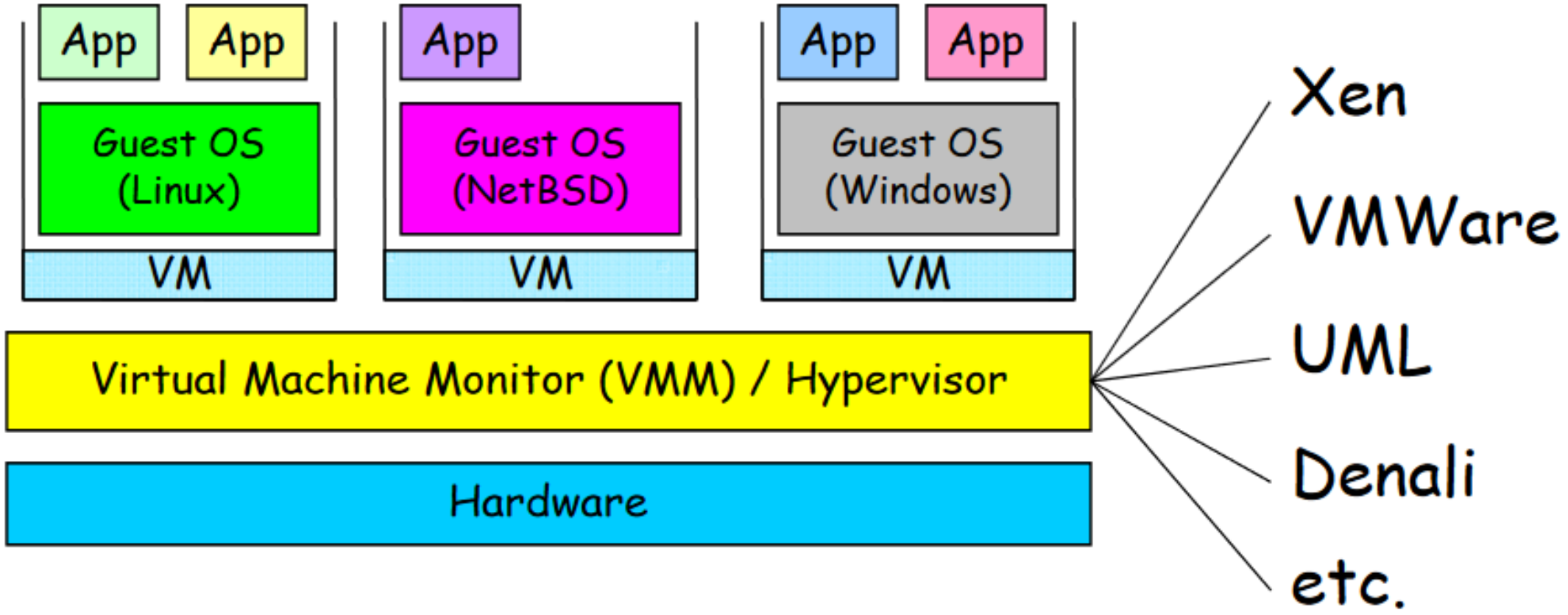
