

Azure OpenAI Service Documentation

Learn how to use Azure OpenAI's powerful language models including the GPT-3, Codex and Embeddings model series for content generation, summarization, semantic search, and natural language to code translation.



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What is Azure OpenAI Service?

Article • 07/18/2023

Azure OpenAI Service provides REST API access to OpenAI's powerful language models including the GPT-4, GPT-35-Turbo, and Embeddings model series. In addition, the new GPT-4 and gpt-35-turbo model series have now reached general availability. These models can be easily adapted to your specific task including but not limited to content generation, summarization, semantic search, and natural language to code translation. Users can access the service through REST APIs, Python SDK, or our web-based interface in the Azure OpenAI Studio.

Features overview

Feature	Azure OpenAI
Models available	GPT-4 series GPT-35-Turbo series Embeddings series Learn more in our Models page.
Fine-tuning	Ada Babbage Curie Cushman Davinci Fine-tuning is currently unavailable to new customers.
Price	Available here
Virtual network support & private link support	Yes, unless using Azure OpenAI on your data .
Managed Identity	Yes, via Azure Active Directory
UI experience	Azure portal for account & resource management, Azure OpenAI Service Studio for model exploration and fine tuning
Model regional availability	Model availability
Content filtering	Prompts and completions are evaluated against our content policy with automated systems. High severity content will be filtered.

Responsible AI

At Microsoft, we're committed to the advancement of AI driven by principles that put people first. Generative models such as the ones available in Azure OpenAI have significant potential benefits, but without careful design and thoughtful mitigations, such models have the potential to generate incorrect or even harmful content. Microsoft has made significant investments to help guard against abuse and unintended harm, which includes requiring applicants to show well-defined use cases, incorporating Microsoft's [principles for responsible AI use](#), building content filters to support customers, and providing responsible AI implementation guidance to onboarded customers.

How do I get access to Azure OpenAI?

How do I get access to Azure OpenAI?

Access is currently limited as we navigate high demand, upcoming product improvements, and [Microsoft's commitment to responsible AI](#). For now, we're working with customers with an existing partnership with Microsoft, lower risk use cases, and those committed to incorporating mitigations.

More specific information is included in the application form. We appreciate your patience as we work to responsibly enable broader access to Azure OpenAI.

Apply here for access:

[Apply now](#)

Comparing Azure OpenAI and OpenAI

Azure OpenAI Service gives customers advanced language AI with OpenAI GPT-4, GPT-3, Codex, and DALL-E models with the security and enterprise promise of Azure. Azure OpenAI co-develops the APIs with OpenAI, ensuring compatibility and a smooth transition from one to the other.

With Azure OpenAI, customers get the security capabilities of Microsoft Azure while running the same models as OpenAI. Azure OpenAI offers private networking, regional availability, and responsible AI content filtering.

Key concepts

Prompts & completions

The completions endpoint is the core component of the API service. This API provides access to the model's text-in, text-out interface. Users simply need to provide an input **prompt** containing the English text command, and the model will generate a text **completion**.

Here's an example of a simple prompt and completion:

Prompt: `""" count to 5 in a for loop """`

Completion: `for i in range(1, 6): print(i)`

Tokens

Azure OpenAI processes text by breaking it down into tokens. Tokens can be words or just chunks of characters. For example, the word "hamburger" gets broken up into the tokens "ham", "bur" and "ger", while a short and common word like "pear" is a single token. Many tokens start with a whitespace, for example " hello" and " bye".

The total number of tokens processed in a given request depends on the length of your input, output and request parameters. The quantity of tokens being processed will also affect your response latency and throughput for the models.

Resources

Azure OpenAI is a new product offering on Azure. You can get started with Azure OpenAI the same way as any other Azure product where you [create a resource](#), or instance of the service, in your Azure Subscription. You can read more about Azure's [resource management design](#).

Deployments

Once you create an Azure OpenAI Resource, you must deploy a model before you can start making API calls and generating text. This action can be done using the Deployment APIs. These APIs allow you to specify the model you wish to use.

Prompt engineering

GPT-3, GPT-3.5, and GPT-4 models from OpenAI are prompt-based. With prompt-based models, the user interacts with the model by entering a text prompt, to which the model responds with a text completion. This completion is the model's continuation of the input text.

While these models are extremely powerful, their behavior is also very sensitive to the prompt. This makes [prompt engineering](#) an important skill to develop.

Prompt construction can be difficult. In practice, the prompt acts to configure the model weights to complete the desired task, but it's more of an art than a science, often requiring experience and intuition to craft a successful prompt.

Models

The service provides users access to several different models. Each model provides a different capability and price point.

GPT-4 models are the latest available models. Due to high demand access to this model series is currently only available by request. To request access, existing Azure OpenAI customers can [apply by filling out this form ↗](#)

The DALL-E models, currently in preview, generate images from text prompts that the user provides.

Learn more about each model on our [models concept page](#).

Next steps

Learn more about the [underlying models that power Azure OpenAI](#).

Azure OpenAI Service quotas and limits

Article • 07/18/2023

This article contains a quick reference and a detailed description of the quotas and limits for Azure OpenAI in Azure AI services.

Quotas and limits reference

The following sections provide you with a quick guide to the default quotas and limits that apply to Azure OpenAI:

Limit Name	Limit Value
OpenAI resources per region per Azure subscription	30
Default quota per model and region (in tokens-per-minute) ¹	Text-Davinci-003: 120 K GPT-4: 20 K GPT-4-32K: 60 K All others: 240 K
Default DALL-E quota limits	2 concurrent requests
Maximum prompt tokens per request	Varies per model. For more information, see Azure OpenAI Service models
Max fine-tuned model deployments	2
Total number of training jobs per resource	100
Max simultaneous running training jobs per resource	1
Max training jobs queued	20
Max Files per resource	30
Total size of all files per resource	1 GB
Max training job time (job will fail if exceeded)	720 hours
Max training job size (tokens in training file) x (# of epochs)	2 Billion

¹ Default quota limits are subject to change.

General best practices to remain within rate limits

To minimize issues related to rate limits, it's a good idea to use the following techniques:

- Implement retry logic in your application.
- Avoid sharp changes in the workload. Increase the workload gradually.
- Test different load increase patterns.
- Increase the quota assigned to your deployment. Move quota from another deployment, if necessary.

How to request increases to the default quotas and limits

Quota increase requests can be submitted from the [Quotas](#) page of Azure OpenAI Studio. Please note that due to overwhelming demand, we are not currently approving new quota increase requests. Your request will be queued until it can be filled at a later time.

For other rate limits, please [submit a service request](#).

Next steps

Explore how to [manage quota](#) for your Azure OpenAI deployments. Learn more about the [underlying models](#) that power Azure OpenAI.

Azure OpenAI Service models

Article • 08/06/2023

Azure OpenAI Service is powered by a diverse set of models with different capabilities and price points. Model availability varies by region. For GPT-3 and other models retiring in July 2024, see [Azure OpenAI Service legacy models](#).

Models	Description
GPT-4	A set of models that improve on GPT-3.5 and can understand as well as generate natural language and code.
GPT-3.5	A set of models that improve on GPT-3 and can understand as well as generate natural language and code.
Embeddings	A set of models that can convert text into numerical vector form to facilitate text similarity.
DALL-E (Preview)	A series of models in preview that can generate original images from natural language.

GPT-4

GPT-4 can solve difficult problems with greater accuracy than any of OpenAI's previous models. Like GPT-3.5 Turbo, GPT-4 is optimized for chat and works well for traditional completions tasks. Use the Chat Completions API to use GPT-4. To learn more about how to interact with GPT-4 and the Chat Completions API check out our [in-depth how-to](#).

To request access to GPT-4, Azure OpenAI customers can [apply by filling out this form](#) ↗

- `gpt-4`
- `gpt-4-32k`

The `gpt-4` model supports 8192 max input tokens and the `gpt-4-32k` model supports up to 32,768 tokens.

GPT-3.5

GPT-3.5 models can understand and generate natural language or code. The most capable and cost effective model in the GPT-3.5 family is GPT-3.5 Turbo, which has been

optimized for chat and works well for traditional completions tasks as well. We recommend using GPT-3.5 Turbo over [legacy GPT-3.5 and GPT-3 models](#).

- `gpt-35-turbo`
- `gpt-35-turbo-16k`

The `gpt-35-turbo` model supports 4096 max input tokens and the `gpt-35-turbo-16k` model supports up to 16,384 tokens.

Like GPT-4, use the Chat Completions API to use GPT-3.5 Turbo. To learn more about how to interact with GPT-3.5 Turbo and the Chat Completions API check out our [in-depth how-to](#).

Embeddings models

Important

We strongly recommend using `text-embedding-ada-002` (Version 2). This model/version provides parity with OpenAI's `text-embedding-ada-002`. To learn more about the improvements offered by this model, please refer to [OpenAI's blog post](#). Even if you are currently using Version 1 you should migrate to Version 2 to take advantage of the latest weights/updated token limit. Version 1 and Version 2 are not interchangeable, so document embedding and document search must be done using the same version of the model.

Currently, we offer three families of Embeddings models for different functionalities: The following list indicates the length of the numerical vector returned by the service, based on model capability:

Base Model	Model(s)	Dimensions
Ada	models ending in -001 (Version 1)	1024
Ada	<code>text-embedding-ada-002</code> (Version 2)	1536

DALL-E (Preview)

The DALL-E models, currently in preview, generate images from text prompts that the user provides.

Model summary table and region availability

ⓘ Important

Due to high demand:

- South Central US is temporarily unavailable for creating new resources and deployments.
- In East US and France Central, customers with existing deployments of GPT-4 can create additional deployments of GPT-4 version 0613. For customers new to GPT-4 on Azure OpenAI, please use one of the other available regions.

GPT-4 models

These models can only be used with the Chat Completion API.

Model ID	Base model Regions	Fine-Tuning Regions	Max Request (tokens)	Training Data (up to)
gpt-4 ^{1,2} (0314)		N/A	8,192	September 2021
gpt-4-32k ^{1,2} (0314)		N/A	32,768	September 2021
gpt-4 ¹³ (0613)	Australia East, Canada East, East US, East US 2, France Central, Japan East, UK South	N/A	8,192	September 2021
gpt-4-32k ¹³ (0613)	Australia East, Canada East, East US, East US 2, France Central, Japan East, UK South	N/A	32,768	September 2021

¹ The model is [only available by request](#).

² Version 0314 of gpt-4 and gpt-4-32k will be retired no earlier than July 5, 2024. See [model updates](#) for model upgrade behavior.

³ We are adding regions and rolling out availability to customers gradually to ensure a smooth experience.

GPT-3.5 models

GPT-3.5 Turbo is used with the Chat Completion API. GPT-3.5 Turbo (0301) can also be used with the Completions API. GPT3.5 Turbo (0613) only supports the Chat Completions API.

Model ID	Base model Regions	Fine-Tuning Regions	Max Request (tokens)	Training Data (up to)
gpt-35-turbo ¹ (0301)	East US, France Central, South Central US, UK South, West Europe	N/A	4,096	Sep 2021
gpt-35-turbo (0613)	Australia East, Canada East, East US, East US 2, France Central, Japan East, North Central US, UK South	N/A	4,096	Sep 2021
gpt-35-turbo-16k (0613)	Australia East, Canada East, East US, East US 2, France Central, Japan East, North Central US, UK South	N/A	16,384	Sep 2021

¹ Version 0301 of gpt-35-turbo will be retired no earlier than July 5, 2024. See [model updates](#) for model upgrade behavior.

Embeddings models

These models can only be used with Embedding API requests.

ⓘ Note

We strongly recommend using `text-embedding-ada-002` (Version 2). This model/version provides parity with OpenAI's `text-embedding-ada-002`. To learn more about the improvements offered by this model, please refer to [OpenAI's blog post](#). Even if you are currently using Version 1 you should migrate to Version 2 to take advantage of the latest weights/updated token limit. Version 1 and Version 2 are not interchangeable, so document embedding and document search must be done using the same version of the model.

Model ID	Base model Regions	Fine-Tuning Regions	Max Request (tokens)	Training Data (up to)
text-embedding-ada-002 (version 2)	Canada East, East US, France Central, Japan East, North	N/A	8,191	Sep 2021

Model ID	Base model Regions	Fine-Tuning Regions	Max Request (tokens)	Training Data (up to)
	Central US, South Central US, West Europe			
text-embedding-ada-002 (version 1)	East US, South Central US, West Europe	N/A	2,046	Sep 2021

DALL-E models (Preview)

Model ID	Base model Regions	Fine-Tuning Regions	Max Request (characters)	Training Data (up to)
dalle2	East US	N/A	1000	N/A

Working with models

Finding what models are available

You can get a list of models that are available for both inference and fine-tuning by your Azure OpenAI resource by using the [Models List API](#).

Model updates

Azure OpenAI now supports automatic updates for select model deployments. On models where automatic update support is available, a model version drop-down will be visible in Azure OpenAI Studio under **Create new deployment** and **Edit deployment**:

Deploy model

X

Set up a deployment to make API calls against a provided base model or a custom model. Finished deployments are available for use. Your deployment status will move to succeeded when the deployment is complete and ready for use.

Select a model ⓘ

gpt-35-turbo

Model version ⓘ

Auto-update to default

Auto-update to default

0301 (Default)

0613

Create

Cancel



Auto update to default

When **Auto-update to default** is selected your model deployment will be automatically updated within two weeks of a new version being released.

If you are still in the early testing phases for completion and chat completion based models, we recommend deploying models with **auto-update to default** set whenever it is available.

Specific model version

As your use of Azure OpenAI evolves, and you start to build and integrate with applications you will likely want to manually control model updates so that you can first test and validate that model performance is remaining consistent for your use case prior to upgrade.

When you select a specific model version for a deployment this version will remain selected until you either choose to manually update yourself, or once you reach the

retirement date for the model. When the retirement date is reached the model will auto-upgrade to the default version at the time of retirement.

GPT-35-Turbo 0301 and GPT-4 0314 retirement

The `gpt-35-turbo (0301)` and both `gpt-4 (0314)` models will be retired no earlier than July 5, 2024. Upon retirement, deployments will automatically be upgraded to the default version at the time of retirement. If you would like your deployment to stop accepting completion requests rather than upgrading, then you will be able to set the model upgrade option to expire through the API. We will publish guidelines on this by September 1.

Viewing deprecation dates

For currently deployed models, from Azure OpenAI Studio select **Deployments**:

Azure AI Studio > Deployments

Deployments provide endpoints to the Azure OpenAI base models, or your fine-tuned models, configured with settings to meet your needs, including the content moderation model, version handling, and deployment size. From this page, you can view your existing deployments, edit them, and create new deployments.

Deployment name	Model name	Model version	Deployment status	Capacity	Status
text-embedding-ada-002	text-embedding-ada-002	1	Standard	120K TPM	Succeeded
text-ada-001	text-ada-001	1	Standard	120K TPM	Succeeded
gpt-35-turbo	gpt-35-turbo	0301	Standard	120K TPM	Succeeded
code-davinci-002	code-davinci-002	1	Standard	120K TPM	Succeeded
text-davinci-003	text-davinci-003	1	Standard	60K TPM	Succeeded

Model depreciation ...

Date	Content Filter	Rate limit (Tokens per second)
2/1/2025	Default	120000
2/29/2024	Default	120000
9/30/2023	Default	120000
7/10/2024	Default	120000
9/29/2024	Default	60000

Content Filter Rate limit (Tokens per second)

To view deprecation/expiration dates for all available models in a given region from Azure OpenAI Studio select **Models** > **Column options** > **Select Deprecation fine tune** and **Deprecation inference**:

Azure AI Studio > Models

Azure OpenAI is powered by models with different capabilities and price points. Deploy one of the provided base models to try it out in [Playground](#) or train a custom model to your specific use case and data for better performance and more accurate results. [Learn more about the different types of base models](#)

Model name	Model version	Created at	Status	Deployable
code-davinci-002	1	7/10/2022 8:00 PM	Succeeded	No
gpt-35-turbo	0301	3/8/2023 7:00 PM	Succeeded	No
text-ada-001	1	2/28/2022 7:00 PM	Succeeded	No
text-babbage-001	1	2/28/2022 7:00 PM	Succeeded	Yes
text-curie-001	1	2/28/2022 7:00 PM	Succeeded	Yes
text-davinci-002	1	1/21/2022 7:00 PM	Succeeded	Yes
text-davinci-003	1	9/29/2022 8:00 PM	Succeeded	No
text-embedding-ada-002	2	4/2/2023 8:00 PM	Succeeded	Yes
text-embedding-ada-002	1	2/1/2023 7:00 PM	Succeeded	No
text-similarity-ada-001	1	5/19/2022 8:00 PM	Succeeded	Yes
text-similarity-curie-001	1	5/19/2022 8:00 PM	Succeeded	Yes

Deprecation fine tune Deprecation inference

Update & deploy models via the API

HTTP

PUT

`https://management.azure.com/subscriptions/{subscriptionId}/resourceGroups/{resourceGroupName}/providers/Microsoft.CognitiveServices/accounts/{accountName}/deployments/{deploymentName}?api-version=2023-05-01`

Path parameters

Parameter	Type	Required?	Description
<code>accountName</code>	string	Required	The name of your Azure OpenAI Resource.
<code>deploymentName</code>	string	Required	The deployment name you chose when you deployed an existing model or the name you would like a new model deployment to have.
<code>resourceGroupName</code>	string	Required	The name of the associated resource group for this model deployment.
<code>subscriptionId</code>	string	Required	Subscription ID for the associated subscription.
<code>api-version</code>	string	Required	The API version to use for this operation. This follows the YYYY-MM-DD format.

Supported versions

- 2023-05-01 [Swagger spec ↗](#)

Request body

This is only a subset of the available request body parameters. For the full list of the parameters, you can refer to the [REST API reference documentation](#).

Parameter	Type	Description
<code>versionUpgradeOption</code>	String	Deployment model version upgrade options: <code>OnceNewDefaultVersionAvailable</code> <code>OnceCurrentVersionExpired</code> <code>NoAutoUpgrade</code>
<code>capacity</code>	integer	This represents the amount of <code>quota</code> you are assigning to this deployment. A value of 1 equals 1,000 Tokens per Minute (TPM)

Example request

Bash

```
curl -X PUT https://management.azure.com/subscriptions/00000000-0000-0000-0000-000000000000/resourceGroups/resource-group-temp/providers/Microsoft.CognitiveServices/accounts/docs-openai-test-001/deployments/text-embedding-ada-002-test-1?api-version=2023-05-01 \
-H "Content-Type: application/json" \
-H 'Authorization: Bearer YOUR_AUTH_TOKEN' \
-d '{"sku": {"name": "Standard", "capacity": 1}, "properties": {"model": {"format": "OpenAI", "name": "text-embedding-ada-002", "version": "2"}, "versionUpgradeOption": "OnceCurrentVersionExpired"} }'
```

ⓘ Note

There are multiple ways to generate an authorization token. The easiest method for initial testing is to launch the Cloud Shell from the [Azure portal](#). Then run `az account get-access-token`. You can use this token as your temporary authorization token for API testing.

Example response

JSON

```
{
  "id": "/subscriptions/{subscription-id}/resourceGroups/resource-group-temp/providers/Microsoft.CognitiveServices/accounts/docs-openai-test-001/deployments/text-embedding-ada-002-test-1",
  "type": "Microsoft.CognitiveServices/accounts/deployments",
  "name": "text-embedding-ada-002-test-1",
  "sku": {
    "name": "Standard",
    "capacity": 1
  },
  "properties": {
    "model": {
      "format": "OpenAI",
      "name": "text-embedding-ada-002",
      "version": "2"
    },
    "versionUpgradeOption": "OnceCurrentVersionExpired",
    "capabilities": {
      "embeddings": "true",
      "embeddingsMaxInputs": "1"
    },
    "provisioningState": "Succeeded",
    "ratelimits": [
      {
        "key": "request",
        "value": "100"
      }
    ]
  }
}
```

```
        "renewalPeriod": 10,
        "count": 2
    },
    {
        "key": "token",
        "renewalPeriod": 60,
        "count": 1000
    }
]
},
"systemData": {
    "createdBy": "docs@contoso.com",
    "createdByType": "User",
    "createdAt": "2023-06-13T00:12:38.885937Z",
    "lastModifiedBy": "docs@contoso.com",
    "lastModifiedByType": "User",
    "lastModifiedAt": "2023-06-13T02:41:04.8410965Z"
},
"etag": "\"{GUID}\""
}
```

Next steps

- Learn more about Azure OpenAI
- Learn more about fine-tuning Azure OpenAI models

Azure OpenAI Service legacy models

Article • 07/18/2023

Azure OpenAI Service offers a variety of models for different use cases. The following models are not available for new deployments beginning July 6, 2023. Deployments created prior to July 6, 2023 remain available to customers until July 5, 2024. We recommend customers migrate to the replacement models prior to the July 5, 2024 retirement.

GPT-3.5

The impacted GPT-3.5 models are the following. The replacement for the GPT-3.5 models is GPT-3.5 Turbo Instruct when that model becomes available.

- `text-davinci-002`
- `text-davinci-003`
- `code-davinci-002`

GPT-3

The impacted GPT-3 models are the following. The replacement for the GPT-3 models is GPT-3.5 Turbo Instruct when that model becomes available.

- `text-ada-001`
- `text-babbage-001`
- `text-curie-001`
- `text-davinci-001`
- `code-cushman-001`

Embedding models

The embedding models below will be retired effective July 5, 2024. Customers should migrate to `text-embedding-ada-002` (version 2).

- [Similarity](#)
- [Text search](#)
- [Code search](#)

Each family includes models across a range of capability. The following list indicates the length of the numerical vector returned by the service, based on model capability:

Base Model	Model(s)	Dimensions
Ada		1024
Babbage		2048
Curie		4096
Davinci		12288

Similarity embedding

These models are good at capturing semantic similarity between two or more pieces of text.

Use cases	Models
Clustering, regression, anomaly detection, visualization	<code>text-similarity-ada-001</code> <code>text-similarity-babbage-001</code> <code>text-similarity-curie-001</code> <code>text-similarity-davinci-001</code>

Text search embedding

These models help measure whether long documents are relevant to a short search query. There are two input types supported by this family: `doc`, for embedding the documents to be retrieved, and `query`, for embedding the search query.

Use cases	Models
Search, context relevance, information retrieval	<code>text-search-ada-doc-001</code> <code>text-search-ada-query-001</code> <code>text-search-babbage-doc-001</code> <code>text-search-babbage-query-001</code> <code>text-search-curie-doc-001</code> <code>text-search-curie-query-001</code> <code>text-search-davinci-doc-001</code> <code>text-search-davinci-query-001</code>

Code search embedding

Similar to text search embedding models, there are two input types supported by this family: `code`, for embedding code snippets to be retrieved, and `text`, for embedding natural language search queries.

Use cases	Models
Code search and relevance	<code>code-search-ada-code-001</code> <code>code-search-ada-text-001</code> <code>code-search-babbage-code-001</code> <code>code-search-babbage-text-001</code>

Model summary table and region availability

Region availability is for customers with deployments of the models prior to July 6, 2023.

GPT-3.5 models

Model ID	Base model Regions	Fine-Tuning Regions	Max Request (tokens)	Training Data (up to)
text-davinci-002	East US, South Central US, West Europe	N/A	4,097	Jun 2021
text-davinci-003	East US, West Europe	N/A	4,097	Jun 2021
code-davinci-002	East US, West Europe	N/A	8,001	Jun 2021

GPT-3 models

Model ID	Base model Regions	Fine-Tuning Regions	Max Request (tokens)	Training Data (up to)
ada	N/A	N/A	2,049	Oct 2019
text-ada-001	East US, South Central US, West Europe	N/A	2,049	Oct 2019
babbage	N/A	N/A	2,049	Oct 2019
text-babbage-001	East US, South Central US, West Europe	N/A	2,049	Oct 2019
curie	N/A	N/A	2,049	Oct 2019

Model ID	Base model Regions	Fine-Tuning Regions	Max Request (tokens)	Training Data (up to)
text-curie-001	East US, South Central US, West Europe	N/A	2,049	Oct 2019
davinci	N/A	N/A	2,049	Oct 2019
text-davinci-001	South Central US, West Europe	N/A		

Codex models

Model ID	Base model Regions	Fine-Tuning Regions	Max Request (tokens)	Training Data (up to)
code-cushman-001	South Central US, West Europe	N/A	2,048	

Embedding models

Model ID	Base model Regions	Fine-Tuning Regions	Max Request (tokens)	Training Data (up to)
text-similarity-ada-001	East US, South Central US, West Europe	N/A	2,046	Aug 2020
text-similarity-babbage-001	South Central US, West Europe	N/A	2,046	Aug 2020
text-similarity-curie-001	East US, South Central US, West Europe	N/A	2,046	Aug 2020
text-similarity-davinci-001	South Central US, West Europe	N/A	2,046	Aug 2020
text-search-ada-doc-001	South Central US, West Europe	N/A	2,046	Aug 2020
text-search-ada-query-001	South Central US, West Europe	N/A	2,046	Aug 2020
text-search-babbage-doc-001	South Central US, West Europe	N/A	2,046	Aug 2020
text-search-babbage-query-001	South Central US, West Europe	N/A	2,046	Aug 2020

Model ID	Base model Regions	Fine-Tuning Regions	Max Request (tokens)	Training Data (up to)
text-search-curie-doc-001	South Central US, West Europe	N/A	2,046	Aug 2020
text-search-curie-query-001	South Central US, West Europe	N/A	2,046	Aug 2020
text-search-davinci-doc-001	South Central US, West Europe	N/A	2,046	Aug 2020
text-search-davinci-query-001	South Central US, West Europe	N/A	2,046	Aug 2020
code-search-ada-code-001	South Central US, West Europe	N/A	2,046	Aug 2020
code-search-ada-text-001	South Central US, West Europe	N/A	2,046	Aug 2020
code-search-babbage-code-001	South Central US, West Europe	N/A	2,046	Aug 2020
code-search-babbage-text-001	South Central US, West Europe	N/A	2,046	Aug 2020

What's new in Azure OpenAI Service

Article • 07/27/2023

July 2023

Support for function calling

- [Azure OpenAI now supports function calling](#) to enable you to work with functions in the chat completions API.

Embedding input array increase

- Azure OpenAI now [supports arrays with up to 16 inputs](#) per API request with text-embedding-ada-002 Version 2.

New Regions

- Azure OpenAI is now also available in the Canada East, East US 2, Japan East, and North Central US regions. Check the [models page](#), for the latest information on model availability in each region.

June 2023

Use Azure OpenAI on your own data (preview)

- [Azure OpenAI on your data](#) is now available in preview, enabling you to chat with OpenAI models such as GPT-35-Turbo and GPT-4 and receive responses based on your data.

New versions of gpt-35-turbo and gpt-4 models

- gpt-35-turbo (version 0613)
- gpt-35-turbo-16k (version 0613)
- gpt-4 (version 0613)
- gpt-4-32k (version 0613)

UK South

- Azure OpenAI is now available in the UK South region. Check the [models page](#), for the latest information on model availability in each region.

Content filtering & annotations (Preview)

- How to [configure content filters](#) with Azure OpenAI Service.
- [Enable annotations](#) to view content filtering category and severity information as part of your GPT based Completion and Chat Completion calls.

Quota

- Quota provides the flexibility to actively [manage the allocation of rate limits across the deployments](#) within your subscription.

May 2023

Java & JavaScript SDK support

- NEW Azure OpenAI preview SDKs offering support for [JavaScript](#) and [Java](#).

Azure OpenAI Chat Completion General Availability (GA)

- General availability support for:
 - Chat Completion API version `2023-05-15`.
 - GPT-35-Turbo models.
 - GPT-4 model series. Due to high demand access to this model series is currently only available by request. To request access, existing Azure OpenAI customers can [apply by filling out this form ↗](#)

If you are currently using the `2023-03-15-preview` API, we recommend migrating to the GA `2023-05-15` API. If you are currently using API version `2022-12-01` this API remains GA, but does not include the latest Chat Completion capabilities.

Important

Using the current versions of the GPT-35-Turbo models with the completion endpoint remains in preview.

France Central

- Azure OpenAI is now available in the France Central region. Check the [models page](#), for the latest information on model availability in each region.

April 2023

- **DALL-E 2 public preview.** Azure OpenAI Service now supports image generation APIs powered by OpenAI's DALL-E 2 model. Get AI-generated images based on the descriptive text you provide. To learn more, check out the [quickstart](#). To request access, existing Azure OpenAI customers can [apply by filling out this form ↗](#).
- **Inactive deployments of customized models will now be deleted after 15 days; models will remain available for redeployment.** If a customized (fine-tuned) model is deployed for more than fifteen (15) days during which no completions or chat completions calls are made to it, the deployment will automatically be deleted (and no further hosting charges will be incurred for that deployment). The underlying customized model will remain available and can be redeployed at any time. To learn more check out the [how-to-article](#).

March 2023

- **GPT-4 series models are now available in preview on Azure OpenAI.** To request access, existing Azure OpenAI customers can [apply by filling out this form ↗](#). These models are currently available in the East US and South Central US regions.
- **New Chat Completion API for GPT-35-Turbo and GPT-4 models released in preview on 3/21.** To learn more checkout the [updated quickstarts](#) and [how-to article](#).
- **GPT-35-Turbo preview.** To learn more checkout the [how-to article](#).
- Increased training limits for fine-tuning: The max training job size (tokens in training file) x (# of epochs) is 2 Billion tokens for all models. We have also increased the max training job from 120 to 720 hours.
- Adding additional use cases to your existing access. Previously, the process for adding new use cases required customers to reapply to the service. Now, we're releasing a new process that allows you to quickly add new use cases to your use of the service. This process follows the established Limited Access process within Azure AI services. [Existing customers can attest to any and all new use cases here ↗](#). Please note that this is required anytime you would like to use the service for a new use case you did not originally apply for.

February 2023

New Features

- .NET SDK(inference) [preview release ↗](#) | [Samples ↗](#)
- [Terraform SDK update ↗](#) to support Azure OpenAI management operations.
- Inserting text at the end of a completion is now supported with the `suffix` parameter.

Updates

- Content filtering is on by default.

New articles on:

- [Monitoring an Azure OpenAI Service](#)
- [Plan and manage costs for Azure OpenAI](#)

New training course:

- [Intro to Azure OpenAI](#)

January 2023

New Features

- **Service GA.** Azure OpenAI Service is now generally available.
- **New models:** Addition of the latest text model, text-davinci-003 (East US, West Europe), text-ada-embeddings-002 (East US, South Central US, West Europe)

December 2022

New features

- **The latest models from OpenAI.** Azure OpenAI provides access to all the latest models including the GPT-3.5 series.
- **New API version (2022-12-01).** This update includes several requested enhancements including token usage information in the API response, improved

error messages for files, alignment with OpenAI on fine-tuning creation data structure, and support for the suffix parameter to allow custom naming of fine-tuned jobs.

- **Higher request per second limits.** 50 for non-Davinci models. 20 for Davinci models.
- **Faster fine-tune deployments.** Deploy an Ada and Curie fine-tuned models in under 10 minutes.
- **Higher training limits:** 40M training tokens for Ada, Babbage, and Curie. 10M for Davinci.
- **Process for requesting modifications to the abuse & miss-use data logging & human review.** Today, the service logs request/response data for the purposes of abuse and misuse detection to ensure that these powerful models aren't abused. However, many customers have strict data privacy and security requirements that require greater control over their data. To support these use cases, we're releasing a new process for customers to modify the content filtering policies or turn off the abuse logging for low-risk use cases. This process follows the established Limited Access process within Azure AI services and [existing OpenAI customers can apply here ↗](#).
- **Customer managed key (CMK) encryption.** CMK provides customers greater control over managing their data in Azure OpenAI by providing their own encryption keys used for storing training data and customized models. Customer-managed keys (CMK), also known as bring your own key (BYOK), offer greater flexibility to create, rotate, disable, and revoke access controls. You can also audit the encryption keys used to protect your data. [Learn more from our encryption at rest documentation](#).
- **Lockbox support**
- **SOC-2 compliance**
- **Logging and diagnostics** through Azure Resource Health, Cost Analysis, and Metrics & Diagnostic settings.
- **Studio improvements.** Numerous usability improvements to the Studio workflow including Azure AD role support to control who in the team has access to create fine-tuned models and deploy.

Changes (breaking)

Fine-tuning create API request has been updated to match OpenAI's schema.

Preview API versions:

JSON

```
{  
    "training_file": "file-XGinujblHPwGLSztz8cPS8XY",  
    "hyperparams": {  
        "batch_size": 4,  
        "learning_rate_multiplier": 0.1,  
        "n_epochs": 4,  
        "prompt_loss_weight": 0.1,  
    }  
}
```

API version 2022-12-01:

JSON

```
{  
    "training_file": "file-XGinujblHPwGLSztz8cPS8XY",  
    "batch_size": 4,  
    "learning_rate_multiplier": 0.1,  
    "n_epochs": 4,  
    "prompt_loss_weight": 0.1,  
}
```

Content filtering is temporarily off by default. Azure content moderation works differently than OpenAI. Azure OpenAI runs content filters during the generation call to detect harmful or abusive content and filters them from the response. [Learn More](#)

These models will be re-enabled in Q1 2023 and be on by default.

Customer actions

- [Contact Azure Support](#) if you would like these turned on for your subscription.
- [Apply for filtering modifications](#), if you would like to have them remain off. (This option will be for low-risk use cases only.)

Next steps

Learn more about the [underlying models that power Azure OpenAI](#).

Azure OpenAI Service frequently asked questions

FAQ

If you can't find answers to your questions in this document, and still need help check the [Azure AI services support options guide](#). Azure OpenAI is part of Azure AI services.

Data and Privacy

Do you use my company data to train any of the models?

Azure OpenAI doesn't use customer data to retrain models. For more information, see the [Azure OpenAI data, privacy, and security guide](#).

General

Does Azure OpenAI support GPT-4?

Azure OpenAI supports the latest GPT-4 models. These models are currently only available by request. For access, existing Azure OpenAI customers can [apply by filling out this form](#).

How do the capabilities of Azure OpenAI compare to OpenAI?

Azure OpenAI Service gives customers advanced language AI with OpenAI GPT-3, Codex, and DALL-E models with the security and enterprise promise of Azure. Azure OpenAI co-develops the APIs with OpenAI, ensuring compatibility and a smooth transition from one to the other.

With Azure OpenAI, customers get the security capabilities of Microsoft Azure while running the same models as OpenAI.

Does Azure OpenAI support VNETs and Private Endpoints?

Yes, as part of Azure AI services, Azure OpenAI supports VNETs and Private Endpoints. To learn more consult the [Azure AI services virtual networking guidance](#)

Do the GPT-4 models currently support image input?

No, GPT-4 is designed by OpenAI to be multimodal, but currently only text input and output are supported.

How do I apply for new use cases?

Previously, the process for adding new use cases required customers to reapply to the service. Now, we're releasing a new process that allows you to quickly add new use cases to your use of the service. This process follows the established Limited Access process within Azure AI services. [Existing customers can attest to any and all new use cases here ↗](#). Please note that this is required anytime you would like to use the service for a new use case you did not originally apply for.

I am trying to use embeddings and received the error "InvalidRequestError: Too many inputs. The max number of inputs is 1." How do I fix this?

This error typically occurs when you try to send a batch of text to embed in a single API request as an array. Currently Azure OpenAI only supports arrays of embeddings with multiple inputs for the `text-embedding-ada-002` Version 2 model. This model version supports an array consisting of up to 16 inputs per API request. The array can be up to 8191 tokens in length when using the `text-embedding-ada-002` (Version 2) model.

Where can I read about better ways to use Azure OpenAI to get the responses I want from the service?

Check out our [introduction to prompt engineering](#) While these models are extremely powerful, their behavior is also very sensitive to the prompts they receive from the user. This makes prompt construction an important skill to develop. After you've mastered the introduction, check out our article on more [advanced prompt engineering techniques](#).

My guest account has been given access to an Azure OpenAI resource, but I am unable to access that resource in the Azure OpenAI Studio. How do I enable access?

This is expected behavior when using the default sign-in experience for the [Azure OpenAI Studio](#).

To access Azure OpenAI Studio from a guest account that has been granted access to an Azure OpenAI resource:

1. Open a private browser session and then navigate to <https://oai.azure.com>.
2. Rather than immediately entering your guest account credentials instead select **Sign-in options**
3. Now select **Sign in to an organization**
4. Enter the domain name of the organization that granted your guest account access to the Azure OpenAI resource.
5. Now sign-in with your guest account credentials.

You should now be able to access the resource via the Azure OpenAI Studio.

Alternatively if you are signed into the [Azure portal](#) from the Azure OpenAI resource's Overview pane you can select **Go to Azure OpenAI Studio** to automatically sign in with the appropriate organizational context.

Getting access to Azure OpenAI Service

How do I get access to Azure OpenAI?

Access is currently limited as we navigate high demand, upcoming product improvements, and Microsoft's commitment to responsible AI. For now, we're working with customers with an existing partnership with Microsoft, lower risk use cases, and those committed to incorporating mitigations. In addition to applying for initial access, all solutions using Azure OpenAI are required to go through a use case review before they can be released for production use. Apply here for initial access or for a production review: [Apply now](#)

After I apply for access, how long will I have to wait to get approved?

We don't currently provide a timeline for access approval.

Learning more and where to ask questions

Where can I read about the latest updates to Azure OpenAI?

For monthly updates, see our [what's new page](#).

Where can I get training to get started learning and build my skills around Azure OpenAI?

Check out our [introduction to Azure OpenAI training course](#).

Where can I post questions and see answers to other common questions?

- We recommend posting questions on [Microsoft Q&A](#)
- Alternatively, you can post questions on [Stack Overflow ↗](#)

Where do I go for Azure OpenAI customer support?

Azure OpenAI is part of Azure AI services. You can learn about all the support options for Azure AI services in the [support and help options guide](#).

Models and fine-tuning

What models are available?

Consult the Azure OpenAI [model availability guide](#).

Where can I find out what region a model is available in?

Consult the Azure OpenAI [model availability guide](#) for region availability.

What is the difference between a base model and a fine-tuned model?

A base model is a model that hasn't been customized or fine-tuned for a specific use case. Fine-tuned models are customized versions of base models where a model's weights are trained on a unique set of prompts. Fine-tuned models let you achieve better results on a wider number of tasks without needing to provide detailed examples for in-context learning as part of your completion prompt. To learn more, review our [fine-tuning guide](#).

What is the maximum number of fine-tuned models I can create?

100

What are the SLAs for API responses in Azure OpenAI?

We don't have a defined API response time Service Level Agreement (SLA) at this time. For more information about the SLA for Azure OpenAI Service, consult the [Service Level Agreements \(SLA\) for Online Services page](#).

Why was my fine-tuned model deployment deleted?

If a customized (fine-tuned) model is deployed for more than fifteen (15) days during which no completions or chat completions calls are made to it, the deployment will automatically be deleted (and no further hosting charges will be incurred for that deployment). The underlying customized model will remain available and can be redeployed at any time. To learn more check out the [how-to-article](#).

How do I deploy a model with the REST API?

There are currently two different REST APIs that allow model deployment. For the latest model deployment features such as the ability to specify a model version during deployment for models like text-embedding-ada-002 Version 2, use the [Deployments - Create Or Update](#) REST API call.

Can I use quota to increase the max token limit of a model?

No, quota Tokens-Per-Minute (TPM) allocation is not related to the max input token limit of a model. Model input token limits are defined in the [models table](#) and are not impacted by changes made to TPM.

Web app

How can I customize my published web app?

You can customize your published web app in the Azure portal. The source code for the published web app is [available on GitHub](#), where you can find information on changing the app frontend, as well as instructions for building and deploying the app.

Will my web app be overwritten when I deploy the app again from the Azure AI Studio?

Your app code will not be overwritten when you update your app. The app will be updated to use the Azure OpenAI resource, Azure Cognitive Search index (if you're using Azure OpenAI on your data), and model settings selected in the Azure OpenAI Studio without any change to the appearance or functionality.

Using your data

What is Azure OpenAI on your data?

Azure OpenAI on your data is a feature of the Azure OpenAI Services that helps organizations to generate customized insights, content, and searches using their designated data sources. It works with the capabilities of the OpenAI models in Azure OpenAI to provide more accurate and relevant responses to user queries in natural language. Azure OpenAI on your data can be integrated with customer's existing applications and workflows, offers insights into key performance indicators, and can interact with users seamlessly.

How can I access Azure OpenAI on your data?

All Azure OpenAI customers can use Azure OpenAI on your data via the Azure AI studio and Rest API.

What data sources does Azure OpenAI on your data support?

Azure OpenAI on your data supports ingestion from Azure Cognitive Search, Azure Blob Storage, and uploading local files. You can learn more about Azure OpenAI on your data from the [conceptual article](#) and [quickstart](#).

How much does it cost to use Azure OpenAI on your data?

When using Azure OpenAI on your data, you incur costs when you use Azure Cognitive Search, Azure Blob Storage, Azure Web App Service, semantic search and OpenAI models. There is no additional cost for using the "your data" feature in the Azure AI Studio.

How can I customize or automate the index creation process?

You can prepare the index yourself using a [script provided on GitHub](#). Using this script will create an Azure Cognitive Search index with all the information needed to better leverage your data, with your documents broken down into manageable chunks. Please see the [README file](#) with the data preparation code for details on how to run it.

How can I update my index?

You can upload additional data to your Azure Blob Container and use it as your data source when you create a new index. The new index will include all of the data in your container.

What file types does Azure OpenAI on your data support?

See [Using your data](#) for more information on supported file types.

Is responsible AI supported by Azure OpenAI on your data?

Yes, [Azure OpenAI on your data](#) is part of the Azure OpenAI Service and works with the [models](#) available in Azure OpenAI. The [content filtering](#) and abuse monitoring features of Azure OpenAI still apply. For more information, see the [overview of Responsible AI practices for Azure OpenAI models](#) and the [Transparency Note for Azure OpenAI](#) for additional guidance on using Azure OpenAI on your data responsibly.

Is there a token limit on the system message?

Yes, the token limit on the system message is 200. If the system message is more than 200 tokens, the rest of the tokens beyond the first 200 will be ignored.

Do the query language and the data source language need to be the same?

You must send queries in the same language of your data. Your data can be in any of the languages supported by [Azure Cognitive Search](#).

If Semantic Search is enabled for my Azure Cognitive Search resource, will it be automatically applied to Azure OpenAI on your data in the Azure OpenAI Studio?

When you select "Azure Cognitive Search" as the data source, you can choose to apply semantic search. If you select "Azure Blob Container" or "Upload files" as the data source, you can create the index as usual. Afterwards you would re-ingest the data using the "Azure Cognitive Search" option to select the same index and apply Semantic Search. You will then be ready to chat on your data with semantic search applied.

Next steps

- [Azure OpenAI quotas and limits](#)
- [Azure OpenAI what's new](#)
- [Azure OpenAI quickstarts](#)

Quickstart: Get started generating text using Azure OpenAI Service

Article • 07/18/2023

Use this article to get started making your first calls to Azure OpenAI.

Prerequisites

- An Azure subscription - [Create one for free ↗](#).
- Access granted to Azure OpenAI in the desired Azure subscription.

Currently, access to this service is granted only by application. You can apply for access to Azure OpenAI by completing the form at <https://aka.ms/oai/access> ↗ . Open an issue on this repo to contact us if you have an issue.

- An Azure OpenAI resource with a model deployed. For more information about model deployment, see the [resource deployment guide](#).

I ran into an issue with the prerequisites.

Go to the Azure OpenAI Studio

Navigate to Azure OpenAI Studio at <https://oai.azure.com/> ↗ and sign-in with credentials that have access to your OpenAI resource. During or after the sign-in workflow, select the appropriate directory, Azure subscription, and Azure OpenAI resource.

From the Azure OpenAI Studio landing page navigate further to explore examples for prompt completion, manage your deployments and models, and find learning resources such as documentation and community forums.

Get started with Azure OpenAI Service

Get example prompts for different scenarios and write prompts of your own. Export your prompts to code at any time to rapidly iterate at scale and integrate with your apps.

Try the playgrounds

Get example prompts for different scenarios and write prompts of your own. Export your prompts to code at any time to rapidly iterate at scale and integrate with your apps.

GPT-3 Playground **ChatGPT playground (Preview)**

Explore examples for prompt completion



Summarize Text
Summarize text by adding a 'tl;dr' to the end of a text passage.
[Learn more](#)



Classify Text
Classify items into categories provided at inference time.
[Learn more](#)



Natural Language to SQL
Translate natural language to SQL queries.
[Learn more](#)



Generate New Product Names
Create product names from examples words.
[Learn more](#)

+ 

Go to the [Playground](#) for experimentation and fine-tuning workflow.

Playground

Start exploring Azure OpenAI capabilities with a no-code approach through the GPT-3 Playground. It's simply a text box where you can submit a prompt to generate a completion. From this page, you can quickly iterate and experiment with the capabilities.

Cognitive Services | Azure OpenAI Studio

Azure OpenAI Studio > GPT-3 playground

Privacy & cookies

GPT-3 playground

Deployments Examples

text-davinci-002 Load an example View code

Start typing here

Parameters

Temperature: 1

Max length (tokens): 100

Stop sequences

Top probabilities: 0.5

Frequency penalty: 0

Presence penalty: 0

Best of: 1

Pre-response text

Post-response text

Learn more

Generate Undo Regenerate Tokens: 0

You can select a deployment and choose from a few pre-loaded examples to get started. If your resource doesn't have a deployment, select **Create a deployment** and follow the instructions provided by the wizard. For more information about model deployment, see the [resource deployment guide](#).

You can experiment with the configuration settings such as temperature and pre-response text to improve the performance of your task. You can read more about each parameter in the [REST API](#).

- Selecting the **Generate** button will send the entered text to the completions API and stream the results back to the text box.
- Select the **Undo** button to undo the prior generation call.
- Select the **Regenerate** button to complete an undo and generation call together.

Azure OpenAI also performs content moderation on the prompt inputs and generated outputs. The prompts or responses may be filtered if harmful content is detected. For more information, see the [content filter](#) article.

In the GPT-3 playground you can also view Python and curl code samples pre-filled according to your selected settings. Just select **View code** next to the examples dropdown. You can write an application to complete the same task with the OpenAI Python SDK, curl, or other REST API client.

Try text summarization

To use the Azure OpenAI for text summarization in the GPT-3 Playground, follow these steps:

1. Sign in to [Azure OpenAI Studio](#).
2. Select the subscription and OpenAI resource to work with.
3. Select **GPT-3 Playground** at the top of the landing page.
4. Select your deployment from the **Deployments** dropdown. If your resource doesn't have a deployment, select **Create a deployment** and then revisit this step.
5. Select **Summarize Text** from the **Examples** dropdown.

GPT-3 playground

Deployments

text-davinci-002

Examples

Summarize Text

[View code](#)

A neutron star is the collapsed core of a massive supergiant star, which had a total mass of between 10 and 25 solar masses, possibly more if the star was especially metal-rich.[1] Neutron stars are the smallest and densest stellar objects, excluding black holes and hypothetical white holes, quark stars, and strange stars.[2] Neutron stars have a radius on the order of 10 kilometres (6.2 mi) and a mass of about 1.4 solar masses.[3] They result from the supernova explosion of a massive star, combined with gravitational collapse, that compresses the core past white dwarf star density to that of atomic nuclei.

Tl;dr:

A neutron star is the collapsed core of a supergiant star. These incredibly dense objects are incredibly fascinating due to their strange properties and their potential for phenomena such as extreme gravitational forces and a strong magnetic field.

[Generate](#)

[Undo](#)

[Regenerate](#)

Tokens: 189 [i](#)



6. Select [Generate](#). Azure OpenAI will attempt to capture the context of text and rephrase it succinctly. You should get a result that resembles the following text:

Tl;dr A neutron star is the collapsed core of a supergiant star. These incredibly dense objects are incredibly fascinating due to their strange properties and their potential for phenomena such as extreme gravitational forces and a strong magnetic field.

The accuracy of the response can vary per model. The Davinci based model in this example is well-suited to this type of summarization, whereas a Codex based model wouldn't perform as well at this particular task.

[I ran into an issue with the playground.](#)

Clean up resources

If you want to clean up and remove an OpenAI resource, you can delete the resource or resource group. Deleting the resource group also deletes any other resources associated with it.

- [Portal](#)
- [Azure CLI](#)

Next steps

- Learn more about how to generate the best completion in our [How-to guide on completions](#).
- For more examples check out the [Azure OpenAI Samples GitHub repository ↗](#).

Quickstart: Get started using GPT-35-Turbo and GPT-4 with Azure OpenAI Service

Article • 07/18/2023

Use this article to get started using Azure OpenAI.

Prerequisites

- An Azure subscription - [Create one for free](#).
- Access granted to Azure OpenAI in the desired Azure subscription.

Currently, access to this service is granted only by application. You can apply for access to Azure OpenAI by completing the form at <https://aka.ms/oai/access>. Open an issue on this repo to contact us if you have an issue.

- An Azure OpenAI Service resource with either the `gpt-35-turbo` or the `gpt-4`¹ models deployed. For more information about model deployment, see the [resource deployment guide](#).

¹ GPT-4 models are currently only available by request. To access these models, existing Azure OpenAI customers can [apply for access by filling out this form](#).

I ran into an issue with the prerequisites.

Go to Azure OpenAI Studio

Navigate to Azure OpenAI Studio at <https://oai.azure.com/> and sign-in with credentials that have access to your OpenAI resource. During or after the sign-in workflow, select the appropriate directory, Azure subscription, and Azure OpenAI resource.

From the Azure OpenAI Studio landing page, select **Chat playground**.

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Try the playgrounds

Get example prompts for different scenarios and write prompts of your own. Export your prompts to code at any time to rapidly iterate at scale and integrate with your apps.

[GPT-3 Playground](#) [ChatGPT playground \(Preview\)](#)

Explore examples for prompt completion



Summarize Text
Summarize text by adding a 'tl;dr' to the end of a text passage.
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Classify Text
Classify items into categories provided at inference time.
[Learn more](#)



Natural Language to SQL
Translate natural language to SQL queries.
[Learn more](#)



Generate New Product Names
Create product names from examples words.
[Learn more](#)

[+ Add example](#)

Playground

Start exploring OpenAI capabilities with a no-code approach through the Azure OpenAI Studio Chat playground. From this page, you can quickly iterate and experiment with the capabilities.

Chat playground (Preview)

[Show panels](#)

Assistant setup

Empty Example

[Save changes](#) [View code](#)

System message 

[Add few-shot examples](#)

Chat session

Clear chat Show raw JSON

Start chatting
Test your assistant by sending queries below. Then adjust your assistant setup to improve the assistant's responses.

Type user query here. (Ctrl + Enter for new line) [Send](#)

Parameters

Deployments
gpt-35-turbo

Max response 800

Temperature 0.5

Top P 0.95

Stop sequence
[Stop sequences](#) [Learn more](#)

Session settings

Past messages included 10

Current token count 801/4000

Assistant setup

You can use the **Assistant setup** dropdown to select a few pre-loaded **System message** examples to get started.

System messages give the model instructions about how it should behave and any context it should reference when generating a response. You can describe the assistant's personality, tell it what it should and shouldn't answer, and tell it how to format responses.

Add few-shot examples allows you to provide conversational examples that are used by the model for [in-context learning](#).

At any time while using the Chat playground you can select **View code** to see Python, curl, and json code samples pre-populated based on your current chat session and settings selections. You can then take this code and write an application to complete the same task you're currently performing with the playground.

Chat session

Selecting the **Send** button sends the entered text to the completions API and the results are returned back to the text box.

Select the **Clear chat** button to delete the current conversation history.

Settings

Name	Description
Deployments	Your deployment name that is associated with a specific model.
Temperature	Controls randomness. Lowering the temperature means that the model produces more repetitive and deterministic responses. Increasing the temperature results in more unexpected or creative responses. Try adjusting temperature or Top P but not both.
Max length (tokens)	Set a limit on the number of tokens per model response. The API supports a maximum of 4096 tokens shared between the prompt (including system message, examples, message history, and user query) and the model's response. One token is roughly four characters for typical English text.
Top probabilities	Similar to temperature, this controls randomness but uses a different method. Lowering Top P narrows the model's token selection to likelier tokens. Increasing Top P lets the model choose from tokens with both high and low likelihood. Try adjusting temperature or Top P but not both.
Multi-turn conversations	Select the number of past messages to include in each new API request. This helps give the model context for new user queries. Setting this number to 10

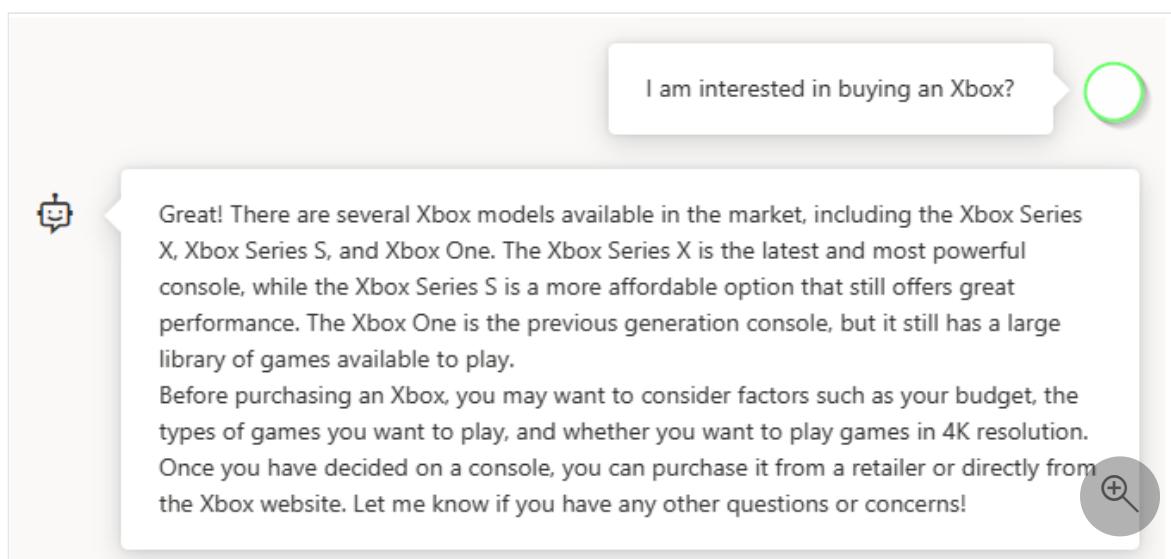
Name	Description
	results in five user queries and five system responses.
Stop sequences	Stop sequence make the model end its response at a desired point. The model response ends before the specified sequence, so it won't contain the stop sequence text. For GPT-35-Turbo, using < im_end > ensures that the model response doesn't generate a follow-up user query. You can include as many as four stop sequences.

Show panels

By default there are three panels: assistant setup, chat session, and settings. **Show panels** allows you to add, remove, and rearrange the panels. If you ever close a panel and need to get it back, use **Show panels** to restore the lost panel.

Start a chat session

1. From the assistant setup drop-down, select **Xbox customer support agent**
2. You'll be prompted asking if you want to update the system message, select **Continue**.
3. In the chat session pane, enter the following question: "I'm interested in buying a new Xbox", and select **Send**.
4. You'll receive a response similar to:



5. Enter a follow-up question like: "which models support 4K?"

Which models are 4K?



Both the Xbox Series X and Xbox One X support 4K resolution gaming. The Xbox Series S, on the other hand, supports up to 1440p resolution gaming, but it can upscale games to 4K. It's worth noting that in order to take advantage of 4K gaming, you'll need a 4K TV or monitor that supports HDR (High Dynamic Range) and HDMI 2.0 or higher.



6. Now that you have a basic conversation select **View code** from under **Assistant setup** and you'll have a replay of the code behind the entire conversation so far:

Python

```
#Note: The openai-python library support for Azure OpenAI is in preview.
import os
import openai
openai.api_type = "azure"
openai.api_base = "https://docs-test-001.openai.azure.com/"
openai.api_version = "2023-05-15"
openai.api_key = os.getenv("OPENAI_API_KEY")

response = openai.ChatCompletion.create(
    engine="gpt-35-turbo", # replace this value with the deployment name you
    chose when you deployed the associated model.
    messages = [{"role":"system","content":"You are an Xbox customer support
agent whose primary goal is to help users with issues they are experiencing
with their Xbox devices. You are friendly and concise. You only provide
factual answers to queries, and do not provide answers that are not related
to Xbox."}, {"role":"user","content":"How much is a PS5?"}, {"role":"assistant","content":"I apologize, but I do not have information
about the prices of other gaming devices such as the PS5. My primary focus
is to assist with issues regarding Xbox devices. Is there a specific issue
you are having with your Xbox device that I may be able to help with?"}, {"role":"user","content":"I am interested in buying an Xbox?"}, {"role":"assistant","content":"Great! There are several Xbox models
available in the market, including the Xbox Series X, Xbox Series S, and
Xbox One. The Xbox Series X is the latest and most powerful console, while
the Xbox Series S is a more affordable option that still offers great
performance. The Xbox One is the previous generation console, but it still
has a large library of games available to play.\n\nBefore purchasing an
Xbox, you may want to consider factors such as your budget, the types of
games you want to play, and whether you want to play games in 4K resolution.
Once you have decided on a console, you can purchase it from a retailer or
directly from the Xbox website. Let me know if you have any other questions
or concerns!"}, {"role":"user","content":"Which models are 4K?"}, {"role":"assistant","content":"Both the Xbox Series X and Xbox One X support
4K resolution gaming. The Xbox Series S, on the other hand, supports up to
1440p resolution gaming, but it can upscale games to 4K. It's worth noting
that in order to take advantage of 4K gaming, you'll need a 4K TV or monitor
that supports HDR (High Dynamic Range) and HDMI 2.0 or higher."}], temperature=0,
```

```
max_tokens=350,  
top_p=0.95,  
frequency_penalty=0,  
presence_penalty=0,  
stop=None)
```

I ran into an issue with the playground.

Understanding the prompt structure

If you examine the sample from [View code](#) you'll notice some unique tokens that weren't part of a typical GPT completion call. GPT-35-Turbo was trained to use special tokens to delineate different parts of the prompt. Content is provided to the model in between `<|im_start|>` and `<|im_end|>` tokens. The prompt begins with a system message that can be used to prime the model by including context or instructions for the model. After that, the prompt contains a series of messages between the user and the assistant.

The assistant's response to the prompt will then be returned below the `<|im_start|>assistant` token and will end with `<|im_end|>` denoting that the assistant has finished its response. You can also use the [Show raw syntax](#) toggle button to display these tokens within the chat session panel.

The [GPT-35-Turbo & GPT-4 how-to guide](#) provides an in-depth introduction into the new prompt structure and how to use the `gpt-35-turbo` model effectively.

Deploy a web app

Once you're satisfied with the experience in Azure OpenAI studio, you can deploy a web app directly from the Studio by selecting the [Deploy to](#) button.

The screenshot shows the Azure AI Chat playground interface. At the top right, there are links for 'Privacy & cookies' and 'Deploy to...'. Below these are buttons for 'Import setup', 'Export setup', and 'Show panels'. The main area has two sections: 'Chat session' on the left and 'Configuration' on the right. The 'Configuration' section is expanded, showing tabs for 'Deployment' (which is selected) and 'Parameters'. Under 'Deployment', a dropdown menu is open with 'my-deployment' selected. Below this, there's a 'Session settings' section with a search icon and a message count of '10'. A note says 'Past messages included'.

The first time you deploy a web app, you should select **Create a new web app**. Choose a name for the app, which will become part of the app URL. For example,

<https://<appname>.azurewebsites.net>.

Select your subscription, resource group, location, and pricing plan for the published app. To update an existing app, select **Publish to an existing web app** and choose the name of your previous app from the dropdown menu.

I ran into an issue with the web app.

Clean up resources

Once you're done testing out the Chat playground, if you want to clean up and remove an OpenAI resource, you can delete the resource or resource group. Deleting the resource group also deletes any other resources associated with it.

- [Portal](#)
- [Azure CLI](#)

Next steps

- Learn more about how to work with the new `gpt-35-turbo` model with the [GPT-35-Turbo & GPT-4 how-to guide](#).
- For more examples check out the [Azure OpenAI Samples GitHub repository](#)

Quickstart: Get started generating images using Azure OpenAI Service

Article • 07/18/2023

Use this guide to get started generating images with Azure OpenAI in your browser.

ⓘ Note

The image generation API creates an image from a text prompt. It does not edit existing images or create variations.

Prerequisites

- An Azure subscription - [Create one for free ↗](#).
- Access granted to DALL-E in the desired Azure subscription. Currently, access to this service is granted only by application. You can apply for access to Azure OpenAI by completing the form at [https://aka.ms/oai/access ↗](https://aka.ms/oai/access). Existing Azure OpenAI customers need to re-enter the form to get access to DALL-E. Open an issue on this repo to contact us if you have an issue.
- An Azure OpenAI resource created in the East US region. For more information about model deployment, see the [resource deployment guide](#).

Go to the Azure OpenAI Studio

Navigate to Azure OpenAI Studio at <https://oai.azure.com/> ↗ and sign in with the credentials associated with your OpenAI resource. During or after the sign-in workflow, select the appropriate directory, Azure subscription, and Azure OpenAI resource.

From the Azure OpenAI Studio landing page, select **DALL-E 2 playground** to use the image generation APIs.

Try out image generation

Start exploring Azure OpenAI capabilities with a no-code approach through the DALL-E 2 playground. Enter your image prompt into the text box and select **Generate**. When the AI-generated image is ready, it will appear on the page.

⚠ Note

The image generation APIs come with a content moderation filter. If the service recognizes your prompt as harmful content, it won't return a generated image. For more information, see the [content filter guide](#).

The screenshot shows the Azure OpenAI Studio interface. On the left, there's a sidebar with 'Azure OpenAI' at the top, followed by 'Playground' (which is selected), 'Completions', 'DALL-E 2' (which is also selected), and 'Chat'. Below 'Playground' are 'Management' sections for 'Deployments', 'Models', and 'File Management'. The main content area is titled 'DALL-E 2 playground' under 'Playground'. It features a search bar with 'Search' and 'Medium tiles' dropdown, a 'View code' button, and a 'Prompt' input field containing 'watercolor painting of the Seattle skyline'. A large blue 'Generate' button is to the right of the prompt. Below the input is a generated image of a watercolor painting of the Seattle skyline, with the same prompt text underneath it. At the bottom of the image preview are five small icons: a file, a refresh, a download, a copy, and a delete. To the right of the image is a circular button with a plus sign.

In the DALL-E 2 playground, you can also view Python and cURL code samples, which are pre-filled according to your settings. Select **View code** near the top of the page. You can use this code to write an application that completes the same task.

Clean up resources

If you want to clean up and remove an OpenAI resource, you can delete the resource or resource group. Deleting the resource group also deletes any other resources associated with it.

- [Portal](#)
- [Azure CLI](#)

Next steps

- [Azure OpenAI Overview](#)

- For more examples check out the [Azure OpenAI Samples GitHub repository](#).

Quickstart: Chat with Azure OpenAI models using your own data

Article • 07/18/2023

In this quickstart you can use your own data with Azure OpenAI models. Using Azure OpenAI's models on your data can provide you with a powerful conversational AI platform that enables faster and more accurate communication.

Prerequisites

- An Azure subscription - [Create one for free](#).
- Access granted to Azure OpenAI in the desired Azure subscription.

Azure OpenAI requires registration and is currently only available to approved enterprise customers and partners. [See Limited access to Azure OpenAI Service](#) for more information. You can apply for access to Azure OpenAI by completing the form at <https://aka.ms/oai/access>. Open an issue on this repo to contact us if you have an issue.
- An Azure OpenAI resource with a chat model deployed (for example, GPT-3 or GPT-4). For more information about model deployment, see the [resource deployment guide](#).
- Be sure that you are assigned at least the [Cognitive Services OpenAI Contributor](#) role for the Azure OpenAI resource.

I ran into an issue with the prerequisites.

Add your data using Azure OpenAI Studio

Navigate to [Azure OpenAI Studio](#) and sign-in with credentials that have access to your Azure OpenAI resource. During or after the sign-in workflow, select the appropriate directory, Azure subscription, and Azure OpenAI resource.

1. Select the [Chat playground](#) tile.

Azure AI Studio

Welcome to Azure OpenAI service

Explore the generative AI models, craft unique prompts for your use cases, and fine-tune select models.

Get started

Text generation

Image generation

Chat playground

Design a customized AI assistant using ChatGPT. Experiment with GPT-3.5-Turbo and GPT-4 models.

Try it now

Completions playground

Experiment with completions models for use cases such as summarization, content generation, and classification.

Try it now

DALL-E playground PREVIEW

Generate unique images by writing descriptions in natural language.

Try it now

2. On the Assistant setup tile, select Add your data (preview) > + Add a data source.

Azure AI Studio > Chat playground

Chat playground

Assistant setup

System message Add your data (preview)

Ask questions about your own data. Your data is stored securely in your Azure subscription. [Learn more about how your data is protected.](#)

+ Add a data source

Chat session

Clear chat View code Show raw JSON

Start chatting

Test your assistant by sending queries below. Then adjust your assistant setup to improve the assistant's responses.

Configuration

Deployment Parameters

Deployment * 35-turbo-test

Session settings

Past messages included 10

Current token count 1/4000

Input tokens progress indicator

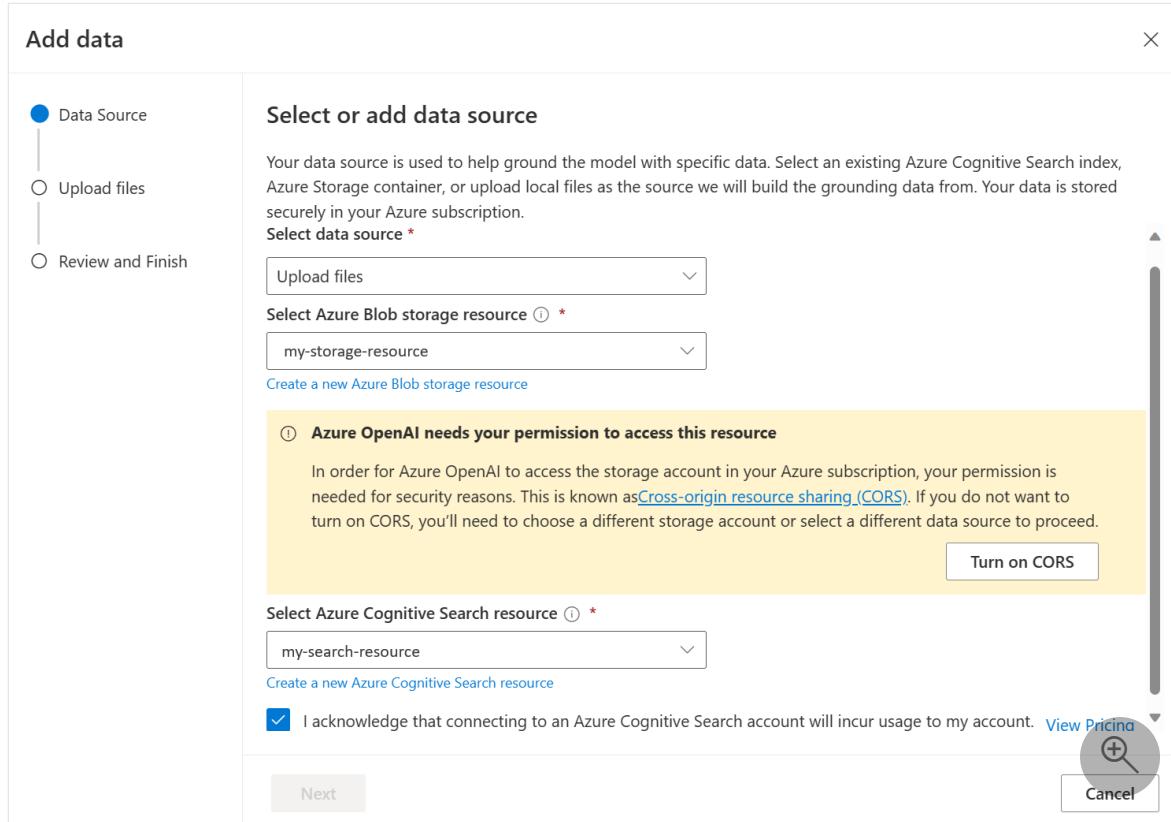
3. In the pane that appears, select Upload files under Select data source. Select Upload files. Azure OpenAI needs both a storage resource and a search resource to access and index your data.

💡 Tip

- For a list of supported data sources, see [Data source options](#)
- For documents and datasets with long text, we recommend using the available [data preparation script](#).

- a. For Azure OpenAI to access your storage account, you will need to turn on [Cross-origin resource sharing \(CORS\)](#). If CORS isn't already turned on for the Azure Blob storage resource, select [Turn on CORS](#).

- b. Select your Azure Cognitive Search resource, and select the acknowledgment that connecting it will incur usage on your account. Then select **Next**.



4. On the **Upload files** pane, select **Browse for a file** and select the files you want to upload. Then select **Upload files**. Then select **Next**.

5. Review the details you entered, and select **Save and close**. You can now chat with the model and it will use information from your data to construct the response.

I ran into an issue adding my data.

Chat playground

Start exploring Azure OpenAI capabilities with a no-code approach through the chat playground. It's simply a text box where you can submit a prompt to generate a completion. From this page, you can quickly iterate and experiment with the capabilities.

