



Microsoft Azure

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2 Azure Fundamental

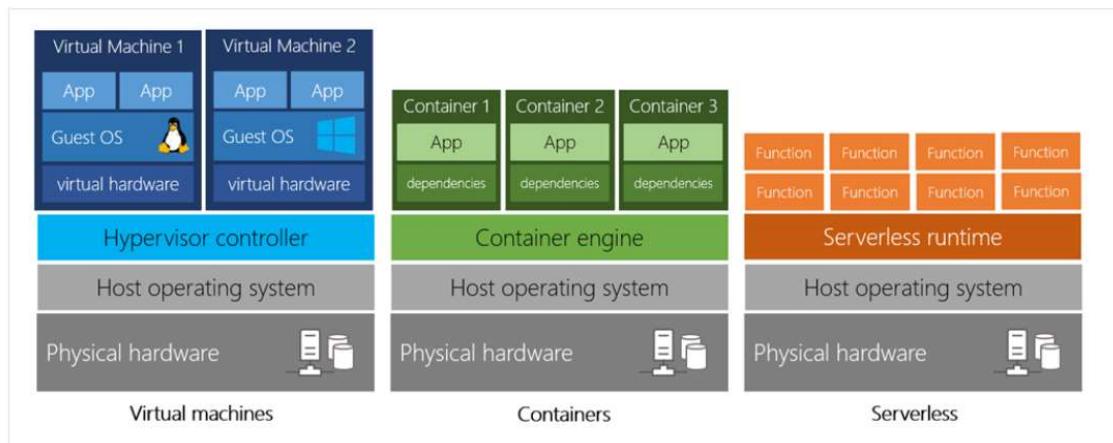
2.1 Unit 1 – Principles of cloud computing

2.1.1 Introduction

Cloud computing is renting resources, like storage space or CPU cycles, on another company's computers. You only pay for what you use.

Cloud providers typically include:

- Compute power - such as Linux servers or web applications used for computation and processing tasks. Compute power can be provided by means of VMs, containers and serverless computing depending on your needs.



- Storage - such as files and databases.
- Networking - such as secure connections between the cloud provider and your company.
- Analytics - such as visualizing telemetry and performance data.

2.1.2 Benefits

- Consumption-based pricing model.
- Scalability – vertical scaling in order to add CPUs (scaling up) or memory or horizontal scaling to add more than one server (scaling out, scale in is to release resources).
- Elastic - as your workload changes due to a spike or drop in demand, a cloud computing system can compensate by automatically adding or removing resources.
- It is instant - you're able to focus on what matters: building and deploying applications. Cloud usage eliminates the burdens of maintaining software patches, hardware setup, upgrades, and other IT management tasks.
- Reliable - Cloud computing providers offer data backup, disaster recovery, redundancy, and data replication services to make sure your data is always safe. Fault tolerance up to 99,999%.
- Global - cloud providers have fully redundant datacenters located in various regions all over the globe. This gives you a local presence close to your customers to give them the best response time

- Secure - cloud providers offer a broad set of policies, technologies, controls, and expert technical skills that can provide better security than most organizations can otherwise achieve.
- Economies of scale - is the ability to do things more efficiently or at a lower-cost per unit when operating at a larger scale.

2.1.3 Capital (CapEx) vs Operational expenditure (OpEx)

- Capital Expenditure (CapEx): CapEx is the spending of money on physical infrastructure up front, and then deducting that expense from your tax bill over time. CapEx is an upfront cost, which has a value that reduces over time. Fixed costs.
- Operational Expenditure (OpEx): OpEx is spending money on services or products now and being billed for them now. You can deduct this expense from your tax bill in the same year. There's no upfront cost. You pay for a service or product as you use it. Ideally for unpredictable demands.

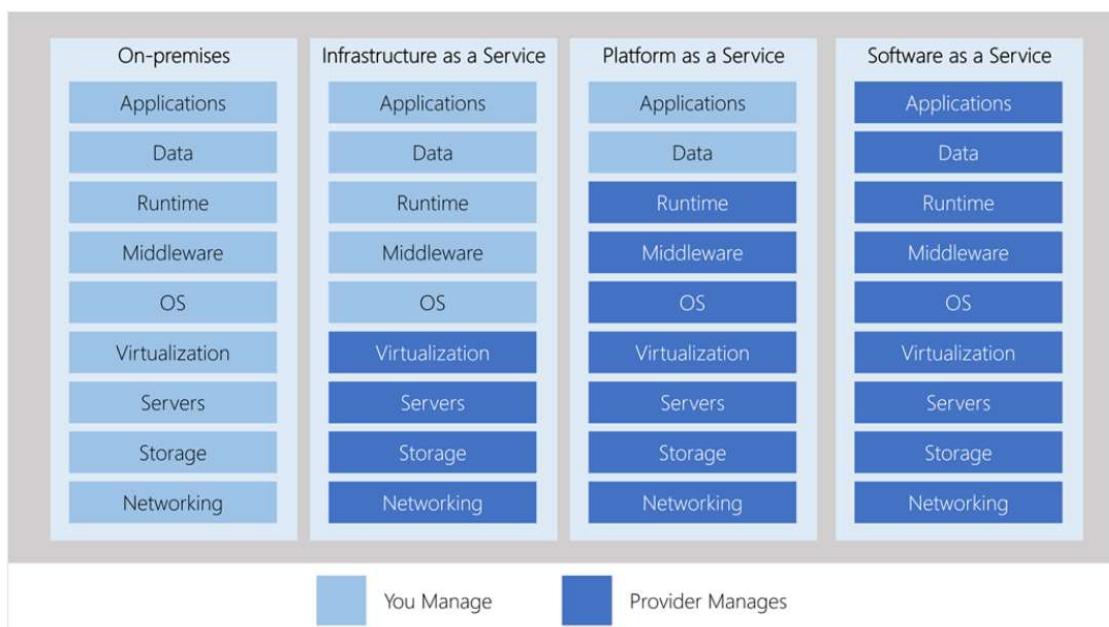
2.1.4 Cloud deployment

Where data is stored and how customers interact with it.

- Public cloud – no local hardware, everything runs on your cloud provider.
- Private cloud - you create your own cloud environment in your own datacenter.

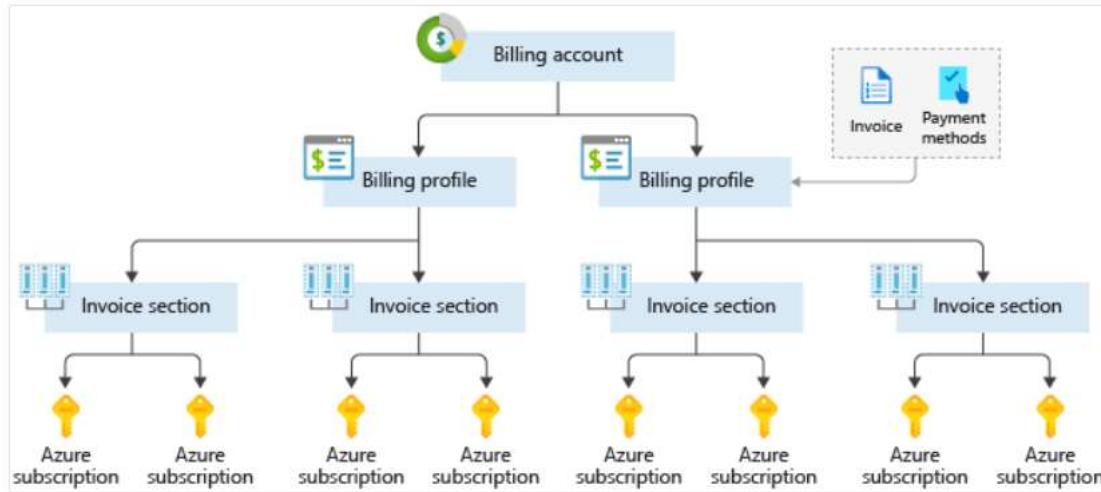
2.1.5 Cloud services

- Infrastructure as a Service (IaaS) – most control over the provided hardware that runs your app by means of VMs.
- Platform as a service (PaaS) – control over the provided environment in order to run, test and deploy your software applications.
- Software as a service (SaaS) – least control. A software is delivered to the end customers and they manage it.



2.2 Unit 2 – Create an Azure account

2.2.1 Understand Azure billing



The Azure subscription for a user is the one that keeps the resources and elements available.

You might create different types of Azure subscriptions in terms of:

- **Environments:** When managing your resources, you can choose to create subscriptions to set up separate environments for development and testing, security, or to isolate data for compliance reasons.
- **Organizational structures:** You can create subscriptions to reflect different organizational structures. For example, you could limit a team to lower-cost resources, while allowing the IT department a full range.
- **Billing:** You might want to also create additional subscriptions for billing purposes (cost centers). Because costs are first aggregated at the subscription level, you might want to create subscriptions to manage and track costs based on your needs.

2.2.2 Azure support plans for customers

	Developer	Standard	Professional Direct
Best for	Non-critical workloads	Production workloads	Business-critical workloads
Reactive technical support	1 business day response	1-hour response for critical cases	1-hour response + priority tracking of critical cases
Proactive technical support	Not applicable	Not applicable	Access to a pool of technical experts

For the full list, see [Azure support plans](#).

2.3 Unit 3 – Azure services

- **Compute:** such as Azure Virtual Machines running Windows or Linux or Azure Kubernetes Service to create a cluster of VMs that run services that communicate with each other.

- **Networking:** Azure Virtual Network in order to connect VMs with VPNs in the company or Azure Load Balancers to balance inbound or outbound communication to service endpoints. Not to mention high-performance VPNs in order to access the Azure Virtual Network, firewalls and traffic managers.
- **Storage:** Blob storage (videos, large pictures), Table storage (NoSQL databases), Queue storage (in order to queue and deliver messages).
- **Mobile:** Azure enables developers to create mobile backend services for iOS, Android, and Windows apps quickly and easily.
- **Databases:** SQL, MariaDB, MySQL, Cache for Redis.
- **Web:** Azure includes first-class support to build and host web apps and HTTP-based web services. The Azure App Service is an example of platform (PaaS) that you can use as a host for your webs.
- **Internet of Things:** Now the internet allows any item that's online-capable to access valuable information.
- **Big Data:** Run analytics at a massive scale using a cloud-based Enterprise Data Warehouse (EDW) that leverages massive parallel processing (MPP).
- **Artificial Intelligence:** Azure Machine Learning Service.
- **DevOps - Azure DevOps Services** (formerly known as Visual Studio Team Services, or VSTS), provides development collaboration tools including high-performance pipelines, free private Git repositories, configurable Kanban boards, and extensive automated and cloud-based load testing. What we use to develop.

2.4 Unit 4 - Azure architecture and service guarantees

2.4.1 Regions

A region is a geographical area on the planet containing at least one, but potentially multiple datacenters that are nearby and networked together with a low-latency network.

When you deploy a resource in Azure, you will often need to choose the region where you want your resource deployed.



2.4.2 Geographies

Azure divides the world into geographies that are defined by geopolitical boundaries or country borders. An Azure geography is a discrete market typically containing two or more regions that preserve data residency and compliance boundaries.

