

Product Comparison

Alibaba Cloud for Azure Professionals

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Overview

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1. Objective

This document is intended to help professionals, such as engineers, architects, and operations and maintenance (O&M) personnel, who are familiar with Azure services to understand how to navigate through Alibaba Cloud services. This document compares Alibaba Cloud with Azure in terms of products, characteristics, and solution architecture to reveal the similarities and differences between the two cloud providers regarding concepts, terminologies, and implementation. In addition, it

provides quick-reference mappings of Azure products, concepts, and terminology to the corresponding products, concepts, and terminology on Alibaba Cloud. This section provides a general overview of the services provided by the two cloud providers. For more information, please navigate to the relevant categories for specific products.

2. Why Alibaba Cloud

Founded in 2009, Alibaba Cloud provides a comprehensive set of cloud computing services with global coverage to help you develop your businesses. Alibaba Cloud is the cloud computing branch of Alibaba Group, serving the internal demands of Alibaba's extensive e-commerce ecosystem, including Taobao, Tmall, and Alipay. According to the Gartner's report Market Share Analysis: Public Cloud Services, Worldwide, 2016, Alibaba Cloud is the third largest cloud service provider globally. Alibaba Cloud is also the leader of the Chinese market, with more than 40 cloud computing products and services, spanning across 18 data center regions globally.

3. Portal websites

In principal, Azure provides three different kinds of portals: The Azure Account portal for managing your account, the Azure Subscription Portal for managing your resources, and the so-called Enterprise Agreement portal, which provides a dedicated experience and functionality for enterprise accounts in terms of cost management, and subscription administration comparable to AWS Organizations. Each of those is available for Azure's four environments International Cloud, German Cloud, US Gov Cloud, and "China Cloud" which are strictly isolated from each other, meaning their authentication systems (Azure AD) do not have a trust-relationship with each other. That is, you need to create and manage different accounts for each of those environments.

Alibaba Cloud has an easier experience, and only provides two portals namely the Chinese Portal and Global Portal, which provide services for enterprises and individuals who are registered in China and abroad, respectively. The Global Portal consists of a bilingual console (English and Chinese) and a multilingual website (English, Chinese, and Japanese). On either portal, users can browse and read about Alibaba Cloud products and services, as well as register or log on to the portal to purchase and manage their cloud services. Because laws and security regulations vary from region to region and from country to country, the Chinese portal differs from the global portal to some extent in terms of products, solutions, support services, and marketplace product offerings. Due to exchange rates and local tax rates, prices on the Chinese portal and global portal may vary as well. For pricing details, see [Pricing on Chinese Portal](#) and [Pricing on Global Portal](#).

To launch services in China and internationally, you do not need to have separate accounts on the Chinese Portal and Global Portal. For more information, see [6.1 Accounts](#).

4. Regions and zones

Azure resources are distributed globally in multiple positions, and these positions are marked by

regions, availability zones, and availability sets. A region is a cluster of data centers. Each region represents a geographically separate area and may be composed of multiple separate availability zones.

Azure provides three different options (that can be combined) to protect applications at different scopes of failure: Availability Sets, Availability Zones, and Paired Regions.

Alibaba Cloud uses similar concepts. They differ, however, in certain ways that we like to discuss.

An Azure Availability Set protects applications at the scope of rack failure within one availability zone. Applications deployed within an availability set are thus spread across a configurable number of different hardware racks (fault domains) that share a common power source and network switch. Alibaba Cloud does not provide a comparable concept.

Both Azure and Alibaba Cloud provide so-called Availability Zones which are physically separate datacenters within a region. Each Availability Zone has a distinct power source, network, and cooling. Deploying VMs across availability zones helps to protect an application against datacenter-wide failures.

Unlike Availability Zones, which are physically separate datacenters but may be in relatively nearby geographic areas, regions are usually separated by hundreds of miles ensuring large scale disasters only impact one of the regions. In Azure, each region has a so-called paired region. These pairs are configured so that platform updates are rolled out to only one region in the pair at a time. Alibaba Cloud also provides regions, it does not know the concept, however, of paired regions as described above.

Alibaba Cloud provides the concept of region and Availability Zone.

- If your applications require high disaster recovery capabilities, we recommend that you deploy your instances in different zones of the same region.
- If your applications require low network latency between instances, we recommend that you create your instances in the same zone.

For more information about regions and zones, see the [Alibaba Cloud Global Infrastructure](#).

The following table summarizes each option for both Azure and Alibaba Cloud.

Azure / Alibaba Cloud	Availability Set / NA	Availability Zone / Availability Zone	(Paired) Region / Region
Scope of Failure	Rack	Datacenter	Region
Request Routing	Load Balancer Basic	Load Balancer Standard / Elastic Load Balancer	Traffic Manager / Alibaba Cloud DNS
Network Latency	<0.6ms	<0.6ms	<100ms / < 100ms
Virtual Networking	VNET	VNET / VPC	Cross-Region VNET Peering / Express Connect, VPN Gateway

5. Endpoints

An endpoint is the web address (URL) of your service, which can be accessed by a client application. To reduce the network latency of application requests, most Azure services are provided with endpoints to optimize user requests. These endpoints are exposed by so-called resource providers which can be activated / deactivated on a subscription level.

Azure Resource providers are organized in namespaces such as Microsoft.Compute, Microsoft.Storage, or Microsoft.Network.

Each of these resource types provide their own set of REST-full operations and APIs. Depending on the Azure environment you are using, the management endpoint that hosts these APIs is different. For instance, the resource provider APIs of the International Cloud are hosted at <https://management.azure.com>, while the APIs of the Chinese Cloud are hosted at <https://management.chinacloudapi.cn>.

Example: In order to talk to the REST API of a virtual machine named myVM in the resource group myrg in subscription 8d4dee44-4b28-4e05-9927-3a5d34a42bf5 in the International Cloud you would call

```
https://management.azure.com/subscriptions/8d4dee44-4b28-4e05-9927-3a5d34a42bf5/resourceGroups/myrg/providers/Microsoft.Compute/virtualMachines/myVM?api-version=2016-03-01
```

The call needs to be authorized by a JSON Web Token (JWT) added to the authorization header of the request. This token needs to be acquired by the oauth2 endpoint of the particular Azure Active Directory tenant the subscription is associated to.

Alibaba Cloud also exposes most of its services through a web-based API. It takes, however, a very different approach to it. Most basic services such as ECS and OSS are already activated by default meaning they can be used from the portal, by SDKs, or through the web-based interfaces right from the beginning. Others need to be explicitly activated in the portal before they can be used.

These service endpoints usually take the following format:

```
https://<service-name>.<region>.aliyuncs.com/<request-parameters>
```

For example, in order to create a snapshot of a disk with the id 1033-60053321 that is hosted in the German region you would call:

```
https://ecs.eu-central1.aliyuncs.com/?Action=CreateSnapshot&DiskId=1033-60053321&<Common Request Parameters>
```

Depending on the service that is being used the format may vary slightly. If the region part is omitted the request is routed to the configured default region.

The authentication works by providing the access key id and a signature parameter to the request as part of the common request parameters. The access key id indicates the identity of the user while the signature parameter is the canonicalized query string which is symmetrically encrypted with the

access key secret. Please refer to <https://www.alibabacloud.com/help/doc-detail/25492.htm> for details on how to compose a standardized request URL.

6. Accounts, constraints, and pricing

6.1 Accounts

The concept of an account in Azure and Alibaba Cloud differ.

In Azure an account can be thought of as your user directory (Azure Active Directory tenant) and the owner of the payment methods available for the individual subscriptions that are associated to it. Subscriptions are a grouping of resources with an assigned owner responsible for billing and permissions management. Subscriptions exist independently of their owner accounts and can be reassigned to new owners as needed. Azure accounts and thus subscriptions are strictly associated to an environment meaning you cannot operate workloads globally and within China from one single account. Identities and authorization rules (Role-based access control (RBAC) are separately managed at the Azure Active Directory tenant level (identities), and subscription level, respectively.

On Alibaba Cloud, any resources created under the Alibaba Cloud account are tied to that account. There is no further grouping. Identities and authorization rules (policies and permissions) are centrally managed at the account level. You only need one Alibaba Cloud account to operate globally and within China. This greatly simplifies billing, account management, and service deployments for products and services that are launched internationally. To purchase an ECS server that is located within the Mainland China territory, you will need to comply with China's real-name authentication requirements.

6.2 Service constraints

Alibaba Cloud sets default service purchase quotas and constraints on accounts, which are similar to the subscription quotas on Azure. These limits are set to ensure optimized performance and security for users. Some of the quotas can be increased by opening a ticket on the Console.

6.3 Pricing

Like Azure, Alibaba Cloud employs different billing methods and prices for different services, allowing you to choose the proper billing model for your needs. Azure provides Reserved Instances (RIs) and PAYG as billing methods. Azure RIs need to be paid upfront and can be purchased as 1 year or 3-year purchase. They can be cancelled anytime with a cancellation fee of 12% or converted to different instance types. They do not, however, guarantee a capacity reservation. The reserved model is only available for Virtual Machines.

The two main types of billing methods at Alibaba Cloud are Subscription and Pay-As-You-Go. Subscription is more economical for long term usage, while Pay-As-You-Go is better for small-scale, experimental usage of Alibaba Cloud products. Subscriptions can be purchased for a variety of

different services not only restricted to Virtual Machines. They cannot, however, be cancelled but need to be sold on the spot market.

7. Resource management interfaces

7.1 Web based console

The Azure web-based portal is an important entry point for Azure to manage service resources. Alibaba Cloud also provides a web-based portal (which is termed console) on which users create, manage, and monitor their resources.

7.2 Rest API

Both Azure and Alibaba Cloud provide REST APIs for most functions provided by the console.

7.3 Command line interface (CLI)

Like Azure, Alibaba Cloud provides a CLI through which users can interact with and manage cloud computing services and resources. Azure provides the Azure CLI, while Alibaba Cloud provides an Alibaba Cloud CLI tool. The CLI tools provide standard CLIs for most cloud computing services and are compatible with mainstream OSs, including Windows, Linux, and Mac OS X.

7.4 SDKs

Both Azure and Alibaba Cloud provide SDKs for different programming languages such as Python, Java, Go, PHP and Node JS for example.

8. Types of cloud services

The following sections compare general cloud computing services and the relevant characteristics of Azure and Alibaba Cloud, respectively. Generally speaking, cloud services are composed of a set of basic services, falling into computing, storage, network, and database services. Basic Azure and Alibaba Cloud services include:

Category	Azure	Alibaba Cloud
Computing	Azure Virtual Machines (including GPU types), Virtual Machine Scale Sets, Azure Container Service (AKS, fully managed K8 master, and ACS which supports K8, DC/OS, Swarm), Azure Batch Compute	Elastic Compute Service (ECS), Elastic GPU Service (EGS), Auto Scaling, Container Service (Supports both Kubernetes and Swarm), Spot Instances, E-HPC.
Storage	Azure Blob Storage, Table Storage, CosmosDB, Azure	Object Storage Service (OSS), Table Store, Alibaba Cloud

	CDN (operated by Akamai or Verizon), Azure File Storage , StorSimple	CDN, Network Attached Storage (NAS) , Hybrid Cloud Storage Array
Network	Azure Virtual Network (VNET), ExpressRoute, Azure Network Loadbalancer (NAT included), Azure Reserved IP, VPN Gateway	Virtual Private Cloud (VPC), Express Connect, NAT Gateway, SLB, Elastic IP, VPN Gateway
Database	Azure MySQL / Postgresql, Azure SQL, Azure Redis, CosmosDB for MongoDB, Azure Database Migration Service	ApsaraDB for RDS(MySQL/SQL Server/Postgresql), ApsaraDB for Redis,ApsaraDB for MemCache, ApsaraDB for MongoDB, HybridDB for PostgreSQL,HiTSDB,Data Transmission Service (DTS)

9. Services

- Compute

Description	Azure	Alibaba Cloud
Virtual Servers	Azure Virtual Machines	Elastic Compute Service (ECS)
GPU Servers	Azure Virtual Machines (NC, ND, NV series)	Elastic GPU Service (EGS)
Auto Scale	Virtual Machine Scale Sets	Auto Scaling
Container Management	Azure Container Service (ECS) Azure Container Service for Kubernetes (EKS)	Container Service(Supports both Kubernetes and Swarm)
Pre-emptible VMs	Azure Batch Compute	Alibaba Batch Compute
high-performance computing	Azure HPC Pack	ECHP
Work management	Azure Batch	Batch Compute

- Storage & CDN

Description	Azure	Alibaba Cloud
Object Storage	Azure Blob Storage / Azure Storage v2	Object Storage Service (OSS)
NoSQL Database	Azure Table Storage, CosmosDB (supports MongoDB, Cassandra APIs)	Table Store,MongoDB
Content Delivery	Azure CDN (operated by Akamai and Verizon)	Alibaba Cloud CDN

Shared File Storage	Azure File Storage, Data Lake Store (WebHDFS)	Network Attached Storage (NAS)
Hybrid Storage	StorSimple	Hybrid Cloud Storage Array

- Networking

Description	Azure	Alibaba Cloud
Networking	Virtual Network (VNET)	Virtual Private Cloud (VPC)
Dedicated Network	ExpressRoute	Express Connect
NAT Gateway	N/A (part of Network Load Balancer)	NAT Gateway
Load Balancing	Network Load Balancer (Level 4) / Application Gateway (Level 7)	Server load Balancer(SLB)(SU supports bot layer 4 and layer 7)
Elastic IP	Reserved IP	Elastic IP
Cross-premises Connectivity	VPN Gateway	VPN Gateway