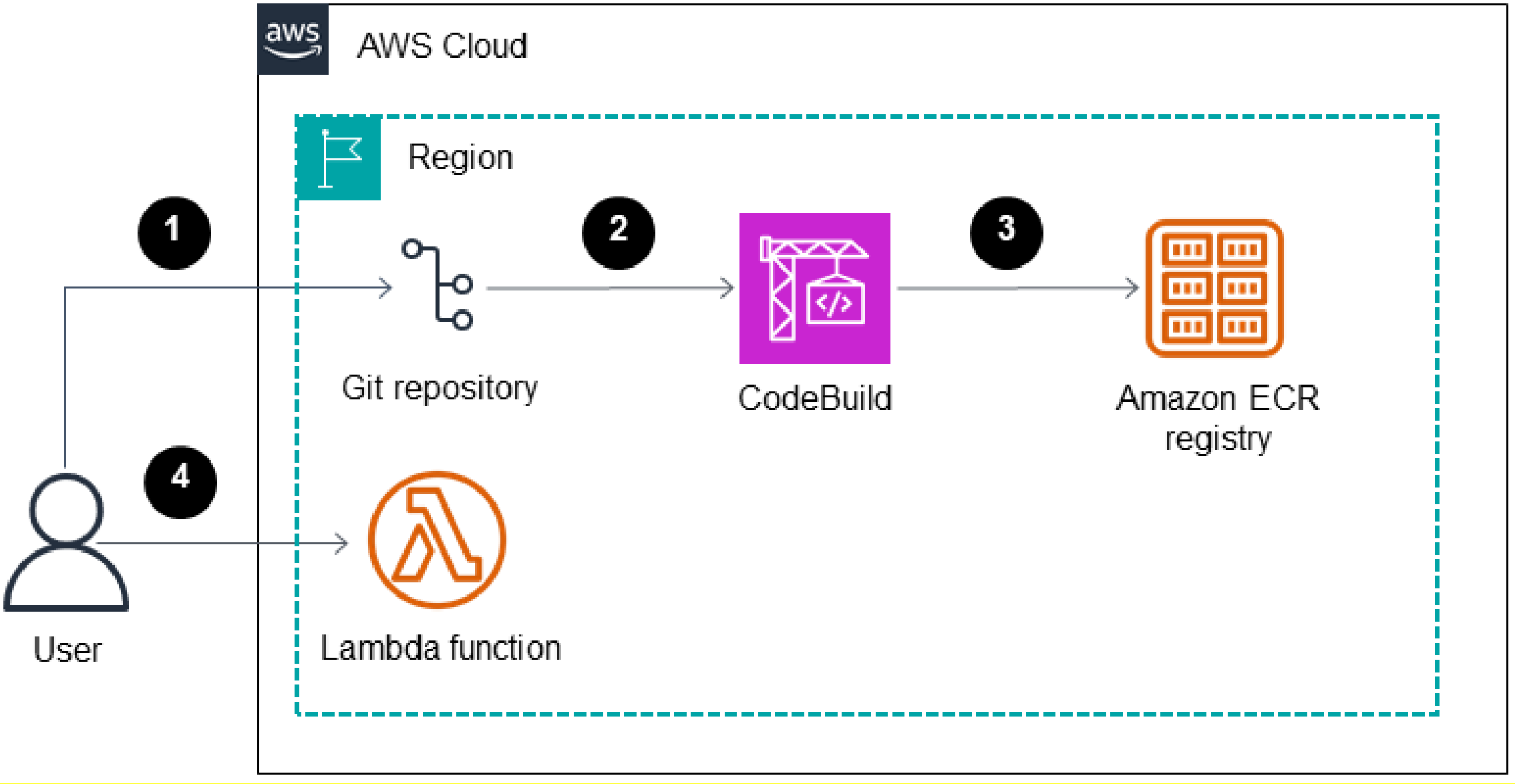