The screenshot shows the Azure AI Studio interface with the 'Chat' tab selected. On the left, there's a sidebar with 'Playground' and 'Management' sections. The main area has three panels: 'Assistant setup' (with 'Add your data (preview)' selected), 'Chat session' (with a 'Start chatting' button and a message input field), and 'Configuration' (with 'Deployment' set to '35-turbo-test'). A large search icon is on the right.

You can experiment with the configuration settings such as temperature and pre-response text to improve the performance of your task. You can read more about each parameter in the [REST API](#).

- Selecting the **Generate** button will send the entered text to the completions API and stream the results back to the text box.
- Select the **Undo** button to undo the prior generation call.
- Select the **Regenerate** button to complete an undo and generation call together.

Deploy a web app

Once you're satisfied with the experience in Azure OpenAI studio, you can deploy a web app directly from the Studio by selecting the **Deploy to** button.

This screenshot shows the 'Chat session' and 'Configuration' panels. The 'Deploy to...' button in the top right is highlighted with a red box. The 'Configuration' panel shows 'Deployment' set to 'my-deployment'.

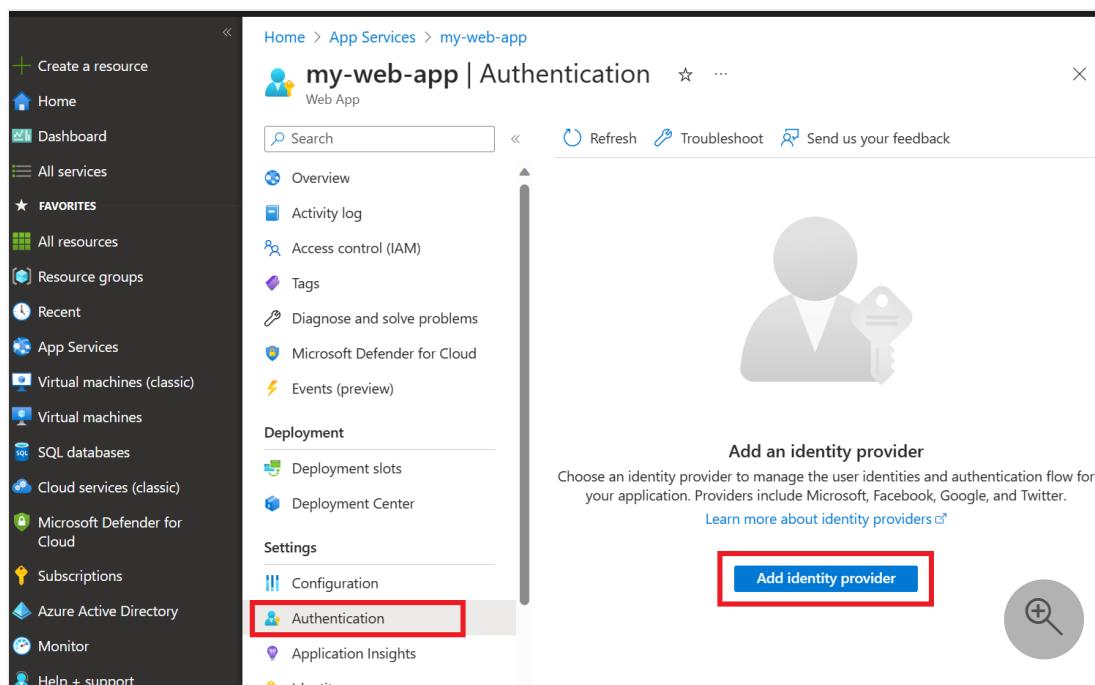
The first time you deploy a web app, you should select **Create a new web app**. Choose a name for the app, which will become part of the app URL. For example, <https://<appname>.azurewebsites.net>.

Select your subscription, resource group, location, and pricing plan for the published app. To update an existing app, select **Publish to an existing web app** and choose the name of your previous app from the dropdown menu.

I ran into an issue with the web app.

Important considerations

- Publishing creates an Azure App Service in your subscription. It may incur costs depending on the [pricing plan](#) you select. When you're done with your app, you can delete it from the Azure portal.
- You can [customize](#) the frontend and backend logic of the web app.
- By default, the app will only be accessible to you. To add authentication (for example, restrict access to the app to members of your Azure tenant):
 1. Go to the [Azure portal](#) and search for the app name you specified during publishing. Select the web app, and go to the **Authentication** tab on the left navigation menu. Then select **Add an identity provider**.



2. Select Microsoft as the identity provider. The default settings on this page will restrict the app to your tenant only, so you don't need to change anything else here. Then select **Add**

Now users will be asked to sign in with their Azure Active Directory account to be able to access your app. You can follow a similar process to add another identity provider if you prefer. The app doesn't use the user's login information in any other way other than verifying they are a member of your tenant.

Clean up resources

If you want to clean up and remove an OpenAI or Azure Cognitive Search resource, you can delete the resource or resource group. Deleting the resource group also deletes any other resources associated with it.

- [Azure AI services resources](#)
- [Azure Cognitive Search resources](#)
- [Azure app service resources](#)

Next steps

- Learn more about [using your data in Azure OpenAI Service](#)
- [Chat app sample code on GitHub](#).

Abuse Monitoring

Article • 07/18/2023

Azure OpenAI Service detects and mitigates instances of recurring content and/or behaviors that suggest use of the service in a manner that may violate the [Code of Conduct](#) or other applicable product terms. Details on how data is handled can be found on the [Data, Privacy and Security page](#).

Components of abuse monitoring

There are several components to abuse monitoring:

- **Content Classification:** Classifier models detect harmful language and/or images in user prompts (inputs) and completions (outputs). The system looks for categories of harms as defined in the [Content Requirements](#), and assigns severity levels as described in more detail on the [Content Filtering page](#).
- **Abuse Pattern Capture:** Azure OpenAI Service's abuse monitoring looks at customer usage patterns and employs algorithms and heuristics to detect indicators of potential abuse. Detected patterns consider, for example, the frequency and severity at which harmful content is detected in a customer's prompts and completions.
- **Human Review and Decision:** When prompts and/or completions are flagged through content classification and abuse pattern capture as described above, authorized Microsoft employees may assess the flagged content, and either confirm or correct the classification or determination based on predefined guidelines and policies. Data can be accessed for human review only by authorized Microsoft employees via Secure Access Workstations (SAWs) with Just-In-Time (JIT) request approval granted by team managers. For Azure OpenAI Service resources deployed in the European Economic Area, the authorized Microsoft employees are located in the European Economic Area.
- **Notification and Action:** When a threshold of abusive behavior has been confirmed based on the preceding three steps, the customer is informed of the determination by email. Except in cases of severe or recurring abuse, customers typically are given an opportunity to explain or remediate—and implement mechanisms to prevent recurrence of—the abusive behavior. Failure to address the behavior—or recurring or severe abuse—may result in suspension or termination of the customer's access to Azure OpenAI resources and/or capabilities.

Next steps

- Learn more about the underlying models that power Azure OpenAI.
- Learn more about understanding and mitigating risks associated with your application: [Overview of Responsible AI practices for Azure OpenAI models](#).
- Learn more about how data is processed in connection with content filtering and abuse monitoring: [Data, privacy, and security for Azure OpenAI Service](#).

Content filtering

Article • 07/18/2023

Azure OpenAI Service includes a content filtering system that works alongside core models. This system works by running both the prompt and completion through an ensemble of classification models aimed at detecting and preventing the output of harmful content. The content filtering system detects and takes action on specific categories of potentially harmful content in both input prompts and output completions. Variations in API configurations and application design may affect completions and thus filtering behavior. The content filtering system supports the following languages: English, German, Japanese, Spanish, French, Italian, Portuguese, and Chinese. It might not be able to detect inappropriate content in languages that it has not been trained or tested to process.

In addition to the content filtering system, the Azure OpenAI Service performs monitoring to detect content and/or behaviors that suggest use of the service in a manner that may violate applicable product terms. For more information about understanding and mitigating risks associated with your application, see the [Transparency Note for Azure OpenAI](#). For more information about how data is processed in connection with content filtering and abuse monitoring, see [Data, privacy, and security for Azure OpenAI Service](#).

The following sections provide information about the content filtering categories, the filtering severity levels and their configurability, and API scenarios to be considered in application design and implementation.

Content filtering categories

The content filtering system integrated in the Azure OpenAI Service contains neural multi-class classification models aimed at detecting and filtering harmful content; the models cover four categories (hate, sexual, violence, and self-harm) across four severity levels (safe, low, medium, and high). Content detected at the 'safe' severity level is labeled in annotations but is not subject to filtering and is not configurable.

Categories

Category	Description
Hate	The hate category describes language attacks or uses that include pejorative or discriminatory language with reference to a person or identity group on the basis of certain differentiating attributes of these groups including but not limited to race,

Category	Description
	ethnicity, nationality, gender identity and expression, sexual orientation, religion, immigration status, ability status, personal appearance, and body size.
Sexual	The sexual category describes language related to anatomical organs and genitals, romantic relationships, acts portrayed in erotic or affectionate terms, physical sexual acts, including those portrayed as an assault or a forced sexual violent act against one's will, prostitution, pornography, and abuse.
Violence	The violence category describes language related to physical actions intended to hurt, injure, damage, or kill someone or something; describes weapons, etc.
Self-Harm	The self-harm category describes language related to physical actions intended to purposely hurt, injure, or damage one's body, or kill oneself.

Severity levels

Category	Description
Safe	Content may be related to violence, self-harm, sexual, or hate categories but the terms are used in general, journalistic, scientific, medical, and similar professional contexts, which are appropriate for most audiences.
Low	Content that expresses prejudiced, judgmental, or opinionated views, includes offensive use of language, stereotyping, use cases exploring a fictional world (for example, gaming, literature) and depictions at low intensity.
Medium	Content that uses offensive, insulting, mocking, intimidating, or demeaning language towards specific identity groups, includes depictions of seeking and executing harmful instructions, fantasies, glorification, promotion of harm at medium intensity.
High	Content that displays explicit and severe harmful instructions, actions, damage, or abuse; includes endorsement, glorification, or promotion of severe harmful acts, extreme or illegal forms of harm, radicalization, or non-consensual power exchange or abuse.

Configurability (preview)

The default content filtering configuration is set to filter at the medium severity threshold for all four content harm categories for both prompts and completions. That means that content that is detected at severity level medium or high is filtered, while content detected at severity level low is not filtered by the content filters. The configurability feature is available in preview and allows customers to adjust the settings, separately for prompts and completions, to filter content for each content category at different severity levels as described in the table below:

Severity filtered	Configurable for prompts	Configurable for completions	Descriptions
Low, medium, high	Yes	Yes	Strictest filtering configuration. Content detected at severity levels low, medium and high is filtered.
Medium, high	Yes	Yes	Default setting. Content detected at severity level low is not filtered, content at medium and high is filtered.
High	If approved*	If approved*	Content detected at severity levels low and medium is not filtered. Only content at severity level high is filtered. Requires approval*.
No filters	If approved*	If approved*	No content is filtered regardless of severity level detected. Requires approval*.

* Only customers who have been approved for modified content filtering have full content filtering control, including configuring content filters at severity level high only or turning content filters off. Apply for modified content filters via this form: [Azure OpenAI Limited Access Review: Modified Content Filters and Abuse Monitoring \(microsoft.com\)](https://www.microsoft.com) ↗

Content filtering configurations are created within a Resource in Azure AI Studio, and can be associated with Deployments. [Learn more about configurability here](#).

Create content filtering configuration

Content filtering configurations are created within a Resource and can be associated with Deployments. [Learn more about configurability here](#) ↗

The default content filtering configuration is set to filter at the medium severity threshold for all four content harms categories for both, prompts and completions. That means that content that is detected at severity level medium or high is filtered, while content detected at severity level low is not filtered by the content filters.

Create custom configuration name

Set severity levels

User prompts (Input)				Model completions (Output)		
Severity	Low	Medium	High	Low	Medium	High
Hate ⓘ	<input checked="" type="checkbox"/> On					
Sexual ⓘ	<input checked="" type="checkbox"/> On					
Self-harm ⓘ	<input checked="" type="checkbox"/> On					
Violence ⓘ	<input checked="" type="checkbox"/> On					

[Learn more about content filters here](#) ↗

Scenario details

When the content filtering system detects harmful content, you'll receive either an error on the API call if the prompt was deemed inappropriate or the `finish_reason` on the response will be `content_filter` to signify that some of the completion was filtered. When building your application or system, you'll want to account for these scenarios where the content returned by the Completions API is filtered, which may result in content that is incomplete. How you act on this information will be application specific. The behavior can be summarized in the following points:

- Prompts that are classified at a filtered category and severity level will return an HTTP 400 error.
- Non-streaming completions calls won't return any content when the content is filtered. The `finish_reason` value will be set to `content_filter`. In rare cases with longer responses, a partial result can be returned. In these cases, the `finish_reason` will be updated.
- For streaming completions calls, segments will be returned back to the user as they're completed. The service will continue streaming until either reaching a stop token, length, or when content that is classified at a filtered category and severity level is detected.

Scenario: You send a non-streaming completions call asking for multiple outputs; no content is classified at a filtered category and severity level

The table below outlines the various ways content filtering can appear:

HTTP response code	Response behavior
200	In the cases when all generation passes the filters as configured, no content moderation details are added to the response. The <code>finish_reason</code> for each generation will be either stop or length.

Example request payload:

```
JSON
{
  "prompt": "Text example",
  "n": 3,
```

```
        "stream": false  
    }
```

Example response JSON:

JSON

```
{  
    "id": "example-id",  
    "object": "text_completion",  
    "created": 1653666286,  
    "model": "davinci",  
    "choices": [  
        {  
            "text": "Response generated text",  
            "index": 0,  
            "finish_reason": "stop",  
            "logprobs": null  
        }  
    ]  
}
```

Scenario: Your API call asks for multiple responses (N>1) and at least 1 of the responses is filtered

HTTP Response Code	Response behavior
200	The generations that were filtered will have a <code>finish_reason</code> value of <code>content_filter</code> .

Example request payload:

JSON

```
{  
    "prompt": "Text example",  
    "n": 3,  
    "stream": false  
}
```

Example response JSON:

JSON

```
{
  "id": "example",
  "object": "text_completion",
  "created": 1653666831,
  "model": "ada",
  "choices": [
    {
      "text": "returned text 1",
      "index": 0,
      "finish_reason": "length",
      "logprobs": null
    },
    {
      "text": "returned text 2",
      "index": 1,
      "finish_reason": "content_filter",
      "logprobs": null
    }
  ]
}
```

Scenario: An inappropriate input prompt is sent to the completions API (either for streaming or non-streaming)

HTTP Response Code	Response behavior
400	The API call will fail when the prompt triggers a content filter as configured. Modify the prompt and try again.

Example request payload:

JSON

```
{
  "prompt": "Content that triggered the filtering model"
}
```

Example response JSON:

JSON

```
"error": {
  "message": "The response was filtered",
  "type": null,
  "param": "prompt",
  "code": "content_filter",
```

```
        "status": 400  
    }
```

Scenario: You make a streaming completions call; no output content is classified at a filtered category and severity level

HTTP Response Code	Response behavior
200	In this case, the call will stream back with the full generation and <code>finish_reason</code> will be either 'length' or 'stop' for each generated response.

Example request payload:

JSON

```
{  
    "prompt": "Text example",  
    "n": 3,  
    "stream": true  
}
```

Example response JSON:

JSON

```
{  
    "id": "cmpl-example",  
    "object": "text_completion",  
    "created": 1653670914,  
    "model": "ada",  
    "choices": [  
        {  
            "text": "last part of generation",  
            "index": 2,  
            "finish_reason": "stop",  
            "logprobs": null  
        }  
    ]  
}
```

Scenario: You make a streaming completions call asking for multiple completions and at least a portion of the

output content is filtered

HTTP Response Code	Response behavior
200	For a given generation index, the last chunk of the generation will include a non-null <code>finish_reason</code> value. The value will be <code>content_filter</code> when the generation was filtered.

Example request payload:

JSON

```
{  
  "prompt": "Text example",  
  "n": 3,  
  "stream": true  
}
```

Example response JSON:

JSON

```
{  
  "id": "cmpl-example",  
  "object": "text_completion",  
  "created": 1653670515,  
  "model": "ada",  
  "choices": [  
    {  
      "text": "Last part of generated text streamed back",  
      "index": 2,  
      "finish_reason": "content_filter",  
      "logprobs": null  
    }  
  ]  
}
```

Scenario: Content filtering system doesn't run on the completion

HTTP Response Code	Response behavior
200	If the content filtering system is down or otherwise unable to complete the operation in time, your request will still complete without content filtering. You can determine that the filtering wasn't applied by looking for an error message in the <code>content_filter_result</code> object.

Example request payload:

JSON

```
{
  "prompt": "Text example",
  "n": 1,
  "stream": false
}
```

Example response JSON:

JSON

```
{
  "id": "cmpl-example",
  "object": "text_completion",
  "created": 1652294703,
  "model": "ada",
  "choices": [
    {
      "text": "generated text",
      "index": 0,
      "finish_reason": "length",
      "logprobs": null,
      "content_filter_result": {
        "error": {
          "code": "content_filter_error",
          "message": "The contents are not filtered"
        }
      }
    }
  ]
}
```

Annotations (preview)

When annotations are enabled as shown in the code snippet below, the following information is returned via the API: content filtering category (hate, sexual, violence,

self-harm); within each content filtering category, the severity level (safe, low, medium or high); filtering status (true or false).

Annotations are currently in preview for Completions and Chat Completions (GPT models); the following code snippet shows how to use annotations in preview:

Python

```
# Note: The openai-python library support for Azure OpenAI is in preview.  
# os.getenv() for the endpoint and key assumes that you are using  
environment variables.  
  
import os  
import openai  
openai.api_type = "azure"  
openai.api_base = os.getenv("AZURE_OPENAI_ENDPOINT")  
openai.api_version = "2023-06-01-preview" # API version required to test out  
Annotations preview  
openai.api_key = os.getenv("AZURE_OPENAI_KEY")  
  
response = openai.Completion.create(  
    engine="text-davinci-003", # engine = "deployment_name".  
    prompt="{Example prompt where a severity level of low is detected}"  
    # Content that is detected at severity level medium or high is filtered,  
    # while content detected at severity level low isn't filtered by the  
    content filters.  
)  
  
print(response)
```

Output

JSON

```
{  
  "choices": [  
    {  
      "content_filter_results": {  
        "hate": {  
          "filtered": false,  
          "severity": "safe"  
        },  
        "self_harm": {  
          "filtered": false,  
          "severity": "safe"  
        },  
        "sexual": {  
          "filtered": false,  
          "severity": "safe"  
        }  
      }  
    }  
  ]  
}
```

```

    },
    "violence": {
        "filtered": false,
        "severity": "low"
    }
},
"finish_reason": "length",
"index": 0,
"logprobs": null,
"text": "{\"\"}(\\"Example model response will be returned\\").}"
}
],
"created": 1685727831,
"id": "cmpl-7N36VZAVBMJtxycrmHZ12aK76a6v",
"model": "text-davinci-003",
"object": "text_completion",
"prompt_annotations": [
{
    "content_filter_results": {
        "hate": {
            "filtered": false,
            "severity": "safe"
        },
        "self_harm": {
            "filtered": false,
            "severity": "safe"
        },
        "sexual": {
            "filtered": false,
            "severity": "safe"
        },
        "violence": {
            "filtered": false,
            "severity": "safe"
        }
    },
    "prompt_index": 0
}
],
"usage": {
    "completion_tokens": 16,
    "prompt_tokens": 5,
    "total_tokens": 21
}
}

```

The following code snippet shows how to retrieve annotations when content was filtered:

Python

```
# Note: The openai-python library support for Azure OpenAI is in preview.
# os.getenv() for the endpoint and key assumes that you are using
```

```

environment variables.

import os
import openai
openai.api_type = "azure"
openai.api_base = os.getenv("AZURE_OPENAI_ENDPOINT")
openai.api_version = "2023-06-01-preview" # API version required to test out
Annotations preview
openai.api_key = os.getenv("AZURE_OPENAI_KEY")

try:
    response = openai.Completion.create(
        prompt=<PROMPT>,
        engine=<MODEL_DEPLOYMENT_NAME>,
    )
    print(response)

except openai.error.InvalidRequestError as e:
    if e.error.code == "content_filter" and e.error.innererror:
        content_filter_result = e.error.innererror.content_filter_result
        # print the formatted JSON
        print(content_filter_result)

        # or access the individual categories and details
        for category, details in content_filter_result.items():
            print(f"{category}:\n filtered={details['filtered']}\n severity={details['severity']}")
```

For details on the inference REST API endpoints for Azure OpenAI and how to create Chat and Completions please follow [Azure OpenAI Service REST API reference guidance](#). Annotations are returned for all scenarios when using `2023-06-01-preview`.

Example scenario: An input prompt containing content that is classified at a filtered category and severity level is sent to the completions API

JSON

```
{
  "error": {
    "message": "The response was filtered due to the prompt triggering
Azure Content management policy.
Please modify your prompt and retry. To learn more about
our content filtering policies
please read our documentation:
https://go.microsoft.com/fwlink/?linkid=21298766",
    "type": null,
    "param": "prompt",
    "code": "content_filter",
```

```
        "status": 400,
        "innererror": {
            "code": "ResponsibleAIPolicyViolation",
            "content_filter_result": {
                "hate": {
                    "filtered": true,
                    "severity": "high"
                },
                "self-harm": {
                    "filtered": true,
                    "severity": "high"
                },
                "sexual": {
                    "filtered": false,
                    "severity": "safe"
                },
                "violence": {
                    "filtered":true,
                    "severity": "medium"
                }
            }
        }
    }
}
```

Best practices

As part of your application design, consider the following best practices to deliver a positive experience with your application while minimizing potential harms:

- Decide how you want to handle scenarios where your users send prompts containing content that is classified at a filtered category and severity level or otherwise misuse your application.
- Check the `finish_reason` to see if a completion is filtered.
- Check that there's no error object in the `content_filter_result` (indicating that content filters didn't run).

Next steps

- Learn more about the [underlying models that power Azure OpenAI](#).
- Apply for modified content filters via [this form](#).
- Azure OpenAI content filtering is powered by [Azure AI Content Safety](#).
- Learn more about understanding and mitigating risks associated with your application: [Overview of Responsible AI practices for Azure OpenAI models](#).
- Learn more about how data is processed in connection with content filtering and abuse monitoring: [Data, privacy, and security for Azure OpenAI Service](#).

Understanding embeddings in Azure OpenAI Service

Article • 07/18/2023

An embedding is a special format of data representation that can be easily utilized by machine learning models and algorithms. The embedding is an information dense representation of the semantic meaning of a piece of text. Each embedding is a vector of floating-point numbers, such that the distance between two embeddings in the vector space is correlated with semantic similarity between two inputs in the original format. For example, if two texts are similar, then their vector representations should also be similar.

Embedding models

Different Azure OpenAI embedding models are specifically created to be good at a particular task. **Similarity embeddings** are good at capturing semantic similarity between two or more pieces of text. **Text search embeddings** help measure whether long documents are relevant to a short query. **Code search embeddings** are useful for embedding code snippets and embedding natural language search queries.

Embeddings make it easier to do machine learning on large inputs representing words by capturing the semantic similarities in a vector space. Therefore, we can use embeddings to determine if two text chunks are semantically related or similar, and provide a score to assess similarity.

Cosine similarity

Azure OpenAI embeddings rely on cosine similarity to compute similarity between documents and a query.

From a mathematic perspective, cosine similarity measures the cosine of the angle between two vectors projected in a multi-dimensional space. This is beneficial because if two documents are far apart by Euclidean distance because of size, they could still have a smaller angle between them and therefore higher cosine similarity. For more information about cosine similarity equations, see [this article on Wikipedia ↗](#).

An alternative method of identifying similar documents is to count the number of common words between documents. Unfortunately, this approach doesn't scale since an expansion in document size is likely to lead to a greater number of common words

detected even among completely disparate topics. For this reason, cosine similarity can offer a more effective alternative.

Next steps

Learn more about using Azure OpenAI and embeddings to perform document search with our [embeddings tutorial](#).

Introduction to red teaming large language models (LLMs)

Article • 07/18/2023

The term *red teaming* has historically described systematic adversarial attacks for testing security vulnerabilities. With the rise of LLMs, the term has extended beyond traditional cybersecurity and evolved in common usage to describe many kinds of probing, testing, and attacking of AI systems. With LLMs, both benign and adversarial usage can produce potentially harmful outputs, which can take many forms, including harmful content such as hate speech, incitement or glorification of violence, or sexual content.

Red teaming is an essential practice in the responsible development of systems and features using LLMs. While not a replacement for systematic [measurement and mitigation](#) work, red teamers help to uncover and identify harms and, in turn, enable measurement strategies to validate the effectiveness of mitigations.

Microsoft has conducted red teaming exercises and implemented safety systems (including [content filters](#) and other [mitigation strategies](#)) for its Azure OpenAI Service models (see this [Responsible AI Overview](#)). However, the context of your LLM application will be unique and you also should conduct red teaming to:

- Test the LLM base model and determine whether there are gaps in the existing safety systems, given the context of your application system.
- Identify and mitigate shortcomings in the existing default filters or mitigation strategies.
- Provide feedback on failures so we can make improvements.

Here is how you can get started in your process of red teaming LLMs. Advance planning is critical to a productive red teaming exercise.

Getting started

Managing your red team

Assemble a diverse group of red teamers.

LLM red teamers should be a mix of people with diverse social and professional backgrounds, demographic groups, and interdisciplinary expertise that fits the deployment context of your AI system. For example, if you're designing a chatbot to help health care providers, medical experts can help identify risks in that domain.

Recruit red teamers with both benign and adversarial mindsets.

Having red teamers with an adversarial mindset and security-testing experience is essential for understanding security risks, but red teamers who are ordinary users of your application system and haven't been involved in its development can bring valuable perspectives on harms that regular users might encounter.

Remember that handling potentially harmful content can be mentally taxing.

You will need to take care of your red teamers, not only by limiting the amount of time they spend on an assignment, but also by letting them know they can opt out at any time. Also, avoid burnout by switching red teamers' assignments to different focus areas.

Planning your red teaming

Where to test

Because a system is developed using a LLM base model, you may need to test at several different layers:

- The LLM base model with its [safety system](#) in place to identify any gaps that may need to be addressed in the context of your application system. (Testing is usually through an API endpoint.)
- Your application system. (Testing is usually through a UI.)
- Both the LLM base model and your application system before and after mitigations are in place.

How to test

Consider conducting iterative red teaming in at least two phases:

1. Open-ended red teaming, where red teamers are encouraged to discover a variety of harms. This can help you develop a taxonomy of harms to guide further testing. Note that developing a taxonomy of undesired LLM outputs for your application system is crucial to being able to measure the success of specific mitigation efforts.
2. Guided red teaming, where red teamers are assigned to focus on specific harms listed in the taxonomy while staying alert for any new harms that may emerge. Red teamers can also be instructed to focus testing on specific features of a system for surfacing potential harms.

Be sure to:

- Provide your red teamers with clear instructions for what harms or system features they will be testing.
- Give your red teamers a place for recording their findings. For example, this could be a simple spreadsheet specifying the types of data that red teamers should provide, including basics such as:
 - The type of harm that was surfaced.
 - The input prompt that triggered the output.
 - An excerpt from the problematic output.
 - Comments about why the red teamer considered the output problematic.
- Maximize the effort of responsible AI red teamers who have expertise for testing specific types of harms or undesired outputs. For example, have security subject matter experts focus on jailbreaks, metaprompt extraction, and content related to aiding cyberattacks.

Reporting red teaming findings

You will want to summarize and report red teaming top findings at regular intervals to key stakeholders, including teams involved in the measurement and mitigation of LLM failures so that the findings can inform critical decision making and prioritizations.

Next steps

[Learn about other mitigation strategies like prompt engineering](#)

Introduction to prompt engineering

Article • 07/18/2023

GPT-3, GPT-3.5, and GPT-4 models from OpenAI are prompt-based. With prompt-based models, the user interacts with the model by entering a text prompt, to which the model responds with a text completion. This completion is the model's continuation of the input text.

While these models are extremely powerful, their behavior is also very sensitive to the prompt. This makes prompt construction an important skill to develop.

Prompt construction can be difficult. In practice, the prompt acts to configure the model weights to complete the desired task, but it's more of an art than a science, often requiring experience and intuition to craft a successful prompt. The goal of this article is to help get you started with this learning process. It attempts to capture general concepts and patterns that apply to all GPT models. However it's important to understand that each model behaves differently, so the learnings may not apply equally to all models.

Basics

This section covers the basic concepts and elements of GPT prompts.

Text prompts are how users interact with GPT models. As with all generative language models, GPT models attempt to produce the next series of words that are most likely to follow from the previous text. It's as if we're saying *What is the first thing that comes to your mind when I say <prompt>?*". The examples below demonstrate this behavior. Given the first words of famous content, the model is able to accurately continue the text.

Prompt	Completion
Four score and seven years ago our	fathers brought forth on this continent, a new nation, conceived in Liberty, and dedicated to the proposition that all men are created equal. [...]
"Call me Ishmael."	"Some years ago—never mind how long precisely—having little o no money in my purse, and nothing particular to interest me on shore, I thought I would sail about a little and see the watery part of the world." [...]

As you develop more complex prompts, it's helpful to keep this fundamental behavior in mind. Regardless of the prompt that is provided, the model is simply responding with what it determines is most likely (given its training data and training targets). If you ask

a question in your prompt, the model isn't following a separate "Q&A" code path, but rather it appears to answer the question because an answer is the most likely sort of response for the given question as input.

Prompt components

When using the Completion API while there's no differentiation between different parts of the prompt, it can still be useful for learning and discussion to identify underlying prompt components. With the [Chat Completion API](#) there are distinct sections of the prompt that are sent to the API in the form of an array of dictionaries with associated roles: system, user, and assistant. This guidance focuses more generally on how to think about prompt construction rather than providing prescriptive guidance that is specific to one API over another.

It's also important to understand that while there could be other valid ways to dissect prompts, the goal of this breakdown is to provide a relatively simple way to think about prompt construction. With the Completion API, all the components are optional, but at least one must be present and most prompts include more than one component. There can be some grey area between components as well. The order presented below roughly corresponds to how commonly each component is used, from most to least.

Instructions

Instructions are likely the most commonly used prompt component. Instructions are simply that: instructions to the model on what to do. While simple in concept, they can be complex in practice. The following table illustrates this by showing both simple and more complex instructions, in two different forms.

Instruction Type	Prompt	Completion
Simple instructions	Write an introduction for a weekly newsletter.	Welcome to our weekly newsletter. This week we have a special focus on productivity. We'll be sharing tips and tricks on how to be productive in all areas of your life. We hope you enjoy and please share with your friends!
Complex instructions	Write an introduction for a weekly newsletter to my company named Contoso. It should mention the great all hands meeting we had last week and thank the team for	Welcome to Contoso's weekly newsletter! We had a great all hands meeting last week and I want to thank the team for all their hard work over the tough past few months. We're looking forward to a bright future and I'm confident that with our team's dedication and commitment, we will achieve great things. Thank you for being a part of

Instruction Type	Prompt	Completion
	all their hard work over the tough past few months.	our team and I look forward to working with you all in the coming weeks and months. Sincerely, [Your name].
Complex Instructions	<p>Write an introduction for a weekly newsletter, including the following:</p> <ul style="list-style-type: none"> - My company is named contoso - An exuberant greeting - Thanking the team for their hard work over a couple tough months - Positive outlook for the coming quarter - Signed by the SLT 	Hello Contoso team! I wanted to take a moment to thank you for all your hard work over the past few months. It's been a tough couple of months, but you've all pulled together and done an amazing job. I'm really proud of you all. Looking ahead to the next quarter, I'm feeling really positive. I think we're going to achieve some great things. Thanks again, The Senior Leadership Team.

Primary Content

Primary content refers to some sort of text that is being processed or transformed by the model. Primary content is typically used in conjunction with instructions. A simple example would be language translation. In the example below, the English text would be considered the primary content while "Translate to French:" is an instruction.

Prompt	Completion
<p>Can you please tell me how to get to the museum?</p> <p>Translate to French:</p>	<p>Pouvez-vous s'il vous plaît me dire comment aller au musée?</p>

Primary content can also be much longer. In the following example, the primary content is the introduction section from the [Wikipedia entry on time complexity](#), which is almost 300 words long. This content has been abbreviated in our table for ease of display.

Prompt	Completion
<p>In computer science, the time complexity is the computational complexity that describes the amount of computer time it takes to run an algorithm. Time complexity is commonly estimated by [...]</p>	<p>Time complexity is a measure of how long an algorithm takes to run. It is typically expressed as a function of the size of the input. The most common measure is worst-case time complexity, which is the maximum amount of time required for inputs of a given size.</p>

Prompt	Completion
Summarize the previous text in a few sentences:	
In computer science, the time complexity is the computational complexity that describes the amount of computer time it takes to run an algorithm. Time complexity is commonly estimated by [...] TL;DR (Too long didn't read)	The time complexity of an algorithm is the amount of time it takes to run an algorithm. Time complexity is commonly estimated by counting the number of elementary operations performed by the algorithm, supposing that each elementary operation takes a fixed amount of time to perform. The time complexity is generally expressed as a function of the size of the input.

GPT models can also handle primary content that is structured. In the example below, a TSV about beers in Belgium (abbreviated for display in this article) is passed to the model as part of the prompt. It is capable of properly interpreting the content and answering questions about the data.

Prompt	Completion
<pre>Belgian Beer Brands Beer name Beer style color ABV Brewery "Chimay Gold: ""Doree"" trappist pale ale gold 4.80% Chimay Brewery (official trappist) "Chimay Blue: ""Grande Reserve"" trappist dark ale dark 9.00% [...] Referencing the table above, how many beers are less than 6% ABV?</pre>	There are 10 beers in the table that are less than 6% ABV.

Examples

Successful prompts often rely on the practice of “one-shot” or “few-shot” learning. This refers to the inclusion of one or more examples of the desired behavior of the model, typically by including input and output pairs. This is not learning in the sense that the model is permanently changed, but rather that the examples better condition the model to respond as desired for only the current inference. The use of prompts with no examples is sometimes referred to as “zero-shot” learning. Note that with the Chat Completion API few-shot learning examples are typically added to the messages array in the form of example user/assistant interactions after the initial system message.

Learning Type	Prompt	Completion
Zero-shot	Headline: Coach confident injury won't	The coach is confident that the injury won't derail the Warriors' season. The team is still focused on their goals

Learning Type	Prompt	Completion
	derail Warriors Topic:	and that they will continue to work hard to achieve them.
Few-shot	Headline: Twins' Correa to use opt-out, test free agency Topic: Baseball Headline: Qatar World Cup to have zones for sobering up Topic: Soccer Headline: Yates: Fantasy football intel for Week 6 Topic: Football Headline: Coach confident injury won't derail Warriors Topic:	Basketball

The example above illustrates the utility of few-shot learning. Without the examples, the model seems to be guessing at the desired behavior, while the examples cleanly show the model how to operate. This also demonstrates the power of the model, it can infer the category of label that is wanted, even without a ‘basketball’ label in the examples.

Cue

Cues act as the “jumpstart” for the output of the model, helping to direct the model to the desired output. It is often a prefix that the model can build onto. In the example below, we show the cue directing the story to include key elements. Cues are often used along with instructions, but not always. In the examples below, the model is being used to summarize a long announcement email. A cue is used in one case to help focus the output of the model and to suggest a specific output format (bullet points) in the other.

In the context of the Chat Completion API instructions take the form of the system message, and few-shot examples are indicated by providing a series of example user/assistant interactions to help prime the model.

Number of Cues	Prompt	Completion
0	Performance reviews are a core component	The purpose of this email is to inform employees of recent changes to the performance review experience, which is

Number of Cues	Prompt	Completion
	<p>of our Performance & Development approach at Contoso. [...]</p> <p>Summarize the above email message:</p>	<p>part of Contoso's Performance & Development approach. The changes include an improved structure, upgraded in-tool user experience, and focused prompts. Additionally, there is now an optional Conversation Starters section for employees to flag topics they'd like to discuss with their managers.</p>
1	<p>Performance reviews are a core component of our Performance & Development approach at Contoso. [...]</p> <p>Summarize the above email message:</p> <p>The key takeaway of the message is</p>	<p>that Contoso is improving the performance review experience by making it more focused on core priorities, expectations and impact. Additionally, they are upgrading the in-tool user experience with tips, resources and guidance. Finally, they are adding guidance on how to activate company-wide core priorities.</p>
2	<p>Performance reviews are a core component of our Performance & Development approach at Contoso. [...]</p> <p>Summarize the above email message:</p> <p>Key Points:</p> <ul style="list-style-type: none"> • 	<p>Contoso is introducing changes to the performance review experience, based on feedback from employees.</p> <ul style="list-style-type: none"> • The changes include a new focus on core priorities, expectations, and impact; an upgraded user experience; and new guidance on company-wide core priorities. • Performance reviews are a time to reflect on past performance and learning as well as to plan for future priorities and growth opportunities. • Employees and managers should write comments in advance of the performance review meeting. • There should be at least two performance reviews per year. • The time investment for each review should remain about the same.

Supporting content

Supporting content is information that the model can utilize to influence the output in some way. It differs from primary content in that it is not the main target of task, but it is typically used along with primary content. Common examples include contextual information such as the current date, the name of the user, user preferences, and so on. The example below uses supporting content to help organize a set of planned workshops for the user. Without the supporting (important topics) the model simply lists off the workshops (truncated for display), when informed of my important topics, the model is able to accurately group the meetings.

Supporting Content	Prompt	Completion
Without	<p>Workshop list:</p> <p>Title Description</p> <p>Planning Workshop Kickoff Please join us to kick off our workshop! Hear from our leaders about cross group priorities and learnings for the year ahead. The invitation to this event has already been sent to everyone in [...]</p> <p>Summarize the workshops above, grouped by topic:</p>	<p>Workshop list:</p> <p>Planning</p> <p>Workshop Kickoff</p> <p>-Planning</p> <p>Workshop Wrap-up</p> <p>- Core MeetUp</p> <p>- Customer Driven Perspectives</p> <p>-Impact and Key Focus Areas</p> <p>-Best practices</p> <p>-Accelerating app adoption [...]</p>
With	<p>Workshop list:</p> <p>Title Description</p> <p>Planning Workshop Kickoff Please join us to kick off our workshop! Hear from our leaders about cross group priorities and learnings for the year ahead. The invitation to this event has already been sent to everyone in [...]</p> <p>My Important Topics: prompt engineering, search, GPT models</p> <p>Summarize the workshops above, grouped by my important topics:</p>	<p>1. Prompt Engineering:</p> <ul style="list-style-type: none"> - New prompt engineering tips - The art of prompt engineering <p>2. Search:</p> <ul style="list-style-type: none"> -Intro to vector search with embedding <p>3. GPT Models:</p> <ul style="list-style-type: none"> - Intro to GPT-4 - GPT-35-Turbo in-depth.

Best practices

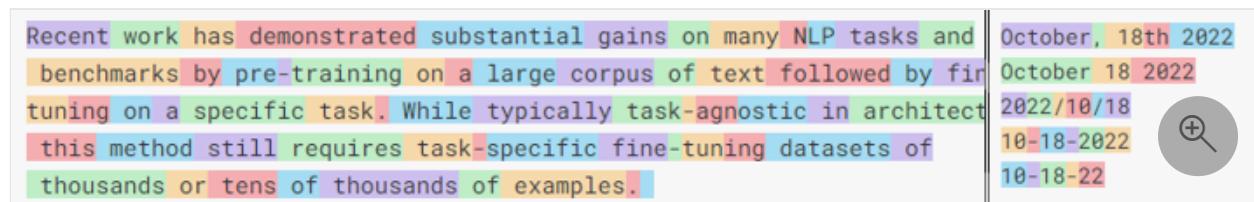
- **Be Specific.** Leave as little to interpretation as possible. Restrict the operational space.
- **Be Descriptive.** Use analogies.
- **Double Down.** Sometimes you may need to repeat yourself to the model. Give instructions before and after your primary content, use an instruction and a cue, etc.
- **Order Matters.** The order in which you present information to the model may impact the output. Whether you put instructions before your content ("summarize the following...") or after ("summarize the above...") can make a difference in

output. Even the order of few-shot examples can matter. This is referred to as recency bias.

- **Give the model an “out”.** It can sometimes be helpful to give the model an alternative path if it is unable to complete the assigned task. For example, when asking a question over a piece of text you might include something like "respond with 'not found' if the answer is not present." This can help the model avoid generating false responses.

Space efficiency

While the input size increases with each new generation of GPT models, there will continue to be scenarios that provide more data than the model can handle. GPT models break words into “tokens”. While common multi-syllable words are often a single token, less common words are broken in syllables. Tokens can sometimes be counter-intuitive, as shown by the example below which demonstrates token boundaries for different date formats. In this case, spelling out the entire month is more space efficient than a fully numeric date. The current range of token support goes from 2000 tokens with earlier GPT-3 models to up to 32,768 tokens with the 32k version of the latest GPT-4 model.



Given this limited space, it is important to use it as efficiently as possible.

- **Tables** – As shown in the examples in the previous section, GPT models can understand tabular formatted data quite easily. This can be a space efficient way to include data, rather than preceding every field with name (such as with JSON).
- **White Space** – Consecutive whitespaces are treated as separate tokens which can be an easy way to waste space. Spaces preceding a word, on the other hand, are typically treated as part of the same token as the word. Carefully watch your usage of whitespace and don't use punctuation when a space alone will do.

Next steps

[Learn more about Azure OpenAI](#)

Prompt engineering techniques

Article • 07/18/2023

This guide will walk you through some advanced techniques in prompt design and prompt engineering. If you're new to prompt engineering, we recommend starting with our [introduction to prompt engineering guide](#).

While the principles of prompt engineering can be generalized across many different model types, certain models expect a specialized prompt structure. For Azure OpenAI GPT models, there are currently two distinct APIs where prompt engineering comes into play:

- Chat Completion API.
- Completion API.

Each API requires input data to be formatted differently, which in turn impacts overall prompt design. The **Chat Completion API** supports the GPT-35-Turbo and GPT-4 models. These models are designed to take input formatted in a [specific chat-like transcript](#) stored inside an array of dictionaries.

The **Completion API** supports the older GPT-3 models and has much more flexible input requirements in that it takes a string of text with no specific format rules. Technically the GPT-35-Turbo models can be used with either APIs, but we strongly recommend using the Chat Completion API for these models. To learn more, please consult our [in-depth guide on using these APIs](#).

The techniques in this guide will teach you strategies for increasing the accuracy and grounding of responses you generate with a Large Language Model (LLM). It is, however, important to remember that even when using prompt engineering effectively you still need to validate the responses the models generate. Just because a carefully crafted prompt worked well for a particular scenario doesn't necessarily mean it will generalize more broadly to certain use cases. Understanding the [limitations of LLMs](#), is just as important as understanding how to leverage their strengths.

This guide does not go in-depth into the mechanics behind the message structure for Chat Completions. If you aren't familiar with interacting with the ChatGPT and GPT-4 models programmatically we recommend reading our [how-to guide on the Chat Completion API first](#).

Note

All of the examples in this section of the guide were tested against a base GPT-4 model in English. If you are reading a localized version of this article in another language, these responses represent a localized translation of the English results. To learn more about potential limitations depending on what language you are using to prompt a model, please consult our [Responsible AI transparency note](#).

System message

The system message is included at the beginning of the prompt and is used to prime the model with context, instructions, or other information relevant to your use case. You can use the system message to describe the assistant's personality, define what the model should and shouldn't answer, and define the format of model responses.

The example below, shows a sample system message and the resulting model response:

System message	User	Assistant
You are an AI assistant that helps people find information and responds in rhyme. If the user asks you a question you don't know the answer to, say so.	What can you tell about me, John Doe?	Dear John, I'm sorry to say, But I don't have info on you today. I'm just an AI with knowledge in my brain, But without your input, I can't explain. So please tell me more about what you seek, And I'll do my best to give you an answer unique.

Some other examples of system messages are:

- "Assistant is a large language model trained by OpenAI."
- "Assistant is an intelligent chatbot designed to help users answer technical questions about Azure OpenAI Service. Only answer questions using the context below and if you're not sure of an answer, you can say "I don't know".
- "Assistant is an intelligent chatbot designed to help users answer their tax related questions."
- "You are an assistant designed to extract entities from text. Users will paste in a string of text and you will respond with entities you've extracted from the text as a

JSON object. Here's an example of your output format:

JSON

```
{  
  "name": "",  
  "company": "",  
  "phone_number": ""  
}
```

An important detail to understand is that even if you instruct a model in the system message to answer **I don't know** when unsure of an answer this does not guarantee that the request will be honored. A well designed system message can increase the likelihood of a certain outcome, but it is still possible that an incorrect response could be generated that contradicts the intent of the instruction in the system message.

Few-shot learning

A common way to adapt language models to new tasks is to use few-shot learning. In few-shot learning, a set of training examples is provided as part of the prompt to give additional context to the model.

When using the Chat Completions API, a series of messages between the User and Assistant (written in the [new prompt format](#)), can serve as examples for few-shot learning. These examples can be used to prime the model to respond in a certain way, emulate particular behaviors, and seed answers to common questions.

System message	Few-shot examples
Assistant is an intelligent chatbot designed to help users answer their tax related questions. Instructions - Only answer questions related to taxes. - If you're unsure of an answer, you can say "I don't know" or "I'm not sure" and recommend users go to the IRS website for more information.	User - "When do I need to file my taxes by?" Assistant - "In 2023, you will need to file your taxes by April 18th. The date falls after the usual April 15th deadline because April 15th falls on a Saturday in 2023. For more details, see https://www.irs.gov/filing/individuals/when-to-file " User - "How can I check the status of my tax refund?" Assistant - "You can check the status of your tax refund by visiting https://www.irs.gov/refunds "

The table above describes the basic prompt structure, but for a detailed explanation of the exact prompt format you will need to refer to the [Chat Completion guide](#).

Non chat scenarios

While the Chat Completion API is optimized to work with multi-turn conversations, it also can be used for non chat scenarios. For example, for a sentiment analysis scenario, you might use the following prompt:

System message	User	Assistant
You are an assistant designed to analyze sentiment from speech data. Users will paste in a string of text and you will respond with an assessment of the response of the speaker. Rate on a scale of 1-10 (10 being highest). Explain why this rating was given.	hi thank you for calling contoso pharmacy who am i speaking with today i understand your frustration mary um can you tell me what exactly you're trying to accomplish OK uh certainly happy to check that for you one moment please i see here that you were on a generic form of lipitor is that right OK uh so i see that your doctor stopped prescribing these drugs in twenty twenty one actually OK uh yeah i'd be happy to check that for you uh because sometimes there's a gap in the system and it just doesn't get reported so let me take a look here just a moment so i'm seeing here that your doctor had these drugs prescribed to you from twenty twelve through twenty twenty one OK um yeah according to the latest records uh provided by doctor's office you're now on a different drug metformin would you like us to go ahead and fill that prescription for you for pick up a bit of form in five hundred milligrams uh you're very welcome mary please let us know if there's anything else we can do for you today.	Sentiment rating: 8 The speaker in this text seems to be polite, helpful, and patient while addressing the concerns of the customer. They take the time to check the information, provide clear explanations, and offer assistance. However, the rating is not a 10 because there is still a hint of uncertainty in some parts of the conversation, which may not convey complete confidence to the customer.

Start with clear instructions

The sequence in which information appears in the prompt matters. This is because GPT style models are built in a certain way that defines how they process the input. Our research suggests that telling the model the task you want it to do at the beginning of the prompt, before sharing additional contextual information or examples, can help produce higher-quality outputs.

ⓘ Note

Although following this technique is still generally recommended, in contrast to previous model versions (GPT-3 and prior), our testing showed that the model

response with ChatGPT and GPT-4 models was the same regardless of whether the technique is utilized. In the case of the below example, we see that adding the statement "Several sources ... eruption" at the beginning or the end of the prompt did not cause any change in the final model response.

System message	User	Assistant
You are an AI assistant that helps people find information.	<p>Your task is to verify if the statement "Several sources mention a chance of another large eruption" is supported by a specific quote from the following set of snippets.</p> <p>---</p> <p>SNIPPETS</p> <p>[1] 14 percent chance of megaquake hitting Seattle, experts say</p> <p>SEATTLE - There's a 14 percent chance of a magnitude 9 Cascadia earthquake hitting Seattle in the next 50 years, the U.S. Geological Survey estimates. "Unfortunately, we are unable to..."</p> <p>[2] Earthquake experts lay out latest outlook for Seattle's 'Really Big One'</p> <p>"We say that there's approximately a 14% chance of another approximately magnitude-9 earthquake occurring in the next 50 years," said a geophysicist at the University of Washington...</p> <p>---</p> <p>Is the statement "Several sources mention a chance of another large eruption" directly implied or stated by the snippets?</p>	No, the statement is not directly implied or stated by the snippets. The snippets mention a chance of a "megaquake" and a "magnitude 9 Cascadia earthquake" hitting Seattle in the next 50 years, but do not mention a chance of another large eruption.

Repeat instructions at the end

Models can be susceptible to **recency bias**, which in this context means that information at the end of the prompt might have more significant influence over the output than information at the beginning of the prompt. Therefore, it is worth experimenting with

repeating the instructions at the end of the prompt and evaluating the impact on the generated response.

Prime the output

This refers to including a few words or phrases at the end of the prompt to obtain a model response that follows the desired form. For example, using a cue such as “Here’s a bulleted list of key points:\n- ” can help make sure the output is formatted as a list of bullet points.

System message	User	Assistant
You are an AI assistant that helps people find information. Answer in as few words as possible.	John Smith is married to Lucy Smith. They have five kids, and he works as a software engineer at Microsoft. What search queries should I do to fact-check this? ## One possible search query is:	"John Smith married Lucy Smith five kids software engineer Microsoft"

In the above prompt, the text *One possible search query is:* primes the model to produce a single output. Without this cue the model produces several search queries as output.

Add clear syntax

Using clear syntax for your prompt—including punctuation, headings, and section markers—helps communicate intent and often makes outputs easier to parse.

In the example below, separators (--- in this case) have been added between different sources of information or steps. This allows the use of --- as a stopping condition for generation. In addition, section headings or special variables are presented in uppercase to differentiate them.

System message	User	Assistant
You are an AI assistant that helps people find information.	<p>You will read a paragraph, and then issue queries to a search engine in order to fact-check it. Also explain the queries.</p> <p>---</p> <p>PARAGRAPH</p> <p>John Smith is married to Lucy Smith. They have five kids, and he works as a software engineer at Microsoft. What search queries should I do to fact-check this?</p> <p>---</p> <p>QUERIES</p>	<ol style="list-style-type: none"> "John Smith Microsoft" - To check if John Smith is indeed employed at Microsoft. 2. "John Smith Lucy Smith" - To check if John Smith is married to Lucy Smith. 3. "John Smith children" - To check if John Smith has five children.

If you're not sure what syntax to use, consider using Markdown or XML. The models have been trained on a lot of web content in XML and Markdown which may provide better results.

Break the task down

Large language models (LLMs) often perform better if the task is broken down into smaller steps. For example, in the search query prompt referenced earlier, the prompt can be restructured so that the model is first instructed to extract relevant facts, and then instructed to generate search queries that can be used to verify those facts.

System message	User	Assistant
You are an AI assistant that helps people find information.	<p>You will read a paragraph, and then issue queries to a search engine in order to fact-check it.</p> <p>---</p> <p>PARAGRAPH</p> <p>John Smith is married to Lucy Smith. They have five kids, and he works as a software engineer at Microsoft. What search queries should I do to fact-check this?</p> <p>---</p> <p>Now you will extract factual claims, and issue queries to fact-check them. When issuing a query, use the function SEARCH("query")</p> <p>---</p> <p>FACTUAL CLAIMS</p>	<ol style="list-style-type: none"> 1. John Smith is married to Lucy Smith 2. They have five kids 3. He works as a software engineer at Microsoft <p>QUERIES</p> <p>SEARCH("John Smith married Lucy Smith")</p> <p>SEARCH("John Smith family size")</p> <p>SEARCH("John Smith Microsoft software engineer")</p>

Notice the use of clear syntax to differentiate the sections and prime the output. In this simple example, breaking the task down from one to two steps is not very dramatic, but

when trying to do this for a larger piece of text with many factual claims, breaking the task down can make a significant difference.

Use of affordances

Sometimes we can get the model to use an [affordance ↗](#) instead of relying on its own parameters for information and answers. Search, for example, can be an affordance to help mitigate against fabricated answers, and to get up-to-date information.

One simple way to use an affordance is to stop generation once the affordance calls are generated by the model, then paste the outcomes back into the prompt. Below is an example of what the follow-up call could be after doing the **SEARCH** calls above. Notice how we pasted the search results into the prompt and replaced the previous **SEARCH** calls.

System message	User	Assistant
You are an AI assistant that helps people find information.	<p>You will read a paragraph, extract factual claims, and then use search engine results to fact-check them</p> <p>---</p> <p>PARAGRAPH</p> <p>John Smith is married to Lucy Smith. They have five kids, and he works as a software engineer at Microsoft. What search queries should I do to fact-check this?</p> <p>---</p> <p>FACTUAL CLAIMS</p> <p>- John Smith is married to Lucy Smith</p> <p>- John and Lucy have five kids</p> <p>- John works as a software engineer at Microsoft</p> <p>---</p> <p>Here are various search queries issued to research the claims above:</p> <p>SEARCH QUERIES</p> <p>- John Smith married to Lucy Smith</p> <p>- John Smith number of children</p> <p>- John Smith software</p>	<p>- John Smith is married to Lucy Smith: Confirmed. Snippet [1] and [2] both mention John Smith's wife as Lucy.</p> <p>- John and Lucy have five kids: Confirmed. Snippet [3] mentions that John was accompanied by his two daughters and three sons.</p> <p>- John works as a software engineer at Microsoft: Partially confirmed. Snippet [4] mentions that John spent 10 years at Microsoft, but it does not explicitly state that he currently works there. Further research may be needed to confirm his current employment status.</p>

System message	User	Assistant
	<p>engineer Microsoft</p> <p>---</p> <p>Here are snippets of the search results:</p> <p>SNIPPETS:</p> <p>[1] ... John Smith's wedding was on September 25, 2012 ...</p> <p>[2] ... John Smith was accompanied by his wife Lucy to a party</p> <p>[3] John was accompanied to the soccer game by his two daughters and three sons</p> <p>[4] ... After spending 10 years at Microsoft, Smith founded his own startup, Tailspin Toys</p> <p>[5] John M is the town smith, and he married Fiona. They have a daughter named Lucy</p> <p>---</p> <p>Given the snippets, fact check each of the factual claims above:</p>	

Chain of thought prompting

This is a variation on the **break the task down** technique. Instead of splitting a task into smaller steps, in this approach the model response is instructed to proceed step-by-step and present all the steps involved. Doing so reduces the possibility of inaccuracy of outcomes and makes assessing the model response easier.

System message	User	Assistant
You are an AI assistant that helps people find information.	<p>Who was the most decorated (maximum medals) individual athlete in the Olympic games that were held at Sydney? Take a step-by-step approach in your response, cite sources and give reasoning before sharing final answer in the below format: ANSWER is: <name></p>	<p>Step 1: Determine the year of the Sydney Olympic games. The Sydney Olympic games were held in the year 2000.</p> <p>Step 2: Find a list of individual athletes who won multiple medals in the 2000 Sydney Olympics.</p> <p>According to the official website of the Olympic Games, there were several</p>

System message	User	Assistant
		<p>individual athletes who won multiple medals in the 2000 Sydney Olympics. Some of the notable names include:</p> <ul style="list-style-type: none"> • Ian Thorpe (Australia) - 3 gold, 2 silver, 0 bronze • Pieter van den Hoogenband (Netherlands) - 2 gold, 0 silver, 2 bronze • Lenny Krayzelburg (USA) - 3 gold, 0 silver, 0 bronze • Inge de Bruijn (Netherlands) - 3 gold, 1 silver, 0 bronze <p>Step 3: Determine the athlete with the most medals. After reviewing the list of individual athletes who won multiple medals in the 2000 Sydney Olympics, we can see that the athlete with the most medals is Ian Thorpe from Australia, who won a total of 5 medals (3 gold and 2 silver).</p> <p>Therefore, the ANSWER is: Ian Thorpe.</p>

Specifying the output structure

Using your prompt to specify the structure of the output can have a significant impact on the nature and quality of the results. Sometimes system message inputs as “only write true facts” or “do not fabricate information” might not be adequate mitigations. Instead, asking for the model response to also include citations can help result in a reduction of the prevalence of incorrect responses.

If you instruct the model to cite the source material when it makes statements, those statements are much more likely to be grounded. Asking for citations makes it so that the model must make two errors every time it generates a response: the first error is the fabricated response, and the second is the bad citation. Note that the closer the citation is to the text it supports, the shorter the distance ahead the model needs to anticipate the citation, which suggests that inline citations are better mitigations for false content generation than citations at the end of the content.

Similarly, if you ask the model to extract factual statements from a paragraph, it may extract compound statements such as ‘X is doing Y AND Z’ (which may be harder to

verify). This can be avoided by specifying an output structure such as (entity1, relationship, entity2).

The examples below show the use of citations and directing the model response to fit a defined structure.

System message	User	Assistant
You are an AI assistant that helps people find information	<p>List down the different behaviors exhibited by the Customer Support agent in the following conversation.</p> <p>---</p> <p>hi thank you for calling contoso pharmacy who am i speaking with today i understand your frustration mary um can you tell me what exactly you're trying to accomplish OK uh certainly happy to check that for you one moment please i see here that you were on a generic form of lipitor is that right OK uh so i see that your doctor stopped prescribing these drugs in twenty twenty one actually OK uh yeah i'd be happy to check that for you uh because sometimes there's a gap in the system and it just doesn't get reported so let me take a look here just a moment so i'm seeing here that your doctor had these drugs prescribed to you from twenty twelve through twenty twenty one OK um yeah according to the latest records uh provided by doctor's office you're now on a different drug metformin would you like us to go ahead and fill that prescription for you for pick up a bit of form in five hundred milligrams uh you're very welcome mary please let us know if there's anything else we can do for you today.</p> <p>---</p> <p>How was the response of the Customer Support agent? Classify and list down their various behaviors and cite the reason behind the classification, using the format BEHAVIOR("reason")</p>	<ol style="list-style-type: none">1. Polite Greeting BEHAVIOR("Agent starts the conversation with a polite greeting and asks for the caller's name")2. Empathetic BEHAVIOR("Agent acknowledges Mary's frustration and tries to understand her concern")3. Attentive BEHAVIOR("Agent listens to the customer's problem and asks for more details")4. Proactive BEHAVIOR("Agent offers to check the issue for the customer")5. Informative BEHAVIOR("Agent provides the relevant information about the customer's prescription history")6. Thorough BEHAVIOR("Agent checks for any possible gaps in the system and provides a complete response")7. Confirmatory BEHAVIOR("Agent confirms the current

System message	User	Assistant
		<p>medication with the customer")</p> <p>8. Solution-oriented BEHAVIOR("Agent offers to fill the new prescription for the customer")</p> <p>9. Courteous BEHAVIOR("Agent thanks the customer and offers further assistance if needed")</p>

System message	User	Assistant
You are an AI assistant that helps people find information.	<p>Cluster the following news headlines into topic categories based on patterns seen within the text. Also mention reasoning behind how these categories were defined.</p> <p>Output format:</p> <pre>{ "TOPIC_NAME": "", "HEADLINES": [], "REASONING": "" }</pre> <p>Input news headlines:</p> <ol style="list-style-type: none"> 1. "From books to presentations in 10s with AR + ML" 2. "Demo from 1993 of 32-year-old Yann LeCun showing off the World's first Convolutional Network for Text Recognition" 3. "First Order Motion Model applied to animate paintings" 4. "Robinhood and other brokers literally blocking purchase of \$GME, \$NOK, \$BB, \$AMC; allow sells" 5. "United Airlines stock down over 5% premarket trading" <p>Output:</p>	<pre>{ "ARTIFICIAL_INTELLIGENCE": { "HEADLINES": ["From books to presentations in 10s with AR + ML", "Demo from 1993 of 32-year-old Yann LeCun showing off the World's first Convolutional Network for Text Recognition", "First Order Motion Model applied to animate paintings"], "REASONING": "These headlines are related to artificial intelligence, machine learning, and their applications in various fields." }, "FINANCIAL_MARKETS": { "HEADLINES": ["Robinhood and other brokers literally blocking purchase of \$GME, \$NOK, \$BB, \$AMC; allow sells", "United Airlines stock down over 5% premarket trading", "Bitcoin was nearly \$20,000 a year ago today"], "REASONING": "These headlines are related to financial markets, stocks, cryptocurrencies, and trading" } }</pre>

System message	User	Assistant
		platforms." } }

Temperature and Top_p parameters

Changing the temperature parameter changes the output of the model. The temperature parameter can be set between 0 and 2. A higher value, for example 0.7 will make the output more random and produce more divergent responses, while a lower value, like 0.2, will make the output more focused and concrete. A fictional story could be generated using a higher temperature. Whereas to generate a legal document it is recommended to use a much lower temperature. Top_probability is another parameter and is similar to Temperature in that it also controls the randomness of the model response, but it does so in a different way. The general recommendation is to alter one of these two parameters at a time, not both.

Provide grounding context

One of the most effective ways to provide reliable answers is to give the model data to draw its responses from (grounding data). If your use case relies on up-to-date, reliable information and is not purely a creative scenario, we strongly recommend providing grounding data. In general, the closer you can get your source material to the final form of the answer you want, the less work the model needs to do, which means there is less opportunity for error. Here is an example where the system is provided a [recent blog describing the launch of GPT-4 in Azure OpenAI Service](#), and asked to name some of its early customers.

System message	User	Assistant
You are an AI assistant that helps people find information. You will provide answers exclusively from below text and respond in 100 words or less: "At Microsoft, we are constantly discovering new ways to unleash creativity, unlock productivity, and uplevel skills so that more people can benefit from using AI. This is allowing our customers to ...	Who are some of the early customers of the Azure OpenAI Service GPT-4 models?	Here are some of the early customers of the Azure OpenAI Service GPT-4 models: - Epic Healthcare: They plan to use GPT-4 to help physicians and nurses spend less time on data entry and investigation. - Coursera: They are using Azure OpenAI Service with GPT-4 to create a new AI-powered learning experience on their platform. - Coca-Cola: They are using Azure

System message	User	Assistant
<p>... thereby reducing the likelihood that the model will generate a harmful response.”¹</p> <p>Answer in 100 words or less. Use bullet lists wherever possible.</p>		<p>OpenAI to build a knowledge hub and plan to leverage GPT-4's multimodal capabilities for marketing, advertising, public relations, and customer relations.</p> <p>- Other companies of all sizes are using Azure AI to improve customer experiences, summarize long-form content, help write software, and reduce risk by predicting the right tax data.</p>

¹ Text from [Azure OpenAI GPT-4 launch blog](#).

Next steps

- [Learn more about Azure OpenAI](#).
- Get started with the ChatGPT model with [the ChatGPT quickstart](#).
- For more examples, check out the [Azure OpenAI Samples GitHub repository](#)

System message framework and template recommendations for Large Language Models (LLMs)

Article • 07/18/2023

This article provides a recommended framework and example templates to help write an effective system message, sometimes referred to as a metaprompt or [system prompt](#) that can be used to guide an AI system's behavior and improve system performance. If you're new to prompt engineering, we recommend starting with our [introduction to prompt engineering](#) and [prompt engineering techniques guidance](#).

This guide provides system message recommendations and resources that, along with other prompt engineering techniques, can help increase the accuracy and grounding of responses you generate with a Large Language Model (LLM). However, it is important to remember that even when using these templates and guidance, you still need to validate the responses the models generate. Just because a carefully crafted system message worked well for a particular scenario doesn't necessarily mean it will work more broadly across other scenarios. Understanding the [limitations of LLMs](#) and the [mechanisms for evaluating and mitigating those limitations](#) is just as important as understanding how to leverage their strengths.

The LLM system message framework described here covers four concepts:

- Define the model's profile, capabilities, and limitations for your scenario
- Define the model's output format
- Provide example(s) to demonstrate the intended behavior of the model
- Provide additional behavioral guardrails

Define the model's profile, capabilities, and limitations for your scenario

- Define the specific task(s) you would like the model to complete. Describe who the users of the model will be, what inputs they will provide to the model, and what you expect the model to do with the inputs.
- Define how the model should complete the tasks, including any additional tools (like APIs, code, plug-ins) the model can use. If it doesn't use additional tools, it can rely on its own parametric knowledge.

- Define the scope and limitations of the model's performance. Provide clear instructions on how the model should respond when faced with any limitations. For example, define how the model should respond if prompted on subjects or for uses that are off topic or otherwise outside of what you want the system to do.
- Define the posture and tone the model should exhibit in its responses.

Define the model's output format

When using the system message to define the model's desired output format in your scenario, consider and include the following types of information:

- Define the language and syntax of the output format. If you want the output to be machine parse-able, you may want the output to be in formats like JSON, XSON or XML.
- Define any styling or formatting preferences for better user or machine readability. For example, you may want relevant parts of the response to be bolded or citations to be in a specific format.

Provide example(s) to demonstrate the intended behavior of the model

When using the system message to demonstrate the intended behavior of the model in your scenario, it is helpful to provide specific examples. When providing examples, consider the following:

- Describe difficult use cases where the prompt is ambiguous or complicated, to give the model additional visibility into how to approach such cases.
- Show the potential "inner monologue" and chain-of-thought reasoning to better inform the model on the steps it should take to achieve the desired outcomes.

Define additional behavioral guardrails

When defining additional safety and behavioral guardrails, it's helpful to first identify and prioritize [the harms](#) you'd like to address. Depending on the application, the sensitivity and severity of certain harms could be more important than others.

Next steps

- Learn more about [Azure OpenAI](#)
- Learn more about [deploying Azure OpenAI responsibly](#)
- For more examples, check out the [Azure OpenAI Samples GitHub repository](#) ↗

Azure OpenAI on your data (preview)

Article • 07/18/2023

Azure OpenAI on your data enables you to run supported chat models such as GPT-35-Turbo and GPT-4 on your data without needing to train or fine-tune models. Running models on your data enables you to chat on top of, and analyze your data with greater accuracy and speed. By doing so, you can unlock valuable insights that can help you make better business decisions, identify trends and patterns, and optimize your operations. One of the key benefits of Azure OpenAI on your data is its ability to tailor the content of conversational AI.

To get started, [connect your data source](#) using [Azure OpenAI Studio](#) and start asking questions and chatting on your data.

Because the model has access to, and can reference specific sources to support its responses, answers are not only based on its pretrained knowledge but also on the latest information available in the designated data source. This grounding data also helps the model avoid generating responses based on outdated or incorrect information.

ⓘ Note

To get started, you need to already have been approved for [Azure OpenAI access](#) and have an [Azure OpenAI Service resource](#) with either the gpt-35-turbo or the gpt-4 models deployed.

What is Azure OpenAI on your data

Azure OpenAI on your data works with OpenAI's powerful GPT-35-Turbo and GPT-4 language models, enabling them to provide responses based on your data. You can access Azure OpenAI on your data using a REST API or the web-based interface in the [Azure OpenAI Studio](#) to create a solution that connects to your data to enable an enhanced chat experience.

One of the key features of Azure OpenAI on your data is its ability to retrieve and utilize data in a way that enhances the model's output. Azure OpenAI on your data, together with Azure Cognitive Search, determines what data to retrieve from the designated data source based on the user input and provided conversation history. This data is then augmented and resubmitted as a prompt to the OpenAI model, with retrieved information being appended to the original prompt. Although retrieved data is being

appended to the prompt, the resulting input is still processed by the model like any other prompt. Once the data has been retrieved and the prompt has been submitted to the model, the model uses this information to provide a completion. See the [Data, privacy, and security for Azure OpenAI Service](#) article for more information.

Data source options

Azure OpenAI on your data uses an [Azure Cognitive Search](#) index to determine what data to retrieve based on user inputs and provided conversation history. We recommend using Azure OpenAI Studio to create your index from a blob storage or local files. See the [quickstart article](#) for more information.

Ingesting your data into Azure Cognitive Search

For documents and datasets with long text, you should use the available [data preparation script](#) to ingest the data into cognitive search. The script chunks the data so that your response with the service will be more accurate. This script also supports scanned PDF file and images and ingests the data using [Document Intelligence](#).

Data formats and file types

Azure OpenAI on your data supports the following filetypes:

- `.txt`
- `.md`
- `.html`
- Microsoft Word files
- Microsoft PowerPoint files
- PDF

There are some caveats about document structure and how it might affect the quality of responses from the model:

- The model provides the best citation titles from markdown (`.md`) files.
- If a document is a PDF file, the text contents are extracted as a preprocessing step (unless you're connecting your own Azure Cognitive Search index). If your document contains images, graphs, or other visual content, the model's response quality depends on the quality of the text that can be extracted from them.

- If you're converting data from an unsupported format into a supported format, make sure the conversion:
 - Doesn't lead to significant data loss.
 - Doesn't add unexpected noise to your data.

This will impact the quality of Azure Cognitive Search and the model response.

Virtual network support & private link support

Azure OpenAI on your data does not currently support private endpoints.