- Databases

Description	Azure	Alibaba Cloud
Relational Database	Azure MySQL / PostgreSQL, Azure SQL, Azure Managed SQL Instances	ApsaraDB for RDS (MySQL, PostgreSQL, MS SQL), Distributed RDS
Caching	Azure Redis	ApsaraDB for Redis/Memcache
Elastic Data Warehouse	Azure SQL Data Warehouse	HybridDB for PostgreSQL
NoSQL - Document Storage	CosmosDB for MongoDB, CosmosDB SQL (aka DocumentDB)	ApsaraDB for MongoDB
NoSQL – Key/Value	CosmosDB Table, CosmosDB Cassandra	Table Store
NoSQL – Graph	CosmosDB Graph (Tinkerpop, Gremlin)	N/A
Time-series Database	Time Series Insights	High-Performance Time Series Database (HiTSDB)
Database Migration	Database Migration Service	Data Transmission Service (DTS)

- Security

Description	Azure	Alibaba Cloud
DDoS Mitigation	DDoS Protection Service	Anti-DDoS Basic

DDoS Mitigation	DDoS Protection Service	Anti-DDoS Pro
Mobile Security	Visual Studio App Center	Mobile Security
Web Application Security	Part of Application Gateway	Web Application Firewall
Instance Security	N/A	Server Guard
Certificate Service	Part of Azure AppService, not standalone	SSL Certificates Service

- Monitoring & Management

Description	Azure	Alibaba Cloud
Monitoring	Azure Monitor	CloudMonitor
Authentication and Authorization	Azure Active Directory + Role-based Access Control	Resource Access Management
Encryption	Azure KeyVault	Key Management Service
Resource Orchestration	Azure Resource Manager	Resource Orchestration Service

- Domains & Websites

Description	Azure	Alibaba Cloud
Web Applications	Azure AppService	Web Hosting
Domain Name	Azure DNS	Domains
Domain Name System (DNS)	Azure DNS, Azure Traffic Manager	Alibaba Cloud DNS

- Analytics

Description	Azure	Alibaba Cloud
Big Data Processing	Azure	MaxCompute ,E-MapReduce
Data Visualization	PowerBI	DataV ,QuickBI
Development Platform	N/A	DataWorks

- Application Service

Description	Azure	Alibaba Cloud
Notification Service	Notification Hubs, Azure EventGrid	Message Service
API Service	API Management	API Gateway
Log Service	Log Analytics, App Insights	Log Service

Email Sending and Receiving	Through 3rd party offering SendGrid	DirectMail
Queues	Azure Queue Storage, Azure Service Bus	Message Queue

- Media Services

Description	Azure	Alibaba Cloud
Live Video Streaming	Azure Media Services	ApsaraVideo Live
Media Transcoding Service	Azure Media Services	ApsaraVideo for Media Processing

Storage

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This article discusses the main differences and similarities between Azure and Alibaba Cloud of storage & Content Delivery Network (CDN) services. It covers the following products:

Feature	Azure	Alibaba Cloud
Object storage	Blob Storage	Object Storage Service(OSS)
Content Delivery Network	Azure CDN	Alibaba Cloud CDN
File Storage	Azure Files	Network Attached Storage (NAS)
NoSQL Database	CosmosDB	Table Store

1. Object storage

This section compares Azure Blob Storage and the distributed Object Storage Service (OSS) of Alibaba Cloud.

Object storage is a type of data storage where data are managed as objects, instead of blocks or files. Typically, object storage is used to store large files that are dominated by read operations. Similar to Azure Blob Storage, Alibaba Cloud OSS boasts high reliability, cost effectiveness, and scalability. OSS is designed for 11 9s of data reliability and guarantees 99,9 % of availability per month. Each object is replicated three times across three different physical machines. Users can request data of any amount, regardless of time or location.

To distinguish between scenarios requiring different data access frequencies, Alibaba Cloud OSS categorizes storage types into Standard, Infrequent Access, and Archive, which are equally reliable but have different availability, shortest storage time, and storage overhead. For details, see [Introduction to Storage Types](#). Azure provides similar storage types which are called Hot, Cool, and Archive, respectively.

1.1 Service models

The following table compares the basic functions and terminologies of Azure Blob Storage vs Alibaba Cloud OSS:

Function Feature	Azure Blob Storage	Alibaba Cloud OSS
Object Storage	Azure Blob Storage	Alibaba Cloud OSS

Deployment Unit	Account	Bucket
Account / Bucket ACL	Supported	Supported
Max Account / Bucket Quantity	200	30
Version Control	Not natively supported (Snapshots only)	Not supported
Object identifier	Key	Key
Object Metadata	Metadata	Object meta
Object Version Control	Not natively supported (Snapshots only)	Not supported
Object Lifecycle Management	Supported	Supported
Storage type	Hot, Cool, Archive	Standard, Infrequent Access, Archive
Replication Options	LRS, ZRS, GRS, RA-GRS	Cross-Region Replication
Deployment Location	Region	Region

1.2 Storage Space & Object

1.2.1 Storage Space (Account)

Similar to an Azure Blob Storage Account from a conceptual perspective, Alibaba Cloud OSS uses so-called buckets to store data. As the place where data is stored, a bucket is configured with a region, access permission, and lifecycle to meet user requirements. An Azure Blob Storage account must be named in accordance with the DNS standard. Similarly, a bucket of Alibaba Cloud OSS must be named in line with certain standards. Account names of Azure Blob Storage and bucket names of Alibaba Cloud OSS must be globally unique, and they should not be nested.

By setting a bucket ACL, Alibaba Cloud OSS authenticates a user to see whether the user has access permission for a bucket, thereby implementing access control by storage space levels. Buckets of Alibaba Cloud OSS do not currently support version control. Azure Blob Storage provides the possibility to create snapshots of individual blobs. Snapshot dates (which are used in combination with the blob name as id) need to be managed and stored by the user, though, meaning that no native versioning feature is available but must be implemented on your own by using snapshots. Alibaba Cloud OSS will support a native versioning feature soon, please stay tuned for more information.

1.2.2 Object

Similar to Azure Blob Storage, Alibaba Cloud OSS stores file data in buckets (comparable to accounts in Azure). The file data is composed of a Key-Value and Object Meta pair. The Key is unique within a bucket, the Value stores object content, and the Object Meta is a pair of key values which describe

object properties, including last modification time, size, and custom information.

Alibaba Cloud OSS does not place a limit on the quantity and total size of objects in a bucket. In Azure Blob Storage there can be at most 500TB per account with a single blob at most 4.75TB in size. For large files, Alibaba Cloud OSS supports segment-by-segment uploading. The max file size cannot exceed 48.8 TB. The single object upload limit for OSS is 5GB. For Azure Blob Storage it is 256MB.

1.3 Security

1.3.1 Object Permission Management

Alibaba Cloud OSS and Azure Storage use different methods to manage object permissions. Azure offers two authentication methods, namely Shared Key Authentication and Shared Access Signatures (SAS). The latter one is recommended for providing temporary access to resources without exposing the master keys. Note that Shared Access Keys and SAS, respectively, are not integrated with Azure's Role-based Access Control which is comparable to Alibaba's Resource Access Management.

Each Alibaba Cloud OSS object can be configured with read and write permissions for the root account or any sub-account. By default, access permissions inherit bucket ACL properties. Users can set an ACL to Private-Read-Write, Public-Read, or Public-Read-Write. You are strongly discouraged from using the Public-Read-Write permission and should use it cautiously.

In addition, in combination with Alibaba Cloud Security Token Service (STS), OSS can employ the temporary security credentials of STS to implement object access, without exposing the account AccessKey, thereby achieving highly secure access control.

1.3.2 Data Security Management

Alibaba Cloud OSS provides similar data encryption functions as Azure Blob Storage to protect data during transmission and storage. Users can protect data in transmission by encrypting it through a client.

Alibaba Cloud OSS uses AES256 algorithms to implement data encryption on a server. After data is uploaded to OSS, the server encrypts the data and stores it on OSS. If an authorized user downloads the data, OSS decrypts the data and returns original data to the user.

Event notification

Both Alibaba Cloud OSS and Azure Blob Storage provide event notification functions. On Azure, Blob Storage is currently integrated with Azure Functions and Azure EventGrid which allows to configure routing rules from Blob storage to other services on the platform.

To enable users to receive notifications in case of an event in the storage space, Alibaba Cloud OSS allows users to create event notification rules. Based on these rules, a message will be sent to a target after the corresponding event. OSS allows an event message to be sent to a specified URL over HTTP or a topic of Alibaba Cloud Message Service. Users can obtain event messages after subscribing to

the topic.

1.4 OSS image processing service (Image service)

Alibaba Cloud OSS provides easy-to-use image processing functions for image files. After a user uploads images to OSS, the user can process the images through the RESTful API, for example, converting the image format, zooming, cropping, rotating, or adding watermarks. This is currently not natively supported by Azure Blob Storage. The following table compares the features and terminologies of the object function between Azure Blob Storage and Alibaba Cloud OSS:

Function Feature	Azure Storage	Alibaba Cloud OSS
Storage object	Object	Object
Object ACL	Supported	Supported
Max object size	4.75TB	48.8T
Data reliability	Depending on redundancy level: between 11 9s and 16 9s	99.99999999%(11s 9)
Object metadata	Metadata	Object meta
Object lifecycle management	Not Supported	Supported
Object version control	Not natively supported (only snapshots)	Not Supported
Update event notification	Supported (GRS and RA-GRS redundancy level, to paired region only)	Supported
Cross-region Replication	Supported (GRS and RA-GRS redundancy level, to paired region only)	Supported
Object append write	Supported by AppendBlobs	Supported
Concurrent or segment upload	Supported	Supported
Request protocol	HTTP/HTTPS	HTTP/HTTPS
Image processing function	Not Supported	Supported

1.5 Service level agreement (SLA)

Both Azure Storage and Alibaba Cloud OSS provide service availability guarantees. For KPIs that do not reach the guarantee standard, the cloud providers will provide compensation according to the time the service is unavailable. For details about the Alibaba Cloud OSS SLA, see [Alibaba Cloud OSS Service Level Agreement](#).

1.6 Pricing

At Azure Blob Storage users only pay for the resources they have consumed. The pricing is dependent on the storage usage by storage type and size, redundancy level, request type and quantity, storage management fees, and outbound internet traffic. Like Azure Blob Storage, Object Storage Service (OSS) fees are calculated based on the total volume of storage used, the amount of data transferred, OSS Pricing.

2. Content delivery Network

Content delivery network refers to the network of edge or proxy servers, which cache data in order to accelerate access to certain files. Azure CDN and Alibaba Cloud CDN are two global content delivery network (CDN) vendors that provide network of Edge Locations and Edge Nodes distributed globally. Note that Azure CDN currently consists of four different product offerings which differ in price and features: Azure CDN Standard from Akamai, Verizon, or Microsoft (Preview), and Azure CDN Premium from Verizon. Premium from Verizon currently offers the most features, so in our comparison we will always refer to this offering unless otherwise noted. This section compares the Azure CDN and Alibaba Cloud CDN across different dimensions.

2.1 Service model

Similar to Azure CDN, Alibaba Cloud CDN publishes source content to an edge node over a transmission network that is composed of edge nodes deployed globally. In combination with a precise scheduling system, the CDN improves users' web request speed.

2.2 Basic functions

The following table compares the basic features and terminologies of content delivery network between Azure CDN and Alibaba Cloud CDN:

Function Feature	Azure CDN	Alibaba Cloud CDN
Source Station Type	Storage Account, Azure Cloud Service, Azure WebApp, custom domain name	OSS domain name, custom domain name, and IP address
Automatic Compression	Supported	Supported
Cache Request Type	GET	GET
Transparently Transmitted Request Type	The following requests are supported but not configurable: GET, POST, HEAD, PUT, DELETE, OPTIONS, PATCH	The following requests are supported but not configurable: GET, POST, HEAD, PUT, DELETE, OPTIONS
Cache Refresh	supported	supported
Cache Failure	Not supported	Not supported

HTTP Jump to HTTPS	Supported (Verizon Premium only)	Supported
CDN Cache TTL Configuration	Supported	Supported
Access Log	Access to core reports through supplemental Verizon portal but no access to raw logs	Console
Geographic Location Limit	Supported	Not Supported

2.2.1 Source station type

Alibaba Cloud CDN can be configured with an origin site, including OSS domain name, custom origin domain name, and IP address.

2.2.2 Data compression

To reduce transmission content and accelerate delivery speed, both Alibaba Cloud CDN and Azure CDN provide the data compression function.

2.2.3 Cache request type

Azure CDN and Alibaba Cloud CDN caches GET requests and transmits POST/HEAD/PUT/DELETE/OPTIONS requests to the origin site transparently.

2.2.4 Cache refresh

In certain scenarios, for example, origin site updates or static content modifications, users may need to refresh the CDN cache manually. Alibaba Cloud CDN allows users to pull the latest content from the origin site manually to refresh the CDN content. Alibaba Cloud CDN supports URL refresh, directory refresh, and URL push. Azure CDN supports purging content based on a content path and allows to pre-load / URL push cached assets.

2.2.5 Cache invalidation

In certain scenarios, users may need to remove CDN cache content in advance. On Azure CDN, users either purge old content from the CDN or access objects based on a file name that carries a version of the objects using the object version management function. This is realized by using "Cache every unique URL" mode in combination with custom query parameters. Alibaba Cloud CDN does not currently support forcibly configuring cache invalidation.

2.2.6 Access log

Azure CDN does not provide access to the raw logs. It provides access to core reports through supplemental Verizon portal which can be manually downloaded. Alibaba Cloud CDN provides log

download/combination tools. Alibaba Cloud CDN implements log download on the console.

2.2.7 Geographic location restriction

To specify the regions where content is delivered, Azure CDN allows users to geo-filter content-based country codes. Alibaba Cloud CDN does not support this function.

2.3 Security

The following table compares the security functions and terminologies of content delivery network between Azure CDN and Alibaba Cloud CDN:

Function Feature	Azure CDN	Alibaba Cloud CDN
Full Link HTTPS	Supported	Supported
Integrated Certificate Management	Yes, through SAN certificate only.	Supported
Access Authentication	Supported	Supported
Sub-account Access Control / RBAC Integration	Supported	Supported
WAF Security Defense	Supported through Application Gateway + WAF	Supported

2.3.1 Https

Similar to Azure CDN, Alibaba Cloud CDN supports full link HTTPS speedup. Alibaba Cloud users can select a certificate using the certificate service or upload a custom certificate/private key and query and update the certificate in online mode.

