Study guide for Exam AI-102: Designing and Implementing a Microsoft Azure AI Solution

Purpose of this document

This study guide should help you understand what to expect on the exam and includes a summary of the topics the exam might cover and links to additional resources. The information and materials in this document should help you focus your studies as you prepare for the exam.

Useful links	Description
Review the skills measured as of February 2, 2023	This list represents the skills measured AFTER the date provided. Study this list if you plan to take the exam AFTER that date.
Review the skills measured prior to February 2, 2023	Study this list of skills if you take your exam PRIOR to the date provided.
Change log	You can go directly to the change log if you want to see the changes that will be made on the date provided.
How to earn the certification	Some certifications only require passing one exam, while others require passing multiple exams.
Certification renewal	Microsoft associate, expert, and specialty certifications expire annually. You can renew by passing a **free** online assessment on Microsoft Learn.
Your Microsoft Learn profile	Connecting your certification profile to Learn allows you to schedule and renew exams and share and print certificates.
Passing score	A score of 700 or greater is required to pass.
Exam sandbox	You can explore the exam environment by visiting our exam sandbox.

Useful links	Description
Request accommodations	If you use assistive devices, require extra time, or need modification to any part of the exam experience, you can request an accommodation.
Take a practice test	Are you ready to take the exam or do you need to study a bit more?

Updates to the exam

Our exams are updated periodically to reflect skills that are required to perform a role. We have included two versions of the Skills Measured objectives depending on when you are taking the exam.

We always update the English language version of the exam first. Some exams are localized into other languages, and those are updated approximately eight weeks after the English version is updated. Other available languages are listed in the **Schedule Exam** section of the **Exam Details** webpage. If the exam isn't available in your preferred language, you can request an additional 30 minutes to complete the exam.

Note

The bullets that follow each of the skills measured are intended to illustrate how we are assessing that skill. Related topics may be covered in the exam.

Note

Most questions cover features that are general availability (GA). The exam may contain questions on Preview features if those features are commonly used.

Skills measured as of February 2, 2023

Audience profile

Microsoft Azure AI engineers build, manage, and deploy AI solutions that make the most of Azure Cognitive Services and Azure services. Their responsibilities include participating in all phases of AI solutions development—from requirements definition and design to development, deployment, integration, maintenance, performance tuning, and monitoring.

These professionals work with solution architects to translate their vision and with data scientists, data engineers, IoT specialists, infrastructure administrators, and other software developers to build complete end-to-end AI solutions.

Azure AI engineers have experience developing solutions that use languages such as Python or C# and should be able to use REST-based APIs and software development kits (SDKs) to build secure image processing, video processing, natural language processing (NLP), knowledge mining, and conversational AI solutions on Azure. They should be familiar with all methods of implementing AI solutions. Plus, they

understand the components that make up the Azure AI portfolio and the available data storage options. Azure AI engineers also need to understand and be able to apply responsible AI principles.

- Plan and manage an Azure AI solution (25–30%)
- Implement image and video processing solutions (15–20%)
- Implement natural language processing solutions (25–30%)
- Implement knowledge mining solutions (5–10%)
- Implement conversational AI solutions (15–20%)

Plan and manage an Azure AI solution (25–30%)

Select the appropriate Azure AI service

- Select the appropriate service for a vision solution
- Select the appropriate service for a language analysis solution
- Select the appropriate service for a decision support solution
- Select the appropriate service in Cognitive Services for a speech solution
- Select the appropriate Applied AI services

Plan and configure security for Azure AI services

- Manage account keys
- Manage authentication for a resource
- Secure services by using Azure Virtual Networks
- Plan for a solution that meets Responsible AI principles

Create and manage an Azure AI service

- Create an Azure AI resource
- Configure diagnostic logging
- Manage costs for Azure AI services
- Monitor an Azure AI resource

Deploy Azure AI services

- Determine a default endpoint for a service
- Create a resource by using the Azure portal
- Integrate Azure AI services into a continuous integration/continuous deployment (CI/CD) pipeline
- Plan a container deployment
- Implement prebuilt containers in a connected environment

Create solutions to detect anomalies and improve content

- Create a solution that uses Anomaly Detector, part of Cognitive Services
- Create a solution that uses Azure Content Moderator
- Create a solution that uses Personalizer, part of Cognitive Services

- Create a solution that uses Azure Metrics Advisor, part of Azure Applied AI Services
- Create a solution that uses Azure Immersive Reader, part of Azure Applied AI Services

Implement image and video processing solutions (15–20%)

Analyze images

- Select appropriate visual features to meet image processing requirements
- Create an image processing request to include appropriate image analysis features
- Interpret image processing responses