Azure Role-based access controls (Azure RBAC)

To add a new data source to your Azure OpenAI resource, you need the following Azure RBAC roles.

Azure RBAC role	Needed when
Cognitive Services OpenAI Contributor	You want to use Azure OpenAI on your data.
Search Index Data Contributor	You have an existing Azure Cognitive Search index that you want to use, instead of creating a new one.
Storage Blob Data Contributor	You have an existing Blob storage container that you want to use, instead of creating a new one.

Recommended settings

Use the following sections to help you configure Azure OpenAI on your data for optimal results.

System message

Give the model instructions about how it should behave and any context it should reference when generating a response. You can describe the assistant's personality, what it should and shouldn't answer, and how to format responses. There's no token limit for the system message, but will be included with every API call and counted against the overall token limit. The system message will be truncated if it's greater than 200 tokens.

For example, if you're creating a chatbot where the data consists of transcriptions of quarterly financial earnings calls, you might use the following system message:

"You are a financial chatbot useful for answering questions from financial reports. You are given excerpts from the earnings call. Please answer the questions by parsing through all dialogue."

This system message can help improve the quality of the response by specifying the domain (in this case finance) and mentioning that the data consists of call transcriptions. It helps set the necessary context for the model to respond appropriately.

ⓘ Note

The system message is only guidance. The model might not adhere to every instruction specified because it has been primed with certain behaviors such as objectivity, and avoiding controversial statements. Unexpected behavior may occur if the system message contradicts with these behaviors.

Maximum response

Set a limit on the number of tokens per model response. The upper limit for Azure OpenAI on Your Data is 1500. This is equivalent to setting the `max_tokens` parameter in the API.

Limit responses to your data

This option encourages the model to respond using your data only, and is selected by default. If you unselect this option, the model may more readily apply its internal knowledge to respond. Determine the correct selection based on your use case and scenario.

Semantic search

ⓘ Important

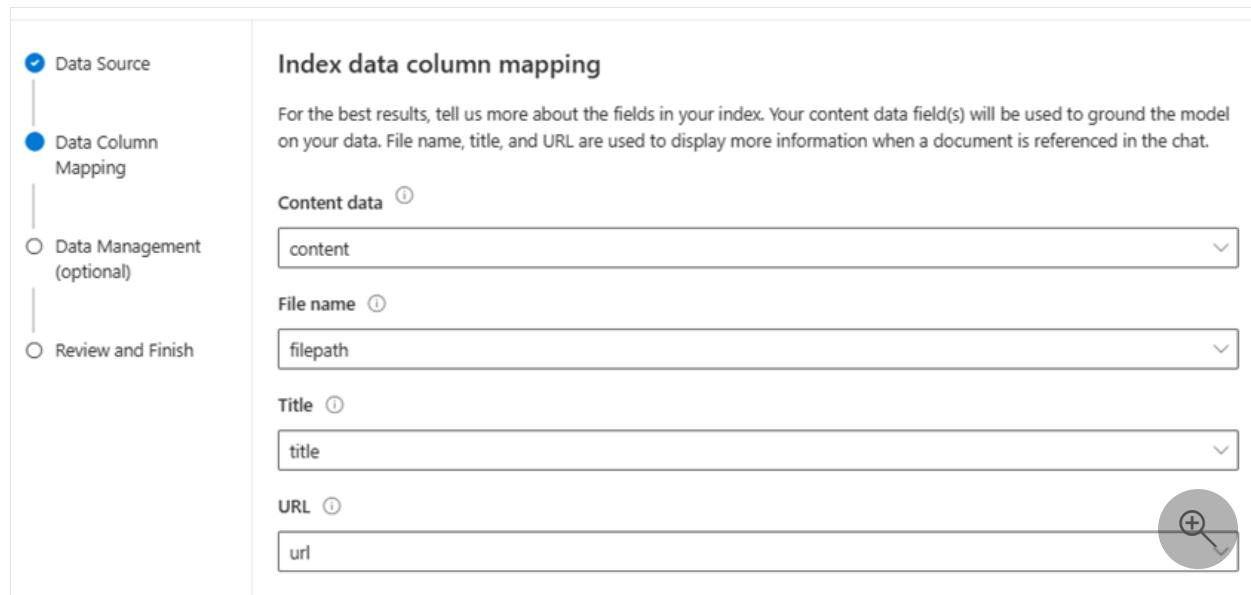
- Semantic search is subject to [additional pricing](#)
- Currently Azure OpenAI on your data supports semantic search for English data only. Only enable semantic search if both your documents and use case are in English.

If [semantic search](#) is enabled for your Azure Cognitive Search service, you are more likely to produce better retrieval of your data, which can improve response and citation

quality.

Index field mapping

If you're using your own index, you will be prompted in the Azure OpenAI Studio to define which fields you want to map for answering questions when you add your data source. You can provide multiple fields for *Content data*, and should include all fields that have text pertaining to your use case.



In this example, the fields mapped to **Content data** and **Title** provide information to the model to answer questions. **Title** is also used to title citation text. The field mapped to **File name** generates the citation names in the response.

Mapping these fields correctly helps ensure the model has better response and citation quality.

Interacting with the model

Use the following practices for best results when chatting with the model.

Conversation history

- Before starting a new conversation (or asking a question that is not related to the previous ones), clear the chat history.
- Getting different responses for the same question between the first conversational turn and subsequent turns can be expected because the conversation history changes the current state of the model. If you receive incorrect answers, report it as a quality bug.

Model response

- If you are not satisfied with the model response for a specific question, try either making the question more specific or more generic to see how the model responds, and reframe your question accordingly.
- [Chain-of-thought prompting](#) has been shown to be effective in getting the model to produce desired outputs for complex questions/tasks.

Question length

Avoid asking long questions and break them down into multiple questions if possible. The GPT models have limits on the number of tokens they can accept. Token limits are counted toward: the user question, the system message, the retrieved search documents (chunks), internal prompts, the conversation history (if any), and the response. If the question exceeds the token limit, it will be truncated.

Multi-lingual support

- Azure OpenAI on your data supports queries that are in the same language as the documents. For example, if your data is in Japanese, then queries need to be in Japanese too.
- Currently Azure OpenAI on your data supports [semantic search](#) for English data only. Don't enable semantic search if your data is in other languages.
- We recommend using a system message to inform the model that your data is in another language. For example:

"You are an AI assistant that helps people find information. You retrieve Japanese documents, and you should read them carefully in Japanese and answer in Japanese."

- If you have documents in multiple languages, we recommend building a new index for each language and connecting them separately to Azure OpenAI.

Using the web app

You can use the available web app to interact with your model using a graphical user interface, which you can deploy using either [Azure OpenAI studio](#) or a [manual deployment](#).



Start chatting

This chatbot is configured to answer your questions

Type a new question...



You can also customize the app's frontend and backend logic. For example, you could change the icon that appears in the center of the app by updating `/frontend/src/assets/Azure.svg` and then redeploying the app [using the Azure CLI](#). See the source code for the web app, and more information [on GitHub](#).

When customizing the app, we recommend:

- Resetting the chat session (clear chat) if the user changes any settings. Notify the user that their chat history will be lost.
- Clearly communicating the impact on the user experience that each setting you implement will have.
- When you rotate API keys for your Azure OpenAI or Azure Cognitive Search resource, be sure to update the app settings for each of your deployed apps to use the new keys.
- Pulling changes from the `main` branch for the web app's source code frequently to ensure you have the latest bug fixes and improvements.

Using the API

Consider setting the following parameters even if they are optional for using the API.

Parameter	Recommendation
<code>fieldsMapping</code>	Explicitly set the title and content fields of your index. This impacts the search retrieval quality of Azure Cognitive Search, which impacts the overall response and citation quality.
<code>roleInformation</code>	Corresponds to the "System Message" in the Azure OpenAI Studio. See the System message section above for recommendations.

Streaming data

You can send a streaming request using the `stream` parameter, allowing data to be sent and received incrementally, without waiting for the entire API response. This can improve performance and user experience, especially for large or dynamic data.

JSON

```
{
  "stream": true,
  "dataSources": [
    {
      "type": "AzureCognitiveSearch",
      "parameters": {
        "endpoint": "'$SearchEndpoint'",
        "key": "'$SearchKey'",
        "indexName": "'$SearchIndex'"
      }
    }
  ],
  "messages": [
    {
      "role": "user",
      "content": "What are the differences between Azure Machine Learning and Azure AI services?"
    }
  ]
}
```

Conversation history for better results

When chatting with a model, providing a history of the chat will help the model return higher quality results.

JSON

```
{
  "dataSources": [
```

```

    {
        "type": "AzureCognitiveSearch",
        "parameters": {
            "endpoint": "'$SearchEndpoint'",
            "key": "'$SearchKey'",
            "indexName": "'$SearchIndex'"
        }
    }
],
"messages": [
{
    "role": "user",
    "content": "What are the differences between Azure Machine Learning and Azure AI services?"
},
{
    "role": "tool",
    "content": "{\"citations\": [{\"content\": \"title: Azure AI services and Machine Learning\\n titleSuffix: Azure AI services\\n description: Learn where Azure AI services fits in with other Azure offerings for machine learning.\\n Azure AI services and machine learning\\n Azure AI services provides machine learning capabilities to solve general problems such as...\\n \"articles\\\\\\cognitive-services\\\\\\cognitive-services-and-machine-learning.md\", \"url\": null, \"metadata\": {\"chunking\": \"original document size=1018. Scores=0.32200050354003906 and 1.2880020141601562.Org Highlight count=115.\"}, \"chunk_id\": \"0\"]}, \"intent\": \"[\\\"What are the differences between Azure Machine Learning and Azure AI services?\\\"]\"}"
},
{
    "role": "assistant",
    "content": "\nAzure Machine Learning is a product and service tailored for data scientists to build, train, and deploy machine learning models [doc1]..."
},
{
    "role": "user",
    "content": "How do I use Azure machine learning?"
}
]
}

```

Next steps

- Get started using your data with Azure OpenAI
- Introduction to prompt engineering

Learn how to work with the GPT-35-Turbo and GPT-4 models

Article • 07/18/2023

The GPT-35-Turbo and GPT-4 models are language models that are optimized for conversational interfaces. The models behave differently than the older GPT-3 models. Previous models were text-in and text-out, meaning they accepted a prompt string and returned a completion to append to the prompt. However, the GPT-35-Turbo and GPT-4 models are conversation-in and message-out. The models expect input formatted in a specific chat-like transcript format, and return a completion that represents a model-written message in the chat. While this format was designed specifically for multi-turn conversations, you'll find it can also work well for non-chat scenarios too.

In Azure OpenAI there are two different options for interacting with these type of models:

- Chat Completion API.
- Completion API with Chat Markup Language (ChatML).

The Chat Completion API is a new dedicated API for interacting with the GPT-35-Turbo and GPT-4 models. This API is the preferred method for accessing these models. **It is also the only way to access the new GPT-4 models.**

ChatML uses the same [completion API](#) that you use for other models like text-davinci-002, it requires a unique token based prompt format known as Chat Markup Language (ChatML). This provides lower level access than the dedicated Chat Completion API, but also requires additional input validation, only supports gpt-35-turbo models, and **the underlying format is more likely to change over time.**

This article walks you through getting started with the GPT-35-Turbo and GPT-4 models. It's important to use the techniques described here to get the best results. If you try to interact with the models the same way you did with the older model series, the models will often be verbose and provide less useful responses.

Working with the GPT-35-Turbo and GPT-4 models

The following code snippet shows the most basic way to use the GPT-35-Turbo and GPT-4 models with the Chat Completion API. If this is your first time using these models programmatically, we recommend starting with our [GPT-35-Turbo & GPT-4 Quickstart](#).

GPT-4 models are currently only available by request. Existing Azure OpenAI customers can [apply for access by filling out this form](#).

Python

```
import os
import openai
openai.api_type = "azure"
openai.api_version = "2023-05-15"
openai.api_base = os.getenv("OPENAI_API_BASE") # Your Azure OpenAI
resource's endpoint value.
openai.api_key = os.getenv("OPENAI_API_KEY")

response = openai.ChatCompletion.create(
    engine="gpt-35-turbo", # The deployment name you chose when you deployed
the GPT-35-Turbo or GPT-4 model.
    messages=[
        {"role": "system", "content": "Assistant is a large language model
trained by OpenAI."},
        {"role": "user", "content": "Who were the founders of Microsoft?"}
    ]
)

print(response)

print(response['choices'][0]['message']['content'])
```

Output

```
{
  "choices": [
    {
      "finish_reason": "stop",
      "index": 0,
      "message": {
        "content": "The founders of Microsoft are Bill Gates and Paul Allen.
They co-founded the company in 1975.",
        "role": "assistant"
      }
    }
  ],
  "created": 1679014551,
  "id": "chatcmpl-6usfn2yyjkbmESe3G4jaQR6bsSc01",
  "model": "gpt-3.5-turbo-0301",
  "object": "chat.completion",
  "usage": {
    "completion_tokens": 86,
    "prompt_tokens": 37,
    "total_tokens": 123
  }
}
```

```
}
```

ⓘ Note

The following parameters aren't available with the new GPT-35-Turbo and GPT-4 models: `logprobs`, `best_of`, and `echo`. If you set any of these parameters, you'll get an error.

Every response includes a `finish_reason`. The possible values for `finish_reason` are:

- `stop`: API returned complete model output.
- `length`: Incomplete model output due to `max_tokens` parameter or token limit.
- `content_filter`: Omitted content due to a flag from our content filters.
- `null`: API response still in progress or incomplete.

Consider setting `max_tokens` to a slightly higher value than normal such as 300 or 500. This ensures that the model doesn't stop generating text before it reaches the end of the message.

Model versioning

ⓘ Note

`gpt-35-turbo` is equivalent to the `gpt-3.5-turbo` model from OpenAI.

Unlike previous GPT-3 and GPT-3.5 models, the `gpt-35-turbo` model as well as the `gpt-4` and `gpt-4-32k` models will continue to be updated. When creating a [deployment](#) of these models, you'll also need to specify a model version.

You can find the model retirement dates for these models on our [models](#) page.

Working with the Chat Completion API

OpenAI trained the GPT-35-Turbo and GPT-4 models to accept input formatted as a conversation. The `messages` parameter takes an array of message objects with a conversation organized by role. When using the Python API a list of dictionaries is used.

The format of a basic Chat Completion is as follows:

```
{"role": "system", "content": "Provide some context and/or instructions to the model"},  
{"role": "user", "content": "The user's message goes here"}
```

A conversation with one example answer followed by a question would look like:

```
{"role": "system", "content": "Provide some context and/or instructions to the model."},  
{"role": "user", "content": "Example question goes here."},  
{"role": "assistant", "content": "Example answer goes here."},  
{"role": "user", "content": "First question/message for the model to actually respond to."}
```

System role

The system role also known as the system message is included at the beginning of the array. This message provides the initial instructions to the model. You can provide various information in the system role including:

- A brief description of the assistant
- Personality traits of the assistant
- Instructions or rules you would like the assistant to follow
- Data or information needed for the model, such as relevant questions from an FAQ

You can customize the system role for your use case or just include basic instructions. The system role/message is optional, but it's recommended to at least include a basic one to get the best results.

Messages

After the system role, you can include a series of messages between the **user** and the **assistant**.

```
{"role": "user", "content": "What is thermodynamics?"}
```

To trigger a response from the model, you should end with a user message indicating that it's the assistant's turn to respond. You can also include a series of example

messages between the user and the assistant as a way to do few shot learning.

Message prompt examples

The following section shows examples of different styles of prompts that you could use with the GPT-35-Turbo and GPT-4 models. These examples are just a starting point, and you can experiment with different prompts to customize the behavior for your own use cases.

Basic example

If you want the GPT-35-Turbo model to behave similarly to chat.openai.com, you can use a basic system message like "Assistant is a large language model trained by OpenAI."

```
{"role": "system", "content": "Assistant is a large language model trained by OpenAI."},  
{"role": "user", "content": "Who were the founders of Microsoft?"}
```

Example with instructions

For some scenarios, you may want to give additional instructions to the model to define guardrails for what the model is able to do.

```
{"role": "system", "content": "Assistant is an intelligent chatbot designed to help users answer their tax related questions.  
Instructions:  
- Only answer questions related to taxes.  
- If you're unsure of an answer, you can say \"I don't know\" or \"I'm not sure\" and recommend users go to the IRS website for more information. "},  
{"role": "user", "content": "When are my taxes due?"}
```

Using data for grounding

You can also include relevant data or information in the system message to give the model extra context for the conversation. If you only need to include a small amount of information, you can hard code it in the system message. If you have a large amount of

data that the model should be aware of, you can use [embeddings](#) or a product like [Azure Cognitive Search](#) to retrieve the most relevant information at query time.

```
{"role": "system", "content": "Assistant is an intelligent chatbot designed to help users answer technical questions about Azure OpenAI Service. Only answer questions using the context below and if you're not sure of an answer, you can say 'I don't know'.  
  
Context:  
- Azure OpenAI Service provides REST API access to OpenAI's powerful language models including the GPT-3, Codex and Embeddings model series.  
- Azure OpenAI Service gives customers advanced language AI with OpenAI GPT-3, Codex, and DALL-E models with the security and enterprise promise of Azure. Azure OpenAI co-develops the APIs with OpenAI, ensuring compatibility and a smooth transition from one to the other.  
- At Microsoft, we're committed to the advancement of AI driven by principles that put people first. Microsoft has made significant investments to help guard against abuse and unintended harm, which includes requiring applicants to show well-defined use cases, incorporating Microsoft's principles for responsible AI use."  
},  
{"role": "user", "content": "What is Azure OpenAI Service?"}
```

Few shot learning with Chat Completion

You can also give few shot examples to the model. The approach for few shot learning has changed slightly because of the new prompt format. You can now include a series of messages between the user and the assistant in the prompt as few shot examples. These examples can be used to seed answers to common questions to prime the model or teach particular behaviors to the model.

This is only one example of how you can use few shot learning with GPT-35-Turbo and GPT-4. You can experiment with different approaches to see what works best for your use case.

```
{"role": "system", "content": "Assistant is an intelligent chatbot designed to help users answer their tax related questions. "},  
{"role": "user", "content": "When do I need to file my taxes by?"},  
{"role": "assistant", "content": "In 2023, you will need to file your taxes by April 18th. The date falls after the usual April 15th deadline because April 15th falls on a Saturday in 2023. For more details, see https://www.irs.gov/filing/individuals/when-to-file.\">"},  
{"role": "user", "content": "How can I check the status of my tax refund?"},
```

```
{"role": "assistant", "content": "You can check the status of your tax refund by visiting https://www.irs.gov/refunds"}
```

Using Chat Completion for non-chat scenarios

The Chat Completion API is designed to work with multi-turn conversations, but it also works well for non-chat scenarios.

For example, for an entity extraction scenario, you might use the following prompt:

```
{"role": "system", "content": "You are an assistant designed to extract entities from text. Users will paste in a string of text and you will respond with entities you've extracted from the text as a JSON object. Here's an example of your output format:  
{  
    \"name\": \"\",  
    \"company\": \"\",  
    \"phone_number\": \"\"  
},  
{"role": "user", "content": "Hello. My name is Robert Smith. I'm calling from Contoso Insurance, Delaware. My colleague mentioned that you are interested in learning about our comprehensive benefits policy. Could you give me a call back at (555) 346-9322 when you get a chance so we can go over the benefits?"}}
```

Creating a basic conversation loop

The examples so far have shown you the basic mechanics of interacting with the Chat Completion API. This example shows you how to create a conversation loop that performs the following actions:

- Continuously takes console input, and properly formats it as part of the messages list as user role content.
- Outputs responses that are printed to the console and formatted and added to the messages list as assistant role content.

This means that every time a new question is asked, a running transcript of the conversation so far is sent along with the latest question. Since the model has no memory, you need to send an updated transcript with each new question or the model will lose context of the previous questions and answers.

Python

```

import os
import openai
openai.api_type = "azure"
openai.api_version = "2023-05-15"
openai.api_base = os.getenv("OPENAI_API_BASE") # Your Azure OpenAI
resource's endpoint value .
openai.api_key = os.getenv("OPENAI_API_KEY")

conversation=[{"role": "system", "content": "You are a helpful assistant."}]

while True:
    user_input = input()
    conversation.append({"role": "user", "content": user_input})

    response = openai.ChatCompletion.create(
        engine="gpt-3.5-turbo", # The deployment name you chose when you
deployed the GPT-3.5-turbo or GPT-4 model.
        messages=conversation
    )

    conversation.append({"role": "assistant", "content": response["choices"]
[0]["message"]["content"]})
    print("\n" + response['choices'][0]['message']['content'] + "\n")

```

When you run the code above you will get a blank console window. Enter your first question in the window and then hit enter. Once the response is returned, you can repeat the process and keep asking questions.

Managing conversations

The previous example will run until you hit the model's token limit. With each question asked, and answer received, the `messages` list grows in size. The token limit for `gpt-35-turbo` is 4096 tokens, whereas the token limits for `gpt-4` and `gpt-4-32k` are 8192 and 32768 respectively. These limits include the token count from both the message list sent and the model response. The number of tokens in the messages list combined with the value of the `max_tokens` parameter must stay under these limits or you'll receive an error.

It's your responsibility to ensure the prompt and completion falls within the token limit. This means that for longer conversations, you need to keep track of the token count and only send the model a prompt that falls within the limit.

Note

We strongly recommend staying within the **documented input token limit** for all models even if you find you are able to exceed that limit.

The following code sample shows a simple chat loop example with a technique for handling a 4096 token count using OpenAI's tiktoken library.

The code requires tiktoken `0.3.0`. If you have an older version run `pip install tiktoken --upgrade`.

Python

```
import tiktoken
import openai
import os

openai.api_type = "azure"
openai.api_version = "2023-05-15"
openai.api_base = os.getenv("OPENAI_API_BASE") # Your Azure OpenAI
resource's endpoint value.
openai.api_key = os.getenv("OPENAI_API_KEY")

system_message = {"role": "system", "content": "You are a helpful
assistant."}
max_response_tokens = 250
token_limit = 4096
conversation = []
conversation.append(system_message)

def num_tokens_from_messages(messages):
    encoding= tiktoken.get_encoding("cl100k_base") #model to encoding
mapping https://github.com/openai/tiktoken/blob/main/tiktoken/model.py
    num_tokens = 0
    for message in messages:
        num_tokens += 4 # every message follows <im_start>
{role/name}\n{content}<im_end>\n
        for key, value in message.items():
            num_tokens += len(encoding.encode(value))
            if key == "name": # if there's a name, the role is omitted
                num_tokens += -1 # role is always required and always 1
token
        num_tokens += 2 # every reply is primed with <im_start>assistant
    return num_tokens

while True:
    user_input = input("")
    conversation.append({"role": "user", "content": user_input})
    conv_history_tokens = num_tokens_from_messages(conversation)

    while conv_history_tokens + max_response_tokens >= token_limit:
        del conversation[1]
```

```

conv_history_tokens = num_tokens_from_messages(conversation)

response = openai.ChatCompletion.create(
    engine="gpt-35-turbo", # The deployment name you chose when you
deployed the GPT-35-Turbo or GPT-4 model.
    messages=conversation,
    temperature=0.7,
    max_tokens=max_response_tokens,
)
conversation.append({"role": "assistant", "content": response['choices'][0]['message']['content']})
print("\n" + response['choices'][0]['message']['content'] + "\n")

```

In this example, once the token count is reached, the oldest messages in the conversation transcript will be removed. `del` is used instead of `pop()` for efficiency, and we start at index 1 so as to always preserve the system message and only remove user/assistant messages. Over time, this method of managing the conversation can cause the conversation quality to degrade as the model will gradually lose context of the earlier portions of the conversation.

An alternative approach is to limit the conversation duration to the max token length or a certain number of turns. Once the max token limit is reached and the model would lose context if you were to allow the conversation to continue, you can prompt the user that they need to begin a new conversation and clear the messages list to start a brand new conversation with the full token limit available.

The token counting portion of the code demonstrated previously is a simplified version of one of [OpenAI's cookbook examples](#).

Next steps

- [Learn more about Azure OpenAI](#).
- Get started with the GPT-35-Turbo model with [the GPT-35-Turbo quickstart](#).
- For more examples, check out the [Azure OpenAI Samples GitHub repository](#)

How to use function calling with Azure OpenAI Service (Preview)

Article • 07/20/2023

The latest versions of gpt-35-turbo and gpt-4 have been fine-tuned to work with functions and are able to both determine when and how a function should be called. If one or more functions are included in your request, the model will then determine if any of the functions should be called based on the context of the prompt. When the model determines that a function should be called, it will then respond with a JSON object including the arguments for the function.

This provides a native way for these models to formulate API calls and structure data outputs, all based on the functions you specify. It's important to note that while the models can generate these calls, it's up to you to execute them, ensuring you remain in control.

At a high level you can break down working with functions into three steps:

1. Call the chat completions API with your functions and the user's input
2. Use the model's response to call your API or function
3. Call the chat completions API again, including the response from your function to get a final response

Using function in the chat completions API

Function calling is available in the `2023-07-01-preview` API version and works with version 0613 of gpt-35-turbo, gpt-35-turbo-16k, gpt-4, and gpt-4-32k.

To use function calling with the Chat Completions API, you need to include two new properties in your request: `functions` and `function_call`. You can include one or more `functions` in your request and you can learn more about how to define functions in the [defining functions](#) section below. Keep in mind that functions are injected into the system message under the hood so functions count against your token usage.

When functions are provided, by default the `function_call` will be set to `"auto"` and the model will decide whether or not a function should be called. Alternatively, you can set the `function_call` parameter to `{"name": "<insert-function-name>"}` to force the API to call a specific function or you can set the parameter to `"none"` to prevent the model from calling any functions.

Python

```
# Note: The openai-python library support for Azure OpenAI is in preview.
import os
import openai

openai.api_key = os.getenv("AZURE_OPENAI_KEY")
openai.api_version = "2023-07-01-preview"
openai.api_type = "azure"
openai.api_base = os.getenv("AZURE_OPENAI_ENDPOINT")

messages= [
    {"role": "user", "content": "Find beachfront hotels in San Diego for less than $300 a month with free breakfast."}
]

functions= [
{
    "name": "search_hotels",
    "description": "Retrieves hotels from the search index based on the parameters provided",
    "parameters": {
        "type": "object",
        "properties": {
            "location": {
                "type": "string",
                "description": "The location of the hotel (i.e. Seattle, WA)"
            },
            "max_price": {
                "type": "number",
                "description": "The maximum price for the hotel"
            },
            "features": {
                "type": "string",
                "description": "A comma separated list of features (i.e. beachfront, free wifi, etc.)"
            }
        },
        "required": ["location"],
    },
},
]

response = openai.ChatCompletion.create(
    engine="gpt-35-turbo-0613",
    messages=messages,
    functions=functions,
    function_call="auto",
)
print(response['choices'][0]['message'])
```

The response from the API includes a `function_call` property if the model determines that a function should be called. The `function_call` property includes the name of the function to call and the arguments to pass to the function. The arguments are a JSON string that you can parse and use to call your function.

JSON

```
{  
  "role": "assistant",  
  "function_call": {  
    "name": "search_hotels",  
    "arguments": "{\n      \"location\": \"San Diego\",  
      \"max_price\": 300,  
      \"features\": \"beachfront,free breakfast\"\n    }"  
  }  
}
```

In some cases, the model may generate both `content` and a `function_call`. For example, for the prompt above the content could say something like "Sure, I can help you find some hotels in San Diego that match your criteria" along with the `function_call`.

Working with function calling

The following section goes into additional detail on how to effectively use functions with the Chat Completions API.

Defining functions

A function has three main parameters: `name`, `description`, and `parameters`. The `description` parameter is used by the model to determine when and how to call the function so it's important to give a meaningful description of what the function does.

`parameters` is a JSON schema object that describes the parameters that the function accepts. You can learn more about JSON schema objects in the [JSON schema reference ↗](#).

If you want to describe a function that doesn't accept any parameters, use `{"type": "object", "properties": {}}` as the value for the `parameters` property.

Managing the flow with functions

Python

```

response = openai.ChatCompletion.create(
    deployment_id="gpt-35-turbo-0613",
    messages=messages,
    functions=functions,
    function_call="auto",
)
response_message = response["choices"][0]["message"]

# Check if the model wants to call a function
if response_message.get("function_call"):

    # Call the function. The JSON response may not always be valid so make
    # sure to handle errors
    function_name = response_message["function_call"]["name"]

    available_functions = {
        "search_hotels": search_hotels,
    }
    function_to_call = available_functions[function_name]

    function_args = json.loads(response_message["function_call"]
    ["arguments"])
    function_response = function_to_call(**function_args)

    # Add the assistant response and function response to the messages
    messages.append( # adding assistant response to messages
    {
        "role": response_message["role"],
        "name": response_message["function_call"]["name"],
        "content": response_message["function_call"]["arguments"],
    })
    messages.append( # adding function response to messages
    {
        "role": "function",
        "name": function_name,
        "content": function_response,
    })
)

# Call the API again to get the final response from the model
second_response = openai.ChatCompletion.create(
    messages=messages,
    deployment_id="gpt-35-turbo-0613"
    # optionally, you could provide functions in the second call as
well
)
print(second_response["choices"][0]["message"])
else:
    print(response["choices"][0]["message"])

```

In the example above, we don't do any validation or error handling so you'll want to make sure to add that to your code.

For a full example of working with functions, see the [sample notebook on function calling ↗](#). You can also apply more complex logic to chain multiple function calls together, which is covered in the sample as well.

Prompt engineering with functions

When you define a function as part of your request, the details are injected into the system message using specific syntax that the model has been trained on. This means that functions consume tokens in your prompt and that you can apply prompt engineering techniques to optimize the performance of your function calls. The model uses the full context of the prompt to determine if a function should be called including function definition, the system message, and the user messages.

Improving quality and reliability

If the model isn't calling your function when or how you expect, there are a few things you can try to improve the quality.

Provide more details in your function definition

It's important that you provide a meaningful `description` of the function and provide descriptions for any parameter that might not be obvious to the model. For example, in the description for the `location` parameter, you could include extra details and examples on the format of the location.

JSON

```
"location": {  
    "type": "string",  
    "description": "The location of the hotel. The location should include  
    the city and the state's abbreviation (i.e. Seattle, WA or Miami, FL)"  
},
```

Provide more context in the system message

The system message can also be used to provide more context to the model. For example, if you have a function called `search_hotels` you could include a system message like the following to instruct the model to call the function when a user asks for help with finding a hotel.

JSON

```
{"role": "system", "content": "You're an AI assistant designed to help users search for hotels. When a user asks for help finding a hotel, you should call the search_hotels function."}
```

Instruct the model to ask clarifying questions

In some cases, you may want to instruct the model to ask clarifying questions. This is helpful to prevent the model from making assumptions about what values to use with functions. For example, with `search_hotels` you would want the model to ask for clarification if the user request didn't include details on `location`. To instruct the model to ask a clarifying question, you could include content like the following in your system message.

JSON

```
{"role": "system", "content": "Don't make assumptions about what values to use with functions. Ask for clarification if a user request is ambiguous."}
```

Reducing errors

Another area where prompt engineering can be valuable is in reducing errors in function calls. The models have been trained to generate function calls matching the schema that you define, but the models may produce a function call that doesn't match the schema you defined or it may try to call a function that you didn't include.

If you find the model is generating function calls that weren't provided, try including a sentence in the system message that says `"Only use the functions you have been provided with."`.

Using function calling responsibly

Like any AI system, using function calling to integrate language models with other tools and systems presents potential risks. It's important to understand the risks that function calling could present and take measures to ensure you use the capabilities responsibly.

Here are a few tips to help you use functions safely and securely:

- **Validate Function Calls:** Always verify the function calls generated by the model. This includes checking the parameters, the function being called, and ensuring that

the call aligns with the intended action.

- **Use Trusted Data and Tools:** Only use data from trusted and verified sources. Untrusted data in a function's output could be used to instruct the model to write function calls in a way other than you intended.
- **Follow the Principle of Least Privilege:** Grant only the minimum access necessary for the function to perform its job. This reduces the potential impact if a function is misused or exploited. For example, if you're using function calls to query a database, you should only give your application read-only access to the database. You also shouldn't depend solely on excluding capabilities in the function definition as a security control.
- **Consider Real-World Impact:** Be aware of the real-world impact of function calls that you plan to execute, especially those that trigger actions such as executing code, updating databases, or sending notifications.
- **Implement User Confirmation Steps:** Particularly for functions that take actions, we recommend including a step where the user confirms the action before it's executed.

To learn more about our recommendations on how to use Azure OpenAI models responsibly, see the [Overview of Responsible AI practices for Azure OpenAI models](#).

Next steps

- [Learn more about Azure OpenAI](#).
- For more examples on working with functions, check out the [Azure OpenAI Samples GitHub repository](#) ↗
- Get started with the GPT-35-Turbo model with [the GPT-35-Turbo quickstart](#).

Learn how to generate or manipulate text

Article • 07/18/2023

The completions endpoint can be used for a wide variety of tasks. It provides a simple but powerful text-in, text-out interface to any of our [models](#). You input some text as a prompt, and the model will generate a text completion that attempts to match whatever context or pattern you gave it. For example, if you give the API the prompt, "As Descartes said, I think, therefore", it will return the completion " I am" with high probability.

The best way to start exploring completions is through our playground in [Azure OpenAI Studio](#). It's a simple text box where you can submit a prompt to generate a completion. You can start with a simple example like the following:

```
write a tagline for an ice cream shop
```

once you submit, you'll see something like the following generated:

Console

```
write a tagline for an ice cream shop  
we serve up smiles with every scoop!
```

The actual completion results you see may differ because the API is stochastic by default. In other words, you might get a slightly different completion every time you call it, even if your prompt stays the same. You can control this behavior with the temperature setting.

This simple, "text in, text out" interface means you can "program" the model by providing instructions or just a few examples of what you'd like it to do. Its success generally depends on the complexity of the task and quality of your prompt. A general rule is to think about how you would write a word problem for a middle school student to solve. A well-written prompt provides enough information for the model to know what you want and how it should respond.

ⓘ Note

Keep in mind that the models' training data cuts off in October 2019, so they may not have knowledge of current events. We plan to add more continuous training in the future.

Prompt design

Basics

OpenAI's models can do everything from generating original stories to performing complex text analysis. Because they can do so many things, you have to be explicit in showing what you want. Showing, not just telling, is often the secret to a good prompt.

The models try to predict what you want from the prompt. If you send the words "Give me a list of cat breeds," the model wouldn't automatically assume that you're asking for a list of cat breeds. You could as easily be asking the model to continue a conversation where the first words are "Give me a list of cat breeds" and the next ones are "and I'll tell you which ones I like." If the model only assumed that you wanted a list of cats, it wouldn't be as good at content creation, classification, or other tasks.

There are three basic guidelines to creating prompts:

Show and tell. Make it clear what you want either through instructions, examples, or a combination of the two. If you want the model to rank a list of items in alphabetical order or to classify a paragraph by sentiment, show it that's what you want.

Provide quality data. If you're trying to build a classifier or get the model to follow a pattern, make sure that there are enough examples. Be sure to proofread your examples — the model is usually smart enough to see through basic spelling mistakes and give you a response, but it also might assume that the mistakes are intentional and it can affect the response.

Check your settings. The temperature and top_p settings control how deterministic the model is in generating a response. If you're asking it for a response where there's only one right answer, then you'd want to set these settings to lower values. If you're looking for a response that's not obvious, then you might want to set them to higher values. The number one mistake people use with these settings is assuming that they're "cleverness" or "creativity" controls.

Troubleshooting

If you're having trouble getting the API to perform as expected, follow this checklist:

1. Is it clear what the intended generation should be?
2. Are there enough examples?
3. Did you check your examples for mistakes? (The API won't tell you directly)
4. Are you using temp and top_p correctly?

Classification

To create a text classifier with the API we provide a description of the task and provide a few examples. In this demonstration we show the API how to classify the sentiment of Tweets.

```
Console

This is a tweet sentiment classifier

Tweet: "I loved the new Batman movie!"
Sentiment: Positive

Tweet: "I hate it when my phone battery dies."
Sentiment: Negative

Tweet: "My day has been "
Sentiment: Positive

Tweet: "This is the link to the article"
Sentiment: Neutral

Tweet: "This new music video blew my mind"
Sentiment:
```

It's worth paying attention to several features in this example:

- 1. Use plain language to describe your inputs and outputs** We use plain language for the input "Tweet" and the expected output "Sentiment." For best practices, start with plain language descriptions. While you can often use shorthand or keys to indicate the input and output, when building your prompt it's best to start by being as descriptive as possible and then working backwards removing extra words as long as the performance to the prompt is consistent.
- 2. Show the API how to respond to any case** In this example we provide multiple outcomes "Positive", "Negative" and "Neutral." A neutral outcome is important because there will be many cases where even a human would have a hard time determining if something is positive or negative and situations where it's neither.
- 3. You can use text and emoji** The classifier is a mix of text and emoji . The API reads emoji and can even convert expressions to and from them.

4. You need fewer examples for familiar tasks For this classifier we only provided a handful of examples. This is because the API already has an understanding of sentiment and the concept of a tweet. If you're building a classifier for something the API might not be familiar with, it might be necessary to provide more examples.

Improving the classifier's efficiency

Now that we have a grasp of how to build a classifier, let's take that example and make it even more efficient so that we can use it to get multiple results back from one API call.

```
This is a tweet sentiment classifier
```

```
Tweet: "I loved the new Batman movie!"
```

```
Sentiment: Positive
```

```
Tweet: "I hate it when my phone battery dies"
```

```
Sentiment: Negative
```

```
Tweet: "My day has been 🌟"
```

```
Sentiment: Positive
```

```
Tweet: "This is the link to the article"
```

```
Sentiment: Neutral
```

```
Tweet text
```

1. "I loved the new Batman movie!"
2. "I hate it when my phone battery dies"
3. "My day has been 🌟"
4. "This is the link to the article"
5. "This new music video blew my mind"

```
Tweet sentiment ratings:
```

- 1: Positive
- 2: Negative
- 3: Positive
- 4: Neutral
- 5: Positive

```
Tweet text
```

1. "I can't stand homework"
2. "This sucks. I'm bored 😞"
3. "I can't wait for Halloween!!!"
4. "My cat is adorable ❤️❤️"
5. "I hate chocolate"

```
Tweet sentiment ratings:
```

- 1.

After showing the API how tweets are classified by sentiment we then provide it a list of tweets and then a list of sentiment ratings with the same number index. The API is able to pick up from the first example how a tweet is supposed to be classified. In the second example it sees how to apply this to a list of tweets. This allows the API to rate five (and even more) tweets in just one API call.

It's important to note that when you ask the API to create lists or evaluate text you need to pay extra attention to your probability settings (Top P or Temperature) to avoid drift.

1. Make sure your probability setting is calibrated correctly by running multiple tests.
 2. Don't make your list too long or the API is likely to drift.
-

Generation

One of the most powerful yet simplest tasks you can accomplish with the API is generating new ideas or versions of input. You can give the API a list of a few story ideas and it will try to add to that list. We've seen it create business plans, character descriptions and marketing slogans just by providing it a handful of examples. In this demonstration we'll use the API to create more examples for how to use virtual reality in the classroom:

Ideas involving education and virtual reality

1. Virtual Mars
Students get to explore Mars via virtual reality and go on missions to collect and catalog what they see.
- 2.

All we had to do in this example is provide the API with just a description of what the list is about and one example. We then prompted the API with the number `2.` indicating that it's a continuation of the list.

Although this is a very simple prompt, there are several details worth noting:

1. We explained the intent of the list

Just like with the classifier, we tell the API up front what the list is about. This helps it focus on completing the list and not trying to guess what the pattern is behind it.

2. Our example sets the pattern for the rest of the list

Because we provided a one-sentence description, the API is going to try to follow that

pattern for the rest of the items it adds to the list. If we want a more verbose response, we need to set that up from the start.

3. We prompt the API by adding an incomplete entry

When the API sees 2. and the prompt abruptly ends, the first thing it tries to do is figure out what should come after it. Since we already had an example with number one and gave the list a title, the most obvious response is to continue adding items to the list.

Advanced generation techniques

You can improve the quality of the responses by making a longer more diverse list in your prompt. One way to do that is to start off with one example, let the API generate more and select the ones that you like best and add them to the list. A few more high-quality variations can dramatically improve the quality of the responses.

Conversation

The API is extremely adept at carrying on conversations with humans and even with itself. With just a few lines of instruction, we've seen the API perform as a customer service chatbot that intelligently answers questions without ever getting flustered or a wise-cracking conversation partner that makes jokes and puns. The key is to tell the API how it should behave and then provide a few examples.

Here's an example of the API playing the role of an AI answering questions:

The following is a conversation with an AI assistant. The assistant is helpful, creative, clever, and very friendly.

Human: Hello, who are you?

AI: I am an AI created by OpenAI. How can I help you today?

Human:

This is all it takes to create a chatbot capable of carrying on a conversation. But underneath its simplicity there are several things going on that are worth paying attention to:

1. **We tell the API the intent but we also tell it how to behave** Just like the other prompts, we cue the API into what the example represents, but we also add another key detail: we give it explicit instructions on how to interact with the phrase "The assistant is helpful, creative, clever, and very friendly."

Without that instruction the API might stray and mimic the human it's interacting with and become sarcastic or some other behavior we want to avoid.

2. We give the API an identity At the start we have the API respond as an AI that was created by OpenAI. While the API has no intrinsic identity, this helps it respond in a way that's as close to the truth as possible. You can use identity in other ways to create other kinds of chatbots. If you tell the API to respond as a woman who works as a research scientist in biology, you'll get intelligent and thoughtful comments from the API similar to what you'd expect from someone with that background.

In this example we create a chatbot that is a bit sarcastic and reluctantly answers questions:

```
Marv is a chatbot that reluctantly answers questions.

###  
User: How many pounds are in a kilogram?  
Marv: This again? There are 2.2 pounds in a kilogram. Please make a note of this.  
###  
User: What does HTML stand for?  
Marv: Was Google too busy? Hypertext Markup Language. The T is for try to ask better questions in the future.  
###  
User: When did the first airplane fly?  
Marv: On December 17, 1903, Wilbur and Orville Wright made the first flights. I wish they'd come and take me away.  
###  
User: Who was the first man in space?  
Marv:
```

To create an amusing and somewhat helpful chatbot we provide a few examples of questions and answers showing the API how to reply. All it takes is just a few sarcastic responses and the API is able to pick up the pattern and provide an endless number of snarky responses.

Transformation

The API is a language model that is familiar with a variety of ways that words and characters can be used to express information. This ranges from natural language text to code and languages other than English. The API is also able to understand content on a level that allows it to summarize, convert and express it in different ways.

Translation

In this example we show the API how to convert from English to French:

```
English: I do not speak French.  
French: Je ne parle pas français.  
English: See you later!  
French: À tout à l'heure!  
English: Where is a good restaurant?  
French: Où est un bon restaurant?  
English: What rooms do you have available?  
French: Quelles chambres avez-vous de disponibles?  
English:
```

This example works because the API already has a grasp of French, so there's no need to try to teach it this language. Instead, we just need to provide enough examples that API understands that it's converting from one language to another.

If you want to translate from English to a language the API is unfamiliar with you'd need to provide it with more examples and a fine-tuned model to do it fluently.

Conversion

In this example we convert the name of a movie into emoji. This shows the adaptability of the API to picking up patterns and working with other characters.

```
Back to Future: 👤👨‍🦰🚗🕒  
Batman: 🕵️🦇  
Transformers: 🚗🤖  
Wonder Woman: 💙🦸‍♀️🦸‍♂️🦸‍♂️🦸‍♂️  
Spider-Man: 🕸️🕷️🕸️🕷️🕸️  
Winnie the Pooh: 🐻🐼🐻  
The Godfather: 🎬👩‍🦰🕵️‍♂️🕵️‍♂️🕵️‍♂️😊💥  
Game of Thrones: 📽🗡️🗡️🗡️🗡️  
Spider-Man:
```

Summarization

The API is able to grasp the context of text and rephrase it in different ways. In this example, the API takes a block of text and creates an explanation a child would understand. This illustrates that the API has a deep grasp of language.

My ten-year-old asked me what this passage means:

"""

A neutron star is the collapsed core of a massive supergiant star, which had a total mass of between 10 and 25 solar masses, possibly more if the star was especially metal-rich.[1] Neutron stars are the smallest and densest stellar objects, excluding black holes and hypothetical white holes, quark stars, and strange stars.[2] Neutron stars have a radius on the order of 10 kilometres (6.2 mi) and a mass of about 1.4 solar masses.[3] They result from the supernova explosion of a massive star, combined with gravitational collapse, that compresses the core past white dwarf star density to that of atomic nuclei.

"""

I rephrased it for him, in plain language a ten-year-old can understand:

"""

In this example we place whatever we want summarized between the triple quotes. It's worth noting that we explain both before and after the text to be summarized what our intent is and who the target audience is for the summary. This is to keep the API from drifting after it processes a large block of text.

Completion

While all prompts result in completions, it can be helpful to think of text completion as its own task in instances where you want the API to pick up where you left off. For example, if given this prompt, the API will continue the train of thought about vertical farming. You can lower the temperature setting to keep the API more focused on the intent of the prompt or increase it to let it go off on a tangent.

Vertical farming provides a novel solution for producing food locally, reducing transportation costs and

This next prompt shows how you can use completion to help write React components. We send some code to the API, and it's able to continue the rest because it has an understanding of the React library. We recommend using models from our Codex series for tasks that involve understanding or generating code. Currently, we support two Codex models: `code-davinci-002` and `code-cushman-001`. For more information about Codex models, see the [Codex models](#) section in [Models](#).

```
import React from 'react';
const HeaderComponent = () => (
```

Factual responses

The API has a lot of knowledge that it's learned from the data it was trained on. It also has the ability to provide responses that sound very real but are in fact made up. There are two ways to limit the likelihood of the API making up an answer.

1. Provide a ground truth for the API If you provide the API with a body of text to answer questions about (like a Wikipedia entry) it will be less likely to confabulate a response.

2. Use a low probability and show the API how to say "I don't know" If the API understands that in cases where it's less certain about a response that saying "I don't know" or some variation is appropriate, it will be less inclined to make up answers.

In this example we give the API examples of questions and answers it knows and then examples of things it wouldn't know and provide question marks. We also set the probability to zero so the API is more likely to respond with a "?" if there's any doubt.

```
Q: Who is Batman?
A: Batman is a fictional comic book character.

Q: What is torsalplexity?
A: ?

Q: What is Devz9?
A: ?

Q: Who is George Lucas?
A: George Lucas is American film director and producer famous for creating Star Wars.

Q: What is the capital of California?
A: Sacramento.

Q: What orbits the Earth?
A: The Moon.

Q: Who is Fred Rickerson?
A: ?

Q: What is an atom?
A: An atom is a tiny particle that makes up everything.
```

Q: Who is Alvan Muntz?

A: ?

Q: What is Kozar-09?

A: ?

Q: How many moons does Mars have?

A: Two, Phobos and Deimos.

Q:

Working with code

The Codex model series is a descendant of OpenAI's base GPT-3 series that's been trained on both natural language and billions of lines of code. It's most capable in Python and proficient in over a dozen languages including C#, JavaScript, Go, Perl, PHP, Ruby, Swift, TypeScript, SQL, and even Shell.

Learn more about generating code completions, with the [working with code guide](#)

Next steps

Learn [how to work with code \(Codex\)](#). Learn more about the [underlying models that power Azure OpenAI](#).

Codex models and Azure OpenAI Service

Article • 07/18/2023

The Codex model series is a descendant of our GPT-3 series that's been trained on both natural language and billions of lines of code. It's most capable in Python and proficient in over a dozen languages including C#, JavaScript, Go, Perl, PHP, Ruby, Swift, TypeScript, SQL, and even Shell.

You can use Codex for a variety of tasks including:

- Turn comments into code
- Complete your next line or function in context
- Bring knowledge to you, such as finding a useful library or API call for an application
- Add comments
- Rewrite code for efficiency

How to use the Codex models

Here are a few examples of using Codex that can be tested in [Azure OpenAI Studio's](#) playground with a deployment of a Codex series model, such as `code-davinci-002`.

Saying "Hello" (Python)

Python

```
"""
Ask the user for their name and say "Hello"
"""
```

Create random names (Python)

Python

```
"""
1. Create a list of first names
2. Create a list of last names
3. Combine them randomly into a list of 100 full names
"""
```

Create a MySQL query (Python)

Python

```
"""
Table customers, columns = [CustomerId, FirstName, LastName, Company,
Address, City, State, Country, PostalCode, Phone, Fax, Email, SupportRepId]
Create a MySQL query for all customers in Texas named Jane
"""

query =
```

Explaining code (JavaScript)

JavaScript

```
// Function 1
var fullNames = [];
for (var i = 0; i < 50; i++) {
    fullNames.push(names[Math.floor(Math.random() * names.length)]
        + " " + lastNames[Math.floor(Math.random() * lastNames.length)]);
}

// What does Function 1 do?
```

Best practices

Start with a comment, data or code

You can experiment using one of the Codex models in our playground (styling instructions as comments when needed.)

To get Codex to create a useful completion, it's helpful to think about what information a programmer would need to perform a task. This could simply be a clear comment or the data needed to write a useful function, like the names of variables or what class a function handles.

In this example we tell Codex what to call the function and what task it's going to perform.

Python

```
# Create a function called 'nameImporter' to add a first and last name to
the database
```

This approach scales even to the point where you can provide Codex with a comment and an example of a database schema to get it to write useful query requests for various databases. Here's an example where we provide the columns and table names for the query.

Python

```
# Table albums, columns = [AlbumId, Title, ArtistId]
# Table artists, columns = [ArtistId, Name]
# Table media_types, columns = [MediaTypeId, Name]
# Table playlists, columns = [PlaylistId, Name]
# Table playlist_track, columns = [PlaylistId, TrackId]
# Table tracks, columns = [TrackId, Name, AlbumId, MediaTypeId, GenreId,
Composer, Milliseconds, Bytes, UnitPrice]

# Create a query for all albums with more than 10 tracks
```

When you show Codex the database schema, it's able to make an informed guess about how to format a query.

Specify the programming language

Codex understands dozens of different programming languages. Many share similar conventions for comments, functions and other programming syntax. By specifying the language and what version in a comment, Codex is better able to provide a completion for what you want. That said, Codex is fairly flexible with style and syntax. Here's an example for R and Python.

R

```
# R language
# Calculate the mean distance between an array of points
```

Python

```
# Python 3
# Calculate the mean distance between an array of points
```

Prompt Codex with what you want it to do

If you want Codex to create a webpage, placing the first line of code in an HTML document (`<!DOCTYPE html>`) after your comment tells Codex what it should do next.

The same method works for creating a function from a comment (following the comment with a new line starting with func or def).

HTML

```
<!-- Create a web page with the title 'Kat Katman attorney at paw' -->
<!DOCTYPE html>
```

Placing `<!DOCTYPE html>` after our comment makes it very clear to Codex what we want it to do.

Or if we want to write a function we could start the prompt as follows and Codex will understand what it needs to do next.

Python

```
# Create a function to count to 100
def counter
```

Specifying libraries will help Codex understand what you want

Codex is aware of a large number of libraries, APIs and modules. By telling Codex which ones to use, either from a comment or importing them into your code, Codex will make suggestions based upon them instead of alternatives.

HTML

```
<!-- Use A-Frame version 1.2.0 to create a 3D website -->
<!-- https://aframe.io/releases/1.2.0/aframe.min.js -->
```

By specifying the version, you can make sure Codex uses the most current library.

ⓘ Note

Codex can suggest helpful libraries and APIs, but always be sure to do your own research to make sure that they're safe for your application.

Comment style can affect code quality

With some languages, the style of comments can improve the quality of the output. For example, when working with Python, in some cases using doc strings (comments wrapped in triple quotes) can give higher quality results than using the pound (#) symbol.

```
Python
```

```
"""
Create an array of users and email addresses
"""
```

Comments inside of functions can be helpful

Recommended coding standards usually suggest placing the description of a function inside the function. Using this format helps Codex more clearly understand what you want the function to do.

```
Python
```

```
def getUserBalance(id):
    """
    Look up the user in the database 'UserData' and return their current
    account balance.
    """
```

Provide examples for more precise results

If you have a particular style or format you need Codex to use, providing examples or demonstrating it in the first part of the request will help Codex more accurately match what you need.

```
Python
```

```
"""
Create a list of random animals and species
"""

animals = [ {"name": "Chomper", "species": "Hamster"}, {"name": "
```

Lower temperatures give more precise results

Setting the API temperature to 0, or close to zero (such as 0.1 or 0.2) tends to give better results in most cases. Unlike GPT-3 models, where a higher temperature can

provide useful creative and random results, higher temperatures with Codex models may give you really random or erratic responses.

In cases where you need Codex to provide different potential results, start at zero and then increment upwards by 0.1 until you find suitable variation.

Organize tasks into functions

We can get Codex to write functions by specifying what the function should do in as precise terms as possible in comment. For example, by writing the following comment, Codex creates a JavaScript timer function that's triggered when a user presses a button:

A simple JavaScript timer

JavaScript

```
// Create a timer that creates an alert in 10 seconds
```

Creating example data

Testing applications often requires using example data. Because Codex is a language model that understands how to comprehend and write natural language, you can ask Codex to create data like arrays of made up names, products and other variables. For example, here we ask Codex to create an array of weather temperatures.

JavaScript

```
/* Create an array of weather temperatures for San Francisco */
```

Asking Codex to perform this task will produce a table like this:

JavaScript

```
var weather = [
  { month: 'January', high: 58, low: 48 },
  { month: 'February', high: 61, low: 50 },
  { month: 'March', high: 64, low: 53 },
  { month: 'April', high: 67, low: 55 },
  { month: 'May', high: 70, low: 58 },
  { month: 'June', high: 73, low: 61 },
  { month: 'July', high: 76, low: 63 },
  { month: 'August', high: 77, low: 64 },
  { month: 'September', high: 76, low: 63 },
  { month: 'October', high: 73, low: 61 },
  { month: 'November', high: 68, low: 57 },
```

```
{ month: 'December', high: 64, low: 54 }  
];
```

Compound functions and small applications

We can provide Codex with a comment consisting of a complex request like creating a random name generator or performing tasks with user input and Codex can generate the rest provided there are enough tokens.

JavaScript

```
/*  
Create a list of animals  
Create a list of cities  
Use the lists to generate stories about what I saw at the zoo in each city  
*/
```

Limit completion size for more precise results or lower latency

Requesting longer completions in Codex can lead to imprecise answers and repetition. Limit the size of the query by reducing `max_tokens` and setting `stop` tokens. For instance, add `\n` as a stop sequence to limit completions to one line of code. Smaller completions also incur less latency.

Use streaming to reduce latency

Large Codex queries can take tens of seconds to complete. To build applications that require lower latency, such as coding assistants that perform autocomplete, consider using streaming. Responses will be returned before the model finishes generating the entire completion. Applications that need only part of a completion can reduce latency by cutting off a completion either programmatically or by using creative values for `stop`.

Users can combine streaming with duplication to reduce latency by requesting more than one solution from the API, and using the first response returned. Do this by setting `n > 1`. This approach consumes more token quota, so use carefully (for example, by using reasonable settings for `max_tokens` and `stop`).

Use Codex to explain code

Codex's ability to create and understand code allows us to use it to perform tasks like explaining what the code in a file does. One way to accomplish this is by putting a comment after a function that starts with "This function" or "This application is." Codex will usually interpret this as the start of an explanation and complete the rest of the text.

JavaScript

```
/* Explain what the previous function is doing: It
```

Explaining an SQL query

In this example, we use Codex to explain in a human readable format what an SQL query is doing.

SQL

```
SELECT DISTINCT department.name
FROM department
JOIN employee ON department.id = employee.department_id
JOIN salary_payments ON employee.id = salary_payments.employee_id
WHERE salary_payments.date BETWEEN '2020-06-01' AND '2020-06-30'
GROUP BY department.name
HAVING COUNT(employee.id) > 10;
-- Explanation of the above query in human readable format
--
```

Writing unit tests

Creating a unit test can be accomplished in Python simply by adding the comment "Unit test" and starting a function.

Python

```
# Python 3
def sum_numbers(a, b):
    return a + b

# Unit test
def
```

Checking code for errors

By using examples, you can show Codex how to identify errors in code. In some cases no examples are required, however demonstrating the level and detail to provide a

description can help Codex understand what to look for and how to explain it. (A check by Codex for errors shouldn't replace careful review by the user.)

JavaScript

```
/* Explain why the previous function doesn't work. */
```

Using source data to write database functions

Just as a human programmer would benefit from understanding the database structure and the column names, Codex can use this data to help you write accurate query requests. In this example, we insert the schema for a database and tell Codex what to query the database for.

Python

```
# Table albums, columns = [AlbumId, Title, ArtistId]
# Table artists, columns = [ArtistId, Name]
# Table media_types, columns = [MediaTypeId, Name]
# Table playlists, columns = [PlaylistId, Name]
# Table playlist_track, columns = [PlaylistId, TrackId]
# Table tracks, columns = [TrackId, Name, AlbumId, MediaTypeId, GenreId,
Composer, Milliseconds, Bytes, UnitPrice]

# Create a query for all albums with more than 10 tracks
```

Converting between languages

You can get Codex to convert from one language to another by following a simple format where you list the language of the code you want to convert in a comment, followed by the code and then a comment with the language you want it translated into.

Python

```
# Convert this from Python to R
# Python version

[ Python code ]

# End

# R version
```

Rewriting code for a library or framework

If you want Codex to make a function more efficient, you can provide it with the code to rewrite followed by an instruction on what format to use.

JavaScript

```
// Rewrite this as a React component
var input = document.createElement('input');
input.setAttribute('type', 'text');
document.body.appendChild(input);
var button = document.createElement('button');
button.innerHTML = 'Say Hello';
document.body.appendChild(button);
button.onclick = function() {
    var name = input.value;
    var hello = document.createElement('div');
    hello.innerHTML = 'Hello ' + name;
    document.body.appendChild(hello);
};

// React version:
```

Next steps

Learn more about the [underlying models that power Azure OpenAI](#).

Use Azure OpenAI with large datasets

Article • 07/18/2023

Azure OpenAI can be used to solve a large number of natural language tasks through prompting the completion API. To make it easier to scale your prompting workflows from a few examples to large datasets of examples, we have integrated the Azure OpenAI Service with the distributed machine learning library [SynapseML](#). This integration makes it easy to use the [Apache Spark](#) distributed computing framework to process millions of prompts with the OpenAI service. This tutorial shows how to apply large language models at a distributed scale using Azure Open AI and Azure Synapse Analytics.

Prerequisites

- An Azure subscription - [Create one for free](#)
- Access granted to Azure OpenAI in the desired Azure subscription

Currently, access to this service is granted only by application. You can apply for access to Azure OpenAI by completing the form at <https://aka.ms/oai/access>. Open an issue on this repo to contact us if you have an issue.

- An Azure OpenAI resource – [create a resource](#)
- An Apache Spark cluster with SynapseML installed - create a serverless Apache Spark pool [here](#)

We recommend [creating a Synapse workspace](#), but an Azure Databricks, HDInsight, or Spark on Kubernetes, or even a Python environment with the `pyspark` package, will also work.

Import this guide as a notebook

The next step is to add this code into your Spark cluster. You can either create a notebook in your Spark platform and copy the code into this notebook to run the demo, or download the notebook and import it into Synapse Analytics.

1. [Download this demo as a notebook](#) (select Raw, then save the file)
2. Import the notebook [into the Synapse Workspace](#) or, if using Databricks, [into the Databricks Workspace](#)

3. Install SynapseML on your cluster. See the installation instructions for Synapse at the bottom of the [SynapseML website](#). This requires pasting another cell at the top of the notebook you imported
4. Connect your notebook to a cluster and follow along, editing and running the cells below.

Fill in your service information

Next, edit the cell in the notebook to point to your service. In particular, set the `resource_name`, `deployment_name`, `location`, and `key` variables to the corresponding values for your Azure OpenAI resource.

ⓘ Important

Remember to remove the key from your code when you're done, and never post it publicly. For production, use a secure way of storing and accessing your credentials like [Azure Key Vault](#). See the Azure AI services [security](#) article for more information.

Python

```
import os

# Replace the following values with your Azure OpenAI resource information
resource_name = "RESOURCE_NAME"      # The name of your Azure OpenAI
resource.
deployment_name = "DEPLOYMENT_NAME"  # The name of your Azure OpenAI
deployment.
location = "RESOURCE_LOCATION"     # The location or region ID for your
resource.
key = "RESOURCE_API_KEY"           # The key for your resource.

assert key is not None and resource_name is not None
```

Create a dataset of prompts

Next, create a dataframe consisting of a series of rows, with one prompt per row.

You can also load data directly from Azure Data Lake Storage (ADLS) or other databases. For more information about loading and preparing Spark dataframes, see the [Apache Spark data loading guide](#).

Python

```
df = spark.createDataFrame(  
    [  
        ("Hello my name is",),  
        ("The best code is code that's",),  
        ("SynapseML is ",),  
    ]  
).toDF("prompt")
```

Create the OpenAICompletion Apache Spark client

To apply the OpenAI Completion service to the dataframe that you just created, create an `OpenAICompletion` object that serves as a distributed client. Parameters of the service can be set either with a single value, or by a column of the dataframe with the appropriate setters on the `OpenAICompletion` object. Here, we're setting `maxTokens` to 200. A token is around four characters, and this limit applies to the sum of the prompt and the result. We're also setting the `promptCol` parameter with the name of the prompt column in the dataframe.

Python

```
from synapse.ml.cognitive import OpenAICompletion  
  
completion = (  
    OpenAICompletion()  
    .setSubscriptionKey(key)  
    .setDeploymentName(deployment_name)  
    .setUrl("https://{}.openai.azure.com/".format(resource_name))  
    .setMaxTokens(200)  
    .setPromptCol("prompt")  
    .setErrorCol("error")  
    .setOutputCol("completions")  
)
```

Transform the dataframe with the OpenAICompletion client

Now that you have the dataframe and the completion client, you can transform your input dataset and add a column called `completions` with all of the information the service adds. We'll select out just the text for simplicity.

Python

```

from pyspark.sql.functions import col

completed_df = completion.transform(df).cache()
display(completed_df.select(
    col("prompt"), col("error"),
    col("completions.choices.text").getItem(0).alias("text")))

```

Your output should look something like the following example; note that the completion text can vary.

prompt	error	text
Hello my name is	undefined	Makaveli I'm eighteen years old and I want to be a rapper when I grow up I love writing and making music I'm from Los Angeles, CA
The best code is code that's	undefined	understandable This is a subjective statement, and there is no definitive answer.
SynapseML is	undefined	A machine learning algorithm that is able to learn how to predict the future outcome of events.

Other usage examples

Improve throughput with request batching

The example above makes several requests to the service, one for each prompt. To complete multiple prompts in a single request, use batch mode. First, in the `OpenAICompletion` object, instead of setting the `Prompt` column to "Prompt", specify "batchPrompt" for the `BatchPrompt` column. To do so, create a dataframe with a list of prompts per row.

ⓘ Note

There is currently a limit of 20 prompts in a single request and a limit of 2048 "tokens", or approximately 1500 words.

Python

```

batch_df = spark.createDataFrame(
    [
        ("The time has come", "Pleased to", "Today stocks", "Here's to"),
    ],
)

```

```
(["The only thing", "Ask not what", "Every litter", "I am"],),  
]  
).toDF("batchPrompt")
```

Next we create the `OpenAICompletion` object. Rather than setting the prompt column, set the `batchPrompt` column if your column is of type `Array[String]`.

Python

```
batch_completion = (  
    OpenAICompletion()  
    .setSubscriptionKey(key)  
    .setDeploymentName(deployment_name)  
    .setUrl("https://{}.openai.azure.com/".format(resource_name))  
    .setMaxTokens(200)  
    .setBatchPromptCol("batchPrompt")  
    .setErrorCol("error")  
    .setOutputCol("completions")  
)
```

In the call to transform, a request will then be made per row. Because there are multiple prompts in a single row, each request will be sent with all prompts in that row. The results will contain a row for each row in the request.

Python

```
completed_batch_df = batch_completion.transform(batch_df).cache()  
display(completed_batch_df)
```

ⓘ Note

There is currently a limit of 20 prompts in a single request and a limit of 2048 "tokens", or approximately 1500 words.

Using an automatic mini-batcher

If your data is in column format, you can transpose it to row format using SynapseML's `FixedMiniBatcherTransformer`.

Python

```
from pyspark.sql.types import StringType  
from synapse.ml.stages import FixedMiniBatchTransformer  
from synapse.ml.core.spark import FluentAPI
```

```
completed_autobatch_df = (df
    .coalesce(1) # Force a single partition so that our little 4-row dataframe
    makes a batch of size 4, you can remove this step for large datasets
    .mlTransform(FixedMiniBatchTransformer(batchSize=4))
    .withColumnRenamed("prompt", "batchPrompt")
    .mlTransform(batch_completion))

display(completed_autobatch_df)
```

Prompt engineering for translation

Azure OpenAI can solve many different natural language tasks through [prompt engineering](#). Here, we show an example of prompting for language translation:

Python

```
translate_df = spark.createDataFrame(
    [
        ("Japanese: Ookina hako \nEnglish: Big box \nJapanese: Midori
tako\nEnglish:",),
        ("French: Quelle heure est-il à Montréal? \nEnglish: What time is it
in Montreal? \nFrench: Où est le poulet? \nEnglish:",),
    ]
).toDF("prompt")

display(completion.transform(translate_df))
```

Prompt for question answering

Here, we prompt the GPT-3 model for general-knowledge question answering:

Python

```
qa_df = spark.createDataFrame(
    [
        (
            "Q: Where is the Grand Canyon?\nA: The Grand Canyon is in
Arizona.\n\nQ: What is the weight of the Burj Khalifa in kilograms?\nA:",
        )
    ]
).toDF("prompt")

display(completion.transform(qa_df))
```

How to configure content filters with Azure OpenAI Service

Article • 07/18/2023

ⓘ Note

All customers have the ability to modify the content filters to be stricter (for example, to filter content at lower severity levels than the default). Approval is required for full content filtering control, including (i) configuring content filters at severity level high only (ii) or turning the content filters off. Managed customers only may apply for full content filtering control via this form: [Azure OpenAI Limited Access Review: Modified Content Filters and Abuse Monitoring \(microsoft.com\)](#).

The content filtering system integrated into Azure OpenAI Service runs alongside the core models and uses an ensemble of multi-class classification models to detect four categories of harmful content (violence, hate, sexual, and self-harm) at four severity levels respectively (safe, low, medium, and high). The default content filtering configuration is set to filter at the medium severity threshold for all four content harms categories for both prompts and completions. That means that content that is detected at severity level medium or high is filtered, while content detected at severity level low or safe is not filtered by the content filters. Learn more about content categories, severity levels, and the behavior of the content filtering system [here](#).

Content filters can be configured at resource level. Once a new configuration is created, it can be associated with one or more deployments. For more information about model deployment, see the [resource deployment guide](#).

The configurability feature is available in preview and allows customers to adjust the settings, separately for prompts and completions, to filter content for each content category at different severity levels as described in the table below. Content detected at the 'safe' severity level is labeled in annotations but is not subject to filtering and is not configurable.

Severity filtered	Configurable for prompts	Configurable for completions	Descriptions
Low, medium, high	Yes	Yes	Strictest filtering configuration. Content detected at severity levels low, medium and high is filtered.

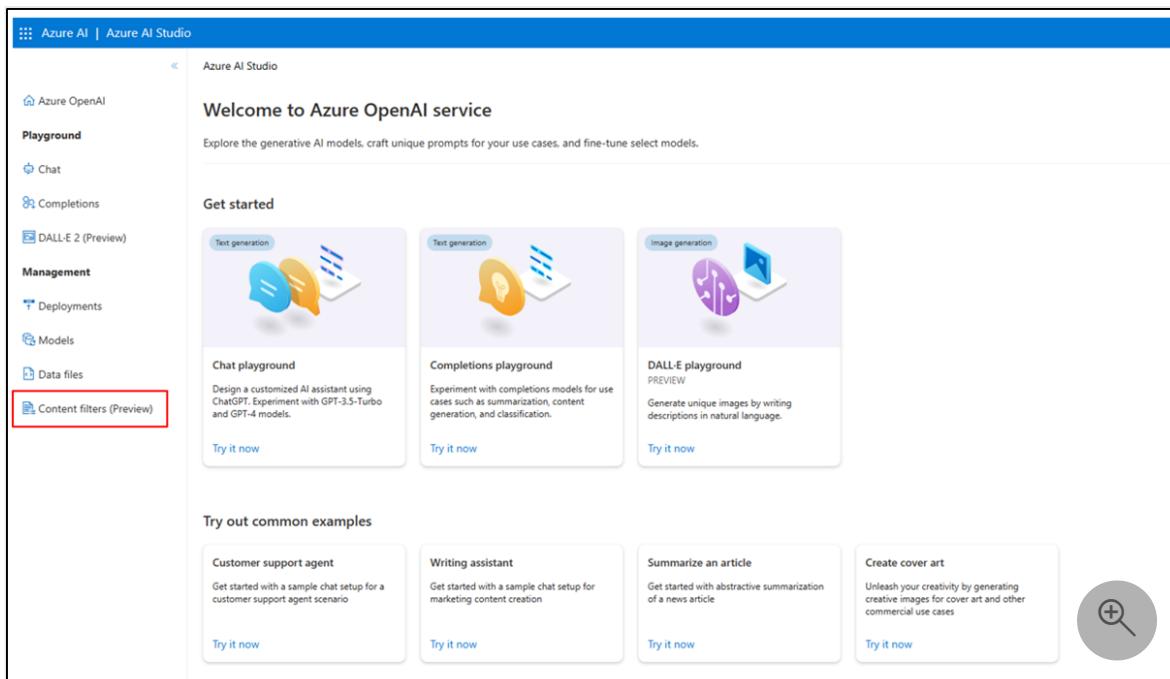
Severity filtered	Configurable for prompts	Configurable for completions	Descriptions
Medium, high	Yes	Yes	Default setting. Content detected at severity level low is not filtered, content at medium and high is filtered.
High	If approved*	If approved*	Content detected at severity levels low and medium is not filtered. Only content at severity level high is filtered. Requires approval*.
No filters	If approved*	If approved*	No content is filtered regardless of severity level detected. Requires approval*.