With Azure CDN, customers can only use SAN certificates published by DigiCert and cannot bring their own certificates yet. Own certificates are currently only supported by Azure CDN Verizon Premium.

The two cloud providers support redirect HTTP to HTTPS. Alibaba Cloud CDN supports HTTP and HTTPS, redirect HTTP to HTTPS, and redirect to HTTP or HTTPS.

Alibaba Cloud CDN does not currently support SNI back-to-source.

2.3.2 Access authentication

Azure CDN and Alibaba Cloud CDN support access authentication for private content. Azure uses a token-based approach, while Alibaba Cloud CDN uses signature URLs through which a user initiates a request to the CDN. Upon receiving the request, the CDN node checks the request for its validity and rejects invalid requests.

2.3.3 Sub-account access control

Similar to Azure RBAC, Alibaba Cloud CDN authorizes sub-accounts with a policy to access CDN resources based on the Resource Access Management (RAM) service, thereby limiting or authorizing permissions on the CDN resources.

2.3.4 WAF security defense

Alibaba Cloud CDN can combine with WAF to implement security defence. Similar to that, Azure CDN can be combined with Application Gateway and its add-on WAF.

2.4 Streaming media

Alibaba Cloud CDN supports live streaming, on-demand, RTMP video scenarios, and provides video transcoding, slicing, and playback functions.

The following table compares the streaming media functions of Azure CDN and Alibaba Cloud CDN:

Function Feature	Azure CDN	Alibaba Cloud CDN
Live Streaming	Not supported (only through Azure Media Service)	Supported
On-demand Videos	Supported	Supported
Video Transcoding	Not supported (only through Azure Media Service)	Supported
Format	HLS, HDS, DASH, Smooth	HLS, RTMP

2.5 Pricing

Azure CDN bills outgoing (internet / region) data transfer in a tiered pay-as-you-go pricing model (the more you consume the cheaper). The exact fees depend on the CDN tier (standard vs premium), optional separate acceleration data transfers, and the node location from where the transfers are served, not the end user' s location.

The pricing of Alibaba Cloud CDN is comprised of data transfer traffic and HTTPS requests for secure acceleration. There are two billing methods for data transfer fees: Pay-By-Bandwidth and Pay-By-Traffic. You can also subscribe to one or more Traffic Packages for a year.

For the duration of the resource package, fees are deducted for your use of the traffic quota. For traffic exceeding the quota, fees are billed based on the traffic usage.

3. File storage

Azure and Alibaba Cloud both provide file storage services. In this section we are going to compare and contrast Azure Files with Alibaba Cloud Network Attached Storage (NAS).

3.1 Service model

Azure Files is accessed by Azure Virtual Machines running inside a VNET through SMB only. It allows users to create and configure file systems. You can mount an Azure Files file system on Azure virtual machines through a standard file system interface and file system access semantic.

Like Azure Files, you can access the Alibaba Cloud NAS file system through standard POSIX interfaces when using Alibaba Cloud ECS instances or other nodes such as HPC or Docker.

Function Feature	Azure Files	Alibaba Cloud NAS
Access Point	Mount target	Mount Point
Storage Capacity	5TB per share, 500TB per storage account	10 PB (Capacity-type),1 PB (Performance-type)*
Scale Up/Down	Supported (size only)	Supported
Performance	No different performance tiers	Supported
Cross Instance Access	Supported	Supported
Multiple Client Access	Supported	Supported
Access Control	Supported	Supported
Protocol	>SMB2.0	NFSv3, NFSv4, >SMB2.0*
Compute Node	Virtual Machines, AKS Node	ECS, HPC, Docker

3.2 Performance

Azure Files does not offer different performance tiers but provides static performance metrics. Per Azure Files share there is hard limit at 1000 IOPS and 60MB/s throughput independent from the size of the share. The share size can seamlessly be scaled up or down in increments of 1GB.

Alibaba Cloud NAS also offers two performance modes: capacity-type and performance-type. Each model offers different performance and storage capability.

Total throughput for each performance-type file system (MB/s) = minimum [0.6MB/s * capacity of file system (GB) + 600MB/s, 20GB/s]

Total throughput for each capacity-type file system (MB/s) = minimum [0.15MB/s * capacity of file system (GB) + 150MB/s, 10GB/s]

The upper limit of the storage capacity of an SSD performance-type file system is 1 petabyte, and that of a capacity-type file system is 10 petabytes.

Performance	Azure Files	Alibaba Cloud NAS
Latency	Millisecond level	Millisecond level
Total throughput for Each File System	60MB/s	10 GB/s (Capacity-type),20 GB/s(Performance-type)

Concurrent Clients per File System	2000	10,000+
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3.3 Security

Azure Files employs the same authentication concept as Azure Blob Storage, meaning it relies on Shared Access Keys, and Shared Access Signatures only. Currently, there is no integration with Azure Active Directory or RBAC.

Alibaba Cloud NAS provides multiple security mechanisms including support for network isolation (VPC) and user isolation (classic network), file system standard access and group permissions control, and RAM master account and sub-account authorization. These features are implemented to ensure complete data security in the file system.

3.4 Migration

Azure Files provides Azure File Sync which is a multi-master sync solution that replicates and caches data between Azure File shares and on-premises Windows servers. Users need to download and deploy a File Sync agent into the source environment, configure the source and destination file systems, and start the sync.

Alibaba Cloud NAS also provides migration tool named nasimport. It supports migration to Alibaba Cloud NAS from a wide variety of source storage including:

- Local data centers
- Alibaba Cloud OSS
- Third-party storage services (Amazon S3, Baidu Object Storage, Tencent Cloud COS, Jinshan Object Storage, UPYUN, Qiniu, and HTTP links)

Learn more about [Nasimport Tools](#).

3.5 Pricing

With Azure Files, you pay only for the storage used by your file system and not the quota set. In addition, you are charged for both REST and SMB operations. These prices vary based on the redundancy option (LRS, ZRS, GRS) you select. You don't need to provision storage in advance and there is no minimum fee or setup cost.

Like Azure Files, Alibaba Cloud NAS fees are calculated based on the total volume of storage used per month. There is no minimum fee and there are no set-up charges. There are also no charges for bandwidth or requests. Furthermore, NAS provides a storage plan for users who want to create a NAS file system. By purchasing a storage plan ahead of time, you realize significant cost savings compared to Pay-As-You-Go storage fee per GB. Learn more about [Alibaba Cloud NAS pricing](#).

4. Nosql database

Azure CosmosDB Table and Alibaba Cloud Table Store are two similar fully managed cloud NoSQL database services. With cloud-based NoSQL database service, users do not have to care about hardware provisioning, setup and configuration, replication, partitioning, software patching, and cluster scaling.

4.1 Service model

Azure CosmosDB is a fully managed NoSQL database service whose service-side latencies are typically within a single-digit millisecond which is also covered by the SLA. Azure CosmosDB storage is constrained by disk space or by a hard limit on the maximum number of indexes, document, or other high-level resources, whichever comes first. From a storage perspective there can be at most 12 partitions each 200GB, that is in total 2.4TB per database. It automatically partitions (based on your partition key) and replicates data based on so-called request units (RUs) that you manually choose. Request units measure Azure CosmosDB throughput per second, and request unit consumption varies by operation. It supports different APIs including, MongoDB, Cassandra, Gremlin, and proprietary Table and Document.

Similarly, Alibaba Cloud Table Store is a fully managed NoSQL database service based on automatic data partitioning and load balancing technologies. Based on SSD technology, this cloud NoSQL database service enables you to store large quantities of structured and semi-structured data with real-time access. Table Store also features strong consistency and single-digit millisecond latency. You can query Table Store by RESTful API, web-based Management Console, or SDKs.

Function Feature	Azure CosmosDB Table	Alibaba Cloud Table Store
Latency	Single-digit milliseconds (backed by SLA)	Single-digit milliseconds
Scale	Limited by space and/or number of indexes	Any
Storage Medium	SSD	SSD
Data Partition	Supported	Supported
Data structure	Key/Value, Document, Graph	Structured and semi-structured
Access method	SDKs, Portal, REST API	RESTful API and SDKs

4.2 Data model

A table is a collection of data in Azure CosmosDB Table. Each table contains multiple entities. An entity is a group of properties and can have its own distinct attributes. All of the attributes are scalar, which means that they can have only one value. In order to determine the partition for each entity, you must specify the primary key in each table. A primary key can be either a partition key or a

partition key & row key. In Azure CosmosDB Table every key is indexed by default at no additional cost.

Similar to Azure CosmosDB Table, the data model of Alibaba Cloud Table Store is described by Table, Row, Primary Key, and Attribute. A table is a set of rows, and a row consists of the Primary Key and Attribute. The Primary Key and Attribute consist of names and values. A table must define at least a Primary Key and the first primary key will be the partition key. Each Attribute column can contain multiple versions, and each version (that is, the timestamp) corresponds to a value, which is different from that of a Primary Key column.

Throughput is defined as reserved read/write throughput units. It reserves the necessary capacity to meet the specified throughput requirements.

4.2.1 Version control

Unlike Azure CosmosDB, Alibaba Cloud Table Store provides version management for each attribute columns. The version is a timestamp defined by the number of milliseconds that have elapsed since 01/01/1970 00:00:00 UTC. When you read from each row, you can specify the maximum number of versions per attribute column, or the version range. The earlier versions will be discarded when the number of version exceeds the value of Max Versions.

4.2.2 Time to live (TTL)

Similar to Azure CosmosDB, Alibaba Cloud offers TTL attribute which provide a mechanism to set a specific timestamp for expiring items from your table. Table Store clears any data asynchronously that exceeds the TTL. The following table compares the data model of each service:

Data Model	Azure CosmosDB Table	Alibaba Cloud Table Store
Schema	Schema-less	Schema-less
Data Unit	Table	Table
Data Record	Entity	Row
Unique Identifier	PartitionKey + RowKey	Primary Key
Primary Key Type	String, Int64, Int32, Guid, Double, DateTime, Binary	String, integer, or binary
Secondary Indexes	Auto-Indexing	Not Supported
Nested Attribute	Supported	Not Supported
Versioning	Not Supported	Supported
TTL	Supported	Supported

4.3 Performance

With Azure CosmosDB you specify the throughput capacity in terms of so-called request units (RUs)

when creating a table. When a request gets rate-limited, the server pre-emptively ends the request with RequestRateTooLargeException (HTTP status code 429) and returns the x-ms-retry-after-ms header indicating the amount of time, in milliseconds, that the user must wait before retrying the request.

Azure CosmosDB provides two options for specifying request units: on a second level and, in addition, on a minute level, to smoothen out sudden spikes.

Similar to Azure CosmosDB, the read/write throughput of Alibaba Cloud Table Store is measured by read/write capacity units (CUs). Table Store provides two options for managing throughput:

Reserved throughput: Set the reserved read/write throughput to a value greater than 0, and Table Store will assign and reserve enough resources for the table according to this configuration to guarantee low resource costs.

Additional throughput: If the actual consumed read/write throughput exceed the reserved read/write throughput, Table Store will give an additional throughput automatically to meet user' s requests.

Performance	Azure CosmosDB Table	Alibaba Cloud Table Store
Read Capacity Units(per second)	Depends on consistency level and operation. For session consistency:1KB / RU	4 KB/item
Write Capacity Units(per second)	Depends on consistency level and operation. For session consistency:1KB / 5 RU	4 KB/item

4.4 Security

Azure CosmosDB provides two authentication schemas. One uses hash-based message authentication code (HMAC) for authorization by using shared keys.

The other one integrates with Azure Active Directory and RBAC for fine-grained access control for users within your organization. You can assign unique security credentials to each user and control each user' s access to services and resources.

Alibaba Cloud Table Store also offers user-level data isolation, access control and permission management. With Resource Access Management (RAM) and Security Token Service (STS), Table Store enable users to access the tables through subaccounts with different permissions and grant users temporary access authorization.

4.5 Backup and restore

Azure CosmosDB automates the backup process. Automated backups are taken approximately every

four hours and the latest 2 backups are stored at all times. Backups are per default geo-redundantly (GRS) stored on Azure Blob Storage in the region of the current write database region (and hence also its paired region). If the data is accidentally dropped or corrupted, Azure support must be contacted within 8 hours.

Similar to Azure CosmosDB, Alibaba Cloud Table Store automates the backup and restore process. Table Store manages data with multiple cloud data backups across different servers in different racks. When any node of the backups fails, the other servers with backup copies will immediately restore to achieve virtually zero data loss.

4.6 Pricing

Azure CosmosDB offers a free 7-day trial. The pricing model works in a pay-as-you-go fashion. Azure CosmosDB fees depend on the traffic of data transfer “out” , the size of the storage, and the request units per table. Note that request units must be provisioned per table, not per database.

In contrast, Alibaba Cloud Table Store pricing is divided into four parts: data storage that exceed free quota, the reserved read/write throughput, the additional read/write throughput and the Internet downstream traffic. Learn more about <https://www.alibabacloud.com/help/doc-detail/27291.htm>

Compute

Alibaba Cloud for Azure Professionals

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- 2. Virtual Servers
 - 2.1 Instance Family Types
 - 2.2 Instance images
- 3. Automatic scalings
- 4. Container service

1. Objective

This article discusses the main differences and similarities between Azure and Alibaba Cloud compute services. It covers the following products:

Feature	Azure	Alibaba Cloud
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Virtual Servers	Azure Virtual Machines	Elastic Compute Service (ECS)
Block Storage	General and Premium Disk Storage	ECS Disks
Automatic Scaling	Virtual Machine Scale Sets	Auto Scaling
Container Service	Azure Container Service (ACS) Azure Container Service for Kubernetes (AKS)	Container Service
High Performance Computing	Azure Virtual Machines N-Series, no native PaaS Offering but 3rd party vendor offerings on Azure Marketplace	Elastic High Performance Computing (E-HPC), Super Computing Cluster

2. Virtual Servers

Both Azure Virtual Machines and Alibaba Cloud ECS provide virtual servers for cloud computing. Virtual servers, or virtual machines, provide IaaS services to users. Alibaba Cloud and Azure servers share similar terminologies and concepts, as shown in the following table:

Feature	Azure	Alibaba Cloud
Virtual Servers	Azure Virtual Machine	Alibaba Cloud ECS
Virtual Machine	Instance	Instance
Images	VM Image	Images
Ephemeral Compute	Low-priority VMs	Spot Instance
Firewall	Network Security Group	Security Group
Automatic Instance Scaling	Virtual Machine Scale Sets	Auto Scaling
Persistent Block Storage	Managed Disks (Premium SSD, Standard SSD and PremiumStandard HDD)	Cloud Disk (Basic, Ultra, SSD)
Local Mount Disk	Temporary Storage	Local Disk
Shared Block Storage	N/A	Shared Block Storage
Disk Volume Backup	Snapshot	Snapshot
VM Import	VHD, VHDX, VMDK	RAW, VHD
High Availability	Availability Set, Availability Zone, Paired Regions	Availability Zone
Third Party Integrations	VM Extensions	N/A

2.1 Instance Family Types

Alibaba Cloud and Azure employ the same method to categorize VM instances by specifications, types, and application scenarios. Each family is composed of different instance type configurations.

