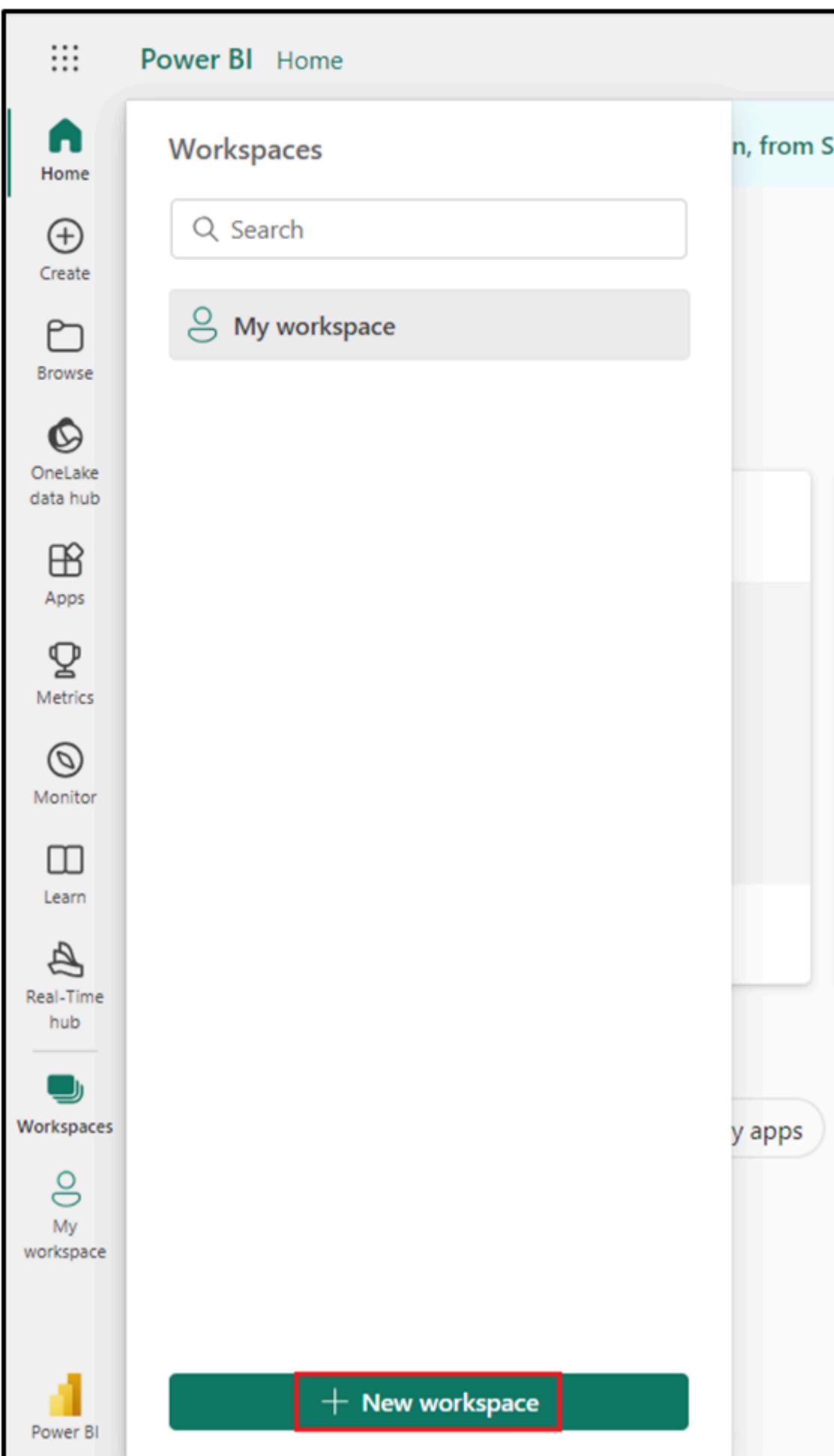
My apps

Workspaces

My workspace

Power BI

7. In the Workspaces pane, click on + New workspace button.



8. In the **Create a workspace** pane that appears on the right side, enter the following details, and click on the **Apply** button.

Name	** Document Intelligence-FabricXX (XXX can be a unique number) (here, we entered AI-Fabric-XX *-789)
Advanced	Select Fabric Capacity
Capacity	Select****Realtimefabriccapacity-West US 3

Create a workspace

Name *

Document Intelligence-Fabric34

This name is available

Description

Describe this workspace

Domain ⓘ

Assign to a domain (optional)



[Learn more about workspace settings](#)

Workspace image



Upload

Reset

Advanced

[Learn more](#) 

Fabric capacity

Select Fabric capacity if the workspace will be hosted in a Microsoft Fabric capacity. With Fabric capacities, users can create Microsoft Fabric items and collaborate with others using Fabric features and experiences. Explore new capabilities in Power BI, Data Factory, Data Engineering, and Real-Time Intelligence, among others. [Learn more](#) 

Semantic model storage format

- Small semantic model storage format
- Large semantic model storage format

[Learn more about semantic model storage formats](#) 

Capacity *

fabriccapacity45 - West US 3

Power BI

Template apps

Template apps are developed for sharing outside your organization. A template app workspace will be created for developing and releasing the app. [Learn more about template apps](#) 

 [Apply](#)

[Cancel](#)

Synapse Data Engineering Document Intelligence-Fabric34

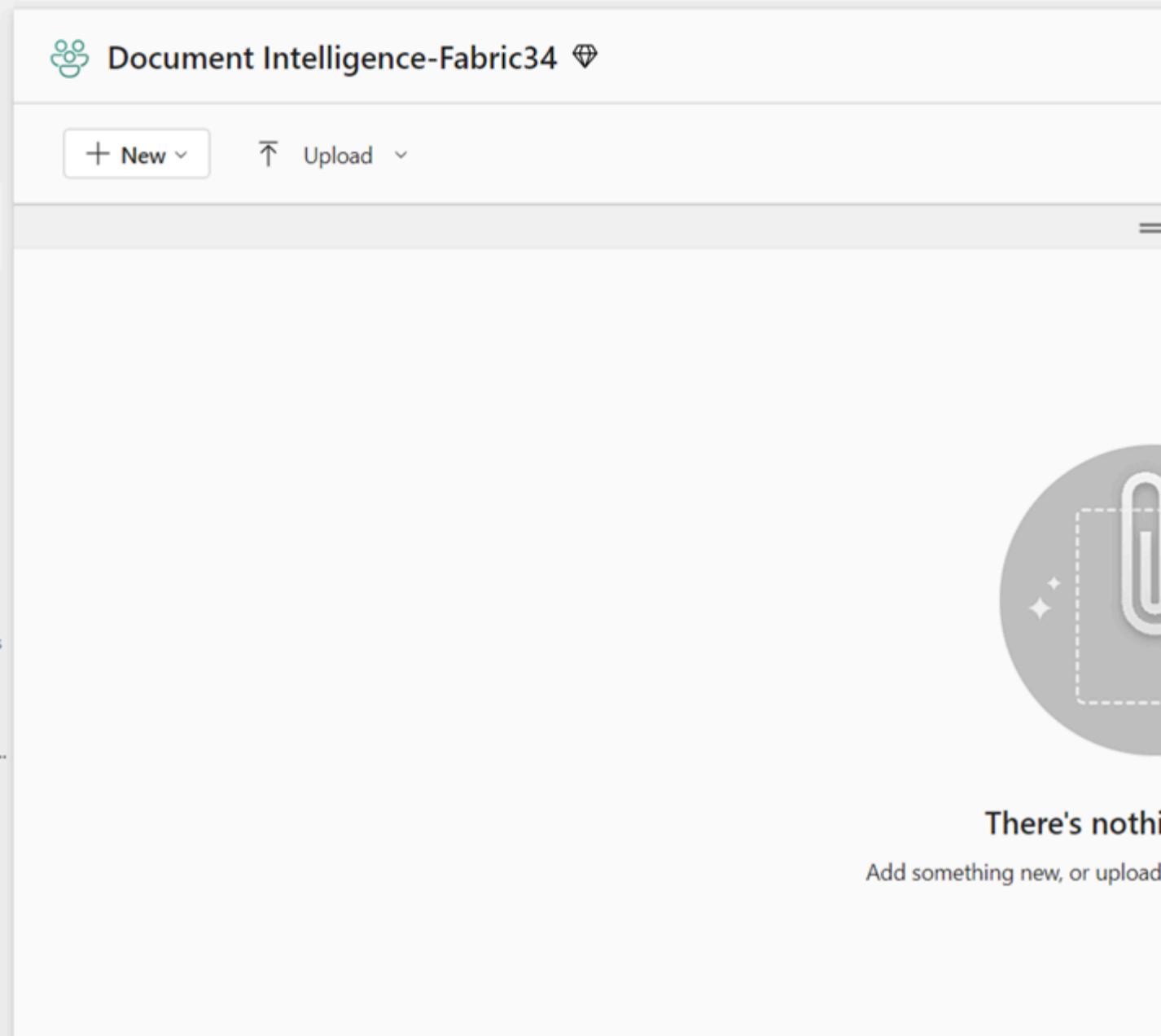
Search

Home Create Browse OneLake data hub Monitor Real-Time hub Workspaces Document Intelligence... Data Engineering

Document Intelligence-Fabric34

+ New Upload

There's nothing here. Add something new, or upload something.