Geographies are broken up into the following areas:

- Americas
- Europe
- Asia Pacific
- Middle East and Africa

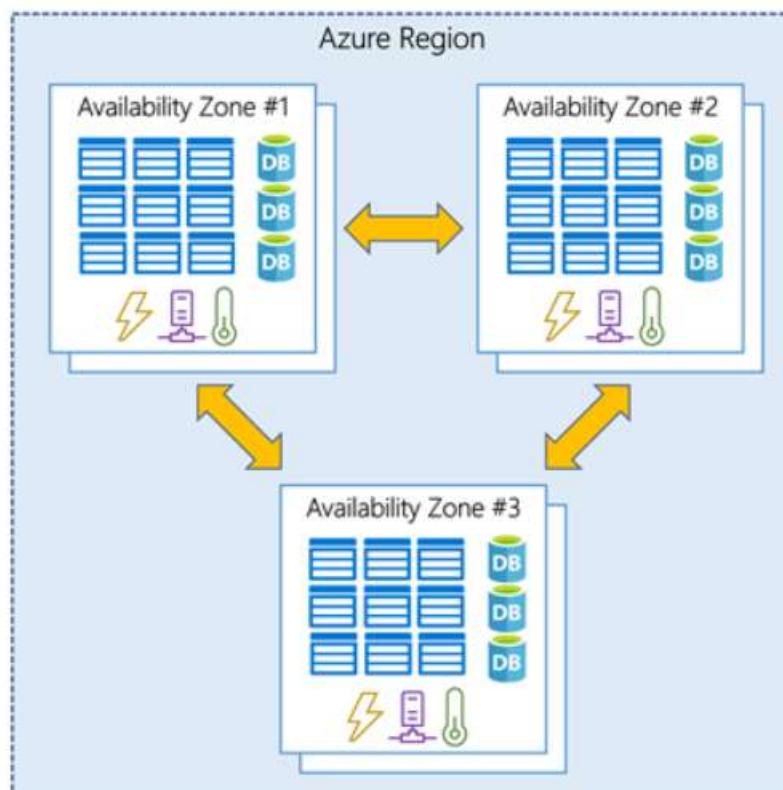
Each region belongs to a single geography and has specific service availability, compliance, and data residency/sovereignty rules applied to it.

2.4.3 Availability zone

Availability Zones are physically separate datacenters within an Azure **region**.

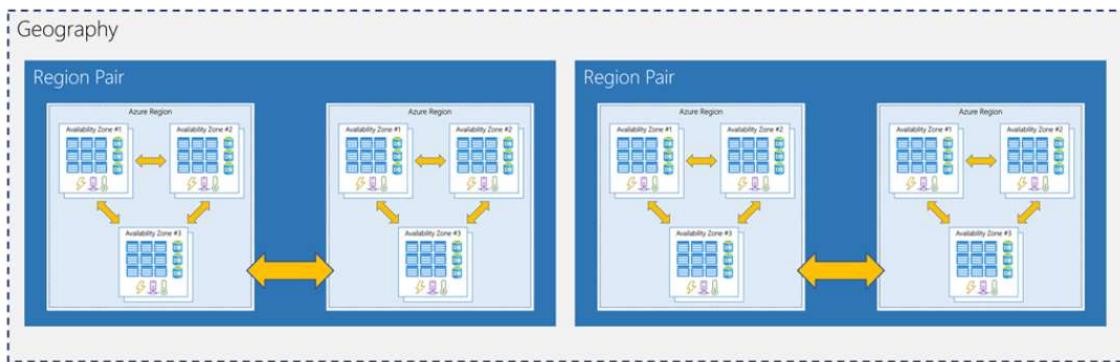
Each Availability Zone is made up of **one or more datacenters equipped with independent power, cooling, and networking**. It is set up to be an isolation boundary. If one **availability zone** goes down, the other continues working. **Availability Zones are connected** through high-speed, private fiber-optic networks.

Availability Zones are primarily for VMs, managed disks, load balancers, and SQL databases. You can locate your compute, storage, networking, and data resources within a zone and replicating in other zones.



2.4.4 Region pair

Each Azure region is always paired with another region within the same geography (such as US, Europe, or Asia) at least 300 miles away. This approach allows for the **replication of resources** (such as virtual machine storage) across a geography that helps reduce the likelihood of interruptions due to events such as natural disasters, civil unrest, power outages, or physical network outages affecting both regions at once.



Since the pair of regions is directly connected and far enough apart to be isolated from regional disasters, you can use them to provide reliable services and data redundancy so to avoid disruptions.

2.4.5 Service-Level agreement

Uptime and Connectivity Guarantees

A typical SLA specifies performance-target commitments that range from 99.9 percent ("three nines") to 99.999 percent ("five nines"), for each corresponding Azure product or service. These targets can apply to such performance criteria as uptime or response times for services.

The following table lists the potential cumulative downtime for various SLA levels over different durations:

SLA %	Downtime per week	Downtime per month	Downtime per year
99	1.68 hours	7.2 hours	3.65 days
99.9	10.1 minutes	43.2 minutes	8.76 hours
99.95	5 minutes	21.6 minutes	4.38 hours
99.99	1.01 minutes	4.32 minutes	52.56 minutes
99.999	6 seconds	25.9 seconds	5.26 minutes

2.4.6 Resiliency

Resiliency is the ability of a system to recover from failures and continue to function. It's not about avoiding failures, but responding to failures in a way that avoids downtime or data loss.

2.4.7 Availability

Availability refers to the time that a system is functional and working. Maximizing availability requires implementing measures to prevent possible service failures. For example: A workload that requires 99.99 percent uptime shouldn't depend upon a service with a 99.9 percent SLA.

2.5 Unit 5 – Manage services with the Azure portal

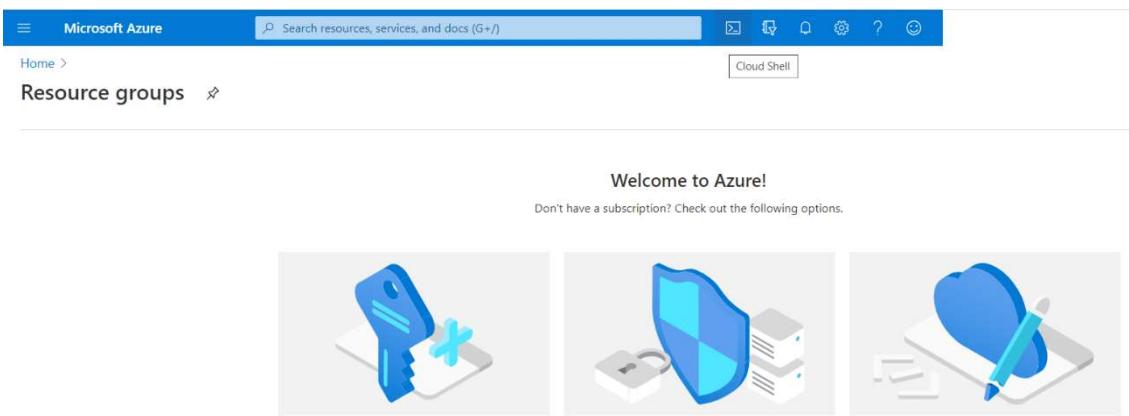
2.5.1 Azure portal

The Azure portal is a public website that you can access with any web browser. Once you sign in with your Azure account, you can create, manage, and monitor any available Azure services.

The dashboard view provides high-level details about your Azure environment. You can customize the dashboard by moving and resizing tiles, and displaying services you're interested in.

An Azure dashboard is stored as a JSON file.

2.5.2 Azure PowerShell

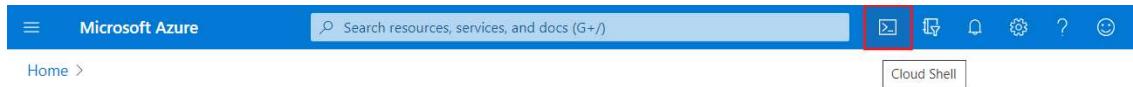


Azure PowerShell is a module that you can install for Windows PowerShell or PowerShell Core, which is a cross-platform version of PowerShell that runs on Windows, Linux, or macOS. Azure PowerShell enables you to connect to your Azure subscription and manage resources.

- **New-AzVM:** command that creates a virtual machine for you inside your Azure subscription.
- **Connect-AzAccount:** sign in to your Azure account (subscription).

Creating administration scripts and using automation tools is a powerful way to optimize your workflow.

2.5.3 Azure Cloud Shell



Azure Cloud Shell is an interactive, authenticated, browser-accessible shell for managing Azure resources. It provides the flexibility of choosing the shell experience that best suits the way you work, either Bash or PowerShell.

You can switch between the two shells, and both support the Azure CLI and Azure PowerShell module. Bash defaults to the Azure CLI (with the az command pre-installed), but you can switch to PowerShell Core within Linux by typing pwsh.

2.5.4 Azure CLI

Azure CLI is a cross-platform command-line program that connects to Azure and executes administrative commands on Azure resources. Cross-platform means that it can be run on Windows, Linux, or macOS.

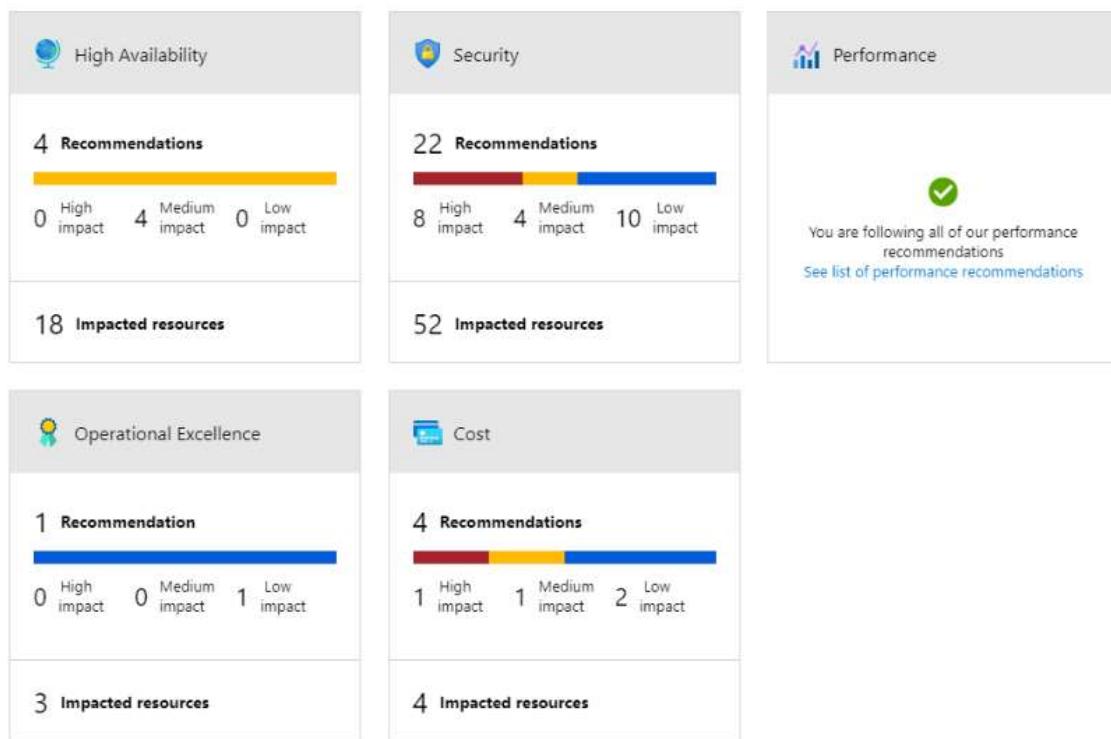
- **az vm create:** command that creates a virtual machine for you inside your Azure subscription.
- **az login:** sign in to your Azure account (subscription).

2.5.5 Azure mobile app

It allows you to access, manage, and monitor all your Azure accounts and resources from your iOS or Android phone or tablet.