Alibaba Cloud ECS provides multiple types of instance families and configurations to meet business requirements and performance requirements in different scenarios. The following table lists Azure Virtual Machine instance types and Alibaba Cloud ECS instance families.

Scenario	Azure Instance Type	Alibaba Cloud ECS Instance Family
General Purpose Burstable	B	t5
General Purpose	Dv2, Dsv2, Dv3, Dsv3, Av2, A0-A7	g5, sn1, sn1ne, sn2, sn2e
Compute optimized	F, Fs, Fsv2	c4, c5, cm4, ce4, hfc5
Memory optimized	Esv3, Ev3, M, Gs, G	r5, re4, se1, se1ne
Big Data	Ls	i1, i2
Storage optimized	Ls	i1, i2
GPU	NV, NC, NCv2, NCv3, ND	ga1, gn4, gn5
FPGA	N/A	f1, f2
HPC	H, A8-11 (no bare metal)	ebmg5, sccg5, scch5

2.2 Instance Images

Instance image refers to the running environment template for virtual machine instances. Azure Virtual Machines and Alibaba Cloud ECS use images to create instances. Azure instance images are referred to as VM Images, and Alibaba Cloud instance images are simply referred to as Images. When an instance is created, Alibaba Cloud ECS provides four types of images for users to choose from: public images, cloud marketplace images, user shared images, and custom images. Azure provides officially endorsed images, custom images, and Azure marketplace images.

Public images are system images provided by Alibaba Cloud ECS for users, which are similar to the Azure officially endorsed images.

Cloud marketplace images are provided by third-party ISV partners on the Alibaba Cloud Marketplace. Beside the OS, cloud marketplace images may be preinstalled with other software and services.

Like the custom images of Azure, Alibaba Cloud custom images are created by users based on snapshots or the current state of an instance. Custom images can be shared to other specific Alibaba Cloud users by using the image sharing function of Alibaba Cloud ECS.

Like custom images in Azure, ECS images are a type of regional resource. Custom images (and shared

images) can be used only in the same region. To use the images in a different region, you need to replicate them to that region first.

Azure supports the use of uploaded images. An on premises image can be created and uploaded into Azure storage to be used to create one or more virtual machines based on that image.

Category	Azure	Alibaba Cloud
Basic (Magnetic)	Standard Disk	Basic Cloud Disk
Intermediate (Hybrid)	N/A	Ultra Cloud Disk
Advanced (I/O optimized)	Premium Disk	SSD Cloud Disk

Additionally, Alibaba Cloud also provides two types of local block storage for instances, which feature low access latency, high random IOPS, and high I/O throughput: local NVMe SSD and SATA HDD.

In Azure, except for the A0-7 and Av2 instance types (which have magnetic local disks) every VM type has SSD-based storage as local disk. The size and number are not configurable, however, and depend on the instance type.

Instance pricing model: Alibaba Cloud ECS provides pay-as-you-go and yearly/monthly subscription options. The pay-as-you-go model is similar to that of Azure Virtual Machines, which can be either pay-as-you-go or can draw from an upfront payment called an Azure Pre-commitment as part of a larger enterprise agreement or through self-service what is called Azure Reserved Instances (ARIs). The yearly/monthly purchase is a payment and settlement method used in the prepaid model, and similar to Azure Reserved Instances. Note though, that ARIs only offer yearly (1 and 3 years) reservations which can be canceled but incur a cancelation fee. Alibaba Cloud Subscriptions, in contrast, can be bought on a flexible monthly (or yearly) cadence.

As for ephemeral compute, Alibaba Cloud ECS currently provides billing models for spot instances, meaning that un-used compute capacity is traded on a spot market. Azure does not provide a spot market but rather provides Azure low-priority VMs which allows you to purchase Azure VMs at a fixed discount which is not subject to supply and demand on a spot market.

3. Virtual Servers

Auto Scaling is a feature that automatically adjusts computing resources based on the volume of user requests. Both Azure and Alibaba Cloud support automatic scaling. On Azure that feature is called Azure Virtual Machine Scale Sets, on Alibaba Cloud it is called Auto Scaling. Auto Scaling enables users to set automatic scaling policies according to actual business circumstances and add/release ECS instance resources to meet business requirements.

Both Alibaba Cloud Auto Scaling and Azure Virtual Machine Scale Sets support the following scaling modes:

- Custom mode: Add/release compute instances, such as Azure VMs and Alibaba Cloud ECS, manually.

- Scheduled mode: Users configure periodic tasks to add/release compute instances according to a schedule.
- Dynamic mode: Auto Scaling is performed automatically by monitoring compute resources. Azure adds/releases VMs instances based on the different metric sources that it can consume from host-based metrics, storage accounts, Service Bus Queues, and Applications Insights, while Alibaba Cloud adds/releases ECS instances based on the CloudMonitor scaling policy.

Function Feature	Azure Virtual Machine Scale Sets	Alibaba Cloud Auto Scaling
Custom Mode	Supported	Supported
Scheduled Mode	Supported	Supported
Dynamic Mode	Supported	Supported
Vertical Scaling	Supported	Not Supported
Launch Ephemeral Instances	Supported	Not supported yet (no spot instance integration)

Azure Virtual Machine Scale Sets are available for use at no additional fees. However, the usage of the Azure VM instances that are part of the scale set, and any other services that store or provide metrics data such as Application Insights are billed separately. Similar to Azure, Alibaba Cloud Auto Scaling is offered to customers at no extra cost. You will only be charged for the usage of the ECS instances automatically created or manually added to Auto Scaling.

4. Container Service

Azure Container Service (ACS and AKS for Kubernetes) and Alibaba Cloud Container Service are container orchestration services that simplify container management and application scaling. Both services replace the need to install, operate, and scale your container cluster infrastructure. ACS supports three different orchestrators (Docker Swarm, DC/OS, and Kubernetes). The master nodes are not, however, fully managed by ACS. In contrast, AKS only supports Kubernetes. Its master nodes are fully managed by Azure, though.

Alibaba Cloud Container Service enables you to efficiently run and manage Docker applications on a distributed cluster of Alibaba Cloud ECS instances. Being a fully-managed service, Container Service helps you to focus on your applications rather than managing container infrastructure. With Alibaba Cloud Container Service, users can deploy, manage, and expand Docker containers with ease. Alibaba Cloud Container Service supports App lifecycle management using Docker containers, provides a variety of App publishing methods and continuous delivery capabilities, supports microservice architecture, and integrates with Server Load Balancer, Security Group, Cloud Disk, and Resource Access Management.

Like Azure Container Registry, Alibaba Cloud Container Service provides an image warehouse (Container registry) hosted by Alibaba Cloud, allowing access to official Alibaba Cloud images and

those of Docker, and enables accelerated access to official Docker images. Azure ACS/AKS and Alibaba Cloud Container Service have a similar pricing model in that you do not pay for the service itself but only pay for the resources being consumed. With Azure Container Instances, AKS provides an additional fully managed option, though, to spawn containers without the need to provision a virtual machine similar to AWS Fargate. A similar feature (Serverless Kubernetes) is currently in beta on Alibaba Cloud and will be announced soon.

Just like Azure, Alibaba Cloud Container Service is free of charge. Resources used in collaboration with Container Server (including Server Load Balancer and ECS) are charged separately. ECS instances or Server Load Balancer instances automatically created from the Container Service or manually added are billed by their respective prices.

Azure Service Fabric is Microsoft's proprietary container orchestration technology allowing customers to build microservices applications that can scale up as necessary. Azure Service Fabric allows both Linux and Windows container based implementations. Service Fabric can be used to build microservices based applications that are packaged in containers or other executables and scripts.

Security

Alibaba Cloud for Azure Professionals

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This article discusses the main differences and similarities between Azure and Alibaba Cloud security services. It covers the following products:

Feature	Azure	Alibaba Cloud
Web Application Firewall	Application Gateway (Web Application Firewall)	Alibaba Cloud WAF
Anti-DDoS	Azure DDoS Protection (Azure Marketplace)	Anti-DDoS
Certificate Service	Application service certificate available on the Por	Alibaba Cloud SSL Certificates Service
Mobile Security	N/A	Mobile Security
Server Security	N/A	Server Guard (Server Security)

1. WAF

Alibaba Cloud WAF is a web application firewall that can protect web applications from vulnerability attacks such as SQL injections, XSS, and malicious bot attacks. Alibaba Cloud WAF shares many similar functionalities and technologies with Azure WAF, but it also boasts unique advantages in its defense capabilities.

1.1 Service mode comparison

The Azure Web application firewall (WAF) is integrated in the application gateway to provide services. Alibaba Cloud WAF is deployed by configuring the domain name resolution service.

1.2 Access control

Azure WAF users can add corresponding rules in access control (identification and access management) after creating an application gateway. Alibaba Cloud WAF allows ACL rule configuration after a domain name is configured and supports the combination of different HTTP fields, such as IP, URL, Referer, and User-Agent to implement precise access control. The access control policies can be applied to scenarios such as anti-leeching and website management background protection.

1.3 Web attack defense

Azure WAF provides common web attack protection such as SQL attacks, cross-site scripting attacks, HTTP response splitting, and remote file package attacks. Alibaba Cloud WAF protects against TOP 10 common threats such as OWASP, provides high/medium/low policies according to different website businesses for GET, POST and other common HTTP requests, includes website stealth that avoids site addresses being exposed to attackers, and implements regular patch updates for zero-day vulnerabilities and global patch updates.

1.4 Business risk control

Data risk control is a Big Data capability of WAF based on Alibaba Cloud, and is implemented for specific business scenarios using an industry leading risk engine and man/machine identification techniques. Alibaba Cloud WAF's Big Data ability is developed through our experience in providing world-class security to customers. This includes hosting more than 37% of China-based websites, maintaining the most popular accessed IP database in China, and mitigating more than 800 million attacks every day.

Generally, data risk control can effectively protect key businesses against spoofing behaviors, including but not limited to spam registration, SMS verification code flooding attacks, library hitting and brute force password cracking, malicious buying, robotic ticket buying, and junk email.

1.5 Console configuration

Azure WAF settings can be configured in the application gateway console, Alibaba Cloud WAF console supports domain name configuration and combination of different policies to implement access control.

Alibaba Cloud WAF also provides robust and friendly visualized console for attacks analysis and monitoring, including business analysis and security overview. Business analysis looks at recent access to different domain names. Security overview provides a general score which is obtained based on the severity of recent attacks, attacker threat, and protection rules and policies. Recent web attacks and CC attacks are displayed graphically, and common attack risks are warned in advance and are reported.

1.6 Pricing

The Azure Web application firewall is provided in the new WAF SKU, priced on the basis of hourly gateway instance fees and data processing fees. The hourly gateway pricing for WAF SKUs is different from the standard SKU fee, see Application Gateway Pricing Details. Alibaba Cloud WAF pricing is based on a monthly subscription that comes in different packages with different feature specifications. Learn more about [Alibaba Cloud WAF Pricing](#).

1.7 Feature comparison

The comparison of Azure and Alibaba Cloud WAF services can be summarized as follows:

Feature	Azure WAF	Alibaba Cloud WAF
Deployment Modes	Integrated deployment in the application network	Deployed between the client CDN and load balancer and configured with domain name resolution service to facilitate connection
Configure Web ACL Policy	Supported	Supported
Custom Rules	Supported	Supported
Types of Web Attacks	SQL injection, cross-site scripting (XSS), HTTP protocol anomalous behavior, prevention of automated programs, crawlers and scanners, and other common attacks	Common OWASP vulnerabilities, including SQL injection, XSS, Webshell uploading, backdoor isolation, command injection, illegal HTTP protocol requests, common Web server vulnerability attacks, unauthorized access to core files, path traversing, and scan protection.
HTTP Flood Protection	Supported	Supported
Risk Warning	Supported	Supported
Rules Configuration	Supported	Supported
Attacks Monitoring	Supported	Supported
Security Report	Supported	Supported
Business Analysis	Not Supported	Supported

2. Distributed denial of service (DDoS) protection service

To safeguard data and applications from DDoS attacks, Alibaba Cloud and Azure both provide cloud-based anti-DDoS services to ensure the application availability and performance of properties on the cloud. In this section, we discuss the Azure DDoS protection and Alibaba Cloud Anti-DDoS security

services.

2.1 Service model comparison

Similar to Azure DDoS protection and Azure Marketplace, Alibaba Cloud provides free and enterprise-level DDoS protection services that fall under two tiers: Anti-DDoS Basic and Anti-DDoS Pro.

Tier	Azure DDoS	Alibaba Cloud Security
Basic	Azure DDoS Basic	Alibaba Cloud Anti-DDoS Basic
Advanced	N/A(Rely on the ecological market)	Alibaba Cloud Anti-DDoS Pro

Azure DDoS protection Basic and Alibaba Cloud Anti-DDoS Basic, both with no additional costs, provide protection in the face of network layer (layer 3) and transport layer (layer 4) DDoS attacks. For web application protection, Azure users can add application layer protection through the Azure Application Gateway web application firewall. Alibaba Cloud users can subscribe to the Alibaba Cloud WAF service to minimize web attacks such as HTTP/HTTPS flooding and DDoS attacks.