9. Wait for the deployment to complete. It takes 2-3 minutes to complete.

Synapse Data Engineering Document Intelligence-Fabric78

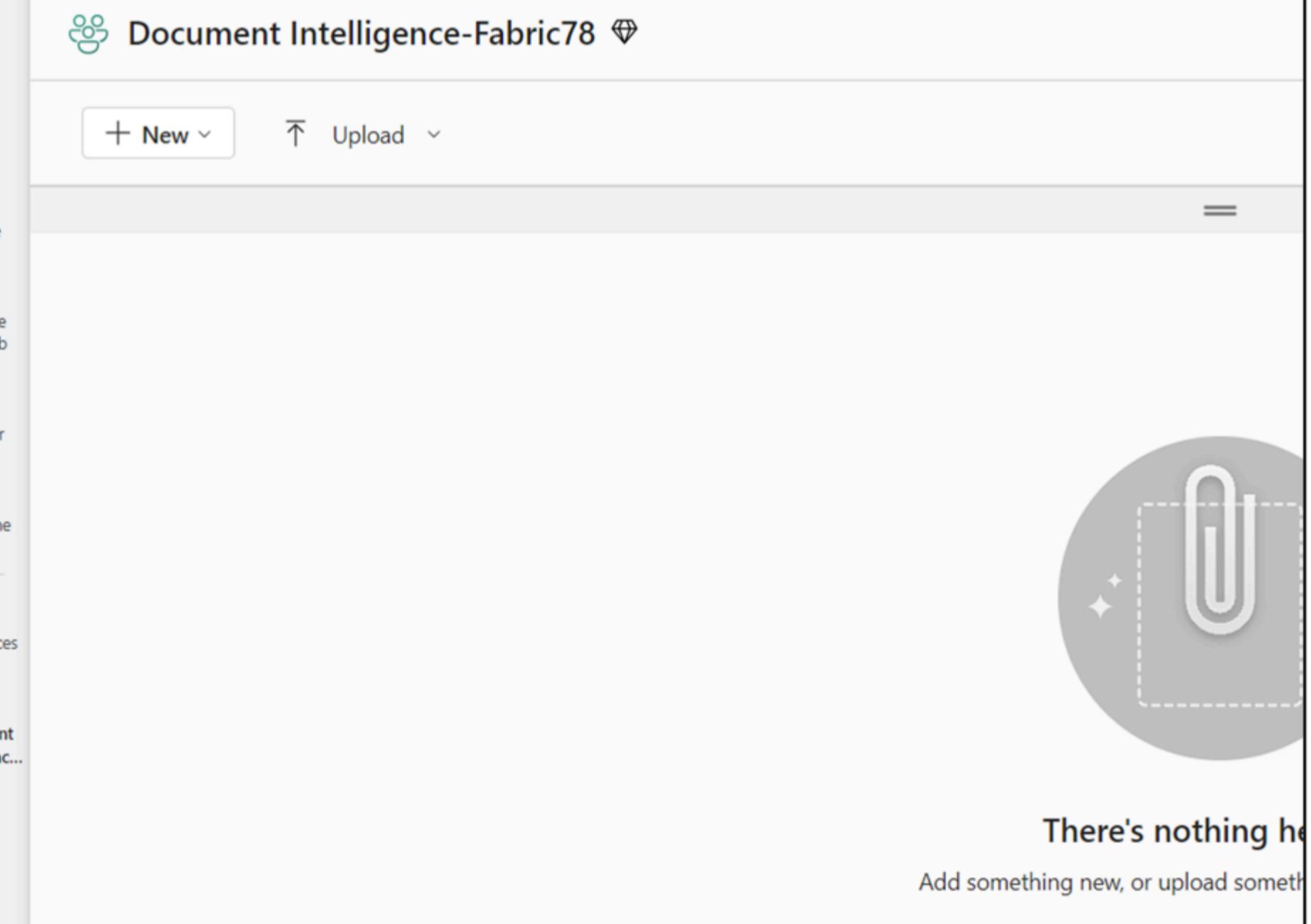
Search

Home Create Browse OneLake data hub Monitor Real-Time hub Workspaces Document Intelligence... Data Engineering

Document Intelligence-Fabric78

+ New Upload

There's nothing here. Add something new, or upload something.



Task 7: Create a lakehouse

1. In the **Document Intelligence-FabricXX** page, click on the **Power BI** icon located at the bottom left and select **Data Engineering** under Synapse.

Power BI Document Intelligence-Fabric34

Document Intelligence-Fabric34

+ New ▾ Upload ▾

Microsoft Fabric →

- Power BI
- Data Factory
- Data Activator
- Industry Solutions
- Real-Time Intelligence

Synapse

- Data Engineering**
- Data Science
- Data Warehouse

2. In the **Synapse Data Engineering Home** page, select **Lakehouse** to create a lakehouse.



Home



Create



Browse

OneLake
data hubReal-Time
hub

Workspaces

Document
Intelligenc...

...



Join us at FabCon Europe in Stockholm, Sweden, from September 25 to 27, 2024 for the ultimate Power BI, Fa

New

Current workspace: Document Intelligence-Fabric34

Items will be saved to this workspace.



Lakehouse



Notebook



Environment

Spark Job
Definition

Data pipeline

Recommended

AI_Fabric_lakehouse78

You frequently open this



Open

What's a lakehouse?

Get started with data engineering



Open

3. In the **Synapse Data Engineering Home** page, select **Lakehouse** to create a lakehouse.

Synapse Data Engineering Home

Join us at FabCon Europe in Stockholm, Sweden, from September 25 to 27, 2024 for the u

Home

Create

Browse

OneLake data hub

Monitor

Real-Time hub

Workspaces

Document Intelligence...

...

Real Time Intelligence

New

Current workspace: Document Intelligence-Fabric34

Items will be saved to this workspace.

Lakehouse

Notebook

Environment

Spark Job Definition

4. In the New lakehouse dialog box, enter **data_lakehouse** in the Name field, click on the Create button and open the new lakehouse.

⚠ Note: Ensure to remove space before **data_lakehouse**.