Extract text from images

- Extract text from images or PDFs by using the Computer Vision service
- Convert handwritten text by using the Computer Vision service
- Extract information using prebuilt models in Azure Form Recognizer
- Build and optimize a custom model for Form Recognizer

Implement image classification and object detection by using the Custom Vision service, part of Azure Cognitive Services

- Choose between image classification and object detection models
- Specify model configuration options, including category, version, and compact
- Label images
- Train custom image models, including classifiers and detectors
- Manage training iterations
- Evaluate model metrics
- Publish a trained iteration of a model
- Export a model to run on a specific target
- Implement a Custom Vision model as a Docker container
- Interpret model responses

Process videos

- Process a video by using Azure Video Indexer
- Extract insights from a video or live stream by using Azure Video Indexer
- Implement content moderation by using Azure Video Indexer
- Integrate a custom language model into Azure Video Indexer

Implement natural language processing solutions (25–30%)

Analyze text

- Retrieve and process key phrases
- Retrieve and process entities
- Retrieve and process sentiment

- Detect the language used in text
- Detect personally identifiable information (PII)

Process speech

- Implement and customize text-to-speech
- Implement and customize speech-to-text
- Improve text-to-speech by using SSML and Custom Neural Voice
- Improve speech-to-text by using phrase lists and Custom Speech
- Implement intent recognition
- Implement keyword recognition

Translate language

- Translate text and documents by using the Translator service
- Implement custom translation, including training, improving, and publishing a custom model
- Translate speech-to-speech by using the Speech service
- Translate speech-to-text by using the Speech service
- Translate to multiple languages simultaneously

Build and manage a language understanding model

- Create intents and add utterances
- Create entities
- Train, evaluate, deploy, and test a language understanding model
- Optimize a Language Understanding (LUIS) model
- Integrate multiple language service models by using Orchestrator
- Import and export LUIS models

Create a question answering solution

- Create a question answering project
- Add question-and-answer pairs manually
- Import sources
- Train and test a knowledge base
- Publish a knowledge base
- Create a multi-turn conversation
- Add alternate phrasing
- Add chit-chat to a knowledge base
- Export a knowledge base
- Create a multi-language question answering solution
- Create a multi-domain question answering solution
- Use metadata for question-and-answer pairs

Implement knowledge mining solutions (5–10%)

Implement a Cognitive Search solution

- Provision a Cognitive Search resource
- Create data sources
- Define an index
- Create and run an indexer
- Query an index, including syntax, sorting, filtering, and wildcards
- Manage knowledge store projections, including file, object, and table projections

Apply AI enrichment skills to an indexer pipeline

- Attach a Cognitive Services account to a skillset
- Select and include built-in skills for documents
- Implement custom skills and include them in a skillset
- Implement incremental enrichment

Implement conversational AI solutions (15–20%)

Design and implement conversation flow

- Design conversational logic for a bot
- Choose appropriate activity handlers, dialogs or topics, triggers, and state handling for a bot

Build a conversational bot

- Create a bot from a template
- Create a bot from scratch
- Implement activity handlers, dialogs or topics, and triggers
- Implement channel-specific logic
- Implement Adaptive Cards
- Implement multi-language support in a bot
- Implement multi-step conversations
- Manage state for a bot
- Integrate Cognitive Services into a bot, including question answering, LUIS, and Speech service

Test, publish, and maintain a conversational bot

- Test a bot using the Bot Framework Emulator or the Power Virtual Agents web app
- Test a bot in a channel-specific environment
- Troubleshoot a conversational bot
- Deploy bot logic

Study resources

We recommend that you train and get hands-on experience before you take the exam. We offer self-study options and classroom training as well as links to documentation, community sites, and videos.

Study resources	Links to learning and documentation
Get trained	Choose from self-paced learning paths and modules or take an instructor led course
Find documentation	Azure Cognitive Services Computer Vision Azure Video Indexer Language Understanding Speech to Text Speech Translation Azure Cognitive Search Azure Bot Service
Ask a question	Microsoft Q&A | Microsoft Docs
Get community support	AI - Machine Learning - Microsoft Tech Community AI - Machine Learning Blog - Microsoft Tech Community
Follow Microsoft Learn	Microsoft Learn - Microsoft Tech Community
Find a video	The AI Show Browse other Microsoft Learn shows

Change log

Key to understanding the table: The topic groups (also known as functional groups) are in bold typeface followed by the objectives within each group. The table is a comparison between the two versions of the exam skills measured and the third column describes the extent of the changes.