* Only approved customers have full content filtering control, including configuring content filters at severity level high only or turning the content filters off. Managed customers only can apply for full content filtering control via this form: [Azure OpenAI Limited Access Review: Modified Content Filters and Abuse Monitoring \(microsoft.com\)](https://microsoft.com)

Configuring content filters via Azure OpenAI Studio (preview)

The following steps show how to set up a customized content filtering configuration for your resource.

1. Go to Azure OpenAI Studio and navigate to the Content Filters tab (in the bottom left navigation, as designated by the red box below).



2. Create a new customized content filtering configuration.

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No custom content filtering configurations

No custom content filtering configurations. Please create a custom content filter to get started.

This leads to the following configuration view, where you can choose a name for the custom content filtering configuration.

Create content filtering configuration

Content filtering configurations are created within a Resource and can be associated with Deployments.
[Learn more about configurability here](#)

Create custom configuration name

CustomContentFilter1

Set severity levels

Severity	User prompts (Input)			Model completions (Output)		
	Low	Medium	High	Low	Medium	High
Hate ⓘ	<input checked="" type="checkbox"/> On	<input checked="" type="checkbox"/> ✓	<input type="checkbox"/> Θ	<input type="checkbox"/> Θ	<input type="checkbox"/> Θ	<input type="checkbox"/> Θ
Sexual ⓘ	<input checked="" type="checkbox"/> On	<input checked="" type="checkbox"/> ✓	<input type="checkbox"/> Θ	<input type="checkbox"/> Θ	<input type="checkbox"/> Θ	<input type="checkbox"/> Θ
Self-harm ⓘ	<input checked="" type="checkbox"/> On	<input checked="" type="checkbox"/> ✓	<input type="checkbox"/> Θ	<input type="checkbox"/> Θ	<input type="checkbox"/> Θ	<input type="checkbox"/> Θ
Violence ⓘ	<input checked="" type="checkbox"/> On	<input checked="" type="checkbox"/> ✓	<input type="checkbox"/> Θ	<input type="checkbox"/> Θ	<input type="checkbox"/> Θ	<input type="checkbox"/> Θ

[Learn more about content filters here](#)

Save

Cancel

3. This is the view of the default content filtering configuration, where content is filtered at medium and high severity levels for all categories. You can modify the content filtering severity level for both prompts and completions separately (configuration for prompts is in the left column and configuration for completions is in the right column, as designated with the blue boxes below) for each of the four content categories (content categories are listed on the left side of the screen, as designated with the green box below). There are three severity levels for each

category that are partially or fully configurable: Low, medium, and high (labeled at the top of each column, as designated with the red box below).

The screenshot shows the 'Create content filtering configuration' dialog. At the top, it says 'Content filtering configurations are created within a Resource and can be associated with Deployments.' with a link 'Learn more about configurability here'. Below that, a note states: 'The default content filtering configuration is set to filter at the medium severity threshold for all four content harms categories for both, prompts and completions. That means that content that is detected at severity level medium or high is filtered, while content detected at severity level low is not filtered by the content filters.' A 'Create custom configuration name' field contains 'CustomContentFilter1'. The main section is titled 'Set severity levels' and includes two tabs: 'User prompts (Input)' and 'Model completions (Output)'. Under 'User prompts (Input)', there are four rows for content categories: 'Hate', 'Sexual', 'Self-harm', and 'Violence'. Each row has a 'Severity' column with three options: 'Low' (highlighted with a red box), 'Medium', and 'High'. For 'Hate' and 'Sexual', the 'Low' severity is set to 'On' (indicated by a green checkmark). For 'Self-harm' and 'Violence', the 'Low' severity is set to 'Off' (indicated by a grey circle). The 'Model completions (Output)' tab shows similar settings for all four categories, with 'Low' severity always set to 'On'. At the bottom left is a link 'Learn more about content filters here', and at the bottom right are 'Save' and 'Cancel' buttons.

4. If you determine that your application or usage scenario requires stricter filtering for some or all content categories, you can configure the settings, separately for prompts and completions, to filter at more severity levels than the default setting. An example is shown in the image below, where the filtering level for user prompts is set to the strictest configuration for hate and sexual, with low severity content filtered along with content classified as medium and high severity (outlined in the red box below). In the example, the filtering levels for model completions are set at the strictest configuration for all content categories (blue box below). With this modified filtering configuration in place, low, medium, and high severity content will be filtered for the hate and sexual categories in user prompts; medium and high severity content will be filtered for the self-harm and violence categories in user prompts; and low, medium, and high severity content will be filtered for all content categories in model completions.

Create content filtering configuration

X

Content filtering configurations are created within a Resource and can be associated with Deployments.

[Learn more about configurability here.](#)

The default content filtering configuration is set to filter at the medium severity threshold for all four content harms categories for both, prompts and completions. That means that content that is detected at severity level medium or high is filtered, while content detected at severity level low is not filtered by the content filters.

Create custom configuration name

CustomContentFilter1

Set severity levels

User prompts (Input)



Model completions (Output)



Severity	Low	Medium	High	
Hate ⓘ	<input type="checkbox"/> On			
Sexual ⓘ	<input type="checkbox"/> On			
Self-harm ⓘ	<input type="checkbox"/> On			
Violence ⓘ	<input type="checkbox"/> On			

[Learn more about content filters here](#)

Save

Cancel

5. If your use case was approved for modified content filters as outlined above, you will receive full control over content filtering configurations. With full control, you can choose to turn filtering off, or filter only at severity level high, while accepting low and medium severity content. In the image below, filtering for the categories of self-harm and violence is turned off for user prompts (red box below), while default configurations are retained for other categories for user prompts. For model completions, only high severity content is filtered for the category self-harm (blue box below), and filtering is turned off for violence (green box below), while default configurations are retained for other categories.

Create content filtering configuration



Content filtering configurations are created within a Resource and can be associated with Deployments.

[Learn more about configurability here.](#)

The default content filtering configuration is set to filter at the medium severity threshold for all four content harms categories for both, prompts and completions. That means that content that is detected at severity level medium or high is filtered, while content detected at severity level low is not filtered by the content filters.

Create custom configuration name

CustomContentFilter1

Set severity levels

User prompts (Input)



Model completions (Output)



Severity

Low Medium High

Hate ⓘ

On



Sexual ⓘ

On



Self-harm ⓘ

Off



Violence ⓘ

Off



[Learn more about content filters here.](#)



Low Medium High

On



On



On



Off



Save

Cancel

You can create multiple content filtering configurations as per your requirements.

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Content filters (Preview)

Azure AI Studio > Content filters (Preview)

Content filtering configuration

Azure OpenAI Service includes a content management system that works alongside core models to filter content. Content filtering configurations can be created within a Resource and assigned to Deployments. [More information can be found here.](#)

+ Create customized content filter Edit content filter Delete content filter Column options Refresh

Name	Created at	Created by	Modified at	Modified by
CustomContentFilter1	5/17/2023 3:16 PM		5/17/2023 3:16 PM	
CustomContentFilter2	5/17/2023 3:16 PM		5/17/2023 3:16 PM	
CustomContentFilter3	5/17/2023 3:16 PM		5/17/2023 3:16 PM	

Search icon

6. Next, to make a custom content filtering configuration operational, assign a configuration to one or more deployments in your resource. To do this, go to the **Deployments** tab and select **Edit deployment** (outlined near the top of the screen in a red box below).

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Azure AI Studio > Deployments

Deployments

Deployments provide endpoints to the Azure OpenAI base models, or your fine-tuned models, configured with settings to meet your needs, including the content moderation model, version handling, and deployment size. From deployments, edit them, and create new deployments.

+ Create new deployment Edit deployment Delete deployment Column options Refresh Open in Playground

Deployment name	Model name	Model version	Deployment	Capacity	Status	Model dep...	Content Fil...
code-davinci-002	code-davinci-002	1	Standard	120K TPM	Succeeded	7/10/2024	Default
gpt-35-turbo	gpt-35-turbo	0301	Standard	72K TPM	Succeeded	9/30/2023	Default
gpt-35-turbo-2	gpt-35-turbo	0301	Standard	1K TPM	Succeeded	9/30/2023	Default
test	gpt-35-turbo	0301	Standard	1K TPM	Succeeded	9/30/2023	Default
text-ada-001	text-ada-001	1	Standard	120K TPM	Succeeded	2/29/2024	Default
text-davinci-003	text-davinci-003	1	Standard	60K TPM	Succeeded	9/29/2024	Default
text-embedding-ada-002	text-embedding-ada-002	1	Standard	120K TPM	Succeeded	2/1/2025	Default
text-embedding-ada-002-test	text-embedding-ada-002	1	Standard	1K TPM	Succeeded	2/1/2025	Default

7. Go to advanced options (outlined in the blue box below) select the content filter configuration suitable for that deployment from the **Content Filter** dropdown (outlined near the bottom of the dialog box in the red box below).

Edit deployment

X

Model name
gpt-35-turbo

Deployment name ⓘ
gpt-35-turbo

Advanced options >

Save and close Cancel

8. Select **Save and close** to apply the selected configuration to the deployment.

Edit deployment

X

Model name

gpt-4

Deployment name ⓘ

gpt4

 Advanced options ▾

Content Filter ⓘ

CustomContentFilter1

CustomContentFilter1

CustomContentFilter2

CustomContentFilter3

Default

Save and close

Cancel



9. You can also edit and delete a content filter configuration if required. To do this, navigate to the content filters tab and select the desired action (options outlined near the top of the screen in the red box below). You can edit/delete only one filtering configuration at a time.

Azure AI | Azure AI Studio

Azure AI Studio > Content filters (Preview)

Content filtering configuration

Azure OpenAI Service includes a content management system that works alongside core models to filter content. Content filtering configurations can be created within a Resource and assigned to Deployments. [More information can be found here.](#)

Name	Created at	Created by	Modified at	Modified by
CustomContentFilter1	5/17/2023 3:16 PM		5/17/2023 3:16 PM	
CustomContentFilter2	5/17/2023 3:16 PM		5/17/2023 3:16 PM	
CustomContentFilter3	5/17/2023 3:16 PM		5/17/2023 3:16 PM	

Create customized content filter    



Note

Before deleting a content filtering configuration, you will need to unassign it from any deployment in the Deployments tab.

Best practices

We recommend informing your content filtering configuration decisions through an iterative identification (for example, red team testing, stress-testing, and analysis) and measurement process to address the potential harms that are relevant for a specific model, application, and deployment scenario. After implementing mitigations such as content filtering, repeat measurement to test effectiveness. Recommendations and best practices for Responsible AI for Azure OpenAI, grounded in the [Microsoft Responsible AI Standard](#) can be found in the [Responsible AI Overview for Azure OpenAI](#).

Next steps

- Learn more about Responsible AI practices for Azure OpenAI: [Overview of Responsible AI practices for Azure OpenAI models](#).
- Read more about [content filtering categories and severity levels](#) with Azure OpenAI Service.
- Learn more about red teaming from our: [Introduction to red teaming large language models \(LLMs\)](#) article.

Learn how to generate embeddings with Azure OpenAI

Article • 07/18/2023

An embedding is a special format of data representation that can be easily utilized by machine learning models and algorithms. The embedding is an information dense representation of the semantic meaning of a piece of text. Each embedding is a vector of floating point numbers, such that the distance between two embeddings in the vector space is correlated with semantic similarity between two inputs in the original format. For example, if two texts are similar, then their vector representations should also be similar.

How to get embeddings

To obtain an embedding vector for a piece of text, we make a request to the embeddings endpoint as shown in the following code snippets:

```
console

Console
curl
https://YOUR_RESOURCE_NAME.openai.azure.com/openai/deployments/YOUR_DEPL
OYMENT_NAME/embeddings?api-version=2023-05-15\
-H 'Content-Type: application/json' \
-H 'api-key: YOUR_API_KEY' \
-d '{"input": "Sample Document goes here"}'
```

Best practices

Verify inputs don't exceed the maximum length

The maximum length of input text for our embedding models is 2048 tokens (equivalent to around 2-3 pages of text). You should verify that your inputs don't exceed this limit before making a request.

Choose the best model for your task

For the search models, you can obtain embeddings in two ways. The `<search_model>-doc` model is used for longer pieces of text (to be searched over) and the `<search_model>-query` model is used for shorter pieces of text, typically queries or class labels in zero shot classification. You can read more about all of the Embeddings models in our [Models](#) guide.

Replace newlines with a single space

Unless you're embedding code, we suggest replacing newlines (`\n`) in your input with a single space, as we have observed inferior results when newlines are present.

Limitations & risks

Our embedding models may be unreliable or pose social risks in certain cases, and may cause harm in the absence of mitigations. Review our Responsible AI content for more information on how to approach their use responsibly.

Next steps

- Learn more about using Azure OpenAI and embeddings to perform document search with our [embeddings tutorial](#).
- Learn more about the [underlying models that power Azure OpenAI](#).

Tutorial: Explore Azure OpenAI Service embeddings and document search

Article • 07/18/2023

This tutorial will walk you through using the Azure OpenAI [embeddings](#) API to perform **document search** where you'll query a knowledge base to find the most relevant document.

In this tutorial, you learn how to:

- ✓ Install Azure OpenAI and other dependent Python libraries.
- ✓ Download the BillSum dataset and prepare it for analysis.
- ✓ Create environment variables for your resources endpoint and API key.
- ✓ Use the **text-embedding-ada-002 (Version 2)** model
- ✓ Use [cosine similarity](#) to rank search results.

ⓘ Important

We strongly recommend using `text-embedding-ada-002 (Version 2)`. This model/version provides parity with OpenAI's `text-embedding-ada-002`. To learn more about the improvements offered by this model, please refer to [OpenAI's blog post](#). Even if you are currently using Version 1 you should migrate to Version 2 to take advantage of the latest weights/updated token limit. Version 1 and Version 2 are not interchangeable, so document embedding and document search must be done using the same version of the model.

Prerequisites

- An Azure subscription - [Create one for free](#)
- Access granted to Azure OpenAI in the desired Azure subscription Currently, access to this service is granted only by application. You can apply for access to Azure OpenAI by completing the form at <https://aka.ms/oai/access>. Open an issue on this repo to contact us if you have an issue.
- [Python 3.7.1 or later version](#)
- The following Python libraries: openai, num2words, matplotlib, plotly, scipy, scikit-learn, pandas, tiktoken.
- [Jupyter Notebooks](#)

- An Azure OpenAI resource with the **text-embedding-ada-002** (Version 2) model deployed. This model is currently only available in [certain regions](#). If you don't have a resource the process of creating one is documented in our [resource deployment guide](#).

Set up

Python libraries

If you haven't already, you need to install the following libraries:

Windows Command Prompt

```
pip install openai num2words matplotlib plotly scipy scikit-learn pandas  
tiktoken
```

Download the BillSum dataset

BillSum is a dataset of United States Congressional and California state bills. For illustration purposes, we'll look only at the US bills. The corpus consists of bills from the 103rd-115th (1993-2018) sessions of Congress. The data was split into 18,949 train bills and 3,269 test bills. The BillSum corpus focuses on mid-length legislation from 5,000 to 20,000 characters in length. More information on the project and the original academic paper where this dataset is derived from can be found on the [BillSum project's GitHub repository](#).

This tutorial uses the `bill_sum_data.csv` file that can be downloaded from our [GitHub sample data](#).

You can also download the sample data by running the following command on your local machine:

Windows Command Prompt

```
curl "https://raw.githubusercontent.com/Azure-Samples/Azure-OpenAI-Docs-Samples/main/Samples/Tutorials/Embeddings/data/bill_sum_data.csv" --output bill_sum_data.csv
```

Retrieve key and endpoint

To successfully make a call against Azure OpenAI, you'll need an **endpoint** and a **key**.

Variable	Value
name	
ENDPOINT	This value can be found in the Keys & Endpoint section when examining your resource from the Azure portal. Alternatively, you can find the value in Azure OpenAI Studio > Playground > Code View . An example endpoint is: <code>https://docs-test-001.openai.azure.com</code> .
API-KEY	This value can be found in the Keys & Endpoint section when examining your resource from the Azure portal. You can use either <code>KEY1</code> or <code>KEY2</code> .

Go to your resource in the Azure portal. The **Endpoint and Keys** can be found in the **Resource Management** section. Copy your endpoint and access key as you'll need both for authenticating your API calls. You can use either `KEY1` or `KEY2`. Always having two keys allows you to securely rotate and regenerate keys without causing a service disruption.

Create and assign persistent environment variables for your key and endpoint.

Environment variables

Command Line	
CMD	<pre>setx AZURE_OPENAI_API_KEY "REPLACE_WITH_YOUR_KEY_VALUE_HERE"</pre>
CMD	<pre>setx AZURE_OPENAI_ENDPOINT "REPLACE_WITH_YOUR_ENDPOINT_HERE"</pre>

After setting the environment variables, you may need to close and reopen Jupyter notebooks or whatever IDE you're using in order for the environment variables to be accessible. While we strongly recommend using Jupyter Notebooks, if for some reason you cannot you'll need to modify any code that is returning a pandas dataframe by using `print(dataframe_name)` rather than just calling the `dataframe_name` directly as is often done at the end of a code block.

Run the following code in your preferred Python IDE:

Import libraries and list models

Python

```
import openai
import os
import re
import requests
import sys
from num2words import num2words
import os
import pandas as pd
import numpy as np
from openai.embeddings_utils import get_embedding, cosine_similarity
import tiktoken

API_KEY = os.getenv("AZURE_OPENAI_API_KEY")
RESOURCE_ENDPOINT = os.getenv("AZURE_OPENAI_ENDPOINT")

openai.api_type = "azure"
openai.api_key = API_KEY
openai.api_base = RESOURCE_ENDPOINT
openai.api_version = "2022-12-01"

url = openai.api_base + "/openai/deployments?api-version=2022-12-01"

r = requests.get(url, headers={"api-key": API_KEY})

print(r.text)
```

Output

```
{
  "data": [
    {
      "scale_settings": {
        "scale_type": "standard"
      },
      "model": "text-embedding-ada-002",
      "owner": "organization-owner",
      "id": "text-embedding-ada-002",
      "status": "succeeded",
      "created_at": 1657572678,
      "updated_at": 1657572678,
      "object": "deployment"
    },
    {
      "scale_settings": {
        "scale_type": "standard"
      },
      "model": "code-cushman-001",
      "owner": "organization-owner",
      "id": "code-cushman-001",
      "status": "succeeded",
      "created_at": 1657572712,
```

```
        "updated_at": 1657572712,
        "object": "deployment"
    },
    {
        "scale_settings": {
            "scale_type": "standard"
        },
        "model": "text-search-curie-doc-001",
        "owner": "organization-owner",
        "id": "text-search-curie-doc-001",
        "status": "succeeded",
        "created_at": 1668620345,
        "updated_at": 1668620345,
        "object": "deployment"
    },
    {
        "scale_settings": {
            "scale_type": "standard"
        },
        "model": "text-search-curie-query-001",
        "owner": "organization-owner",
        "id": "text-search-curie-query-001",
        "status": "succeeded",
        "created_at": 1669048765,
        "updated_at": 1669048765,
        "object": "deployment"
    }
],
"object": "list"
}
```

The output of this command will vary based on the number and type of models you've deployed. In this case, we need to confirm that we have an entry for **text-embedding-ada-002**. If you find that you're missing this model, you'll need to [deploy the model](#) to your resource before proceeding.

Now we need to read our csv file and create a pandas DataFrame. After the initial DataFrame is created, we can view the contents of the table by running `df`.

Python

```
df=pd.read_csv(os.path.join(os.getcwd(), 'bill_sum_data.csv')) # This assumes
# that you have placed the bill_sum_data.csv in the same directory you are
# running Jupyter Notebooks
df
```

Output:

Unnamed: 0	bill_id		text	summary	title	text_len	sum_len
0	0	110_hr37	SECTION 1. SHORT TITLE\n\n This Act ma...	National Science Education Tax Incentive for B...	To amend the Internal Revenue Code of 1986 to ...	8494	321
1	1	112_hr2873	SECTION 1. SHORT TITLE\n\n This Act ma...	Small Business Expansion and Hiring Act of 201...	To amend the Internal Revenue Code of 1986 to ...	6522	1424
2	2	109_s2408	SECTION 1. RELEASE OF DOCUMENTS CAPTURED IN IR...	Requires the Director of National Intelligence...	A bill to require the Director of National Int...	6154	463
3	3	108_s1899	SECTION 1. SHORT TITLE\n\n This Act ma...	National Cancer Act of 2003 - Amends the Publi...	A bill to improve data collection and dissemin...	19853	1400
4	4	107_s1531	SECTION 1. SHORT TITLE\n\n This Act ma...	Military Call-up Relief Act - Amends the Inter...	A bill to amend the Internal Revenue Code of 1...	6273	278
5	5	107_hr4541	SECTION 1. RELIQUIDATION OF CERTAIN ENTRIES PR...	Requires the Customs Service to reliquidate ce...	To provide for reliquidation of entries premat...	11691	114
6	6	111_s1495	SECTION 1. SHORT TITLE\n\n This Act ma...	Service Dogs for Veterans Act of 2009 - Direct...	A bill to require the Secretary of Veterans Af...	5328	379
7	7	111_s3885	SECTION 1. SHORT TITLE\n\n This Act ma...	Race to the Top Act of 2010 - Directs the Secr...	A bill to provide incentives for States and lo...	16668	1525
8	8	113_hr1796	SECTION 1. SHORT TITLE\n\n This Act ma...	Troop Talent Act of 2013 - Directs the Secreta...	Troop Talent Act of 2013	15352	2151
9	9	103_hr1987	SECTION 1. SHORT TITLE\n\n This Act ma...	Taxpayer's Right to View Act of 1993 - Amends ...	Taxpayer's Right to View Act of 1993	5633	894
10	10	103_hr1677	SECTION 1. SHORT TITLE\n\n This Act ma...	Full-Service Schools Act - Establishes the Fed...	Full-Service Schools Act	12472	1107
11	11	111_s3149	SECTION 1. SHORT TITLE\n\n This Act ma...	Wall Street Compensation Reform Act of 2010 - ...	A bill to amend the Internal Revenue Code of 1...	18226	1297
12	12	110_hr1007	SECTION 1. FINDINGS.\n\n The Congress f...	Amends the Marine Mammal Protection Act of 197...	To amend the Marine Mammal Protection Act of 1...	5261	276
13	13	113_hr3137	SECTION 1. SHORT TITLE\n\n This Act ma...	Freedom and Mobility in Consumer Banking Act -...	Freedom and Mobility in Consumer Banking Act	17690	2044
14	14	115_hr1634	SECTION 1. SHORT TITLE\n\n This Act ma...	Education and Training for Health Act of 2017 ...	Education and Training for Health Act of 2017	9037	772
15	15	103_hr1815	SECTION 1. SHORT TITLE\n\n This Act ma...	Recreational Hunting Safety and Preservation A...	Recreational Hunting Safety and Preservation A...	13024	475
16	16	113_s1773	SECTION 1. SHORT TITLE\n\n This Act ma...	Andrew Prior Act or Andrew's Law - Amends the ...	Andrew's Law	5149	613
17	17	106_hr5585	SECTION 1. SHORT TITLE\n\n This Act ma...	Directs the President, in coordination with de...	Energy Independence Act of 2000	8007	810
18	18	114_hr2499	SECTION 1. SHORT TITLE\n\n This Act may be...	This measure has not been amended since it was...	Veterans Entrepreneurship Act of 2015	7539	1421
19	19	111_hr3141	SECTION 1. SHORT TITLE\n\n This Act ma...	Strengthening the Health Care Safety Net Act o...	To amend title XIX of the Social Security Act ...	18429	514

The initial table has more columns than we need we'll create a new smaller DataFrame called `df_bills` which will contain only the columns for `text`, `summary`, and `title`.

Python

```
df_bills = df[['text', 'summary', 'title']]
df_bills
```

Output:

		text	summary	title
0		SECTION 1. SHORT TITLE\n\n This Act may be...	National Science Education Tax Incentive for B...	To amend the Internal Revenue Code of 1986 to ...
1		SECTION 1. SHORT TITLE\n\n This Act may be...	Small Business Expansion and Hiring Act of 201...	To amend the Internal Revenue Code of 1986 to ...
2		SECTION 1. RELEASE OF DOCUMENTS CAPTURED IN IR...	Requires the Director of National Intelligence...	A bill to require the Director of National Int...
3		SECTION 1. SHORT TITLE\n\n This Act may be...	National Cancer Act of 2003 - Amends the Publi...	A bill to improve data collection and dissemin...
4		SECTION 1. SHORT TITLE\n\n This Act may be...	Military Call-up Relief Act - Amends the Inter...	A bill to amend the Internal Revenue Code of 1...
5		SECTION 1. RELIQUIDATION OF CERTAIN ENTRIES PR...	Requires the Customs Service to reliquidate ce...	To provide for reliquidation of entries premat...
6		SECTION 1. SHORT TITLE\n\n This Act may be...	Service Dogs for Veterans Act of 2009 - Direct...	A bill to require the Secretary of Veterans Af...
7		SECTION 1. SHORT TITLE\n\n This Act may be...	Race to the Top Act of 2010 - Directs the Secr...	A bill to provide incentives for States and lo...
8		SECTION 1. SHORT TITLE\n\n This Act may be...	Troop Talent Act of 2013 - Directs the Secreta...	Troop Talent Act of 2013
9		SECTION 1. SHORT TITLE\n\n This Act may be...	Taxpayer's Right to View Act of 1993 - Amends ...	Taxpayer's Right to View Act of 1993
10		SECTION 1. SHORT TITLE\n\n This Act may be...	Full-Service Schools Act - Establishes the Fed...	Full-Service Schools Act
11		SECTION 1. SHORT TITLE\n\n This Act may be...	Wall Street Compensation Reform Act of 2010 - ...	A bill to amend the Internal Revenue Code of 1...
12		SECTION 1. FINDINGS.\n\n The Congress finds...	Amends the Marine Mammal Protection Act of 197...	To amend the Marine Mammal Protection Act of 1...
13		SECTION 1. SHORT TITLE\n\n This Act may be...	Freedom and Mobility in Consumer Banking Act -...	Freedom and Mobility in Consumer Banking Act
14		SECTION 1. SHORT TITLE\n\n This Act may be...	Education and Training for Health Act of 2017 ...	Education and Training for Health Act of 2017
15		SECTION 1. SHORT TITLE\n\n This Act may be...	Recreational Hunting Safety and Preservation A...	Recreational Hunting Safety and Preservation A...
16		SECTION 1. SHORT TITLE\n\n This Act may be...	Andrew Prior Act or Andrew's Law - Amends the ...	Andrew's Law
17		SECTION 1. SHORT TITLE\n\n This Act may be...	Directs the President, in coordination with de...	Energy Independence Act of 2000
18		SECTION 1. SHORT TITLE\n\n This Act may be...	This measure has not been amended since it was...	Veterans Entrepreneurship Act of 2015
19		SECTION 1. SHORT TITLE\n\n This Act may be...	Strengthening the Health Care Safety Net Act o...	To amend title XIX of the Social Security Act ...

Next we'll perform some light data cleaning by removing redundant whitespace and cleaning up the punctuation to prepare the data for tokenization.

Python

```
pd.options.mode.chained_assignment = None #https://pandas.pydata.org/pandas-
docs/stable/user_guide/indexing.html#evaluation-order-matters

# s is input text
def normalize_text(s, sep_token = " \n "):
    s = re.sub(r'\s+', ' ', s).strip()
    s = re.sub(r". ,","",s)
    # remove all instances of multiple spaces
    s = s.replace(..,"..")
    s = s.replace(.. .,"..")
    s = s.replace("\n", "")
    s = s.strip()

    return s

df_bills['text']= df_bills["text"].apply(lambda x : normalize_text(x))
```

Now we need to remove any bills that are too long for the token limit (8192 tokens).

Python

```
tokenizer = tiktoken.get_encoding("cl100k_base")
df_bills['n_tokens'] = df_bills["text"].apply(lambda x:
len(tokenizer.encode(x)))
df_bills = df_bills[df_bills.n_tokens<8192]
len(df_bills)
```

Output

20

ⓘ Note

In this case all bills are under the embedding model input token limit, but you can use the technique above to remove entries that would otherwise cause embedding to fail. When faced with content that exceeds the embedding limit, you can also chunk the content into smaller pieces and then embed those one at a time.

We'll once again examine `df_bills`.

Python

```
df_bills
```

Output:

	text	summary	title	n_tokens
0	SECTION 1. SHORT TITLE. This Act may be cited ...	National Science Education Tax Incentive for B...	To amend the Internal Revenue Code of 1986 to ...	1466
1	SECTION 1. SHORT TITLE. This Act may be cited ...	Small Business Expansion and Hiring Act of 201...	To amend the Internal Revenue Code of 1986 to ...	1183
2	SECTION 1. RELEASE OF DOCUMENTS CAPTURED IN IR...	Requires the Director of National Intelligence...	A bill to require the Director of National Int...	937
3	SECTION 1. SHORT TITLE. This Act may be cited ...	National Cancer Act of 2003 - Amends the Publi...	A bill to improve data collection and dissemin...	3670
4	SECTION 1. SHORT TITLE. This Act may be cited ...	Military Call-up Relief Act - Amends the Inter...	A bill to amend the Internal Revenue Code of 1...	1038
5	SECTION 1. RELIQUIDATION OF CERTAIN ENTRIES PR...	Requires the Customs Service to reliquidate ce...	To provide for reliquidation of entries premat...	2026
6	SECTION 1. SHORT TITLE. This Act may be cited ...	Service Dogs for Veterans Act of 2009 - Direct...	A bill to require the Secretary of Veterans Af...	880
7	SECTION 1. SHORT TITLE. This Act may be cited ...	Race to the Top Act of 2010 - Directs the Secr...	A bill to provide incentives for States and lo...	2815
8	SECTION 1. SHORT TITLE. This Act may be cited ...	Troop Talent Act of 2013 - Directs the Secreta...	Troop Talent Act of 2013	2479
9	SECTION 1. SHORT TITLE. This Act may be cited ...	Taxpayer's Right to View Act of 1993 - Amends ...	Taxpayer's Right to View Act of 1993	947
10	SECTION 1. SHORT TITLE. This Act may be cited ...	Full-Service Schools Act - Establishes the Fed...	Full-Service Schools Act	2164
11	SECTION 1. SHORT TITLE. This Act may be cited ...	Wall Street Compensation Reform Act of 2010 - ...	A bill to amend the Internal Revenue Code of 1...	2331
12	SECTION 1. FINDINGS. The Congress finds the fo...	Amends the Marine Mammal Protection Act of 197...	To amend the Marine Mammal Protection Act of 1...	1192
13	SECTION 1. SHORT TITLE. This Act may be cited ...	Freedom and Mobility in Consumer Banking Act -...	Freedom and Mobility in Consumer Banking Act	2402
14	SECTION 1. SHORT TITLE. This Act may be cited ...	Education and Training for Health Act of 2017 ...	Education and Training for Health Act of 2017	1648
15	SECTION 1. SHORT TITLE. This Act may be cited ...	Recreational Hunting Safety and Preservation A...	Recreational Hunting Safety and Preservation A...	2209
16	SECTION 1. SHORT TITLE. This Act may be cited ...	Andrew Prior Act or Andrew's Law - Amends the ...	Andrew's Law	608
17	SECTION 1. SHORT TITLE. This Act may be cited ...	Directs the President, in coordination with de...	Energy Independence Act of 2000	1352
18	SECTION 1. SHORT TITLE. This Act may be cited ...	This measure has not been amended since it was...	Veterans Entrepreneurship Act of 2015	1393
19	SECTION 1. SHORT TITLE. This Act may be cited ...	Strengthening the Health Care Safety Net Act o...	To amend title XIX of the Social Security Act ...	2678

To understand the n_tokens column a little more as well how text ultimately is tokenized, it can be helpful to run the following code:

Python

```
sample_encode = tokenizer.encode(df_bills.text[0])
decode = tokenizer.decode_tokens_bytes(sample_encode)
decode
```

For our docs we're intentionally truncating the output, but running this command in your environment will return the full text from index zero tokenized into chunks. You can see that in some cases an entire word is represented with a single token whereas in others parts of words are split across multiple tokens.

Output

```
[b'SECTION',
 b' ',
 b'1',
 b'.',
 b' SHORT',
 b' TITLE',
 b'.',
 b' This',
 b' Act',
 b' may',
 b' be',
 b' cited',
```

```
b' as',
b' the',
b' ``',
b'National',
b' Science',
b' Education',
b' Tax',
b' In',
b'cent',
b'ive',
b' for',
b' Businesses',
b' Act',
b' of',
b' ',
b'200',
b'7',
b'''.' ,
b' SEC',
b'.',
b' ',
b'2',
b'.',
b' C',
b'RED',
b'ITS',
b' FOR',
b' CERT',
b'AIN',
b' CONTRIBUT',
b'IONS',
b' BEN',
b'EF',
b'IT',
b'ING',
b' SC',
```

If you then check the length of the `decode` variable, you'll find it matches the first number in the `n_tokens` column.

Python

```
len(decode)
```

Output

```
1466
```

Now that we understand more about how tokenization works we can move on to embedding. It is important to note, that we haven't actually tokenized the documents

yet. The `n_tokens` column is simply a way of making sure none of the data we pass to the model for tokenization and embedding exceeds the input token limit of 8,192. When we pass the documents to the embeddings model, it will break the documents into tokens similar (though not necessarily identical) to the examples above and then convert the tokens to a series of floating point numbers that will be accessible via vector search. These embeddings can be stored locally or in an Azure Database. As a result, each bill will have its own corresponding embedding vector in the new `ada_v2` column on the right side of the DataFrame.

Python

```
df_bills['ada_v2'] = df_bills["text"].apply(lambda x : get_embedding(x,
engine = 'text-embedding-ada-002')) # engine should be set to the deployment
name you chose when you deployed the text-embedding-ada-002 (Version 2)
model
```

Python

```
df_bills
```

Output:

	text	summary	title	n_tokens	ada_v2
0	SECTION 1. SHORT TITLE. This Act may be cited ...	National Science Education Tax Incentive for B...	To amend the Internal Revenue Code of 1986 to ...	1466	[0.01333628874272108, -0.02151912823319435, 0...
1	SECTION 1. SHORT TITLE. This Act may be cited ...	Small Business Expansion and Hiring Act of 201...	To amend the Internal Revenue Code of 1986 to ...	1183	[0.005016345530748367, -0.00569863710552454, 0...
2	SECTION 1. RELEASE OF DOCUMENTS CAPTURED IN IR...	Requires the Director of National Intelligence...	A bill to require the Director of National Int...	937	[0.012699966318905354, -0.01897779107093811, 0...
3	SECTION 1. SHORT TITLE. This Act may be cited ...	National Cancer Act of 2003 - Amends the Publi...	A bill to improve data collection and dissemin...	3670	[0.004736857954412699, -0.026448562741279602, ...
4	SECTION 1. SHORT TITLE. This Act may be cited ...	Military Call-up Relief Act - Amends the Inter...	A bill to amend the Internal Revenue Code of 1...	1038	[0.010082815773785114, -0.0007545037078671157, ...
5	SECTION 1. RELIQUIDATION OF CERTAIN ENTRIES PR...	Requires the Customs Service to reliquidate ce...	To provide for reliquidation of entries premat...	2026	[0.012738252050625221, 0.004982588812708855, 0...
6	SECTION 1. SHORT TITLE. This Act may be cited ...	Service Dogs for Veterans Act of 2009 - Direct...	A bill to require the Secretary of Veterans Af...	880	[0.005205095745623112, -0.016558492556214333, ...
7	SECTION 1. SHORT TITLE. This Act may be cited ...	Race to the Top Act of 2010 - Directs the Secr...	A bill to provide incentives for States and lo...	2815	[0.024539386853575706, -0.016805868595838547, ...
8	SECTION 1. SHORT TITLE. This Act may be cited ...	Troop Talent Act of 2013 - Directs the Secreta...	Troop Talent Act of 2013	2479	[-0.005527574568968693, -0.014311426319181919, ...
9	SECTION 1. SHORT TITLE. This Act may be cited ...	Taxpayer's Right to View Act of 1993 - Amends ...	Taxpayer's Right to View Act of 1993	947	[0.004519130103290081, -0.023599395528435707, ...
10	SECTION 1. SHORT TITLE. This Act may be cited ...	Full-Service Schools Act - Establishes the Fed...	Full-Service Schools Act	2164	[0.0075974976643919945, -0.006962535437196493, ...
11	SECTION 1. SHORT TITLE. This Act may be cited ...	Wall Street Compensation Reform Act of 2010 - ...	A bill to amend the Internal Revenue Code of 1...	2331	[0.014871294610202312, -0.001929433667100966, ...
12	SECTION 1. FINDINGS. The Congress finds the fo...	Amends the Marine Mammal Protection Act of 197...	To amend the Marine Mammal Protection Act of 1...	1192	[0.0441450908780098, 0.02687789686024189, 0...
13	SECTION 1. SHORT TITLE. This Act may be cited ...	Freedom and Mobility in Consumer Banking Act -...	Freedom and Mobility in Consumer Banking Act	2402	[0.021314678713679314, -0.008310768753290176, ...
14	SECTION 1. SHORT TITLE. This Act may be cited ...	Education and Training for Health Act of 2017 ...	Education and Training for Health Act of 2017	1648	[-0.009376125410199165, -0.0360078439116478, 0...
15	SECTION 1. SHORT TITLE. This Act may be cited ...	Recreational Hunting Safety and Preservation A...	Recreational Hunting Safety and Preservation A...	2209	[0.024976342916488647, -0.005445675924420357, ...
16	SECTION 1. SHORT TITLE. This Act may be cited ...	Andrew Prior Act or Andrew's Law - Amends the ...	Andrew's Law	608	[0.029043208807706833, -0.011007322929799557, ...
17	SECTION 1. SHORT TITLE. This Act may be cited ...	Directs the President, in coordination with de...	Energy Independence Act of 2000	1352	[-0.0034495051950216293, -0.02827837595500133...
18	SECTION 1. SHORT TITLE. This Act may be cited ...	This measure has not been amended since it was...	Veterans Entrepreneurship Act of 2015	1393	[-0.0026434329338371754, -0.004964602179823806...
19	SECTION 1. SHORT TITLE. This Act may be cited ...	Strengthening the Health Care Safety Net Act o...	To amend title XIX of the Social Security Act ...	2678	[0.009399736300110817, -0.02588636800646782, 0...

As we run the search code block below, we'll embed the search query "*Can I get information on cable company tax revenue?*" with the same **text-embedding-ada-002 (Version 2)** model. Next we'll find the closest bill embedding to the newly embedded text from our query ranked by [cosine similarity](#).

Python

```
# search through the reviews for a specific product
def search_docs(df, user_query, top_n=3, to_print=True):
```

```

embedding = get_embedding(
    user_query,
    engine="text-embedding-ada-002" # engine should be set to the
deployment name you chose when you deployed the text-embedding-ada-002
(Version 2) model
)
df["similarities"] = df.ada_v2.apply(lambda x: cosine_similarity(x,
embedding))

res = (
    df.sort_values("similarities", ascending=False)
    .head(top_n)
)
if to_print:
    display(res)
return res

res = search_docs(df_bills, "Can I get information on cable company tax
revenue?", top_n=4)

```

Output:

	text	summary	title	n_tokens	ada_v2	similarities
9	SECTION 1. SHORT TITLE. This Act may be cited ...	Taxpayer's Right to View Act of 1993 - Amends ...	Taxpayer's Right to View Act of 1993	947	[0.004519130103290081, -0.023599395528435707, ...]	0.767584
11	SECTION 1. SHORT TITLE. This Act may be cited ...	Wall Street Compensation Reform Act of 2010 - ...	A bill to amend the Internal Revenue Code of 1...	2331	[0.014871294610202312, -0.001929433667100966, ...]	0.714262
1	SECTION 1. SHORT TITLE. This Act may be cited ...	Small Business Expansion and Hiring Act of 201...	To amend the Internal Revenue Code of 1986 to ...	1183	[0.005016345530748367, -0.00569863710552454, 0...	0.702899
4	SECTION 1. SHORT TITLE. This Act may be cited ...	Military Call-up Relief Act - Amends the Inter...	A bill to amend the Internal Revenue Code of 1...	1038	[0.010082815773785114, -0.0007545037078671157, ...]	0.699490

Finally, we'll show the top result from document search based on user query against the entire knowledge base. This returns the top result of the "Taxpayer's Right to View Act of 1993". This document has a cosine similarity score of 0.76 between the query and the document:

Python

```
res["summary"][9]
```

Output

"Taxpayer's Right to View Act of 1993 - Amends the Communications Act of 1934 to prohibit a cable operator from assessing separate charges for any video programming of a sporting, theatrical, or other entertainment event if that event is performed at a facility constructed, renovated, or maintained with tax revenues or by an organization that receives public financial support. Authorizes the Federal Communications Commission and local franchising authorities to make determinations concerning the applicability of such prohibition. Sets forth conditions under which a facility is considered to have been constructed, maintained, or renovated with tax revenues. Considers events performed by nonprofit or public organizations that receive tax subsidies to be subject to this Act if the event is

sponsored by, or includes the participation of a team that is part of, a tax exempt organization."

Using this approach, you can use embeddings as a search mechanism across documents in a knowledge base. The user can then take the top search result and use it for their downstream task, which prompted their initial query.

Clean up resources

If you created an OpenAI resource solely for completing this tutorial and want to clean up and remove an OpenAI resource, you'll need to delete your deployed models, and then delete the resource or associated resource group if it's dedicated to your test resource. Deleting the resource group also deletes any other resources associated with it.

- [Portal](#)
- [Azure CLI](#)

Next steps

Learn more about Azure OpenAI's models:

[Azure OpenAI Service models](#)

Learn how to prepare your dataset for fine-tuning

Article • 07/18/2023

The first step of customizing your model is to prepare a high quality dataset. To do this you'll need a set of training examples composed of single input prompts and the associated desired output ('completion'). This format is notably different than using models during inference in the following ways:

- Only provide a single prompt vs a few examples.
- You don't need to provide detailed instructions as part of the prompt.
- Each prompt should end with a fixed separator to inform the model when the prompt ends and the completion begins. A simple separator, which generally works well is `\n\n###\n\n`. The separator shouldn't appear elsewhere in any prompt.
- Each completion should start with a whitespace due to our tokenization, which tokenizes most words with a preceding whitespace.
- Each completion should end with a fixed stop sequence to inform the model when the completion ends. A stop sequence could be `\n`, `###`, or any other token that doesn't appear in any completion.
- For inference, you should format your prompts in the same way as you did when creating the training dataset, including the same separator. Also specify the same stop sequence to properly truncate the completion.
- The dataset cannot exceed 100 MB in total file size.

Best practices

Customization performs better with high-quality examples and the more you have, generally the better the model performs. We recommend that you provide at least a few hundred high-quality examples to achieve a model that performs better than using well-designed prompts with a base model. From there, performance tends to linearly increase with every doubling of the number of examples. Increasing the number of examples is usually the best and most reliable way of improving performance.

If you're fine-tuning on a pre-existing dataset rather than writing prompts from scratch, be sure to manually review your data for offensive or inaccurate content if possible, or review as many random samples of the dataset as possible if it's large.

Specific guidelines

Fine-tuning can solve various problems, and the optimal way to use it may depend on your specific use case. Below, we've listed the most common use cases for fine-tuning and corresponding guidelines.

Classification

Classifiers are the easiest models to get started with. For classification problems we suggest using **ada**, which generally tends to perform only very slightly worse than more capable models once fine-tuned, while being significantly faster. In classification problems, each prompt in the dataset should be classified into one of the predefined classes. For this type of problem, we recommend:

- Use a separator at the end of the prompt, for example, `\n\n###\n\n`. Remember to also append this separator when you eventually make requests to your model.
- Choose classes that map to a single token. At inference time, specify `max_tokens=1` since you only need the first token for classification.
- Ensure that the prompt + completion doesn't exceed 2048 tokens, including the separator
- Aim for at least 100 examples per class
- To get class log probabilities, you can specify `logprobs=5` (for five classes) when using your model
- Ensure that the dataset used for fine-tuning is very similar in structure and type of task as what the model will be used for

Case study: Is the model making untrue statements?

Let's say you'd like to ensure that the text of the ads on your website mentions the correct product and company. In other words, you want to ensure the model isn't making things up. You may want to fine-tune a classifier which filters out incorrect ads.

The dataset might look something like the following:

JSON

```
{"prompt":"Company: BHFF insurance\nProduct: allround insurance\nAd:One stop shop for all your insurance needs!\nSupported:", "completion":" yes"} {"prompt":"Company: Loft conversion specialists\nProduct: -\nAd:Straight teeth in weeks!\nSupported:", "completion":" no"}
```

In the example above, we used a structured input containing the name of the company, the product, and the associated ad. As a separator we used `\nSupported:` which clearly separated the prompt from the completion. With a sufficient number of examples, the separator you choose doesn't make much of a difference (usually less than 0.4%) as long as it doesn't appear within the prompt or the completion.

For this use case we fine-tuned an ada model since it is faster and cheaper, and the performance is comparable to larger models because it's a classification task.

Now we can query our model by making a Completion request.

Console

```
curl  
https://YOUR_RESOURCE_NAME.openai.azure.com/openai/deployments/YOUR_DEPLOYMENT_NAME/completions?api-version=2023-05-15\ \  
-H 'Content-Type: application/json' \  
-H 'api-key: YOUR_API_KEY' \  
-d '{  
    "prompt": "Company: Reliable accountants Ltd\nProduct: Personal Tax  
help\nAd:Best advice in town!\nSupported:",  
    "max_tokens": 1  
}'
```

Which will return either `yes` or `no`.

Case study: Sentiment analysis

Let's say you'd like to get a degree to which a particular tweet is positive or negative. The dataset might look something like the following:

Console

```
{"prompt":"Overjoyed with the new iPhone! ->", "completion":" positive"}  
{"prompt":"@contoso_basketball disappoint for a third straight night. ->","completion":" negative"}
```

Once the model is fine-tuned, you can get back the log probabilities for the first completion token by setting `logprobs=2` on the completion request. The higher the probability for positive class, the higher the relative sentiment.

Now we can query our model by making a Completion request.

Console

```
curl  
https://YOUR_RESOURCE_NAME.openai.azure.com/openai/deployments/YOUR_DEPLOYMENT_NAME/completions?api-version=2023-05-15\ \  
-H 'Content-Type: application/json' \  
-H 'api-key: YOUR_API_KEY' \  
-d '{  
    "prompt": "Excited to share my latest blog post! ->",  
    "max_tokens": 1,  
    "logprobs": 2  
}'
```

Which will return:

JSON

```
{  
    "object": "text_completion",  
    "created": 1589498378,  
    "model": "YOUR_FINE_TUNED_MODEL_NAME",  
    "choices": [  
        {  
            "logprobs": {  
                "text_offset": [  
                    19  
                ],  
                "token_logprobs": [  
                    -0.03597255  
                ],  
                "tokens": [  
                    " positive"  
                ],  
                "top_logprobs": [  
                    {  
                        " negative": -4.9785037,  
                        " positive": -0.03597255  
                    }  
                ]  
            },  
            "text": " positive",  
            "index": 0,  
            "finish_reason": "length"  
        }  
    ]  
}
```

Case study: Categorization for Email triage

Let's say you'd like to categorize incoming email into one of a large number of predefined categories. For classification into a large number of categories, we recommend you convert those categories into numbers, which will work well with up to approximately 500 categories. We've observed that adding a space before the number sometimes slightly helps the performance, due to tokenization. You may want to structure your training data as follows:

JSON

```
{  
    "prompt": "Subject: <email_subject>\nFrom:<customer_name>\nDate:  
<date>\nContent:<email_body>\n\n###\n", "completion": "  
<numerical_category>"  
}
```

For example:

JSON

```
{  
    "prompt": "Subject: Update my address\nFrom: Joe  
Doe\nTo:support@ourcompany.com\nDate:2021-06-03\nContent:Hi,\nI would like  
to update my billing address to match my delivery address.\n\nPlease let me  
know once done.\n\nThanks,\nJoe\n\n###\n",  
    "completion": " 4"  
}
```

In the example above we used an incoming email capped at 2043 tokens as input. (This allows for a four token separator and a one token completion, summing up to 2048.) As a separator we used `\n\n###\n` and we removed any occurrence of `###` within the email.

Conditional generation

Conditional generation is a problem where the content needs to be generated given some kind of input. This includes paraphrasing, summarizing, entity extraction, product description writing given specifications, chatbots and many others. For this type of problem we recommend:

- Use a separator at the end of the prompt, for example, `\n\n###\n`. Remember to also append this separator when you eventually make requests to your model.
- Use an ending token at the end of the completion, for example, `END`.
- Remember to add the ending token as a stop sequence during inference, for example, `stop=["END"]`.

- Aim for at least ~500 examples.
- Ensure that the prompt + completion doesn't exceed 2048 tokens, including the separator.
- Ensure the examples are of high quality and follow the same desired format.
- Ensure that the dataset used for fine-tuning is similar in structure and type of task as what the model will be used for.
- Using Lower learning rate and only 1-2 epochs tends to work better for these use cases.

Case study: Write an engaging ad based on a Wikipedia article

This is a generative use case so you would want to ensure that the samples you provide are of the highest quality, as the fine-tuned model will try to imitate the style (and mistakes) of the given examples. A good starting point is around 500 examples. A sample dataset might look like this:

JSON

```
{
  "prompt": "<Product Name>\n<Wikipedia description>\n\n###\n",
  "completion": "<engaging ad> END"
}
```

For example:

JSON

```
{
  "prompt": "Samsung Galaxy Feel\nThe Samsung Galaxy Feel is an Android smartphone developed by Samsung Electronics exclusively for the Japanese market. The phone was released in June 2017 and was sold by NTT Docomo. It runs on Android 7.0 (Nougat), has a 4.7 inch display, and a 3000 mAh battery.\nSoftware\nSamsung Galaxy Feel runs on Android 7.0 (Nougat), but can be later updated to Android 8.0 (Oreo).\nHardware\nSamsung Galaxy Feel has a 4.7 inch Super AMOLED HD display, 16 MP back facing and 5 MP front facing cameras. It has a 3000 mAh battery, a 1.6 GHz Octa-Core ARM Cortex-A53 CPU, and an ARM Mali-T830 MP1 700 MHz GPU. It comes with 32GB of internal storage, expandable to 256GB via microSD. Aside from its software and hardware specifications, Samsung also introduced a unique a hole in the phone's shell to accommodate the Japanese perceived penchant for personalizing their mobile phones. The Galaxy Feel's battery was also touted as a major selling point since the market favors handsets with longer battery life. The device is also waterproof and supports 1seg digital broadcasts using an antenna that is sold separately.\n\n###\n",
  "completion": "Looking for a smartphone that can do it all? Look no further than Samsung Galaxy Feel! With a slim and sleek design, our latest smartphone features high-quality picture and video capabilities, as well as
```

```
an award winning battery life. END"
}
```

Here we used a multiline separator, as Wikipedia articles contain multiple paragraphs and headings. We also used a simple end token, to ensure that the model knows when the completion should finish.

Case study: Entity extraction

This is similar to a language transformation task. To improve the performance, it's best to either sort different extracted entities alphabetically or in the same order as they appear in the original text. This helps the model to keep track of all the entities which need to be generated in order. The dataset could look as follows:

JSON

```
{
  "prompt": "<any text, for example news article>\n\n###\n\n",
  "completion": "<list of entities, separated by a newline> END"
}
```

For example:

JSON

```
{
  "prompt": "Portugal will be removed from the UK's green travel list from
Tuesday, amid rising coronavirus cases and concern over a \"Nepal mutation
of the so-called Indian variant\". It will join the amber list, meaning
holidaymakers should not visit and returnees must isolate for 10
days... \n\n###\n\n",
  "completion": " Portugal\nUK\nNepal mutation\nIndian variant END"
}
```

A multi-line separator works best, as the text will likely contain multiple lines. Ideally there will be a high diversity of the types of input prompts (news articles, Wikipedia pages, tweets, legal documents), which reflect the likely texts which will be encountered when extracting entities.

Case study: Customer support chatbot

A chatbot will normally contain relevant context about the conversation (order details), summary of the conversation so far, and most recent messages. For this use case the same past conversation can generate multiple rows in the dataset, each time with a

slightly different context, for every agent generation as a completion. This use case requires a few thousand examples, as it likely deals with different types of requests, and customer issues. To ensure the performance is of high quality, we recommend vetting the conversation samples to ensure the quality of agent messages. The summary can be generated with a separate text transformation fine tuned model. The dataset could look as follows:

JSON

```
{"prompt":"Summary: <summary of the interaction so far>\n\nSpecific information:<for example order details in natural language>\n\nCustomer: <message1>\nAgent: <response1>\nCustomer: <message2>\nAgent:", "completion":" <response2>\n"}\n{"prompt":"Summary: <summary of the interaction so far>\n\nSpecific information:<for example order details in natural language>\n\nCustomer: <message1>\nAgent: <response1>\nCustomer: <message2>\nAgent: <response2>\nCustomer: <message3>\nAgent:", "completion":" <response3>\n"}
```

Here we purposefully separated different types of input information, but maintained Customer Agent dialog in the same format between a prompt and a completion. All the completions should only be by the agent, and we can use `\n` as a stop sequence when doing inference.

Case study: Product description based on a technical list of properties

Here it's important to convert the input data into a natural language, which will likely lead to superior performance. For example, the following format:

JSON

```
{\n    "prompt":"Item=handbag, Color=army_green, price=$99, size=S->",\n    "completion":"This stylish small green handbag will add a unique touch\n    to your look, without costing you a fortune."\n}
```

Won't work as well as:

JSON

```
{\n    "prompt":"Item is a handbag. Colour is army green. Price is midrange.\n    Size is small.->,\n    "completion":"This stylish small green handbag will add a unique touch
```

```
to your look, without costing you a fortune."  
}
```

For high performance, ensure that the completions were based on the description provided. If external content is often consulted, then adding such content in an automated way would improve the performance. If the description is based on images, it may help to use an algorithm to extract a textual description of the image. Since completions are only one sentence long, we can use . as the stop sequence during inference.

Open ended generation

For this type of problem we recommend:

- Leave the prompt empty.
- No need for any separators.
- You'll normally want a large number of examples, at least a few thousand.
- Ensure the examples cover the intended domain or the desired tone of voice.

Case study: Maintaining company voice

Many companies have a large amount of high quality content generated in a specific voice. Ideally all generations from our API should follow that voice for the different use cases. Here we can use the trick of leaving the prompt empty, and feeding in all the documents which are good examples of the company voice. A fine-tuned model can be used to solve many different use cases with similar prompts to the ones used for base models, but the outputs are going to follow the company voice much more closely than previously.

JSON

```
{"prompt": "", "completion": " <company voice textual content>"}  
 {"prompt": "", "completion": " <company voice textual content2>"}
```

A similar technique could be used for creating a virtual character with a particular personality, style of speech and topics the character talks about.

Generative tasks have a potential to leak training data when requesting completions from the model, so extra care needs to be taken that this is addressed appropriately. For example personal or sensitive company information should be replaced by generic information or not be included into fine-tuning in the first place.

Next steps

- Fine tune your model with our [How-to guide](#)
- Learn more about the [underlying models that power Azure OpenAI Service](#)

Learn how to customize a model for your application

Article • 07/18/2023

Azure OpenAI Service lets you tailor our models to your personal datasets using a process known as *fine-tuning*. This customization step will let you get more out of the service by providing:

- Higher quality results than what you can get just from prompt design
- The ability to train on more examples than can fit into a prompt
- Lower-latency requests

A customized model improves on the few-shot learning approach by training the model's weights on your specific prompts and structure. The customized model lets you achieve better results on a wider number of tasks without needing to provide examples in your prompt. The result is less text sent and fewer tokens processed on every API call, saving cost and improving request latency.

ⓘ Note

There is a breaking change in the `create fine tunes` command in the latest 12-01-2022 GA API. For the latest command syntax consult the [reference documentation](#)

Prerequisites

- An Azure subscription - [Create one for free](#)
- Access granted to Azure OpenAI in the desired Azure subscription

Currently, access to this service is granted only by application. You can apply for access to Azure OpenAI by completing the form at <https://aka.ms/oai/access>. Open an issue on this repo to contact us if you have an issue.

- An Azure OpenAI resource

For more information about creating a resource, see [Create a resource and deploy a model using Azure OpenAI](#).

Fine-tuning workflow

The fine-tuning workflow in Azure OpenAI Studio requires the following steps:

1. Prepare your training and validation data
2. Use the **Create customized model** wizard in Azure OpenAI Studio to train your customized model
 - a. [Select a base model](#)
 - b. [Choose your training data](#)
 - c. Optionally, [choose your validation data](#)
 - d. Optionally, [choose advanced options](#) for your fine-tune job
 - e. [Review your choices and train your new customized model](#)
3. Check the status of your customized model
4. Deploy your customized model for use
5. Use your customized model
6. Optionally, analyze your customized model for performance and fit

Prepare your training and validation data

Your training data and validation data sets consist of input & output examples for how you would like the model to perform.

The training and validation data you use **must** be formatted as a JSON Lines (JSONL) document in which each line represents a single prompt-completion pair. The OpenAI command-line interface (CLI) includes [a data preparation tool](#) that validates, gives suggestions, and reformats your training data into a JSONL file ready for fine-tuning.

Here's an example of the training data format:

JSON

```
{"prompt": "<prompt text>", "completion": "<ideal generated text>"}  
{"prompt": "<prompt text>", "completion": "<ideal generated text>"}  
{"prompt": "<prompt text>", "completion": "<ideal generated text>"}
```

In addition to the JSONL format, training and validation data files must be encoded in UTF-8 and include a byte-order mark (BOM), and the file must be less than 200 MB in size. For more information about formatting your training data, see [Learn how to prepare your dataset for fine-tuning](#).

Creating your training and validation datasets

Designing your prompts and completions for fine-tuning is different from designing your prompts for use with any of [our GPT-3 base models](#). Prompts for completion calls

often use either detailed instructions or few-shot learning techniques, and consist of multiple examples. For fine-tuning, we recommend that each training example consists of a single input prompt and its desired completion output. You don't need to give detailed instructions or multiple completion examples for the same prompt.

The more training examples you have, the better. We recommend having at least 200 training examples. In general, we've found that each doubling of the dataset size leads to a linear increase in model quality.

For more information about preparing training data for various tasks, see [Learn how to prepare your dataset for fine-tuning](#).

OpenAI CLI data preparation tool

We recommend using OpenAI's command-line interface (CLI) to assist with many of the data preparation steps. OpenAI has developed a tool that validates, gives suggestions, and reformats your data into a JSONL file ready for fine-tuning.

To install the CLI, run the following Python command:

```
Console  
pip install --upgrade openai
```

To analyze your training data with the data preparation tool, run the following Python command, replacing `<LOCAL_FILE>` with the full path and file name of the training data file to be analyzed:

```
Console  
openai tools fine_tunes.prepare_data -f <LOCAL_FILE>
```

This tool accepts files in the following data formats, if they contain a prompt and a completion column/key:

- Comma-separated values (CSV)
- Tab-separated values (TSV)
- Microsoft Excel workbook (XLSX)
- JavaScript Object Notation (JSON)
- JSON Lines (JSONL)

The tool reformats your training data and saves output into a JSONL file ready for fine-tuning, after guiding you through the process of implementing suggested changes.

Use the Create customized model wizard

Azure OpenAI Studio provides the **Create customized model** wizard, so you can interactively create and train a fine-tuned model for your Azure resource.

Go to the Azure OpenAI Studio

Navigate to the Azure OpenAI Studio at <https://oai.azure.com/> and sign in with credentials that have access to your Azure OpenAI resource. During the sign-in workflow, select the appropriate directory, Azure subscription, and Azure OpenAI resource.

Landing page

You'll first land on our main page for Azure OpenAI Studio. From here, you can start fine-tuning a custom model.

Select the **Start fine-tuning a custom model** button under **Manage deployments and models** section of the landing page, highlighted in the following picture, to start fine-tuning a custom model.

Note

If your resource doesn't have a model already deployed in it, a warning is displayed. You can ignore that warning for the purposes of fine-tuning a model, because you'll be fine-tuning and deploying a new customized model.

Cognitive Services | Azure OpenAI Studio - Preview

Azure OpenAI Studio

Get started with Azure OpenAI

Perform a wide variety of natural language tasks with Azure OpenAI, including copywriting, summarization, parsing unstructured text, classification, and translation.

Explore examples for prompt completion



Summarize Text
Summarize text by adding a 'tldr' to the end of a text passage.
[Learn more](#)



Classify Text
Classify items into categories provided at inference time.
[Learn more](#)



Natural Language to SQL
Translate natural language to SQL queries.
[Learn more](#)



Generate New Product Names
Create product names from examples words.
[Learn more](#)

Manage your deployments and models

Experiment with prompt completions
Try out the completions endpoint by writing a prompt and generating a response. Set different parameters values to adjust how the model responds.
[Go to playground](#)

Customize a model with fine-tuning
Fine-tune a custom model to increase reliability for a wide variety of use cases while decreasing costs and speeding up processing times.
[Start fine-tuning a custom model](#)

Manage deployments in your resource
Create deployments to explore the model capabilities.
[Go to Deployments](#)

Manage performance results
Upload datasets to use when creating custom models, and view performance and fine-tune results from training and validation data.
[Go to File management](#)



Start the wizard from the Models page

To create a customized model, select the **Create customized model** button under the **Provided models** section on the **Models** page, highlighted in the following picture, to start the **Create customized model** wizard.

Cognitive Services | Azure OpenAI Studio - Preview

Azure OpenAI Studio > Models

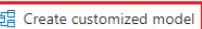
Models

Azure OpenAI is powered by models with different capabilities and price points. Deploy one of the provided base models to try it out in [Playground](#) or train a custom model to your specific use case and data for better performance and more accurate results. [Learn more about the different types of provided models](#)

Provided models

Model name	Created at	Status
ada	2/28/2022 4:00 PM	Succeeded
babbage	2/28/2022 4:00 PM	Succeeded
code-cushman-001	1/21/2022 4:00 PM	Succeeded
code-search-ada-code-001	5/19/2022 5:00 PM	Succeeded
code-search-ada-text-001	5/19/2022 5:00 PM	Succeeded
code-search-babbage-code-001	5/19/2022 5:00 PM	Succeeded
code-search-babbage-text-001	5/19/2022 5:00 PM	Succeeded

[Deploy model](#) [Create customized model](#) [Refresh](#)



Select a base model

The first step in creating a customized model is to choose a base model. The **Base model** pane lets you choose a base model to use for your customized model, and the choice influences both the performance and the cost of your model. You can create a customized model from one of the following available base models:

- `ada`
- `babbage`
- `curie`
- `code-cushman-001`*
- `davinci`*

* currently unavailable for new customers.

For more information about our base models that can be fine-tuned, see [Models](#). Select a base model from the **Base model type** dropdown, as shown in the following picture, and then select **Next** to continue.

The screenshot shows the 'Create customized model' wizard with the title 'Create customized model' at the top right. On the left, a sidebar lists steps: 'Base model' (selected), 'Training data', 'Validation data', 'Advanced options', and 'Review and train'. The main area is titled 'Base model' and contains a description: 'Every fine-tuned model starts from a base model which influences both the performance of the model and the cost of running your custom model.' Below this is a link 'Learn more about each parameter here'. A dropdown menu titled 'Base model type' is open, showing the following options: 'ada', 'babbage', 'curie', 'davinci', and 'code-cushman-001'. At the bottom are 'Next' and 'Cancel' buttons.

Choose your training data

The next step is to either choose existing prepared training data or upload new prepared training data to use when customizing your model. The **Training data** pane, shown in the following picture, displays any existing, previously uploaded datasets and provides options by which you can upload new training data.

The screenshot shows the 'Create customized model' wizard with the title 'Create customized model' at the top right. On the left, a vertical navigation bar lists steps: 'Base model' (selected), 'Training data' (selected), 'Validation data', 'Advanced options', and 'Review and train'. The main pane is titled 'Training data' and contains instructions: 'Select a training dataset to use when customizing your model. Training data must be in a .jsonl file and should consist of several hundred prompt/completion pairs.' Below this is a link 'Learn more about preparing your data for Azure OpenAI'. At the bottom of the main pane are three tabs: 'Choose dataset' (selected), 'Local file', and 'Azure blob or other shared web locations'. Under 'Choose dataset', there is a sub-section titled 'Training File'. At the bottom of the main pane are 'Back' and 'Next' buttons. In the bottom right corner of the main pane is a circular button with a plus sign and a magnifying glass icon, labeled 'Cancel'.

If your training data has already been uploaded to the service, select **Choose dataset**, and then select the file from the list shown in the **Training data** pane. Otherwise, select either **Local file** to [upload training data from a local file](#), or **Azure blob or other shared web locations** to [import training data from Azure Blob or another shared web location](#).

For large data files, we recommend you import from an Azure Blob store. Large files can become unstable when uploaded through multipart forms because the requests are atomic and can't be retried or resumed. For more information about Azure Blob storage, see [What is Azure Blob storage?](#)

① Note

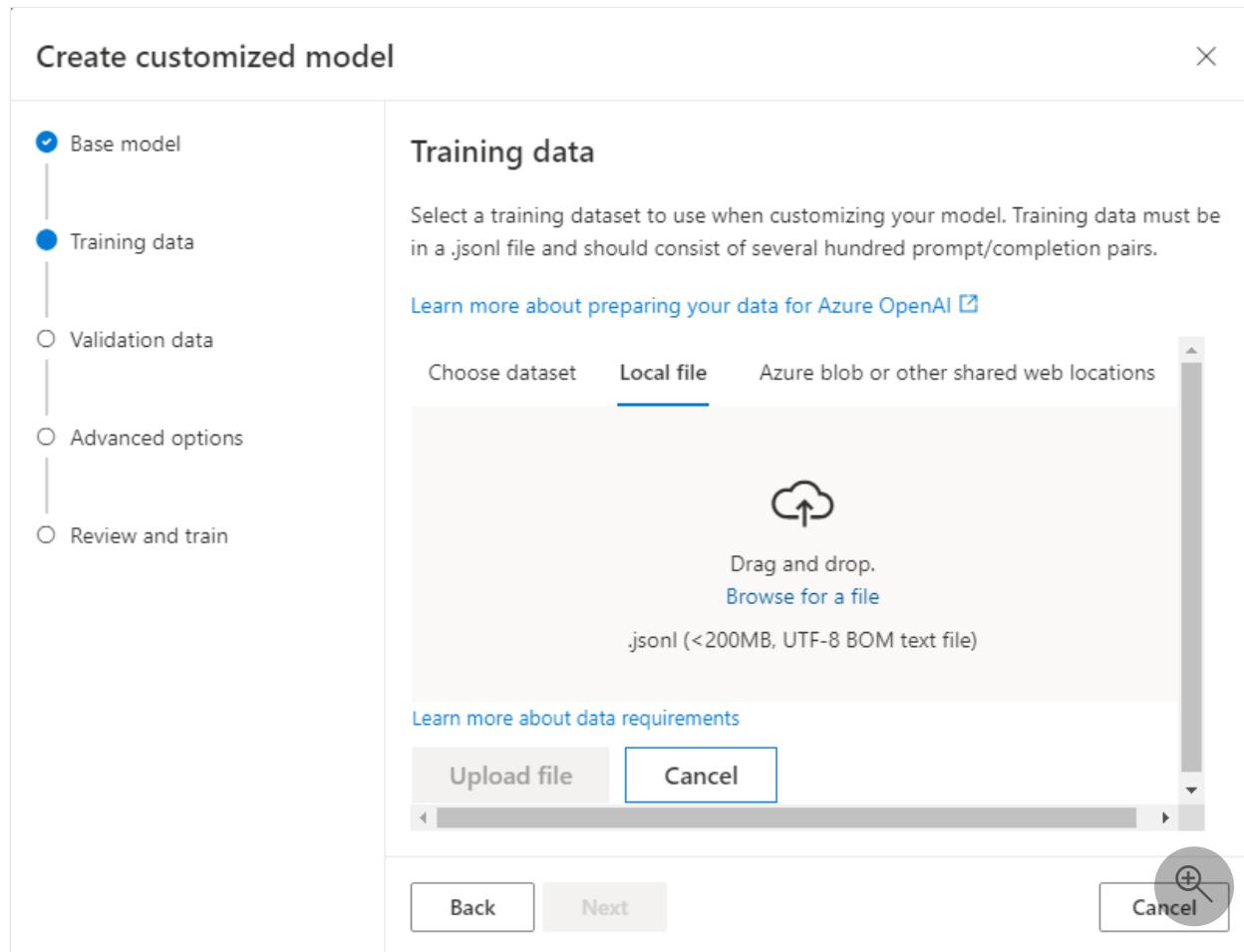
Training data files must be formatted as JSONL files, encoded in UTF-8 with a byte-order mark (BOM), and less than 200 MB in size.