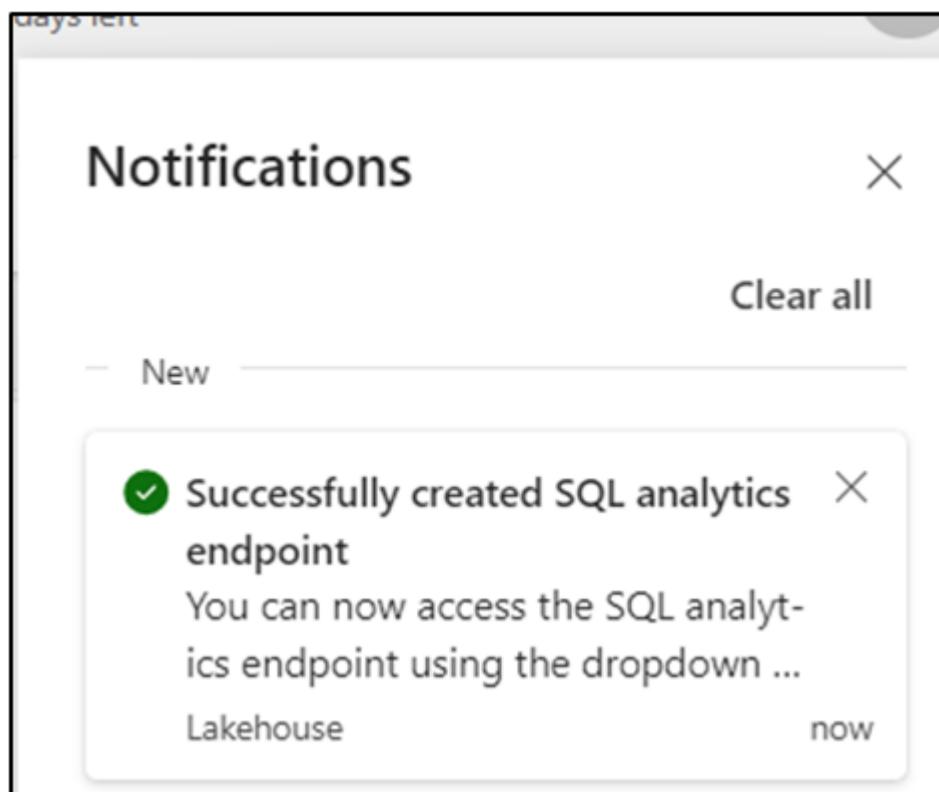
New lakehouse

Name *

Lakehouse schemas (Public Preview) ⓘ

Create **Cancel**

5. You will see a notification stating **Successfully created SQL endpoint**.



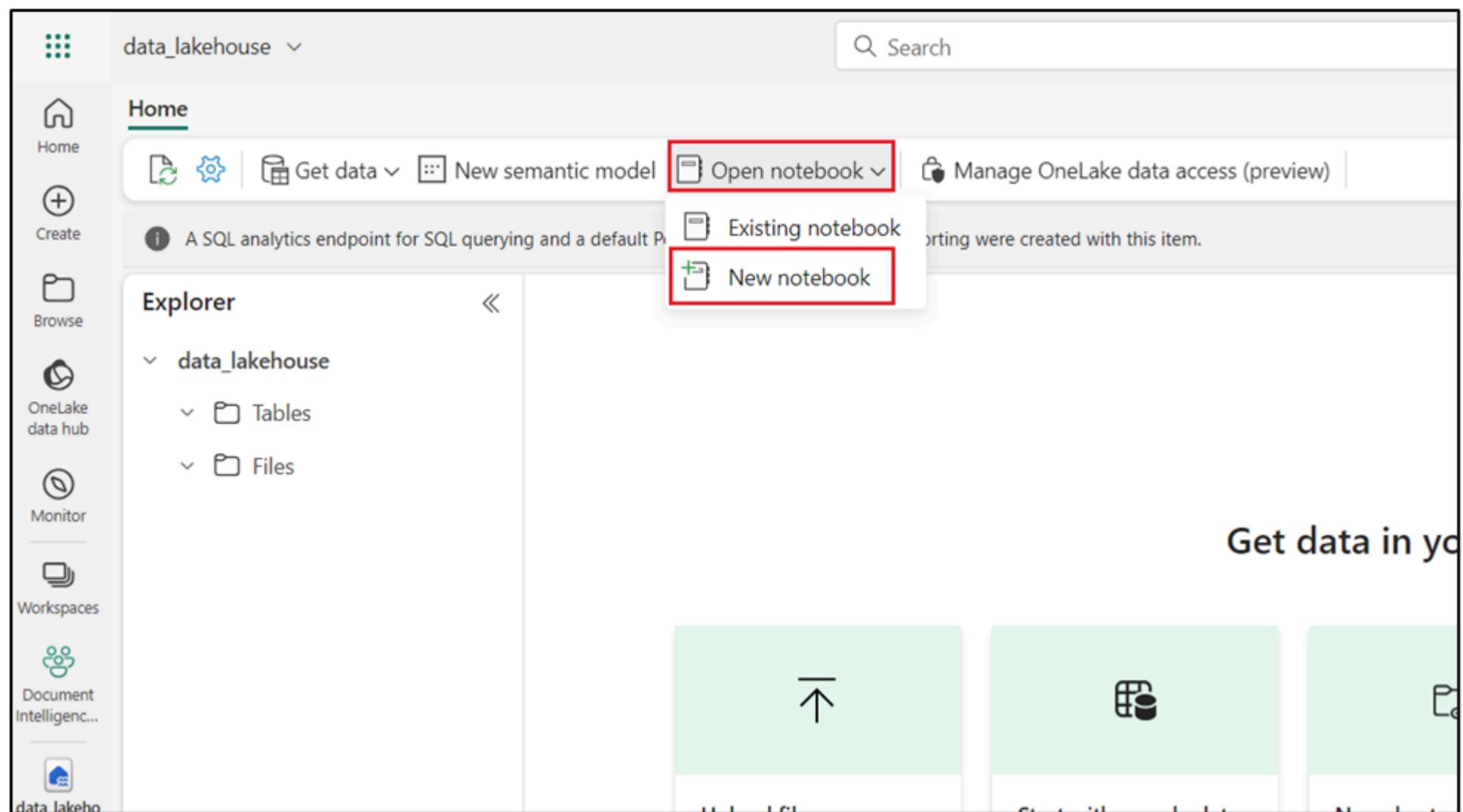
The screenshot shows the Power BI workspace interface. On the left is a navigation bar with icons for Home, Create, Browse, OneLake data hub, Monitor, Workspaces, Document Intelligence, and Data Engineering. The 'data_lakehouse' workspace is selected. The main area has a header with 'data_lakehouse' and a search bar. Below the header, there's a message: 'A SQL analytics endpoint for SQL querying and a default Power BI semantic model for reporting were created with this item.' The 'Home' tab is selected. In the center, there's an 'Explorer' pane showing a folder structure under 'data_lakehouse': 'Tables' and 'Files'. To the right, there's a 'Get data in your lakehouse' section with four cards: 'Upload files' (with a file icon), 'Start with sample data' (with a grid icon), 'New shortcut' (with a folder icon), and 'New D' (partially visible). The 'Upload files' card has a sub-description: 'Upload data from your local machine.'

Exercise 2:**Loading and Pre-processing PDF Documents **

Task 1: Configure Azure API keys

- To begin, navigate back to the rag_workshop Lakehouse in your workspace and create a new notebook by selecting Open Notebook and selecting New Notebook from the options.

- 1. In the **Lakehouse** page, navigate and click on **Open notebook** drop in the command bar, then select **New notebook**.



2. In the query editor, paste the following code. Provide the keys for Azure AI Services, Azure Key Vault name and secrets to access the services

Copy

```
# Azure AI Search  
  
AI_SEARCH_NAME = ""  
  
AI_SEARCH_INDEX_NAME = "rag-demo-index"  
  
AI_SEARCH_API_KEY = ""  
  
# Azure AI Services  
  
AI_SERVICES_KEY = ""  
  
AI_SERVICES_LOCATION = ""
```

i This environment has been updated to Fabric Runtime 1.3 (Spark 3.5 and Delta 3.1). Your notebook will use the updated runtime when you save settings and custom environments. [Learn more about Runtime 1.3](#)



5

```
1 # Azure AI Search
2 AI_SEARCH_NAME = "mysearchservice21" 1
3 AI_SEARCH_INDEX_NAME = "rag-demo-index"
4 AI_SEARCH_API_KEY = "8afQM7Y6A3sS7ZmXJZgg3Zk0L9yIW9e76jHmoeoBZqAzSeBoGMin" 2
5
6 # Azure AI Services
7 AI_SERVICES_KEY = "67a3cb7eac3d43f1b2e41b0676a27721" 3
8 AI_SERVICES_LOCATION = 'eastus2' 4
9
```

[1] ✓ 9 sec - Apache Spark session ready in 7 sec 859 ms. Command executed in 1 sec 691 ms by MOD Administrator on 12:05:25 AM, 7/

> Log

Task 2: Loading & Analyzing the Document

- 1. we will be using a specific document named [support.pdf](#) which will be the source of our data.
- 2. To download the document, use the **+ Code** icon below the cell output to add a new code cell to the notebook, and enter the following code in it. Click on **Run cell** button and review the output

Copy

```
import requests

import os

url = "https://github.com/Azure-Samples/azure-openai-rag-workshop/raw/main/data/support.pdf"

response = requests.get(url)

# Specify your path here

path = "/lakehouse/default/Files/"

# Ensure the directory exists

os.makedirs(path, exist_ok=True)

# Write the content to a file in the specified path

filename = url.rsplit("/")[-1]

with open(os.path.join(path, filename), "wb") as f:

    f.write(response.content)
```

1 Other people in your organization may have access to notebooks and Spark job definitions in this workspace. Carefully review this item before running it.