2.5.6 Azure Advisor

It is a free service built into Azure that provides recommendations on high availability, security, performance, operational excellence, and cost. Advisor analyzes your deployed services and looks for ways to improve your environment across those areas.



2.6 Unit 6 – Azure compute concepts

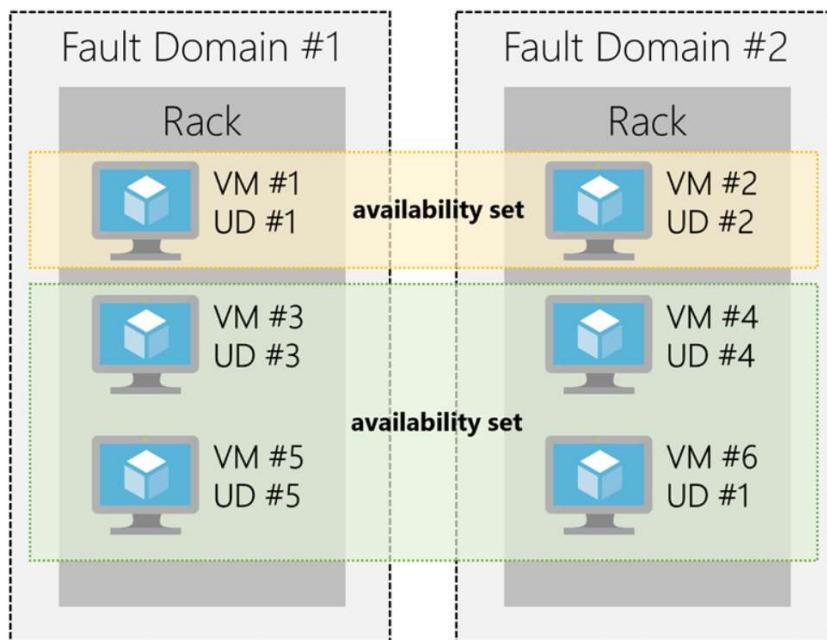
2.6.1 Virtual machines

VMs are software emulations of physical computers. They include a virtual processor, memory, storage, and networking resources. They host an operating system (OS), and you're able to install and run software just like a physical computer.

2.6.1.1 *Availability sets*

An availability set is a logical grouping of two or more VMs that help keep your application available during planned or unplanned maintenance. When the VM is part of an availability set, the Azure fabric updates are sequenced so not all of the associated VMs are rebooted at the same time.

Your VMs are then sequentially placed across the fault and update domains. The following diagram shows an example where you have six VMs in two availability sets distributed across the two **fault domains** (unplanned events that affect VMs with common hardware) and five **update domains** (planned maintenance where VMs with common hardware are rebooted at the same time).



There's no cost for an availability set. You only pay for the VMs within the availability set. In the case above you would have to pay for the use of the 6 VMs.

2.6.1.2 *Machine scale sets*

Scale sets allow you to centrally manage, configure, and update a large number of VMs in minutes to provide highly available applications. The number of VM instances can automatically increase or decrease in response to demand or a defined schedule. With Virtual Machine Scale Sets, you can build large-scale services for areas such as compute, big data, and container workloads.

2.6.1.3 *Azure Batch*

Azure Batch enables large-scale job scheduling and compute management with the ability to scale to tens, hundreds, or thousands of VMs.

2.6.2 *Containers*

Containers are a virtualization environment for running applications. Just like virtual machines, containers run on top of a host operating system. But unlike VMs, containers don't include an

operating system for the apps running inside the container. Instead, containers bundle the libraries and components needed to run the application and use the existing host OS running the container.

Containers are often used to create solutions using a microservice architecture. This architecture is where you break solutions into smaller, independent pieces.

2.6.2.1 Azure Container Instances

Azure Container Instances (ACI) offers the fastest and simplest way to run a container in Azure. You don't have to manage any virtual machines or configure any additional services. It is a PaaS offering that allows you to upload your containers and execute them directly with automatic elastic scale.

2.6.2.2 Azure Kubernetes Service

The task of automating, managing, and interacting with a large number of containers is known as orchestration. Azure Kubernetes Service (AKS) is a complete orchestration service for containers with distributed architectures with multiple containers.

2.6.3 Azure App Service

Azure App Service is a platform-as-a-service (PaaS) offering in Azure that is designed to host enterprise-grade web-oriented applications.

2.6.3.1 App Service costs

You pay for the Azure compute resources your app uses while it processes requests based on the App Service Plan you choose. Depending on your demands you can choose a different service plan based on the Web requests you think you will get.

2.6.3.2 Types of app services

- Web apps.
- Web jobs.
- API apps.

2.6.4 Serverless Computing

It is a cloud-hosted execution environment that runs your code but completely abstracts the underlying hosting environment. You create an instance of the service, and you add your code.

- Serverless computing is an excellent fit for workloads that respond to incoming events. Events include triggers by timers (for example, if a function needs to run every day at 10:00 AM UTC), HTTP (API and webhook scenarios), queues (for example, with order processing), and much more.
- With serverless computing, they pay only for the time their code runs. If no active function executions occur, they're not charged.

2.6.4.1 Azure Functions

They're commonly used when you need to perform work in response to an event, often via a REST request, timer, or message from another Azure service and when that work can be completed quickly, within seconds or less.

2.6.4.2 Azure logic apps

Where Functions execute code, Logic Apps execute workflows designed to automate business scenarios and built from predefined logic blocks. Every logic app workflow starts with a trigger, which fires when a specific event happens or when newly available data meets specific criteria.

You create Logic App workflows using a visual designer on the Azure portal or in Visual Studio. The workflows are persisted as a JSON file with a known workflow schema.

Azure provides over 200 different connectors and processing blocks to interact with different services.

-	Functions	Logic Apps
State	Normally stateless, but Durable Functions provide state	Stateful
Development	Code-first (imperative)	Designer-first (declarative)
Connectivity	About a dozen built-in binding types, write code for custom bindings	Large collection of connectors, Enterprise Integration Pack for B2B scenarios, build custom connectors
Actions	Each activity is an Azure function; write code for activity functions	Large collection of ready-made actions
Monitoring	Azure Application Insights	Azure portal, Log Analytics
Management	REST API, Visual Studio	Azure portal, REST API, PowerShell, Visual Studio
Execution context	Can run locally or in the cloud	Runs only in the cloud.

2.7 Unit 7 – Azure Storage

2.7.1 Benefits

- Automated backup and recovery.
- Replication across the globe.
- Support for data analytics.
- Encryption.
- Multiple data types.
- Data storage in virtual disks.
- Storage tiers.

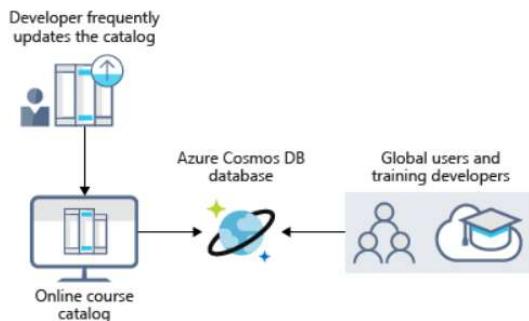
2.7.2 Azure SQL Database

Azure SQL Database is a relational database as a service (DaaS) based on the latest stable version of the Microsoft SQL Server database engine. SQL Database is a high-performance, reliable, fully managed and secure database.

2.7.3 Azure Cosmos DB

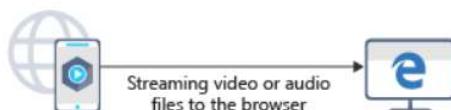
Azure Cosmos DB is a globally distributed database service. It supports schema-less data that lets you build highly responsive and Always On applications to support constantly changing

data. You can use this feature to store data that is updated and maintained by users around the world.



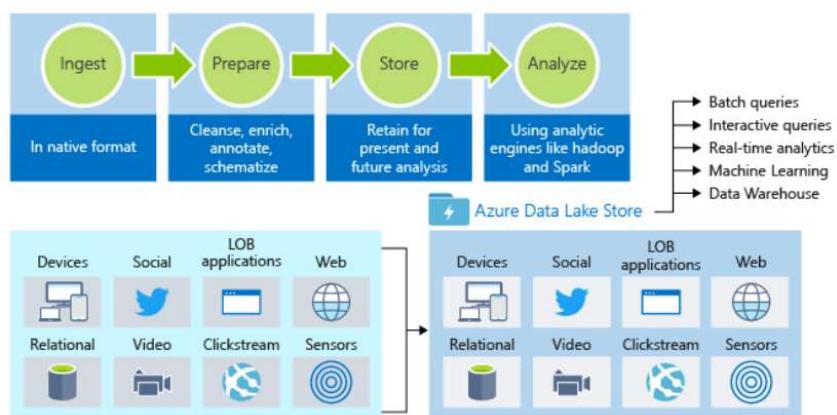
2.7.4 Azure Blob storage

Azure Blob Storage is unstructured, meaning that there are no restrictions on the kinds of data it can hold. Blobs are highly scalable and apps work with blobs in much the same way as they would work with files on a disk, such as reading and writing data. Blob Storage can manage thousands of simultaneous uploads, massive amounts of video data, constantly growing log files, and can be reached from anywhere with an internet connection.



2.7.5 Azure Data Lake Storage

Azure Data Lake Storage combines the scalability and cost benefits of object storage with the reliability and performance of the Big Data file system capabilities.

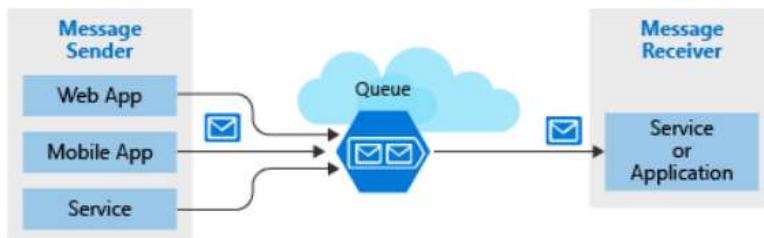


2.7.6 Azure Files (like dropbox)

Azure Files offers fully managed file shares in the cloud that are accessible via the industry standard Server Message Block (SMB) protocol. Azure file shares can be mounted concurrently by cloud or on-premises deployments of Windows, Linux, and macOS. Applications running in Azure virtual machines or cloud services can mount a file storage share to access file data, just as a desktop application would mount a typical SMB share.

2.7.7 Azure Queue (like Neuron)

Azure Queue Storage can be used to help build flexible applications and separate functions for better durability across large workloads. When application components are decoupled, they can scale independently. Queue storage provides asynchronous message queueing for communication between application components.



2.7.8 Disk Storage (virtual hard disks)

Disk storage provides disks for virtual machines, applications, and other services to access and use as they need, similar to how they would in on-premises scenarios. Disk storage allows data to be persistently stored and accessed from an attached virtual hard disk.

2.7.9 Storage tiers

Choose a tier for blob object storage.

- **Hot storage tier:** optimized for storing data that is accessed frequently.
- **Cool storage tier:** optimized for data that are infrequently accessed and stored for at least 30 days.
- **Archive storage tier:** for data that are rarely accessed and stored for at least 180 days with flexible latency requirements.

2.7.10 Encryption and replication

Azure provides security and high availability to your data through encryption and replication features.

2.7.11 Comparison between Azure data storage and on-premises storage

- Cost effectiveness.
- Reliability.
- Storage types.
- Agility and elasticity.

2.8 Unit 8 - Azure networking options

2.8.1 Azure region

A region is one or more Azure data centers within a specific geographic location.