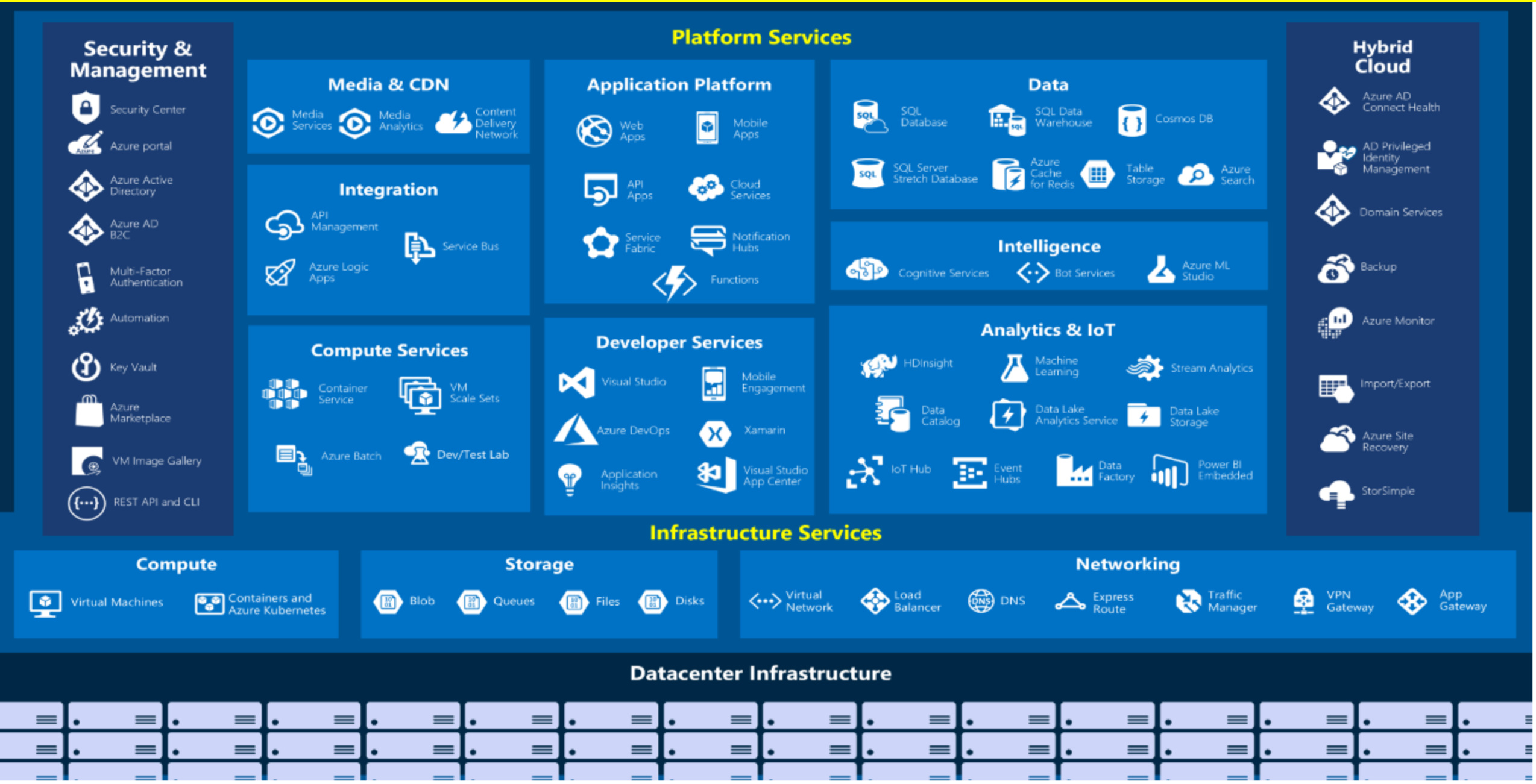
22AIE305: CLOUD COMPUTING