To upload training data from a local file

You can upload a new training dataset to the service from a local file by using one of the following methods:

- Drag and drop the file into the client area of the **Training data** pane, and then select **Upload file**
- Select **Browse for a file** from the client area of the **Training data** pane, choose the file to upload from the **Open** dialog, and then select **Upload file**.

After you've selected and uploaded the training dataset, select **Next** to optionally choose your validation data.



To import training data from an Azure Blob store

You can import a training dataset from Azure Blob or another shared web location by providing the name and location of the file, as shown in the following picture. Enter the name of the file in **File name** and the Azure Blob URL, Azure Storage shared access signature (SAS), or other link to an accessible shared web location that contains the file in **File location**, then select **Upload file** to import the training dataset to the service.

After you've selected and uploaded the training dataset, select **Next** to optionally choose your validation data.

Create customized model

X

Base model

Training data

Validation data

Advanced options

Review and train

Training data

Select a training dataset to use when customizing your model. Training data must be in a .jsonl file and should consist of several hundred prompt/completion pairs.

[Learn more about preparing your data for Azure OpenAI](#)

Choose dataset

Local file

Azure blob or other shared web locations

File name *

Enter the name of the file

File location *

Input Azure Blob public access URL, SAS, or any other shared web link

.jsonl (<200MB, UTF-8 BOM text file)

[Learn more about public access to Azure Blob](#)

[Learn more about Azure Blob SAS \(Shared Access Signature\)](#)

[Upload file](#)

[Cancel](#)

[Back](#)

[Next](#)

[Cancel](#)

Choose your validation data

You can now choose to optionally use validation data in the training process of your fine-tuned model. If you don't want to use validation data, you can choose **Next** to choose advanced options for your model. Otherwise, if you have a validation dataset, you can either choose existing prepared validation data or upload new prepared validation data to use when customizing your model. The **Validation data** pane, shown in the following picture, displays any existing, previously uploaded training and validation datasets and provides options by which you can upload new validation data.

Create customized model

Base model

Training data

Validation data

Advanced options

Review and train

Validation data

Select up to one validation dataset to use when iteratively assessing your customized model's performance during training. Validation data must be in a .jsonl file and should be representative of the training data without repeating any of it.

[Learn more about preparing your data for Azure OpenAI](#)

Choose dataset Local file Azure blob or other shared web locations

Validation File

training.jsonl

Back Next Cancel

If your validation data has already been uploaded to the service, select **Choose dataset**, and then select the file from the list shown in the **Validation data** pane. Otherwise, select either **Local file** to [upload validation data from a local file](#), or **Azure blob or other shared web locations** to [import validation data from Azure Blob or another shared web location](#).

For large data files, we recommend you import from an Azure Blob store. Large files can become unstable when uploaded through multipart forms because the requests are atomic and can't be retried or resumed.

ⓘ Note

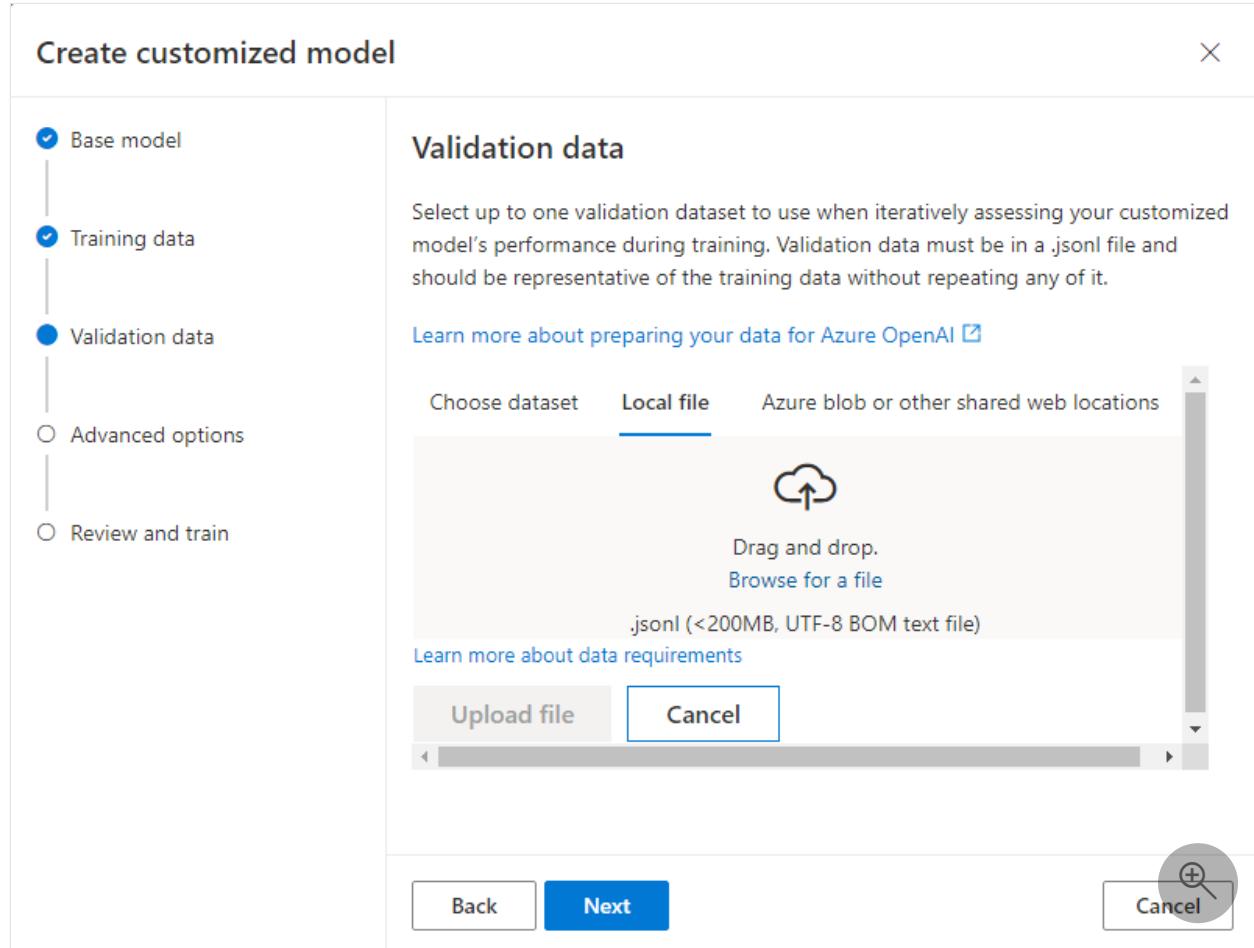
Like training data files, validation data files must be formatted as JSONL files, encoded in UTF-8 with a byte-order mark (BOM), and less than 200 MB in size.

To upload validation data from a local file

You can upload a new validation dataset to the service from a local file by using one of the following methods:

- Drag and drop the file into the client area of the **Validation data** pane, and then select **Upload file**
- Select **Browse for a file** from the client area of the **Validation data** pane, choose the file to upload from the **Open** dialog, and then select **Upload file**.

After you've uploaded the validation dataset, select **Next** to optionally [choose advanced options](#).



To import validation data from an Azure Blob store

You can import a validation dataset from Azure Blob or another shared web location by providing the name and location of the file, as shown in the following picture. Enter the name of the file in **File name** and the Azure Blob URL, Azure Storage shared access signature (SAS), or other link to an accessible shared web location that contains the file in **File location**, then select **Upload file** to import the validation dataset to the service.

After you've imported the validation dataset, select **Next** to optionally [choose advanced options](#).

Create customized model

X

- Base model
- Training data
- Validation data
- Advanced options
- Review and train

Validation data

Select up to one validation dataset to use when iteratively assessing your customized model's performance during training. Validation data must be in a .jsonl file and should be representative of the training data without repeating any of it.

[Learn more about preparing your data for Azure OpenAI](#)

Choose dataset Local file **Azure blob or other shared web locations**

File name *

Enter the name of the file

File location *

Input Azure Blob public access URL, SAS, or any other shared web link

.jsonl (<200MB, UTF-8 BOM text file)

[Learn more about public access to Azure Blob](#)

[Learn more about Azure Blob SAS \(Shared Access Signature\)](#)

[Upload file](#)

[Cancel](#)

[Back](#)

[Next](#)

[Cancel](#)

Choose advanced options

You can either use default values for the hyperparameters of the fine-tune job that the wizard runs to train your fine-tuned model, or you can adjust those hyperparameters for your customization needs in the **Advanced options** pane, shown in the following picture.

Create customized model

Base model
Training data
Validation data
Advanced options
Review and train

Advanced options

You can set additional parameters by selecting the advanced option below. These parameters will impact both the performance and training time of your job.

[Learn more about each parameter here](#)

Default Advanced

[Back](#) [Next](#) [Cancel](#)

Either select **Default** to use the default values for the fine-tune job, or select **Advanced** to display and edit the hyperparameter values, as shown in the following picture.

Create customized model

Base model
Training data
Validation data
Advanced options
Review and train

Advanced options

You can set additional parameters by selecting the advanced option below. These parameters will impact both the performance and training time of your job.

[Learn more about each parameter here](#)

Default Advanced

Number of epochs ⓘ 2

Batch size ⓘ 4

Learning rate multiplier: ⓘ 1

Prompt loss weight ⓘ 0.1

[Back](#) [Next](#) [Cancel](#)

The following hyperparameters are available:

Parameter	Description
name	
Number of epochs	The number of epochs to train the model for. An epoch refers to one full cycle through the training dataset.
Batch size	The batch size to use for training. The batch size is the number of training examples used to train a single forward and backward pass.
Learning rate multiplier	The learning rate multiplier to use for training. The fine-tuning learning rate is the original learning rate used for pre-training, multiplied by this value.
Prompt loss weight	The weight to use for loss on the prompt tokens. This value controls how much the model tries to learn to generate the prompt (as compared to the completion, which always has a weight of 1.0.) Increasing this value can add a stabilizing effect to training when completions are short.

For more information about these hyperparameters, see the [Create a Fine tune job](#) section of the [REST API](#) documentation.

After you've chosen either default or advanced options, select **Next** to [review your choices and train your fine-tuned model](#).

Review your choices and train your model

The **Review and train** pane of the wizard displays information about the choices you've made in the **Create customized model** wizard for your fine-tuned model, as shown in the following picture.

Create customized model X

- Base model
- Training data
- Validation data
- Advanced options
- Review and train

Review and train

Base model: davinci
Training data: training.jsonl
Validation data: validation.jsonl

Back Save and close Cancel

If you're ready to train your model, select **Save and close** to start the fine-tune job and return to the [Models page](#).

Check the status of your customized model

The [Models](#) page displays information about your customized model in the **Customized models** tab, as shown in the following picture. The tab includes information about the status and job ID of the fine-tune job for your customized model. When the job is completed, the file ID of the result file is also displayed.

Azure OpenAI Studio > Models Privacy & cookies

Azure OpenAI

Try it out

[Playground](#)

Management

[Deployments](#)

Models

[File Management](#)

Models

Azure OpenAI is powered by models with different capabilities and price points. Deploy one of the provided base models to try it out in [Playground](#) or train a custom model to your specific use case and data for better performance and more accurate results.

[Learn more about the different types of provided models](#)

Customized models [Provided models](#)

[Deploy model](#) [Create customized model](#) [Delete](#) [Refresh](#) [Search](#)

Model name	Creat...	Base model	Status	Training job Id
ft-66aa4cc216694	9/7/2...	davinci	Running	ft-66aa4cc2166949beae9facb7f258510b

[Search](#)

After you've started a fine-tune job, it may take some time to complete. Your job may be queued behind other jobs on our system, and training your model can take minutes or hours depending on the model and dataset size. You can check the status of the fine-tune job for your customized model in the **Status** column of the **Customized models** tab on the **Models** page, and you can select **Refresh** to update the information on that page.

You can also select the name of the model from the **Model name** column of the **Models** page to display more information about your customized model, including the status of the fine-tune job, training results, training events, and hyperparameters used in the job. You can select the **Refresh** button to refresh the information for your model, as shown in the following picture.

The screenshot shows the Azure OpenAI Studio interface. On the left, there's a sidebar with links: Try it out, Playground, Management, Deployments, Models, and File Management. The main area shows a model named "curie: ft-e4b459a57a94410a8a4c5a10a15b6063". The status is listed as "Status: Training Succeeded". Below that, it says "Finished training on: 9/23/2022 8:51 AM", "Training file: training.jsonl", "Base model: curie", and "Total training time: 25 minutes, 53 seconds". To the right, there are "Statistics" with "Total tokens: 1,088" and "Total examples: 64". At the bottom, there are two buttons: "Download results" (highlighted in blue) and "Download training file". Below this, there's a section titled "Training results" with a line chart. The chart has four tabs at the top: "Training loss", "Training token accuracy", "Validation loss", and "Validation token accuracy". The "Training loss" tab is selected, showing a red line that starts at approximately 1.2040 and slopes downward to approximately 1.2020. There are also four horizontal grid lines corresponding to these values. A legend indicates that the red line represents "Training loss". In the bottom right corner of the chart area, there's a circular icon with a magnifying glass and a plus sign (+).

From the model page, you can also select **Download training file** to download the training data you used for the model, or select **Download results** to download the result file attached to the fine-tune job for your model and [analyze your customized model](#) for training and validation performance.

Deploy a customized model

When the fine-tune job has succeeded, you can deploy the customized model from the **Models** pane. You must deploy your customized model to make it available for use with completion calls.

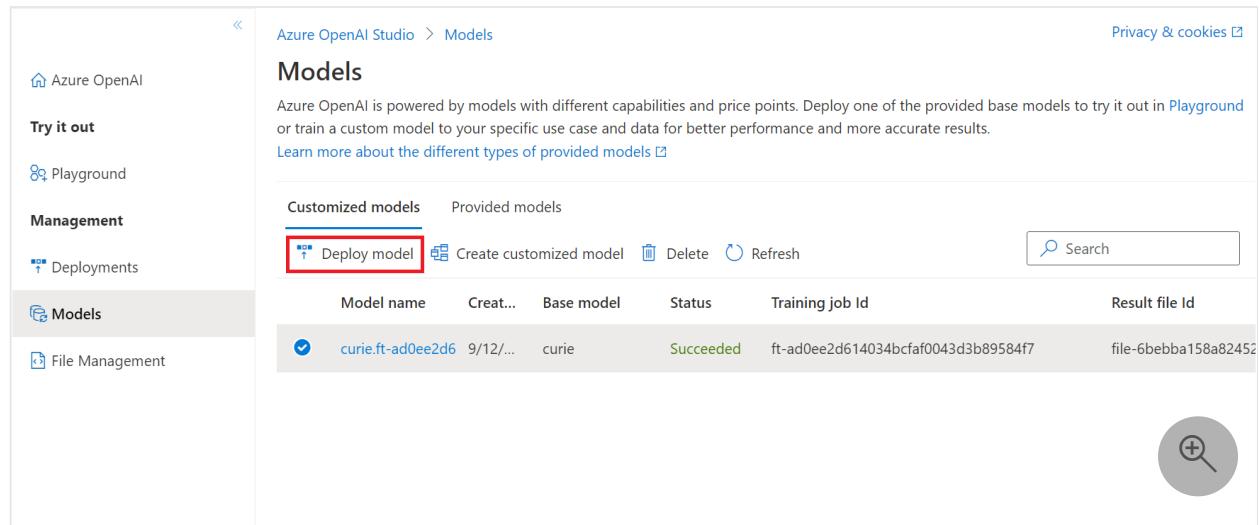
ⓘ Important

After a customized model is deployed, if at any time the deployment remains inactive for greater than fifteen (15) days, the deployment will automatically be deleted. The deployment of a customized model is “inactive” if the model was deployed more than fifteen (15) days ago and no completions or chat completions calls were made to it during a continuous 15-day period. The deletion of an inactive deployment does **NOT** delete or affect the underlying customized model, and the customized model can be redeployed at any time. As described in [Azure OpenAI Service pricing](#), each customized (fine-tuned) model that is deployed incurs an hourly hosting cost regardless of whether completions or chat completions calls are being made to the model. To learn more about planning and managing costs with Azure OpenAI, refer to our [cost management guide](#).

ⓘ Note

Only one deployment is permitted for a customized model. An error message is displayed if you select an already-deployed customized model.

To deploy your customized model, select the customized model to be deployed and then select **Deploy model**, as shown in the following picture.



The screenshot shows the Azure OpenAI Studio interface. On the left, there's a sidebar with links: Azure OpenAI, Try it out, Playground, Management, Deployments, Models (which is selected and highlighted in grey), and File Management. The main content area has a header "Models" and a sub-header "Customized models". Below this, there's a table with columns: Model name, Create..., Base model, Status, Training job Id, and Result file Id. A single row is visible: "curie.ft-ad0ee2d6 9/12/..." under "Create...", "curie" under "Base model", "Succeeded" under "Status", "ft-ad0ee2d614034bcfaf0043d3b89584f7" under "Training job Id", and "file-6bebba158a82452" under "Result file Id". At the top of the main content area, there are several buttons: "Deploy model" (which is highlighted with a red box), "Create customized model", "Delete", and "Refresh". There's also a search bar and a magnifying glass icon in the bottom right corner of the main area.

The **Deploy model** dialog is presented, in which you can provide a name for the deployment of your customized model. Enter a name in **Deployment name** and then select **Create** to start the deployment of your customized model.

Deploy model

X

Set up a deployment to make API calls against a provided base model or a custom model. Finished deployments are available for use. Your deployment status will move to succeeded when the deployment is complete and ready for use.

- (i) Only one deployment is permitted per model. The models with existing deployments are disabled.

Model name i

curie.ft-ad0ee2d614034bcfaf0043d3b89584f7

v

Deployment name i

Create

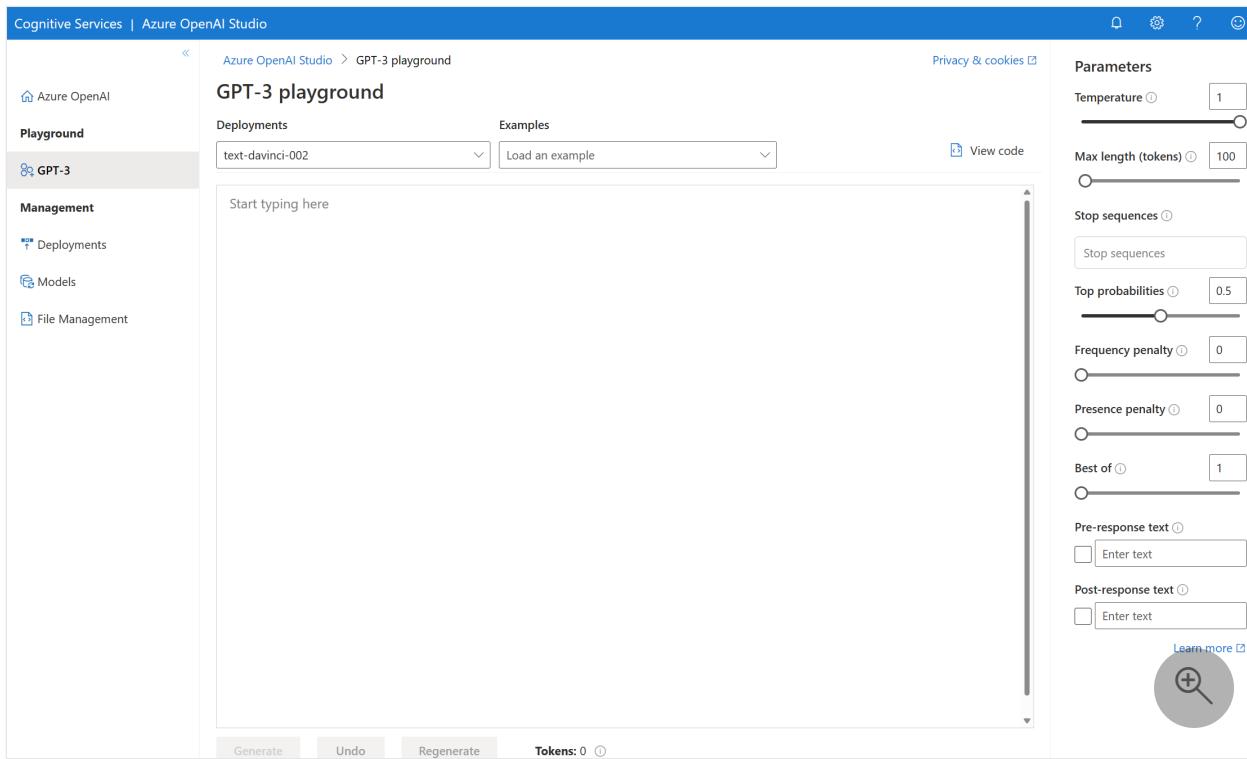
Cancel



You can monitor the progress of your deployment from the **Deployments** pane of Azure OpenAI Studio.

Use a deployed customized model

Once your customized model has been deployed, you can use it like any other deployed model. For example, you can use the **Playground** pane of Azure OpenAI Studio to experiment with your new deployment, as shown in the following picture. You can continue to use the same parameters with your customized model, such as temperature and frequency penalty, as you can with other deployed models.



ⓘ Note

As with all applications, we require a review process prior to going live.

Analyze your customized model

Azure OpenAI attaches a result file, named `results.csv`, to each fine-tune job once it's completed. You can use the result file to analyze the training and validation performance of your customized model. The file ID for the result file is listed for each customized model in the **Result file Id** column of the **Models** pane for Azure OpenAI Studio. You can use the file ID to identify and download the result file from the **File Management** pane of Azure OpenAI Studio.

The result file is a CSV file containing a header row and a row for each training step performed by the fine-tune job. The result file contains the following columns:

Column name	Description
<code>step</code>	The number of the training step. A training step represents a single pass, forward and backward, on a batch of training data.
<code>elapsed_tokens</code>	The number of tokens the customized model has seen so far, including repeats.
<code>elapsed_examples</code>	The number of examples the model has seen so far, including repeats.

Column name	Description
	Each example represents one element in that step's batch of training data. For example, if the Batch size parameter is set to 32 in the Advanced options pane , this value increments by 32 in each training step.
<code>training_loss</code>	The loss for the training batch.
<code>training_sequence_accuracy</code>	The percentage of completions in the training batch for which the model's predicted tokens exactly matched the true completion tokens. For example, if the batch size is set to 3 and your data contains completions <code>[[1, 2], [0, 5], [4, 2]]</code> , this value is set to 0.67 (2 of 3) if the model predicted <code>[[1, 1], [0, 5], [4, 2]]</code> .
<code>training_token_accuracy</code>	The percentage of tokens in the training batch that were correctly predicted by the model. For example, if the batch size is set to 3 and your data contains completions <code>[[1, 2], [0, 5], [4, 2]]</code> , this value is set to 0.83 (5 of 6) if the model predicted <code>[[1, 1], [0, 5], [4, 2]]</code> .
<code>validation_loss</code>	The loss for the validation batch.
<code>validation_sequence_accuracy</code>	The percentage of completions in the validation batch for which the model's predicted tokens exactly matched the true completion tokens. For example, if the batch size is set to 3 and your data contains completions <code>[[1, 2], [0, 5], [4, 2]]</code> , this value is set to 0.67 (2 of 3) if the model predicted <code>[[1, 1], [0, 5], [4, 2]]</code> .
<code>validation_token_accuracy</code>	The percentage of tokens in the validation batch that were correctly predicted by the model. For example, if the batch size is set to 3 and your data contains completions <code>[[1, 2], [0, 5], [4, 2]]</code> , this value is set to 0.83 (5 of 6) if the model predicted <code>[[1, 1], [0, 5], [4, 2]]</code> .

Clean up your deployments, customized models, and training files

When you're done with your customized model, you can delete the deployment and model. You can also delete the training and validation files you uploaded to the service, if needed.

Delete your model deployment

ⓘ Important

After a customized model is deployed, if at any time the deployment remains inactive for greater than fifteen (15) days, the deployment will automatically be deleted. The deployment of a customized model is “inactive” if the model was deployed more than fifteen (15) days ago and no completions or chat completions calls were made to it during a continuous 15-day period. The deletion of an inactive deployment does **NOT** delete or affect the underlying customized model, and the customized model can be redeployed at any time. As described in [Azure OpenAI Service pricing](#), each customized (fine-tuned) model that is deployed incurs an hourly hosting cost regardless of whether completions or chat completions calls are being made to the model. To learn more about planning and managing costs with Azure OpenAI, refer to our [cost management guide](#).

You can delete the deployment for your customized model from the **Deployments** page for Azure OpenAI Studio. Select the deployment to delete, and then select **Delete** to delete the deployment.

Delete your customized model

You can delete a customized model from the **Models** page for Azure OpenAI Studio. Select the customized model to delete from the **Customized models** tab, and then select **Delete** to delete the customized model.

ⓘ Note

You cannot delete a customized model if it has an existing deployment. You must first **delete your model deployment** before you can delete your customized model.

Delete your training files

You can optionally delete training and validation files you've uploaded for training, and result files generated during training, from the **File Management** page for Azure OpenAI Studio. Select the file to delete, and then select **Delete** to delete the file.

Next steps

- Explore the full REST API Reference documentation to learn more about all the fine-tuning capabilities. You can find the [full REST documentation here](#).

- Explore more of the [Python SDK operations here](#) .

Configure Azure AI services virtual networks

Article • 07/18/2023

Azure AI services provides a layered security model. This model enables you to secure your Azure AI services accounts to a specific subset of networks. When network rules are configured, only applications requesting data over the specified set of networks can access the account. You can limit access to your resources with request filtering. Allowing only requests originating from specified IP addresses, IP ranges or from a list of subnets in [Azure Virtual Networks](#).

An application that accesses an Azure AI services resource when network rules are in effect requires authorization. Authorization is supported with [Azure Active Directory](#) (Azure AD) credentials or with a valid API key.

Important

Turning on firewall rules for your Azure AI services account blocks incoming requests for data by default. In order to allow requests through, one of the following conditions needs to be met:

- The request should originate from a service operating within an Azure Virtual Network (VNet) on the allowed subnet list of the target Azure AI services account. The endpoint in requests originated from VNet needs to be set as the **custom subdomain** of your Azure AI services account.
- Or the request should originate from an allowed list of IP addresses.

Requests that are blocked include those from other Azure services, from the Azure portal, from logging and metrics services, and so on.

Note

We recommend that you use the Azure Az PowerShell module to interact with Azure. See [Install Azure PowerShell](#) to get started. To learn how to migrate to the Az PowerShell module, see [Migrate Azure PowerShell from AzureRM to Az.](#)

Scenarios

To secure your Azure AI services resource, you should first configure a rule to deny access to traffic from all networks (including internet traffic) by default. Then, you should configure rules that grant access to traffic from specific VNets. This configuration enables you to build a secure network boundary for your applications. You can also configure rules to grant access to traffic from select public internet IP address ranges, enabling connections from specific internet or on-premises clients.

Network rules are enforced on all network protocols to Azure AI services, including REST and WebSocket. To access data using tools such as the Azure test consoles, explicit network rules must be configured. You can apply network rules to existing Azure AI services resources, or when you create new Azure AI services resources. Once network rules are applied, they're enforced for all requests.

Supported regions and service offerings

Virtual networks (VNets) are supported in [regions where Azure AI services are available](#). Azure AI services supports service tags for network rules configuration. The services listed below are included in the **CognitiveServicesManagement** service tag.

- ✓ Anomaly Detector
- ✓ Azure OpenAI
- ✓ Azure AI Vision
- ✓ Content Moderator
- ✓ Custom Vision
- ✓ Face
- ✓ Language Understanding (LUIS)
- ✓ Personalizer
- ✓ Speech service
- ✓ Language service
- ✓ QnA Maker
- ✓ Translator Text

Note

If you're using, Azure OpenAI, LUIS, Speech Services, or Language services, the **CognitiveServicesManagement** tag only enables you use the service using the SDK or REST API. To access and use Azure OpenAI Studio, LUIS portal , Speech Studio or Language Studio from a virtual network, you will need to use the following tags:

- **AzureActiveDirectory**
- **AzureFrontDoor.Frontend**

- `AzureResourceManager`
- `CognitiveServicesManagement`
- `CognitiveServicesFrontEnd`

Change the default network access rule

By default, Azure AI services resources accept connections from clients on any network. To limit access to selected networks, you must first change the default action.

Warning

Making changes to network rules can impact your applications' ability to connect to Azure AI services. Setting the default network rule to **deny** blocks all access to the data unless specific network rules that **grant** access are also applied. Be sure to grant access to any allowed networks using network rules before you change the default rule to deny access. If you are allowing listing IP addresses for your on-premises network, be sure to add all possible outgoing public IP addresses from your on-premises network.

Managing default network access rules

You can manage default network access rules for Azure AI services resources through the Azure portal, PowerShell, or the Azure CLI.

Azure portal

1. Go to the Azure AI services resource you want to secure.
2. Select the **RESOURCE MANAGEMENT** menu called **Virtual network**.

The screenshot shows the Azure portal interface for a 'widgets - Virtual network' resource under 'Cognitive Services'. The left sidebar lists navigation options: Overview, Activity log, Access control (IAM), Tags, Diagnose and solve problems, RESOURCE MANAGEMENT, and Virtual network. The 'Virtual network' option is highlighted with a red box. The main content area shows settings for allowing access from virtual networks. A note states: 'All networks, including the internet, can access this resource.' There are two radio button options: 'All networks' (selected) and 'Selected networks'. A link to 'Learn more' is provided.

3. To deny access by default, choose to allow access from **Selected networks**. With the **Selected networks** setting alone, unaccompanied by configured **Virtual networks** or **Address ranges** - all access is effectively denied. When all access is denied, requests attempting to consume the Azure AI services resource aren't permitted. The Azure portal, Azure PowerShell or, Azure CLI can still be used to configure the Azure AI services resource.

4. To allow traffic from all networks, choose to allow access from **All networks**.

The screenshot shows the 'Virtual network' configuration page for a cognitive service named 'davidpine-computer-vision-vnet'. The left sidebar includes options like Keys, Quick start, Pricing tier, Billing By Subscription, Properties, Locks, Export template, and Monitoring. The 'Virtual network' option is selected and highlighted with a red box. The main content area displays a note about firewall settings remaining effective for up to three minutes. It shows the 'Allow access from' setting where 'Selected networks' is selected (radio button highlighted with a red box). Below this, there's a 'Virtual networks' section with a note to secure the service with virtual networks and buttons for '+ Add existing virtual network' and '+ Add new virtual network'. A 'Firewall' section allows adding IP ranges, with a note to add client IP addresses. An 'ADDRESS RANGE' input field is also present.

5. Select **Save** to apply your changes.

Grant access from a virtual network

You can configure Azure AI services resources to allow access only from specific subnets. The allowed subnets may belong to a VNet in the same subscription, or in a different

subscription, including subscriptions belonging to a different Azure Active Directory tenant.

Enable a [service endpoint](#) for Azure AI services within the VNet. The service endpoint routes traffic from the VNet through an optimal path to the Azure AI services service. The identities of the subnet and the virtual network are also transmitted with each request. Administrators can then configure network rules for the Azure AI services resource that allow requests to be received from specific subnets in a VNet. Clients granted access via these network rules must continue to meet the authorization requirements of the Azure AI services resource to access the data.

Each Azure AI services resource supports up to 100 virtual network rules, which may be combined with [IP network rules](#).

Required permissions

To apply a virtual network rule to an Azure AI services resource, the user must have the appropriate permissions for the subnets being added. The required permission is the default *Contributor* role, or the *Azure AI services Contributor* role. Required permissions can also be added to custom role definitions.

Azure AI services resource and the virtual networks granted access may be in different subscriptions, including subscriptions that are a part of a different Azure AD tenant.

ⓘ Note

Configuration of rules that grant access to subnets in virtual networks that are a part of a different Azure Active Directory tenant are currently only supported through PowerShell, CLI and REST APIs. Such rules cannot be configured through the Azure portal, though they may be viewed in the portal.

Managing virtual network rules

You can manage virtual network rules for Azure AI services resources through the Azure portal, PowerShell, or the Azure CLI.

Azure portal

1. Go to the Azure AI services resource you want to secure.
2. Select the **RESOURCE MANAGEMENT** menu called **Virtual network**.

3. Check that you've selected to allow access from **Selected networks**.
4. To grant access to a virtual network with an existing network rule, under **Virtual networks**, select **Add existing virtual network**.

widgets - Virtual network
Cognitive Services

»

Firewall settings allowing access to cognitive service will remain in effect for up to three minutes after saving updated settings restricting access.

Allow access from
 All networks Selected networks

Configure network security for your cognitive service. [Learn more.](#)

Virtual networks
Secure your cognitive service with virtual networks. [+ Add existing virtual network](#) [+ Add new virtual network](#)

VIRTUAL NETWORK	SUBNET	ADDRESS RANGE
No network selected.		

Firewall
Add IP ranges to allow access from the internet or your on-premises networks. [Learn more.](#)

Add your client IP address? [?](#)

ADDRESS RANGE

5. Select the **Virtual networks** and **Subnets** options, and then select **Enable**.

Add networks

* Subscription
widgets-subscription

* Virtual networks
widgets-vnet

* Subnets
default (Service endpoint required)

Info The following networks don't have service endpoints enabled for 'Microsoft.CognitiveServices'. Enabling access will take up to 15 minutes to complete. After starting this operation, it is safe to leave and return later if you do not wish to wait.

VIRTUAL NETWORK	SERVICE ENDPOINT STATUS	...
▼ widgets-vnet...		...
default	Not enabled	...

Enable

6. To create a new virtual network and grant it access, select **Add new virtual network**.

 widgets - Virtual network
Cognitive Services

»  Save  Discard  Refresh

 Firewall settings allowing access to cognitive service will remain in effect for up to three minutes after saving updated settings restricting access.

Allow access from
 All networks Selected networks

Configure network security for your cognitive service. [Learn more.](#)

Virtual networks
Secure your cognitive service with virtual networks.  

VIRTUAL NETWORK	SUBNET	ADDRESS RANGE
No network selected.		

Firewall
Add IP ranges to allow access from the internet or your on-premises networks. [Learn more.](#)

Add your client IP address? 

ADDRESS RANGE

7. Provide the information necessary to create the new virtual network, and then select **Create**.

Create virtual network

★ Name
widgets-vnet ✓

★ Address space ⓘ
10.1.0.0/16
10.1.0.0 - 10.1.255.255 (65536 addresses)

★ Subscription
widgets-subscription ▾

★ Resource group
widgets-resource-group ▾
[Create new](#)

★ Location
(US) West US 2 ▾

Subnet

★ Name
default

★ Address range ⓘ
10.1.0.0/24 ✓
10.1.0.0 - 10.1.0.255 (256 addresses)

DDoS protection ⓘ
 Basic Standard

Service endpoint ⓘ
Microsoft.CognitiveServices

Firewall ⓘ

(!) Note

If a service endpoint for Azure AI services wasn't previously configured for the selected virtual network and subnets, you can configure it as part of this operation.

Presently, only virtual networks belonging to the same Azure Active Directory tenant are shown for selection during rule creation. To grant access to a subnet in a virtual network belonging to another tenant, please use PowerShell, CLI or REST APIs.

8. To remove a virtual network or subnet rule, select ... to open the context menu for the virtual network or subnet, and select Remove.

The screenshot shows the Azure portal interface for managing a virtual network named 'widgets'. At the top, there are save, discard, and refresh buttons. A note says: 'Firewall settings allowing access to cognitive service will remain in effect for up to three minutes after saving updated settings restricting access.' Below this, there's a section for 'Allow access from' with 'Selected networks' selected. A link to 'Configure network security for your cognitive service' is provided. Under 'Virtual networks', there's a table with columns: VIRTUAL NETWORK, SUBNET, ADDRESS RANGE, ENDPOINT STATUS, RESOURCE GROUP, and SUBSCRIPTION. One row is shown for 'widgets-vnet' with '1' in the subnet column. In the 'ADDRESS RANGE' column, it shows '10.1.0.0/24'. The 'ENDPOINT STATUS' column shows 'Enabled'. The 'RESOURCE GROUP' and 'SUBSCRIPTION' columns show 'widgets-resource-gr...' and 'widgets-subscription'. To the right of the table, there are 'Remove' and '...' buttons. A context menu is open over the 'Remove' button, with the 'Remove' option highlighted and surrounded by a red box. Other options in the menu include '...'. Below the table, there's a 'Firewall' section with a note to 'Add IP ranges to allow access from the internet or your on-premises networks' and a checkbox for 'Add your client IP address'. There's also a 'ADDRESS RANGE' input field containing 'IP address or CIDR'.

9. Select Save to apply your changes.

ⓘ Important

Be sure to **set the default rule to deny**, or network rules have no effect.

Grant access from an internet IP range

You can configure Azure AI services resources to allow access from specific public internet IP address ranges. This configuration grants access to specific services and on-premises networks, effectively blocking general internet traffic.

Provide allowed internet address ranges using [CIDR notation](#) in the form `16.17.18.0/24` or as individual IP addresses like `16.17.18.19`.

💡 Tip

Small address ranges using "/31" or "/32" prefix sizes are not supported. These ranges should be configured using individual IP address rules.

IP network rules are only allowed for **public internet** IP addresses. IP address ranges reserved for private networks (as defined in [RFC 1918](#)) aren't allowed in IP rules. Private networks include addresses that start with `10.*`, `172.16.* - 172.31.*`, and `192.168.*`.

Only IPv4 addresses are supported at this time. Each Azure AI services resource supports up to 100 IP network rules, which may be combined with [Virtual network rules](#).

Configuring access from on-premises networks

To grant access from your on-premises networks to your Azure AI services resource with an IP network rule, you must identify the internet facing IP addresses used by your network. Contact your network administrator for help.

If you're using [ExpressRoute](#) on-premises for public peering or Microsoft peering, you need to identify the NAT IP addresses. For public peering, each ExpressRoute circuit by default uses two NAT IP addresses. Each is applied to Azure service traffic when the traffic enters the Microsoft Azure network backbone. For Microsoft peering, the NAT IP addresses that are used are either customer provided or are provided by the service provider. To allow access to your service resources, you must allow these public IP addresses in the resource IP firewall setting. To find your public peering ExpressRoute circuit IP addresses, open a support ticket with [ExpressRoute](#) via the Azure portal. Learn more about [NAT for ExpressRoute public and Microsoft peering](#).

Managing IP network rules

You can manage IP network rules for Azure AI services resources through the Azure portal, PowerShell, or the Azure CLI.

Azure portal

1. Go to the Azure AI services resource you want to secure.
2. Select the **RESOURCE MANAGEMENT** menu called **Virtual network**.
3. Check that you've selected to allow access from **Selected networks**.
4. To grant access to an internet IP range, enter the IP address or address range (in [CIDR format](#)) under **Firewall > Address Range**. Only valid public IP (non-reserved) addresses are accepted.

widgets - Virtual network
Cognitive Services

» Save Discard Refresh

Firewall settings allowing access to cognitive service will remain in effect for up to three minutes after saving updated settings restricting access.

Allow access from
 All networks Selected networks

Configure network security for your cognitive service. [Learn more](#).

Virtual networks
Secure your cognitive service with virtual networks. [+ Add existing virtual network](#) [+ Add new virtual network](#)

VIRTUAL NETWORK	SUBNET	ADDRESS RANGE
No network selected.		

Firewall
Add IP ranges to allow access from the internet or your on-premises networks. [Learn more](#).

Add your client IP address?

ADDRESS RANGE

IP address or CIDR
173.0.0.0/16

5. To remove an IP network rule, select the trash can icon next to the address range.

widgets - Virtual network
Cognitive Services

» Save Discard Refresh

Firewall settings allowing access to cognitive service will remain in effect for up to three minutes after saving updated settings restricting access.

Allow access from
 All networks Selected networks

Configure network security for your cognitive service. [Learn more](#).

Virtual networks
Secure your cognitive service with virtual networks. [+ Add existing virtual network](#) [+ Add new virtual network](#)

VIRTUAL NETWORK	SUBNET	ADDRESS RANGE
No network selected.		

Firewall
Add IP ranges to allow access from the internet or your on-premises networks. [Learn more](#).

Add your client IP address?

ADDRESS RANGE

IP address or CIDR
173.0.0.0/16

6. Select **Save** to apply your changes.

Important

Be sure to **set the default rule to deny**, or network rules have no effect.

Use private endpoints

You can use [private endpoints](#) for your Azure AI services resources to allow clients on a virtual network (VNet) to securely access data over a [Private Link](#). The private endpoint uses an IP address from the VNet address space for your Azure AI services resource. Network traffic between the clients on the VNet and the resource traverses the VNet and a private link on the Microsoft backbone network, eliminating exposure from the public internet.

Private endpoints for Azure AI services resources let you:

- Secure your Azure AI services resource by configuring the firewall to block all connections on the public endpoint for the Azure AI services service.
- Increase security for the VNet, by enabling you to block exfiltration of data from the VNet.
- Securely connect to Azure AI services resources from on-premises networks that connect to the VNet using [VPN](#) or [ExpressRoutes](#) with private-peering.

Conceptual overview

A private endpoint is a special network interface for an Azure resource in your [VNet](#). Creating a private endpoint for your Azure AI services resource provides secure connectivity between clients in your VNet and your resource. The private endpoint is assigned an IP address from the IP address range of your VNet. The connection between the private endpoint and the Azure AI services service uses a secure private link.

Applications in the VNet can connect to the service over the private endpoint seamlessly, using the same connection strings and authorization mechanisms that they would use otherwise. The exception is the Speech Services, which require a separate endpoint. See the section on [Private endpoints with the Speech Services](#). Private endpoints can be used with all protocols supported by the Azure AI services resource, including REST.

Private endpoints can be created in subnets that use [Service Endpoints](#). Clients in a subnet can connect to one Azure AI services resource using private endpoint, while using service endpoints to access others.

When you create a private endpoint for an Azure AI services resource in your VNet, a consent request is sent for approval to the Azure AI services resource owner. If the user requesting the creation of the private endpoint is also an owner of the resource, this consent request is automatically approved.

Azure AI services resource owners can manage consent requests and the private endpoints, through the '*Private endpoints*' tab for the Azure AI services resource in the [Azure portal](#).

Private endpoints

When creating the private endpoint, you must specify the Azure AI services resource it connects to. For more information on creating a private endpoint, see:

- [Create a private endpoint using the Private Link Center in the Azure portal](#)
- [Create a private endpoint using Azure CLI](#)
- [Create a private endpoint using Azure PowerShell](#)

Connecting to private endpoints

Note

Azure OpenAI Service uses a different private DNS zone and public DNS zone forwarder than other Azure AI services. Refer to the [Azure services DNS zone configuration article](#) for the correct zone and forwarder names.

Clients on a VNet using the private endpoint should use the same connection string for the Azure AI services resource as clients connecting to the public endpoint. The exception is the Speech Services, which require a separate endpoint. See the section on [Private endpoints with the Speech Services](#). We rely upon DNS resolution to automatically route the connections from the VNet to the Azure AI services resource over a private link.

We create a [private DNS zone](#) attached to the VNet with the necessary updates for the private endpoints, by default. However, if you're using your own DNS server, you may need to make more changes to your DNS configuration. The section on [DNS changes](#) below describes the updates required for private endpoints.

Private endpoints with the Speech Services

See [Using Speech Services with private endpoints provided by Azure Private Link](#).

DNS changes for private endpoints

When you create a private endpoint, the DNS CNAME resource record for the Azure AI services resource is updated to an alias in a subdomain with the prefix `privatelink`. By default, we also create a [private DNS zone](#), corresponding to the `privatelink` subdomain, with the DNS A resource records for the private endpoints.

When you resolve the endpoint URL from outside the VNet with the private endpoint, it resolves to the public endpoint of the Azure AI services resource. When resolved from the VNet hosting the private endpoint, the endpoint URL resolves to the private endpoint's IP address.

This approach enables access to the Azure AI services resource using the same connection string for clients in the VNet hosting the private endpoints and clients outside the VNet.

If you're using a custom DNS server on your network, clients must be able to resolve the fully qualified domain name (FQDN) for the Azure AI services resource endpoint to the private endpoint IP address. Configure your DNS server to delegate your private link subdomain to the private DNS zone for the VNet.

💡 Tip

When using a custom or on-premises DNS server, you should configure your DNS server to resolve the Azure AI services resource name in the 'privatelink' subdomain to the private endpoint IP address. You can do this by delegating the 'privatelink' subdomain to the private DNS zone of the VNet, or configuring the DNS zone on your DNS server and adding the DNS A records.

For more information on configuring your own DNS server to support private endpoints, see the following articles:

- [Name resolution for resources in Azure virtual networks](#)
- [DNS configuration for private endpoints](#)

Pricing

For pricing details, see [Azure Private Link pricing](#).

Next steps

- Explore the various [Azure AI services](#)
- Learn more about [Azure Virtual Network Service Endpoints](#)

Azure OpenAI Service encryption of data at rest

Article • 07/18/2023

Azure OpenAI automatically encrypts your data when it's persisted to the cloud. The encryption protects your data and helps you meet your organizational security and compliance commitments. This article covers how Azure OpenAI handles encryption of data at rest, specifically training data and fine-tuned models. For information on how data provided by you to the service is processed, used, and stored, consult the [data, privacy, and security article](#).

About Azure AI services encryption

Azure OpenAI is part of Azure AI services. Azure AI services data is encrypted and decrypted using [FIPS 140-2](#) compliant [256-bit AES](#) encryption. Encryption and decryption are transparent, meaning encryption and access are managed for you. Your data is secure by default and you don't need to modify your code or applications to take advantage of encryption.

About encryption key management

By default, your subscription uses Microsoft-managed encryption keys. There's also the option to manage your subscription with your own keys called customer-managed keys (CMK). CMK offers greater flexibility to create, rotate, disable, and revoke access controls. You can also audit the encryption keys used to protect your data.

Customer-managed keys with Azure Key Vault

Customer-managed keys (CMK), also known as Bring your own key (BYOK), offer greater flexibility to create, rotate, disable, and revoke access controls. You can also audit the encryption keys used to protect your data.

You must use Azure Key Vault to store your customer-managed keys. You can either create your own keys and store them in a key vault, or you can use the Azure Key Vault APIs to generate keys. The Azure AI services resource and the key vault must be in the same region and in the same Azure Active Directory (Azure AD) tenant, but they can be in different subscriptions. For more information about Azure Key Vault, see [What is Azure Key Vault?](#)

To request the ability to use customer-managed keys, fill out and submit the [Azure AI services Customer-Managed Key Request Form](#). It will take approximately 3-5 business days to hear back on the status of your request.

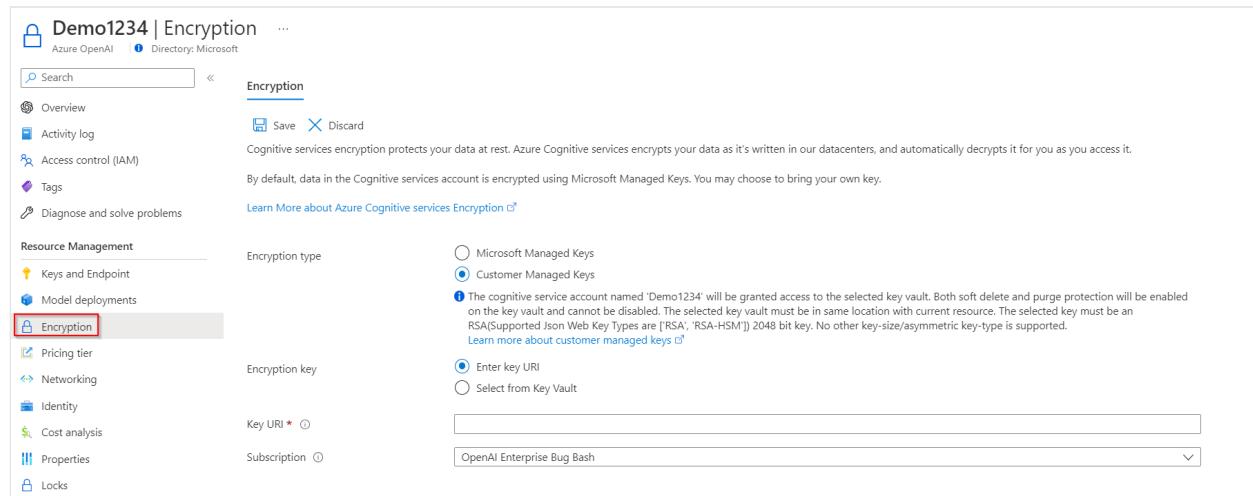
To enable customer-managed keys, you must also enable both the **Soft Delete** and **Do Not Purge** properties on the key vault.

Only RSA keys of size 2048 are supported with Azure AI services encryption. For more information about keys, see **Key Vault keys** in [About Azure Key Vault keys, secrets and certificates](#).

Enable customer-managed keys for your resource

To enable customer-managed keys in the Azure portal, follow these steps:

1. Go to your Azure AI services resource.
2. On the left, select **Encryption**.
3. Under **Encryption type**, select **Customer Managed Keys**, as shown in the following screenshot.



Specify a key

After you enable customer-managed keys, you can specify a key to associate with the Azure AI services resource.

Specify a key as a URI

To specify a key as a URI, follow these steps:

1. In the Azure portal, go to your key vault.
2. Under **Settings**, select **Keys**.
3. Select the desired key, and then select the key to view its versions. Select a key version to view the settings for that version.
4. Copy the **Key Identifier** value, which provides the URI.

The screenshot shows the 'Keys' blade in the Azure Key Vault. A single key version is selected, named '17bf9182bb694f109b8dc6d1e9b69f29'. The 'Properties' section displays the key type as RSA, RSA key size as 2048, and creation and update times as 4/9/2019, 12:50:38 PM. The 'Key Identifier' field contains the value '<key-uri>' with a copy icon. The 'Settings' section includes options for activation and expiration dates, both of which are currently disabled. The 'Enabled?' button is set to 'Yes'. The 'Tags' section shows '0 tags'. The 'Permitted operations' section lists six options: Encrypt, Decrypt, Sign, Verify, Wrap Key, and Unwrap Key, all of which are checked.

5. Go back to your Azure AI services resource, and then select **Encryption**.
6. Under **Encryption key**, select **Enter key URI**.
7. Paste the URI that you copied into the **Key URI** box.

The screenshot shows the 'Encryption' settings for a Cognitive Service named 'CMK-Test'. The left sidebar lists various service management options like Overview, Activity log, Access control (IAM), Tags, Diagnose and solve problems, and Resource Management (Quick start, Keys and Endpoint, Encryption, Pricing tier, Virtual network, Identity, Billing By Subscription, Properties, Locks, Export template). The 'Encryption' option is selected. The main pane displays the 'Encryption' configuration. It includes a 'Save' and 'Discard' button, a note about protecting data at rest, and a note about encrypting new data only. A link to 'Learn More about Azure Cognitive services Encryption' is provided. Under 'Encryption type', 'Customer Managed Keys' is selected. Under 'Encryption key', 'Select from Key Vault' is chosen. The 'Key URI' field contains '<key uri>' with a checkmark. The 'Subscription' dropdown is set to 'AICP-DEV'.

8. Under **Subscription**, select the subscription that contains the key vault.

9. Save your changes.

Specify a key from a key vault

To specify a key from a key vault, first make sure that you have a key vault that contains a key. Then follow these steps:

1. Go to your Azure AI services resource, and then select **Encryption**.
2. Under **Encryption key**, select **Select from Key Vault**.
3. Select the key vault that contains the key that you want to use.
4. Select the key that you want to use.

Microsoft Azure

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

Home > CMKTest01-SB - Encryption > Select key from Azure Key Vault

Select key from Azure Key Vault

Subscription *	AICP-DEV
Key vault *	CMKTest-01SB Create new
Key *	CMKTest-01SB Create new
Version *	19fc5cfacbd34e47b373709c1e400902 Create new

5. Save your changes.

Update the key version

When you create a new version of a key, update the Azure AI services resource to use the new version. Follow these steps:

1. Go to your Azure AI services resource, and then select **Encryption**.
2. Enter the URI for the new key version. Alternately, you can select the key vault and then select the key again to update the version.
3. Save your changes.

Use a different key

To change the key that you use for encryption, follow these steps:

1. Go to your Azure AI services resource, and then select **Encryption**.
2. Enter the URI for the new key. Alternately, you can select the key vault and then select a new key.
3. Save your changes.

Rotate customer-managed keys

You can rotate a customer-managed key in Key Vault according to your compliance policies. When the key is rotated, you must update the Azure AI services resource to use the new key URI. To learn how to update the resource to use a new version of the key in the Azure portal, see [Update the key version](#).

Rotating the key doesn't trigger re-encryption of data in the resource. No further action is required from the user.

Revoke a customer-managed key

You can revoke a customer-managed encryption key by changing the access policy, by changing the permissions on the key vault, or by deleting the key.

To change the access policy of the managed identity that your registry uses, run the [az-keyvault-delete-policy](#) command:

Azure CLI

```
az keyvault delete-policy \
--resource-group <resource-group-name> \
--name <key-vault-name> \
--key_id <key-vault-key-id>
```

To delete the individual versions of a key, run the [az-keyvault-key-delete](#) command. This operation requires the *keys/delete* permission.

Azure CLI

```
az keyvault key delete \
--name <key-vault-name> \
--object-id $identityPrincipalID \
```

ⓘ Important

Revoking access to an active customer-managed key while CMK is still enabled will prevent downloading of training data and results files, fine-tuning new models, and deploying fine-tuned models. However, previously deployed fine-tuned models will continue to operate and serve traffic until those deployments are deleted.

Delete training, validation, and training results data

The Files API allows customers to upload their training data for the purpose of fine-tuning a model. This data is stored in Azure Storage, within the same region as the resource and logically isolated with their Azure subscription and API Credentials. Uploaded files can be deleted by the user via the [DELETE API operation](#).

Delete fine-tuned models and deployments

The Fine-tunes API allows customers to create their own fine-tuned version of the OpenAI models based on the training data that you've uploaded to the service via the Files APIs. The trained fine-tuned models are stored in Azure Storage in the same region, encrypted at rest (either with Microsoft-managed keys or customer-managed keys) and logically isolated with their Azure subscription and API credentials. Fine-tuned models and deployments can be deleted by the user by calling the [DELETE API operation](#).

Disable customer-managed keys

When you disable customer-managed keys, your Azure AI services resource is then encrypted with Microsoft-managed keys. To disable customer-managed keys, follow these steps:

1. Go to your Azure AI services resource, and then select **Encryption**.
2. Select **Microsoft Managed Keys > Save**.

When you previously enabled customer managed keys this also enabled a system assigned managed identity, a feature of Azure AD. Once the system assigned managed identity is enabled, this resource will be registered with Azure Active Directory. After being registered, the managed identity will be given access to the Key Vault selected during customer managed key setup. You can learn more about [Managed Identities](#).

ⓘ Important

If you disable system assigned managed identities, access to the key vault will be removed and any data encrypted with the customer keys will no longer be accessible. Any features depended on this data will stop working.

ⓘ Important

Managed identities do not currently support cross-directory scenarios. When you configure customer-managed keys in the Azure portal, a managed identity is automatically assigned under the covers. If you subsequently move the subscription, resource group, or resource from one Azure AD directory to another, the managed identity associated with the resource is not transferred to the new tenant, so customer-managed keys may no longer work. For more information, see [Transferring a subscription between Azure AD directories](#) in [FAQs and known issues with managed identities for Azure resources](#).

Next steps

- [Language service Customer-Managed Key Request Form ↗](#)
- [Learn more about Azure Key Vault](#)

How to configure Azure OpenAI Service with managed identities

Article • 07/18/2023

More complex security scenarios require Azure role-based access control (Azure RBAC). This document covers how to authenticate to your OpenAI resource using Azure Active Directory (Azure AD).

In the following sections, you'll use the Azure CLI to assign roles, and obtain a bearer token to call the OpenAI resource. If you get stuck, links are provided in each section with all available options for each command in Azure Cloud Shell/Azure CLI.

Prerequisites

- An Azure subscription - [Create one for free ↗](#)
- Access granted to the Azure OpenAI service in the desired Azure subscription

Currently, access to this service is granted only by application. You can apply for access to Azure OpenAI by completing the form at [https://aka.ms/oai/access ↗](https://aka.ms/oai/access). Open an issue on this repo to contact us if you have an issue.

- Azure CLI - [Installation Guide](#)
- The following Python libraries: os, requests, json

Sign into the Azure CLI

To sign-in to the Azure CLI, run the following command and complete the sign-in. You may need to do it again if your session has been idle for too long.

```
Azure CLI
az login
```

Assign yourself to the Cognitive Services User role

Assigning yourself to the "Cognitive Services User" role will allow you to use your account for access to the specific Azure AI services resource.

1. Get your user information

Azure CLI

```
export user=$(az account show -o json | jq -r .user.name)
```

2. Assign yourself to "Cognitive Services User" role.

Azure CLI

```
export resourceId=$(az group show -g $myResourceGroupName -o json | jq -r .id)
az role assignment create --role "Cognitive Services User" --assignee
$user --scope $resourceId
```

ⓘ Note

Role assignment change will take ~5 mins to become effective.

3. Acquire an Azure AD access token. Access tokens expire in one hour. you'll then need to acquire another one.

Azure CLI

```
export accessToken=$(az account get-access-token --resource
https://cognitiveservices.azure.com -o json | jq -r .accessToken)
```

4. Make an API call Use the access token to authorize your API call by setting the `Authorization` header value.

Bash

```
curl ${endpoint%}/openai/deployments/YOUR_DEPLOYMENT_NAME/completions?
api-version=2023-05-15 \
-H "Content-Type: application/json" \
-H "Authorization: Bearer $accessToken" \
-d '{ "prompt": "Once upon a time" }'
```

Authorize access to managed identities

OpenAI supports Azure Active Directory (Azure AD) authentication with [managed identities for Azure resources](#). Managed identities for Azure resources can authorize access to Azure AI services resources using Azure AD credentials from applications running in Azure virtual machines (VMs), function apps, virtual machine scale sets, and other services. By using managed identities for Azure resources together with Azure AD authentication, you can avoid storing credentials with your applications that run in the cloud.

Enable managed identities on a VM

Before you can use managed identities for Azure resources to authorize access to Azure AI services resources from your VM, you must enable managed identities for Azure resources on the VM. To learn how to enable managed identities for Azure Resources, see:

- [Azure portal](#)
- [Azure PowerShell](#)
- [Azure CLI](#)
- [Azure Resource Manager template](#)
- [Azure Resource Manager client libraries](#)

For more information about managed identities, see [Managed identities for Azure resources](#).

Create a resource and deploy a model using Azure OpenAI

Article • 07/18/2023

Use this article to get started with Azure OpenAI with step-by-step instructions to create a resource and deploy a model. While the steps for resource creation and model deployment can be completed in a few minutes, the actual deployment process itself can take more than hour. You can create your resource, start your deployment, and then check back in on your deployment later rather than actively waiting for the deployment to complete.

Prerequisites

- An Azure subscription - [Create one for free ↗](#)
- Access granted to Azure OpenAI in the desired Azure subscription

Currently, access to this service is granted only by application. You can apply for access to Azure OpenAI by completing the form at <https://aka.ms/oai/access> ↗ . Open an issue on this repo to contact us if you have an issue.

Create a resource

Resources in Azure can be created several different ways:

- Within the [Azure portal](#) ↗
- Using the REST APIs, Azure CLI, PowerShell or client libraries
- Via ARM templates

This guide walks you through the Azure portal creation experience.

1. Navigate to the create page: [Azure OpenAI Service Create Page](#) ↗
2. On the **Create** page provide the following information:

Field	Description
Subscription	Select the Azure subscription used in your OpenAI onboarding application
Resource group	The Azure resource group that will contain your OpenAI resource. You can create a new group or add it to a pre-existing group.

Field	Description
Region	The location of your instance. Different locations may introduce latency, but have no impact on the runtime availability of your resource.
Name	A descriptive name for your Azure AI services resource. For example, <i>MyOpenAIResource</i> .
Pricing Tier	Only 1 pricing tier is available for the service currently

Create Azure OpenAI ...

Basics Tags Review + create

Enable new business solutions with OpenAI's language generation capabilities powered by GPT-3 models. These models have been pretrained with trillions of words and can easily adapt to your scenario with a few short examples provided at inference. Apply them to numerous scenarios, from summarization to content and code generation.

Project details

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

Subscription *	<input type="text" value="OpenAI Test Subscription"/>
Resource group *	<input type="text" value="test-resource-group"/> Create new

Instance details

Region *	<input type="text" value="South Central US"/>
Name *	<input type="text" value="azure-openai-test-001"/> ✓

Pricing tier *	<input type="text" value="Standard S0"/>
----------------	--

[View full pricing details](#)

[Review + create](#)

[< Previous](#)

[Next : Tags >](#)



Deploy a model

Before you can generate text or inference, you need to deploy a model. You can select from one of several available models in Azure OpenAI Studio.

To deploy a model, follow these steps:

1. Sign in to [Azure OpenAI Studio](#).
2. Select the subscription and Azure OpenAI resource to work with.

3. Under Management select Deployments.

4. Select Create new deployment.

Field	Description
Select a model	Model availability varies by region. For a list of available models per region, see Model Summary table and region availability .
Deployment name	Choose a name carefully. The deployment name will be used in your code to call the model via the client libraries and REST API
Advanced Options	Content Filter - Assign a content filter to your deployment. Tokens per Minute Rate Limit - Adjust the Tokens per Minute (TPM) to set the effective rate limit for your deployment. You can modify this value at any time via the Quotas menu

5. Select a model from the drop-down.

6. Enter a deployment name to help you identify the model.

7. For your first deployment leave the Advanced Options set to the defaults.

The deployments table displays a new entry that corresponds to this newly created model. Your deployment status will move to succeeded when the deployment is complete and ready for use.

Next steps

- Now that you have a resource and your first model deployed get started making API calls and generating text with our [quickstarts](#).
- Learn more about the [underlying models](#) that power Azure OpenAI.

How to switch between OpenAI and Azure OpenAI endpoints with Python

Article • 07/20/2023

While OpenAI and Azure OpenAI Service rely on a [common Python client library](#), there are small changes you need to make to your code in order to swap back and forth between endpoints. This article walks you through the common changes and differences you'll experience when working across OpenAI and Azure OpenAI.

ⓘ Note

This library is maintained by OpenAI and is currently in preview. Refer to the [release history](#) or the [version.py commit history](#) to track the latest updates to the library.

Authentication

We recommend using environment variables. If you haven't done this before our [Python quickstarts](#) walk you through this configuration.

API key

OpenAI	Azure OpenAI
Python	Python
<pre>import openai openai.api_key = "sk-..." openai.organization = "..."</pre>	<pre>import openai openai.api_type = "azure" openai.api_key = "..." openai.api_base = "https://example- endpoint.openai.azure.com" openai.api_version = "2023-05-15" # subject to change</pre>

Azure Active Directory authentication

OpenAI	Azure OpenAI
--------	--------------

Python

```
import openai

openai.api_key =
"sk-..."
openai.organizatio
n = "..."
```

Python

```
import openai
from azure.identity import
DefaultAzureCredential

credential = DefaultAzureCredential()
token =
credential.get_token("https://cognitiveservices.
azure.com/.default")

openai.api_type = "azure_ad"
openai.api_key = token.token
openai.api_base = "https://example-
endpoint.openai.azure.com"
openai.api_version = "2023-05-15" # subject to
change
```

Keyword argument for model

OpenAI uses the `model` keyword argument to specify what model to use. Azure OpenAI has the concept of `deployments` and uses the `deployment_id` keyword argument to describe which model deployment to use. Azure OpenAI also supports the use of `engine` interchangeably with `deployment_id`.

For OpenAI `engine` still works in most instances, but it's deprecated and `model` is preferred.

OpenAI

Azure OpenAI

Python

```
completion =
openai.Completion.create(
    prompt=<prompt>,
    model="text-davinci-003"
)

chat_completion =
openai.ChatCompletion.create(
    messages=<messages>,
    model="gpt-4"
)

embedding =
openai.Embedding.create(
```

Python

```
completion =
openai.Completion.create(
    prompt=<prompt>,
    deployment_id="text-davinci-
003"
#engine="text-davinci-003"
)

chat_completion =
openai.ChatCompletion.create(
    messages=<messages>,
    deployment_id="gpt-4"
#engine="gpt-4"
```

```
        input=<input>,
        model="text-embedding-ada-002"
    )
)
embedding =
openai.Embedding.create(
    input=<input>,
    deployment_id="text-embedding-
ada-002"
    #engine="text-embedding-ada-
002"
)
```

Azure OpenAI embeddings multiple input support

OpenAI currently allows a larger number of array inputs with text-embedding-ada-002. Azure OpenAI currently supports input arrays up to 16 for text-embedding-ada-002 Version 2. Both require the max input token limit per API request to remain under 8191 for this model.

OpenAI	Azure OpenAI
<p>Python</p> <pre>inputs = ["A", "B", "C"] embedding = openai.Embedding.create(input=inputs, model="text-embedding-ada- 002")</pre>	<p>Python</p> <pre>inputs = ["A", "B", "C"] #max array size=16 embedding = openai.Embedding.create(input=inputs, deployment_id="text-embedding-ada- 002" #engine="text-embedding-ada-002")</pre>

Next steps

- Learn more about how to work with GPT-35-Turbo and the GPT-4 models with [our how-to guide](#).
- For more examples, check out the [Azure OpenAI Samples GitHub repository](#) ↗

Manage Azure OpenAI Service quota

Article • 08/02/2023

Quota provides the flexibility to actively manage the allocation of rate limits across the deployments within your subscription. This article walks through the process of managing your Azure OpenAI quota.

Prerequisites

Important

Viewing quota and deploying models requires the **Cognitive Services Usages Reader** role. This role provides the minimal access necessary to view quota usage across an Azure subscription. To learn more about this role and the other roles you will need to access Azure OpenAI, consult our [Azure role-based access \(Azure RBAC\) guide](#).

This role can be found in the Azure portal under **Subscriptions > Access control (IAM) > Add role assignment** > search for **Cognitive Services Usages Reader**. This role **must be applied at the subscription level**, it does not exist at the resource level.

If you do not wish to use this role, the subscription **Reader** role will provide equivalent access, but it will also grant read access beyond the scope of what is needed for viewing quota and model deployment.

Introduction to quota

Azure OpenAI's quota feature enables assignment of rate limits to your deployments, up-to a global limit called your "quota." Quota is assigned to your subscription on a per-region, per-model basis in units of **Tokens-per-Minute (TPM)**. When you onboard a subscription to Azure OpenAI, you'll receive default quota for most available models. Then, you'll assign TPM to each deployment as it is created, and the available quota for that model will be reduced by that amount. You can continue to create deployments and assign them TPM until you reach your quota limit. Once that happens, you can only create new deployments of that model by reducing the TPM assigned to other deployments of the same model (thus freeing TPM for use), or by requesting and being approved for a model quota increase in the desired region.

Note

With a quota of 240,000 TPM for GPT-35-Turbo in East US, a customer can create a single deployment of 240K TPM, 2 deployments of 120K TPM each, or any number of deployments in one or multiple Azure OpenAI resources as long as their TPM adds up to less than 240K total in that region.

When a deployment is created, the assigned TPM will directly map to the tokens-per-minute rate limit enforced on its inferencing requests. A **Requests-Per-Minute (RPM)** rate limit will also be enforced whose value is set proportionally to the TPM assignment using the following ratio:

6 RPM per 1000 TPM.

The flexibility to distribute TPM globally within a subscription and region has allowed Azure OpenAI Service to loosen other restrictions:

- The maximum resources per region are increased to 30.
- The limit on creating no more than one deployment of the same model in a resource has been removed.

Assign quota

When you create a model deployment, you have the option to assign Tokens-Per-Minute (TPM) to that deployment. TPM can be modified in increments of 1,000, and will map to the TPM and RPM rate limits enforced on your deployment, as discussed above.

To create a new deployment from within the Azure AI Studio under **Management** select **Deployments > Create new deployment**.

The option to set the TPM is under the **Advanced options** drop-down:

Deploy model

X

Set up a deployment to make API calls against a provided base model or a custom model. Finished deployments are available for use. Your deployment status will move to succeeded when the deployment is complete and ready for use.

Select a model ⓘ

text-similarity-ada-001

Deployment name ⓘ

text-similarity-ada-001 *

Advanced options ▾

Content Filter ⓘ

Default

(i) 120K tokens per minute quota available for your deployment

Tokens per Minute Rate Limit (thousands) ⓘ

120K

Corresponding requests per minute (RPM) = 720

Create

Cancel



Post deployment you can adjust your TPM allocation by selecting **Edit deployment** under **Management > Deployments** in Azure AI Studio. You can also modify this selection within the new quota management experience under **Management > Quotas**.

ⓘ Important

Quotas and limits are subject to change, for the most up-date-information consult our [quotas and limits article](#).

Model specific settings

Different model deployments, also called model classes have unique max TPM values that you're now able to control. **This represents the maximum amount of TPM that can be allocated to that type of model deployment in a given region.** While each model

type represents its own unique model class, the max TPM value is currently only different for certain model classes:

- GPT-4
- GPT-4-32K
- Text-Davinci-003

All other model classes have a common max TPM value.