2.8.2 Virtual network

A virtual network is a logically isolated network on Azure. Azure virtual networks will be familiar to you if you've set up networks on Hyper-V, VMware, or even on other public clouds. A virtual network allows Azure resources to securely communicate with each other, the internet, and on-premises networks.

2.8.3 Network security group

A network security group, or NSG, allows or denies inbound network traffic to your Azure resources. Think of a network security group as a cloud-level firewall for your network.

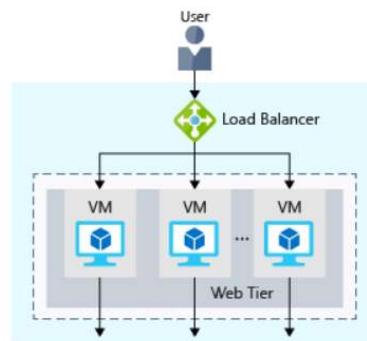
This VM's network security group allows inbound traffic over these ports from all sources. You can configure a network security group to accept traffic only from known sources, such as IP addresses that you trust.

2.8.4 Load balancer

A load balancer distributes traffic evenly among each system in a pool. A load balancer can help you achieve both high availability and resiliency.

The load balancer becomes the entry point to the user. The user doesn't know (or need to know) which system the load balancer chooses to receive the request.

The load balancer receives the user's request and directs the request to one of the VMs in the web tier. If a VM is unavailable or stops responding, the load balancer stops sending traffic to it. The load balancer then directs traffic to one of the responsive servers.

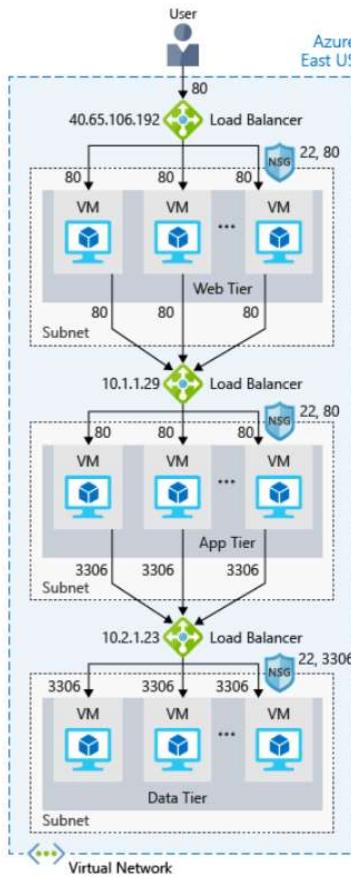


2.8.4.1 Availability and high availability

Availability refers to how long your service is up and running without interruption. High availability, or highly available, refers to a service that's up and running for a long period of time.

2.8.4.2 Resiliency

Resiliency refers to a system's ability to stay operational during abnormal conditions.



2.8.5 Azure Application Gateway

If all your traffic is HTTP, a potentially better option is to use Azure Application Gateway.

Application Gateway is a load balancer designed for web applications. It uses Azure Load Balancer at the transport level (TCP) and applies sophisticated URL-based routing rules to support several advanced scenarios.

- Cookie affinity. Useful when you want to keep a user session on the same backend server.
- SSL termination. Application Gateway can manage your SSL certificates and pass unencrypted traffic to the backend servers to avoid encryption/decryption overhead. It also supports full end-to-end encryption for applications that require that.
- Web application firewall. Application gateway supports a sophisticated firewall (WAF) with detailed monitoring and logging to detect malicious attacks against your network infrastructure.
- URL rule-based routes. Application Gateway allows you to route traffic based on URL patterns, source IP address and port to destination IP address and port. This is helpful when setting up a content delivery network.
- Rewrite HTTP headers. You can add or remove information from the inbound and outbound HTTP headers of each request to enable important security scenarios, or scrub sensitive information such as server names.

2.8.6 Azure Traffic Manager

Traffic Manager uses the DNS server that's closest to the user to direct user traffic to a globally distributed endpoint. Traffic Manager can route traffic in a few different ways, such as to the endpoint with the lowest latency.

Load Balancer and Traffic Manager both help make your services more resilient, but in slightly different ways. When Load Balancer detects an unresponsive VM, it directs traffic to other VMs in the pool. Traffic Manager monitors the health of your endpoints. When Traffic Manager finds an unresponsive endpoint, it directs traffic to the next closest endpoint that is responsive.



2.8.6.1 Latency

Latency refers to the time it takes for data to travel over the network. Latency is typically measured in milliseconds.

2.8.6.2 Bandwidth

Bandwidth refers to the amount of data that can fit on the connection.

2.8.6.3 Scale out (horizontal scaling) to different regions

One way to reduce latency is to provide exact copies of your service in more than one region. The following illustration shows an example of global deployment.

2.9 Unit 9 – Security in Azure

Defense in depth is a strategy that employs a series of mechanisms to slow the advance of an attack aimed at acquiring unauthorized access to information. Each layer provides protection so that if one layer is breached, a subsequent layer is already in place to prevent further exposure.

- **Data** security stored in DBs, hard disks, cloud storage.
- **Application** secure and free of vulnerabilities, sensitive application secrets in a secure storage.
- **Compute**. Secure access to VMs and server and VMs protection.
- **Networking**. Limit comms between resources and deny by default approaches. Also restrict inbound internet access that are not known.
- **Perimeter**. Distributed denial of service (DDoS) protection to filter large-scale attacks. Use perimeter firewalls.
- **Identity and access**. Use multi-factor authentication, audit changes and control access to infrastructure.
- **Physical security**. Physical building security.

2.9.1 Azure Security Center

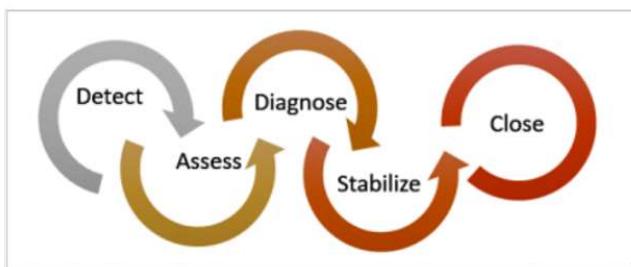
Security Center is a monitoring service that provides threat protection across all of your services both in Azure, and on-premises.

2.9.1.1 Security tiers

- **Free.** Available as part of your Azure subscription, this tier is limited to assessments and recommendations of Azure resources only.
- **Standard.** This tier provides a full suite of security-related services including continuous monitoring, threat detection, just-in-time access control for ports, and more.

2.9.1.2 Usage scenarios when integrating Security Center into our workflows

- **Incident response.** Security Center can be used to detect, asses and diagnose stages.



- Use Security Center recommendations to enhance security.

2.9.2 Authentication and authorization

- **Authentication** is the process of establishing the identity of a person or service looking to access a resource.
- **Authorization** is the process of establishing what level of access an authenticated person or service has.

2.9.3 Azure Active Directory

Azure AD is a cloud-based identity service. It has built in support for synchronizing with your existing on-premises Active Directory or can be used stand-alone. This means that all your applications, whether on-premises, in the cloud (including Office 365), or even mobile can share the same credentials.

2.9.3.1 Single sign-on for all services

The more identities a user has to manage, the greater the risk of a credential-related security incident. More identities mean more passwords to remember and change.

2.9.3.2 Multi-factor authentication

Azure AD has Multi-Factor authentication (MFA) capabilities built in and will integrate with other third-party MFA providers.

2.9.3.3 Providing identities to services

As well as users, services need identities (users and passwords so they can be accessed). Often, and against best practices, credential information is embedded in configuration files with no security.

When you create a managed identity for a service (aka resources), you are creating an account on your organization's Active Directory (a specific organization's Active Directory instance is known as an "Active Directory Tenant"). The Azure infrastructure will automatically take care of authenticating the service and managing the account. You can then use that account like any other Azure AD account, including allowing the authenticated service secure access of other Azure resources.

2.9.3.4 *Role-based access control*

Roles are sets of permissions, like "Read-only" or "Contributor", that users can be granted to access an Azure service instance (aka resources).

Identities are mapped to roles directly or through group membership. Roles can be granted at the individual service instance level, but they also flow down the Azure Resource Manager hierarchy.



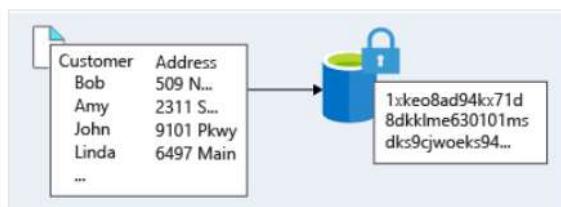
2.9.4 *Encryption*

Encryption is the process of making data unreadable and unusable to unauthorized viewers. Symmetric encryption uses the same key to encrypt and decrypt the data. Asymmetric encryption uses a public key and private key pair. Either key can encrypt but a single key can't decrypt its own encrypted data. To decrypt, you need the paired key. Asymmetric encryption is used for things like Transport Layer Security (TLS) (used in HTTPS) and data signing.

2.9.4.1 *Encryption at rest*

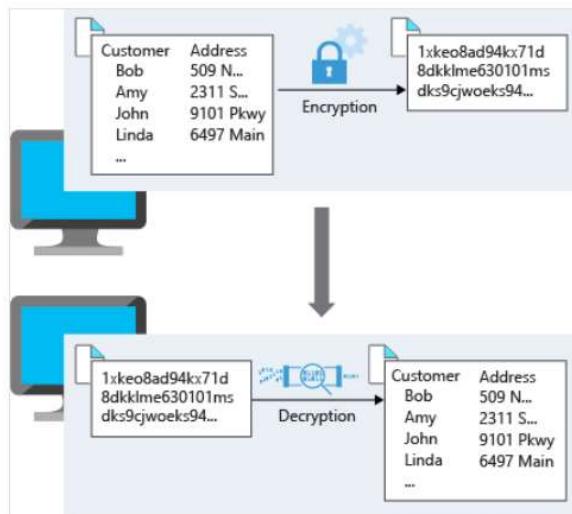
Data at rest is the data that has been stored on a physical medium. This data could be stored on the disk of a server, data stored in a database, or data stored in a storage account.

Regardless of the storage mechanism, encryption of data at rest ensures that the stored data is unreadable without the keys and secrets needed to decrypt it.



2.9.4.2 *Encryption in transit*

Secure transfer can be handled by several different layers. It could be done by encrypting the data at the application layer prior to sending it over a network. HTTPS is an example of application layer in transit encryption.



2.9.4.3 Azure Storage Service Encryption for hard disks

Azure automatically encrypts your data before persisting it to Azure Managed Disks, Azure Blob Storage Azure Files or Azure Queues and decrypts the data prior to retrieval.

2.9.4.4 Azure Disk Encryption for VMs

It helps you encrypts your VM disks with BitLocker feature.

2.9.4.5 Transparent data encryption (TDE) for databases

TDE helps protect Azure SQL Database and Azure Data Warehouse against the threat of malicious activity.

2.9.4.6 Azure Key Vault in order to encrypt secrets

Azure Key Vault is a centralized cloud service for storing your application secrets. Key Vault helps you control your applications' secrets by keeping them in a single, central location and by providing secure access, permissions control, and access logging capabilities.

- Service Certificates, API keys, etc.

2.9.4.7 Service certificates (if you want to use HTTPS so data is fully encrypted)

As mentioned previously, Transport Layer Security (TLS) is the basis for encryption of website data in transit. TLS uses certificates to encrypt and decrypt data. However, these certificates have a lifecycle that requires administrator management. A common security problem with websites is having expired TLS certificates that open security vulnerabilities.