VM technology allows multiple virtual machines to run on a single physical machine.




AWS Cloud
Region
1
2
3
4
Git repository
CodeBuild
Amazon ECR registry
User
Lambda function


Security & Management
Security Center
Azure portal
Azure Active Directory
Azure AD B2C
Multi-Factor Authentication
Automation
Key Vault
Azure Marketplace
VM Image Gallery
REST API and CLI
Platform Services
Media & CDN
Media Services
Media Analytics
Content Delivery Network
Integration
API Management
Service Bus
Azure Logic Apps
Compute Services
Container Service
VM Scale Sets
Azure Batch
Dev/Test Lab
Application Platform
Web Apps
Mobile Apps
API Apps
Cloud Services
Service Fabric
Notification Hubs
Functions
Developer Services
Visual Studio
Mobile Engagement
Azure DevOps
Xamarin
Application Insights
Visual Studio App Center
Data
SQL Database
SQL Data Warehouse
Cosmos DB
SQL Server Stretch Database
Azure Cache for Redis
Table Storage
Azure Search
Intelligence
Cognitive Services
Bot Services
Azure ML Studio
Analytics & IoT
HDInsight
Machine Learning
Stream Analytics
Data Catalog
Data Lake Analytics Service
Data Lake Storage
IoT Hub
Event Hubs
Data Factory
Power BI Embedded
Hybrid Cloud
Azure AD Connect Health
AD Privileged Identity Management
Domain Services
Backup
Azure Monitor
Import/Export
Azure Site Recovery
StorSimple
Infrastructure Services
Compute
Virtual Machines
Containers and Azure Kubernetes
Storage
Blob
Queues
Files
Disks
Networking
Virtual Network
Load Balancer
DNS
Express Route
Traffic Manager
VPN Gateway
App Gateway
Datacenter Infrastructure

COGNITIVE SERVICES

Cognitive Services enable organizations to take advantage of AI with developers, without requiring a data scientist.

This is done by taking the machine learning (ML) models and the pipelines and the infrastructure needed to build a model and packaging it up into a Cognitive Service for vision, speech, search, text processing, language understanding, and more.

ML algorithms can be used to improve an application.

Container support for Cognitive Services are provided by several service providers, making it significantly easier for developers to build ML-driven solutions.

COGNITIVE SERVICES IN AZURE

Cognitive services makes AI accessible to programmers by making it simple for any developer to include AI into their products.

Azure Cognitive Services offers solutions for image recognition, speech synthesis, picture classification, verbal fluency, and many other cognitive tasks.

Using Cognitive Services containers, companies can process all types of files, index millions of documents and find commonalities, and improve the customer experience while keeping the data in-house.

Examples are in insurance, medical care, inventory control, marketing, finance

Cognitive Services can predict maintenance needs in manufacturing companies.

Azure Cognitive Services help developers to infuse intelligence seamlessly into their applications, regardless of the industry. From healthcare's advanced diagnostics to retail's personalized experiences, the impact is profound.

Vision Intelligence: Azure Cognitive Services offers advanced computer vision capabilities, allowing applications to analyze images and videos. Features like image recognition, facial recognition, and optical character recognition (OCR) provide applications with the ability to interpret visual content.

Language Understanding: With natural language processing capabilities, Azure Cognitive Services enables applications to comprehend and derive meaning from written and spoken language. Features like sentiment analysis, language translation, and entity recognition facilitate effective communication.

Speech Recognition: Speech-to-text and text-to-speech capabilities empower applications to interact with users through spoken language. This is particularly valuable for applications involving voice assistants, customer support, and accessibility.

Decision-Making: Azure Cognitive Services equips applications with the power to make informed decisions. Services like Personalizer enable applications to provide personalized recommendations, while Anomaly Detector helps in identifying unusual patterns in data.

Search Capabilities: Enhanced search functionalities allow applications to deliver more accurate and relevant results. Bing Search and Custom Search services enable developers to integrate powerful search capabilities into their applications.

AZURE COGNITIVE SERVICE FEATURES

You can use Microsoft Azure Cognitive Services in the following instances:

- If you want to add smart capabilities to your software to increase its efficiency but do not have the resources to do so.
- If you want to learn more about your data through sentiment analysis and video material, but do not know how to develop and train algorithms.
- If your software necessitates a lot of management, such as content moderation or customer support, and you want to lighten the load.

AZURE COGNITIVE SERVICE USES

- **Accelerated Development:** Azure Cognitive Services eliminates the need for building AI capabilities from scratch, saving developers significant time and effort. This acceleration in development speed allows businesses to bring innovative solutions to market faster.
- **Enhanced User Experiences:** By infusing applications with intelligence, businesses can deliver personalized and context-aware experiences to users. This leads to higher user engagement, satisfaction, and loyalty.
- **Data-Driven Insights:** The cognitive capabilities of Azure enable applications to analyze large volumes of data and extract valuable insights. Businesses can make data-driven decisions and predictions that drive efficiency and growth.
- **Cross-Industry Applicability:** Azure Cognitive Services has applications across diverse industries, from healthcare and finance to retail and entertainment. Its versatility makes it a valuable asset for businesses of all types.
- **Ethical AI:** Microsoft's commitment to responsible AI shines through in Azure Cognitive Services. The tools include features for bias detection and mitigation, ensuring fairness and ethics in application development.