Azure professional protection mainly depends on Azure's eco market. There is no professional anti attack product similar to Alibaba Anti-DDoS Pro. Alibaba Anti-DDoS Pro provides protection for layer 3/layer 4/layer 7 DDoS attacks. However, the two services differ in their technology.

Azure DDoS basic protection will prevent attack traffic and transfer the surplus to the intended destination.

Alibaba Cloud Anti-DDoS Basic supports redirection technologies. The primary protection method is automatic cleaning, supplemented by active mitigation. The service hosts the complete attack protection operation on behalf of a user.

Alibaba Cloud Anti-DDoS Pro users need to resolve the domain name to the Anti-DDoS Pro IP address for non-web services. Anti-DDoS Pro then directs all public network traffic to the Anti-DDoS server room. The user access traffic is forwarded to the source station IP by protocol based port forwarding. Meanwhile, the malicious attack traffic is cleaned and filtered through the Anti-DDoS Pro service, and normal traffic is returned to the source station IP.

2.2 Black hole policies

Azure DDoS Protection and Alibaba Cloud Anti-DDoS has a concept termed black hole. Black hole refers to the restriction of server access when the attack traffic to a server exceeds a specified threshold. Users can configure the black hole threshold for the server, and Alibaba Cloud will block external network access to the server.

The Azure DDoS Protection black hole will not be released and the user will not be notified. Alibaba Cloud black hole release time is 25 minutes — 30 days, of which 99.9% is 40 minutes to lift.

For Alibaba Cloud Anti-DDoS Basic, default threshold settings apply to ECS, Server Load Balancer, and EIP. Besides the default black hole threshold, Anti-DDoS Pro provides a higher capacity for DDoS mitigation.

2.3 Large DDoS defense

Alibaba Cloud Anti-DDoS Pro has large DDoS mitigation capability. Alibaba Cloud Security provides up to 300 Gbps (Mainland China) and 100 Gbps (Hong Kong and Singapore) DDoS mitigation, which can mitigate SYN flood, ACK flood, ICMP flood, UDP flood, NTP flood, SSDP flood, DNS flood, HTTP flood, and CC attacks.

2.4 Monitoring & Reporting

Monitoring and reporting are important parts of security services. Both Azure DDoS Protection and Alibaba Cloud Anti-DDoS provides network flow monitoring, which inspects abnormal traffic packets automatically.

In Alibaba Cloud Anti-DDoS Pro, the network traffic is monitored in real time. It also provides a detailed security report of past attacks.

2.5 product architecture

The Azure DDoS protection standard monitors the actual traffic utilization rate and compares it with the threshold defined in the DDoS policy. When the traffic threshold is exceeded, the DDoS mitigation will automatically start. When traffic is below the threshold, the mitigation will be removed.

Ali cloud' s DDoS foundation protection supports BGP and DNS two schemes in drainage technology.

Incoming traffic is diverted to Alibaba Cloud Anti-DDoS scrubbing centers through updating DNS resolution settings (web) or replacing the original website IP with an Anti-DDoS IP provided by Alibaba Cloud. As traffic passes through the Anti-DDoS service, malicious attacks can be immediately identified and mitigated. The service then forwards clean traffic to the server and ensures comprehensive DDoS protection for your infrastructure.

2.6 Pricing

Azure DDoS Protection Standard, Anti-DDoS Basic provides protection for DDoS attacks at no additional costs.

Anti-DDoS Pro is a paid service with a usage fee based on the protection capacity and carrier network. It provides two kinds of payment method: Pre-paid, Post-paid. Learn more about Anti-DDoS billing methods.

2.7 Feature comparison

Azure DDoS Protection features and terminology map to those of Alibaba Cloud Anti-DDoS as follows:

Feature	Azure DDoS Protection	Alibaba Cloud Anti-DDoS
Type of DDoS Attacks	UDP reflection attacks, SYN flood, DNS query flood, HTTP flood/cache-busting (layer 7) attacks	SYN flood, UDP flood, ACK flood, ICMP flood, DNS query flood, NTP reply flood, HTTP flood attack, and Web application attacks
Application Layer Protection	Supported	Supported
Large DDoS Mitigation Capability	N/A(Rely on the ecological market)	Supported (Anti-DDoS Pro)
Protection Capacity	Capacity do not disclosed	Anti-DDoS Basic provide 500Mbps ~ 5Gbps capacity for different regions Anti-DDoS Pro can defend against up to 300Gbps capacity
Technical Architecture	Routing techniques (Shield Advanced)	Defense room (Anti-DDoS Pro)
Service Integration	Vm,ELB, Azure DNS Traffic Manager and so on	Supports services inside and outside of the cloud

3. Certificate service

Similar to Azure Application service certificate, Alibaba Cloud SSL Certificates Service allows users to purchase, provision, and manage SSL/TSL certificates on Alibaba Cloud.

3.1 Service model

Alibaba Cloud SSL Certificates Service provides certificate purchasing, deploying, and revocation. After the certificate is issued, users can deploy digital certificates with a single click to other Alibaba Cloud services.

The Azure Application Service Certificate is used in Azure for cloud services (service certificates) and for authentication via the management API (management certificates).

3.2 Services integration

Azure App Service certificates are available for any Azure or non-Azure service and are not limited to application services.

if you have purchased Alibaba Cloud' s CDN, Anti-DDoS Pro IP, WAF, or Server Load Balance, you

need to enable HTTPS-secured visiting to these cloud products in advance. Then use the Alibaba Cloud SSL Certificates Service to deploy your purchased digital certificates to these products through one-click deployment.

3.3 Renewal

Azure App Service certificates can be set up for automatic renewal and manual renewal of certificates. Whether it is manual renewal or automatic renewal, the renewed certificate will not be automatically bound to the application.

You need to renew certificates manually on Alibaba Cloud Certificates Service. After renewal and review are complete, a new certificate will be issued. You can install this new certificate on your server to replace the expiring certificate.

3.4 Pricing

The Azure Application Service Certificate S1 Standard Edition is USD/69.99 (estimated), W1 wildcard certificate USD/299.99 (estimated).

Alibaba Cloud Certificates Service not only provides free, trusted certificates, but also provide purchasing highly-secure certificates straight from the Alibaba Cloud platform.

3.5 Feature comparison

Azure features and terminologies maps to that of Alibaba Cloud SSL Certificates Service as follows:

Feature	Azure Application service certificate	Alibaba Cloud SSL Certificate
Using Existing Certificate	Supported	Supported
Import Third-Party Certificates	Supported	Supported
Free Certificates	Supported	Supported
Paid Certificates	Supported	Supported
Renewal	Supported	Supported
Integrated Services	Certificates are available for any Azure or non-Azure service and are not limited to application services	Alibaba Cloud CDN, Anti-DDoS Pro, WAF, and Server Load Balancer
Automatic Deployment	Supported	Supported
Management	console, API, CLI , Azure PowerShell	Console

4. Mobile security

Azure does not provide security services specifically for mobile applications. Alibaba Cloud's Mobile Security provides security services for the full lifecycle of mobile app delivery, including risk detection, security protection, and threat intelligence.

4.1 Risk detection

Risk detection is implemented by uploading an APK package to scan for malicious codes and vulnerabilities. The scan result includes details of vulnerabilities, such as vulnerability quantity, names, types, and repair suggestions.

4.2 Security protection

Security protection is meant to harden apps and connect security components. Apps are hardened to provide SO shelling, and DEX files are shelled to prevent against different types of analysis tools. This feature adds security components and applies ongoing components to newly uploaded apps to prevent attacks, client information leakage, and forged requests.

4.3 Threat intelligence

Threat intelligence detects forgery and risks of network-wide apps based on big data, and keeps an eye on network disks of forums to implement multidimensional forgery detection.

4.4 Pricing

Alibaba Cloud Mobile Security Service is available in two versions: Basic Edition (Free Trial) and Professional Edition (Paid Version). For Professional Edition, Mobile Security service fee is based on two types of services: Vulnerability Scan and Application Hardening.

5. Server guard

At present, Azure has not launched a security product that covers host security. Alibaba Cloud's Server Guard is a lightweight agent installed on a server. Server Guard associates with cloud threat intelligence to implement vulnerability management, baseline detection, exception detection, and asset management, thereby creating an in-depth defense system.

5.1 Vulnerability management

Detect system software CVE vulnerabilities, Windows vulnerabilities, Web-CMS vulnerabilities and other high-risk vulnerabilities.

5.2 Baseline detection

Baseline detection checks for account security, weak passwords, and configuration risks.

5.3 Intrusion detection

By analysis of user behavior, intrusion detection detects off-site login and transaction information, brute force password cracking, and website backdoors.

5.4 Pricing

The basic version of Server Guard is currently available free of charge. When you purchase an ECS instance, you simply need to agree to our license agreement, before logging in to the Server Security Management Console. The advanced version of Server Guard, which offers additional features for enterprises, will be available in mid-2018 and will be a paid service.

Big Data

Alibaba Cloud for Azure Professionals

This article discusses the main differences and similarities between Azure and Alibaba Cloud in big data services. We mainly discuss the following service types and products:

1. Data computing

The comparison covers the products as shown in the table below.

Feature	Azure	Alibaba Cloud
Data computing	Azure HDInsight	Alibaba Cloud MaxCompute
Data processing	Azure Data Factory Azure Data Catalog	Alibaba Cloud DataWorks

1. Data computing

After collecting data to the corresponding cloud environment, these products can convert data, filter the data, and then compute on the data based on your needs.

1.1 Service comparison

The following table compares the basic functions and terminologies of Azure HDInsight vs Alibaba

Cloud MaxCompute :

Function	Alibaba Cloud MaxCompute	Azure HDInsight
Data channel	Tunnel upload/download Based on SDK plug-ins developed: DTS, Sqoop, Kettle, CLT	Kafka
	Datahub real-time transfer/Based on SDK plug- ins : OGG、Flume、 LogStash、Flunted	
Data storage	File compression store RaidFile mechanism	Azure Blob container
Calculation & Analysis task	SQL (Hive-like SQL) 、 UDF	Supported
	MapReduce	Supported
	Graph	Not supported
	Unstructured data processing	Supported
	Spark	Supported
	ElasticSearch	N/A
	BigGraph	N/A
System security	Rights Management Model: Project space users and authorizations managing Resource sharing across project spaces Project space data protection Project space security configuration	Protect enterprise data assets with Azure Virtual Network, encryption, and integration with Azure Active Directory.Meet the most popular industry and government compliance standards.
	ACL authorization	
	Policy authorization	
	Package resource sharing	
	LabelSecurity access control	
Open Source Ecology	API	Hadoop、Spark、LLAP、 Kafka、Storm、HBase、ML Services
	SDK : Python、Java	
	Log import tool : Fluentd、 Flume	
	Client : CLT、Studio	
	Open source code : R、 Sqoop、ogg、eclipse、JDBC Driver	
Maximum size	For single cluster: 10,000 +	Hadoop/Hbase cluster

	,multiple clusters supported	
Elastic scaling	Supported	Supported
Hot fix	Supported	N/A
Quasi-real-time	Supported	N/A
High availability	Storage, scheduling systems highly available, no single point of failure	HDInsight cluster provides two head nodes

1.2 Product comparison overview

Azure HDInsight

Azure HDInsight is a cloud distribution of the Hadoop components from the Hortonworks Data Platform (HDP). Azure HDInsight makes it easy, fast, and cost-effective to process massive amounts of data. You can use the most popular open-source frameworks such as Hadoop, Spark, Hive, LLAP, Kafka, Storm, R, and more. With these frameworks, you can enable a broad range of scenarios such as extract, transform, and load (ETL), data warehousing, machine learning, and IoT. Azure HDInsight is a fully managed, full-spectrum, open-source analytics service for enterprises.

Alibaba Cloud MaxCompute

Alibaba Cloud MaxCompute is the largest big data cloud service platform in China, and provides massive data storage, massive data computing, as well as data exchange among multiple organizations. Alibaba Cloud MaxCompute is a large distributed computing system independently developed by Alibaba Group. MaxCompute supports multi-cluster dual-active disaster recovery. You don't have to concern about the infrastructure stability, which allows you to concentrate on your own business. MaxCompute also ensures data consistency and continuity of its services. Alibaba Cloud MaxCompute provides users with a comprehensive set of big data development tools to improve data import and export solutions, as well as various classic distributed computing models to quickly solve massive data computation, effectively reduce enterprise cost, and safeguard data security.

1.3 Advantage and disadvantage comparison

Azure HDInsight product advantages

- Cloud native: Azure HDInsight enables you to create optimized clusters for Hadoop, Spark, Interactive query (LLAP), Kafka, Storm, HBase, and ML Services on Azure. HDInsight also provides an end-to-end SLA on all your production workloads.
- Low-cost and scalable: HDInsight enables you to scale workloads up or down. You can reduce costs by creating clusters on demand and paying only for what you use.
- Secure and compliant: HDInsight enables you to protect your enterprise data assets with Azure Virtual Network, encryption, and integration with Azure Active Directory. HDInsight also meets the most popular industry and government compliance standards.

- Monitoring: Azure HDInsight integrates with Azure Log Analytics to provide a single interface with which you can monitor all your clusters.
- Productivity: Azure HDInsight enables you to use rich productive tools for Hadoop and Spark with your preferred development environments. These development environments include Visual Studio, VSCode, Eclipse, and IntelliJ for Scala, Python, R, Java, and .NET support.
- Extensibility: You can extend the HDInsight clusters with installed components (Hue, Presto, and so on) by using script actions, by adding edge nodes, or by integrating with other big data certified applications.