Certificates used in Azure are x.509 v3 and can be signed by a trusted certificate authority, or they can be self-signed. A self-signed certificate is signed by its own creator; therefore, it is not trusted by default. Most browsers can ignore this problem. However, you should only use self-signed certificates when developing and testing your cloud services.

Service certificates are attached to cloud services and enable secure communication to and from the service.

You can store your certificates in **Azure Key Vault**.

2.9.5 Network security

2.9.5.1 Firewall

A firewall is a service that grants server access based on the originating IP address of each request. You create firewall rules that specify ranges of IP addresses. Only clients from these granted IP addresses will be allowed to access the server.

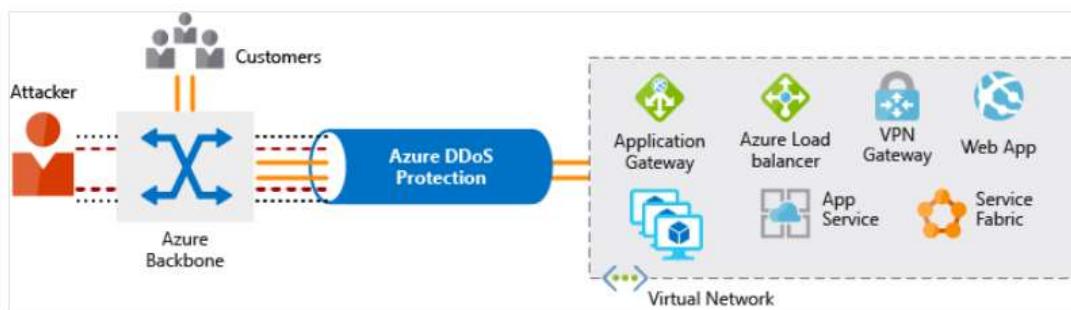
- **Azure Firewall** is a managed, cloud-based, network security service that protects your Azure Virtual Network resources. It is a fully stateful firewall as a service with built-in high availability and unrestricted cloud scalability. Azure Firewall provides inbound protection for non-HTTP/S protocols. Examples of non-HTTP/S protocols include: Remote Desktop Protocol (RDP), Secure Shell (SSH), and File Transfer Protocol (FTP). It also provides outbound, network-level protection for all ports and protocols, and application-level protection for outbound HTTP/S.
- **Azure Application Gateway** is a load balancer that includes a Web Application Firewall (WAF) that provides protection from common, known vulnerabilities in websites. It is designed to protect HTTP traffic.
- **Network virtual appliances (NVAs)** are ideal options for non-HTTP services or advanced configurations, and are similar to hardware firewall appliances.

2.9.5.2 *Distributed Denial of Service (DDoS) attacks*

Any resource exposed on the internet is at risk of being attacked by a denial of service attack. These types of attacks attempt to overwhelm a network resource by sending so many requests that the resource becomes slow or unresponsive.

Azure DDoS Protection provides the following service tiers:

- **Basic** - The Basic service tier is automatically enabled as part of the Azure platform. Always-on traffic monitoring and real-time mitigation of common network-level attacks provide the same defenses that Microsoft's online services use. Azure's global network is used to distribute and mitigate attack traffic across regions.
- **Standard** - The Standard service tier provides additional mitigation capabilities that are tuned specifically to Microsoft Azure Virtual Network resources. DDoS Protection Standard is simple to enable and requires no application changes.



2.9.5.3 *Security inside your virtual network*

For communication between virtual machines, Network Security Groups (NSGs) are a critical piece to restrict unnecessary communication.

Network Security Groups allow you to filter network traffic to and from Azure resources in an Azure virtual network. An NSG can contain multiple inbound and outbound security rules that enable you to filter traffic to and from resources by source and destination IP address, port, and protocol.

Virtual private network (VPN) connections are a common way of establishing secure communication channels between networks. Connections between Azure Virtual Network and an on-premises VPN device are a great way to provide secure communication between your network and your VNet on Azure.

2.9.6 Azure Advanced Threat Protection

Azure Advanced Threat Protection (Azure ATP) is a cloud-based security solution that identifies, detects, and helps you investigate advanced threats, compromised identities, and malicious insider actions directed at your organization.

2.10 Unit 10 – Follow Azure policies in your company

2.10.1 Azure Policy

Azure Policy is an Azure service you use to create, assign and, manage policies. These policies enforce different rules and effects over your resources so that those resources stay compliant with your corporate standards and service level agreements.

2.10.1.1 Policy definition

A policy definition expresses what to evaluate and what action to take. For example, you could ensure all public websites are secured with HTTPS, prevent a particular storage type from being created, or force a specific version of SQL Server to be used.

Policy definition	Description
Allowed Storage Account SKUs	This policy definition has a set of conditions/rules that determine whether a storage account that is being deployed is within a set of SKU sizes. Its effect is to deny all storage accounts that do not adhere to the set of defined SKU sizes.
Allowed Resource Type	This policy definition has a set of conditions/rules to specify the resource types that your organization can deploy. Its effect is to deny all resources that are not part of this defined list.
Allowed Locations	This policy enables you to restrict the locations that your organization can specify when deploying resources. Its effect is used to enforce your geographic compliance requirements.
Allowed Virtual Machine SKUs	This policy enables you to specify a set of VM SKUs that your organization can deploy.
Not allowed resource types	Prevents a list of resource types from being deployed.

2.10.1.2 Identify non-compliant resources

We can use the applied policy definition to identify resources that aren't compliant with the policy assignment through the Azure portal.

The screenshot shows the Azure Policy - Compliance interface. On the left, there's a navigation menu with options like Overview, Getting started, Compliance (which is selected and highlighted in red), Remediation, Authoring, Assignments, Definitions, Blueprints, and Blueprints (preview). The main area displays the following metrics:

- Overall resource compliance: 100%
- Non-compliant initiatives: 0 out of 1
- Non-compliant policies: 0 out of 39
- Non-compliant resources: 0 out of 4

Below these metrics is a table with two rows of data:

NAME	SCOPE	COMPLIANCE STATE	COMPLIANCE	NON-COMPLIANT RESOURCES	NON-COMPLIANT POLICIES
[Audit VMs that do not use ma...]	Contoso/PolicyTarget	Compliant	100%	0	0
[Preview]: Enable Monitoring ...	Contoso/PolicyTarget	Compliant	100%	0	0

2.10.1.3 Initiatives (a set of definitions)

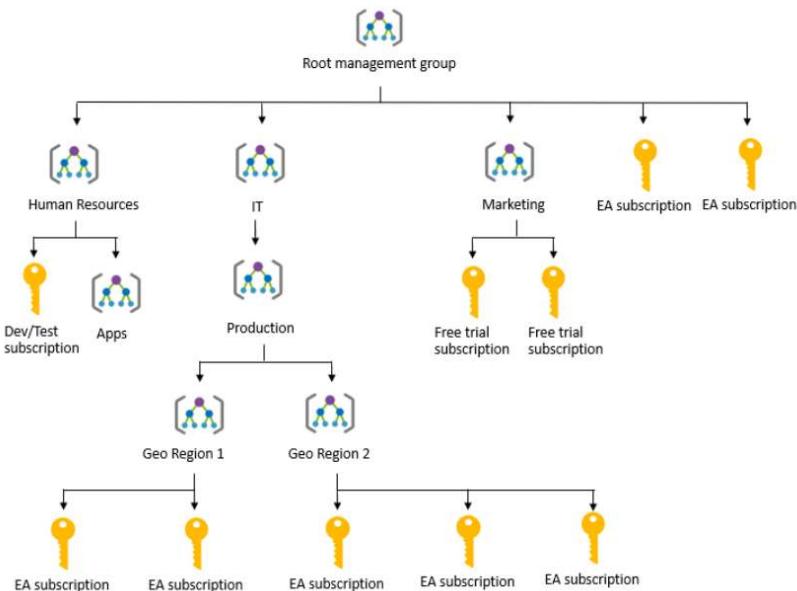
Managing a few policy definitions is easy, but once you have more than a few, you will want to organize them. That's where initiatives come in.

Initiatives work alongside policies in Azure Policy. An initiative definition is a set or group of policy definitions to help track your compliance state for a larger goal.

An initiative assignment is an **initiative definition** assigned to a **specific scope**. Initiative assignments reduce the need to make several initiative definitions for each scope. This scope could also range from a management group to a resource group.

2.10.2 Enterprise governance management

Azure Management Groups are containers for managing access, policies, and compliance across multiple Azure subscriptions. Management groups allow you to order your Azure resources hierarchically into collections, which provide a further level of classification that is above the level of subscriptions.



You might create a hierarchy so you can apply a policy that, for example, limits VM locations to the US West Region for the "Geo Region 1" group. This policy will inherit onto both Enterprise Agreement (EA) subscriptions under that management group and will apply to all VMs under

those subscriptions. This security policy cannot be altered by the resource or subscription owner allowing for improved governance.

You can manage your Azure subscriptions more effectively by using Azure Policy and Azure role-based access controls (RBACs).

2.10.3 Azure Blueprints

Azure Blueprints enables cloud architects and central information technology groups to define a repeatable set of Azure resources that implements and adheres to an organization's standards, patterns, and requirements. Azure Blueprints makes it possible for development teams to rapidly build and deploy new environments with the trust they're building within organizational compliance using a set of built-in components.

Azure Blueprints is a declarative way to orchestrate the deployment of various resource templates and other artifacts, such as:

- Role assignments.
- Policy assignments.
- Azure Resource Manager templates.
- Resource groups.

2.10.4 Microsoft Privacy Statement

The Microsoft privacy statement explains what personal data Microsoft processes, how Microsoft processes it, and for what purposes.

2.10.5 Microsoft Trust Center

Trust Center is a website resource containing information and details about how Microsoft implements and supports security, privacy, compliance, and transparency in all Microsoft cloud products and services.

2.10.6 Service Trust Portal

The Service Trust Portal (STP) hosts the Compliance Manager service, and is the Microsoft public site for publishing audit reports and other compliance-related information relevant to Microsoft's cloud services.

2.10.7 Compliance Manager

Compliance Manager is a workflow-based risk assessment dashboard within the Service Trust Portal that enables you to track, assign, and verify your organization's regulatory compliance activities related to Microsoft professional services and Microsoft cloud services such as Office 365, Dynamics 365, and Azure.

As part of the risk assessment, Compliance Manager also provides recommended actions you can take to improve your regulatory compliance. You can view all action items, or select the action items that correspond with a specific certification.

2.10.8 Azure Monitor

Azure Monitor maximizes the availability and performance of your applications by delivering a comprehensive solution for collecting, analyzing, and acting on telemetry from your cloud and on-premises environments.

It helps you understand how your applications are performing and proactively identifies issues affecting them and the resources they depend on.

2.10.9 Azure Service Health

Azure Service Health is a suite of experiences that provide personalized guidance and support when issues with Azure services affect you. It can notify you, help you understand the impact of issues, and keep you updated as the issue is resolved.

2.11 Unit 11 – Azure Resource Manager

2.11.1 Resource groups

Resource groups are a fundamental element of the Azure platform. A resource group is a logical container for resources deployed on Azure. These resources are anything you create in an Azure subscription like virtual machines, Application Gateways, and CosmosDB instances. All resources must be in a resource group and a resource can only be a member of a single resource group. Resource groups cannot be nested.



A resource group can include a virtual network, a set of VMs, containers and DBs.

You can connect and create interactions between resource groups.

Resource groups can be created following several criteria.

2.11.1.1 Tags

Tags are name/value pairs of text data that you can apply to resources and resource groups.