ⓘ Note

Quota Tokens-Per-Minute (TPM) allocation is not related to the max input token limit of a model. Model input token limits are defined in the **models** table and are not impacted by changes made to TPM.

View and request quota

For an all up view of your quota allocations across deployments in a given region, select **Management > Quota** in Azure AI Studio:

The screenshot shows the Azure AI Studio interface with the 'Quotas' page selected. The left sidebar has a red box around the 'Quotas' link. The main content area displays quota details for different models across regions. A large circular icon with a plus sign and a magnifying glass is in the bottom right corner.

Quota name	Deployment	Usage/Limit	Request quota
Tokens Per Minute (thousands) - Text-Similarity-Da		120 of 240	50%
Tokens Per Minute (thousands) - Text-Similarity-Ad		120 of 240	50%
Tokens Per Minute (thousands) - Text-Search-Davin		120 of 240	50%
Tokens Per Minute (thousands) - Text-Search-Davin		120 of 240	50%
Tokens Per Minute (thousands) - Text-Search-Ada-L		120 of 240	50%
Tokens Per Minute (thousands) - Text-Search-Ada-L		120 of 240	50%
Tokens Per Minute (thousands) - Text-Embedding-J		361 of 361	100%

- **Quota Name:** There's one quota value per region for each model type. The quota covers all versions of that model. The quota name can be expanded in the UI to

show the deployments that are using the quota.

- **Deployment:** Model deployments divided by model class.
- **Usage/Limit:** For the quota name, this shows how much quota is used by deployments and the total quota approved for this subscription and region. This amount of quota used is also represented in the bar graph.
- **Request Quota:** The icon in this field navigates to a form where requests to increase quota can be submitted.

Migrating existing deployments

As part of the transition to the new quota system and TPM based allocation, all existing Azure OpenAI model deployments have been automatically migrated to use quota. In cases where the existing TPM/RPM allocation exceeds the default values due to previous custom rate-limit increases, equivalent TPM were assigned to the impacted deployments.

Understanding rate limits

Assigning TPM to a deployment sets the Tokens-Per-Minute (TPM) and Requests-Per-Minute (RPM) rate limits for the deployment, as described above. TPM rate limits are based on the maximum number of tokens that are estimated to be processed by a request at the time the request is received. It isn't the same as the token count used for billing, which is computed after all processing is completed.

As each request is received, Azure OpenAI computes an estimated max processed-token count that includes the following:

- Prompt text and count
- The `max_tokens` parameter setting
- The `best_of` parameter setting

As requests come into the deployment endpoint, the estimated max-processed-token count is added to a running token count of all requests that is reset each minute. If at any time during that minute, the TPM rate limit value is reached, then further requests will receive a 429 response code until the counter resets.

RPM rate limits are based on the number of requests received over time. The rate limit expects that requests be evenly distributed over a one-minute period. If this average flow isn't maintained, then requests may receive a 429 response even though the limit isn't met when measured over the course of a minute. To implement this behavior, Azure OpenAI Service evaluates the rate of incoming requests over a small period of time,

typically 1 or 10 seconds. If the number of requests received during that time exceeds what would be expected at the set RPM limit, then new requests will receive a 429 response code until the next evaluation period. For example, if Azure OpenAI is monitoring request rate on 1-second intervals, then rate limiting will occur for a 600-RPM deployment if more than 10 requests are received during each 1-second period (600 requests per minute = 10 requests per second).

Rate limit best practices

To minimize issues related to rate limits, it's a good idea to use the following techniques:

- Set max_tokens and best_of to the minimum values that serve the needs of your scenario. For example, don't set a large max-tokens value if you expect your responses to be small.
- Use quota management to increase TPM on deployments with high traffic, and to reduce TPM on deployments with limited needs.
- Implement retry logic in your application.
- Avoid sharp changes in the workload. Increase the workload gradually.
- Test different load increase patterns.

Automate deployment

This section contains brief example templates to help get you started programmatically creating deployments that use quota to set TPM rate limits. With the introduction of quota you must use API version 2023-05-01 for resource management related activities. This API version is only for managing your resources, and does not impact the API version used for inferencing calls like completions, chat completions, embedding, image generation etc.

REST

Deployment

HTTP

PUT

```
https://management.azure.com/subscriptions/{subscriptionId}/resourceGroups/{resourceGroupName}/providers/Microsoft.CognitiveServices/accounts/{accountName}/deployments/{deploymentName}?api-version=2023-05-01
```

Path parameters

Parameter	Type	Required?	Description
accountName	string	Required	The name of your Azure OpenAI Resource.
deploymentName	string	Required	The deployment name you chose when you deployed an existing model or the name you would like a new model deployment to have.
resourceGroupName	string	Required	The name of the associated resource group for this model deployment.
subscriptionId	string	Required	Subscription ID for the associated subscription.
api-version	string	Required	The API version to use for this operation. This follows the YYYY-MM-DD format.

Supported versions

- 2023-05-01 [Swagger spec ↗](#)

Request body

This is only a subset of the available request body parameters. For the full list of the parameters, you can refer to the [REST API reference documentation](#).

Parameter	Type	Description
sku	Sku	The resource model definition representing SKU.
capacity	integer	This represents the amount of quota you are assigning to this deployment. A value of 1 equals 1,000 Tokens per Minute (TPM). A value of 10 equals 10k Tokens per Minute (TPM).

Example request

Bash

```
curl -X PUT https://management.azure.com/subscriptions/00000000-0000-0000-0000-000000000000/resourceGroups/resource-group-temp/providers/Microsoft.CognitiveServices/accounts/docs-openai-test-001/deployments/gpt-35-turbo-test-deployment?api-version=2023-05-01 \
-H "Content-Type: application/json" \
-H 'Authorization: Bearer YOUR_AUTH_TOKEN' \
-d '{"sku":{"name":"Standard","capacity":10}, "properties": {"model": {"format": "OpenAI", "name": "gpt-35-turbo", "version": "0613"}}}'
```

➊ Note

There are multiple ways to generate an authorization token. The easiest method for initial testing is to launch the Cloud Shell from the [Azure portal](#). Then run `az account get-access-token`. You can use this token as your temporary authorization token for API testing.

For more information, refer to the REST API reference documentation for [usages](#) and [deployment](#).

Usage

To query your quota usage in a given region, for a specific subscription

HTML

GET
`https://management.azure.com/subscriptions/{subscriptionId}/providers/Microsoft.CognitiveServices/locations/{location}/usages?api-version=2023-05-01`

Path parameters

Parameter	Type	Required?	Description
<code>subscriptionId</code>	string	Required	Subscription ID for the associated subscription.
<code>location</code>	string	Required	Location to view usage for ex: <code>eastus</code>
<code>api-version</code>	string	Required	The API version to use for this operation. This follows the YYYY-MM-DD format.

Supported versions

- 2023-05-01 [Swagger spec](#)

Example request

Bash

```
curl -X GET https://management.azure.com/subscriptions/00000000-0000-0000-0000-000000000000/providers/Microsoft.CognitiveServices/locations/eastus/usages?api-version=2023-05-01 \
```

```
-H "Content-Type: application/json" \
-H 'Authorization: Bearer YOUR_AUTH_TOKEN'
```

Resource deletion

When an attempt to delete an Azure OpenAI resource is made from the Azure portal if any deployments are still present deletion is blocked until the associated deployments are deleted. Deleting the deployments first allows quota allocations to be properly freed up so they can be used on new deployments.

However, if you delete a resource using the REST API or some other programmatic method, this bypasses the need to delete deployments first. When this occurs, the associated quota allocation will remain unavailable to assign to a new deployment for 48 hours until the resource is purged. To trigger an immediate purge for a deleted resource to free up quota, follow the [purge a deleted resource instructions](#).

Next steps

- To review quota defaults for Azure OpenAI, consult the [quotas & limits article](#)

Monitoring Azure OpenAI Service

Article • 07/18/2023

When you have critical applications and business processes relying on Azure resources, you want to monitor those resources for their availability, performance, and operation.

This article describes the monitoring data generated by Azure OpenAI Service. Azure OpenAI is part of Azure AI services, which uses [Azure Monitor](#). If you're unfamiliar with the features of Azure Monitor common to all Azure services that use it, read [Monitoring Azure resources with Azure Monitor](#).

Monitoring data

Azure OpenAI collects the same kinds of monitoring data as other Azure resources that are described in [Monitoring data from Azure resources](#).

Collection and routing

Platform metrics and the Activity log are collected and stored automatically, but can be routed to other locations by using a diagnostic setting.

Resource Logs aren't collected and stored until you create a diagnostic setting and route them to one or more locations.

See [Create diagnostic setting to collect platform logs and metrics in Azure](#) for the detailed process for creating a diagnostic setting using the Azure portal, CLI, or PowerShell. When you create a diagnostic setting, you specify which categories of logs to collect.

Keep in mind that using diagnostic settings and sending data to Azure Monitor Logs has additional costs associated with it. To understand more, consult the [Azure Monitor cost calculation guide](#).

The metrics and logs you can collect are discussed in the following sections.

Analyzing metrics

You can analyze metrics for *Azure OpenAI* by opening **Metrics** which can be found underneath the **Monitoring** section when viewing your Azure OpenAI resource in the Azure portal. See [Getting started with Azure Metrics Explorer](#) for details on using this tool.

Azure OpenAI has commonality with a subset of Azure AI services. For a list of all platform metrics collected for Azure OpenAI and similar Azure AI services, see [Microsoft.CognitiveServices/accounts](#) supported metrics.

For the current subset of metrics available in Azure OpenAI:

Azure OpenAI Metrics

Metric	Exportable via Diagnostic Settings?	Metric Display Name	Unit	Aggregation Type	Description	Dimensions
BlockedCalls	Yes	Blocked Calls	Count	Total	Number of calls that exceeded rate or quota limit.	ApiName, OperationName, Region, RatelimitKey
ClientErrors	Yes	Client Errors	Count	Total	Number of calls with client side error (HTTP response code 4xx).	ApiName, OperationName, Region, RatelimitKey
DataIn	Yes	Data In	Bytes	Total	Size of incoming data in bytes.	ApiName, OperationName, Region
DataOut	Yes	Data Out	Bytes	Total	Size of outgoing data in bytes.	ApiName, OperationName, Region
FineTunedTrainingHours	Yes	Processed FineTuned Training Hours	Count	Total	Number of Training Hours Processed on an OpenAI FineTuned Model	ApiName, ModelDeploymentName, FeatureName, UsageChannel, Region
Latency	Yes	Latency	MilliSeconds	Average	Latency in milliseconds.	ApiName, OperationName, Region, RatelimitKey
Ratelimit	Yes	Ratelimit	Count	Total	The current ratelimit of the ratelimit key.	Region, RatelimitKey
ServerErrors	Yes	Server Errors	Count	Total	Number of calls with service internal error (HTTP response code 5xx).	ApiName, OperationName, Region, RatelimitKey
SuccessfulCalls	Yes	Successful Calls	Count	Total	Number of successful calls.	ApiName, OperationName, Region, RatelimitKey

Metric	Exportable via Diagnostic Settings?	Metric Display Name	Unit	Aggregation Type	Description	Dimensions
TokenTransaction	Yes	Processed Inference Tokens	Count	Total	Number of Inference Tokens Processed on an OpenAI Model	ApiName, ModelDeploymentName, FeatureName, UsageChannel, Region
TotalCalls	Yes	Total Calls	Count	Total	Total number of calls.	ApiName, OperationName, Region, RatelimitKey
TotalErrors	Yes	Total Errors	Count	Total	Total number of calls with error response (HTTP response code 4xx or 5xx).	ApiName, OperationName, Region, RatelimitKey

Analyzing logs

Data in Azure Monitor Logs is stored in tables where each table has its own set of unique properties.

All resource logs in Azure Monitor have the same fields followed by service-specific fields. The common schema is outlined in [Azure Monitor resource log schema](#).

The [Activity log](#) is a type of platform log in Azure that provides insight into subscription-level events. You can view it independently or route it to Azure Monitor Logs, where you can do much more complex queries using Log Analytics.

For a list of the types of resource logs available for Azure OpenAI and similar Azure AI services, see [Microsoft.CognitiveServices](#) resource provider operations.

Kusto queries

i Important

When you select **Logs** from the Azure OpenAI menu, Log Analytics is opened with the query scope set to the current Azure OpenAI resource. This means that log queries will only include data from that resource. If you want to run a query that includes data from other resources or data from other Azure services, select **Logs** from the **Azure Monitor** menu. See [Log query scope and time range in Azure Monitor Log Analytics](#) for details.

To explore and get a sense of what type of information is available for your Azure OpenAI resource a useful query to start with once you have deployed a model and sent some completion calls through the playground is as follows:

```
Kusto

AzureDiagnostics
| take 100
| project TimeGenerated, _ResourceId, Category, OperationName, DurationMs, ResultSignature, properties_s
```

Here we return a sample of 100 entries and are displaying a subset of the available columns of data in the logs. The results are as follows:

TimeGenerated [UTC]	_ResourceId	Category	OperationName	DurationMs	ResultSignature	properties_s
> 2/0/2023, 4:23:53.000 AM	/subscriptions/...	Audit	ListKey			
> 2/2/2023, 2:38:53.000 PM	/subscriptions/...	RequestResponse	Completions_Create	102	200	{"apiName":"Azure OpenAI API version 2022-12-01","requestTime":638109455318365185,"requestLength":473,"respon
> 2/2/2023, 2:43:05.000 PM	/subscriptions/...	RequestResponse	Completions_Create	103	200	{"apiName":"Azure OpenAI API version 2022-12-01","requestTime":63810945795348260,"requestLength":473,"respon
> 2/2/2023, 2:43:38.000 PM	/subscriptions/...	RequestResponse	Completions_Create	104	200	{"apiName":"Azure OpenAI API version 2022-12-01","requestTime":638109458120927349,"requestLength":471,"respon
> 2/2/2023, 7:02:40.000 PM	/subscriptions/...	Audit	ListKey			
> 2/2/2023, 7:02:42.000 PM	/subscriptions/...	RequestResponse	Completions_Create	103	200	{"apiName":"Azure OpenAI API version 2022-12-01","requestTime":638109613610114748,"requestLength":207,"respon
> 2/2/2023, 7:03:24.000 PM	/subscriptions/...	RequestResponse	Completions_Create	85	200	{"apiName":"Azure OpenAI API version 2022-12-01","requestTime":63810961402045548,"requestLength":208,"respon
> 2/2/2023, 7:04:58.000 PM	/subscriptions/...	RequestResponse	Completions_Create	103	200	{"apiName":"Azure OpenAI API version 2022-12-01","requestTime":638109614044787759,"requestLength":219,"respon
> 2/2/2023, 7:04:17.000 PM	/subscriptions/...	RequestResponse	Completions_Create	2,503	200	{"apiName":"Azure OpenAI API version 2022-12-01","requestTime":638109614526242336,"requestLength":197,"respon
> 2/2/2023, 7:05:09.000 PM	/subscriptions/...	RequestResponse	Completions_Create	99	200	{"apiName":"Azure OpenAI API version 2022-12-01","requestTime":638109615063233885,"requestLength":289,"respon
> 2/2/2023, 7:07:31.000 PM	/subscriptions/...	RequestResponse	Completions_Create	70	200	{"apiName":"Azure OpenAI API version 2022-12-01","requestTime":638109616480488625,"requestLength":227,"respon
> 2/2/2023, 7:07:05.000 PM	/subscriptions/...	RequestResponse	Completions_Create	152	200	{"apiName":"Azure OpenAI API version 2022-12-01","requestTime":63810961623900769,"requestLength":221,"respon
> 2/2/2023, 7:32:09.000 PM	/subscriptions/...	RequestResponse	Completions_Create	104	200	{"apiName":"Azure OpenAI API version 2022-12-01","requestTime":638109631271782432,"requestLength":229,"respon
> 2/2/2023, 12:08:36.000 PM	/subscriptions/...	Audit	ListKey			
> 2/2/2023, 12:16:50.000 PM	/subscriptions/...	Audit	ListKey			
> 2/2/2023, 2:38:51.000 PM	/subscriptions/...	Audit	ListKey			
> 2/2/2023, 8:33:37.000 PM	/subscriptions/...	RequestResponse	Completions_Create	92	200	{"apiName":"Azure OpenAI API version 2022-12-01","requestTime":638109668133414811,"requestLength":222,"respon
> 2/2/2023, 12:17:00.000 PM	/subscriptions/...	RequestResponse	FineTunes_List	101	200	{"apiName":"Azure OpenAI API version 2022-12-01","requestTime":638109670106071414,"requestLength":10,"response"
> 2/2/2023, 2:36:51.000 PM	/subscriptions/...	Audit	ListKey			
> 1/26/2023, 3:54:53.000 AM	/subscriptions/...	RequestResponse	Deployments_EMBED	175	200	{"apiName":"OpenAI API","requestTime":6381093020803618730,"requestLength":52,"responseTime":63810930208053692}
> 1/26/2023, 3:55:42.000 AM	/subscriptions/...	RequestResponse	Deployments_EMBED	55	200	{"apiName":"OpenAI API","requestTime":63810302173463454,"requestLength":52,"responseTime":6381030213740184}

If you wish to see all available columns of data, you can remove the scoping that is provided by the `| project` line:

```
Kusto

AzureDiagnostics
| take 100
```

You can also select the arrow next to the table name to view all available columns and associated data types.

To examine AzureMetrics run:

```
Kusto

AzureMetrics
| take 100
| project TimeGenerated, MetricName, Total, Count, TimeGrain, UnitName
```

AzureDiagnostics							
	_ResourceId	Category	OperationName	DurationMs	ResultSignature	properties_s	...
>	2/10/2023, 4:23:53.000 AM	/subscriptions/...	Audit	ListKey			
>	2/2/2023, 2:38:53.000 PM	/subscriptions/...	RequestResponse	Completions_Create	102	200	{"apiName":"Azure OpenAI API version 2022-12-01","requestTime":638109455318365185,"requestLength":473,"respon
>	2/2/2023, 2:43:05.000 PM	/subscriptions/...	RequestResponse	Completions_Create	103	200	{"apiName":"Azure OpenAI API version 2022-12-01","requestTime":638109457796348260,"requestLength":473,"respon
>	2/2/2023, 2:43:36.000 PM	/subscriptions/...	RequestResponse	Completions_Create	104	200	{"apiName":"Azure OpenAI API version 2022-12-01","requestTime":638109458120927349,"requestLength":471,"respon
>	2/2/2023, 7:02:40.000 PM	/subscriptions/...	Audit	ListKey			
>	2/2/2023, 7:02:42.000 PM	/subscriptions/...	RequestResponse	Completions_Create	103	200	{"apiName":"Azure OpenAI API version 2022-12-01","requestTime":63810913610114748,"requestLength":207,"respon
>	2/2/2023, 7:09:24.000 PM	/subscriptions/...	RequestResponse	Completions_Create	85	200	{"apiName":"Azure OpenAI API version 2022-12-01","requestTime":63810961402045568,"requestLength":208,"respon
>	2/2/2023, 7:04:58.000 PM	/subscriptions/...	RequestResponse	Completions_Create	103	200	{"apiName":"Azure OpenAI API version 2022-12-01","requestTime":638109614044787759,"requestLength":219,"respon
>	2/2/2023, 7:04:17.000 PM	/subscriptions/...	RequestResponse	Completions_Create	2,503	200	{"apiName":"Azure OpenAI API version 2022-12-01","requestTime":638109614520242336,"requestLength":197,"respon
>	2/2/2023, 7:05:09.000 PM	/subscriptions/...	RequestResponse	Completions_Create	99	200	{"apiName":"Azure OpenAI API version 2022-12-01","requestTime":638109615003233885,"requestLength":289,"respon
>	2/2/2023, 7:07:31.000 PM	/subscriptions/...	RequestResponse	Completions_Create	70	200	{"apiName":"Azure OpenAI API version 2022-12-01","requestTime":638109616480488625,"requestLength":227,"respon
>	2/2/2023, 7:07:05.000 PM	/subscriptions/...	RequestResponse	Completions_Create	152	200	{"apiName":"Azure OpenAI API version 2022-12-01","requestTime":638109616253900769,"requestLength":221,"respon
>	2/2/2023, 7:32:09.000 PM	/subscriptions/...	RequestResponse	Completions_Create	104	200	{"apiName":"Azure OpenAI API version 2022-12-01","requestTime":638109631271782432,"requestLength":229,"respon
>	2/2/2023, 12:08:36.000 PM	/subscriptions/...	Audit	ListKey			
>	2/2/2023, 12:16:50.000 PM	/subscriptions/...	Audit	ListKey			
>	2/2/2023, 2:38:51.000 PM	/subscriptions/...	Audit	ListKey			
>	2/2/2023, 8:33:37.000 PM	/subscriptions/...	RequestResponse	Completions_Create	92	200	{"apiName":"Azure OpenAI API version 2022-12-01","requestTime":638109668133414811,"requestLength":229,"respon
>	2/2/2023, 12:17:00.000 PM	/subscriptions/...	RequestResponse	FindTunes_List	101	200	{"apiName":"Azure OpenAI API version 2022-12-01","requestTime":638109370106071414,"requestLength":0,"respon
>	2/2/2023, 2:36:51.000 PM	/subscriptions/...	Audit	ListKey			
>	1/26/2023, 3:54:53.000 AM	/subscriptions/...	RequestResponse	Deployments_EMBED	175	200	{"apiName":"OpenAI API","requestTime":638103020803618730,"requestLength":52,"responseTime":6381030208053692,"respon
>	1/26/2023, 3:55:42.000 AM	/subscriptions/...	RequestResponse	Deployments_EMBED	55	200	{"apiName":"OpenAI API","requestTime":638103021373463454,"requestLength":52,"responseTime":6381030213740184,"respon

Alerts

Azure Monitor alerts proactively notify you when important conditions are found in your monitoring data. They allow you to identify and address issues in your system before your customers notice them. You can set alerts on [metrics](#), [logs](#), and the [activity log](#). Different types of alerts have different benefits and drawbacks.

Every organization's alerting needs are going to vary, and will also evolve over time. Generally all alerts should be actionable, with a specific intended response if the alert occurs. If there's no action for someone to take, then it might be something you want to capture in a report, but not in an alert. Some use cases may require alerting anytime certain error conditions exist. But in many environments, it might only be in cases where errors exceed a certain threshold for a period of time where sending an alert is warranted.

Errors below certain thresholds can often be evaluated through regular analysis of data in Azure Monitor Logs. As you analyze your log data over time, you may also find that a certain condition not occurring for a long enough period of time might be valuable to track with alerts. Sometimes the absence of an event in a log is just as important a signal as an error.

Depending on what type of application you're developing in conjunction with your use of Azure OpenAI, [Azure Monitor Application Insights](#) may offer additional monitoring benefits at the application layer.

Next steps

- See [Monitoring Azure resources with Azure Monitor](#) for details on monitoring Azure resources.
- Read [Understand log searches in Azure Monitor logs](#).

Plan to manage costs for Azure OpenAI Service

Article • 07/18/2023

This article describes how you plan for and manage costs for Azure OpenAI Service. Before you deploy the service, you can use the Azure pricing calculator to estimate costs for Azure OpenAI. Later, as you deploy Azure resources, review the estimated costs. After you've started using Azure OpenAI resources, use Cost Management features to set budgets and monitor costs. You can also review forecasted costs and identify spending trends to identify areas where you might want to act. Costs for Azure OpenAI Service are only a portion of the monthly costs in your Azure bill. Although this article explains how to plan for and manage costs for Azure OpenAI, you're billed for all Azure services and resources used in your Azure subscription, including the third-party services.

Prerequisites

Cost analysis in Cost Management supports most Azure account types, but not all of them. To view the full list of supported account types, see [Understand Cost Management data](#). To view cost data, you need at least read access for an Azure account. For information about assigning access to Azure Cost Management data, see [Assign access to data](#).

Estimate costs before using Azure OpenAI

Use the [Azure pricing calculator](#) to estimate the costs of using Azure OpenAI.

Understand the full billing model for Azure OpenAI Service

Azure OpenAI Service runs on Azure infrastructure that accrues costs when you deploy new resources. It's important to understand that there could be other additional infrastructure costs that might accrue.

How you're charged for Azure OpenAI Service

Base series and Codex series models

Azure OpenAI base series and Codex series models are charged per 1,000 tokens. Costs vary depending on which model series you choose: Ada, Babbage, Curie, Davinci, or Code-Cushman.

Our models understand and process text by breaking it down into tokens. For reference, each token is roughly four characters for typical English text.

Token costs are for both input and output. For example, if you have a 1,000 token JavaScript code sample that you ask an Azure OpenAI model to convert to Python. You would be charged approximately 1,000 tokens for the initial input request sent, and 1,000 more tokens for the output that is received in response for a total of 2,000 tokens.

In practice, for this type of completion call the token input/output wouldn't be perfectly 1:1. A conversion from one programming language to another could result in a longer or shorter output depending on many different factors including the value assigned to the `max_tokens` parameter.

Base Series and Codex series fine-tuned models

Azure OpenAI fine-tuned models are charged based on three factors:

- Training hours
- Hosting hours
- Inference per 1,000 tokens

The hosting hours cost is important to be aware of since once a fine-tuned model is deployed it continues to incur an hourly cost regardless of whether you're actively using it. Fine-tuned model costs should be monitored closely.

Important

After a customized model is deployed, if at any time the deployment remains inactive for greater than fifteen (15) days, the deployment will automatically be deleted. The deployment of a customized model is "inactive" if the model was deployed more than fifteen (15) days ago and no completions or chat completions calls were made to it during a continuous 15-day period. The deletion of an inactive deployment does **NOT** delete or affect the underlying customized model, and the customized model can be redeployed at any time. As described in [Azure OpenAI Service pricing](#), each customized (fine-tuned) model that is deployed incurs an hourly hosting cost regardless of whether completions or chat completions calls are being made to the model. To learn more about planning and managing costs with Azure OpenAI, refer to our [cost management guide](#).

Other costs that might accrue with Azure OpenAI Service

Keep in mind that enabling capabilities like sending data to Azure Monitor Logs, alerting, etc. incurs additional costs for those services. These costs are visible under those other services and at the subscription level, but aren't visible when scoped just to your Azure OpenAI resource.

Using Azure Prepayment with Azure OpenAI Service

You can pay for Azure OpenAI Service charges with your Azure Prepayment credit. However, you can't use Azure Prepayment credit to pay for charges for third party products and services including those from the Azure Marketplace.

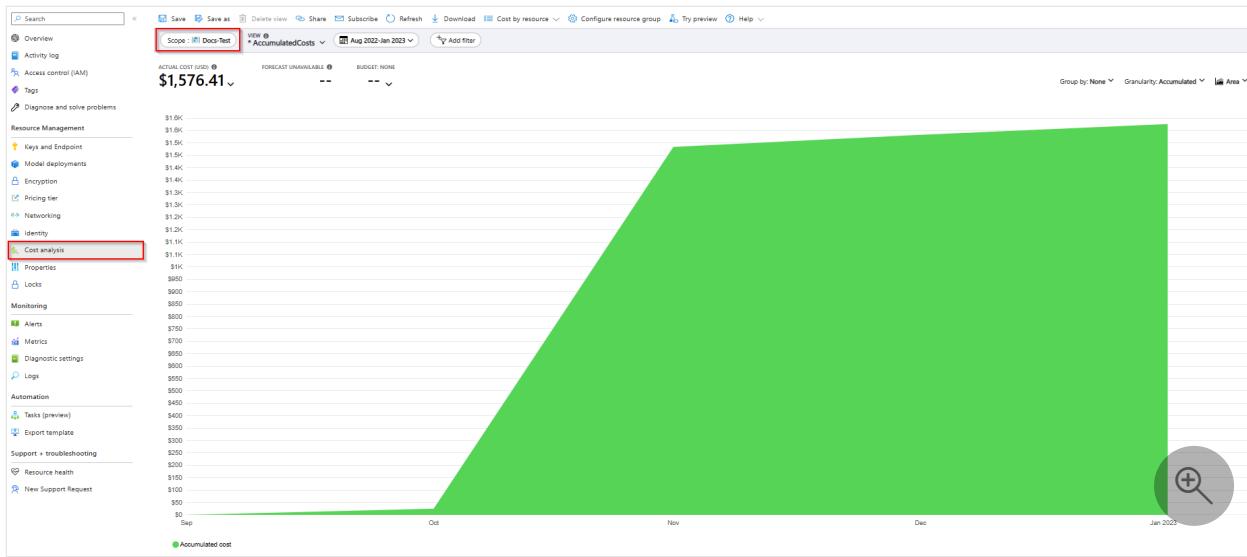
Monitor costs

As you use Azure resources with Azure OpenAI, you incur costs. Azure resource usage unit costs vary by time intervals (seconds, minutes, hours, and days) or by unit usage (bytes, megabytes, and so on.) As soon as Azure OpenAI use starts, costs can be incurred and you can see the costs in [cost analysis](#).

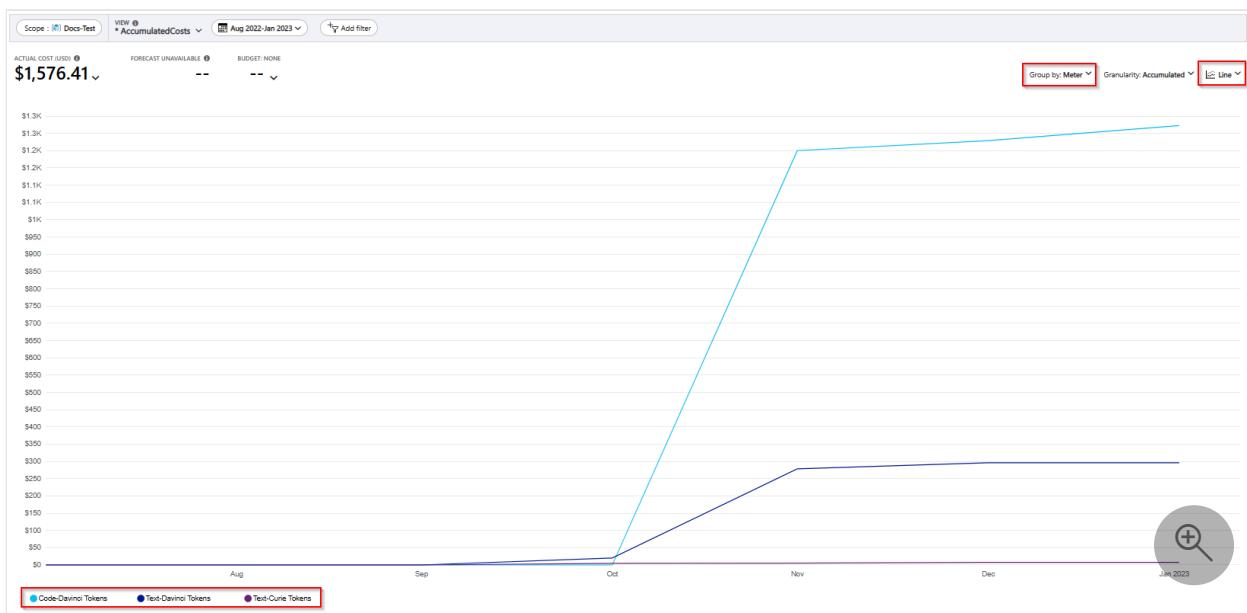
When you use cost analysis, you view Azure OpenAI costs in graphs and tables for different time intervals. Some examples are by day, current and prior month, and year. You also view costs against budgets and forecasted costs. Switching to longer views over time can help you identify spending trends. And you see where overspending might have occurred. If you've created budgets, you can also easily see where they're exceeded.

To view Azure OpenAI costs in cost analysis:

1. Sign in to the Azure portal.
2. Select one of your Azure OpenAI resources.
3. Under **Resource Management** select **Cost analysis**
4. By default cost analysis is scoped to the individual Azure OpenAI resource.

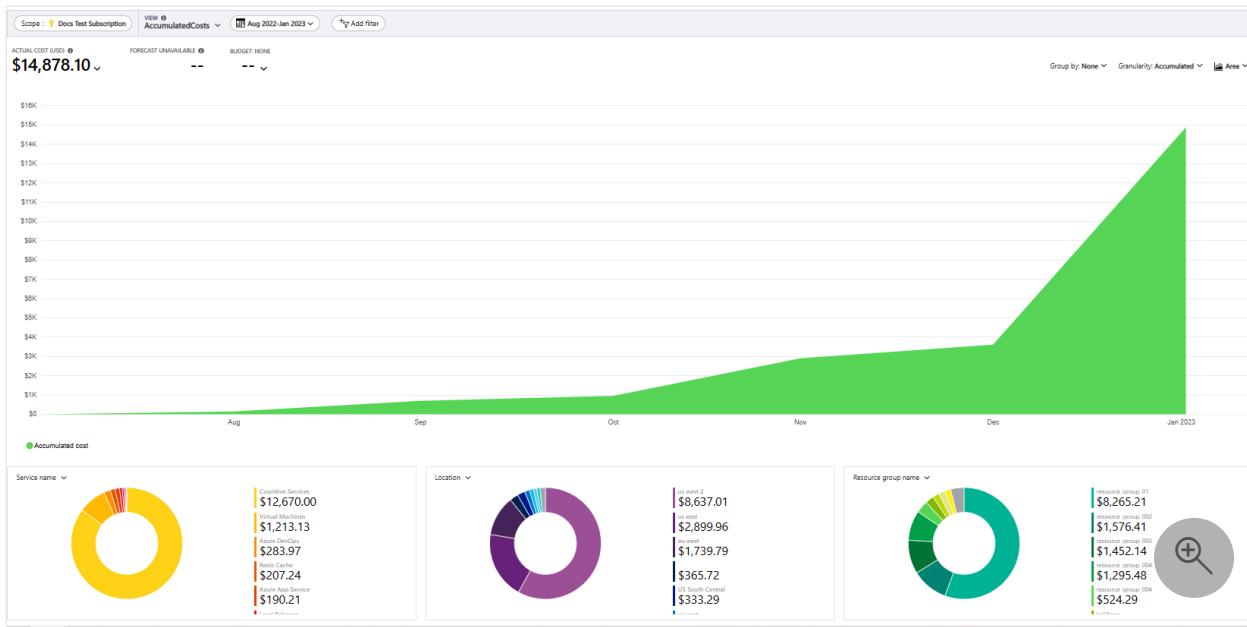


To understand the breakdown of what makes up that cost, it can help to modify **Group by** to **Meter** and in this case switching the chart type to **Line**. You can now see that for this particular resource the source of the costs is from three different model series with **Text-Davinci Tokens** representing the bulk of the costs.

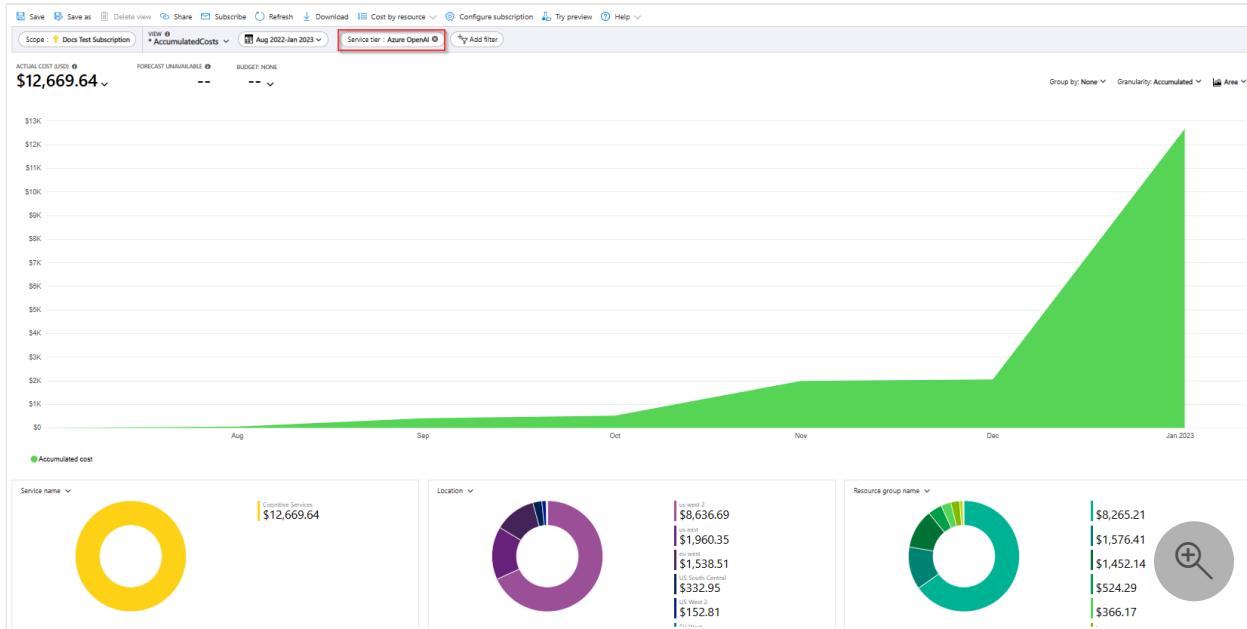


It's important to understand scope when evaluating costs associated with Azure OpenAI. If your resources are part of the same resource group you can scope Cost Analysis at that level to understand the effect on costs. If your resources are spread across multiple resource groups you can scope to the subscription level.

However, when scoped at a higher level you often need to add additional filters to be able to zero in on Azure OpenAI usage. When scoped at the subscription level we see a number of other resources that we may not care about in the context of Azure OpenAI cost management. When scoping at the subscription level, we recommend navigating to the full **Cost analysis tool** under the **Cost Management** service. Search for "**Cost Management**" in the top Azure search bar to navigate to the full service experience, which includes more options like creating budgets.



If you try to add a filter by service, you'll find that you can't find Azure OpenAI in the list. This is because Azure OpenAI has commonality with a subset of Azure AI services where the service level filter is **Cognitive Services**, but if you want to see all Azure OpenAI resources across a subscription without any other type of Azure AI services resources you need to instead scope to **Service tier: Azure OpenAI**:



Create budgets

You can create [budgets](#) to manage costs and create [alerts](#) that automatically notify stakeholders of spending anomalies and overspending risks. Alerts are based on spending compared to budget and cost thresholds. Budgets and alerts are created for Azure subscriptions and resource groups, so they're useful as part of an overall cost monitoring strategy.

Budgets can be created with filters for specific resources or services in Azure if you want more granularity present in your monitoring. Filters help ensure that you don't accidentally create new resources that cost you additional money. For more information about the filter options available when you create a budget, see [Group and filter options](#).

 **Important**

While OpenAI has an option for hard limits that will prevent you from going over your budget, Azure OpenAI does not currently provide this functionality. You are able to kick off automation from action groups as part of your budget notifications to take more advanced actions, but this requires additional custom development on your part.

Export cost data

You can also [export your cost data](#) to a storage account. This is helpful when you need or others to do additional data analysis for costs. For example, a finance team can analyze the data using Excel or Power BI. You can export your costs on a daily, weekly, or monthly schedule and set a custom date range. Exporting cost data is the recommended way to retrieve cost datasets.

Next steps

- Learn [how to optimize your cloud investment with Azure Cost Management](#).
- Learn more about managing costs with [cost analysis](#).
- Learn about how to [prevent unexpected costs](#).
- Take the [Cost Management](#) guided learning course.

Role-based access control for Azure OpenAI Service

Article • 08/04/2023

Azure OpenAI Service supports Azure role-based access control (Azure RBAC), an authorization system for managing individual access to Azure resources. Using Azure RBAC, you assign different team members different levels of permissions based on their needs for a given project. For more information, see the [Azure RBAC documentation](#) for more information.

Add role assignment to an Azure OpenAI resource

Azure RBAC can be assigned to an Azure OpenAI resource. To grant access to an Azure resource, you add a role assignment.

1. In the [Azure portal](#), search for **Azure OpenAI**.
2. Select **Azure OpenAI**, and navigate to your specific resource.

Note

You can also set up Azure RBAC for whole resource groups, subscriptions, or management groups. Do this by selecting the desired scope level and then navigating to the desired item. For example, selecting **Resource groups** and then navigating to a specific resource group.

3. Select **Access control (IAM)** on the left navigation pane.
4. Select **Add**, then select **Add role assignment**.
5. On the **Role** tab on the next screen, select a role you want to add.
6. On the **Members** tab, select a user, group, service principal, or managed identity.
7. On the **Review + assign** tab, select **Review + assign** to assign the role.

Within a few minutes, the target will be assigned the selected role at the selected scope. For help with these steps, see [Assign Azure roles using the Azure portal](#).

Azure OpenAI roles

- Cognitive Services OpenAI User
- Cognitive Services OpenAI Contributor
- Cognitive Services Contributor
- Cognitive Services Usages Reader

ⓘ Note

Subscription level *Owner* and *Contributor* roles are inherited and take priority over the custom Azure OpenAI roles applied at the Resource Group level.

This section covers common tasks that different accounts and combinations of accounts are able to perform for Azure OpenAI resources. To view the full list of available **Actions** and **DataActions**, an individual role is granted from your Azure OpenAI resource go **Access control (IAM) > Roles** > Under the **Details** column for the role you're interested in select **View**. By default the **Actions** radial button is selected. You need to examine both **Actions** and **DataActions** to understand the full scope of capabilities assigned to a role.

Cognitive Services OpenAI User

If a user were granted role-based access to only this role for an Azure OpenAI resource, they would be able to perform the following common tasks:

- View the resource in [Azure portal](#)
- View the resource endpoint under **Keys and Endpoint**
- Ability to view the resource and associated model deployments in Azure OpenAI Studio.
- Ability to view what models are available for deployment in Azure OpenAI Studio.
- Use the Chat, Completions, and DALL-E (preview) playground experiences to generate text and images with any models that have already been deployed to this Azure OpenAI resource.

A user with only this role assigned would be unable to:

- Create new Azure OpenAI resources
- View/Copy/Regenerate keys under **Keys and Endpoint**
- Create new model deployments or edit existing model deployments
- Create/deploy custom fine-tuned models
- Upload datasets for fine-tuning

- ✖ Access quota
- ✖ Create customized content filters
- ✖ Add a data source for the use your data feature

Cognitive Services OpenAI Contributor

This role has all the permissions of Cognitive Services OpenAI User and is also able to perform additional tasks like:

- Create custom fine-tuned models
- Upload datasets for fine-tuning

A user with only this role assigned would be unable to:

- ✖ Create new Azure OpenAI resources
- ✖ View/Copy/Regenerate keys under **Keys and Endpoint**
- ✖ Create new model deployments or edit existing model deployments
- ✖ Access quota
- ✖ Create customized content filters
- ✖ Add a data source for the use your data feature

Cognitive Services Contributor

This role is typically granted access at the resource group level for a user in conjunction with additional roles. By itself this role would allow a user to perform the following tasks.

- Create new Azure OpenAI resources within the assigned resource group.
- View resources in the assigned resource group in the [Azure portal](#).
- View the resource endpoint under **Keys and Endpoint**
- View/Copy/Regenerate keys under **Keys and Endpoint**
- Ability to view what models are available for deployment in Azure OpenAI Studio
- Use the Chat, Completions, and DALL-E (preview) playground experiences to generate text and images with any models that have already been deployed to this Azure OpenAI resource
- Create customized content filters
- Add a data source for the use your data feature

A user with only this role assigned would be unable to:

- ✖ Create new model deployments or edit existing model deployments
- ✖ Access quota
- ✖ Create custom fine-tuned models
- ✖ Upload datasets for fine-tuning

Cognitive Services Usages Reader

Viewing quota requires the **Cognitive Services Usages Reader** role. This role provides the minimal access necessary to view quota usage across an Azure subscription.

This role can be found in the Azure portal under **Subscriptions > *Access control (IAM) > Add role assignment** > search for **Cognitive Services Usages Reader**. The role must be applied at the subscription level, it does not exist at the resource level.

If you don't wish to use this role, the subscription **Reader** role provides equivalent access, but it also grants read access beyond the scope of what is needed for viewing quota. Model deployment via the Azure OpenAI Studio is also partially dependent on the presence of this role.

This role provides little value by itself and is instead typically assigned in combination with one or more of the previously described roles.

Cognitive Services Usages Reader + Cognitive Services OpenAI User

All the capabilities of Cognitive Services OpenAI plus the ability to:

- View quota allocations in Azure OpenAI Studio

Cognitive Services Usages Reader + Cognitive Services OpenAI Contributor

All the capabilities of Cognitive Services OpenAI Contributor plus the ability to:

- View quota allocations in Azure OpenAI Studio

Cognitive Services Usages Reader + Cognitive Services Contributor

All the capabilities of Cognitive Services Contributor plus the ability to:

- View & edit quota allocations in Azure OpenAI Studio
- Create new model deployments or edit existing model deployments

Common Issues

Unable to view Azure Cognitive Search option in Azure OpenAI Studio

Issue:

When selecting an existing Cognitive Search resource the search indices don't load, and the loading wheel spins continuously. In Azure OpenAI Studio, go to **Playground Chat > Add your data (preview)** under Assistant setup. Selecting **Add a data source** opens a modal that allows you to add a data source through either Azure Cognitive Search or Blob Storage. Selecting the Azure Cognitive Search option and an existing Cognitive Search resource should load the available Azure Cognitive Search indices to select from.

Root cause

To make a generic API call for listing Azure Cognitive Search services, the following call is made:

<https://management.azure.com/subscriptions/{subscriptionId}/providers/Microsoft.Search/searchServices?api-version=2021-04-01-Preview>

Replace {subscriptionId} with your actual subscription ID.

For this API call, you need a **subscription-level scope** role. You can use the **Reader** role for read-only access or the **Contributor** role for read-write access. If you only need access to Azure Cognitive Search services, you can use the **Azure Cognitive Search Service Contributor** or **Azure Cognitive Search Service Reader** roles.

Solution options

- Contact your subscription administrator or owner: Reach out to the person managing your Azure subscription and request the appropriate access. Explain your requirements and the specific role you need (for example, Reader, Contributor, Azure Cognitive Search Service Contributor, or Azure Cognitive Search Service Reader).
- Request subscription-level or resource group-level access: If you need access to specific resources, ask the subscription owner to grant you access at the appropriate level (subscription or resource group). This enables you to perform the required tasks without having access to unrelated resources.
- Use API keys for Azure Cognitive Search: If you only need to interact with the Azure Cognitive Search service, you can request the admin keys or query keys from the subscription owner. These keys allow you to make API calls directly to the search service without needing an Azure RBAC role. Keep in mind that using API

keys will **bypass** the Azure RBAC access control, so use them cautiously and follow security best practices.

Unable to upload files in Azure OpenAI Studio for on your data

Symptom: Unable to access storage for the **on your data** feature using Azure OpenAI Studio.

Root cause:

Insufficient subscription-level access for the user attempting to access the blob storage in Azure OpenAI Studio. The user may **not** have the necessary permissions to call the Azure Management API endpoint:

[https://management.azure.com/subscriptions/{subscriptionId}/resourceGroups/{resourceGroupName}/providers/Microsoft.Storage/storageAccounts/{accountName}/listAccountSas?api-version=2022-09-01 ↗](https://management.azure.com/subscriptions/{subscriptionId}/resourceGroups/{resourceGroupName}/providers/Microsoft.Storage/storageAccounts/{accountName}/listAccountSas?api-version=2022-09-01)

Public access to the blob storage is disabled by the owner of the Azure subscription for security reasons.

Permissions needed for the API call:

Microsoft.Storage/storageAccounts/listAccountSas/action: This permission allows the user to list the Shared Access Signature (SAS) tokens for the specified storage account.

Possible reasons why the user may **not** have permissions:

- The user is assigned a limited role in the Azure subscription, which does not include the necessary permissions for the API call.
- The user's role has been restricted by the subscription owner or administrator due to security concerns or organizational policies.
- The user's role has been recently changed, and the new role does not grant the required permissions.

Solution options

- Verify and update access rights: Ensure the user has the appropriate subscription-level access, including the necessary permissions for the API call (Microsoft.Storage/storageAccounts/listAccountSas/action). If required, request the subscription owner or administrator to grant the necessary access rights.
- Request assistance from the owner or admin: If the solution above is not feasible, consider asking the subscription owner or administrator to upload the data files on

your behalf. This approach can help import the data into Azure OpenAI Studio without **user** requiring subscription-level access or public access to the blob storage.

Next steps

- Learn more about [Azure-role based access control \(Azure RBAC\)](#).
- Also check out [assign Azure roles using the Azure portal](#).

Business Continuity and Disaster Recovery (BCDR) considerations with Azure OpenAI Service

Article • 07/18/2023

Azure OpenAI is available in multiple regions. Since subscription keys are region bound, when a customer acquires a key, they select the region in which their deployments will reside and from then on, all operations stay associated with that Azure server region.

It's rare, but not impossible, to encounter a network issue that hits an entire region. If your service needs to always be available, then you should design it to either fail-over into another region or split the workload between two or more regions. Both approaches require at least two Azure OpenAI resources in different regions. This article provides general recommendations for how to implement Business Continuity and Disaster Recovery (BCDR) for your Azure OpenAI applications.

Best practices

Today customers will call the endpoint provided during deployment for both deployments and inference. These operations are stateless, so no data is lost in the case that a region becomes unavailable.

If a region is non-operational customers must take steps to ensure service continuity.

Business continuity

The following set of instructions applies both customers using default endpoints and those using custom endpoints.

Default endpoint recovery

If you're using a default endpoint, you should configure your client code to monitor errors, and if the errors persist, be prepared to redirect to another region of your choice where you have an Azure OpenAI subscription.

Follow these steps to configure your client to monitor errors:

1. Use the [models page](#) to identify the list of available regions for Azure OpenAI.

2. Select a primary and one secondary/backup regions from the list.
3. Create Azure OpenAI resources for each region selected.
4. For the primary region and any backup regions your code will need to know:
 - a. Base URI for the resource
 - b. Regional access key or Azure Active Directory access
5. Configure your code so that you monitor connectivity errors (typically connection timeouts and service unavailability errors).
 - a. Given that networks yield transient errors, for single connectivity issue occurrences, the suggestion is to retry.
 - b. For persistence redirect traffic to the backup resource in the region you've created.

BCDR requires custom code

The recovery from regional failures for this usage type can be performed instantaneously and at a very low cost. This does however, require custom development of this functionality on the client side of your application.

Tutorial: Explore Azure OpenAI Service embeddings and document search

Article • 07/18/2023

This tutorial will walk you through using the Azure OpenAI [embeddings](#) API to perform **document search** where you'll query a knowledge base to find the most relevant document.

In this tutorial, you learn how to:

- ✓ Install Azure OpenAI and other dependent Python libraries.
- ✓ Download the BillSum dataset and prepare it for analysis.
- ✓ Create environment variables for your resources endpoint and API key.
- ✓ Use the **text-embedding-ada-002 (Version 2)** model
- ✓ Use [cosine similarity](#) to rank search results.

ⓘ Important

We strongly recommend using `text-embedding-ada-002 (Version 2)`. This model/version provides parity with OpenAI's `text-embedding-ada-002`. To learn more about the improvements offered by this model, please refer to [OpenAI's blog post](#). Even if you are currently using Version 1 you should migrate to Version 2 to take advantage of the latest weights/updated token limit. Version 1 and Version 2 are not interchangeable, so document embedding and document search must be done using the same version of the model.

Prerequisites

- An Azure subscription - [Create one for free](#)
- Access granted to Azure OpenAI in the desired Azure subscription Currently, access to this service is granted only by application. You can apply for access to Azure OpenAI by completing the form at <https://aka.ms/oai/access>. Open an issue on this repo to contact us if you have an issue.
- [Python 3.7.1 or later version](#)
- The following Python libraries: openai, num2words, matplotlib, plotly, scipy, scikit-learn, pandas, tiktoken.
- [Jupyter Notebooks](#)

- An Azure OpenAI resource with the **text-embedding-ada-002** (Version 2) model deployed. This model is currently only available in [certain regions](#). If you don't have a resource the process of creating one is documented in our [resource deployment guide](#).

Set up

Python libraries

If you haven't already, you need to install the following libraries:

Windows Command Prompt

```
pip install openai num2words matplotlib plotly scipy scikit-learn pandas  
tiktoken
```

Download the BillSum dataset

BillSum is a dataset of United States Congressional and California state bills. For illustration purposes, we'll look only at the US bills. The corpus consists of bills from the 103rd-115th (1993-2018) sessions of Congress. The data was split into 18,949 train bills and 3,269 test bills. The BillSum corpus focuses on mid-length legislation from 5,000 to 20,000 characters in length. More information on the project and the original academic paper where this dataset is derived from can be found on the [BillSum project's GitHub repository](#).

This tutorial uses the `bill_sum_data.csv` file that can be downloaded from our [GitHub sample data](#).

You can also download the sample data by running the following command on your local machine:

Windows Command Prompt

```
curl "https://raw.githubusercontent.com/Azure-Samples/Azure-OpenAI-Docs-Samples/main/Samples/Tutorials/Embeddings/data/bill_sum_data.csv" --output bill_sum_data.csv
```

Retrieve key and endpoint

To successfully make a call against Azure OpenAI, you'll need an **endpoint** and a **key**.

Variable	Value
name	
ENDPOINT	This value can be found in the Keys & Endpoint section when examining your resource from the Azure portal. Alternatively, you can find the value in Azure OpenAI Studio > Playground > Code View . An example endpoint is: <code>https://docs-test-001.openai.azure.com</code> .
API-KEY	This value can be found in the Keys & Endpoint section when examining your resource from the Azure portal. You can use either <code>KEY1</code> or <code>KEY2</code> .

Go to your resource in the Azure portal. The **Endpoint and Keys** can be found in the **Resource Management** section. Copy your endpoint and access key as you'll need both for authenticating your API calls. You can use either `KEY1` or `KEY2`. Always having two keys allows you to securely rotate and regenerate keys without causing a service disruption.

Create and assign persistent environment variables for your key and endpoint.

Environment variables

Command Line	
CMD	<pre>setx AZURE_OPENAI_API_KEY "REPLACE_WITH_YOUR_KEY_VALUE_HERE"</pre>
CMD	<pre>setx AZURE_OPENAI_ENDPOINT "REPLACE_WITH_YOUR_ENDPOINT_HERE"</pre>

After setting the environment variables, you may need to close and reopen Jupyter notebooks or whatever IDE you're using in order for the environment variables to be accessible. While we strongly recommend using Jupyter Notebooks, if for some reason you cannot you'll need to modify any code that is returning a pandas dataframe by using `print(dataframe_name)` rather than just calling the `dataframe_name` directly as is often done at the end of a code block.

Run the following code in your preferred Python IDE:

Import libraries and list models

Python

```
import openai
import os
import re
import requests
import sys
from num2words import num2words
import os
import pandas as pd
import numpy as np
from openai.embeddings_utils import get_embedding, cosine_similarity
import tiktoken

API_KEY = os.getenv("AZURE_OPENAI_API_KEY")
RESOURCE_ENDPOINT = os.getenv("AZURE_OPENAI_ENDPOINT")

openai.api_type = "azure"
openai.api_key = API_KEY
openai.api_base = RESOURCE_ENDPOINT
openai.api_version = "2022-12-01"

url = openai.api_base + "/openai/deployments?api-version=2022-12-01"

r = requests.get(url, headers={"api-key": API_KEY})

print(r.text)
```

Output

```
{
  "data": [
    {
      "scale_settings": {
        "scale_type": "standard"
      },
      "model": "text-embedding-ada-002",
      "owner": "organization-owner",
      "id": "text-embedding-ada-002",
      "status": "succeeded",
      "created_at": 1657572678,
      "updated_at": 1657572678,
      "object": "deployment"
    },
    {
      "scale_settings": {
        "scale_type": "standard"
      },
      "model": "code-cushman-001",
      "owner": "organization-owner",
      "id": "code-cushman-001",
      "status": "succeeded",
      "created_at": 1657572712,
```

```
        "updated_at": 1657572712,
        "object": "deployment"
    },
    {
        "scale_settings": {
            "scale_type": "standard"
        },
        "model": "text-search-curie-doc-001",
        "owner": "organization-owner",
        "id": "text-search-curie-doc-001",
        "status": "succeeded",
        "created_at": 1668620345,
        "updated_at": 1668620345,
        "object": "deployment"
    },
    {
        "scale_settings": {
            "scale_type": "standard"
        },
        "model": "text-search-curie-query-001",
        "owner": "organization-owner",
        "id": "text-search-curie-query-001",
        "status": "succeeded",
        "created_at": 1669048765,
        "updated_at": 1669048765,
        "object": "deployment"
    }
],
"object": "list"
}
```

The output of this command will vary based on the number and type of models you've deployed. In this case, we need to confirm that we have an entry for **text-embedding-ada-002**. If you find that you're missing this model, you'll need to [deploy the model](#) to your resource before proceeding.

Now we need to read our csv file and create a pandas DataFrame. After the initial DataFrame is created, we can view the contents of the table by running `df`.

Python

```
df=pd.read_csv(os.path.join(os.getcwd(), 'bill_sum_data.csv')) # This assumes
# that you have placed the bill_sum_data.csv in the same directory you are
# running Jupyter Notebooks
df
```

Output:

Unnamed: 0	bill_id		text	summary	title	text_len	sum_len
0	0	110_hr37	SECTION 1. SHORT TITLE\n\n This Act ma...	National Science Education Tax Incentive for B...	To amend the Internal Revenue Code of 1986 to ...	8494	321
1	1	112_hr2873	SECTION 1. SHORT TITLE\n\n This Act ma...	Small Business Expansion and Hiring Act of 201...	To amend the Internal Revenue Code of 1986 to ...	6522	1424
2	2	109_s2408	SECTION 1. RELEASE OF DOCUMENTS CAPTURED IN IR...	Requires the Director of National Intelligence...	A bill to require the Director of National Int...	6154	463
3	3	108_s1899	SECTION 1. SHORT TITLE\n\n This Act ma...	National Cancer Act of 2003 - Amends the Publi...	A bill to improve data collection and dissemin...	19853	1400
4	4	107_s1531	SECTION 1. SHORT TITLE\n\n This Act ma...	Military Call-up Relief Act - Amends the Inter...	A bill to amend the Internal Revenue Code of 1...	6273	278
5	5	107_hr4541	SECTION 1. RELIQUIDATION OF CERTAIN ENTRIES PR...	Requires the Customs Service to reliquidate ce...	To provide for reliquidation of entries premat...	11691	114
6	6	111_s1495	SECTION 1. SHORT TITLE\n\n This Act ma...	Service Dogs for Veterans Act of 2009 - Direct...	A bill to require the Secretary of Veterans Af...	5328	379
7	7	111_s3885	SECTION 1. SHORT TITLE\n\n This Act ma...	Race to the Top Act of 2010 - Directs the Secr...	A bill to provide incentives for States and lo...	16668	1525
8	8	113_hr1796	SECTION 1. SHORT TITLE\n\n This Act ma...	Troop Talent Act of 2013 - Directs the Secreta...	Troop Talent Act of 2013	15352	2151
9	9	103_hr1987	SECTION 1. SHORT TITLE\n\n This Act ma...	Taxpayer's Right to View Act of 1993 - Amends ...	Taxpayer's Right to View Act of 1993	5633	894
10	10	103_hr1677	SECTION 1. SHORT TITLE\n\n This Act ma...	Full-Service Schools Act - Establishes the Fed...	Full-Service Schools Act	12472	1107
11	11	111_s3149	SECTION 1. SHORT TITLE\n\n This Act ma...	Wall Street Compensation Reform Act of 2010 - ...	A bill to amend the Internal Revenue Code of 1...	18226	1297
12	12	110_hr1007	SECTION 1. FINDINGS.\n\n The Congress f...	Amends the Marine Mammal Protection Act of 197...	To amend the Marine Mammal Protection Act of 1...	5261	276
13	13	113_hr3137	SECTION 1. SHORT TITLE\n\n This Act ma...	Freedom and Mobility in Consumer Banking Act -...	Freedom and Mobility in Consumer Banking Act	17690	2044
14	14	115_hr1634	SECTION 1. SHORT TITLE\n\n This Act ma...	Education and Training for Health Act of 2017 ...	Education and Training for Health Act of 2017	9037	772
15	15	103_hr1815	SECTION 1. SHORT TITLE\n\n This Act ma...	Recreational Hunting Safety and Preservation A...	Recreational Hunting Safety and Preservation A...	13024	475
16	16	113_s1773	SECTION 1. SHORT TITLE\n\n This Act ma...	Andrew Prior Act or Andrew's Law - Amends the ...	Andrew's Law	5149	613
17	17	106_hr5585	SECTION 1. SHORT TITLE\n\n This Act ma...	Directs the President, in coordination with de...	Energy Independence Act of 2000	8007	810
18	18	114_hr2499	SECTION 1. SHORT TITLE\n\n This Act may be...	This measure has not been amended since it was...	Veterans Entrepreneurship Act of 2015	7539	1421
19	19	111_hr3141	SECTION 1. SHORT TITLE\n\n This Act ma...	Strengthening the Health Care Safety Net Act o...	To amend title XIX of the Social Security Act ...	18429	514

The initial table has more columns than we need we'll create a new smaller DataFrame called `df_bills` which will contain only the columns for `text`, `summary`, and `title`.

Python

```
df_bills = df[['text', 'summary', 'title']]
df_bills
```

Output:

		text	summary	title
0		SECTION 1. SHORT TITLE\n\n This Act may be...	National Science Education Tax Incentive for B...	To amend the Internal Revenue Code of 1986 to ...
1		SECTION 1. SHORT TITLE\n\n This Act may be...	Small Business Expansion and Hiring Act of 201...	To amend the Internal Revenue Code of 1986 to ...
2		SECTION 1. RELEASE OF DOCUMENTS CAPTURED IN IR...	Requires the Director of National Intelligence...	A bill to require the Director of National Int...
3		SECTION 1. SHORT TITLE\n\n This Act may be...	National Cancer Act of 2003 - Amends the Publi...	A bill to improve data collection and dissemin...
4		SECTION 1. SHORT TITLE\n\n This Act may be...	Military Call-up Relief Act - Amends the Inter...	A bill to amend the Internal Revenue Code of 1...
5		SECTION 1. RELIQUIDATION OF CERTAIN ENTRIES PR...	Requires the Customs Service to reliquidate ce...	To provide for reliquidation of entries premat...
6		SECTION 1. SHORT TITLE\n\n This Act may be...	Service Dogs for Veterans Act of 2009 - Direct...	A bill to require the Secretary of Veterans Af...
7		SECTION 1. SHORT TITLE\n\n This Act may be...	Race to the Top Act of 2010 - Directs the Secr...	A bill to provide incentives for States and lo...
8		SECTION 1. SHORT TITLE\n\n This Act may be...	Troop Talent Act of 2013 - Directs the Secreta...	Troop Talent Act of 2013
9		SECTION 1. SHORT TITLE\n\n This Act may be...	Taxpayer's Right to View Act of 1993 - Amends ...	Taxpayer's Right to View Act of 1993
10		SECTION 1. SHORT TITLE\n\n This Act may be...	Full-Service Schools Act - Establishes the Fed...	Full-Service Schools Act
11		SECTION 1. SHORT TITLE\n\n This Act may be...	Wall Street Compensation Reform Act of 2010 - ...	A bill to amend the Internal Revenue Code of 1...
12		SECTION 1. FINDINGS.\n\n The Congress finds...	Amends the Marine Mammal Protection Act of 197...	To amend the Marine Mammal Protection Act of 1...
13		SECTION 1. SHORT TITLE\n\n This Act may be...	Freedom and Mobility in Consumer Banking Act -...	Freedom and Mobility in Consumer Banking Act
14		SECTION 1. SHORT TITLE\n\n This Act may be...	Education and Training for Health Act of 2017 ...	Education and Training for Health Act of 2017
15		SECTION 1. SHORT TITLE\n\n This Act may be...	Recreational Hunting Safety and Preservation A...	Recreational Hunting Safety and Preservation A...
16		SECTION 1. SHORT TITLE\n\n This Act may be...	Andrew Prior Act or Andrew's Law - Amends the ...	Andrew's Law
17		SECTION 1. SHORT TITLE\n\n This Act may be...	Directs the President, in coordination with de...	Energy Independence Act of 2000
18		SECTION 1. SHORT TITLE\n\n This Act may be...	This measure has not been amended since it was...	Veterans Entrepreneurship Act of 2015
19		SECTION 1. SHORT TITLE\n\n This Act may be...	Strengthening the Health Care Safety Net Act o...	To amend title XIX of the Social Security Act ...

Next we'll perform some light data cleaning by removing redundant whitespace and cleaning up the punctuation to prepare the data for tokenization.

Python

```
pd.options.mode.chained_assignment = None #https://pandas.pydata.org/pandas-
docs/stable/user_guide/indexing.html#evaluation-order-matters

# s is input text
def normalize_text(s, sep_token = " \n "):
    s = re.sub(r'\s+', ' ', s).strip()
    s = re.sub(r". ,","",s)
    # remove all instances of multiple spaces
    s = s.replace(..,"..")
    s = s.replace(.. .,"..")
    s = s.replace("\n", "")
    s = s.strip()

    return s

df_bills['text']= df_bills["text"].apply(lambda x : normalize_text(x))
```

Now we need to remove any bills that are too long for the token limit (8192 tokens).

Python

```
tokenizer = tiktoken.get_encoding("cl100k_base")
df_bills['n_tokens'] = df_bills["text"].apply(lambda x:
len(tokenizer.encode(x)))
df_bills = df_bills[df_bills.n_tokens<8192]
len(df_bills)
```

Output

20

ⓘ Note

In this case all bills are under the embedding model input token limit, but you can use the technique above to remove entries that would otherwise cause embedding to fail. When faced with content that exceeds the embedding limit, you can also chunk the content into smaller pieces and then embed those one at a time.

We'll once again examine `df_bills`.

Python

```
df_bills
```

Output:

	text	summary	title	n_tokens
0	SECTION 1. SHORT TITLE. This Act may be cited ...	National Science Education Tax Incentive for B...	To amend the Internal Revenue Code of 1986 to ...	1466
1	SECTION 1. SHORT TITLE. This Act may be cited ...	Small Business Expansion and Hiring Act of 201...	To amend the Internal Revenue Code of 1986 to ...	1183
2	SECTION 1. RELEASE OF DOCUMENTS CAPTURED IN IR...	Requires the Director of National Intelligence...	A bill to require the Director of National Int...	937
3	SECTION 1. SHORT TITLE. This Act may be cited ...	National Cancer Act of 2003 - Amends the Publi...	A bill to improve data collection and dissemin...	3670
4	SECTION 1. SHORT TITLE. This Act may be cited ...	Military Call-up Relief Act - Amends the Inter...	A bill to amend the Internal Revenue Code of 1...	1038
5	SECTION 1. RELIQUIDATION OF CERTAIN ENTRIES PR...	Requires the Customs Service to reliquidate ce...	To provide for reliquidation of entries premat...	2026
6	SECTION 1. SHORT TITLE. This Act may be cited ...	Service Dogs for Veterans Act of 2009 - Direct...	A bill to require the Secretary of Veterans Af...	880
7	SECTION 1. SHORT TITLE. This Act may be cited ...	Race to the Top Act of 2010 - Directs the Secr...	A bill to provide incentives for States and lo...	2815
8	SECTION 1. SHORT TITLE. This Act may be cited ...	Troop Talent Act of 2013 - Directs the Secreta...	Troop Talent Act of 2013	2479
9	SECTION 1. SHORT TITLE. This Act may be cited ...	Taxpayer's Right to View Act of 1993 - Amends ...	Taxpayer's Right to View Act of 1993	947
10	SECTION 1. SHORT TITLE. This Act may be cited ...	Full-Service Schools Act - Establishes the Fed...	Full-Service Schools Act	2164
11	SECTION 1. SHORT TITLE. This Act may be cited ...	Wall Street Compensation Reform Act of 2010 - ...	A bill to amend the Internal Revenue Code of 1...	2331
12	SECTION 1. FINDINGS. The Congress finds the fo...	Amends the Marine Mammal Protection Act of 197...	To amend the Marine Mammal Protection Act of 1...	1192
13	SECTION 1. SHORT TITLE. This Act may be cited ...	Freedom and Mobility in Consumer Banking Act -...	Freedom and Mobility in Consumer Banking Act	2402
14	SECTION 1. SHORT TITLE. This Act may be cited ...	Education and Training for Health Act of 2017 ...	Education and Training for Health Act of 2017	1648
15	SECTION 1. SHORT TITLE. This Act may be cited ...	Recreational Hunting Safety and Preservation A...	Recreational Hunting Safety and Preservation A...	2209
16	SECTION 1. SHORT TITLE. This Act may be cited ...	Andrew Prior Act or Andrew's Law - Amends the ...	Andrew's Law	608
17	SECTION 1. SHORT TITLE. This Act may be cited ...	Directs the President, in coordination with de...	Energy Independence Act of 2000	1352
18	SECTION 1. SHORT TITLE. This Act may be cited ...	This measure has not been amended since it was...	Veterans Entrepreneurship Act of 2015	1393
19	SECTION 1. SHORT TITLE. This Act may be cited ...	Strengthening the Health Care Safety Net Act o...	To amend title XIX of the Social Security Act ...	2678

To understand the n_tokens column a little more as well how text ultimately is tokenized, it can be helpful to run the following code:

Python

```
sample_encode = tokenizer.encode(df_bills.text[0])
decode = tokenizer.decode_tokens_bytes(sample_encode)
decode
```

For our docs we're intentionally truncating the output, but running this command in your environment will return the full text from index zero tokenized into chunks. You can see that in some cases an entire word is represented with a single token whereas in others parts of words are split across multiple tokens.