Azure HDInsight product disadvantages

Azure HDInsight underlying architecture is based on open source Hadoop, Spark and other products. MaxCompute is optimized for high-concurrency processing and execution planning, the performance is better in the scenarios such as CPU-IO sensitivity calculation and large volume join calculation. The calculation time of maxcompute is more stable when the amount of data and the amount of resources are scaled up in the same ratio, it can make full use of the allocated computing resources, and the calculation and resource quantity increase in linear relation.

Under the same amount of data and resource, with the same test set and the same standard conditions, the overall performance of MaxCompute is better. In addition, MaxCompute is highly product-oriented and easier to use.

1.4 Conclusion

In summary, in data computing, Maxcompute have these advantage over Azure HDInsight:

- Fast computing and excellent performance
- Hyperscale computing and storage
- Support multiple computing engines
- Support multi-cluster and cross-cluster computing
- Big data integrated development environment
- Dramatically reducing enterprise usage costs
- High Stability and Security

2. Data processing

Data processing carries out data transfer, data conversion, and other related operations, introducing data from different data sources to transform and process the data. Finally, the data was extracted to other data systems, with the entire data acquisition, conversion, development, analysis processes completed.

2.1 Service comparison

The following table compares the basic functions and terminologies of Azure Data Factory and Azure

Data Catalog vs Alibaba Cloud DataWorks :

Function	Property	Azure Data Factory	Azure Data Catalog	Alibaba Cloud DataWorks
Data acquisition	Real-time acquisition	Not supported	N/A	Supported
	Batch acquisition	Supported	N/A	Supported
	Client acquisition	Supported	N/A	Supported
	Local data	Supported(deployment of proxy gateways)	N/A	Supported
	Cloud data	Supported	N/A	Supported
	Heterogeneous data sources	Azure storage, databases, files	N/A	support over 20 + (RDBMS, NoSQL, MPP, Unstructured storage, Big data storage, etc)
Data management	Data discovery	N/A	Supported	Supported
	Capture metadata	N/A	Supported	Supported
	Version management	N/A	Not supported	Not supported
	Capturing schema changes	N/A	Not supported	Not supported
	Automatic Identification detection	N/A	Not supported	Not supported
	Comment	N/A	Supported	Not supported
	Collecting/structuring tags	N/A	Supported	Not supported
	Data relationship	N/A	N/A	Supported
Data Conversion & Development	Automatic code generating	Not supported	N/A	Not supported
	Online editing	Not supported	N/A	Supported
	Version management	Not supported	N/A	Supported

	Mode	Based on calculating engine (HDInsight, Data Lake Analytices U-SQL, Machine Leaning,R)	N/A	Based on calculating engine(ODPS SQL, SHELL, PAI)
Orchestrating and Task Scheduling	Trigger mode	Cycle	N/A	Cycle,API trigger
	serveless	Supported	N/A	Supported
	Automatically re-run	Supported	N/A	Supported
Monitoring & Alarm	Monitor dashboard	Supported	N/A	Supported
	Alarm	Supported	N/A	Supported
Data quality	Offline monitoring	Not supported	Not supported	Supported
	Online monitoring	Not supported	Not supported	Supported
	Self-defined monitoring rules	Not supported	Not supported	Supported
Openness	API	Supported	Supported	Supported
	SDK	Supported	Supported	Not supported

2.2 Product comparison overview

Azure Data Factory

Azure data integration development tools Data Factory has been online for a long time,integrating data acquisition, data development, task monitoring capabilities.

In the second half of 2017,Data Factory released the V2 version and reconstructed the functional model,with visual drag-and-drop editing and complex process control added, and task monitoring enhanced.There has been considerable progress in the competency and user experience of complex scenes.

Azure Data Factory is a cloud-based data integration service, letting you create data-driven workflows in the cloud to coordinate and automate data movement and transformation.You can use Azure Data Factory to perform the following tasks:

- Create and schedule data-driven workflows (called pipes), so that data can be introduced from different data stores.
- Use computing services such as Aure HDinsight Hadoop, Spark, Azure Data Lake Analytices, Azure Machine Learning to processe or transform data.
- Output data to a data store (for example, Azure SQL Data Warehouse) for business

intelligence (BI) applications.

Azure Data Catalog

Azure Data Catalog is designed to help enterprises make the most of existing information assets. Data Catalog can help users who manage data to discover and understand data sources more easily. Data Catalog provides cloud-based services where you can register data sources: data is retained in an existing location, while a copy of its metadata is added to Data Catalog along with a reference to the data source location. This metadata is also indexed to facilitate easy discovery of each data source by the search function, therefore users who find the data source can understand it easily. After registering the data sources, users can enrich their metadata. Every user can provide descriptions, tags, or other metadata (such as documents that request data source access and process) to comment on the data source. This descriptive metadata supplements structured metadata, such as column names and data types, that are registered in the data source.

The primary purpose of the registering data sources is to discover and understand the data source and its purpose. Enterprise users may need data to be used for business intelligence, application development, data science, or anything else. They can use Azure Data Catalog to quickly find data that matches their needs and learn about it. The data can be then used by opening the data source in their selected tool.

In the meantime, users can also participate in the Azure Data Catalog by marking, logging, and annotating the registered data source. Users can also register for a new data source, these data sources can then be found and used by the Azure Data Catalog community.

DataWorks

- Product location: one-stop big data platform, covering data integration, data management, data development, data operation, data service sharing, data security, data quality and other stages of the big data lifecycle
- Methodology: cloud data warehouse, streaming computing
- Target User: data developers (data integration, data development, data operation), data manager (data management, data security, data quality), data users (data management, data service, real-time analytic)
- How to use: Web-side
- Deployment approach: public cloud serverless, proprietary cloud
- Development language: SQL, Java (openmr), Python, R, etc
- Service level: public test (Data Integration is officially commercial)
- Underlying engine: MaxCompute, Blink.

2.3 Advantage and disadvantage comparison

Azure Data Factory product advantages

- Rigorous conceptual model. Azure Data Factory abstract all possible objects and behaviors in data processing and establish a self-consistent system and methodology. There is virtually no possibility of ambiguity, and it's easy to extend functionality in the future.
- Rich ecosystem. Data Factory abstract The supported data sources and Processing engines as

- linked service objects, there are differences in the scope of linked service that are supported in different activities. According to the official documentation, it supports 68 different Movement data sources, supports eight different Transformation processing engines.
- Unified user experience. Data Factory, as an Azure “window”, has the consistent user experience with other Azure products, you don’t even need to create a new browser window or tab (there can be multiple windows inside a page).
 - Full support for text-based operations. All object definitions are done through JSON and all interface operations are run by the corresponding azure powershell commands. Users can completely leave the browser and save their work through text.

Azure Data Factory product disadvantages

- Online Editing of Activity is not supported. All Activity types, especially transformation, require upload scripts or define stored procedures, result in poor user experience.
- Only Pipeline-level Trigger is supported. That is, within pipeline, you can not define time requirements for Activity. As long as you satisfy the dependOn property, the Activity will be executed.
- Weak monitoring capacity. Pipeline’s monitoring is based entirely on Azure monitor, and there is no better monitoring of data quality.

Azure Data Catalog product advantages

Complete enterprise-class metadata management

Data Catalog carries on Azure’s experience in enterprise-class data management. Data Catalog integrates with Azure AD to facilitate the management of corporate organization and staff privileges. Data Catalog manages metadata permissions by ownership, annotation, registration, visibility and use terms to standardize the description of asset objects and asset attributes. All these properties are suitable for the functions of enterprise-class collaborative scenes, which constitute a more complete solution.

Data knowledge sharing and managing

Data Catalog not only manage metadata, but also manage metadata-related knowledge :

1. You can set a friendly name for an asset object that is easy to identify.
2. For asset objects and attributes, you can set a comment, Tag, or term.
3. Experts can be set up for asset objects to associate with people.
4. For asset objects you can write text-formatted documents.
5. Anyone with annotation privileges can write comments, tags, and terms.

- Data Profile

While the asset object is registered, Data Catalog collects Data Profile which contains statistical information that reflects the characteristics of the data, so that users can have a sensitive understanding of the data content.

Azure Data Catalog product disadvantages

- In terms of interface interaction, Data Catalog maintains a good user experience with informative and friendly user interface, but there are several aspects restricting the entering of new users:

1. Open to corporate or school Azure accounts only.
2. You must subscribe to Azure ready-to-use packages. Although the free version of Data Catalog itself is available, however, a subscription to this package will result in a loss of free usage for other Azure products.
3. The data source import tool must be run under Windows 64-bit operating system while MAC OS is not supported.

- Data Catalog is more independent than other Azure products. In terms of function, Azure Data Catalog focuses on the management of data catalogs and associated knowledge with no link with Data Factory, therefore its application scenario is limited. The premise for interaction with other products is that Datapipeline is seamlessly integrated, the delay in data transmission is small enough, and the possibility of compatibility problems is low enough.

2.4 Conclusion

In summary, in data warehouse and data business process areas, the advantages of DataWorks are:

- Data Integration: supports for streaming control and real-time synchronization.
- Data Development: powerful online editing capabilities to experience a comparable offline IDE.
- Monitoring Operations: supports business baseline monitoring.
- Data Management: complete data management capabilities, also provides unique functions such as classification and data desensitization.
- Data Quality: unique features in competitors.

Domains & Websites

Alibaba Cloud for Azure Professionals

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 - 2.1 Comparison of Main Functions
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 - 2.7 Comparison in Price

1.Domains

Aliyun Cloud (www.net.cn) domain name service brand provides a wide range of domain name registration and domain name trading services for entrepreneurs, small and medium-sized enterprises, and well-known brand enterprises. The user management experience is ensured by a convenient management platform, and the security of the user domain name assets is protected by a secure product strategy.

- Domain name registration: you can register various types of domain names at Alibaba Cloud Domain service.
- Domain name protection: your domain name registration information is fully protected from malicious harassment, based on the inbuilt security services such as privacy protection and security lock.
- Domain name resolution: you can use the Domain service together with Alibaba Cloud DNS. Alibaba Cloud DNS offers a free, effective, and secure DNS server to guarantee the immediate resolution of your domain name.

Enterprise Construction Station One-stop solution, service scope covers domain Name service, host service, Enterprise mailbox, website construction template, enterprise Building station personalization, cloud resolution DNS and other application services, as well as high-end enterprise e-commerce solutions and consulting services. To help enterprise customers to truly realize e-commerce applications, improve the competitiveness of enterprises.

Market No.1: For the 20th consecutive year, the domestic domain name market NO.1 has been registered. More than 20 million domain names are registered in Wanwang. 4 million domain names are inquired in Wanwang every day. We use numbers to prove "domain names, starting from Wanwang(www.net.cn)" .

Easy to use security: Intelligent query, fast registration, you can easily manage through a powerful domain name self-service platform. Unique privacy protection, security locks, self-inspection services, and intimate reminders of expiration renewal, full protection of your domain name.

Fast and stable: one-click cloud resolution, zero cost, very fast real-time effect, 99.99% availability to ensure that the service runs reliably.

High performance-to-price ratio: Refined but inexpensive service is better service, we are committed to let you spend the least money, enjoy the best products and the most professional services.

Azure does not support the purchase of domain names, and you can use Azure web apps or third-party domain registrars to purchase domain names. You can then host your domain in Azure DNS to manage your records.

2. Introduction to DNS services

Alibaba Cloud Domain Name Service (DNS) is an authoritative, highly available, and scalable domain name resolution and management service. It aims to provide enterprises and developers with a stable, secure, and intelligent service that converts website domain names and app resources into IP addresses for computer interconnection. It routes access by end users to the designated websites or app resources, at the same time as providing a DNS scheduling management service. See Alibaba Cloud DNS for more information.

Azure DNS is a hosted service for the DNS domain that provides name resolution using the Microsoft Azure infrastructure. By hosting domains in Azure, you can manage DNS records using the same credentials, APIs, tools, and billing as other Azure services.

2.1 Comparison of Main Functions

Service Type	Alibaba Cloud DNS	Azure DNS
API	Supported	Supported
Security protection	Supported	Supported
Monitoring services	Supported	Supported
Intelligent resolution service	Supported	Supported
DNS load balancing	Supported	Supported
Import file template	Supported	Unknown
DNS record types	A, CNAME, MX, AAAA, SRV, TXT, NS ...	A, AAAA, CAA, CNAME, MX, NS, PTR, SRV and TXT...
Secondary DNS	Supported	Supported
CLI/PowerShell	not Supported	Supported
Custom TTL	Supported	Supported
URL forwarding	Supported	Supported

Chinese domain name resolution	Supported	Not Supported
Wildcard domain name resolution	Supported	Supported
Subdomain name resolution	Supported	Supported
Performance	Single unit performance of up to 40 million QPS, can store over 20 million domain names, can process more than 1 billion QPS.	Unknown
Billing mode	Free version + paid version	Number of DNS regions managed+ Number of received DNS queries

2.2 Comparison in API

Alibaba Cloud DNS supports APIs. You can use an API to control domain name resolution. Please ensure that you read the Alibaba Cloud DNS instructions and user agreement before using this interface. You must sign in to your Alibaba Cloud account in order to use the API.

Azure DNS resource provider REST API allows you to create and modify DNS areas and records hosted in Azure.

2.3 Comparison in Security

Alibaba Cloud DNS with domain name resolution DDoS protection can protect over 10 million domain names against high-volume DNS and DDoS attacks of up to 500,000 QPS.

Azure DNS uses network security groups (network ACLs) to restrict communication with the network, such as blocking DNS traffic (port 53) to servers outside the trusted recursive resolver. At the same time, Azure has begun adding third-party DNS firewalls to Azure Marketplace. These are special DNS servers that check for DNS queries for signs of malware activity and warn and/or block traffic.

2.4 Comparison in Authorization

By default, when you enable DNS services with your cloud account, the cloud account has full permission to manage its own resources. With Alibaba Cloud's Resource Access Management (RAM) service, you can grant permission to access and manage the DNS resources under your cloud account to RAM sub-users.

Azure DNS can be based on Azure rolesAccess control , Control who has access to specific actions for the organization.

2.5 Comparison in Performance

Alibaba Cloud DNS is an authoritative cloud-based DNS service. With support from customers, the

service has reduced costs, allowing more businesses to enjoy low-cost, high-quality high-tech products that require no installation, no deployment, and no O&M.