> Log

...

+ Code 1+ Markdown



3

```
1 import requests
2 import os
3
4 url = "https://github.com/Azure-Samples/azure-openai-rag-workshop/raw/main/data/support.pdf"
5 response = requests.get(url)
6
7 # Specify your path here
8 path = "/lakehouse/default/Files/"
9
10 # Ensure the directory exists
11 os.makedirs(path, exist_ok=True)
12
13 # Write the content to a file in the specified path
14 filename = url.rsplit("/")[-1]
15 with open(os.path.join(path, filename), "wb") as f:
16     f.write(response.content)
17
```

2

[2] ✓ 2 sec - Command executed in 1 sec 634 ms by MOD Administrator on 10:52:57 PM, 7/18/24

- 3. Now, load the PDF document into a Spark DataFrame using the spark.read.format("binaryFile") method provided by Apache Spark
- 4. Use the + **Code** icon below the cell output to add a new code cell to the notebook, and enter the following code in it. Click on ▶** Run cell** button and review the output

Copy

```
from pyspark.sql.functions import udf
from pyspark.sql.types import StringType
document_path = f"Files/{filename}"
df = spark.read.format("binaryFile").load(document_path).select("_metadata.file_name", "content").limit(10).cache()
display(df)
```

1 Other people in your organization may have access to notebooks and Spark job definitions in this workspace. Carefully review this item before running it.

[2] ✓ 2 sec - Command executed in 1 sec 634 ms by MOD Administrator on 10:52:57 PM, 7/18/24

PySpark (Python) ▾

...

+ Code 1+ Markdown



3

```
1 from pyspark.sql.functions import udf
2 from pyspark.sql.types import StringType
3
4 document_path = f"Files/{filename}"
5
6 df = spark.read.format("binaryFile").load(document_path).select("_metadata.file_name", "content").limit(10).cache()
7
8 display(df)
9
```

2

[3] ✓ 9 sec - Command executed in 8 sec 287 ms by MOD Administrator on 10:54:59 PM, 7/18/24

PySpark (Python) ▾

> Spark jobs (1 of 1 succeeded) Resources Log

...

Table Chart

Download ▾ Showing rows 1 - 1

Inspect

Search

...

	ABC file_name	ANY content
1	support.pdf	JVBERi0xLjU...

This code will read the PDF document and create a Spark DataFrame named df with the contents of the PDF. The DataFrame will have a schema that represents the structure of the PDF document, including its textual content.

- 5. Next, we'll use the Azure AI Document Intelligence to read the PDF documents and extract the text from them.
- 6. Use the + **Code** icon below the cell output to add a new code cell to the notebook, and enter the following code in it. Click on ▶** Run cell** button and review the output

Copy

```

from synapse.ml.services import AnalyzeDocument

from pyspark.sql.functions import col

analyze_document = (
    AnalyzeDocument()
    .setPrebuiltModelId("prebuilt-layout")
    .setSubscriptionKey(AI_SERVICES_KEY)
    .setLocation(AI_SERVICES_LOCATION)
    .setImageBytesCol("content")
    .setOutputCol("result")
)

analyzed_df = (
    analyze_document.transform(df)
    .withColumn("output_content", col("result.analyzeResult.content"))
    .withColumn("paragraphs", col("result.analyzeResult.paragraphs"))
).cache()

```

1 This environment has been updated to Fabric Runtime 1.3 (Spark 3.5 and Delta 3.1). Your notebook will use the updated runtime when you settings and custom environments. [Learn more about Runtime 1.3](#)

3

```

1  from synapse.ml.services import AnalyzeDocument
2  from pyspark.sql.functions import col
3
4  analyze_document = (
5      AnalyzeDocument()
6      .setPrebuiltModelId("prebuilt-layout")
7      .setSubscriptionKey('67a3cb7eac3d43f1b2e41b0676a27721') 1
8      .setLocation('eastus2')
9      .setImageBytesCol("content") 2
10     .setOutputCol("result")
11 )
12
13 analyzed_df = (
14     analyze_document.transform(df)
15     .withColumn("output_content", col("result.analyzeResult.content"))
16     .withColumn("paragraphs", col("result.analyzeResult.paragraphs"))
17 ).cache()

```

[4] ✓ 4 sec - Command executed in 3 sec 519 ms by MOD Administrator on 12:05:54 AM, 7/19/24

> Log

- 7. We can observe the analyzed Spark DataFrame named analyzed_df using the following code. Note that we drop the content column as it is not needed anymore.
- 8. Use the + **Code** icon below the cell output to add a new code cell to the notebook, and enter the following code in it. Click on ▶** Run cell** button and review the output

Copy

```

analyzed_df = analyzed_df.drop("content")

display(analyzed_df)

```

This environment has been updated to Fabric Runtime 1.3 (Spark 3.5 and Delta 3.1). Your notebook will use the updated runtime when you start a new Spark session settings and custom environments. [Learn more about Runtime 1.3](#)

The screenshot shows a Jupyter Notebook interface. At the top, a message通知说环境已更新至Fabric Runtime 1.3 (Spark 3.5 and Delta 3.1)。在右侧有一个'Ml'图标。下方是一个代码单元格，显示了以下内容：

```
+ Code 1+ Markdown  
1 analyzed_df = analyzed_df.drop("content")  
2 display(analyzed_df)
```

单元格ID为[5]，运行时间为9秒，由MOD Administrator于12:06:13 AM, 7/19/24执行。

下方是结果输出区，显示了分析后的数据：

ABC file_name	ANY AnalyzeDocument_a723a8cca2...	ANY result	ABC output_content	ANY paragraphs
support.pdf	NULL	{"status": "s..."}	Contoso Real Estat...	[{"role": "title", "c..."}]

右侧有一个'Inspect'按钮。

Exercise 3: Generating and Storing Embeddings

Task 1: Text Chunking

- ② Before we can generate the embeddings, we need to split the text into chunks. To do this we leverage SynapseML's PageSplitter to divide the documents into smaller sections, which are subsequently stored in the chunks column. This allows for more granular representation and processing of the document content.
1. Use the **+ Code** icon below the cell output to add a new code cell to the notebook, and enter the following code in it. Click on **Run cell** button and review the output

Copy

```
from synapse.ml.featurize.text import PageSplitter  
  
ps = (  
    PageSplitter()  
        .setInputCol("output_content")  
        .setMaximumPageLength(4000)  
        .setMinimumPageLength(3000)  
        .setOutputCol("chunks")  
)  
  
splitted_df = ps.transform(analyzed_df)  
  
display(splitted_df)
```

Code **Markdown**

3 2

```

1  from synapse.ml.featurize.text import PageSplitter
2
3  ps = (
4      PageSplitter()
5      .setInputCol("output_content")
6      .setMaximumPageLength(4000)
7      .setMinimumPageLength(3000)
8      .setOutputCol("chunks")
9  )
10
11 splitted_df = ps.transform(analyzed_df)
12 display(splitted_df)

```

[6] ✓ 2 sec - Command executed in 1 sec 577 ms by MOD Administrator on 12:06:25 AM, 7/19/24

> **Spark jobs (1 of 1 succeeded)** **Resources** **Log**

...

	ABC file_name	ANY AnalyzeDocument_a723a8cca2...	ANY result	ABC output_content	ANY paragraphs	ANY chunks	
1	support.pdf	NULL	{"status": "s..."}	Contoso Real Estat...	[{"role": "title", "c...}	["Contoso R...	

Note that the chunks for each document are presented in a single row inside an array. In order to embed all the chunks in the following cells, we need to have each chunk in a separate row.