Skill area prior to February 2, 2023	Skill area as of February 2, 2023	Changes
Audience profile		Major

Skill area prior to February 2, 2023	Skill area as of February 2, 2023	Changes
Plan and manage an Azure Cognitive Services Solution	**Plan and manage an Azure AI solution**	% of exam increased
Select the appropriate Cognitive Services resource	Select the appropriate Azure AI service	Minor
Plan and configure security for a Cognitive Services solution	Plan and configure security for Azure AI services	Minor
Create a Cognitive Services resource	Create and manage an Azure AI service	Minor
Plan and implement Cognitive Services containers	Deploy Azure AI services	Major
	Create solutions to detect anomalies and improve content	Added
Implement Computer Vision Solutions	**Implement image and video processing solutions**	% of exam decreased
Analyze images by using the Computer Vision API	Analyze images	Major
Extract text from images	Extract text from images	Minor
Extract facial information from images		Removed
Implement image classification by using the Custom Vision service	Implement image classification and object detection by using the Custom Vision service	Major
Implement an object detection solution by using the Custom Vision service		Removed
Analyze video by using Azure Video Analyzer for Media (formerly Video Indexer)	Process videos	Major
Implement Natural Language Processing Solutions	**Implement natural language processing solutions**	No change
Analyze text by using the Language service	Analyze text	Minor

Skill area prior to February 2, 2023	Skill area as of February 2, 2023	Changes
Manage speech by using the Speech service	Process speech	Major
Translate language	Translate language	Major
Build an initial language model by using Language Understanding (LUIS)	Build and manage a language understanding model	Major
Iterate on and optimize a language model by using Language Understanding		Removed
Manage a Language Understanding model		Removed
Create a Question Answering solution using the Language service	Create a question answering solution	Major
Implement Knowledge Mining Solutions	**Implement knowledge mining solutions**	% of exam decreased
Implement a Cognitive Search solution	Implement a Cognitive Search solution	Major
Implement an AI enrichment pipeline	Apply AI enrichment skills to an indexer pipeline	Minor
Implement a knowledge store		Removed
Manage a Cognitive Search solution		Removed
Manage indexing		Removed
Implement Conversational AI Solutions	**Implement conversational AI solutions**	% of exam increased
Design and implement conversation flow	Design and implement conversation flow	Minor
Create a bot by using the Bot Framework SDK	Build a conversational bot	Major
Create a bot by using the Bot Framework Composer	Test, publish, and maintain a conversational bot	Major
Integrate Cognitive Services into a bot		Removed

Skills measured prior to February 2, 2023

Audience profile

Candidates for this exam will learn to build, manage, and deploy AI solutions that leverage Azure Cognitive Services and Azure Applied AI services.

Their responsibilities include participating in all phases of AI solutions development—from requirements definition and design to development, deployment, maintenance, performance tuning, and monitoring.

They work with solution architects to translate their vision and with data scientists, data engineers, IoT specialists, and AI developers to build complete end-to-end AI solutions.

Candidates for this exam should be proficient in C# or Python and should be able to use REST-based APIs and SDKs to build computer vision, natural language processing, knowledge mining, and conversational AI solutions on Azure.

They should also understand the components that make up the Azure AI portfolio and the available data storage options. Plus, candidates need to understand and be able to apply responsible AI principles.

- Plan and manage an Azure Cognitive Services solution (10–15%)
- Implement Computer Vision solutions (20–25%)
- Implement natural language processing solutions (25–30%)
- Implement knowledge mining solutions (15–20%)
- Implement conversational AI solutions (10–15%)

Plan and manage an Azure Cognitive Services solution (10–15%)

Select the appropriate Cognitive Services resource

- Select the appropriate cognitive service for a vision solution
- Select the appropriate cognitive service for a language analysis solution
- Select the appropriate cognitive Service for a decision support solution
- Select the appropriate cognitive service for a speech solution

Plan and configure security for a Cognitive Services solution

- Manage Cognitive Services account keys
- Manage authentication for a resource
- Secure Cognitive Services by using Azure Virtual Network
- Plan for a solution that meets responsible AI principles

Create a Cognitive Services resource

- Create a Cognitive Services resource
- Configure diagnostic logging for a Cognitive Services resource
- Manage Cognitive Services costs

- Monitor a Cognitive Services resource
- Implement a privacy policy in Cognitive Services

Plan and implement Cognitive Services containers

- Identify when to deploy to a container
- Containerize Cognitive Services (including Computer Vision, Language, Speech, Form Recognizer)
- Deploy Cognitive Services containers in Microsoft Azure

Implement Computer Vision solutions (20–25%)

Analyze images by using the Computer Vision API

- Retrieve image descriptions and tags by using the Computer Vision API
- Identify landmarks by using the Computer Vision API
- Detect brands in images by using the Computer Vision API
- Moderate content in images by using the Computer Vision API
- Generate thumbnails by using the Computer Vision API