Tags allow you to associate custom details about your resource, in addition to the standard Azure properties a resource has the following properties:

- department (like finance, marketing, and more)
- environment (prod, test, dev)
- cost center
- life cycle and automation (like shutdown and startup of virtual machines)

A resource can have up to 50 tags. The name is limited to 512 characters for all types of resources except storage accounts, which have a limit of 128 characters.

You can use tags to group your billing data. For example, if you're running multiple VMs for different organizations, use the tags to group usage by cost center. You can also use tags to categorize costs by runtime environment, such as the billing usage for VMs running in the production environment. When exporting billing data or accessing it through billing APIs, tags are included in that data and can be used to further slice your data from a cost perspective.

Tags are not inherited and need to be applied to every supported resource that you want tagged. Not all resources support tags.

2.11.2 Azure Policy

Azure Policy is a service you can use to create, assign, and manage policies. These policies apply and enforce rules that your resources need to follow. These policies can enforce these rules when resources are created, and can be evaluated against existing resources to give visibility into compliance.

Policies can enforce things such as only allowing specific types of resources to be created, or only allowing resources in specific Azure regions. You can enforce naming conventions across your Azure environment. You can also enforce that specific tags are applied to resources.

```
{
  "mode": "Indexed",
  "policyRule": {
    "if": {
      "field": "[concat('tags[', parameters('tagName'), ']')]",
      "exists": "false"
    },
    "then": {
      "effect": "deny"
    }
  },
  "parameters": {
    "tagName": {
      "type": "String",
      "metadata": {
        "displayName": "Tag Name",
        "description": "Name of the tag, such as 'environment'"
      }
    }
  }
}
```

2.11.3 Role-based access control

RBAC provides fine-grained access management for Azure resources, enabling you to grant users the specific rights they need to perform their jobs. RBAC is considered a core service and is included with all subscription levels at no cost.

2.11.4 Resource locks

Resource locks are a setting that can be applied to any resource to block modification or deletion. Resource locks can set to either Delete or Read-only. Delete will allow all operations against the resource but block the ability to delete it. Read-only will only allow read activities to be performed against it.

2.12 Unit 12 – Cost and expenditure of Azure

2.12.1 Factors affecting cost

- Resource type.
- Services that you use.
- Location.

- Azure billing zones.

2.12.2 Azure pricing calculator

To make estimates easy for customers to create, Microsoft developed the Azure pricing calculator. The Azure pricing calculator is a free web-based tool that allows you to input Azure services and modify properties and options of the services. It outputs the costs per service and total cost for the full estimate.

Option	Description
Region	Lists the regions from which you can provision a product. Southeast Asia, central Canada, the western United States, and northern Europe are among the possible regions available for some resources.
Tier	Sets the type of tier you wish to allocate to a selected resource, such as Free Tier, Basic Tier, etc.
Billing Options	Highlights the billing options available to different types of customers and subscriptions for a chosen product.
Support Options	Allows you to pick from included or paid support pricing options for a selected product.
Programs and Offers	Allows you to choose from available price offerings according to your customer or subscription type.
Azure Dev/Test Pricing	Lists the available development and test prices for a product. Dev/Test pricing applies only when you run resources within an Azure subscription that is based on a Dev/Test offer.

Tabs:

- **Products:** enter and put your estimate together.
- **Estimate:** display all your previously saved estimates.
- **Export:** export an Excel spreadsheet that you can share or get an URL link to share with your team.

2.12.3 Azure Advisor

Azure Advisor is a free service built into Azure that provides recommendations on high availability, security, performance, operational excellence, and cost. Advisor analyzes your deployed services and looks for ways to improve your environment across each of these areas.

2.12.4 Azure Cost Management

Azure Cost Management is another free, built-in Azure tool that can be used to gain greater insights into where your cloud money is going. You can see historical breakdowns of what services you are spending your money on and how it is tracking against budgets that you have set.

2.12.5 Save on infrastructure cost

2.12.5.1 User Azure credits

Use Azure credits to try out new services such as App Service, Windows 10 VMs, Azure SQL Server databases, Containers, Cognitive Services, Functions, Data Lake, and more, without incurring any monetary costs.

2.12.5.2 Use spending limits

By default, Azure subscriptions that have associated monthly credits (which includes trial accounts) have a spending limit to ensure you aren't charged once you have used up your credits.

2.12.5.3 Use reserved instances

If you have virtual machine workloads that are static and predictable, using reserved instances is a fantastic way to potentially save up to 70 to 80 percent off the pay-as-you-go cost.

You commit to reserved instances in one-year or three-year terms. Payment can be made in full for the entire commitment period, or the commitment can be billed monthly.

2.12.5.4 Choose low-cost locations and regions

The cost of Azure products, services, and resources can vary across locations and regions.

2.12.5.5 Right-size underutilized VMs

Right-sizing a virtual machine is the process of resizing it to a proper size.

2.12.5.6 Deallocate VMs in off hours

If you have virtual machine workloads that are only used during certain periods, but you're running them every hour of every day, you're wasting money. These VMs are great candidates to shut down when not in use and start back up on a schedule, saving you compute costs while the VM is deallocated.

2.12.5.7 Delete unused VMs

This advice may sound obvious, but if you aren't using a service, you should shut it down.

2.12.5.8 Migrate to PaaS or SaaS services

PaaS services typically provide substantial savings in both resource and operational costs. The challenge is that depending on the type of service, varying levels of effort will be required to move to these services, from both a time and resource perspective.

2.12.5.9 Save on licensing cost

Many of the Azure services you deploy have the choice of running on Windows or Linux. In some cases, the cost of the product can be different based on the OS you choose.

Many customers have invested in Windows Server licenses and would like to repurpose this investment on Azure.

2.13 References

<https://docs.microsoft.com/en-us/learn/paths/azure-fundamentals/>

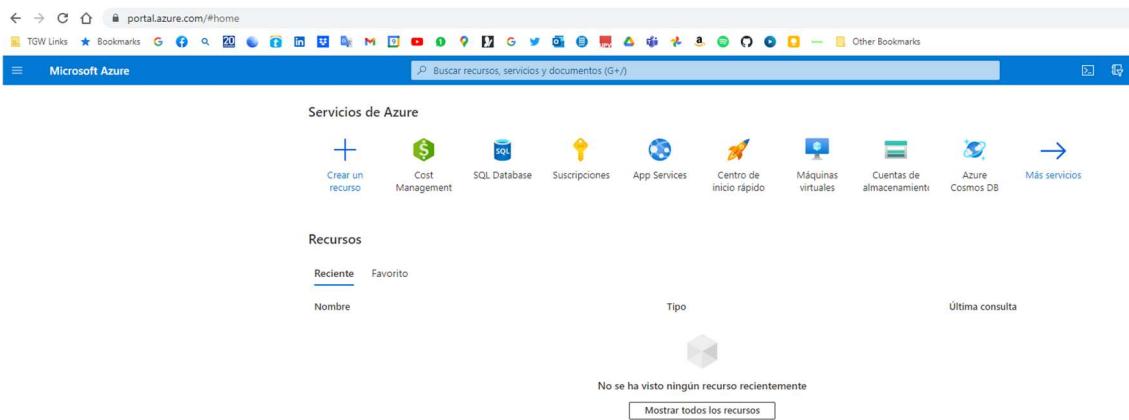
https://docs.microsoft.com/en-us/learn/certifications/exams/az-900?wt.mc_id=learningredirect_certs-web-wwl

3 Azure Developer

3.1 Portal web Azure de acceso principal

El portal de acceso a la gestión de los recursos y la cuenta de Azure:

<https://portal.azure.com/#home>



3.2 Introducción al curso

- Martes y Jueves de 18:00 a 22:00. Con pausa a las 20:00.
- Orientados a trabajadores en activo y un porcentaje reducido en desempleado.
- Asistencia obligatoria a un 75% de horas del curso: un par de clases. En caso de ausencia con motivo hay que avisar con antelación y a ser posible con justificante. Computan las horas que estamos en la session de zoom.
- Evaluación continua con prueba intermedia y prueba final.
- Nota > 5 y asistencia = apto. Nota < 5 y asistencia = diploma de asistencia.
- Dentro de la subvencion no entra el coste de la certificación oficial. El programa PUE Alumni nos permite acceder a las certificaciones de manera más económica. 90€/trimester en lugar de 300€. Hay que finalizer el curso para ser Alumni y preguntar como se hace?
- Ejemplo de aplicación para ponerlo en práctica. Tenemos un mock oficial con Azure pass.
- Curso de 60h que se aprovecha muy bien y sobra tiempo para entrar en detalle.

Programa PUE ALUMNI

- Alta PUE ALUMNI a través de la web: <https://consorci.pue.es/pue>
- Data màxima per a inscriure's: **últim dia del curs**
- Cost anual:



Realiza tu adhesión al programa en cualquier momento del año:

Período	Válido hasta
ENERO - MARZO	31 de marzo del año siguiente
ABRIL - JUNIO	30 de junio del año siguiente
JULIO - SEPTIEMBRE	30 de septiembre del año siguiente
OCTUBRE - DICIEMBRE	31 de diciembre del año siguiente

Dubtes i consultes

- Per a consultes sobre els cursos: <https://help.consorci.pue.es>
- Per a incidències d'accés **aula virtual/entorns** : <https://help.pue.es>
- Per a consultes sobre **certificaciones**: <https://exam.pue.es/help/>
- Per a consultes sobre **orientació professional**: monica.delafuente@pue.es

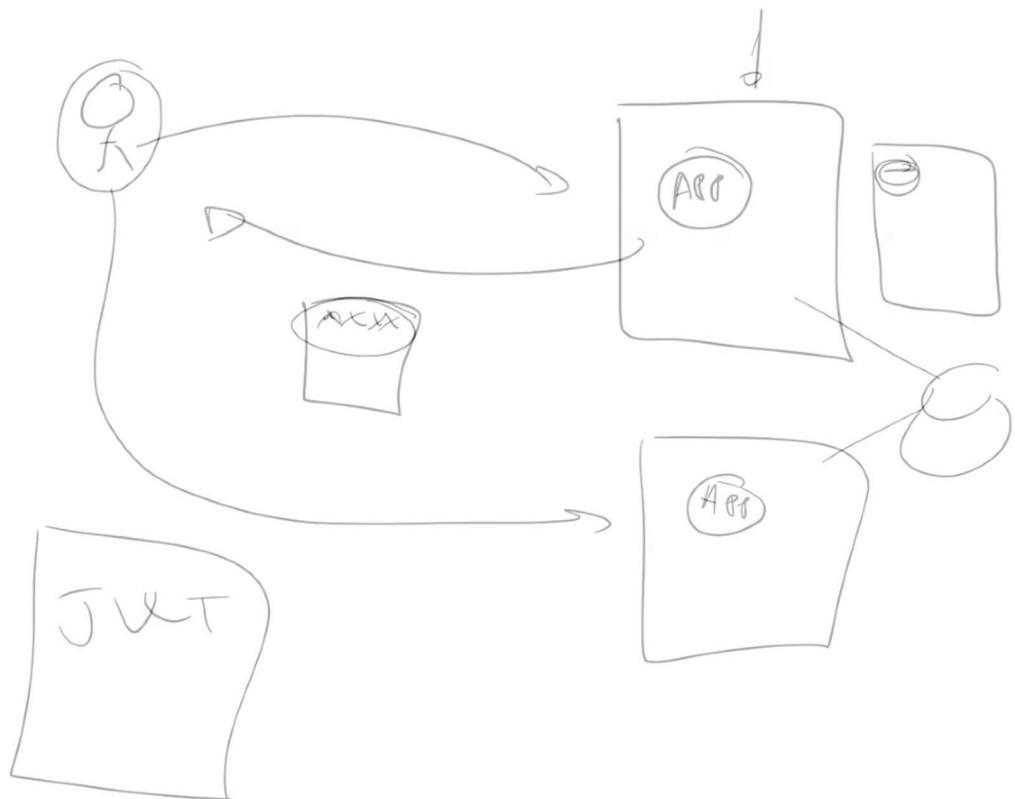
3.3 Introducción

- **Crear Azure App Service para web apps.** Solamente hay que preocuparse de la gestión del código fuente del aplicativo.
- **Implementar Azure Functions.** El modelo serverless para crear microservicios y workflows. Una función se ejecuta en un endpoint y se paga por ejecución de ésta. Se puede dimensionar la capacidad de la función y se paga por uso. Ejemplo: Azure Function obtiene por web la ubicación y esta se guarda en Azure Storage.
- **Azure Storage.** Los datos de nuestros aplicativos deben guardarse fuera de la máquina ya que cuando termina de ejecutarse se borran los datos (*stateless*).
- **Azure Blob Storage.** En aplicaciones *stateless* no se pueden guardar cosas en local. Las aplicaciones web (sobre todo ejecutándose en contenedores o Azure App Service) tienen que ser *stateless*. Cuando nos conectamos a una aplicación web iniciamos una sesión con usuario/password. Antiguamente creábamos una tabla de sesión local en el entorno de ejecución. En el resto de peticiones siempre se adjunta la cookie de sesión que estaba guardada localmente en la RAM del ordenador. Ahora en el mundo