2. Use the **+ Code** icon below the cell output to add a new code cell to the notebook, and enter the following code in it. Click on **Run cell**** button and review the output

Copy

```

from pyspark.sql.functions import poseplode, col, concat

# Each "chunks" column contains the chunks for a single document in an array

# The poseplode function will separate each chunk into its own row

exploded_df = splitted_df.select("file_name", poseplode(col("chunks")).alias("chunk_index", "chunk"))

# Add a unique identifier for each chunk

exploded_df = exploded_df.withColumn("unique_id", concat(exploded_df.file_name, exploded_df.chunk_index))

display(exploded_df)

```

Code **Markdown**

3 2

```

1  from pyspark.sql.functions import poseplode, col, concat
2
3  # Each "chunks" column contains the chunks for a single document in an array
4  # The poseplode function will separate each chunk into its own row
5  exploded_df = splitted_df.select("file_name", poseplode(col("chunks")).alias("chunk_index", "chunk"))
6
7  # Add a unique identifier for each chunk
8  exploded_df = exploded_df.withColumn("unique_id", concat(exploded_df.file_name, exploded_df.chunk_index))
9
10 display(exploded_df)

```

[7] ✓ 1 sec - Command executed in 793 ms by MOD Administrator on 12:06:47 AM, 7/19/24

> **Spark jobs (1 of 1 succeeded)** **Resources** **Log**

...

	ABC file_name	123 chunk_index	ABC chunk	ABC unique_id	
1	support.pdf	0	Contoso Re...	support.pdf0	
2	support.pdf	1	inaccurate i...	support.pdf1	
3	support.pdf	2	Document ...	support.pdf2	

From this code snippet we first explode these arrays so there is only one chunk in each row, then filter the Spark DataFrame in order to only keep the path to the document and the chunk in a single row.

Task 2: Generating Embeddings

- ② Next we'll generate the embeddings for each chunk. To do this we utilize both SynapseML and Azure OpenAI Service. By integrating the built in Azure OpenAI service with SynapseML, we can leverage the power of the Apache Spark distributed computing framework to process numerous prompts using the OpenAI service.
- 1. Use the **+ Code** icon below the cell output to add a new code cell to the notebook, and enter the following code in it. Click on **▶** Run cell**** button and review the output

Copy

```
from synapse.ml.services import OpenAIEembedding

embedding = (
    OpenAIEembedding()
    .setDeploymentName("text-embedding-ada-002")
    .setTextCol("chunk")
    .setErrorCol("error")
    .setOutputCol("embeddings")
)

df_embeddings = embedding.transform(exploded_df)

display(df_embeddings)
```

This environment has been updated to Fabric Runtime 1.3 (Spark 3.5 and Delta 3.1). Your notebook will use the updated runtime when you start a new environments. [Learn more about Runtime 1.3](#)

Code **Markdown**

```
1  from synapse.ml.services import OpenAIEembedding
2
3  embedding = (
4      OpenAIEembedding()
5      .setDeploymentName("text-embedding-ada-002")
6      .setTextCol("chunk")
7      .setErrorCol("error")
8      .setOutputCol("embeddings")
9  )
10
11 df_embeddings = embedding.transform(exploded_df)
12
13 display(df_embeddings)
14
```

[8] ✓ 5 sec - Command executed in 4 sec 855 ms by MOD Administrator on 12:07:02 AM, 7/19/24

>  Spark jobs (1 of 1 succeeded)  Resources  Log

...

 Table	 Chart	 Download	 Showing rows 1 - 3		
ABC file_name	123 chunk_index	ABC chunk	ABC unique_id	ANY error	ANY embeddings
1 support.pdf	0	Contoso Re...	support.pdf0	NULL	{"type":1,"values":...
2 support.pdf	1	inaccurate i...	support.pdf1	NULL	{"type":1,"values":...
3 support.pdf	2	Document ...	support.pdf2	NULL	{"type":1,"values":...

This integration enables the SynapseML embedding client to generate embeddings in a distributed manner, enabling efficient processing of large volumes of data

Task 3: Storing Embeddings

- ② **Azure AI Search** is a powerful search engine that includes the ability to perform full text search, vector search, and hybrid search. For more examples of its vector search capabilities, see the [azure-search-vector-samples repository](#).

Storing data in Azure AI Search involves two main steps:

Creating the index: The first step is to define the schema of the search index, which includes the properties of each field as well as any vector search strategies that will be used.

Adding chunked documents and embeddings: The second step is to upload the chunked documents, along with their corresponding embeddings, to the index. This allows for efficient storage and retrieval of the data using hybrid and vector search.

- 1. The following code snippet demonstrates how to create an index in Azure AI Search using the Azure AI Search REST API. This code creates an index with fields for the unique identifier of each document, the text content of the document, and the vector embedding of the text content.
- 2. Use the **+ Code** icon below the cell output to add a new code cell to the notebook, and enter the following code in it. Click on **▶** Run cell**** button and review the output

Copy

```
import requests

import json

# Length of the embedding vector (OpenAI ada-002 generates embeddings of length 1536)
EMBEDDING_LENGTH = 1536

# Create index for AI Search with fields id, content, and contentVector

# Note the datatypes for each field below

url = f"https://{{AI_SEARCH_NAME}}.search.windows.net/indexes/{{AI_SEARCH_INDEX_NAME}}?api-version=2023-11-01"

payload = json.dumps(

    {

        "name": AI_SEARCH_INDEX_NAME,

        "fields": [

            # Unique identifier for each document

            {

                "name": "id",

                "type": "Edm.String",

                "key": True,

                "filterable": True,

            },

            # Text content of the document

            {

                "name": "content",

                "type": "Edm.String",

                "searchable": True,

                "retrievable": True,

            },

            # Vector embedding of the text content

            {

                "name": "contentVector",

                "type": "Collection(Edm.Single)",

                "searchable": True,

                "retrievable": True,

                "dimensions": EMBEDDING_LENGTH,

                "vectorSearchProfile": "vectorConfig",

            },

        ],

        "vectorSearch": {

            "algorithms": [{"name": "hnswConfig", "kind": "hnsw", "hnswParameters": {"metric": "cosine"}}],

            "profiles": [{"name": "vectorConfig", "algorithm": "hnswConfig"}],


        },


    }

)
```

```
headers = {"Content-Type": "application/json", "api-key": AI_SEARCH_API_KEY}

response = requests.request("PUT", url, headers=headers, data=payload)

if response.status_code == 201:
    print("Index created!")

elif response.status_code == 204:
    print("Index updated!")

else:
    print(f"HTTP request failed with status code {response.status_code}")

    print(f"HTTP response body: {response.text}")
```

Other people in your organization may have access to notebooks and Spark job definitions in this workspace. Carefully review this item before running it.

This environment has been updated to Fabric Runtime 1.3 (Spark 3.5 and Delta 3.1). Your notebook will use the updated runtime when you start a new Spark session. Update in your environments. [Learn more about Runtime 1.3](#)

...

+ Code 1+ Markdown

3

```
1 import requests
2 import json
3
4 # Length of the embedding vector (OpenAI ada-002 generates embeddings of length 1536)
5 EMBEDDING_LENGTH = 1536
6
7 # Create index for AI Search with fields id, content, and contentVector
8 # Note the datatypes for each field below
9 url = f"https://mysearchservice21.search.windows.net/indexes/{AI_SEARCH_INDEX_NAME}?api-version=2023-11-01"
10 payload = json.dumps(
11     {
12         "name": AI_SEARCH_INDEX_NAME,
13         "fields": [
14             # Unique identifier for each document
15             {
16                 "name": "id",
17                 "type": "Edm.String",
18                 "key": True,
19                 "filterable": True,
20             },
21             # Text content of the document
22             {
23                 "name": "content",
24                 "type": "Edm.String",
25                 "searchable": True,
26                 "retrievable": True,
```

2

new session AutoSave On

! Other people in your organization may have access to notebooks and Spark job definitions in this workspace. Carefully review this item before running it.