DEPLOYING AZURE COGNITIVE SERVICES

Here's a step-by-step guide to kickstart your journey:

1. Azure Portal Access: If you haven't already, create an Azure account. Navigate to the Azure Portal, where you'll manage your services.

2. Create a Cognitive Services Resource: Within the Azure Portal, create a new Cognitive Services resource. This resource acts as a hub for the AI capabilities you wish to utilize.

3. Choose a Service: Select the specific cognitive service you want to use, whether it's Computer Vision, Text Analytics, or any other service within the suite.

4. Configure Settings: Configure the settings for your chosen service. This might involve setting up authentication keys, specifying regions, and configuring options related to your application's needs.

DEPLOYING AZURE COGNITIVE SERVICES

5. Integrate into Your Application: Azure Cognitive Services offers APIs and SDKs for various programming languages. These tools facilitate the integration of the cognitive capabilities into your application's codebase.

6. Code Implementation: Depending on the service you're using, you'll need to write code that interacts with the API. This could involve sending images for analysis, sending text for sentiment analysis, or processing audio for speech recognition.

7. Test and Iterate: Test your implementation thoroughly to ensure that it's working as intended. Iterate and refine your code based on feedback and results.

8. Scale and Deploy: Once you're satisfied with your implementation, you can scale it to accommodate more users and deploy it to production environments.

AZURE COGNITIVE SERVICES CONTAINERS

Text Analytics Containers

Container	Description
Key Phrase Extraction	Extracts key phrases to identify the main points. For example, for the input text "The food was delicious and there were wonderful staff," the API returns the main talking points: "food" and "wonderful staff."
Language Detection	For up to 120 languages, detects which language the input text is written in and reports a single language code for every document submitted on the request. The language code is paired with a score indicating the strength of the score.
Sentiment Analysis	Analyzes raw text for clues about positive or negative sentiment. This API returns a sentiment score between 0 and 1 for each document, where 1 is the most positive. The analysis models are pre-trained using an extensive body of text and natural language technologies from Microsoft. For selected languages, the API can analyze and score any raw text that you provide, directly returning results to the calling application.

BASIC LIST OF AZURE COGNITIVE SERVICES

Azure Cognitive Services is a set of Azure APIs that make it simple to enhance apps in five areas allowing the use of AI's capabilities. The following are the five basic foundations in the list of cognitive services that give intellectual comprehension:

- Computer Vision
- Speech Recognition
- Language Processing
- Decision Making
- Search using strings, audio or image clips

COGNITIVE SERVICES IN CONTAINERS

If you put Cognitive Services in containers you can manage them with Azure Kubernetes Service (AKS) or embedded CLI.

AKS provides a rich environment for composing services into applications using a micro-service architecture that enables managing a container separately.

These containerized instances operate in a very similar way to the Cognitive Services cloud APIs running in the hosted Azure endpoint. This means you can use the same API's and samples for details on how to use the service regardless of whether you're calling the container or the Cognitive Services cloud.

The containers must have the ability to connect to Azure both at start-up and then again at regular intervals while they're running.

COMPUTER VISION API

Visual content, pictures, video, and digital ink are analyzed and entities inside it are identified using Microsoft's Vision API. As a result of APIs, applications may identify and categorize faces based on certain traits; identify specific objects and information.

The following are the different vision services:

Computer vision: Users may use cloud-based computer vision to leverage sophisticated mechanisms for analyzing pictures and delivering data. Microsoft Computer Vision algorithms may evaluate visual material in many ways by uploading a picture or giving an image URL.