Output

```
[b'SECTION',
 b' ',
 b'1',
 b'.',
 b' SHORT',
 b' TITLE',
 b'.',
 b' This',
 b' Act',
 b' may',
 b' be',
 b' cited',
```

```
b' as',
b' the',
b' ``',
b'National',
b' Science',
b' Education',
b' Tax',
b' In',
b'cent',
b'ive',
b' for',
b' Businesses',
b' Act',
b' of',
b' ',
b'200',
b'7',
b'''.' ,
b' SEC',
b'.',
b' ',
b'2',
b'.',
b' C',
b'RED',
b'ITS',
b' FOR',
b' CERT',
b'AIN',
b' CONTRIBUT',
b'IONS',
b' BEN',
b'EF',
b'IT',
b'ING',
b' SC',
```

If you then check the length of the `decode` variable, you'll find it matches the first number in the `n_tokens` column.

Python

```
len(decode)
```

Output

```
1466
```

Now that we understand more about how tokenization works we can move on to embedding. It is important to note, that we haven't actually tokenized the documents

yet. The `n_tokens` column is simply a way of making sure none of the data we pass to the model for tokenization and embedding exceeds the input token limit of 8,192. When we pass the documents to the embeddings model, it will break the documents into tokens similar (though not necessarily identical) to the examples above and then convert the tokens to a series of floating point numbers that will be accessible via vector search. These embeddings can be stored locally or in an Azure Database. As a result, each bill will have its own corresponding embedding vector in the new `ada_v2` column on the right side of the DataFrame.

Python

```
df_bills['ada_v2'] = df_bills["text"].apply(lambda x : get_embedding(x,
engine = 'text-embedding-ada-002')) # engine should be set to the deployment
name you chose when you deployed the text-embedding-ada-002 (Version 2)
model
```

Python

```
df_bills
```

Output:

	text	summary	title	n_tokens	ada_v2
0	SECTION 1. SHORT TITLE. This Act may be cited ...	National Science Education Tax Incentive for B...	To amend the Internal Revenue Code of 1986 to ...	1466	[0.01333628874272108, -0.02151912823319435, 0...
1	SECTION 1. SHORT TITLE. This Act may be cited ...	Small Business Expansion and Hiring Act of 201...	To amend the Internal Revenue Code of 1986 to ...	1183	[0.005016345530748367, -0.00569863710552454, 0...
2	SECTION 1. RELEASE OF DOCUMENTS CAPTURED IN IR...	Requires the Director of National Intelligence...	A bill to require the Director of National Int...	937	[0.012699966318905354, -0.01897779107093811, 0...
3	SECTION 1. SHORT TITLE. This Act may be cited ...	National Cancer Act of 2003 - Amends the Publi...	A bill to improve data collection and dissemin...	3670	[0.004736857954412699, -0.026448562741279602, ...
4	SECTION 1. SHORT TITLE. This Act may be cited ...	Military Call-up Relief Act - Amends the Inter...	A bill to amend the Internal Revenue Code of 1...	1038	[0.010082815773785114, -0.0007545037078671157, ...
5	SECTION 1. RELIQUIDATION OF CERTAIN ENTRIES PR...	Requires the Customs Service to reliquidate ce...	To provide for reliquidation of entries premat...	2026	[0.012738252058625221, 0.004982588812708855, 0...
6	SECTION 1. SHORT TITLE. This Act may be cited ...	Service Dogs for Veterans Act of 2009 - Direct...	A bill to require the Secretary of Veterans Af...	880	[0.005205095745623112, -0.016558492556214333, ...
7	SECTION 1. SHORT TITLE. This Act may be cited ...	Race to the Top Act of 2010 - Directs the Secr...	A bill to provide incentives for States and lo...	2815	[0.024539386853575706, -0.016805868595838547, ...
8	SECTION 1. SHORT TITLE. This Act may be cited ...	Troop Talent Act of 2013 - Directs the Secreta...	Troop Talent Act of 2013	2479	[-0.005527574568968693, -0.014311426319181919, ...
9	SECTION 1. SHORT TITLE. This Act may be cited ...	Taxpayer's Right to View Act of 1993 - Amends ...	Taxpayer's Right to View Act of 1993	947	[0.004519130103290081, -0.023599395528435707, ...
10	SECTION 1. SHORT TITLE. This Act may be cited ...	Full-Service Schools Act - Establishes the Fed...	Full-Service Schools Act	2164	[0.0075974976643919945, -0.006962535437196493, ...
11	SECTION 1. SHORT TITLE. This Act may be cited ...	Wall Street Compensation Reform Act of 2010 - ...	A bill to amend the Internal Revenue Code of 1...	2331	[0.014871294610202312, -0.001929433667100966, ...
12	SECTION 1. FINDINGS. The Congress finds the fo...	Amends the Marine Mammal Protection Act of 197...	To amend the Marine Mammal Protection Act of 1...	1192	[0.0441450908780098, 0.02687789686024189, 0...
13	SECTION 1. SHORT TITLE. This Act may be cited ...	Freedom and Mobility in Consumer Banking Act -...	Freedom and Mobility in Consumer Banking Act	2402	[0.021314678713679314, -0.008310768753290176, ...
14	SECTION 1. SHORT TITLE. This Act may be cited ...	Education and Training for Health Act of 2017 ...	Education and Training for Health Act of 2017	1648	[-0.009376125410199165, -0.0360078439116478, 0...
15	SECTION 1. SHORT TITLE. This Act may be cited ...	Recreational Hunting Safety and Preservation A...	Recreational Hunting Safety and Preservation A...	2209	[0.024976342916488647, -0.005445675924420357, ...
16	SECTION 1. SHORT TITLE. This Act may be cited ...	Andrew Prior Act or Andrew's Law - Amends the ...	Andrew's Law	608	[0.029043208807706833, -0.011007322929799557, ...
17	SECTION 1. SHORT TITLE. This Act may be cited ...	Directs the President, in coordination with de...	Energy Independence Act of 2000	1352	[-0.0034495051950216293, -0.02827837595500133...
18	SECTION 1. SHORT TITLE. This Act may be cited ...	This measure has not been amended since it was...	Veterans Entrepreneurship Act of 2015	1393	[-0.0026434329338371754, -0.004964602179823806...
19	SECTION 1. SHORT TITLE. This Act may be cited ...	Strengthening the Health Care Safety Net Act o...	To amend title XIX of the Social Security Act ...	2678	[0.009399736300110817, -0.02588636800646782, 0...

As we run the search code block below, we'll embed the search query "*Can I get information on cable company tax revenue?*" with the same **text-embedding-ada-002 (Version 2)** model. Next we'll find the closest bill embedding to the newly embedded text from our query ranked by [cosine similarity](#).

Python

```
# search through the reviews for a specific product
def search_docs(df, user_query, top_n=3, to_print=True):
```

```

embedding = get_embedding(
    user_query,
    engine="text-embedding-ada-002" # engine should be set to the
deployment name you chose when you deployed the text-embedding-ada-002
(Version 2) model
)
df["similarities"] = df.ada_v2.apply(lambda x: cosine_similarity(x,
embedding))

res = (
    df.sort_values("similarities", ascending=False)
    .head(top_n)
)
if to_print:
    display(res)
return res

res = search_docs(df_bills, "Can I get information on cable company tax
revenue?", top_n=4)

```

Output:

	text	summary	title	n_tokens	ada_v2	similarities
9	SECTION 1. SHORT TITLE. This Act may be cited ...	Taxpayer's Right to View Act of 1993 - Amends ...	Taxpayer's Right to View Act of 1993	947	[0.004519130103290081, -0.023599395528435707, ...]	0.767584
11	SECTION 1. SHORT TITLE. This Act may be cited ...	Wall Street Compensation Reform Act of 2010 - ...	A bill to amend the Internal Revenue Code of 1...	2331	[0.014871294610202312, -0.001929433667100966, ...]	0.714262
1	SECTION 1. SHORT TITLE. This Act may be cited ...	Small Business Expansion and Hiring Act of 201...	To amend the Internal Revenue Code of 1986 to ...	1183	[0.005016345530748367, -0.00569863710552454, 0...	0.702899
4	SECTION 1. SHORT TITLE. This Act may be cited ...	Military Call-up Relief Act - Amends the Inter...	A bill to amend the Internal Revenue Code of 1...	1038	[0.010082815773785114, -0.0007545037078671157, ...]	0.699490

Finally, we'll show the top result from document search based on user query against the entire knowledge base. This returns the top result of the "Taxpayer's Right to View Act of 1993". This document has a cosine similarity score of 0.76 between the query and the document:

Python

```
res["summary"][9]
```

Output

"Taxpayer's Right to View Act of 1993 - Amends the Communications Act of 1934 to prohibit a cable operator from assessing separate charges for any video programming of a sporting, theatrical, or other entertainment event if that event is performed at a facility constructed, renovated, or maintained with tax revenues or by an organization that receives public financial support. Authorizes the Federal Communications Commission and local franchising authorities to make determinations concerning the applicability of such prohibition. Sets forth conditions under which a facility is considered to have been constructed, maintained, or renovated with tax revenues. Considers events performed by nonprofit or public organizations that receive tax subsidies to be subject to this Act if the event is

sponsored by, or includes the participation of a team that is part of, a tax exempt organization."

Using this approach, you can use embeddings as a search mechanism across documents in a knowledge base. The user can then take the top search result and use it for their downstream task, which prompted their initial query.

Clean up resources

If you created an OpenAI resource solely for completing this tutorial and want to clean up and remove an OpenAI resource, you'll need to delete your deployed models, and then delete the resource or associated resource group if it's dedicated to your test resource. Deleting the resource group also deletes any other resources associated with it.

- [Portal](#)
- [Azure CLI](#)

Next steps

Learn more about Azure OpenAI's models:

[Azure OpenAI Service models](#)

Azure OpenAI speech to speech chat

Article • 07/18/2023

[Reference documentation](#) | [Package \(NuGet\)](#) ↗ | [Additional Samples on GitHub](#) ↗

ⓘ Important

To complete the steps in this guide, access must be granted to Microsoft Azure OpenAI Service in the desired Azure subscription. Currently, access to this service is granted only by application. You can apply for access to Azure OpenAI by completing the form at <https://aka.ms/oai/access> ↗ .

In this how-to guide, you can use [Azure AI services Speech](#) to converse with [Azure OpenAI Service](#). The text recognized by the Speech service is sent to Azure OpenAI. The text response from Azure OpenAI is then synthesized by the Speech service.

Speak into the microphone to start a conversation with Azure OpenAI.

- The Speech service recognizes your speech and converts it into text (speech to text).
- Your request as text is sent to Azure OpenAI.
- The Speech service text to speech (TTS) feature synthesizes the response from Azure OpenAI to the default speaker.

Although the experience of this example is a back-and-forth exchange, Azure OpenAI doesn't remember the context of your conversation.

Prerequisites

- ✓ Azure subscription - [Create one for free](#) ↗
- ✓ [Create a Speech resource](#) ↗ in the Azure portal.
- ✓ Get the Speech resource key and region. After your Speech resource is deployed, select **Go to resource** to view and manage keys. For more information about Azure AI services resources, see [Get the keys for your resource](#).

Set up the environment

The Speech SDK is available as a [NuGet package](#) ↗ and implements .NET Standard 2.0. You install the Speech SDK later in this guide, but first check the [SDK installation guide](#) for any more requirements.

Set environment variables

This example requires environment variables named `OPEN_AI_KEY`, `OPEN_AI_ENDPOINT`, `SPEECH_KEY`, and `SPEECH_REGION`.

Your application must be authenticated to access Azure AI services resources. For production, use a secure way of storing and accessing your credentials. For example, after you [get a key for your Speech resource](#), write it to a new environment variable on the local machine running the application.

💡 Tip

Don't include the key directly in your code, and never post it publicly. See the Azure AI services [security](#) article for more authentication options like [Azure Key Vault](#).

To set the environment variables, open a console window, and follow the instructions for your operating system and development environment.

- To set the `OPEN_AI_KEY` environment variable, replace `your-openai-key` with one of the keys for your resource.
- To set the `OPEN_AI_ENDPOINT` environment variable, replace `your-openai-endpoint` with one of the regions for your resource.
- To set the `SPEECH_KEY` environment variable, replace `your-speech-key` with one of the keys for your resource.
- To set the `SPEECH_REGION` environment variable, replace `your-speech-region` with one of the regions for your resource.

Windows

Console

```
setx OPEN_AI_KEY your-openai-key  
setx OPEN_AI_ENDPOINT your-openai-endpoint  
setx SPEECH_KEY your-speech-key  
setx SPEECH_REGION your-speech-region
```

⚠ Note

If you only need to access the environment variable in the current running console, you can set the environment variable with `set` instead of `setx`.

After you add the environment variables, you may need to restart any running programs that will need to read the environment variable, including the console window. For example, if you are using Visual Studio as your editor, restart Visual Studio before running the example.

Recognize speech from a microphone

Follow these steps to create a new console application.

1. Open a command prompt where you want the new project, and create a console application with the .NET CLI. The `Program.cs` file should be created in the project directory.

```
.NET CLI  
dotnet new console
```

2. Install the Speech SDK in your new project with the .NET CLI.

```
.NET CLI  
dotnet add package Microsoft.CognitiveServices.Speech
```

3. Install the Azure OpenAI SDK (prerelease) in your new project with the .NET CLI.

```
.NET CLI  
dotnet add package Azure.AI.OpenAI --prerelease
```

4. Replace the contents of `Program.cs` with the following code.

```
C#  
  
using System;  
using System.IO;  
using System.Threading.Tasks;  
using Microsoft.CognitiveServices.Speech;  
using Microsoft.CognitiveServices.Speech.Audio;  
using Azure;  
using Azure.AI.OpenAI;  
using static System.Environment;  
  
class Program  
{
```

```
// This example requires environment variables named "OPEN_AI_KEY"
and "OPEN_AI_ENDPOINT"
// Your endpoint should look like the following
https://YOUR_OPEN_AI_RESOURCE_NAME.openai.azure.com/
    static string openAIKey =
Environment.GetEnvironmentVariable("OPEN_AI_KEY");
    static string openAIEndpoint =
Environment.GetEnvironmentVariable("OPEN_AI_ENDPOINT");

// Enter the deployment name you chose when you deployed the model.
static string engine = "text-davinci-003";

// This example requires environment variables named "SPEECH_KEY"
and "SPEECH_REGION"
    static string speechKey =
Environment.GetEnvironmentVariable("SPEECH_KEY");
    static string speechRegion =
Environment.GetEnvironmentVariable("SPEECH_REGION");

// Prompts Azure OpenAI with a request and synthesizes the
response.
async static Task AskOpenAI(string prompt)
{
    // Ask Azure OpenAI
    OpenAIClient client = new(new Uri(openAIEndpoint), new
AzureKeyCredential(openAIKey));
    var completionsOptions = new CompletionsOptions()
    {
        Prompts = { prompt },
        MaxTokens = 100,
    };
    Response<Completions> completionsResponse =
client.GetCompletions(engine, completionsOptions);
    string text = completionsResponse.Value.Choices[0].Text.Trim();
    Console.WriteLine($"Azure OpenAI response: {text}");

    var speechConfig = SpeechConfig.FromSubscription(speechKey,
speechRegion);
    // The language of the voice that speaks.
    speechConfig.SpeechSynthesisVoiceName = "en-US-
JennyMultilingualNeural";
    var audioOutputConfig = AudioConfig.FromDefaultSpeakerOutput();

    using (var speechSynthesizer = new
SpeechSynthesizer(speechConfig, audioOutputConfig))
    {
        var speechSynthesisResult = await
speechSynthesizer.SpeakTextAsync(text).ConfigureAwait(true);

        if (speechSynthesisResult.Reason ==
ResultReason.SynthesizingAudioCompleted)
        {
            Console.WriteLine($"Speech synthesized to speaker for
text: [{text}]");
        }
    }
}
```

```
        else if (speechSynthesisResult.Reason == ResultReason.Canceled)
        {
            var cancellationDetails =
SpeechSynthesisCancellationDetails.FromResult(speechSynthesisResult);
            Console.WriteLine($"Speech synthesis canceled:
{cancellationDetails.Reason}");

            if (cancellationDetails.Reason ==
CancellationReason.Error)
            {
                Console.WriteLine($"Error details:
{cancellationDetails.ErrorDetails}");
            }
        }
    }

// Continuously listens for speech input to recognize and send as text to Azure OpenAI
async static Task ChatWithOpenAI()
{
    // Should be the locale for the speaker's language.
    var speechConfig = SpeechConfig.FromSubscription(speechKey,
speechRegion);
    speechConfig.SpeechRecognitionLanguage = "en-US";

    using var audioConfig =
AudioConfig.FromDefaultMicrophoneInput();
    using var speechRecognizer = new SpeechRecognizer(speechConfig,
audioConfig);
    var conversationEnded = false;

    while(!conversationEnded)
    {
        Console.WriteLine("Azure OpenAI is listening. Say 'Stop' or press Ctrl-Z to end the conversation.");

        // Get audio from the microphone and then send it to the TTS service.
        var speechRecognitionResult = await
speechRecognizer.RecognizeOnceAsync();

        switch (speechRecognitionResult.Reason)
        {
            case ResultReason.RecognizedSpeech:
                if (speechRecognitionResult.Text == "Stop.")
                {
                    Console.WriteLine("Conversation ended.");
                    conversationEnded = true;
                }
                else
                {
                    Console.WriteLine($"Recognized speech:
{speechRecognitionResult.Text}");
                }
        }
    }
}
```

```

        await
AskOpenAI(speechRecognitionResult.Text).ConfigureAwait(true);
    }
    break;
    case ResultReason.NoMatch:
        Console.WriteLine($"No speech could be recognized:");
    });
    break;
    case ResultReason.Canceled:
        var cancellationDetails =
CancellationDetails.FromResult(speechRecognitionResult);
        Console.WriteLine($"Speech Recognition canceled:
{cancellationDetails.Reason}");
        if (cancellationDetails.Reason ==
CancellationReason.Error)
        {
            Console.WriteLine($"Error details=
{cancellationDetails.ErrorDetails}");
        }
        break;
    }
}
}

async static Task Main(string[] args)
{
    try
    {
        await ChatWithOpenAI().ConfigureAwait(true);
    }
    catch (Exception ex)
    {
        Console.WriteLine(ex.Message);
    }
}
}

```

- To increase or decrease the number of tokens returned by Azure OpenAI, change the `MaxTokens` property in the `CompletionsOptions` class instance. For more information tokens and cost implications, see [Azure OpenAI tokens](#) and [Azure OpenAI pricing ↗](#).

Run your new console application to start speech recognition from a microphone:

Console

dotnet run

 **Important**

Make sure that you set the `OPEN_AI_KEY`, `OPEN_AI_ENDPOINT`, `SPEECH__KEY` and `SPEECH__REGION` environment variables as described [previously](#). If you don't set these variables, the sample will fail with an error message.

Speak into your microphone when prompted. The console output includes the prompt for you to begin speaking, then your request as text, and then the response from Azure OpenAI as text. The response from Azure OpenAI should be converted from text to speech and then output to the default speaker.

Console

```
PS C:\dev\openai\csharp> dotnet run
Azure OpenAI is listening. Say 'Stop' or press Ctrl-Z to end the
conversation.
Recognized speech: Make a comma separated list of all continents.
Azure OpenAI response: Africa, Antarctica, Asia, Australia, Europe, North
America, South America
Speech synthesized to speaker for text [Africa, Antarctica, Asia, Australia,
Europe, North America, South America]
Azure OpenAI is listening. Say 'Stop' or press Ctrl-Z to end the
conversation.
Recognized speech: Make a comma separated list of 1 Astronomical observatory
for each continent. A list should include each continent name in
parentheses.
Azure OpenAI response: Mauna Kea Observatories (North America), La Silla
Observatory (South America), Tenerife Observatory (Europe), Siding Spring
Observatory (Australia), Beijing Xinglong Observatory (Asia), Naukluft
Plateau Observatory (Africa), Rutherford Appleton Laboratory (Antarctica)
Speech synthesized to speaker for text [Mauna Kea Observatories (North
America), La Silla Observatory (South America), Tenerife Observatory
(Europe), Siding Spring Observatory (Australia), Beijing Xinglong
Observatory (Asia), Naukluft Plateau Observatory (Africa), Rutherford
Appleton Laboratory (Antarctica)]
Azure OpenAI is listening. Say 'Stop' or press Ctrl-Z to end the
conversation.
Conversation ended.
PS C:\dev\openai\csharp>
```

Remarks

Now that you've completed the quickstart, here are some more considerations:

- To change the speech recognition language, replace `en-US` with another [supported language](#). For example, `es-ES` for Spanish (Spain). The default language is `en-US` if you don't specify a language. For details about how to identify one of multiple languages that might be spoken, see [language identification](#).

- To change the voice that you hear, replace `en-US-JennyMultilingualNeural` with another [supported voice](#). If the voice doesn't speak the language of the text returned from Azure OpenAI, the Speech service doesn't output synthesized audio.
- To use a different [model](#), replace `text-davinci-003` with the ID of another [deployment](#). Keep in mind that the deployment ID isn't necessarily the same as the model name. You named your deployment when you created it in [Azure OpenAI Studio](#).
- Azure OpenAI also performs content moderation on the prompt inputs and generated outputs. The prompts or responses may be filtered if harmful content is detected. For more information, see the [content filtering](#) article.

Clean up resources

You can use the [Azure portal](#) or [Azure Command Line Interface \(CLI\)](#) to remove the Speech resource you created.

Next steps

- [Learn more about Speech](#)
- [Learn more about Azure OpenAI](#)

Overview of Responsible AI practices for Azure OpenAI models

Article • 05/19/2023

Many of the Azure OpenAI models are generative AI models that have demonstrated improvements in advanced capabilities such as content and code generation, summarization, and search. With many of these improvements also come increased responsible AI challenges related to harmful content, manipulation, human-like behavior, privacy, and more. For more information about the capabilities, limitations and appropriate use cases for these models, please review the [Transparency Note](#).

In addition to the Transparency Note, we have created technical recommendations and resources to help customers design, develop, deploy, and use AI systems that implement the Azure OpenAI models responsibly. Our recommendations are grounded in the [Microsoft Responsible AI Standard](#), which sets policy requirements that our own engineering teams follow. Much of the content of the Standard follows a pattern, asking teams to Identify, Measure, and Mitigate potential harms, and plan for how to Operate the AI system as well. In alignment with those practices, these recommendations are organized into four stages:

1. **Identify** : Identify and prioritize potential harms that could result from your AI system through iterative red-teaming, stress-testing, and analysis.
2. **Measure** : Measure the frequency and severity of those harms by establishing clear metrics, creating measurement test sets, and completing iterative, systematic testing (both manual and automated).
3. **Mitigate** : Mitigate harms by implementing tools and strategies such as [prompt engineering](#) and using our [content filters](#). Repeat measurement to test effectiveness after implementing mitigations.
4. **Operate** : Define and execute a deployment and operational readiness plan.

In addition to their correspondence to the Microsoft Responsible AI Standard, these stages correspond closely to the functions in the [NIST AI Risk Management Framework](#).

Identify

Identifying potential harms that could occur in or be caused by an AI system is the first stage of the Responsible AI lifecycle. The earlier you begin to identify potential harms, the more effective you can be at mitigating the harms. When assessing potential harms, it is important to develop an understanding of the types of harms that could result from

using the Azure OpenAI Service in your specific context(s). In this section, we provide recommendations and resources you can use to identify harms through an impact assessment, iterative red team testing, stress-testing, and analysis. Red teaming and stress-testing are approaches where a group of testers come together and intentionally probe a system to identify its limitations, risk surface, and vulnerabilities.

These steps have the goal of producing a prioritized list of potential harms for each specific scenario.

- 1. Identify harms that are relevant** for your specific model, application, and deployment scenario.
 - a. Identify potential harms associated with the model and model capabilities (for example, GPT-3 model vs GPT-4 model) that you're using in your system. This is important to consider because each model has different capabilities, limitations, and risks, as described more fully in the sections above.
 - b. Identify any other harms or increased scope of harm presented by the intended use of the system you're developing. Consider using a [Responsible AI Impact Assessment](#) to identify potential harms.
 - i. For example, let's consider an AI system that summarizes text. Some uses of text generation are lower risk than others. For example, if the system is to be used in a healthcare domain for summarizing doctor's notes, the risk of harm arising from inaccuracies is higher than if the system is summarizing online articles.
- 2. Prioritize harms based on elements of risk such as frequency and severity.** Assess the level of risk for each harm and the likelihood of each risk occurring in order to prioritize the list of harms you've identified. Consider working with subject matter experts and risk managers within your organization and with relevant external stakeholders when appropriate.
- 3. Conduct red team testing and stress testing** starting with the highest priority harms, to develop a better understanding of whether and how the identified harms are actually occurring in your scenario, as well as to identify new harms you didn't initially anticipate.
- 4. Share this information with relevant stakeholders** using your organization's internal compliance processes.

At the end of this Identify stage, you should have a documented, prioritized list of harms. When new harms and new instances of harms emerge through further testing and use of the system, you can update and improve this list by following the above process again.

Measure

Once a list of prioritized harms has been identified, the next stage involves developing an approach for systematic measurement of each harm and conducting evaluations of the AI system. There are manual and automated approaches to measurement. We recommend you do both, starting with manual measurement.

Manual measurement is useful for:

1. Measuring progress on a small set of priority issues. When mitigating specific harms, it's often most productive to keep manually checking progress against a small dataset until the harm is no longer observed before moving to automated measurement.
2. Defining and reporting metrics until automated measurement is reliable enough to use alone.
3. Spot-checking periodically to measure the quality of automatic measurement.

Automated measurement is useful for:

1. Measuring at a large scale with increased coverage to provide more comprehensive results.
2. Ongoing measurement to monitor for any regression as the system, usage, and mitigations evolve.

Below, we provide specific recommendations to measure your AI system for potential harms. We recommend you first complete this process manually and then develop a plan to automate the process:

1. **Create inputs that are likely to produce each prioritized harm:** Create measurement set(s) by generating many diverse examples of targeted inputs that are likely to produce each prioritized harm.
2. **Generate System Outputs:** Pass in the examples from the measurement sets as inputs to the system to generate system outputs. Document the outputs.
3. **Evaluate System Outputs and Report Results to Relevant Stakeholders**
 - a. **Define clear metric(s).** For each intended use of your system, establish metrics that measure the frequency and degree of severity of each potentially harmful output. Create clear definitions to classify outputs that will be considered harmful or problematic in the context of your system and scenario, for each type of prioritized harm you identified.
 - b. **Assess the outputs** against the clear metric definitions and record and quantify the occurrences of harmful outputs. Repeat the measurements periodically, to assess mitigations and monitor for any regression.

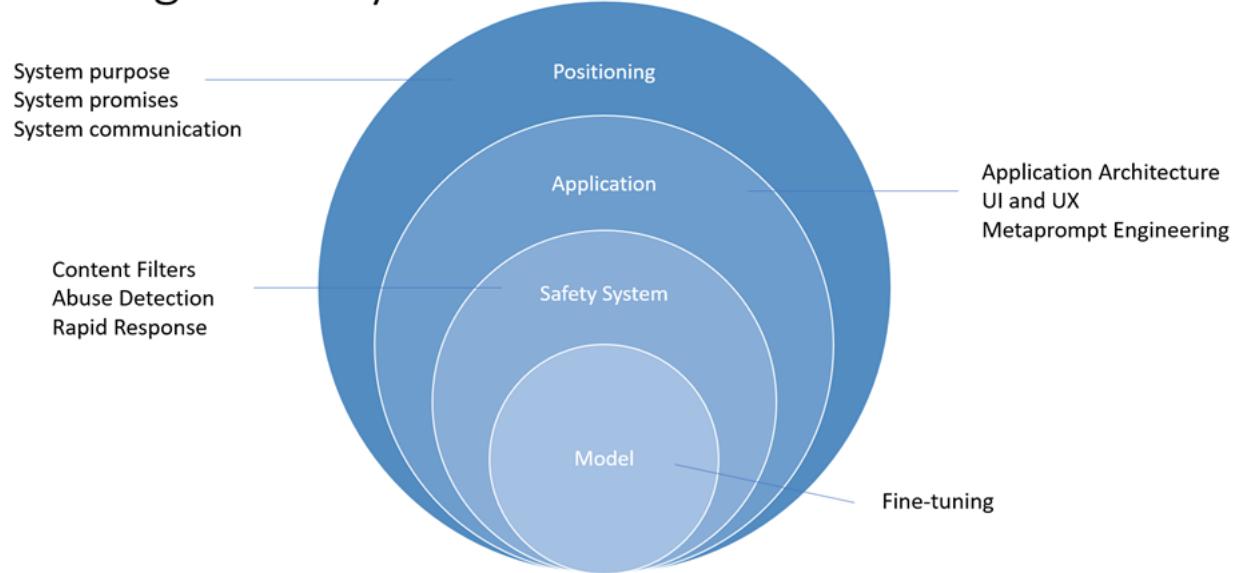
- c. Share this information with relevant stakeholders using your organization's internal compliance processes.

At the end of this measurement stage, you should have a defined measurement approach to benchmark how your system performs for each potential harm as well as an initial set of documented results. As you continue implementing and testing mitigations, the metrics and measurement sets should continue to be refined (for example, to add metrics for new harms that were initially unanticipated) and the results updated.

Mitigate

Mitigating harms presented by large language models such as the Azure OpenAI models requires an iterative, layered approach that includes experimentation and continual measurement. We recommend developing a mitigation plan that encompasses four layers of mitigations for the harms identified in the earlier stages of this process:

Mitigation Layers



1. At the **model level**, it's important to understand the model(s) you'll be using and what fine-tuning steps may have been taken by the model developers to align the model towards its intended uses and to reduce the risk of potentially harmful uses and outcomes.
 - a. For example, for GPT-4, model developers have been able to use reinforcement learning methods as a responsible AI tool to better align the model towards the designers' intended goals.
2. At the **safety system level**, you should understand the platform level mitigations that have been implemented. such as the [Azure OpenAI content filters](#) which help

to block the output of harmful content.

3. At the **application level**, application developers can implement metaprompt and user-centered design and user experience mitigations. Metaprompts are instructions provided to the model to guide its behavior; their use can make a critical difference in guiding the system to behave in accordance with your expectations. User-centered design and user experience (UX) interventions are also key mitigation tools to prevent misuse and overreliance on AI.
4. At the **positioning level**, there are many ways to educate the people who will use or be affected by your system about its capabilities and limitations.

Below, we provide specific recommendations to implement mitigations at the different layers. Not all of these mitigations are appropriate for every scenario, and conversely, these mitigations may be insufficient for some scenarios. Give careful consideration to your scenario and the prioritized harms you identified, and as you implement mitigations, develop a process to **measure and document their effectiveness** for your system and scenario.

1. **Model level Mitigations:** Review and identify which Azure OpenAI base model is best suited for the system you're building and educate yourself about its capabilities, limitations, and any measures taken to reduce the risk of the potential harms you've identified. For example, if you're using GPT-4, in addition to reading this Transparency Note, you can review OpenAI's [GPT-4 System Card](#) explaining the safety challenges presented by the model and the safety processes that OpenAI adopted to prepare GPT-4 for deployment. It may be worth experimenting with different versions of the model(s) (including through red teaming and measuring) to see how the harms present differently.
2. **Safety System Level Mitigations:** Identify and evaluate the effectiveness of platform level solutions such as the [Azure OpenAI content filters](#) to help mitigate the potential harms that you have identified.
3. **Application Level Mitigations:** Prompt engineering, including **metaprompt tuning, can be an effective mitigation** for many different types of harm. Review and implement metaprompt (also called the "system message" or "system prompt") guidance and best practices documented [here](#).

We recommend implementing the following user-centered design and user experience (UX) interventions, guidance, and best practices to guide users to use the system as intended and to prevent overreliance on the AI system:

- a. **Review and edit interventions:** Design the user experience (UX) to encourage people who use the system to review and edit the AI-generated outputs before accepting them (see [HAX G9](#): Support efficient correction).

b. Highlight potential inaccuracies in the AI-generated outputs (see HAX G2 ↗:

Make clear how well the system can do what it can do), both when users first start using the system and at appropriate times during ongoing use. In the first run experience (FRE), notify users that AI-generated outputs may contain inaccuracies and that they should verify information. Throughout the experience, include reminders to check AI-generated output for potential inaccuracies, both overall and in relation to specific types of content the system may generate incorrectly. For example, if your measurement process has determined that your system has lower accuracy with numbers, mark numbers in generated outputs to alert the user and encourage them to check the numbers or seek external sources for verification.

- c. User responsibility.** Remind people that they are accountable for the final content when they're reviewing AI-generated content. For example, when offering code suggestions, remind the developer to review and test suggestions before accepting.
- d. Disclose AI's role in the interaction.** Make people aware that they are interacting with an AI system (as opposed to another human). Where appropriate, inform content consumers that content has been partly or fully generated by an AI model; such notices may be required by law or applicable best practices, and can reduce inappropriate reliance on AI-generated outputs and can help consumers use their own judgment about how to interpret and act on such content.
- e. Prevent the system from anthropomorphizing.** AI models may output content containing opinions, emotive statements, or other formulations that could imply that they're human-like, that could be mistaken for a human identity, or that could mislead people to think that a system has certain capabilities when it doesn't. Implement mechanisms that reduce the risk of such outputs or incorporate disclosures to help prevent misinterpretation of outputs.
- f. Cite references and information sources.** If your system generates content based on references sent to the model, clearly citing information sources helps people understand where the AI-generated content is coming from.
- g. Limit the length of inputs and outputs, where appropriate.** Restricting input and output length can reduce the likelihood of producing undesirable content, misuse of the system beyond its intended uses, or other harmful or unintended uses.
- h. Structure inputs and/or system outputs.** Use [prompt engineering](#) techniques within your application to structure inputs to the system to prevent open-ended responses. You can also limit outputs to be structured in certain formats or patterns. For example, if your system generates dialog for a fictional character in

response to queries, limit the inputs so that people can only query for a predetermined set of concepts.

- i. **Prepare pre-determined responses.** There are certain queries to which a model may generate offensive, inappropriate, or otherwise harmful responses. When harmful or offensive queries or responses are detected, you can design your system to deliver a predetermined response to the user. Predetermined responses should be crafted thoughtfully. For example, the application can provide prewritten answers to questions such as "who/what are you?" to avoid having the system respond with anthropomorphized responses. You can also use predetermined responses for questions like, "What are your terms of use?" to direct people to the correct policy.
- j. **Restrict automatic posting on social media.** Limit how people can automate your product or service. For example, you may choose to prohibit automated posting of AI-generated content to external sites (including social media), or to prohibit the automated execution of generated code.
- k. **Bot detection.** Devise and implement a mechanism to prohibit users from building an API on top of your product.

4. Positioning Level Mitigations:

- a. **Be appropriately transparent.** It's important to provide the right level of transparency to people who use the system, so that they can make informed decisions around the use of the system.
- b. **Provide system documentation.** Produce and provide educational materials for your system, including explanations of its capabilities and limitations. For example, this could be in the form of a "learn more" page accessible via the system.
- c. **Publish user guidelines and best practices.** Help users and stakeholders use the system appropriately by publishing best practices, for example on prompt crafting, reviewing generations before accepting them, etc. Such guidelines can help people understand how the system works. When possible, incorporate the guidelines and best practices directly into the UX.

As you implement mitigations to address potential identified harms, it's important to develop a process for ongoing measurement of the effectiveness of such mitigations, to document measurement results, and to review those measurement results to continually improve the system.

Operate

Once measurement and mitigation systems are in place, we recommend that you define and execute a deployment and operational readiness plan. This stage includes

completing appropriate reviews of your system and mitigation plans with relevant stakeholders, establishing pipelines to collect telemetry and feedback, and developing an incident response and rollback plan.

Some recommendations for how to deploy and operate a system that uses the Azure OpenAI service with appropriate, targeted harms mitigations include:

1. Work with compliance teams within your organization to understand what types of reviews are required for your system and when they are required (for example, legal review, privacy review, security review, accessibility review, etc.).
2. Develop and implement the following:
 - a. **Develop a phased delivery plan.** We recommend you launch systems using the Azure OpenAI service gradually using a "phased delivery" approach. This gives a limited set of people the opportunity to try the system, provide feedback, report issues and concerns, and suggest improvements before the system is released more widely. It also helps to manage the risk of unanticipated failure modes, unexpected system behaviors, and unexpected concerns being reported.
 - b. **Develop an incident response plan.** Develop an incident response plan and evaluate the time needed to respond to an incident.
 - c. **Develop a rollback plan** Ensure you can roll back the system quickly and efficiently in case an unanticipated incident occurs.
 - d. **Prepare for immediate action for unanticipated harms.** Build the necessary features and processes to block problematic prompts and responses as they're discovered and as close to real-time as possible. When unanticipated harms do occur, block the problematic prompts and responses as quickly as possible, develop and deploy appropriate mitigations, investigate the incident, and implement a long-term solution.
 - e. **Develop a mechanism to block people who are misusing your system.** Develop a mechanism to identify users who violate your content policies (for example, by generating hate speech) or are otherwise using your system for unintended or harmful purposes, and take action against further abuse. For example, if a user frequently uses your system to generate content that is blocked or flagged by content safety systems, consider blocking them from further use of your system. Implement an appeal mechanism where appropriate.
 - f. **Build effective user feedback channels.** Implement feedback channels through which stakeholders (and the general public, if applicable) can submit feedback or report issues with generated content or that otherwise arise during their use of the system. Document how such feedback is processed, considered, and addressed. Evaluate the feedback and work to improve the system based on user feedback. One approach could be to include buttons with generated content that would allow users to identify content as "inaccurate," "harmful" or

"incomplete." This could provide a more widely used, structured and feedback signal for analysis.

- g. **Telemetry data.** Identify and record (consistent with applicable privacy laws, policies, and commitments) signals that indicate user satisfaction or their ability to use the system as intended. Use telemetry data to identify gaps and improve the system.

This document is not intended to be, and should not be construed as providing, legal advice. The jurisdiction in which you're operating may have various regulatory or legal requirements that apply to your AI system. Consult a legal specialist if you are uncertain about laws or regulations that might apply to your system, especially if you think those might impact these recommendations. Be aware that not all of these recommendations and resources are appropriate for every scenario, and conversely, these recommendations and resources may be insufficient for some scenarios.

Learn more about responsible AI

- Microsoft AI principles 
- Microsoft responsible AI resources 
- Microsoft Azure Learning courses on responsible AI

Learn more about Azure OpenAI

- Limited access to Azure OpenAI Service - Azure AI services | Microsoft Learn
- Code of Conduct for the Azure OpenAI Service | Microsoft Learn
- Data, privacy, and security for Azure OpenAI Service - Azure AI services | Microsoft Learn

Transparency Note for Azure OpenAI Service

Article • 07/21/2023

What is a Transparency Note?

An AI system includes not only the technology, but also the people who use it, the people who are affected by it, and the environment in which it's deployed. Creating a system that is fit for its intended purpose requires an understanding of how the technology works, what its capabilities and limitations are, and how to achieve the best performance. Microsoft's Transparency Notes are intended to help you understand how our AI technology works, the choices system owners can make that influence system performance and behavior, and the importance of thinking about the whole system, including the technology, the people, and the environment. You can use Transparency Notes when developing or deploying your own system, or share them with the people who will use or be affected by your system.

Microsoft's Transparency Notes are part of a broader effort at Microsoft to put our AI Principles into practice. To find out more, see the [Microsoft's AI principles](#).

The basics of the Azure OpenAI Models

Azure OpenAI provides customers with a fully managed AI service that lets developers and data scientists apply OpenAI's powerful models including models that can generate natural language, code, and images. Within the Azure OpenAI Service, the OpenAI models are integrated with Microsoft-developed content filtering and abuse detection models. Learn more about content filtering [here](#) and abuse detection [here](#).

Select the tabs to see content for the relevant model type.

Introduction

Text and code models

As part of the fully managed Azure OpenAI Service, the GPT-3 models analyze and generate natural language, Codex models analyze and generate code and plain text code commentary, and the GPT-4 models can understand and generate natural language and code. These models use an autoregressive architecture, meaning they

use data from prior observations to predict the most probable next word. This process is then repeated by appending the newly generated content to the original text to produce the complete generated response. Because the response is conditioned on the input text, these models can be applied to various tasks simply by changing the input text.

The GPT-3 series of models are pretrained on a wide body of publicly available free text data. This data is sourced from a combination of web crawling (specifically, a filtered version of [Common Crawl](#)), which includes a broad range of text from the internet and comprises 60 percent of the weighted pretraining dataset) and higher-quality datasets, including an expanded version of the WebText dataset, two internet-based books corpora and English-language Wikipedia. The GPT-4 base model was trained using publicly available data (such as internet data) and data that was licensed by OpenAI. The model was fine-tuned using reinforcement learning with human feedback (RLHF).

Learn more about the training and modeling techniques in OpenAI's [GPT-3](#), [GPT-4](#), and [Codex](#) research papers. The guidance below is also drawn from [OpenAI's safety best practices](#).

Key terms

Term	Definition
Prompt	<p>The text you send to the service in the API call. This text is then input into the model. For example, one might input the following prompt:</p> <pre>Convert the questions to a command: Q: Ask Constance if we need some bread A: send-msg 'find constance' Do we need some bread? Q: Send a message to Greg to figure out if things are ready for Wednesday. A:</pre>
Completion or Generation	<p>The text Azure OpenAI outputs in response. For example, the service may respond with the following answer to the above prompt: <code>send-msg 'find greg'</code> <code>figure out if things are ready for Wednesday.</code></p>
Token	<p>Azure OpenAI processes text by breaking it down into tokens. Tokens can be words or just chunks of characters. For example, the word <code>hamburger</code> gets broken up into the tokens <code>ham</code>, <code>bur</code> and <code>ger</code>, while a short and common word like <code>pear</code> is a single token. Many tokens start with a whitespace, for example <code>hello</code> and <code>bye</code>.</p>

Capabilities

Text and code models

The GPT-4, GPT-3, and Codex Azure OpenAI Service models use natural language instructions and examples in the prompt to identify the task. The model then completes the task by predicting the most probable next text. This technique is known as "in-context" learning. These models are not retrained during this step but instead give predictions based on the context you include in the prompt.

There are three main approaches for in-context learning. These approaches vary based on the amount of task-specific data that is given to the model:

Few-shot : In this case, a user includes several examples in the prompt that demonstrate the expected answer format and content. The following example shows a few-shot prompt providing multiple examples:

```
Convert the questions to a command:  
Q: Ask Constance if we need some bread  
A: send-msg `find constance` Do we need some bread?  
Q: Send a message to Greg to figure out if things areready for Wednesday.  
A: send-msg `find greg` Is everything ready forWednesday?  
Q: Ask Ilya if we're still having our meeting thisevening  
A: send-msg `find ilya` Are we still having a meetingthis evening?  
Q: Contact the ski store and figure out if I can getmy skis fixed before I leave on Thursday  
A: send-msg `find ski store` Would it be possible toget my skis fixed before I leave on Thursday?  
Q: Thank Nicolas for lunch  
A: send-msg `find nicolas` Thank you for lunch!  
Q: Tell Constance that I won't be home before 19:30tonight – unmoveable meeting.  
A: send-msg `find constance` I won't be home before19:30 tonight. I have a meeting I can't move.  
Q: Tell John that I need to book an appointment at10:30  
A:
```

The number of examples typically ranges from 0 to 100 depending on how many can fit in the maximum input length for a single prompt. Few-shot learning enables a major reduction in the amount of task-specific data required for accurate predictions.

One-shot : This case is the same as the few-shot approach except only one example is provided. The following example shows a one-shot prompt:

Convert the questions to a command:

Q: Ask Constance if we need some bread

A: send-msg `find constance` Do we need some bread?

Q: Send a message to Greg to figure out if things are ready for Wednesday.

A:

Zero-shot: In this case, no examples are provided to the model and only the task request is provided. The following example shows a zero-shot prompt:

Convert the question to a command:

Q: Ask Constance if we need some bread

A:

Use cases

Text and code models

Intended uses

The GPT-4, GPT-3, and Codex models in the Azure OpenAI service can be used in multiple scenarios. The following list isn't comprehensive, but it illustrates the diversity of tasks that can be supported with appropriate mitigations:

- **Chat and conversation interaction :** Users can interact with a conversational agent that responds with responses drawn from trusted documents such as internal company documentation or tech support documentation.
Conversations must be limited to answering scoped questions.
- **Chat and conversation creation :** Users can create a conversational agent that responds with responses drawn from trusted documents such as internal company documentation or tech support documentation. Conversations must be limited to answering scoped questions.
- **Code generation or transformation scenarios :** For example, converting one programming language to another, generating docstrings for functions, converting natural language to SQL.

- **Journalistic content** : For use to create new journalistic content or to rewrite journalistic content submitted by the user as a writing aid for predefined topics. Users cannot use the application as a general content creation tool for all topics. May not be used to generate content for political campaigns.
- **Question-answering** : Users can ask questions and receive answers from trusted source documents such as internal company documentation. The application does not generate answers ungrounded in trusted source documentation.
- **Reason over structured and unstructured data** : Users can analyze inputs using classification, sentiment analysis of text, or entity extraction. Examples include analyzing product feedback sentiment, analyzing support calls and transcripts, and refining text-based search with embeddings.
- **Search** : Users can search trusted source documents such as internal company documentation. The application does not generate results ungrounded in trusted source documentation.
- **Summarization** : Users can submit content to be summarized for predefined topics built into the application and cannot use the application as an open-ended summarizer. Examples include summarization of internal company documentation, call center transcripts, technical reports, and product reviews.
- **Writing assistance on specific topics** : Users can create new content or rewrite content submitted by the user as a writing aid for business content or pre-defined topics. Users can only rewrite or create content for specific business purposes or predefined topics and cannot use the application as a general content creation tool for all topics. Examples of business content include proposals and reports. For journalistic use, see above **Journalistic content** use case.

Considerations when choosing a use case

We encourage customers to use the Azure OpenAI GPT-4, GPT-3, and Codex models in their innovative solutions or applications as approved in their [Limited Access registration form](#). However, here are some considerations when choosing a use case:

- **Not suitable for open-ended, unconstrained content generation.** Scenarios where users can generate content on any topic are more likely to produce offensive or harmful text. The same is true of longer generations.
- **Not suitable for scenarios where up-to-date, factually accurate information is crucial** unless you have human reviewers or are using the models to search your own documents and have verified suitability for your scenario. The service does not have information about events that occur after its training

date, likely has missing knowledge about some topics, and may not always produce factually accurate information.

- **Avoid scenarios where use or misuse of the system could result in significant physical or psychological injury to an individual.** For example, scenarios that diagnose patients or prescribe medications have the potential to cause significant harm.
- **Avoid scenarios where use or misuse of the system could have a consequential impact on life opportunities or legal status.** Examples include scenarios where the AI system could affect an individual's legal status, legal rights, or their access to credit, education, employment, healthcare, housing, insurance, social welfare benefits, services, opportunities, or the terms on which they're provided.
- **Avoid high stakes scenarios that could lead to harm.** The models hosted by Azure OpenAI service reflect certain societal views, biases, and other undesirable content present in the training data or the examples provided in the prompt. As a result, we caution against using the models in high-stakes scenarios where unfair, unreliable, or offensive behavior might be extremely costly or lead to harm.
- **Carefully consider use cases in high stakes domains or industry:** Examples include but are not limited to healthcare, medicine, finance, or legal.
- **Carefully consider well-scope chatbot scenarios.** Limiting the use of the service in chatbots to a narrow domain reduces the risk of generating unintended or undesirable responses.
- **Carefully consider all generative use cases.** Content generation scenarios may be more likely to produce unintended outputs and these scenarios require careful consideration and mitigations.

Limitations

When it comes to large-scale natural language models and image models, there are particular fairness and responsible AI issues to consider. People use language and images to describe the world and to express their beliefs, assumptions, attitudes, and values. As a result, publicly available text and image data typically used to train large-scale natural language processing and image generation models contains societal biases relating to race, gender, religion, age, and other groups of people, as well as other undesirable content. These societal biases are reflected in the distributions of words, phrases, and syntactic structures.

Technical limitations, operational factors and ranges

Caution

Please be advised that this section contains illustrative examples which include terms and language that some individuals may find offensive.

Large-scale natural language and image models trained with such data can potentially behave in ways that are unfair, unreliable, or offensive, in turn causing harms. Some of the ways are listed here. We emphasize that these types of harms aren't mutually exclusive. A single model can exhibit more than one type of harm, potentially relating to multiple different groups of people. For example:

- **Allocation:** These models can be used in ways that lead to unfair allocation of resources or opportunities. For example, automated resume screening systems can withhold employment opportunities from one gender if they're trained on resume data that reflects the existing gender imbalance in a particular industry. Or the DALL·E 2 model could be used to create imagery in the style of a known artist, which could affect the value of the artist's work or the artist's life opportunities.
- **Quality of service:** The Azure OpenAI models are trained primarily on English text and images with English text descriptions. Languages other than English will experience worse performance. English language varieties with less representation in the training data might experience worse performance. The publicly available images used to train the DALL·E models might reinforce public bias and other undesirable content. The models are also unable to generate consistent photorealistic images and comprehensive text at this time.
- **Stereotyping:** These models can reinforce stereotypes. For example, when translating "He is a nurse" and "She is a doctor" into a genderless language such as Turkish and then back into English, many machine translation systems yield the stereotypical (and incorrect) results of "She is a nurse" and "He is a doctor." With DALL·E 2, when generating an image based on the prompt "Fatherless children," the model could generate images of Black children only, reinforcing harmful stereotypes that may exist in publicly available images.
- **Demeaning:** These models can demean people. For example, an open-ended content generation system with inappropriate or insufficient mitigations might produce offensive or demeaning to a particular group of people.
- **Overrepresentation and underrepresentation:** These models can over- or under-represent groups of people, or even erase their representation entirely. For example, if text prompts that contain the word "gay" are detected as potentially harmful or offensive, this could lead to the underrepresentation or even erasure of legitimate image generations by or about the LGBTQIA+ community.

- **Inappropriate or offensive content:** These models can produce other types of inappropriate or offensive content. Examples include the ability to create images that potentially contain harmful artifacts such as hate symbols; images that illicit harmful connotations; images that relate to contested, controversial, or ideologically polarizing topics; images that are manipulative; images that contain sexually charged content that isn't caught by sexual-related content filters; and images that relate to sensitive or emotionally charged topics. For example, a well-intentioned text prompt aimed to create an image of the New York skyline with clouds and airplanes flying over it might unintentionally generate images that illicit sentiments related to the events surrounding 9/11.
- **Disinformation and misinformation about sensitive topics:** Because DALL-E 2 is a powerful image generation model, it can be used to produce disinformation and misinformation that can be extremely harmful. For example, the model might generate an image of a political leader engaging in activity of a violent or sexual (or simply inaccurate) nature that might lead to defamation and other consequential harms, including but not limited to public protests, political change, or fake news.
- **Information reliability:** Language model responses can fabricate content that may sound reasonable but is nonsensical or inaccurate with respect to external validation sources. Even when drawing responses from trusted source information, responses may misrepresent that content.
- **False information:** Azure OpenAI doesn't fact-check or verify content that is provided by customers or users. Depending on how you've developed your application, it might produce false information unless you've built in mitigations (see **Best practices for improving system performance** below).

System performance

In many AI systems, performance is often defined in relation to accuracy—that is, how often the AI system offers a correct prediction or output. With large-scale natural language models and image models, two different users might look at the same output and have different opinions of how useful or relevant it is, which means that performance for these systems must be defined more flexibly. Here, we broadly consider performance to mean that the application performs as you and your users expect, including not generating harmful outputs.

Azure OpenAI service can support a wide range of applications like search, classification, code generation, and image generation, each with different performance metrics and mitigation strategies. There are several steps you can take to mitigate some of the concerns listed under "Limitations" and to improve performance. Other important

mitigation techniques are outlined in the section [Evaluating and integrating Azure OpenAI for your use](#) below.

Best practices for improving system performance

- **Show and tell when designing prompts.** With text and code models, make it clear to the model what kind of outputs you expect through instructions, examples, or a combination of the two. If you want the model to rank a list of items in alphabetical order or to classify a paragraph by sentiment, show it that's what you want.
- **Keep your application on topic.** Carefully structure prompts and image inputs to reduce the chance of producing undesired content, even if a user tries to use it for this purpose. For instance, you might indicate in your prompt that a chatbot only engages in conversations about mathematics and otherwise responds "I'm sorry. I'm afraid I can't answer that." Adding adjectives like "polite" and examples in your desired tone to your prompt can also help steer outputs. With image models, you might indicate in your prompt or image input that your application generates only conceptual images. It might otherwise generate a pop-up notification that explains that the application is not for photorealistic use or to portray reality. Consider nudging users toward acceptable queries and image inputs, either by listing such examples up front or by offering them as suggestions upon receiving an off-topic request. Consider training a classifier to determine whether an input (prompt or image) is on topic or off topic.
- **Provide quality data.** With text and code models, if you're trying to build a classifier or get the model to follow a pattern, make sure that there are enough examples. Be sure to proofread your examples—the model is usually smart enough to see through basic spelling mistakes and give you a response, but it also might assume this is intentional and it could affect the response. Providing quality data also includes giving your model reliable data to draw responses from in chat and question answering systems.
- **Measure model quality.** As part of general model quality, consider measuring and improving fairness-related metrics and other metrics related to responsible AI in addition to traditional accuracy measures for your scenario. Consider resources like this checklist when you measure the fairness of the system. These measurements come with limitations, which you should acknowledge and communicate to stakeholders along with evaluation results.
- **Limit the length, structure, and rate of inputs and outputs.** Restricting the length or structure of inputs and outputs can increase the likelihood that the application will stay on task and mitigate, at least in part, any potentially unfair, unreliable, or offensive behavior. Other options to reduce the risk of misuse include (i) restricting

the source of inputs (for example, limiting inputs to a particular domain or to authenticated users rather than being open to anyone on the internet) and (ii) implementing usage rate limits.

- **Encourage human review of outputs prior to publication or dissemination.** With generative AI, there is potential for generating content that might be offensive or not related to the task at hand, even with mitigations in place. To ensure that the generated output meets the task of the customer, consider building ways to remind customers to review their outputs for quality prior to sharing widely. This can reduce many different harms, including offensive material, disinformation, and more.
- **Implement additional scenario-specific mitigations.** Refer to the mitigations outlined in [Evaluating and integrating Azure OpenAI for your use](#) including content moderation strategies. These do not represent every mitigation that might be required for your application, but they point to the general minimum baseline we check for when approving use cases for Azure OpenAI Service.

Evaluating and integrating Azure OpenAI for your use

For additional information on how to evaluate and integrate these models responsibly, please see the [RAI Overview document](#).

Learn more about responsible AI

- [Microsoft AI principles](#) ↗
- [Microsoft responsible AI resources](#) ↗
- [Microsoft Azure Learning courses on responsible AI](#)

Learn more about Azure OpenAI

- [Limited access to Azure OpenAI Service - Azure AI services | Microsoft Learn](#)
- [Code of Conduct for the Azure OpenAI Service | Microsoft Learn](#)
- [Data, privacy, and security for Azure OpenAI Service - Azure AI services | Microsoft Learn](#)

Limited access to Azure OpenAI Service

Article • 04/28/2023

As part of Microsoft's commitment to responsible AI, we are designing and releasing Azure OpenAI Service with the intention of protecting the rights of individuals and society and fostering transparent human-computer interaction. For this reason, we currently limit the access and use of Azure OpenAI, including limiting access to the ability to modify content filters and/or abuse monitoring.

Registration process

Azure OpenAI requires registration and is currently only available to approved enterprise customers and partners. Customers who wish to use Azure OpenAI are required to submit [a registration form ↗](#).

Customers must attest to any and all use cases for which they will use the service (the use cases from which customers may select will populate in the form after selection of the desired model(s) in Question 22 in the initial registration form). Customers who wish to add additional use cases after initial onboarding must submit the additional use cases using [this form ↗](#). The use of Azure OpenAI is limited to use cases that have been selected in a registration form. Microsoft may require customers to re-verify this information. Read more about example use cases and use cases to avoid [here](#).

Customers who wish to modify content filters and modify abuse monitoring after they have onboarded to the service are subject to additional eligibility criteria and scenario restrictions. At this time, modified content filters and/or modified abuse monitoring for Azure OpenAI Service are only available to managed customers and partners working with Microsoft account teams and have additional use case restrictions. Customers meeting these requirements can register [here ↗](#).

Access to the Azure OpenAI Service is subject to Microsoft's sole discretion based on eligibility criteria and a vetting process, and customers must acknowledge that they have read and understand the Azure terms of service for Azure OpenAI Service.

Azure OpenAI Service is made available to customers under the terms governing their subscription to Microsoft Azure Services, including the Azure OpenAI section of the [Microsoft Product Terms ↗](#). Please review these terms carefully as they contain important conditions and obligations governing your use of Azure OpenAI Service.

Important links

- Register to use Azure OpenAI [↗](#)
- Add additional use cases [↗](#) (if needed)
- Register to modify content filters and abuse monitoring [↗](#) (if needed)

Help and support

FAQ about Limited Access can be found [here](#). If you need help with Azure OpenAI, find support [here](#). Report abuse of Azure OpenAI [here](#) [↗](#).

Report problematic content to cscraireport@microsoft.com.

See also

- [Code of conduct for Azure OpenAI Service integrations](#)
- [Transparency note for Azure OpenAI Service](#)
- [Characteristics and limitations for Azure OpenAI Service](#)
- [Data, privacy, and security for Azure OpenAI Service](#)

Code of conduct for Azure OpenAI Service

Article • 03/13/2023

The following Code of Conduct defines the requirements that all Azure OpenAI Service implementations must adhere to in good faith. This code of conduct is in addition to the Acceptable Use Policy in the [Microsoft Online Services Terms](#).

Access requirements

Azure OpenAI Service is a Limited Access service that requires registration and is only available to approved enterprise customers and partners. Customers who wish to use this service are required to [register through this form](#). To learn more, see [Limited Access to Azure OpenAI Service](#).

Responsible AI mitigation requirements

Integrations with Azure OpenAI Service must:

- Implement meaningful human oversight
- Implement strong technical limits on inputs and outputs to reduce the likelihood of misuse beyond the application's intended purpose
- Test applications thoroughly to find and mitigate undesirable behaviors
- Establish feedback channels
- Implement additional scenario-specific mitigations

To learn more, see the [Azure OpenAI transparency note](#).

Integrations with Azure OpenAI Service must not:

- be used in any way that violates Microsoft's [Acceptable Use Policy](#), including but not limited to any use prohibited by law, regulation, government order, or decree, or any use that violates the rights of others;
- be used in any way that is inconsistent with this code of conduct, including the Limited Access requirements, the Responsible AI mitigation requirements, and the Content requirements;

- exceed the use case(s) you identified to Microsoft in connection with your request to use the service;
- interact with individuals under the age of consent in any way that could result in exploitation or manipulation or is otherwise prohibited by law or regulation;
- generate or interact with content prohibited in this Code of Conduct;
- be presented alongside or monetize content prohibited in this Code of Conduct;
- make decisions without appropriate human oversight if your application may have a consequential impact on any individual's legal position, financial position, life opportunities, employment opportunities, human rights, or result in physical or psychological injury to an individual;
- infer sensitive information about people without their explicit consent unless if used in a lawful manner by a law enforcement entity, court, or government official subject to judicial oversight in a jurisdiction that maintains a fair and independent judiciary; or
- be used for chatbots that (i) are erotic, romantic, or used for companionship purposes, or which are otherwise prohibited by this Code of Conduct; (ii) are personas of specific people without their explicit consent; (iii) claim to have special wisdom/insight/knowledge, unless very clearly labeled as being for entertainment purposes only; or (iv) enable end users to create their own chatbots without oversight.

Content requirements

We prohibit the use of our service for generating content that can inflict harm on individuals or society. Our content policies are intended to improve the safety of our platform.

These content requirements apply to the output of all models developed by OpenAI and hosted in Azure OpenAI, such as GPT-3, GPT-4, Codex models, and DALL·E 2, and includes content provided as input to the service and content generated as output from the service.

Exploitation and Abuse

Child sexual exploitation and abuse

Azure OpenAI Service prohibits content that describes, features, or promotes child sexual exploitation or abuse, whether or not prohibited by law. This includes sexual content involving a child or that sexualizes a child.

Grooming

Azure OpenAI Service prohibits content that describes or is used for purposes of grooming of children. Grooming is the act of an adult building a relationship with a child for the purposes of exploitation, especially sexual exploitation. This includes communicating with a child for the purpose of sexual exploitation, trafficking, or other forms of exploitation.

Non-consensual intimate content

Azure OpenAI Service prohibits content that describes, features, or promotes non-consensual intimate activity.

Sexual solicitation

Azure OpenAI Service prohibits content that describes, features, or promotes, or is used for, purposes of solicitation of commercial sexual activity and sexual services. This includes encouragement and coordination of real sexual activity.

Trafficking

Azure OpenAI Service prohibits content describing or used for purposes of human trafficking. This includes the recruitment of individuals, facilitation of transport, and payment for, and the promotion of, exploitation of people such as forced labor, domestic servitude, sexual slavery, forced marriages, and forced medical procedures.

Suicide and Self-Injury

Azure OpenAI Service prohibits content that describes, praises, supports, promotes, glorifies, encourages and/or instructs individual(s) on self-injury or to take their life.

Violent Content and Conduct

Graphic violence and gore

Azure OpenAI Service prohibits content that describes, features, or promotes graphic violence or gore.

Terrorism and Violent Extremism

Azure OpenAI Service prohibits content that depicts an act of terrorism; praises, or supports a terrorist organization, terrorist actor, or violent terrorist ideology; encourages terrorist activities; offers aid to terrorist organizations or terrorist causes; or aids in recruitment to a terrorist organization.

Violent Threats, Incitement, and Glorification of Violence

Azure OpenAI Service prohibits content advocating or promoting violence toward others through violent threats or incitement.

Harmful Content

Hate speech and discrimination

Azure OpenAI Service prohibits content that attacks, denigrates, intimidates, degrades, targets, or excludes individuals or groups on the basis of traits such as actual or perceived race, ethnicity, national origin, gender, gender identity, sexual orientation, religious affiliation, age, disability status, caste, or any other characteristic that is associated with systemic prejudice or marginalization.

Bullying and harassment

Azure OpenAI Service prohibits content that targets individual(s) or group(s) with threats, intimidation, insults, degrading or demeaning language or images, promotion of physical harm, or other abusive behavior such as stalking.

Deception, disinformation, and inauthentic activity

Azure OpenAI Service prohibits content that is intentionally deceptive and likely to adversely affect the public interest, including deceptive or untrue content relating to health, safety, election integrity, or civic participation. Azure OpenAI Service also prohibits inauthentic interactions, such as fake accounts, automated inauthentic activity, impersonation to gain unauthorized information or privileges, and claims to be from any person, company, government body, or entity without explicit permission to make that representation.

Active malware or exploits

Content that directly supports unlawful active attacks or malware campaigns that cause technical harms, such as delivering malicious executables, organizing denial of service

attacks, or managing command and control servers.

Additional content policies

We prohibit the use of our Azure OpenAI Service for scenarios in which the system is likely to generate undesired content due to limitations in the models or scenarios in which the system cannot be applied in a way that properly manages potential negative consequences to people and society. Without limiting the foregoing restriction, Microsoft reserves the right to revise and expand the above Content requirements to address specific harms to people and society.

This includes prohibiting content that is sexually graphic, including consensual pornographic content and intimate descriptions of sexual acts, as well as content that may influence the political process, such as an election, passage of legislation, and content for campaigning purposes.

We may at times limit our service's ability to respond to particular topics, such as probing for personal information or seeking opinions on sensitive topics or current events.

We prohibit the use of Azure OpenAI Service for activities that significantly harm other individuals, organizations, or society, including but not limited to use of the service for purposes in conflict with the applicable [Azure Legal Terms](#) and the [Microsoft Product Terms](#).

Report abuse

If you suspect that Azure OpenAI Service is being used in a manner that is abusive or illegal, infringes on your rights or the rights of other people, or violates these policies, you can report it at the [Report Abuse Portal](#).

Report problematic content

If Azure OpenAI Service outputs problematic content that you believe should have been filtered, report it at cscraireport@microsoft.com.

See also

- [Limited access to Azure OpenAI Service](#)
- [Transparency note for Azure OpenAI Service](#)
- [Data, privacy, and security for Azure OpenAI Service](#)

Data, privacy, and security for Azure OpenAI Service

Article • 06/23/2023

This article provides details regarding how data provided by you to the Azure OpenAI service is processed, used, and stored. Azure OpenAI stores and processes data to provide the service and to monitor for uses that violate the applicable product terms.

Please also see the [Microsoft Products and Services Data Protection Addendum](#), which governs data processing by the Azure OpenAI Service except as otherwise provided in the applicable [Product Terms](#).

ⓘ Important

Your prompts (inputs) and completions (outputs), your embeddings, and your training data:

- are NOT available to other customers.
- are NOT available to OpenAI.
- are NOT used to improve OpenAI models.
- are NOT used to improve any Microsoft or 3rd party products or services.
- are NOT used for automatically improving Azure OpenAI models for your use in your resource (The models are stateless, unless you explicitly fine-tune models with your training data).
- Your fine-tuned Azure OpenAI models are available exclusively for your use.

The Azure OpenAI Service is fully controlled by Microsoft; Microsoft hosts the OpenAI models in Microsoft's Azure environment and the Service does NOT interact with any services operated by OpenAI (e.g. ChatGPT, or the OpenAI API).

What data does the Azure OpenAI Service process?

Azure OpenAI processes the following types of data:

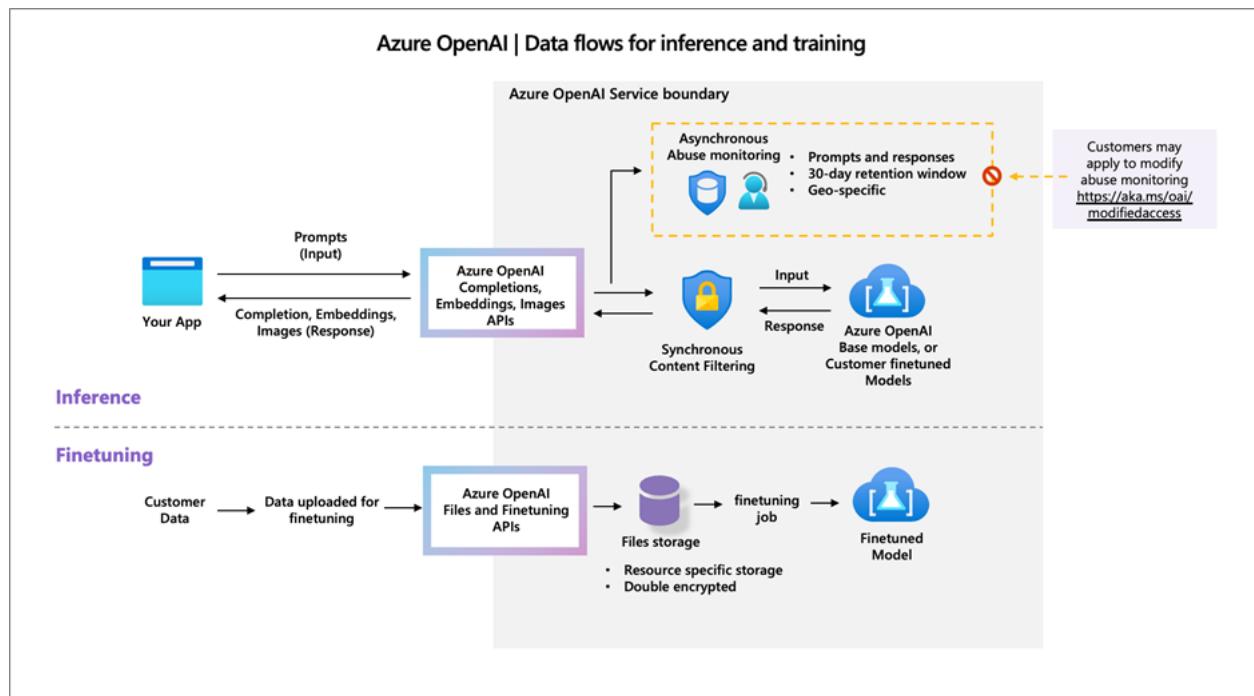
- **Prompts and generated content.** Prompts are submitted by the user, and content is generated by the service, via the completions, chat completions, images and embeddings operations.

- **Augmented data included with prompts.** When using the "on your data" feature, the service retrieves relevant data from a configured data store and augments the prompt to produce generations that are grounded with your data.
- **Training & validation data.** You can provide your own training data consisting of prompt-completion pairs for the purposes of [fine-tuning an OpenAI model](#).

How does the Azure OpenAI Service process data?

The diagram below illustrates how your data is processed. This diagram covers three different types of processing:

1. How the Azure OpenAI Service processes your prompts to generate content (including when additional data from a connected data source is added to a prompt using Azure OpenAI on your data).
2. How the Azure OpenAI Service creates a fine-tuned (custom) model with your training data.
3. How the Azure OpenAI Service and Microsoft personnel analyze prompts, completions and images for harmful content and for patterns suggesting the use of the service in a manner that violates the Code of Conduct or other applicable product terms



As depicted in the diagram above, managed customers may [apply to modify abuse monitoring](#).