! This environment has been updated to Fabric Runtime 1.3 (Spark 3.5 and Delta 3.1). Your notebook will use the updated runtime when you start a new Spark session. Update in environments. [Learn more about Runtime 1.3](#)

```
53         "retrievable": true,
54         "dimensions": EMBEDDING_LENGTH,
55         "vectorSearchProfile": "vectorConfig",
56     },
57 ],
58     "vectorSearch": {
59         "algorithms": [{"name": "hnswConfig", "kind": "hnsw", "hnswParameters": {"metric": "cosine"}}],
60         "profiles": [{"name": "vectorConfig", "algorithm": "hnswConfig"}],
61     },
62 }
63 )
64 headers = {"Content-Type": "application/json", "api-key": AI_SEARCH_API_KEY}
65
66 response = requests.request("PUT", url, headers=headers, data=payload)
67 if response.status_code == 201:
68     print("Index created!")
69 elif response.status_code == 204:
70     print("Index updated!")
71 else:
72     print(f"HTTP request failed with status code {response.status_code}")
73     print(f"HTTP response body: {response.text}")
74
```

[9] ✓ 1 sec - Command executed in 1 sec 492 ms by MOD Administrator on 12:07:11 AM, 7/19/24

... Index created!

- 3. The next step is to upload the chunks to the newly created Azure AI Search index. The Azure AI Search REST API supports up to 1000 "documents" per request. Note that in this case, each of our "documents" is in fact a chunk of the original file
- 4. Use the **+ Code** icon below the cell output to add a new code cell to the notebook, and enter the following code in it. Click on **Run cell** button and review the output

Copy

```
import re

from pyspark.sql.functions import monotonically_increasing_id

def insert_into_index(documents):

    """Uploads a list of 'documents' to Azure AI Search index."""

    url = f"https://{{AI_SEARCH_NAME}}.search.windows.net/indexes/{{AI_SEARCH_INDEX_NAME}}/docs/index?api-version=2023-11-01"

    payload = json.dumps({"value": documents})

    headers = {

        "Content-Type": "application/json",

        "api-key": AI_SEARCH_API_KEY,

    }

    response = requests.request("POST", url, headers=headers, data=payload)

    if response.status_code == 200 or response.status_code == 201:

        return "Success"

    else:

        return f"Failure: {response.text}"

def make_safe_id(row_id: str):

    """Strips disallowed characters from row id for use as Azure AI search document ID."""

    return re.sub("[^0-9a-zA-Z_-]", "_", row_id)

def upload_rows(rows):

    """Uploads the rows in a Spark dataframe to Azure AI Search.

    Limits uploads to 1000 rows at a time due to Azure AI Search API limits.

    """

    BATCH_SIZE = 1000

    rows = list(rows)

    for i in range(0, len(rows), BATCH_SIZE):

        row_batch = rows[i : i + BATCH_SIZE]

        documents = []

        for row in rows:

            documents.append(

                {

                    "id": make_safe_id(row["unique_id"]),

                    "content": row["chunk"],

                    "contentVector": row["embeddings"].tolist(),

                    "@search.action": "upload",

                },

            )

        status = insert_into_index(documents)

        yield [row_batch[0]["row_index"], row_batch[-1]["row_index"], status]

# Add ID to help track what rows were successfully uploaded

df_embeddings = df_embeddings.withColumn("row_index", monotonically_increasing_id())

# Run upload_batch on partitions of the dataframe
```

```

res = df_embeddings.rdd.mapPartitions(upload_rows)

display(res.toDF(["start_index", "end_index", "insertion_status"]))

```



```

1 import re
2
3 from pyspark.sql.functions import monotonically_increasing_id
4
5
6 def insert_into_index(documents):
7     """Uploads a list of 'documents' to Azure AI Search index."""
8
9     url = f"https://{{AI_SEARCH_NAME}}.search.windows.net/indexes/{{AI_SEARCH_INDEX_NAME}}/docs/index?api-version=2023-11-01"
10
11    payload = json.dumps({"value": documents})
12    headers = {
13        "Content-Type": "application/json",
14        "api-key": AI_SEARCH_API_KEY,
15    }
16
17    response = requests.request("POST", url, headers=headers, data=payload)
18
19    if response.status_code == 200 or response.status_code == 201:
20        return "Success"
21    else:
22        return f"Failure: {response.text}"
23
24 def make_safe_id(row_id: str):
25     """Strips disallowed characters from row id for use as Azure AI search document ID."""
26
27     return re.sub("[^0-9a-zA-Z_-]", "_", row_id)

```

i This environment has been updated to Fabric Runtime 1.3 (Spark 3.5 and Delta 3.1). Your notebook will use the updated runtime when you start a new Spark session environments. [Learn more about Runtime 1.3](#)

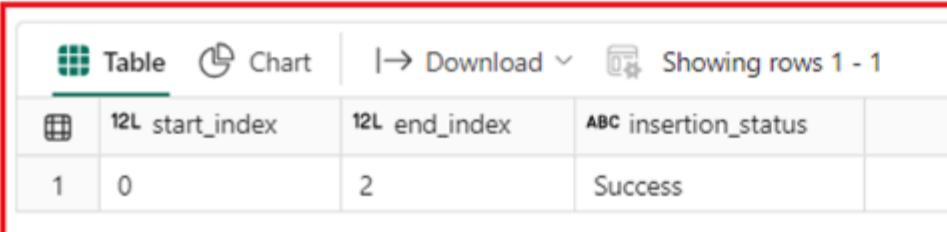
```

41         "id": make_safe_id(row["unique_id"]),
42         "content": row["chunk"],
43         "contentVector": row["embeddings"].tolist(),
44         "@search.action": "upload",
45     },
46 )
47 status = insert_into_index(documents)
48 yield [row_batch[0]["row_index"], row_batch[-1]["row_index"], status]
49
50 # Add ID to help track what rows were successfully uploaded
51 df_embeddings = df_embeddings.withColumn("row_index", monotonically_increasing_id())
52
53 # Run upload_batch on partitions of the dataframe
54 res = df_embeddings.rdd.mapPartitions(upload_rows)
55 display(res.toDF(["start_index", "end_index", "insertion_status"]))
56

```

[10] ✓ 5 sec - Command executed in 4 sec 972 ms by MOD Administrator on 12:07:52 AM, 7/19/24

> Spark jobs (2 of 2 succeeded) Resources Log



	start_index	end_index	insertion_status
1	0	2	Success

Exercise 4: Retrieving Relevant Documents and Answering Questions

- ② After processing the document, we can proceed to pose a question. We will use **SynapseML** to convert the user's question into an embedding and then utilize cosine similarity to retrieve the top K document chunks that closely match the user's question.

Task 1: Configure Environment & Azure API Keys

- ② Create a new notebook in the Lakehouse and save it as rag_application. We'll use this notebook to build the RAG application.

- 1. Provide the credentials for access to Azure AI Search. You can copy the values from the from Azure Portal.(Exercise 1>Task 4)

2. Use the **+ Code** icon below the cell output to add a new code cell to the notebook, and enter the following code in it. Click on **Run cell**** button and review the output

Copy

```
# Azure AI Search
```

```
AI_SEARCH_NAME = ''  
AI_SEARCH_INDEX_NAME = 'rag-demo-index'  
AI_SEARCH_API_KEY = ''
```

THIS environment has been updated to Fabric Runtime 1.3 (Spark 3.3 and Delta 3.1). Your notebook will use the updated runtime when you run environments. [Learn more about Runtime 1.3](#)

1 0 2 Success

+ Code **+ Markdown**

▶ [11] ✓ <1 sec - Command executed in 275 ms by MOD Administrator on 12:13:33 AM, 7/19/24

```
1 # Azure AI Search  
2 AI_SEARCH_NAME = 'mysearchservice21'  
3 AI_SEARCH_INDEX_NAME = 'rag-demo-index'  
4 AI_SEARCH_API_KEY = '8afQM7Y6A3sS7ZmXJZgg3Zk0L9yIW9e76jHmoeoBZqAzSeBoGMin'  
5
```

3. The following function takes a user's question as input and converts it into an embedding using the text-embedding-ada-002 model. This code assumes you're using the Pre-built AI Services in Microsoft Fabric
4. Use the **+ Code** icon below the cell output to add a new code cell to the notebook, and enter the following code in it. Click on **Run cell**** button and review the output

Copy

```
def gen_question_embedding(user_question):
```

```
    """Generates embedding for user_question using SynapseML."""  
  
    from synapse.ml.services import OpenAIEmbedding  
  
    df_ques = spark.createDataFrame([(user_question, 1)], ["questions", "dummy"])  
  
    embedding = (  
  
        OpenAIEmbedding()  
  
        .setDeploymentName('text-embedding-ada-002')  
  
        .setTextCol("questions")  
  
        .setErrorCol("errorQ")  
  
        .setOutputCol("embeddings")  
  
    )  
  
    df_ques_embeddings = embedding.transform(df_ques)  
  
    row = df_ques_embeddings.collect()[0]  
  
    question_embedding = row.embeddings.tolist()  
  
    return question_embedding
```

...