Custom vision: By using custom vision, users may develop, deploy, and improve their image analyzers, which is an AI tool that assigns categories to pictures based on visual characteristics.

Face API: Facial recognition may be integrated into any application to provide smooth and safe user engagement. No prior knowledge of machine learning is necessary. Face identification detects facial characteristics and qualities in a picture, such as a mask, spectacles, or face position to detect and identify faces of people, interpret emotions and recognize faces.

COMPUTER VISION API CONT'D

Form Recognizer – This API can be used to read data from forms and then convert them into electronic formats. Helpful in converting existing paper-based documents into digital PDFs.

One example is in reading pencil marked scannable forms used in examinations (such as GRE and GMAT) and in some hospitals.

Video Indexer – Users can use this API to generate captions from videos, identify content, search for specific content, and interpret the text in the videos

FACE RECOGNITION CONTAINER

Face Container

The Face Container enables you to add face detection, verification, and emotion detection to an application or system. It uses a common configuration framework, so that you can easily configure and manage storage, logging and telemetry, and security settings for your containers.

- Learn how you will need to signup get access to the Face API Container.
- Learn how to install and run the Face Container.
- Learn how you can configure the Face Container.
- Already using Azure? Sign up for the Face Container now.

SPEECH API

With Speech SDK, you can safely and rapidly create voice-enabled apps. You can also, with great reliability, extract speech to text, create natural-sounding text-to-speech voices, translate verbal audio, and employ speech identification during chats. For example, hands-free gadgets, which generate data or follow directions out loud, might benefit from this innovation.

Speech to text: You can translate audio to text in over 85 languages and dialects easily and correctly. Algorithms can be tweaked to boost performance for domain-specific terms. You can also enhance the value of human speech by allowing for search and analytics on transcribed text as well as by enabling acts in scripting languages.

Text to speech: You can create natural-sounding applications and solutions by selecting over 70 languages and dialects and more than 250 voices. From textual reader to customer care chatbot, text to speech offers the ability to distinguish one's business with a unique speech.

Speech translation: Speech translation allows the translation of audio, from more than 30 languages, into a computer language. Speech translation also provides personalized translators for a business' particular terminology.

Speaker recognition: Speaker recognition uses speech biometry to accurately verify and identify speakers based on their distinctive voice traits. It is a technique for determining who is speaking.

LANGUAGE APIs

Language APIs are one of the most used services in Azure Cognitive Services. These APIs provide users with the ability to analyze texts and recognize intents and entities from them. This makes it easier for your application to communicate with your customers more naturally. There are several services available under this category as well.

Immersive Reader – This is a service provided by Microsoft that enables users to generate meaningful information from the text. Suppose you have a document and you want to understand the meaning of the text from it. In such a case, you can use this API and extract meaning from your document

LUIS – This service is used for natural **L**anguage **U**nderstanding and **I**nterpretation **S**ervices. You can use this in your chatbots to learn from users as they talk and interact with your bot

LANGUAGE APIS

QnAMaker – The QnAMaker is an application created by Microsoft to maintain FAQ question banks for chatbots. If your organization has a FAQ page listed, you can use that information in the QnAMaker and the chatbot can reflect that information to the users while they interact with the bot.

Text Analytics – Text Analytics services are mostly used to identify sentiments and named entities from the texts that are being provided to these APIs. It is useful while analysing sentiments of tweets or some other social media applications.

Translator – This new service translates text from one language to another in real-time. It supports more than 100 world languages

TEXT RECOGNITION CONTAINER

The Recognize Text portion of Computer Vision allows you to detect and extract printed text from images of various objects with different surfaces and backgrounds, such as receipts, posters, and business cards.

- Learn how you can sign up get access to the Recognize Text Container.
- Learn how to install and run the Recognize Text Container.
- Learn how you can configure the Recognize Text Container.
- Already using Azure? Sign up for the Recognize Text container now.