Through software and hardware optimization, a single Alibaba Cloud DNS unit provides up to 40 million QPS and the capacity to store over 20 million domain names. The service can handle request volumes of over 1 billion QPS and provide more than 40 OpenAPIs to enterprises and developers.

The current Azure DNS has not yet released detailed performance indicators, and the DNS domain in Azure DNS is hosted on the Azure global network of the DNS name server. Azure DNS uses any broadcast network so that each DNS query can be automatically routed to the nearest name server to provide the best possible performance for the user.

2.6 Comparison in Monitoring Services

Alibaba Cloud DNS features a nationwide monitoring network with over 300,000 monitoring stations. The monitoring stations monitor the security of web services and calculate network latency and DNS resolution times. It also issues alerts in the event of a fault.

Azure DNS provides customers with indicators through the Azure Monitor service to help them monitor specific aspects of the DNS zone hosted in the service. In addition, with Azure DNS indicators, alerts can be configured and received based on interest criteria.

2.7 Comparison in Price

Alibaba Cloud DNS supports two versions: free and premium. You can buy the premium version on monthly or annually basis. The pay-as-you-go version will be launched soon. You can also use Alibaba Cloud DNS API, which is free. But the API cannot be used more than five times. For more information on pricing, see [Reference Price Information](#).

Azure DNS is billed based on the number of DNS zones hosted in Azure and the number of DNS queries received.. For more information on pricing, see [Azure DNS Pricing Information](#).

Media Services

Alibaba Cloud for AWS Professionals

Media Services Contents

- 1. Video-on-Demand
 - 1.1 Comparison of Main Functions

- 2. Live Video
 - 2.1 Service mode
 - 2.2 Functional characteristics
 - 2.3 Product pricing
- 3. Media processing
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1 Video-on-Demand

Video on demand is a one-stop audio and video on demand solution integrating audio and video capture, editing, uploading, automatic transcoding, media resource management, distribution acceleration and video playback.

1.1 Comparison of Main Functions

Function Feature	Azure On-demand Streaming	Alibaba Video-on-Demand
Video Uploading	Supported. Uploading Audio, video and images is available.	Supported. Uploading static H5 video, acquiring media URL, and playback unprotected contents are available.
Video Management	Supported. Allowing dynamic encryption, multilanguage caption, font customization, and short latency.	Supported. Providing data searching and filtering services, allowing audio fetch, caption composition, audiotrack overlapping, opening scene and end scene combination, and so on.
System Control	Supported	Supported
Security Management	Use AES cleartext key and PlayReady and/or Widevine dynamic common encryption	Anti-leech Referer, URL authentication, IP blacklist, and HTTPS acceleration
Data Analysis	Supported	Supported. (UV, VV, duration)
UGC SDK	Not supported	Supported
Client-side Uploading	Not supported	Supported

2 Live Video

2.1 Service mode

Azure Live Streaming : a solution built on Azure Managed Services, including Media Services

(encoding, media analytics, streaming, content protection, CDN, Azure Media Player) and Content Delivery Network (CDN).

Alibaba Video Live: an audio and video live broadcast platform based with leading content distribution networks and large-scale distributed real-time streaming media transcoding technology, providing easy access, High-definition, low-latency, high-concurrency audio and video live broadcast service.

2.2 Functional characteristics

Function Feature	Azure Encoder	ApsaraVideo for Live Streaming
Video Analysis	Supported. Decton of motion, face and expression, and content review (on porn, racial discrimination, obscenity, violence and anything you require.)	Supported. Review on porn, terrorism, advertisement, and meaningless live.
Real-time streaming processing	Supported	Supported
Video Encryption	Use AES cleartext key and PlayReady and/or Widevine dynamic common encryption	Anti-leech Referer, URL authentication, IP blacklist, and HTTPS acceleration
Acceleration	Azure CDN	Alibaba Cloud CDN
Storage Location	Blob Container	OSS Bucket
Video Playing	Azure Media Player	ApsaraVideo Player SDK

2.3 Product pricing

The billing items for Azure Video Services include encoding, live streaming, streaming, content protection, and video analytics. Users only pay for the services they use.

The billing items of Alibaba Cloud Live Broadcasting Service include live broadcast, global acceleration, live transcoding, live screenshots, live advertisement identification, live QR code recognition. Billing Method supports pre-pay and post-paid.

3 Media processing

3.1 Service mode

Azure Encoder: Azure Media Services offers several options for encoding media in the cloud. A codec is software that implements a compression/decompression algorithm.

ApsaraVideo for Media Processing has full coverage of mainstream formats, narrowband HD, double speed transcoding, video encryption. Support screenshots, watermarks, clip stitching, subtitles, video

encryption.

3.2 Functional characteristics

Function Feature	Azure Encoder	ApsaraVideo for Media Processing
Format	MPEG DASH, HLS, smooth streaming processing	H.264, H.265, and caption
Screenshot	Acquire thumbnails by frame grabbing	Image Sprite, Video abstract and highlight
Digital Restoration	Not Supported	Supported. High-frame rate video restoration, SD to HD, 2K to 4K.
Content Review	Detect motions with Azure Media Analytics, such as porn contents.	Recognize porn, terrorism, and politics-involved videos
Content Understanding	Detect motions with Azure Media Analytics to understand audience participation and reaction.	Video classification, labeling, facial and text recognition.
Video Editing	Create video abstract, thumbnails, and video after overlying, splicing and editing, with Azure Media Analytics.	Cloud Clip APIs
Digital Rights Management	Supported	Supported

3.3 Product pricing

The billing items for Azure Video Services include: coding, live streaming, streaming, content protection, video analytics. Users only pay for the services they use.

Alibaba Cloud Media Processing Service offers two billing methods: Pay-As-You-Go and Subscription(long-term packages). The fee consists of the transcoding fee and the interface request fee.

Monitoring & Management

Alibaba Cloud for Azure Professionals

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1. Monitor Service

Alibaba Cloud CloudMonitor is a service that monitors Alibaba Cloud resources and IoT (Internet of Things) applications. Alibaba Cloud CloudMonitor can be used to collect monitoring metrics for Alibaba Cloud resources or monitoring metrics customized by the user to detect service availability, and to set alerts for these metrics. It allows you to be fully aware of resource usage, service status, and service health on Alibaba Cloud, and enables you to promptly respond to error alerts and ensure smooth running of your application.

Azure Monitoring is the act of collecting and analyzing data to determine the performance, health, and availability of your business application as well as the resources that it depends on. An effective monitoring strategy helps you understand the detailed operation of your application's components. It also helps you increase your uptime by proactively notifying you of critical issues so that you can resolve them before they become problems.

1.1 Main functions comparison

In general, Alibaba Cloud CloudMonitor supports more functions than AWS ClouWatch. The following table shows the details of the comparison.

Service Type	Alibaba CloudMonitor	Azure Monitor(Azure portal)
Host monitoring	Supported	Supported
Alarm mode	Aliwangwang, Email, MNS, SMS + DingTalk (China site)	Email , SMS , call
Application group	Supported	supported
Digital operation	Dashboard , resource usage monthly report	Dashboard +Azure portal
Site monitoring	Supported	Not supported
Cloud service monitoring	Supported	Supported
Custom monitoring	Supported	Supported
Log monitoring	Supported (currently unsupported for the international site)	Supported
Overview	Overview of all cloud resource statistics, alerts, events, and resource count & level	Overview of alerts , service running status and Activity log error , Application Insights
AIP SDK	Supported	Supported

1.2 Host monitoring and cloud service monitoring

Alibaba CloudMonitor

- Hybrid cloud: Supports Alibaba Cloud host, one-click installation, authorized automatic installation, non-Alibaba Cloud hosts, and all mainstream operating systems.
- Metrics: Supports extensive metrics, for example cpu/mem, load/disk/net/device 30+f. More metrics will be supported, such as rdma gpu and virtual multiple NICs.
- Process: Top 5 process resource consumption information.
- Second-level monitoring: Collects data every second, aggregates data every 15s, averages resource consumption and business requirements.
- Monitoring: Supports monitoring of all cloud products that have been connected to CloudMonitor.

Azure Monitor

- Microsoft Azure provides rich monitoring metrics that allow users to monitor the running load and status of the cloud host. By default, Azure Monitor' s host enables the four following metrics: CPUs, memory, disks and networks. Users can perform configuration in the

- Azure console to select monitoring metrics that they want to enable.
- Metric alerts can run as frequently as once every minute. Classic metric alerts always run at a frequency of once every 5 minutes.
- You can alert on dimensional metrics, which means you can monitor a specific instance of the metric
- Azure Monitor provides basic infrastructure metrics and logs for most services available in Microsoft Azure.

1.3 Alert service

Alibaba CloudMonitor

- One-click alert function: Supports one-click alert for mainstream products, covering all instances of these products.
- Alert module: Alert module and application grouping allows quick monitoring over big data IT infrastructures.
- Supports combining product alerts to improve the user's alert configuration efficiency.
- Alert methods: Supports multi-channel alerting, including MNS subscription, emails, and Aliwangwang.

Azure Monitor

Features of the unified alert experience:

(1) View triggered Log Analytics alerts in the Azure portal

(2) Separation of triggered alerts and alert rules

(3) Combined monitoring of multiple metrics

(4) Better notification system: The unified alert uses action groups, which are named groups of notifications and actions that can be reused in multiple alerts

- Classic metric alerts: This alert triggers when the value of a specified metric crosses a threshold that you assign.
- Classic activity log alerts: This streaming log alert triggers when an activity log event is generated that matches filter criteria that you've previously assigned.
- Alert methods: Action groups support notification by posting to a webhook URL in addition to email addresses, SMS numbers, and a number of other actions.

1.4 Application group

Alibaba CloudMonitor

- Supports cross-product and cross-region resource grouping.
- Supports group-level aggregation computing and alert aggregation.

- Supports grouping custom speedup settings and time logs.
- Supports group-level authorization, subaccounts, primary/subaccounts, cross-accounts, and so on.

Azure Monitor

An action group is a collection of notification preferences defined by the user. Azure Monitor and Service Health alerts are configured to use a specific action group when the alert is triggered. Various alerts may use the same action group or different action groups depending on the user's requirements.

Azure Monitor provides two out-of-the-box roles: a Monitoring Reader and a Monitoring Contributor.

Monitoring Reader: People assigned the Monitoring Reader role can view all monitoring data in a subscription but cannot modify any resource or edit any settings related to monitoring resources.
Monitoring Contributor: People assigned the Monitoring Contributor role can view all monitoring data in a subscription and create or modify monitoring settings, but cannot modify any other resources.

1.5 Digital operation

Alibaba CloudMonitor

- dashboard : Supports cross-product and cross-region metric display. Supports log monitoring, custom monitoring, and other metrics.
- O&M weekly reports, resource utilization monthly reports (supported by Enterprise Edition).

Azure Monitor

- Dashboard: Azure portal + Dashboard
- Route the data to a third-party visualization tool using either live streaming or by having the tool read from an archive in Azure storage.

1.6 Site monitoring

Alibaba CloudMonitor

- Provides IDC probes (charged) all over Alibaba Cloud with over 300,000 astmile user probes, and a 1-minute probing capacity.
- User access simulation to see the actual status of a website.
- Checks site status, including http, ping, tcp, udp, dns, pop, smtp, ftp, and response time.
- Network fault discovery.

1.7 Custom monitoring

Alibaba CloudMonitor

- Using customized monitoring, you can quickly integrate Redis, MySQL, and other monitoring metrics to Alibaba Cloud CloudMonitor.
- Custom monitoring is a feature that allows you to customize monitoring metrics and alert rules. By using this feature, you can monitor service metrics that you care about, and report collected monitoring data to Alibaba Cloud CloudMonitor, so that Alibaba Cloud CloudMonitor can process the data and generate alerts according to the results.

Azure Monitor

- You can use the Azure Monitor REST API, cross platform Command-Line Interface (CLI) commands, PowerShell cmdlets, or the SDK to access the data in the system or in Azure storage. Examples include: getting data for a custom monitoring application you have written; creating custom queries and sending that data to a third-party application.
- In alerts, log search alerts can take custom period and frequency value in minute(s)

2 Comparison of Access Management

Alibaba Cloud Resource Access Management (RAM) is a management service designed for the centralized management of cloud identities and access permissions. You can use RAM to grant access and management permissions to Alibaba Cloud resources to your enterprise members or partners.

Azure Active Directory (Azure AD) helps you manage user identities and create intelligence-driven access policies to secure your resources. Azure AD centralizes identity and access management to enable deep security, productivity, and management across devices, data, apps, and infrastructure.

2.1 Main functions comparison

Service Type	Alibaba RAM	Azure AD
User Management	Supported	Supported
Policy management	Supported	Supported
Group Management	Supported	Supported
Role management	Supported	Supported
Centralized management	Supported	Supported
Flexibility	Supports integration with Alibaba Cloud service; supports external account management and multi-dimensional authorization	Applications can be integrated using Azure Active Directory
Availability	Multi-node redundancy deployment	Multi-tenant, geographically distributed and highly available design in Azure AD
Security	Token, access key	Multi-factor authentication

		and security tokens
Operation audit	Supported	Supported
API/SDK/CLI	API/SDK/CLI	API/SDK/CLI
Expenses	Free	Free version + paid version

2.2 Identity Management Comparison

2.2.1 User Management

User is an Alibaba Cloud RAM identity which corresponds to an operation entity, such as an operator or application. If you have a new user or application to access your cloud resources, you must create an Alibaba Cloud RAM user and grant it the access to the relevant resources.

Azure Active Directory (Azure AD) is a cloud-based directory, and identity management service that combines core directory services, application access management, and identity protection into a single solution. Microsoft's identity solutions span on-premise and cloud-based capabilities, creating a single user identity for authentication and authorization to all resources regardless of location.