+ Code + Markdown

▶ ▾

```
1 def gen_question_embedding(user_question):
2     """Generates embedding for user_question using SynapseML."""
3     from synapse.ml.services import OpenAIEmbedding
4
5     df_ques = spark.createDataFrame([(user_question, 1)], ["questions", "dummy"])
6     embedding = (
7         OpenAIEmbedding()
8             .setDeploymentName('text-embedding-ada-002')
9             .setTextCol("questions")
10            .setErrorCol("errorQ")
11            .setOutputCol("embeddings")
12    )
13    df_ques_embeddings = embedding.transform(df_ques)
14    row = df_ques_embeddings.collect()[0]
15    question_embedding = row.embeddings.tolist()
16    return question_embedding
17
```

[12] ✓ <1 sec - Command executed in 229 ms by MOD Administrator on 12:13:55 AM, 7/19/24

Task 2: Retrieve Relevant Documents

- 1. The next step is to use the user question and its embedding to retrieve the top K most relevant document chunks from the search index. The following function retrieves the top K entries using hybrid search
- 2. Use the **+ Code** icon below the cell output to add a new code cell to the notebook, and enter the following code in it. Click on **▶** Run cell**** button and review the output

Copy

```

import json
import requests

def retrieve_top_chunks(k, question, question_embedding):
    """Retrieve the top K entries from Azure AI Search using hybrid search."""

    url = f"https://{{AI_SEARCH_NAME}}.search.windows.net/indexes/{{AI_SEARCH_INDEX_NAME}}/docs/search?api-version=2023-11-01"

    payload = json.dumps({
        "search": question,
        "top": k,
        "vectorQueries": [
            {
                "vector": question_embedding,
                "k": k,
                "fields": "contentVector",
                "kind": "vector"
            }
        ]
    })

    headers = {
        "Content-Type": "application/json",
        "api-key": AI_SEARCH_API_KEY,
    }

    response = requests.request("POST", url, headers=headers, data=payload)

    output = json.loads(response.text)

    return output

```

```

This environment has been updated to Fabric Runtime 1.3 (Spark 3.5 and Delta 3.1). Your notebook will use the updated runtime when you start a new Spark session. Update in your workspace settings environments. Learn more about Runtime 1.3

```

Code

```

1 import json
2 import requests
3
4 def retrieve_top_chunks(k, question, question_embedding):
5     """Retrieve the top K entries from Azure AI Search using hybrid search."""
6     url = f"https://{{AI_SEARCH_NAME}}.search.windows.net/indexes/{{AI_SEARCH_INDEX_NAME}}/docs/search?api-version=2023-11-01"
7
8     payload = json.dumps({
9         "search": question,
10        "top": k,
11        "vectorQueries": [
12            {
13                "vector": question_embedding,
14                "k": k,
15                "fields": "contentVector",
16                "kind": "vector"
17            }
18        ]
19    })
20
21    headers = {
22        "Content-Type": "application/json",
23        "api-key": AI_SEARCH_API_KEY,
24    }
25
26    response = requests.request("POST", url, headers=headers, data=payload)
27    output = json.loads(response.text)

```

With those functions defined, we can define a function that takes a user's question, generates an embedding for the question, retrieves the top K document chunks, and concatenates the content of the retrieved documents to form the context for the user's question.

3. Use the **+ Code** icon below the cell output to add a new code cell to the notebook, and enter the following code in it. Click on **Run cell** button and review the output

Copy

```
def get_context(user_question, retrieved_k = 5):

    # Generate embeddings for the question

    question_embedding = gen_question_embedding(user_question)

    # Retrieve the top K entries

    output = retrieve_top_chunks(retrieved_k, user_question, question_embedding)

    # concatenate the content of the retrieved documents

    context = [chunk["content"] for chunk in output["value"]]

    return context
```

This environment has been updated to Fabric Runtime 1.3 (Spark 3.5 and Delta 3.1). Your notebook will use the updated runtime when you start a new Session environments. [Learn more about Runtime 1.3](#)

20 return output
21
22
23
24
25
26
27
28
29

[13] ✓ <1 sec - Command executed in 242 ms by MOD Administrator on 12:14:23 AM, 7/19/24

...

+ Code **+ Markdown**

1 def get_context(user_question, retrieved_k = 5):
2 # Generate embeddings for the question
3 question_embedding = gen_question_embedding(user_question)
4
5 # Retrieve the top K entries
6 output = retrieve_top_chunks(retrieved_k, user_question, question_embedding)
7
8 # concatenate the content of the retrieved documents
9 context = [chunk["content"] for chunk in output["value"]]
10
11 return context
12

[14] ✓ 1 sec - Command executed in 253 ms by MOD Administrator on 12:14:58 AM, 7/19/24

...

Task 3: Answering the User's Question

- Finally, we can define a function that takes a user's question, retrieves the context for the question, and sends both the context and the question to a large language model to generate a response. For this demo, we'll use the gpt-35-turbo-16k, a model that is optimized for conversation.
1. Use the **+ Code** icon below the cell output to add a new code cell to the notebook, and enter the following code in it. Click on **Run cell** button and review the output

Copy

```
from pyspark.sql import Row

from synapse.ml.services.openai import OpenAIChatCompletion

def make_message(role, content):

    return Row(role=role, content=content, name=role)

def get_response(user_question):

    context = get_context(user_question)

    # Write a prompt with context and user_question as variables

    prompt = f"""

    context: {context}

    Answer the question based on the context above.

    If the information to answer the question is not present in the given context then reply "I don't know".

    """

    chat_df = spark.createDataFrame(

        [
            (
                [
                    make_message(
                        "system", prompt
                    ),
                    make_message("user", user_question),
                ],
            ),
        ],
    )

    ).toDF("messages")

    chat_completion = (

        OpenAIChatCompletion()

        .setDeploymentName("gpt-35-turbo-16k") # deploymentName could be one of {gpt-35-turbo, gpt-35-turbo-16k}

        .setMessagesCol("messages")

        .setErrorCol("error")

        .setOutputCol("chat_completions")

    )

    result_df = chat_completion.transform(chat_df).select("chat_completions.choices.message.content")

    result = []

    for row in result_df.collect():

        content_string = ' '.join(row['content'])

        result.append(content_string)

    # Join the list into a single string

    result = ' '.join(result)

    return result
```

This environment has been updated to Fabric Runtime 1.3 (Spark 3.5 and Delta 3.1). Your notebook will use the updated runtime when you start a new Spark session. Update in your environments. [Learn more about Runtime 1.3](#)

+ Code + Markdown

```
1  from pyspark.sql import Row
2  from synapse.ml.services.openai import OpenAIChatCompletion
3
4
5  def make_message(role, content):
6      return Row(role=role, content=content, name=role)
7
8  def get_response(user_question):
9      context = get_context(user_question)
10
11     # Write a prompt with context and user_question as variables
12     prompt = f"""
13         context: {context}
14         Answer the question based on the context above.
15         If the information to answer the question is not present in the given context then reply "I don't know".
16         """
17
18     chat_df = spark.createDataFrame(
19         [
20             (
21                 [
22                     make_message(
23                         "system", prompt
24                     ),
25                     make_message("user", user_question),
26                 ],
27             ),
28         ]
29     ).toDF("messages")
30
31     chat_completion = (
32         OpenAIChatCompletion()
33         .setDeploymentName("gpt-35-turbo-16k") # deploymentName could be one of {gpt-35-turbo, gpt-35-turbo-16k}
34         .setMessagesCol("messages")
35         .setErrorCol("error")
36         .setOutputCol("chat_completions")
37     )
38
39     result_df = chat_completion.transform(chat_df).select("chat_completions.choices.message.content")
40
41     result = []
42     for row in result_df.collect():
43         content_string = ' '.join(row['content'])
44         result.append(content_string)
45
46     # Join the list into a single string
47     result = ' '.join(result)
48
49     return result
50
```