de pagar por lo que usamos la aplicación si no es 24/7 lo que hay en la RAM se pierde. Además en aplicaciones que tienen varios servidores web puede que la RAM no tenga los datos de session al no poder ser compartidos.

La alternativa, montar una base de datos que sea comun a todas las máquinas y accessible desde cualquier web. El problema es la lentitud del acceso. Las aplicaciones *stateless* no almacenan datos de session en ningun lado y en su lugar se usan JSON web tokens. Nuesta aplicacion tiene una clave que solo conocen los clientes y se entrega un token firmado con la clave privada que solamente conoce el backend. Lo importante es observer que el token no ha sido modificado. El *logout* sucede cuando el token cambia o caduca.

Si guardamos cualquier cosa en local la aplicación ya no es *stateless* y en cuanto otra aplicacion reciba una petición o request no tendremos acceso a esa información. Lo unico que deberia guardarse local son *caches* que se puedan recrear cuando no están.



- Azure Cosmos DB. Motor de replicacion NoSQL de azure.

3.4 Portal web calculadora de costes de Azure

La siguiente web permite hacer una estimación de los recursos que se quieren crear:

<https://azure.microsoft.com/es-es/pricing/calculator/>

The screenshot shows the Azure Pricing Calculator interface. At the top, there's a navigation bar with links like 'TGW Links', 'Bookmarks', and 'Other Bookmarks'. The main title is 'Su presupuesto' (Your budget). Below it, a section for 'Virtual Machines' is shown, with a note indicating a reservation for '1 D2 v3 (2 vCPU, 8 GB de RAM) x 730 Horas (Pago p...)' at a price of 'Por adelantado: 0,00 ... Mensualmente: 152,6...'. The 'Virtual Machines' search bar contains the placeholder text: 'Ahora puede buscar una instancia de máquina virtual; haga clic en el icono de búsqueda para comenzar.' The search dropdown shows 'D2 v3: 2 vCPU, 8 GB de RAM, 50 GB de almacenamiento temporal, 0,20...'. Below the search bar, there are filters for 'REGIONE:' (West US), 'SISTEMA OPERATIVO:' (Windows), 'CATEGORÍA:' (All), 'SERIE DE INSTANCIAS:' (All), and 'INSTANCIA:' (D2 v3: 2 vCPU, 8 GB de RAM, 50 GB de almacenamiento temporal, 0,20...). The quantity is set to 1 and the duration is 730 hours. A summary table at the bottom shows the 'Proceso (D2 v3)' (Pago por uso, 1 año de reserva, 3 años de reserva), 'SO (Windows)' (Licencia incluida, Ventaja híbrida de Azure), and total cost '67,16 US\$' and '152,57 US\$'.

3.5 Regiones

Regions

Azure offers more global regions than any other cloud provider with 60+ regions representing over 140 countries



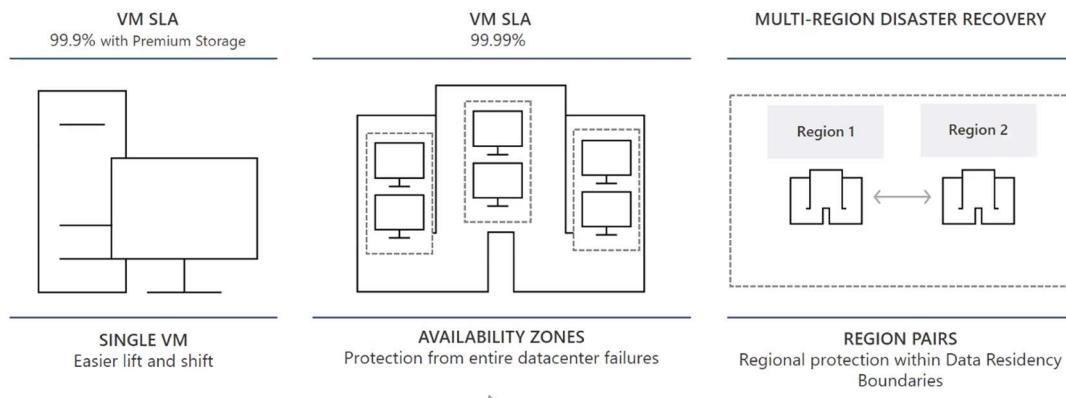
Las regiones son ámbitos geográficos donde se ubican data centers muy cercanos entre si. Los lugares de mayor presencia son Europa, America del Norte, India y Asia. A la hora de ubicar recursos en los centros de datos de China se lanza la alerta de que la información podría ser intervenida por el gobierno.

3.5.1 Regiones pares

Permite replicar servicios en diferentes regiones para conseguir duplicidad de servicios. Las regiones pares cuentan con una separación mínima de 300 millas. Esto permite que cuando necesitamos alta disponibilidad de servicios nuestra aplicación pueda seguir en funcionamiento aún en caso de catástrofe.

3.5.2 Disponibilidad de máquinas virtuales

Availability Options



El SLA de una máquina virtual es mínimo 99,9% (como mucho una caída de 1 minuto y 26 segundos al día) con subcripción premium.

El riesgo de caída de una única máquina virtual es mínimo. En un centro de datos, si cae un rack, la información se duplica dentro del mismo centro de datos en al menos dos racks diferentes. Cuando cae el servicio, gracias a esta redundancia, el servicio se restablece enseguida.

Si se requieren trabajos de mantenimiento en el centro de datos, entonces podría existir interrupción en el servicio. Configurando una “availability zone” el riesgo de caída de nuestro servicio es mínimo porque aunque caiga nuestro data center, existe otro data center donde el servicio está duplicado.

Con todo, nosotros solamente estamos pagando por utilizar una máquina virtual, aunque al crear una “availability zone” se va a crear una máquina virtual espejo (pero a la que no ganaremos acceso) que solamente dará servicio si la principal falla. Esto nos protege de fallos graves en centros de datos.

También existe la posibilidad de tener una protección por region con el “region pair”. De manera que, si algo sucede en una region entera, nuestro servicio seguiría disponible.

Region Pairs

- At least 300 miles of separation between region pairs.
- Automatic replication for some services.
- Prioritized region recovery in the event of outage.
- Updates are rollout sequentially to minimize downtime.

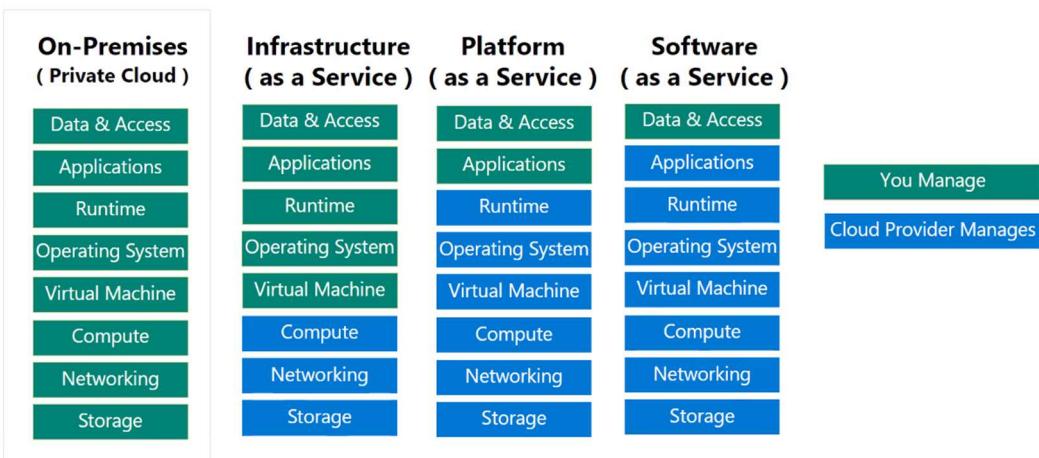
Web Link: <https://aka.ms/PairedRegions>

Region
North Central US
East US
West US 2
US East 2
Canada Central
North Europe
UK West
Germany Central
South East Asia
East China
Japan East
Australia Southeast
India South
Brazil South (Primary)
South Central US
West US
West Central US
Central US
Canada East
West Europe
UK South
Germany Northeast
East Asia
North China
Japan West
Australia East
India Central
South Central US



3.6 Modelo de responsabilidad compartida

Shared responsibility model



Dependiendo del modelo de gestión: On-Premises, IaaS, PaaS, SaaS tenemos unas responsabilidades u otras de las que hacemos cargo.

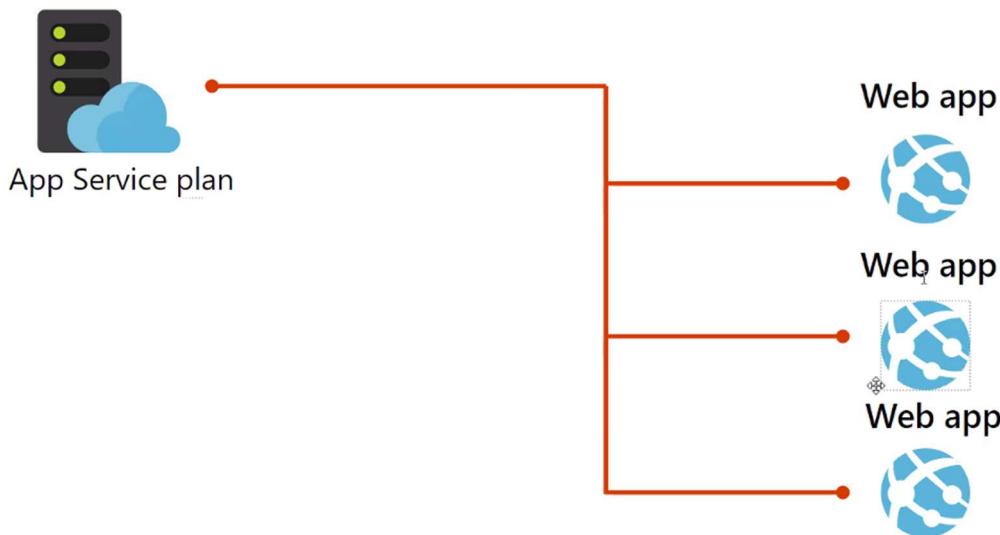
En el modelo **IaaS** necesitamos crearnos una máquina virtual y configurarla para instalar nuestro software así como todos los requisitos necesarios para que funcione. Es nuestra responsabilidad actualizarlo y mantener en buen estado la máquina virtual.