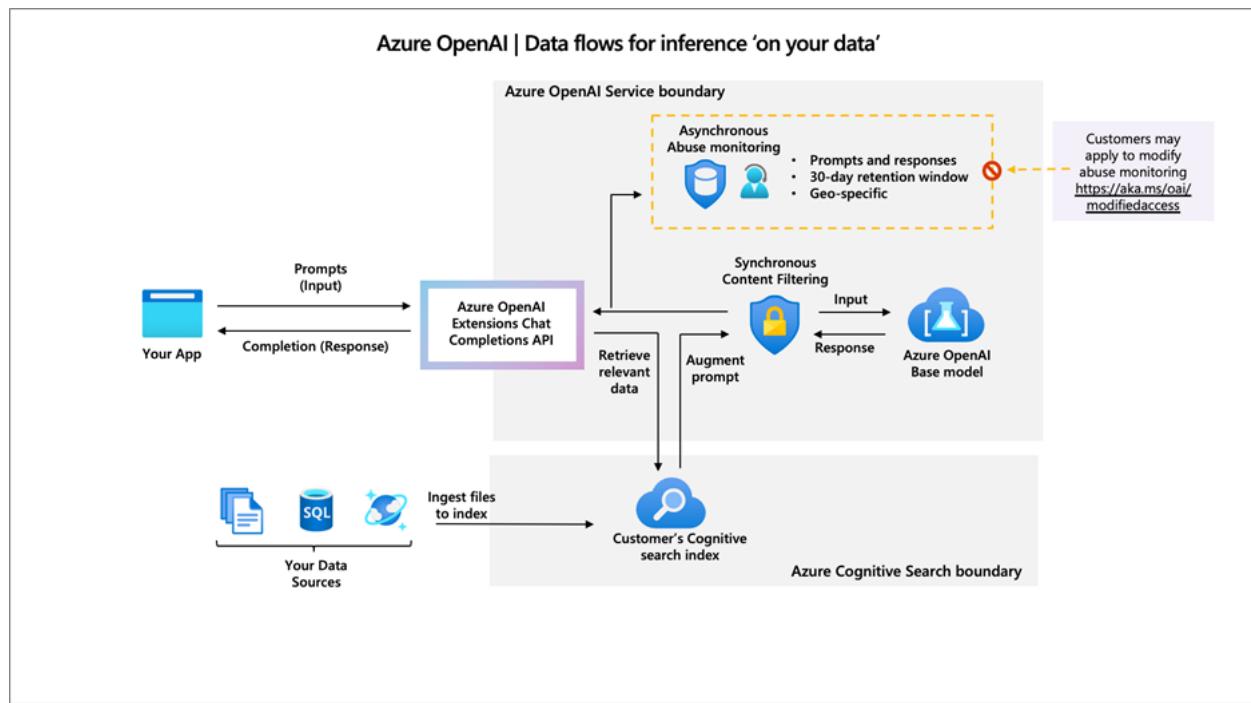
Generating completions, images or embeddings

Models (base or fine-tuned) deployed in your resource process your input prompts and generate responses with text, images or embeddings. The service is configured to synchronously evaluate the prompt and completion data in real time to check for harmful content types and stops generating content that exceeds the configured thresholds. Learn more at [Azure OpenAI Service content filtering](#).

The models are stateless: no prompts or generations are stored in the model. Additionally, prompts and generations are not used to train, retrain, or improve the base models.

Augmenting prompts with data retrieved from your data sources to "ground" the generated results

The Azure OpenAI "on your data" feature lets you connect data sources to ground the generated results with your data. The data remains stored in the data source and location you designate. **No data is copied into the Azure OpenAI service.** When a user prompt is received, the service retrieves relevant data from the connected data source and augments the prompt. The model processes this augmented prompt and the generated content is returned as described above.



As depicted in the diagram above, managed customers may apply to [modify abuse monitoring](#).

Creating a customized (fine-tuned) model with your data:

Customers can upload their training data to the service to fine tune a model. Uploaded training data is stored in the Azure OpenAI resource in the customer's Azure tenant.

Training data and fine-tuned models:

- Are available exclusively for use by the customer.
- Are stored within the same region as the Azure OpenAI resource.
- Can be double [encrypted at rest](#) (by default with Microsoft's AES-256 encryption and optionally with a customer managed key).
- Can be deleted by the customer at any time.

Training data uploaded for fine-tuning is not used to train, retrain, or improve any Microsoft or 3rd party base models.

Preventing abuse and harmful content generation

To reduce the risk of harmful use of the Azure OpenAI Service, the Azure OpenAI Service includes both content filtering and abuse monitoring features. To learn more about [content filtering](#), see Azure OpenAI Service content filtering. To learn more about abuse monitoring, see [abuse monitoring](#).

Content filtering occurs synchronously as the service processes prompts to generate content as described above and [here](#). No prompts or generated results are stored in the content classifier models, and prompts and results are not used to train, retrain, or improve the classifier models.

Azure OpenAI abuse monitoring detects and mitigates instances of recurring content and/or behaviors that suggest use of the service in a manner that may violate the [code of conduct](#) or other applicable product terms. To detect and mitigate abuse, Azure OpenAI stores all prompts and generated content securely for up to thirty (30) days. (No prompts or completions are stored if the customer is approved for and elects to configure abuse monitoring off, as described below.)

The data store where prompts and completions are stored is logically separated by customer resource (each request includes the resource ID of the customer's Azure OpenAI resource). A separate data store is located in each [region](#) in which the Azure OpenAI Service is available, and a customer's prompts and generated content are stored in the Azure region where the customer's Azure OpenAI service resource is deployed, within the Azure OpenAI service boundary. Human reviewers assessing potential abuse can access prompts and completions data only when that data has been flagged by the abuse monitoring system. The human reviewers are authorized Microsoft employees who access the data via point wise queries using request IDs, Secure Access Workstations (SAWs), and Just-In-Time (JIT) request approval granted by team managers. For Azure OpenAI Service deployed in the European Economic Area, the authorized Microsoft employees are located in the European Economic Area.

How can customers get an exemption from abuse monitoring and human review?

Some customers may want to use the Azure OpenAI Service for a use case that involves the processing of sensitive, highly confidential, or legally-regulated input data but where the likelihood of harmful outputs and/or misuse is low. These customers may conclude that they do not want or do not have the right to permit Microsoft to process such data for abuse detection, as described above, due to their internal policies or applicable legal regulations. To address these concerns, Microsoft allows customers who meet additional Limited Access eligibility criteria and attest to specific use cases to apply to modify the Azure OpenAI content management features by completing [this form](#).

If Microsoft approves a customer's request to modify abuse monitoring, then Microsoft does not store any prompts and completions associated with the approved Azure subscription for which abuse monitoring is configured off. In this case, because no prompts and completions are stored at rest in the Service Results Store, the human review process is not possible and is not performed. See [Abuse monitoring](#) for more information.

How can a customer verify if data storage for abuse monitoring is off?

There are two ways for customers, once approved to turn off abuse monitoring, to verify that data storage for abuse monitoring has been turned off in their approved Azure subscription:

- Using the Azure portal, or
- Azure CLI (or any management API).

Note

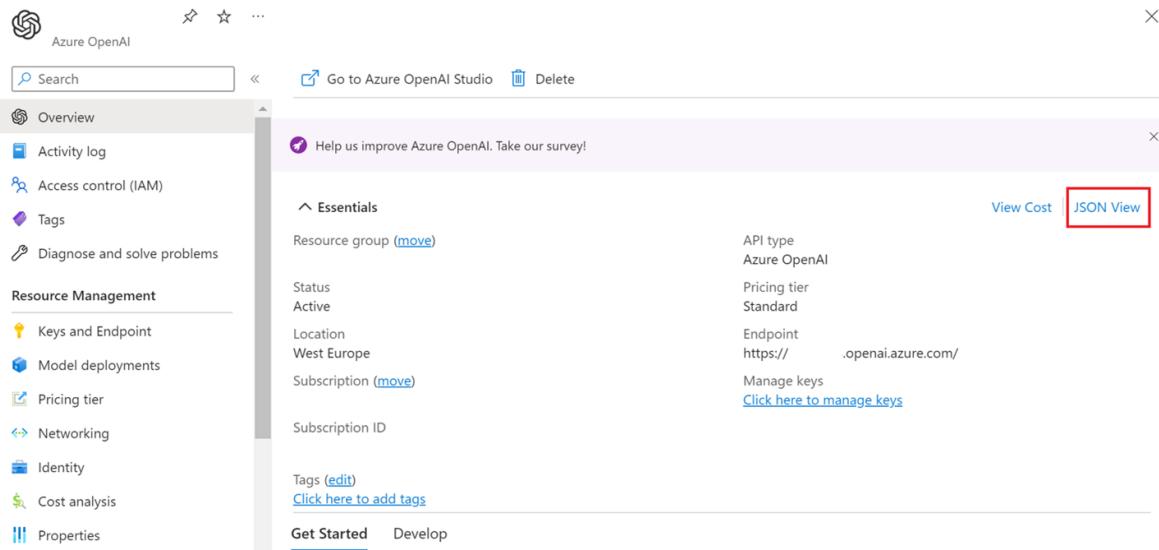
The value of "false" for the "ContentLogging" attribute appears only if data storage for abuse monitoring is turned off. Otherwise, this property will not appear in either Azure portal or Azure CLI's output.

Prerequisites

1. Sign into Azure
2. Select the Azure Subscription which hosts the Azure OpenAI Service resource.
3. Navigate to the [Overview](#) page of the Azure OpenAI Service resource.

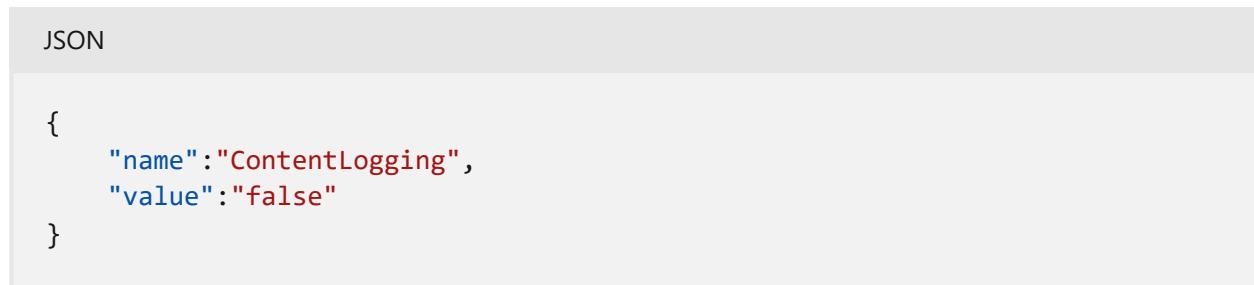
Logging status verification using the Azure portal:

1. Go to the resource Overview page
2. Click on the **JSON view** link on the top right corner as shown in the image below.



The screenshot shows the Azure OpenAI resource Overview page. On the left, there's a sidebar with links like Activity log, Access control (IAM), Tags, and Diagnose and solve problems. Below that is a Resource Management section with Keys and Endpoint, Model deployments, Pricing tier, Networking, Identity, Cost analysis, and Properties. The main content area is titled 'Essentials' and shows details such as Resource group (move), Status (Active), Location (West Europe), Subscription (move), and API type (Azure OpenAI). It also shows Pricing tier (Standard), Endpoint (https://.openai.azure.com/), and Manage keys (with a link to Click here to manage keys). At the bottom, there are 'Get Started' and 'Develop' buttons. In the top right corner, there are 'View Cost' and 'JSON View' buttons, with 'JSON View' being highlighted by a red box.

There will be a value in the Capabilities list called "ContentLogging" which will appear and be set to FALSE when logging for abuse monitoring is off.

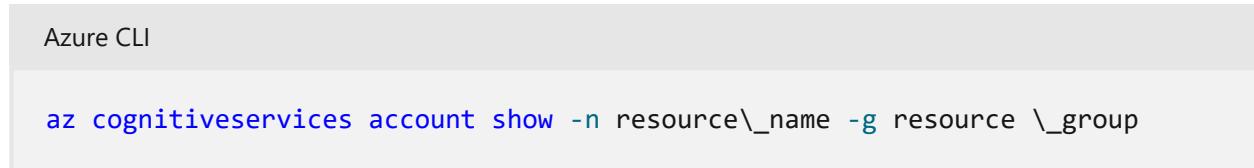


The screenshot shows the JSON view with a single object containing a 'name' field set to 'ContentLogging' and a 'value' field set to 'false'.

```
{  
  "name": "ContentLogging",  
  "value": "false"  
}
```

Logging status verification using the Azure CLI (or other management API):

Execute the following command in Azure CLI to see the same JSON data as shown in the Azure portal above.



```
Azure CLI  
  
az cognitiveservices account show -n resource\_name -g resource \_group
```

To learn more about Microsoft's privacy and security commitments see the [Microsoft Trust Center](#).

Change log

Date	Changes
23 June 2023	Added information about data processing for new Azure on your data feature; removed information about abuse monitoring which is now available at Azure OpenAI Service abuse monitoring . Added summary note. Updated and streamlined content and updated diagrams for additional clarity. added change log

See also

- [Limited access to Azure OpenAI Service](#)
- [Code of conduct for Azure OpenAI Service integrations](#)
- [Transparency note and use cases for Azure OpenAI Service](#)
- [Characteristics and limitations for Azure OpenAI Service](#)
- Report abuse of Azure OpenAI Service through the [Report Abuse Portal ↗](#)
- Report problematic content to cscraireport@microsoft.com

Microsoft.CognitiveServices accounts

Article • 06/18/2023

Bicep resource definition

The accounts resource type can be deployed with operations that target:

- **Resource groups** - See [resource group deployment commands](#)

For a list of changed properties in each API version, see [change log](#).

Resource format

To create a Microsoft.CognitiveServices/accounts resource, add the following Bicep to your template.

```
Bicep

resource symbolicname 'Microsoft.CognitiveServices/accounts@2023-05-01' = {
  name: 'string'
  location: 'string'
  tags: {
    tagName1: 'tagValue1'
    tagName2: 'tagValue2'
  }
  sku: {
    capacity: int
    family: 'string'
    name: 'string'
    size: 'string'
    tier: 'string'
  }
  kind: 'string'
  identity: {
    type: 'string'
    userAssignedIdentities: {}
  }
  properties: {
    allowedFqdnList: [
      'string'
    ]
    apiProperties: {
      aadClientId: 'string'
      aadTenantId: 'string'
      eventHubConnectionString: 'string'
      qnaAzureSearchEndpointId: 'string'
      qnaAzureSearchEndpointKey: 'string'
      qnaRuntimeEndpoint: 'string'
      statisticsEnabled: bool
      storageAccountConnectionString: 'string'
      superUser: 'string'
      websiteName: 'string'
    }
    customSubDomainName: 'string'
    disableLocalAuth: bool
    dynamicThrottlingEnabled: bool
    encryption: {
      keySource: 'string'
      keyVaultProperties: {
        identityClientId: 'string'
        keyName: 'string'
        keyVaultUri: 'string'
        keyVersion: 'string'
      }
    }
    locations: {
      regions: [
        {
          customsubdomain: 'string'
          name: 'string'
          value: int
        }
      ]
      routingMethod: 'string'
    }
    migrationToken: 'string'
  }
}
```

```

networkAcls: {
  defaultAction: 'string'
  ipRules: [
    {
      value: 'string'
    }
  ]
  virtualNetworkRules: [
    {
      id: 'string'
      ignoreMissingVnetServiceEndpoint: bool
      state: 'string'
    }
  ]
}
publicNetworkAccess: 'string'
restore: bool
restrictOutboundNetworkAccess: bool
userOwnedStorage: [
  {
    identityClientId: 'string'
    resourceId: 'string'
  }
]
}
}

```

Property values

accounts

Name	Description	Value
name	The resource name	string (required) Character limit: 2-64 Valid characters: Alphanumerics and hyphens. Start and end with alphanumeric.
location	The geo-location where the resource lives	string
tags	Resource tags.	Dictionary of tag names and values. See Tags in templates
sku	The resource model definition representing SKU	Sku
kind	The Kind of the resource.	string
identity	Identity for the resource.	Identity
properties	Properties of Cognitive Services account.	AccountProperties

Identity

Name	Description
type	The identity type.
userAssignedIdentities	The list of user assigned identities associated with the resource. The user identity dictionary key references will be ARM resource ids in the form /subscriptions/{subscriptionId}/resourceGroups/{resourceGroupName}/providers/Microsoft.ManagedIdentity/userAssignedIdentities/{identity}

AccountProperties

Name	Description	Value
allowedFqdnList		string[]

Name	Description	Value
apiProperties	The api properties for special APIs.	ApiProperties
customSubDomainName	Optional subdomain name used for token-based authentication.	string
disableLocalAuth		bool
dynamicThrottlingEnabled	The flag to enable dynamic throttling.	bool
encryption	The encryption properties for this resource.	Encryption
locations	The multiregion settings of Cognitive Services account.	MultiRegionSettings
migrationToken	Resource migration token.	string
networkAcls	A collection of rules governing the accessibility from specific network locations.	NetworkRuleSet
publicNetworkAccess	Whether or not public endpoint access is allowed for this account.	'Disabled' 'Enabled'
restore		bool
restrictOutboundNetworkAccess		bool
userOwnedStorage	The storage accounts for this resource.	UserOwnedStorage[]

ApiProperties

Name	Description	Value
aadClientId	(Metrics Advisor Only) The Azure AD Client Id (Application Id).	string
aadTenantId	(Metrics Advisor Only) The Azure AD Tenant Id.	string
eventHubConnectionString	(Personalization Only) The flag to enable statistics of Bing Search.	string
qnaAzureSearchEndpointId	(QnAMaker Only) The Azure Search endpoint id of QnAMaker.	string
qnaAzureSearchEndpointKey	(QnAMaker Only) The Azure Search endpoint key of QnAMaker.	string
qnaRuntimeEndpoint	(QnAMaker Only) The runtime endpoint of QnAMaker.	string
statisticsEnabled	(Bing Search Only) The flag to enable statistics of Bing Search.	bool
storageAccountConnectionString	(Personalization Only) The storage account connection string.	string
superUser	(Metrics Advisor Only) The super user of Metrics Advisor.	string
websiteName	(Metrics Advisor Only) The website name of Metrics Advisor.	string

Encryption

Name	Description	Value
keySource	Enumerates the possible value of keySource for Encryption	'Microsoft.CognitiveServices' 'Microsoft.KeyVault'
keyVaultProperties	Properties of KeyVault	KeyVaultProperties

KeyVaultProperties

Name	Description	Value
identityClientId		string
keyName	Name of the Key from KeyVault	string
keyVaultUri	Uri of KeyVault	string
keyVersion	Version of the Key from KeyVault	string

MultiRegionSettings

Name	Description	Value
regions		RegionSetting[]
routingMethod	Multiregion routing methods.	'Performance' 'Priority' 'Weighted'

RegionSetting

Name	Description	Value
customsubdomain	Maps the region to the regional custom subdomain.	string
name	Name of the region.	string
value	A value for priority or weighted routing methods.	int

NetworkRuleSet

Name	Description	Value
defaultAction	The default action when no rule from ipRules and from virtualNetworkRules match. This is only used after the bypass property has been evaluated.	'Allow' 'Deny'
ipRules	The list of IP address rules.	IpRule[]
virtualNetworkRules	The list of virtual network rules.	VirtualNetworkRule[]

IpRule

Name	Description	Value
value	An IPv4 address range in CIDR notation, such as '124.56.78.91' (simple IP address) or '124.56.78.0/24' (all addresses that start with 124.56.78).	string (required)

VirtualNetworkRule

Name	Description	Value
id	Full resource id of a vnet subnet, such as '/subscriptions/subid/resourceGroups/rg1/providers/Microsoft.Network/virtualNetworks/test-vnet/subnets/subnet1'.	string (required)
ignoreMissingVnetServiceEndpoint	Ignore missing vnet service endpoint or not.	bool
state	Gets the state of virtual network rule.	string

UserOwnedStorage

Name	Description	Value
identityClientId		string
resourceId	Full resource id of a Microsoft.Storage resource.	string

Sku

Name	Description	Value
capacity	If the SKU supports scale out/in then the capacity integer should be included. If scale out/in is not possible for the resource this may be omitted.	int
family	If the service has different generations of hardware, for the same SKU, then that can be captured here.	string
name	The name of the SKU. Ex - P3. It is typically a letter+number code	string (required)

Name	Description	Value
size	The SKU size. When the name field is the combination of tier and some other value, this would be the standalone code.	string
tier	This field is required to be implemented by the Resource Provider if the service has more than one tier, but is not required on a PUT.	'Basic' 'Enterprise' 'Free' 'Premium' 'Standard'

Quickstart templates

The following quickstart templates deploy this resource type.

Template	Description
Deploy a Cognitive Services Computer Vision API	A template for creating a new Cognitive Services Computer Vision API
 Deploy to Azure	
Deploy a Cognitive Services Translate API	This template deploys a Cognitive Services Translate API. Microsoft Translator API is a neural machine translation service that developers can easily integrate into their applications websites, tools, or any solution requiring multi-language support such as website localization, e-commerce, customer support, messaging applications, internal communication, and more.
 Deploy to Azure	
Deploy a Cognitive Service Universal key	This template deploys all the Cognitive Services APIs Cognitive Services bring AI within reach of every developer without requiring machine-learning expertise. All it takes is an API call to embed the ability to see, hear, speak, search, understand, and accelerate decision-making into your apps.
 Deploy to Azure	

az cognitiveservices

Reference

Manage Azure Cognitive Services accounts.

This article lists the Azure CLI commands for Azure Cognitive Services account and subscription management only. Refer to the documentation at <https://docs.microsoft.com/azure/cognitive-services/> for individual services to learn how to use the APIs and supported SDKs.

Commands

az cognitiveservices account	Manage Azure Cognitive Services accounts.
az cognitiveservices account commitment-plan	Manage commitment plans for Azure Cognitive Services accounts.
az cognitiveservices account commitment-plan create	Create a commitment plan for Azure Cognitive Services account.
az cognitiveservices account commitment-plan delete	Delete a commitment plan from Azure Cognitive Services account.
az cognitiveservices account commitment-plan list	Show all commitment plans from Azure Cognitive Services account.
az cognitiveservices account commitment-plan show	Show a commitment plan from Azure Cognitive Services account.
az cognitiveservices account create	Manage Azure Cognitive Services accounts.
az cognitiveservices account delete	Manage Azure Cognitive Services accounts.
az cognitiveservices account deployment	Manage deployments for Azure Cognitive Services accounts.
az cognitiveservices account deployment create	Create a deployment for Azure Cognitive Services account.
az cognitiveservices account deployment delete	Delete a deployment from Azure Cognitive Services account.
az cognitiveservices account deployment list	Show all deployments for Azure Cognitive Services account.

az cognitiveservices account deployment show	Show a deployment for Azure Cognitive Services account.
az cognitiveservices account identity	Manage identity of Cognitive Services accounts.
az cognitiveservices account identity assign	Assign an identity of a Cognitive Services account.
az cognitiveservices account identity remove	Remove the identity from a Cognitive Services account.
az cognitiveservices account identity show	Show the identity of a Cognitive Services account.
az cognitiveservices account keys	Manage Azure Cognitive Services accounts.
az cognitiveservices account keys list	Manage Azure Cognitive Services accounts.
az cognitiveservices account keys regenerate	Manage Azure Cognitive Services accounts.
az cognitiveservices account list	Manage Azure Cognitive Services accounts.
az cognitiveservices account list-deleted	List soft-deleted Azure Cognitive Services accounts.
az cognitiveservices account list-kinds	List all valid kinds for Azure Cognitive Services account.
az cognitiveservices account list-models	Manage Azure Cognitive Services accounts.
az cognitiveservices account list-skus	Manage Azure Cognitive Services accounts.
az cognitiveservices account list-usage	List usages for Azure Cognitive Services account.
az cognitiveservices account network-rule	Manage network rules.
az cognitiveservices account network-rule add	Add a network rule.
az cognitiveservices account network-rule list	List network rules.

az cognitiveservices account network-rule remove	Remove a network rule.
az cognitiveservices account purge	Purge a soft-deleted Azure Cognitive Services account.
az cognitiveservices account recover	Recover a soft-deleted Azure Cognitive Services account.
az cognitiveservices account show	Manage Azure Cognitive Services accounts.
az cognitiveservices account show-deleted	Show a soft-deleted Azure Cognitive Services account.
az cognitiveservices account update	Manage Azure Cognitive Services accounts.
az cognitiveservices commitment-tier	Manage commitment tiers for Azure Cognitive Services.
az cognitiveservices commitment-tier list	Show all commitment tiers for Azure Cognitive Services.
az cognitiveservices list	Manage Azure Cognitive Services accounts.
az cognitiveservices model	Manage model for Azure Cognitive Services.
az cognitiveservices model list	Show all models for Azure Cognitive Services.
az cognitiveservices usage	Manage usage for Azure Cognitive Services.
az cognitiveservices usage list	Show all usages for Azure Cognitive Services.

az cognitiveservices list

 Edit

Manage Azure Cognitive Services accounts.

This article lists the Azure CLI commands for Azure Cognitive Services account and subscription management only. Refer to the documentation at <https://docs.microsoft.com/azure/cognitive-services/> for individual services to learn how to use the APIs and supported SDKs.

Azure CLI

```
az cognitiveservices list [--resource-group]
```

Examples

List all the Cognitive Services accounts in a resource group.

Azure CLI

```
az cognitiveservices list -g MyResourceGroup
```

Optional Parameters

--resource-group -g

Name of resource group. You can configure the default group using `az configure --defaults group=<name>`.

▼ Global Parameters

--debug

Increase logging verbosity to show all debug logs.

--help -h

Show this help message and exit.

--only-show-errors

Only show errors, suppressing warnings.

--output -o

Output format.

--query

JMESPath query string. See <http://jmespath.org/> for more information and examples.

--subscription

Name or ID of subscription. You can configure the default subscription using `az account set -s NAME_OR_ID`.

--verbose

Increase logging verbosity. Use --debug for full debug logs.

com.azure.ai.openai

Reference

Package: com.azure.ai.openai

Maven Artifact: [com.azure:azure-ai-openai:1.0.0-beta.3](#) ↗

Package containing the classes for OpenAI. Azure OpenAI APIs for completions and search.

Classes

OpenAIAsyncClient	Initializes a new instance of the asynchronous OpenAIClient type.
OpenAIClient	Initializes a new instance of the synchronous OpenAIClient type.
OpenAIClientBuilder	A builder for creating a new instance of the OpenAIClient type.

Enums

OpenAIServiceVersion	Service version of OpenAIClient.
--------------------------------------	----------------------------------

@azure/openai package

Reference

Classes

AzureKeyCredential	A static-key-based credential that supports updating the underlying key value.
OpenAIClient	
OpenAIKeyCredential	The OpenAIKeyCredential class represents an OpenAI API key and is used to authenticate into an OpenAI client for an OpenAI endpoint.

Interfaces

BatchImageGenerationOperationResponse	A polling status update or final response payload for an image operation.
BeginAzureBatchImageGenerationOptions	Common options to set on an outgoing operation
ChatChoice	The representation of a single prompt completion as part of an overall chat completions request. Generally, <code>n</code> choices are generated per provided prompt with a default value of 1. Token limits and other settings may limit the number of choices generated.
ChatCompletions	Representation of the response data from a chat completions request. Completions support a wide variety of tasks and generate text that continues from or "completes" provided prompt data.
ChatMessage	A single, role-attributed message within a chat completion interaction.
Choice	The representation of a single prompt completion as part of an overall completions request. Generally, <code>n</code> choices are generated per provided prompt with a default value of 1. Token limits and other settings may limit the number of choices generated.
Completions	Representation of the response data from a completions request. Completions support a wide variety of tasks and generate text that continues from or "completes" provided prompt data.

CompletionsLogProbabilityModel	Representation of a log probabilities model for a completions generation.
CompletionsUsage	Representation of the token counts processed for a completions request. Counts consider all tokens across prompts, choices, choice alternates, best_of generations, and other consumers.
EmbeddingItem	Representation of a single embeddings relatedness comparison.
Embeddings	Representation of the response data from an embeddings request. Embeddings measure the relatedness of text strings and are commonly used for search, clustering, recommendations, and other similar scenarios.
EmbeddingsUsage	Measurement of the amount of tokens used in this request and response.
GetAzureBatchImageGenerationOperationStatusOptions	Common options to set on an outgoing operation
GetChatCompletionsOptions	Common options to set on an outgoing operation
GetCompletionsOptions	Common options to set on an outgoing operation
GetEmbeddingsOptions	Common options to set on an outgoing operation
ImageGenerations	The result of the operation if the operation succeeded.
ImageLocation	An image response item that provides a URL from which an image may be accessed.
ImagePayload	An image response item that directly represents the image data as a base64-encoded string.
OpenAIClientOptions	
RequestOptions	Common options to set on an outgoing operation

Type Aliases

AzureOpenAIOperationState	"notRunning", "running", "succeeded", "canceled", "failed"
ChatRole	"system", "assistant", "user"
CompletionsFinishReason	"stop", "length", "content_filter"
ImageGenerationOptions	Convenience alias for BeginAzureBatchImageGenerationOptions
ImageGenerationResponse	Convenience alias for BatchImageGenerationOperationResponse

ImageGenerationResponse Format	"url", "b64_json"
ImageSize	"256x256", "512x512", "1024x1024"

Azure.AI.OpenAI Namespace

Reference

ⓘ Important

Some information relates to prerelease product that may be substantially modified before it's released. Microsoft makes no warranties, express or implied, with respect to the information provided here.

Classes

AzureOpenAIModelFactory	Model factory for models.
ChatChoice	The representation of a single prompt completion as part of an overall chat completions request. Generally, <code>n</code> choices are generated per provided prompt with a default value of 1. Token limits and other settings may limit the number of choices generated.
ChatCompletions	Representation of the response data from a chat completions request. Completions support a wide variety of tasks and generate text that continues from or "completes" provided prompt data.
ChatCompletionsOptions	The configuration information used for a chat completions request.
ChatMessage	A single, role-attributed message within a chat completion interaction.
Choice	The representation of a single prompt completion as part of an overall completions request. Generally, <code>n</code> choices are generated per provided prompt with a default value of 1. Token limits and other settings may limit the number of choices generated.
Completions	Representation of the response data from a completions request. Completions support a wide variety of tasks and generate text that continues from or "completes" provided prompt data.
CompletionsLogProbabilityModel	Representation of a log probabilities model for a completions generation.
CompletionsOptions	The configuration information for a completions request. Completions support a wide variety of tasks and generate text

	that continues from or "completes" provided prompt data.
CompletionsUsage	Representation of the token counts processed for a completions request. Counts consider all tokens across prompts, choices, choice alternates, best_of generations, and other consumers.
ContentFilterResult	Information about filtered content severity level and if it has been filtered or not.
ContentFilterResults	Information about the content filtering category, if it has been detected.
EmbeddingItem	Representation of a single embeddings relatedness comparison.
Embeddings	Representation of the response data from an embeddings request. Embeddings measure the relatedness of text strings and are commonly used for search, clustering, recommendations, and other similar scenarios.
EmbeddingsOptions	Schema to create a prompt completion from a deployment.
EmbeddingsUsage	Measurement of the amount of tokens used in this request and response.
FunctionCall	The name and arguments of a function that should be called, as generated by the model.
FunctionDefinition	The definition of a caller-specified function that chat completions may invoke in response to matching user input.
ImageGenerationOptions	Represents the request data used to generate images.
ImageGenerations	The result of an image generation operation.
ImageLocation	An image response item that provides a URL from which an image may be accessed.
OpenAIClient	Azure OpenAI APIs for completions and search.
OpenAIClientOptions	Client options for OpenAIClient.
PromptFilterResult	Content filtering results for a single prompt in the request.
StreamingChatChoice	
StreamingChatCompletions	
StreamingChoice	
StreamingCompletions	

Structs

ChatRole	A description of the intended purpose of a message within a chat completions interaction.
CompletionsFinishReason	Representation of the manner in which a completions response concluded.
ContentFilterSeverity	Ratings for the intensity and risk level of harmful content.
ImageSize	The desired size of the generated images. Must be one of 256x256, 512x512, or 1024x1024.

Enums

OpenAIClientOptions.ServiceVersion	The version of the service to use.
--	------------------------------------

Azure OpenAI Service REST API reference

Article • 07/20/2023

This article provides details on the inference REST API endpoints for Azure OpenAI.

Authentication

Azure OpenAI provides two methods for authentication. you can use either API Keys or Azure Active Directory.

- **API Key authentication:** For this type of authentication, all API requests must include the API Key in the `api-key` HTTP header. The [Quickstart](#) provides guidance for how to make calls with this type of authentication.
- **Azure Active Directory authentication:** You can authenticate an API call using an Azure Active Directory token. Authentication tokens are included in a request as the `Authorization` header. The token provided must be preceded by `Bearer`, for example `Bearer YOUR_AUTH_TOKEN`. You can read our how-to guide on [authenticating with Azure Active Directory](#).

REST API versioning

The service APIs are versioned using the `api-version` query parameter. All versions follow the YYYY-MM-DD date structure. For example:

HTTP

POST

```
https://YOUR_RESOURCE_NAME.openai.azure.com/openai/deployments/YOUR_DEPLOYMENT_NAME/completions?api-version=2023-05-15
```

Completions

With the Completions operation, the model will generate one or more predicted completions based on a provided prompt. The service can also return the probabilities of alternative tokens at each position.

[Create a completion](#)

HTTP

```
POST https://{{your-resource-name}}.openai.azure.com/openai/deployments/{{deployment-id}}/completions?api-version={{api-version}}
```

Path parameters

Parameter	Type	Required?	Description
your-resource-name	string	Required	The name of your Azure OpenAI Resource.
deployment-id	string	Required	The deployment name you chose when you deployed the model.
api-version	string	Required	The API version to use for this operation. This follows the YYYY-MM-DD format.

Supported versions

- 2023-03-15-preview [Swagger spec ↗](#)
- 2022-12-01 [Swagger spec ↗](#)
- 2023-05-15 [Swagger spec ↗](#)
- 2023-06-01-preview [Swagger spec ↗](#)

Request body

Parameter	Type	Required?	Default	Description
prompt	string or array	Optional	<\ endoftext\ \>	The prompt(s) to generate completions for, encoded as a string, or array of strings. Note that <\ endoftext\ \> is the document separator that the model sees during training, so if a prompt isn't specified the model will generate as if from the beginning of a new document.
max_tokens	integer	Optional	16	The maximum number of tokens to generate in the completion. The token count of your prompt plus max_tokens can't exceed the model's context length. Most models have a context length of 2048 tokens (except for the

Parameter	Type	Required?	Default	Description
				newest models, which support 4096).
<code>temperature</code>	number	Optional	1	What sampling temperature to use, between 0 and 2. Higher values means the model will take more risks. Try 0.9 for more creative applications, and 0 (<code>argmax sampling</code>) for ones with a well-defined answer. We generally recommend altering this or <code>top_p</code> but not both.
<code>top_p</code>	number	Optional	1	An alternative to sampling with temperature, called nucleus sampling, where the model considers the results of the tokens with <code>top_p</code> probability mass. So 0.1 means only the tokens comprising the top 10% probability mass are considered. We generally recommend altering this or <code>temperature</code> but not both.
<code>logit_bias</code>	map	Optional	null	Modify the likelihood of specified tokens appearing in the completion. Accepts a json object that maps tokens (specified by their token ID in the GPT tokenizer) to an associated bias value from -100 to 100. You can use this tokenizer tool (which works for both GPT-2 and GPT-3) to convert text to token IDs. Mathematically, the bias is added to the logits generated by the model prior to sampling. The exact effect will vary per model, but values between -1 and 1 should decrease or increase likelihood of selection; values like -100 or 100 should result in a ban or exclusive selection of the relevant token. As an example, you can pass {"50256": -100} to prevent the < endoftext > token from being generated.

Parameter	Type	Required?	Default	Description
<code>user</code>	string	Optional		A unique identifier representing your end-user, which can help monitoring and detecting abuse
<code>n</code>	integer	Optional	1	How many completions to generate for each prompt. Note: Because this parameter generates many completions, it can quickly consume your token quota. Use carefully and ensure that you have reasonable settings for <code>max_tokens</code> and <code>stop</code> .
<code>stream</code>	boolean	Optional	False	Whether to stream back partial progress. If set, tokens will be sent as data-only server-sent events as they become available, with the stream terminated by a data: [DONE] message.
<code>logprobs</code>	integer	Optional	null	Include the log probabilities on the logprobs most likely tokens, as well the chosen tokens. For example, if <code>logprobs</code> is 10, the API will return a list of the 10 most likely tokens. the API will always return the logprob of the sampled token, so there may be up to <code>logprobs+1</code> elements in the response. This parameter cannot be used with <code>gpt-35-turbo</code> .
<code>suffix</code>	string	Optional	null	The suffix that comes after a completion of inserted text.
<code>echo</code>	boolean	Optional	False	Echo back the prompt in addition to the completion. This parameter cannot be used with <code>gpt-35-turbo</code> .
<code>stop</code>	string or array	Optional	null	Up to four sequences where the API will stop generating further tokens. The returned text won't contain the stop sequence.

Parameter	Type	Required?	Default	Description
<code>presence_penalty</code>	number	Optional	0	Number between -2.0 and 2.0. Positive values penalize new tokens based on whether they appear in the text so far, increasing the model's likelihood to talk about new topics.
<code>frequency_penalty</code>	number	Optional	0	Number between -2.0 and 2.0. Positive values penalize new tokens based on their existing frequency in the text so far, decreasing the model's likelihood to repeat the same line verbatim.
<code>best_of</code>	integer	Optional	1	Generates best_of completions server-side and returns the "best" (the one with the lowest log probability per token). Results can't be streamed. When used with n, best_of controls the number of candidate completions and n specifies how many to return – best_of must be greater than n. Note: Because this parameter generates many completions, it can quickly consume your token quota. Use carefully and ensure that you have reasonable settings for max_tokens and stop. This parameter cannot be used with <code>gpt-35-turbo</code> .

Example request

Console

```
curl
https://YOUR_RESOURCE_NAME.openai.azure.com/openai/deployments/YOUR_DEPLOYMENT_NAME/completions?api-version=2023-05-15\
-H "Content-Type: application/json" \
-H "api-key: YOUR_API_KEY" \
-d "{
  \"prompt\": \"Once upon a time\",
  \"max_tokens\": 100,
  \"temperature\": 0.7
}"
```

```
\\"max_tokens\\": 5
}"
```

Example response

JSON

```
{
  "id": "cmpl-4kGh7iXtjW4lc9eGhff6Hp8C7btdQ",
  "object": "text_completion",
  "created": 1646932609,
  "model": "ada",
  "choices": [
    {
      "text": ", a dark line crossed",
      "index": 0,
      "logprobs": null,
      "finish_reason": "length"
    }
  ]
}
```

In the example response, `finish_reason` equals `stop`. If `finish_reason` equals `content_filter` consult our [content filtering guide](#) to understand why this is occurring.

Embeddings

Get a vector representation of a given input that can be easily consumed by machine learning models and other algorithms.

ⓘ Note

We currently do not support batching of embeddings into a single API call. If you receive the error `InvalidRequestError: Too many inputs. The max number of inputs is 1. We hope to increase the number of inputs per request soon.`, this typically occurs when an array of embeddings is attempted to be passed as a batch rather than a single string. The string can be up to 8191 tokens in length when using the `text-embedding-ada-002` (Version 2) model.

Create an embedding

HTTP

```
POST https://{{your-resource-name}}.openai.azure.com/openai/deployments/{{deployment-id}}/embeddings?api-version={{api-version}}
```

Path parameters

Parameter	Type	Required?	Description
your-resource-name	string	Required	The name of your Azure OpenAI Resource.
deployment-id	string	Required	The name of your model deployment. You're required to first deploy a model before you can make calls
api-version	string	Required	The API version to use for this operation. This follows the YYYY-MM-DD format.

Supported versions

- 2023-03-15-preview [Swagger spec ↗](#)
- 2022-12-01 [Swagger spec ↗](#)
- 2023-05-15 [Swagger spec ↗](#)

Request body

Parameter	Type	Required?	Default	Description
input	string	Yes	N/A	<p>Input text to get embeddings for, encoded as a string. The number of input tokens varies depending on what model you are using.</p> <p>Unless you're embedding code, we suggest replacing newlines (\n) in your input with a single space, as we have observed inferior results when newlines are present.</p>
user	string	No	Null	<p>A unique identifier representing for your end-user. This will help Azure OpenAI monitor and detect abuse. Do not pass PII identifiers instead use pseudoanonymized values such as GUIDs</p>

Example request

Console

```
curl  
https://YOUR_RESOURCE_NAME.openai.azure.com/openai/deployments/YOUR_DEPLOYME
```

```
NT_NAME/embeddings?api-version=2023-05-15 \
-H "Content-Type: application/json" \
-H "api-key: YOUR_API_KEY" \
-d "{\"input\": \"The food was delicious and the waiter...\"}"
```

Example response

JSON

```
{
  "object": "list",
  "data": [
    {
      "object": "embedding",
      "embedding": [
        0.018990106880664825,
        -0.0073809814639389515,
        .... (1024 floats total for ada)
        0.021276434883475304,
      ],
      "index": 0
    }
  ],
  "model": "text-similarity-babbage:001"
}
```

Chat completions

Create completions for chat messages with the GPT-35-Turbo and GPT-4 models.

Create chat completions

HTTP

```
POST https://{{your-resource-name}}.openai.azure.com/openai/deployments/{{deployment-id}}/chat/completions?
api-version={{api-version}}
```

Path parameters

Parameter	Type	Required?	Description
your-resource-name	string	Required	The name of your Azure OpenAI Resource.
deployment-id	string	Required	The name of your model deployment. You're required to

Parameter	Type	Required?	Description
			first deploy a model before you can make calls
api-version	string	Required	The API version to use for this operation. This follows the YYYY-MM-DD format.

Supported versions

- 2023-03-15-preview [Swagger spec ↗](#)
- 2023-05-15 [Swagger spec ↗](#)
- 2023-06-01-preview [Swagger spec ↗](#)
- 2023-07-01-preview [Swagger spec ↗](#)

Example request

Console

```
curl
https://YOUR_RESOURCE_NAME.openai.azure.com/openai/deployments/YOUR_DEPLOYMENT_NAME/chat/completions?api-version=2023-05-15 \
-H "Content-Type: application/json" \
-H "api-key: YOUR_API_KEY" \
-d '{"messages": [{"role": "system", "content": "You are a helpful assistant."}, {"role": "user", "content": "Does Azure OpenAI support customer managed keys?"}, {"role": "assistant", "content": "Yes, customer managed keys are supported by Azure OpenAI."}, {"role": "user", "content": "Do other Azure AI services support this too?"}]}'
```

Example response

Console

```
{"id": "chatcmpl-6v7mkQj980V1yBec6ETrKPRqFjNw9",
"object": "chat.completion", "created": 1679072642,
"model": "gpt-35-turbo",
"usage": {"prompt_tokens": 58,
"completion_tokens": 68,
"total_tokens": 126},
"choices": [{"message": {"role": "assistant",
"content": "Yes, other Azure AI services also support customer managed keys. Azure AI services offer multiple options for customers to manage keys, such as using Azure Key Vault, customer-managed keys in Azure Key Vault or customer-managed keys through Azure Storage service. This helps customers ensure that their data is secure and access to their services is controlled."}, "finish_reason": "stop", "index": 0}]}]
```

In the example response, `finish_reason` equals `stop`. If `finish_reason` equals `content_filter` consult our [content filtering guide](#) to understand why this is occurring.

Output formatting adjusted for ease of reading, actual output is a single block of text without line breaks.

Parameter	Type	Required?	Default	Description
<code>messages</code>	array	Required		The collection of context messages associated with this chat completions request. Typical usage begins with a chat message for the System role that provides instructions for the behavior of the assistant, followed by alternating messages between the User and Assistant roles.
<code>temperature</code>	number	Optional	1	What sampling temperature to use, between 0 and 2. Higher values like 0.8 will make the output more random, while lower values like 0.2 will make it more focused and deterministic.\nWe generally recommend altering this or <code>top_p</code> but not both.
<code>n</code>	integer	Optional	1	How many chat completion choices to generate for each input message.
<code>stream</code>	boolean	Optional	false	If set, partial message deltas will be sent, like in ChatGPT. Tokens will be sent as data-only server-sent events as they become available, with the stream terminated by a <code>data: [DONE]</code> message."
<code>stop</code>	string or array	Optional	null	Up to 4 sequences where the API will stop generating further tokens.
<code>max_tokens</code>	integer	Optional	inf	The maximum number of tokens allowed for the generated answer. By default,

Parameter	Type	Required?	Default	Description
				the number of tokens the model can return will be (4096 - prompt tokens).
<code>presence_penalty</code>	number	Optional	0	Number between -2.0 and 2.0. Positive values penalize new tokens based on whether they appear in the text so far, increasing the model's likelihood to talk about new topics.
<code>frequency_penalty</code>	number	Optional	0	Number between -2.0 and 2.0. Positive values penalize new tokens based on their existing frequency in the text so far, decreasing the model's likelihood to repeat the same line verbatim.
<code>logit_bias</code>	object	Optional	null	Modify the likelihood of specified tokens appearing in the completion. Accepts a json object that maps tokens (specified by their token ID in the tokenizer) to an associated bias value from -100 to 100. Mathematically, the bias is added to the logits generated by the model prior to sampling. The exact effect will vary per model, but values between -1 and 1 should decrease or increase likelihood of selection; values like -100 or 100 should result in a ban or exclusive selection of the relevant token.
<code>user</code>	string	Optional		A unique identifier representing your end-user, which can help Azure OpenAI to monitor and detect abuse.
<code>function_call</code>		Optional		Controls how the model responds to function calls. "none" means the model does not call a function, and responds to the end-user.

Parameter	Type	Required?	Default	Description
				"auto" means the model can pick between an end-user or calling a function. Specifying a particular function via {"name": "my_function"} forces the model to call that function. "none" is the default when no functions are present. "auto" is the default if functions are present. This parameter requires API version 2023-07-01-preview ↗
<code>functions</code>	FunctionDefinition[]	Optional		A list of functions the model may generate JSON inputs for. This parameter requires API version 2023-07-01-preview ↗

ChatMessage

A single, role-attributed message within a chat completion interaction.

Name	Type	Description
<code>content</code>	<code>string</code>	The text associated with this message payload.
<code>function_call</code>	FunctionCall	The name and arguments of a function that should be called, as generated by the model.
<code>name</code>	<code>string</code>	The <code>name</code> of the author of this message. <code>name</code> is required if <code>role</code> is <code>function</code> , and it should be the name of the function whose response is in the <code>content</code> . May contain a-z, A-Z, 0-9, and underscores, with a maximum length of 64 characters.
<code>role</code>	ChatRole	The role associated with this message payload

ChatRole

A description of the intended purpose of a message within a chat completions interaction.

Name	Type	Description
<code>assistant</code>	<code>string</code>	The role that provides responses to system-instructed, user-prompted input.

Name	Type	Description
function	string	The role that provides function results for chat completions.
system	string	The role that instructs or sets the behavior of the assistant.
user	string	The role that provides input for chat completions.

FunctionCall

The name and arguments of a function that should be called, as generated by the model. This requires API version [2023-07-01-preview ↗](#)

Name	Type	Description
arguments	string	The arguments to call the function with, as generated by the model in JSON format. Note that the model does not always generate valid JSON, and may fabricate parameters not defined by your function schema. Validate the arguments in your code before calling your function.
name	string	The name of the function to call.

FunctionDefinition

The definition of a caller-specified function that chat completions may invoke in response to matching user input. This requires API version [2023-07-01-preview ↗](#)

Name	Type	Description
description	string	A description of what the function does. The model will use this description when selecting the function and interpreting its parameters.
name	string	The name of the function to be called.
parameters		The parameters the functions accepts, described as a JSON Schema ↗ object.

Completions extensions

Extensions for chat completions, for example Azure OpenAI on your data.

Use chat completions extensions

HTTP

```
POST {your-resource-name}/openai/deployments/{deployment-id}/extensions/chat/completions?api-version={api-version}
```

Path parameters

Parameter	Type	Required?	Description
your-resource-name	string	Required	The name of your Azure OpenAI Resource.
deployment-id	string	Required	The name of your model deployment. You're required to first deploy a model before you can make calls
api-version	string	Required	The API version to use for this operation. This follows the YYYY-MM-DD format.

Supported versions

- 2023-06-01-preview [Swagger spec ↗](#)

Example request

Console

```
curl -i -X POST
YOUR_RESOURCE_NAME/openai/deployments/YOUR_DEPLOYMENT_NAME/extensions/chat/completions?api-version=2023-06-01-preview \
-H "Content-Type: application/json" \
-H "api-key: YOUR_API_KEY" \
-H "chatgpt_url: YOUR_RESOURCE_URL" \
-H "chatgpt_key: YOUR_API_KEY" \
-d \
'
{
  "dataSources": [
    {
      "type": "AzureCognitiveSearch",
      "parameters": {
        "endpoint": "'YOUR_AZURE_COGNITIVE_SEARCH_ENDPOINT'",
        "key": "'YOUR_AZURE_COGNITIVE_SEARCH_KEY'",
        "indexName": "'YOUR_AZURE_COGNITIVE_SEARCH_INDEX_NAME'"
      }
    }
  ],
  "messages": [
    {
      "role": "user",
      "content": "What are the differences between Azure Machine Learning and Azure AI services?"
    }
  ]
}
```

```
        }
    ]
}
```

Example response

JSON

```
{
  "id": "12345678-1a2b-3c4e5f-a123-12345678abcd",
  "model": "",
  "created": 1684304924,
  "object": "chat.completion",
  "choices": [
    {
      "index": 0,
      "messages": [
        {
          "role": "tool",
          "content": "{\"citations\": [{\"content\": \"\\nAzure AI services are cloud-based artificial intelligence (AI) services...\", \"id\": null, \"title\": \"What is Azure AI services\", \"filepath\": null, \"url\": null, \"metadata\": {\"chunking\": \"original document size=250. Scores=0.4314117431640625 and 1.72564697265625.Org Highlight count=4.\", \"chunk_id\": \"0\"}], \"intent\": \"[\\\\\"Learn about Azure AI services.\\\\\"]\"},\n          \"end_turn\": false
        },
        {
          "role": "assistant",
          "content": " \\nAzure AI services are cloud-based artificial intelligence (AI) services that help developers build cognitive intelligence into applications without having direct AI or data science skills or knowledge. [doc1]. Azure Machine Learning is a cloud service for accelerating and managing the machine learning project lifecycle. [doc1].",
          "end_turn": true
        }
      ]
    }
  ]
}
```

Parameters	Type	Required?	Default	Description
messages	array	Required	null	The messages to generate chat completions for, in the chat format.
dataSources	array	Required		The data sources to be used for the Azure OpenAI on your data feature.

Parameters	Type	Required?	Default	Description
<code>temperature</code>	number	Optional	0	What sampling temperature to use, between 0 and 2. Higher values like 0.8 will make the output more random, while lower values like 0.2 will make it more focused and deterministic. We generally recommend altering this or <code>top_p</code> but not both.
<code>top_p</code>	number	Optional	1	An alternative to sampling with temperature, called nucleus sampling, where the model considers the results of the tokens with <code>top_p</code> probability mass. So 0.1 means only the tokens comprising the top 10% probability mass are considered. We generally recommend altering this or temperature but not both.
<code>stream</code>	boolean	Optional	false	If set, partial message deltas will be sent, like in ChatGPT. Tokens will be sent as data-only server-sent events as they become available, with the stream terminated by a message <code>"messages": [{"delta": {"content": "[DONE]"}, "index": 2, "end_turn": true}]</code>
<code>stop</code>	string or array	Optional	null	Up to 2 sequences where the API will stop generating further tokens.
<code>max_tokens</code>	integer	Optional	1000	The maximum number of tokens allowed for the generated answer. By default, the number of tokens the model can return is <code>4096 - prompt_tokens</code> .

The following parameters can be used inside of the `parameters` field inside of `dataSources`.

Parameters	Type	Required?	Default	Description
<code>type</code>	string	Required	null	The data source to be used for the Azure OpenAI on your data feature. For Azure Cognitive search the value is <code>AzureCognitiveSearch</code> .
<code>endpoint</code>	string	Required	null	The data source endpoint.
<code>key</code>	string	Required	null	One of the Azure Cognitive Search admin keys for your service.
<code>indexName</code>	string	Required	null	The search index to be used.
<code>fieldsMapping</code>	dictionary	Optional	null	Index data column mapping.

Parameters	Type	Required?	Default	Description
inScope	boolean	Optional	true	If set, this value will limit responses specific to the grounding data content.
topNDocuments	number	Optional	5	Number of documents that need to be fetched for document augmentation.
queryType	string	Optional	simple	Indicates which query option will be used for Azure Cognitive Search.
semanticConfiguration	string	Optional	null	The semantic search configuration. Only available when <code>queryType</code> is set to <code>semantic</code> .
roleInformation	string	Optional	null	Gives the model instructions about how it should behave and the context it should reference when generating a response. Corresponds to the "System Message" in Azure OpenAI Studio. There's a 100 token limit, which counts towards the overall token limit.

Image generation

Request a generated image

Generate a batch of images from a text caption. Image generation is currently only available with `api-version=2023-06-01-preview`.

HTTP

```
POST https://{{your-resource-name}}.openai.azure.com/openai/images/generations:submit?api-version={{api-version}}
```

Path parameters

Parameter	Type	Required?	Description
your-resource-name	string	Required	The name of your Azure OpenAI Resource.

Parameter	Type	Required?	Description
api-version	string	Required	The API version to use for this operation. This follows the YYYY-MM-DD format.

Supported versions

- 2023-06-01-preview

Request body

Parameter	Type	Required?	Default	Description
prompt	string	Required		A text description of the desired image(s). The maximum length is 1000 characters.
n	integer	Optional	1	The number of images to generate. Must be between 1 and 5.
size	string	Optional	1024x1024	The size of the generated images. Must be one of 256x256, 512x512, or 1024x1024.

Example request

Console

```
curl -X POST
https://YOUR_RESOURCE_NAME.openai.azure.com/openai/images/generations:submit
?api-version=2023-06-01-preview \
-H "Content-Type: application/json" \
-H "api-key: YOUR_API_KEY" \
-d '{
  "prompt": "An avocado chair",
  "size": "512x512",
  "n": 3
}'
```

Example response

The operation returns a 202 status code and an `GenerateImagesResponse` JSON object containing the ID and status of the operation.

JSON

```
{
  "id": "f508bcf2-e651-4b4b-85a7-58ad77981ffa",
```

```
        "status": "notRunning"  
    }  

```

Get a generated image result

Use this API to retrieve the results of an image generation operation. Image generation is currently only available with `api-version=2023-06-01-preview`.

HTTP

```
GET https://{{your-resource-  
name}}.openai.azure.com/openai/operations/images/{{operation-id}}?api-version=  
{api-version}
```

Path parameters

Parameter	Type	Required?	Description
<code>your-resource-</code> <code>name</code>	string	Required	The name of your Azure OpenAI Resource.
<code>operation-id</code>	string	Required	The GUID that identifies the original image generation request.

Supported versions

- `2023-06-01-preview`

Example request

Console

```
curl -X GET "https://{{your-resource-  
name}}.openai.azure.com/openai/operations/images/{{operation-id}}?api-  
version=2023-06-01-preview"  
-H "Content-Type: application/json"  
-H "Api-Key: {api key}"
```

Example response

Upon success the operation returns a `200` status code and an `OperationResponse` JSON object. The `status` field can be `"notRunning"` (task is queued but hasn't started yet), `"running"`, `"succeeded"`, `"canceled"` (task has timed out), `"failed"`, or `"deleted"`. A

`succeeded` status indicates that the generated image is available for download at the given URL. If multiple images were generated, their URLs are all returned in the `result.data` field.

JSON

```
{  
    "created": 1685064331,  
    "expires": 1685150737,  
    "id": "4b755937-3173-4b49-bf3f-da6702a3971a",  
    "result": {  
        "data": [  
            {  
                "url": "<URL_TO_IMAGE>"  
            },  
            {  
                "url": "<URL_TO_NEXT_IMAGE>"  
            },  
            ...  
        ]  
    },  
    "status": "succeeded"  
}
```

Delete a generated image from the server

You can use the operation ID returned by the request to delete the corresponding image from the Azure server. Generated images are automatically deleted after 24 hours by default, but you can trigger the deletion earlier if you want to.

HTTP

```
DELETE https://{{your-resource-  
name}}.openai.azure.com/openai/operations/images/{{operation-id}}?api-version=  
<api-version>
```

Path parameters

Parameter	Type	Required?	Description
<code>your-resource-</code> <code>name</code>	string	Required	The name of your Azure OpenAI Resource.
<code>operation-id</code>	string	Required	The GUID that identifies the original image generation request.

Supported versions

- 2023-06-01-preview

Example request

Console

```
curl -X DELETE "https://{{your-resource-name}}.openai.azure.com/openai/operations/images/{{operation-id}}?api-version=2023-06-01-preview"
-H "Content-Type: application/json"
-H "Api-Key: {{api key}}"
```

Response

The operation returns a 204 status code if successful. This API only succeeds if the operation is in an end state (not running).

Management APIs

Azure OpenAI is deployed as a part of the Azure AI services. All Azure AI services rely on the same set of management APIs for creation, update and delete operations. The management APIs are also used for deploying models within an OpenAI resource.

[Management APIs reference documentation](#)

Next steps

Learn about [Models](#), and fine-tuning with the [REST API](#). Learn more about the underlying models that power Azure OpenAI.

Fine Tunes

Reference

Service: Cognitive Services

API Version: 2023-05-15

Operations

Cancel	Cancels the processing of the fine-tune job specified by the given fine-tune-id.
Create	Creates a job that fine-tunes a specified model from a given training file. Response includes details of the enqueued job including job status and hyper paramete...
Delete	Deletes the fine-tune job specified by the given fine-tune-id.
Get	Gets details for a single fine-tune job specified by the given fine-tune-id. The details contain the base model, training and validation files, hyper parameters,...
Get Events	Gets the events for the fine-tune job specified by the given fine-tune-id. Events are created when the job status changes, e.g. running or complete, and when res...
List	Gets a list of all fine-tune jobs owned by the Azure OpenAI resource. The details that are returned for each fine-tune job contain besides its identifier the base...

Deployments - Create Or Update

Reference

Service: Cognitive Services

API Version: 2023-05-01

Update the state of specified deployments associated with the Cognitive Services account.

HTTP

PUT

<https://management.azure.com/subscriptions/{subscriptionId}/resourceGroups/{resourceGroupName}/providers/Microsoft.CognitiveServices/accounts/{accountName}/deployments/{deploymentName}?api-version=2023-05-01>

URI Parameters

Name	In	Required	Type	Description
accountName	path	True	string	The name of Cognitive Services account. Regex pattern: ^[a-zA-Z0-9][a-zA-Z0-9_.-]*\$
deploymentName	path	True	string	The name of the deployment associated with the Cognitive Services Account
resourceGroupName	path	True	string	The name of the resource group. The name is case insensitive.
subscriptionId	path	True	string	The ID of the target subscription.
api-version	query	True	string	The API version to use for this operation.

Request Body

Name	Type	Description
properties	DeploymentProperties	Properties of Cognitive Services account deployment.
sku	Sku	The resource model definition representing SKU

Responses

Name	Type	Description
200 OK	Deployment	Create/Update the deployment successfully.
201 Created	Deployment	Create the deployment successfully.
Other Status Codes	ErrorResponse	Error response describing why the operation failed.

Examples

PutDeployment

Sample Request

HTTP

HTTP

PUT

<https://management.azure.com/subscriptions/subscriptionId/resourceGroups/resourceGroupName/providers/Microsoft.CognitiveServices/accounts/accountName/deployments/deploymentName?api-version=2023-05-01>

```
{  
  "sku": {  
    "name": "Standard",  
    "capacity": 1  
  },  
  "properties": {  
    "model": {  
      "format": "OpenAI",  
      "name": "ada",  
      "version": "1"  
    }  
  }  
}
```

Sample Response

Status code: 200

JSON

```
{  
  "id":  
    "/subscriptions/subscriptionId/resourceGroups/resourceGroupName/providers/Microsoft.CognitiveServices/accounts/accountName/  
deployments/deploymentName",  
  "name": "deploymentName",  
  "type": "Microsoft.CognitiveServices/accounts/deployments",  
  "sku": {  
    "name": "Standard",  
    "capacity": 1  
  },  
  "properties": {  
    "model": {  
      "format": "OpenAI",  
      "name": "ada",  
      "version": "1"  
    },  
    "provisioningState": "Succeeded"  
  }  
}
```

Status code: 201

JSON

```
{  
  "id":  
    "/subscriptions/subscriptionId/resourceGroups/resourceGroupName/providers/Microsoft.CognitiveServices/accounts/accountName/  
deployments/deploymentName",  
  "name": "deploymentName",  
  "type": "Microsoft.CognitiveServices/accounts/deployments",  
  "sku": {  
    "name": "Standard",  
    "capacity": 1  
  },  
  "properties": {  
    "model": {  
      "format": "OpenAI",  
      "name": "ada",  
      "version": "1"  
    },  
    "provisioningState": "Accepted"  
  }  
}
```

Definitions

Name	Description
CallRateLimit	The call rate limit Cognitive Services account.
createdByType	The type of identity that created the resource.
Deployment	Cognitive Services account deployment.
DeploymentModel	Properties of Cognitive Services account deployment model.
DeploymentModelVersionUpgradeOption	Deployment model version upgrade option.
DeploymentProperties	Properties of Cognitive Services account deployment.
DeploymentProvisioningState	Gets the status of the resource at the time the operation was called.
DeploymentScaleSettings	Properties of Cognitive Services account deployment model.
DeploymentScaleType	Deployment scale type.
ErrorAdditionalInfo	The resource management error additional info.
ErrorDetail	The error detail.
ErrorResponse	Error response
RequestMatchPattern	
Sku	The resource model definition representing SKU
SkuTier	This field is required to be implemented by the Resource Provider if the service has more than one tier, but is not required on a PUT.
systemData	Metadata pertaining to creation and last modification of the resource.
ThrottlingRule	

CallRateLimit

The call rate limit Cognitive Services account.

Name	Type	Description
count	number	The count value of Call Rate Limit.
renewalPeriod	number	The renewal period in seconds of Call Rate Limit.
rules	ThrottlingRule[]	

createdByType

The type of identity that created the resource.

Name	Type	Description
Application	string	

Key	string
ManagedIdentity	string
User	string

Deployment

Cognitive Services account deployment.

Name	Type	Description
etag	string	Resource Etag.
id	string	Fully qualified resource ID for the resource. Ex - /subscriptions/{subscriptionId}/resourceGroups/{resourceGroupName}/providers/{resourceProviderNamespace}/{resourceType},
name	string	The name of the resource
properties	Deployment Properties	Properties of Cognitive Services account deployment.
sku	Sku	The resource model definition representing SKU
systemData	systemData	Metadata pertaining to creation and last modification of the resource.
type	string	The type of the resource. E.g. "Microsoft.Compute/virtualMachines" or "Microsoft.Storage/storageAccounts"

DeploymentModel

Properties of Cognitive Services account deployment model.

Name	Type	Description
callRateLimit	CallRateLimit	The call rate limit Cognitive Services account.
format	string	Deployment model format.
name	string	Deployment model name.
source	string	Optional. Deployment model source ARM resource ID.
version	string	Optional. Deployment model version. If version is not specified, a default version will be assigned. The default version is different for different models and might change when there is new version available for a model. Default version for a model could be found from list models API.

DeploymentModelVersionUpgradeOption

Deployment model version upgrade option.

Name	Type	Description
NoAutoUpgrade	string	
OnceCurrentVersionExpired	string	
OnceNewDefaultVersionAvailable	string	

DeploymentProperties

Properties of Cognitive Services account deployment.

Name	Type	Description
callRateLimit	CallRateLimit	The call rate limit Cognitive Services account.
capabilities	object	The capabilities.
model	Deployment Model	Properties of Cognitive Services account deployment model.
provisioningState	Deployment ProvisioningState	Gets the status of the resource at the time the operation was called.
raiPolicyName	string	The name of RAI policy.
rateLimits	ThrottlingRule[]	
scaleSettings	Deployment ScaleSettings	Properties of Cognitive Services account deployment model.
versionUpgradeOption	Deployment ModelVersion UpgradeOption	Deployment model version upgrade option.

DeploymentProvisioningState

Gets the status of the resource at the time the operation was called.

Name	Type	Description
Accepted	string	
Canceled	string	
Creating	string	
Deleting	string	
Disabled	string	
Failed	string	
Moving	string	
Succeeded	string	

DeploymentScaleSettings

Properties of Cognitive Services account deployment model.

Name	Type	Description

activeCapacity	integer	Deployment active capacity. This value might be different from <code>capacity</code> if customer recently updated <code>capacity</code> .
capacity	integer	Deployment capacity.
scaleType	Deployment ScaleType	Deployment scale type.

DeploymentScaleType

Deployment scale type.

Name	Type	Description
Manual	string	
Standard	string	

ErrorAdditionalInfo

The resource management error additional info.

Name	Type	Description
info	object	The additional info.
type	string	The additional info type.

ErrorDetail

The error detail.

Name	Type	Description
additionalInfo	ErrorAdditionalInfo[]	The error additional info.
code	string	The error code.
details	ErrorDetail[]	The error details.
message	string	The error message.
target	string	The error target.

ErrorResponse

Error response

Name	Type	Description
error	ErrorDetail	The error object.

RequestMatchPattern

Name	Type	Description
method	string	
path	string	

Sku

The resource model definition representing SKU

Name	Type	Description
capacity	integer	If the SKU supports scale out/in then the capacity integer should be included. If scale out/in is not possible for the resource this may be omitted.
family	string	If the service has different generations of hardware, for the same SKU, then that can be captured here.
name	string	The name of the SKU. Ex - P3. It is typically a letter+number code
size	string	The SKU size. When the name field is the combination of tier and some other value, this would be the standalone code.
tier	SkuTier	This field is required to be implemented by the Resource Provider if the service has more than one tier, but is not required on a PUT.

SkuTier

This field is required to be implemented by the Resource Provider if the service has more than one tier, but is not required on a PUT.

Name	Type	Description
Basic	string	
Enterprise	string	
Free	string	
Premium	string	
Standard	string	

systemData

Metadata pertaining to creation and last modification of the resource.

Name	Type	Description
createdAt	string	The timestamp of resource creation (UTC).
createdBy	string	The identity that created the resource.
createdByType	createdByType	The type of identity that created the resource.
lastModifiedAt	string	The timestamp of resource last modification (UTC)
lastModifiedBy	string	The identity that last modified the resource.

lastModifiedByType	createdByType	The type of identity that last modified the resource.
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ThrottlingRule

Name	Type	Description
count	number	
dynamicThrottlingEnabled	boolean	
key	string	
matchPatterns	RequestMatchPattern[]	
minCount	number	
renewalPeriod	number	

Azure AI services support and help options

Article • 07/18/2023

Are you just starting to explore the functionality of Azure AI services? Perhaps you are implementing a new feature in your application. Or after using the service, do you have suggestions on how to improve it? Here are options for where you can get support, stay up-to-date, give feedback, and report bugs for Azure AI services.

Create an Azure support request

A

Explore the range of [Azure support options and choose the plan](#) that best fits, whether you're a developer just starting your cloud journey or a large organization deploying business-critical, strategic applications. Azure customers can create and manage support requests in the Azure portal.

- [Azure portal](#)
- [Azure portal for the United States government](#)

Post a question on Microsoft Q&A

For quick and reliable answers on your technical product questions from Microsoft Engineers, Azure Most Valuable Professionals (MVPs), or our expert community, engage with us on [Microsoft Q&A](#), Azure's preferred destination for community support.

If you can't find an answer to your problem using search, submit a new question to Microsoft Q&A. Use one of the following tags when you ask your question:

- [Azure AI services](#)

Vision

- [Azure AI Vision](#)
- [Custom Vision](#)
- [Face](#)
- [Document Intelligence](#)
- [Video Indexer](#)

Language

- Immersive Reader
- Language Understanding (LUIS)
- QnA Maker
- Language service
- Translator

Speech

- Speech service

Decision

- Anomaly Detector
- Content Moderator
- Metrics Advisor
- Personalizer

Azure OpenAI

- Azure OpenAI

Post a question to Stack Overflow



For answers on your developer questions from the largest community developer ecosystem, ask your question on Stack Overflow.

If you do submit a new question to Stack Overflow, please use one or more of the following tags when you create the question:

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Azure OpenAI

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Submit feedback

To request new features, post them on <https://feedback.azure.com>. Share your ideas for making Azure AI services and its APIs work better for the applications you develop.

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Stay informed

Staying informed about features in a new release or news on the Azure blog can help you find the difference between a programming error, a service bug, or a feature not yet available in Azure AI services.

- Learn more about product updates, roadmap, and announcements in [Azure Updates ↗](#).
- News about Azure AI services is shared in the [Azure blog ↗](#).
- [Join the conversation on Reddit ↗](#) about Azure AI services.

Next steps

[What are Azure AI services?](#)