2.2.2 Group Management

If you have created multiple Alibaba Cloud RAM users under your Alibaba Cloud account, we recommend you use groups to better manage the users and their permissions. You can create a group for Alibaba Cloud RAM users who share the same responsibilities, and grant permissions by group. This provides the following advantages:

- When a user's responsibility changes, you only need to move this user to a group that has the corresponding responsibility, without affecting other users.
- When a group's responsibility changes, you only need to modify the group's authorization policy that applies to all users in the group.

One of the Azure AD user management capabilities is to use groups to execute management tasks:

- A group of users created in Azure Active Directory. When a role is assigned to a group, all users in this group have this role.
- A license or permission can be assigned to multiple users at the same time.

2.2.3 Role Management

Alibaba Cloud RAM and user are both identities used in RAM. In comparison with a RAM user, a RAM role is a virtual user who does not have a long-term authentication key, and cannot be used without being played by an authorized entity.

- As a virtual user, a RAM role has a fixed identity and can be granted group authorization policies. However, it does not have a fixed identity authentication key (password or access

key).

- A RAM role differs from a RAM user in the way it is used. A RAM role must be played by an authorized entity. After playing the role successfully, the entity receives a temporary STS security token for this RAM role. Then, this entity is able to use this security token to access the resources authorized for the role.

Azure AD has a set of different management roles that are used to manage directories or identity-related functions. These administrators have access to the Azure Portal or various functions in the Azure Portal. The administrator's role determines what they can do, like create or edit users, assign administrative roles to others, reset user passwords, manage user licenses, or manage domains. Azure AD has a variety of user roles, including

- Cloud Application Administrator role
- Conditional Access Administrator role
- Application Developer role
- Intune Service Administrator role

Intune's Role-Based Access Control (RBAC) helps you control who can perform various Intune tasks within your organization, and who those tasks apply to. You can either use the built-in roles that cover some common Intune scenarios, or you can create your own roles

2.3 Authorization Management Comparison

Alibaba Cloud RAM uses permission to describe an internal identity's ability (such as user, user group, and role) to access a specific resource. A permission is used to allow or deny the execution of certain operations on certain resources under certain conditions.

In Azure AD, granting access to cloud apps is subject of user assignments. With Azure AD conditional access, you can control how authorized users can access your cloud apps under specific conditions. You can also configure access to be blocked by a policy.

2.3.1 Permissions

Alibaba Cloud RAM permissions include:

- The primary account (resource owner) controls all permissions.
- By default, RAM users (operators) have no permissions.
- Resource creators (RAM users) are not automatically granted permissions for resources created by them.

Azure AD defines two kinds of permissions:

- Delegated permission: Are used by apps that have a signed-in user present.
- Application permissions: Are used by apps that run without a signed-in user present.

2.3.2 Authorization policies

Alibaba Cloud RAM supports the following two types of authorization policies:

- System access policies: A group of commonly used permission sets created and managed by Alibaba Cloud, such as the read-only permission for ECS and the complete permission for ECS. You can use these policies, but cannot modify them.
- Custom access policies: A group of permission sets created and managed by the user. They can be used to expand and supplement system authorization policies.

In Azure AD, you can use authorized access control policies to completely stop access, or you can limit to allowing access only when other access conditions are met. Azure AD has multi-factor access policy controls, primarily including the following:

- Multi-factor authentication: Using multi-factor authentication helps protect resources from being accessed by an unauthorized user who might have gained access to a valid user's primary credentials.
- Compliant device: You can configure conditional access policies that are device-based. The objective of a device-based conditional access policy is to grant access to the configured resources only from managed devices.
- Custom controls: These controls allow the use of certain external or custom services as conditional access controls and generally extend the capabilities of Conditional Access.

2.4 Expenses

Alibaba Cloud RAM does not charge service fees. If you meet the activation criteria and have activated this service, you can use it immediately.

Free and paid versions (only billed for required functions) are available in Azure. The free version comes in four editions: Basics, Premium P1, Premium P2 and Office 365.

3 Key management service

Alibaba Cloud Key Management Service (KMS) is a secure and easy-to-use service to create, control, and manage encryption keys used to secure your data. KMS enables you to protect the confidentiality, integrity, and availability of keys while also saving on costs.

Azure Key Vault helps safeguard and manage cryptographic keys and secrets used by cloud applications and services. By using Key Vault, you can encrypt keys and secrets using keys protected by Hardware Security Modules (HSMs).

3.1 Main functions comparison

Service Type	Azure Key Vault	Alibaba Cloud KMS
API/SKD	API,SDK	API,SDK
Key management	Centralized management	Fully-managed
Key protection	Keys are safeguarded by	KMS combines a distributed

	Azure, using industry-standard algorithms, key lengths, and HSMs.	system and cryptographic hardware to achieve high reliability.
Authorized access	Azure Active Directory is used to perform authentication	Integrates RAM and supports unified authorization management
Security	Symmetric Data Encryption Keys (DEKs) are used to encrypt data	It can integrate with a variety of Alibaba Cloud services (such as ApsaraDB for RDS and OSS) and support integration with third-party services.
Service reliability	99.9%	99.9%
Scalability	Supported	Supported

3.2 API & SDK Support

Alibaba Cloud KMS allows you to generate and manage master keys using APIs as well as encrypt and decrypt small volume of data by directly using APIs. You can call KMS API interfaces by sending HTTP POST and GET requests to the KMS API server address, with corresponding request parameters included in these requests according to the interface instructions. The system will return the processing results based on the processing of the requests. Currently, Alibaba Cloud provides SDKs in four language versions: Java, Python, PHP and C#.

Managing your key vaults as well as the keys, secrets, and certificates within your key vaults can be accomplished through a REST API. You can use PowerShell to create a key vault and then store a secret in the newly created vault. Currently SDKs in NET, Java, Python and Node.js are supported by Azure Key Vault.

3.3 Key management and protection

Alibaba cloud KMS combines a distributed system and cryptographic hardware to achieve high reliability. KMS enables easy data key encryption and decryption by using Customer Master Keys (CMKs) stored in KMS and supports APIs that are based on the envelope encryption technology and open to KMS. KMS can integrate with your services and encrypt/decrypt your data keys using a master key that you specify, easily meeting the “no plain text in storage devices” requirement. KMS eliminates the risk of storing plain text directly in storage devices. Centralizing storage of application secrets in Azure Key Vault allows you to control their distribution. Keys are safeguarded by Azure, using industry-standard algorithms, key lengths, and HSMs. Access to a key vault requires proper authentication and authorization before a caller (user or application) can get access.

3.4 Access authorization

When RAM is used to implement KMS resource authorization, a user's primary account has full

operation permissions to its own resources. In the event of a sub-account, however, a user needs to grant your sub-account the corresponding resource operation permissions by using the RAM authorization.

Applications that use a Azure key vault must authenticate by using a token from Azure Active Directory. To do this, the owner of the application must first register the application in their Azure Active Directory.

3.5 Service integration

KMS allows you to integrate with a variety of Alibaba Cloud services (such as ApsaraDB for RDS and OSS) or use the RESTful API to integrate with third-party services, so that you can encrypt critical information including certificates and keys stored with these services. You can use these keys securely and conveniently, and focus on developing encryption/decryption function scenarios.

The Azure Key Vault (AKV) service is designed to improve the security and management of these keys in a secure and highly available location. For example, for SQL Server in Azure VMs, you can save time by using the AKV Integration feature. After enabling Azure Key Vault Integration, you can enable SQL Server encryption on your SQL VM.

3.6 Cost

Alibaba Cloud KMS in foreign regions has not been commercialized and therefore is now available for free. KMS in China provides three billing scenarios (charges depend on billing scenarios). 1. Common key management charges 2. Service keys management charges 3 API calling charges.

AKV offers two service tiers—standard and premium. Each service tier contains different billing items. For more information, please see [Key Vault Pricing](#).

Networking

With Alibaba Cloud network products, you can isolate cloud infrastructure, expand request processing capabilities and connect the local network to Virtual Private Cloud (VPC). For example, you can establish a secure and stable network by leveraging dedicated network connections.

No matter if you want to implement a multi-cloud architecture, or to fully migrate your services from Azure to Alibaba Cloud, this document introduces the comparison of the servicing capabilities of the networking products provided by Azure and Alibaba Cloud.

1. Networking products

The following table shows the comparison of the networking products of Azure and Alibaba Cloud.

Both have similar servicing capabilities, but vary in terms of depth and width.

Azure	Alibaba Cloud	Description
Azure Virtual Network	Virtual Private Cloud	It is a private network dedicated to you, where you can customize your own IP address range, subnets, route tables, and network gateways.
ExpressRoute	Express Connect	It enables you to establish a dedicated network connection from your local data center to cloud services. It improves the flexibility of your network topology and the quality of cross-network communications.
Azure Load Balancer	Server Load Balancer	It is a traffic distribution service that distributes network traffic across multiple cloud servers to improve the servicing capabilities of your applications, eliminating the single point of failure.
Azure DNS	Alibaba Cloud DNS	A highly available and scalable Domain Name System (DNS) service and DNS management service. Provides businesses and developers with a stable, secure, and intelligent way to route end users to websites or applications by translating domain names or applications to IP addresses. DNS management is also supported.
Azure Content Delivery Network (CDN)	Alibaba Cloud CDN	A global content delivery network (CDN) service that delivers content to the location closest to the user that is requesting the content. This increases the response speed and content delivery rate. Additionally, it resolves the delivery latency problem due to distributions, bandwidth, and server performance, greatly improving scenarios such as site speed increase and on-demand and live video streaming.
VPN Gateway	VPN Gateway	It provisions traditional Internet infrastructure to connect a local data center or a remote client to a VPC through an encrypted tunnel.
N/A	NAT Gateway	It is an enterprise-class Internet gateway that provides NAT proxy services (SNAT and DNAT) with

		of up to 10 Gbps forwarding capacity. It supports binding multiple Elastic IP Addresses and these Elastic IP Addresses share the instance bandwidth.
Elastic IP	Elastic IP Address	It is a public IP address resource that you can purchase and possess independently. You can bind an EIP to an ECS or SLB instance of the VPC network, or a NAT Gateway.

2. VPC

Azure Virtual Network and Alibaba Cloud VPC have similar architectures, usage scenarios, and features. Both services let you establish logically isolated sections of a networking environment. You can logically isolate private networks from each other.

2.1 Feature comparison

Feature	Azure Virtual Network	Alibaba Cloud VPC
Supported resources	You can use Azure resources such as Azure VM, Azure Database for MySQL and Blob Storage by provisioning them with IP addresses in your VPC.	You have full control over your VPC, including specifying its IP address range, and configuring route tables and network gateways. You can use Alibaba Cloud resources such as Elastic Compute Service (ECS), Relational Database Service (RDS), and Server Load Balancer (SLB) in your VPC.
Security policies	You can connect your VPC with your local infrastructure using an encrypted VPN connection. This extends your existing security and management policies to your VPC instances as if they were running within your infrastructure.	You can use security groups to classify instances in your VPC into different security domains and define different security policies for each security domain. You can also use Resource Access Management (RAM) to manage permissions in your VPC.
Subnet routing	Supported	Supported
Elastic network interface	Supported	Supported
Multiple IP	Supported	Supported

2.2 Costs

Both Azure Virtual Network and Alibaba Cloud VPC are free to use. However, you will be charged if you use additional services such as NAT Gateways, VPN Gateways, and Elastic IP Address, and so on.

3. Load balancing

The load balancing service distributes traffic across multiple cloud servers to improve the servicing capabilities of your applications. Azure Load Balancer and Alibaba Cloud Server Load Balancer (SLB) are slightly different in architecture and usage scenarios. Azure Load Balancer supports TCP/UDP-based protocols such as HTTP, HTTPS, and SMTP, and protocols used for real-time voice and video messaging applications. Alibaba Cloud Server Load Balancer supports Layer-4 (TCP/UDP) and Layer-7 (HTTP/HTTPS) protocols, and also provides you with the certificate management and health check functions.

3.1 Feature comparison

Feature	Azure Load Balancer	Alibaba Cloud SLB
Supported protocols	TCP/UDP/HTTP/HTTPS/SMTP	TCP/UDP/HTTP/HTTPS
IPv6	Supported	Supported
HTTP/2	Supported	Supported
WebSocket	Supported	Supported
Access control (Whitelist and blacklist)	Not supported	Supported
Domain and URL forwarding	Supported	Supported
Redirect 80 to 443	Supported	Supported
Active/standby server group	Not supported	Supported
Monitor running status	Supported	Supported
Health check	Supported	Supported
HTTPS two-way authentication	Not supported	Supported
Across region	Not supported	Not supported
Add local servers	Not supported	Supported

3.2 Costs

The Basic Azure Load Balancer is free of charge. The Standard Azure Load Balancer has a charge associated with it. The pricing for Standard Load Balancer is based on number of rules configured

(load balancer rules and NAT rules) and data processed.

The Alibaba Cloud SLB is charged on the traffic usage.

4. Dedicated network connections

You can have high-speed, stable, and secure private communications between different network environments. For example, cross-regional and cross-account connectivity between VPCs on the cloud, and the connection between your local data environment and the cloud. Dedicated network connections help improve the flexibility of your network topology and the quality of cross-network communications.

4.1 Feature comparison

Feature	ExpressRoute	Alibaba Cloud Express Connect
Dedicated network connection	Use Azure ExpressRoute to create private connections between Azure datacenters and infrastructure on your premises or in a colocation environment. ExpressRoute connections don't go over the public Internet, and they offer more reliability, faster speeds, and lower latencies than typical Internet connections.	Alibaba Cloud Express Connect enables you to physically connect your local infrastructure to Alibaba Cloud using physical leased lines. After that you can create a virtual border router (VBR) and router interfaces to connect your data center to your Alibaba Cloud VPC.
Dedicated network connection by using the Border Gateway Protocol (BGP)	Supported	Supported
VPC interconnection	Supported	Supported
Cloud Enterprise Network	Not supported	Supported

4.2 Costs

For Azure ExpressRoute, all inbound data transfer is free of charge, and all outbound data transfer is charged based on a pre-determined rate. Alibaba Cloud bills you on a daily or monthly basis. You are charged on leased line and traffic usage.