[15] ✓ <1 sec - Command executed in 239 ms by MOD Administrator on 12:15:20 AM, 7/19/24

- 2. Now, we can call that function with an example question to see the response:
- 3. Use the **+ Code** icon below the cell output to add a new code cell to the notebook, and enter the following code in it. Click on **Run cell** button and review the output

Copy

```
user_question = "how do i make a booking?"

response = get_response(user_question)

print(response)
```

This environment has been updated to Fabric Runtime 1.3 (Spark 3.5 and Delta 3.1). Your notebook will use the updated runtime when you start a new Spark session. Update in your workspace setting environments. [Learn more about Runtime 1.3](#)

Code **Markdown**

```
1 user_question = "how do i make a booking?"
2 response = get_response(user_question)
3 print(response)
4
```

[16] ✓ 8 sec - Command executed in 8 sec 18 ms by MOD Administrator on 12:15:56 AM, 7/19/24

> [Spark jobs \(2 of 2 succeeded\)](#) [Resources](#) [Log](#)

... To make a booking on Contoso Real Estate, follow these steps:

1. Search for Rentals:
 - Enter your destination, check-in and check-out dates, and the number of guests.
 - Apply filters such as price range, property type, and amenities to narrow down your options.
 - Browse through the listings to find the perfect place for your stay.
2. View Listing Details:
 - Click on a listing to view detailed information, including photos, property description, reviews, and host information.
3. Make a Booking:
 - Click the "Book Now" button on the listing page.
 - Review the booking details, including the total cost and house rules.
 - Confirm your booking by providing payment information.
 - Once the host accepts your booking, you'll receive a confirmation.

Please note that Contoso Real Estate handles the payment process securely, and you'll only be charged once your booking is confirmed. communicate with the host through our messaging system for any questions or special requests.

Task 4: Delete the resources

To avoid incurring unnecessary Azure costs, you should delete the resources you created in this quickstart if they're no longer needed. To manage resources, you can use the [Azure portal](#).

1. To delete the storage account, navigate to **Azure portal Home** page, click on **Resource groups**.

The screenshot shows the Microsoft Azure portal interface. At the top, there's a navigation bar with icons for search, notifications, and settings. Below it, the main header says "Microsoft Azure" and "Search resources, services, and docs (G+/)".

The main content area is titled "Azure services". It features a "Create a resource" button and a "Resource groups" button, which is highlighted with a red box. Other service icons include Azure OpenAI, Quickstart Center, Virtual machines, App Services, Storage accounts, and SQL databases. Below this is a "More services" section with "Azure Cosmos DB" and an "→" icon.

The next section is titled "Resources". It has tabs for "Recent" (which is selected) and "Favorite". A table lists recent resources:

Name	Type	Last Viewed
aoai210705_RG	Resource group	10 minutes ago
Azure-openai-test90	Azure OpenAI	17 hours ago

 There's also a "See all" link at the bottom of this list.

The final section is titled "Navigate" and contains links for "Subscriptions", "Resource groups" (which is highlighted with a red box), and "All resources".

2. Click on the assigned resource group.

[Home >](#)

Resource groups

Contoso

[Create](#) [Manage view](#) [Refresh](#) [Export to CSV](#) [Open query](#) [Assign tags](#)

Filter for any field... [Subscription equals all](#) [Location equals all](#) [Add filter](#)

Showing 1 to 1 of 1 records.

Name
<input type="checkbox"/> AI-Fabric879

3. In the **Resource group** home page, select the **delete resource group**

[Home > Resource groups >](#)

AI-Fabric879

Resource group

[Search](#) [Create](#) [Manage view](#) [Delete resource group](#) [Refresh](#) [Export to CSV](#) [Open query](#) [Assign tags](#)

[Overview](#) [Essentials](#)

Subscription (move) : [Azure Pass - Sponsorship](#) Deployments : 1
Subscription ID : 85677dc1-5950-436b-9280-7c7f9306d95c Location : EMEA
Tags (edit) : [Add tags](#)

[Resources](#) [Recommendations](#)

Filter for any field... [Type equals all](#) [Location equals all](#) [Add filter](#)

Showing 1 to 6 of 6 records. Show hidden types

Name	Type
aoafabric456	Azure OpenAI
Cognitive-service879	Azure AI services management
fabriccapacity45	Fabric Capacity
fabrickeyvault231	Key vault
fabricstorage234	Storage account

4. In the **Delete Resources** pane that appears on the right side, navigate to **Enter "resource group name" to confirm deletion** field, then click on the **Delete** button.

Delete a resource group

X

The following resource group and all its dependent resources will be permanently deleted.

Resource group to be deleted



Dependent resources to be deleted (6)

All dependent resources, including hidden types, are shown

Name	Resource type
aoaifabric456	Azure OpenAI
Cognitive-service879	Azure AI services multi-service account
fabriccapacity45	Fabric Capacity
fabrickeyvault231	Key vault
fabricstorage234	Storage account
mysearchservice21	Search service

Enter resource group name to confirm deletion *

AI-Fabric879

Delete

Cancel

5. On **Delete confirmation** dialog box, click on **Delete** button.

Delete confirmation

Deleting this resource group and its dependent resources is a permanent action and cannot be undone.

Delete

Go back

6. Click on the bell icon, you'll see the notification --**Deleted resource group AOAI-RG8**

Notifications

More events in the activity log →

Dismiss all ▾

✓ Deleted resource group AI-FabricRG89

Deleted resource group AI-FabricRG89

a few seconds ago

7. Open your browser, navigate to the address bar, and type or paste the following URL: `https://app.fabric.microsoft.com/` then press the **Enter** button.

The screenshot shows the 'Workspaces' section of the Synapse Data Engineering interface. On the left, there's a sidebar with icons for Home, Create, Browse, Workspaces (which is selected and highlighted with a red border), Document Intelligence..., custumenv, Notebook 1, data_lakeho use1, Notebook 1, data_lakeho use, and a '...' option. The main area displays a list of workspaces under 'All'. The 'Admin monitoring' workspace is listed first, followed by 'My workspace', and then 'Document Intelligence-Fa...'. The 'Document Intelligence-Fa...' workspace is highlighted with a red rectangle. At the bottom, there are sections for 'Deployment pipelines' and a green button labeled '+ New workspace'.

8. Select the ... option under the workspace name and select **Workspace settings**.

The screenshot shows a list of items in the 'Document Intelligence-Fabric78' workspace. The items are:

Name	Type	Task	Owner	Refreshed	Next refresh	Endorsement	Sensitivity	Included in app
data_lakehouse	Lakehouse	—	MOD Administr...	—	—	—	—	—
data_lakehouse	Semantic model...	—	Document Intell...	7/18/24, 10:14:35 ...	N/A	—	—	—
data_lakehouse	SQL analytics e...	—	Document Intell...	—	N/A	—	—	—
Notebook 1	Notebook	—	MOD Administr...	—	—	—	—	—

9. Select **General** and click on **Remove this workspace**.

The 'General' section of the workspace settings page is selected. It includes:

- Notifications**
- Workspace contacts**: A list containing 'AOAI TFS 006351'.
- OneDrive**: A section with a button labeled 'Enter groups'.
- Power BI**, **Data**, **Engineering/Science**, and **Data Factory** sections, each with a 'Manage' link.
- Delete workspace**: A warning message stating the workspace will be deleted after 7 days if not restored by the Fabric administrator. It features a red button labeled 'Remove this workspace'.

10. Click on **Delete** in the warning that pops up.

A confirmation dialog box titled 'Delete workspace?' is displayed. The message inside says: 'You're about to delete this workspace. Are you sure you want to continue?'. At the bottom are two buttons: a green 'Delete' button and a white 'Cancel' button.

11. Wait for a notification that the Workspace has been deleted, before proceeding to the next lab.

The screenshot shows the Power BI 'My workspace' interface. On the left, there's a sidebar with icons for Home, Create, Browse, OneLake data hub, Apps, Metrics, and Workspaces. The main area is titled 'My workspace' and contains buttons for '+ New', 'Upload', and 'Workspace settings'. A search bar at the top right says 'Search' and 'Filter by keyword'. In the top right corner, there's a status message: 'Fabric Trial: 59 days left' followed by several icons. A red box highlights a notification message: 'Workspace deleted' with a green checkmark, and below it, the text 'The workspace was successfully deleted.'