Extract text from images

- Extract text from images or PDFs by using the Computer Vision service
- Extract information using pre-built models in Form Recognizer
- Build and optimize a custom model for Form Recognizer

Extract facial information from images

- Detect faces in an image by using the Face API
- Recognize faces in an image by using the Face API
- Match similar faces by using the Face API

Implement image classification by using the Custom Vision service

- Label images by using the Custom Vision Portal
- Train a custom image classification model in the Custom Vision Portal
- Train a custom image classification model by using the SDK
- Manage model iterations
- Evaluate classification model metrics
- Publish a trained iteration of a model
- Export a model in an appropriate format for a specific target
- Consume a classification model from a client application
- Deploy image classification custom models to containers

Implement an object detection solution by using the Custom Vision service

- Label images with bounding boxes by using the Custom Vision Portal
- Train a custom object detection model by using the Custom Vision Portal

- Train a custom object detection model by using the SDK
- Manage model iterations
- Evaluate object detection model metrics
- Publish a trained iteration of a model
- Consume an object detection model from a client application
- Deploy custom object detection models to containers

Analyze video by using Azure Video Analyzer for Media (formerly Video Indexer)

- Process a video
- Extract insights from a video
- Moderate content in a video
- Customize the Brands model used by Video Analyzer for Media
- Customize the Language model used by Video Analyzer for Media by using the Custom Speech service
- Extract insights from a live stream of video data

Implement natural language processing solutions (25–30%)

Analyze text by using the Language service

- Retrieve and process key phrases
- Retrieve and process entity information (people, places, URLs, etc.)
- Retrieve and process sentiment
- Detect the language used in text

Manage speech by using the Speech service

- Implement text-to-speech
- Customize text-to-speech
- Implement speech-to-text
- Improve speech-to-text accuracy
- Improve text-to-speech accuracy
- Implement intent recognition

Translate language

- Translate text by using the Translator service
- Translate speech-to-speech by using the Speech service
- Translate speech-to-text by using the Speech service

Build an initial language model by using language understanding

- Create intents and entities based on a schema, and add utterances
- Create complex hierarchical entities

- Train and deploy a model

Iterate on and optimize a language model by using language understanding

- Implement phrase lists
- Implement a model as a feature (i.e., prebuilt entities)
- Manage punctuation and diacritics
- Implement active learning
- Monitor and correct data imbalances
- Implement patterns

Manage a language understanding model

- Manage collaborators
- Manage versioning
- Publish a model through the portal or in a container
- Export a Language Service package
- Deploy a Language Service package to a container

Create a Questions Answering solution using the Language service

- Create a question answering project
- Import questions and answers
- Train and test a knowledge base
- Publish a knowledge base
- Create a multi-turn conversation
- Add alternate phrasing
- Add chit-chat to a knowledge base
- Export a knowledge base
- Add active learning to a knowledge base

Implement knowledge mining solutions (15–20%)

Implement a Cognitive Search solution

- Create data sources
- Define an index
- Create and run an indexer
- Query an index
- Configure an index to support autocomplete and autosuggest
- Boost results based on relevance
- Implement synonyms

Implement an AI enrichment pipeline

- Attach a Cognitive Services account to a skillset

- Select and include built-in skills for documents
- Implement custom skills and include them in a skillset

Implement a knowledge store

- Define file projections
- Define object projections
- Define table projections
- Query projections

Manage a Cognitive Search solution

- Provision Cognitive Search
- Configure security for Cognitive Search
- Configure scalability for Cognitive Search

Manage indexing

- Manage re-indexing
- Rebuild indexes
- Schedule indexing
- Monitor indexing
- Implement incremental indexing
- Manage concurrency
- Push data to an index
- Troubleshoot indexing for a pipeline

Implement conversational AI solutions (10–15%)

Design and implement conversation flow

- Design conversational logic for a bot
- Create and evaluate .chat file conversations by using the Bot Framework Emulator
- Choose an appropriate conversational model for a bot, including activity handlers and dialogs

Create a bot by using the Bot Framework SDK

- Use the Bot Framework SDK to create a bot from a template
- Implement activity handlers and dialogs
- Use a turn context
- Test a bot using the Bot Framework Emulator
- Deploy a bot to Azure

Create a bot by using the Bot Framework Composer

- Implement dialogs
- Maintain state
- Implement logging for a bot conversation

- Implement prompts for user input
- Troubleshoot a conversational bot
- Test a bot
- Publish a bot
- Add language generation for a response
- Design and implement Adaptive Cards

Integrate Cognitive Services into a bot

- Integrate a question answering model
- Integrate a language understanding service
- Integrate a Speech service resource