En el modelo **PaaS** desarrollamos las aplicaciones y las publicamos en un runtime ya configurado (container, App Service).

En el modelo **SaaS** las empresas alquilan soluciones de software o venden productos a base de licencia en las que contratamos el acceso (usuario y contraseña) a una web que no gestionamos. Con este modelo no es necesario preocuparse por la infraestructura ni el software.

El precio disminuye a medida que delegamos responsabilidades en Azure. Desde On-Premises hacia SaaS el coste es decreciente.

3.7 Azure App Service para aplicaciones Web



3.7.1 Creando y desplegando el servicio

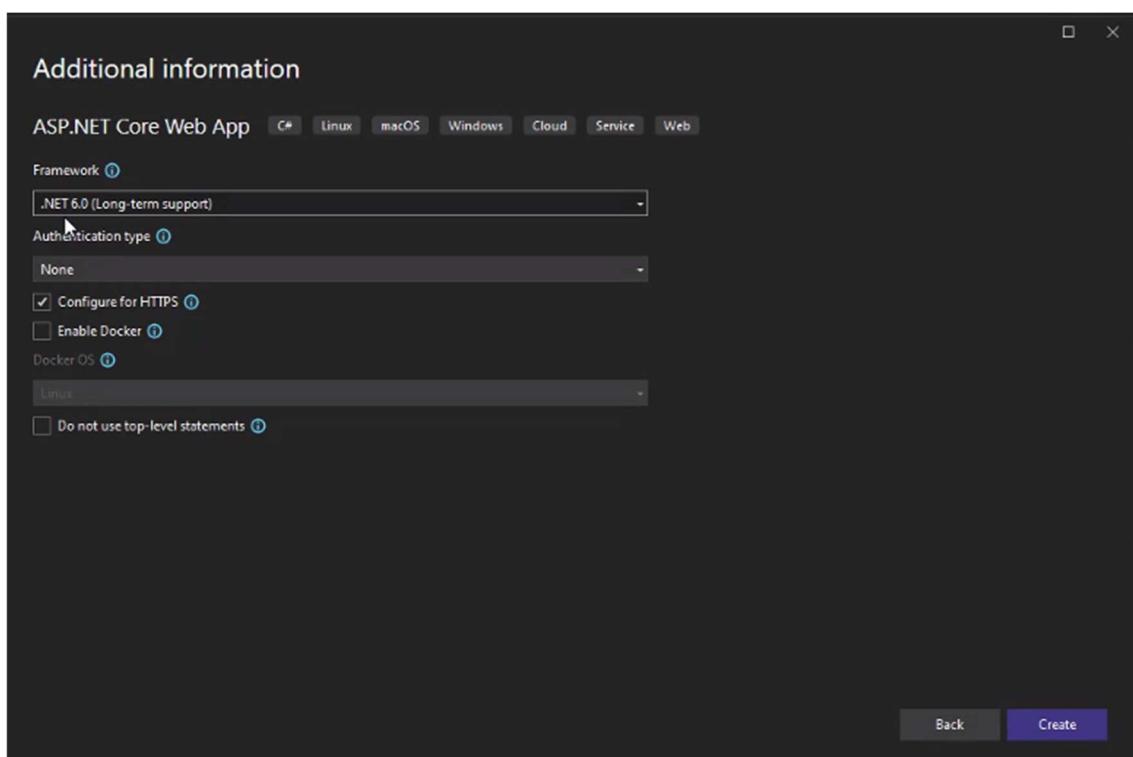
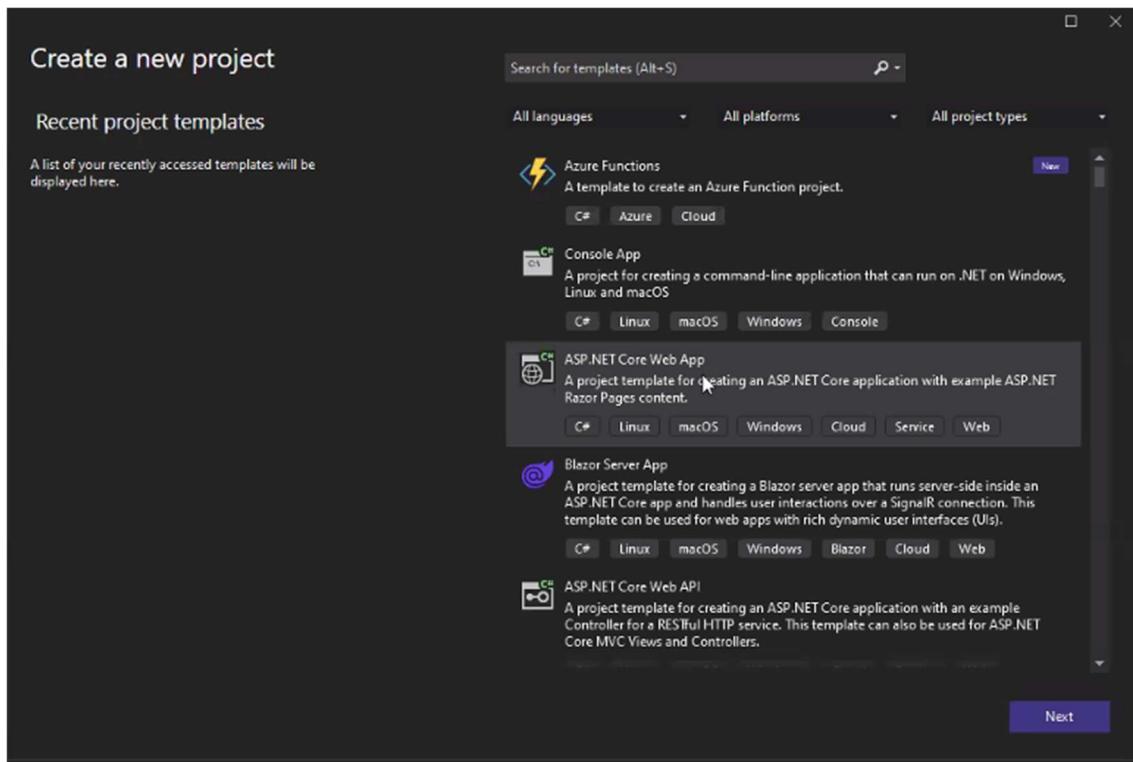
	You Manage	Cloud Provider Manages	
On-premises (Private Cloud)	Infrastructure (as a Service)	Platform (as a Service)	Software (as a Service)
Data & Access	Data & Access	Data & Access	Data & Access
Applications	Applications	Applications	Applications
Runtime	Runtime	Runtime	Runtime
Operating System	Operating System	Operating System	Operating System
Virtual Machine	Virtual Machine	Virtual Machine	Virtual Machine
Compute	Compute	Compute	Compute
Networking	Networking	Networking	Networking
Storage	Storage	Storage	Storage

Una aplicación en .NET Core debería ejecutarse en Linux para reducir mucho su coste con respecto a máquinas virtuales. No obstante, hay que tener en cuenta que la estructura de carpetas es diferente entre Linux y Windows y las aplicaciones deben adaptarse.

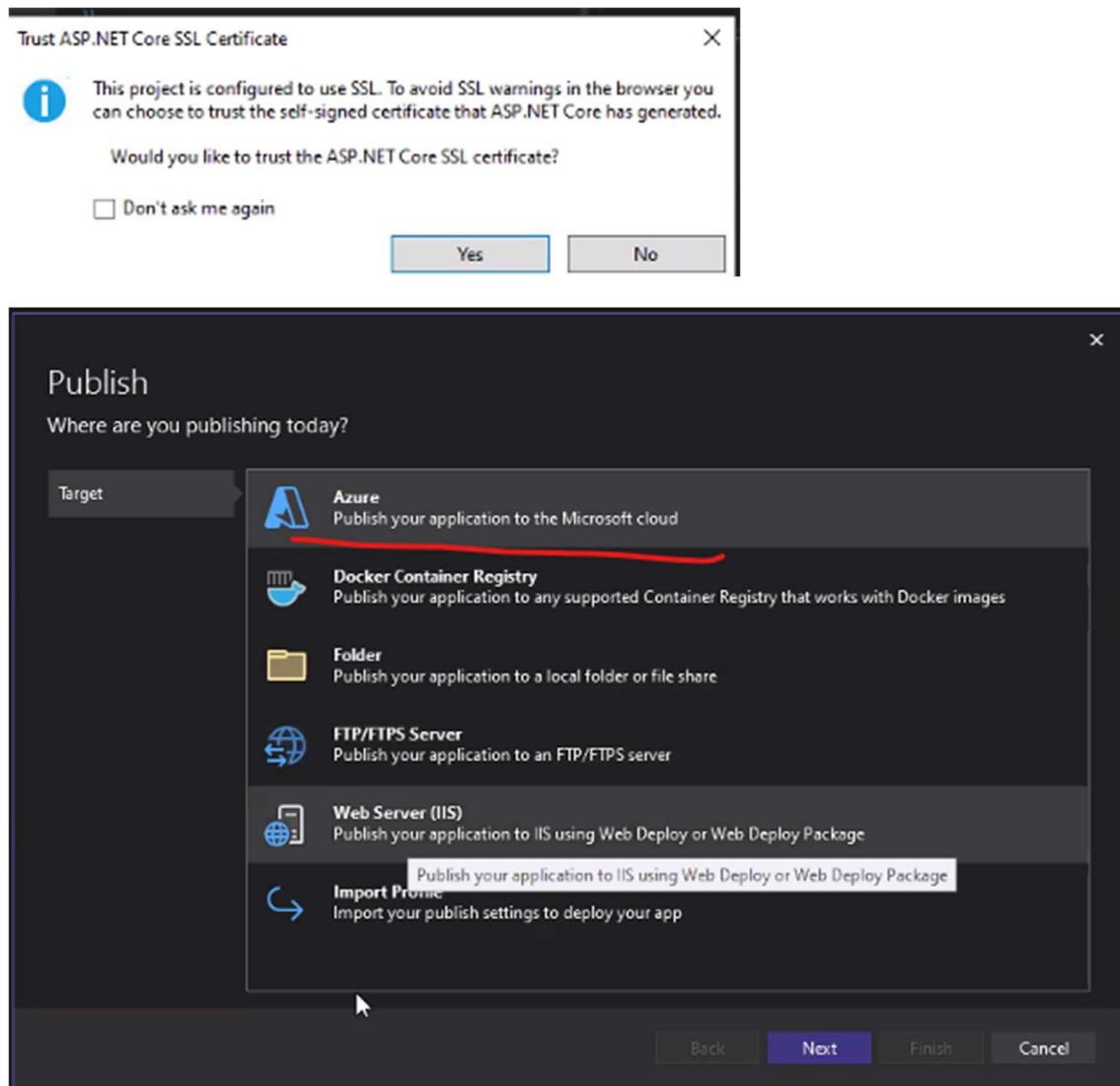
Desde el punto de vista económico, lo más barato es ejecutar la aplicación en PaaS para reducir coste. Con todo, la aplicación debe diseñarse para funcionar *stateless* y para utilizar el Azure App Service para aplicaciones Web.

Con Visual Studio es posible crear una aplicación Web de ejemplo con unos pocos pasos.

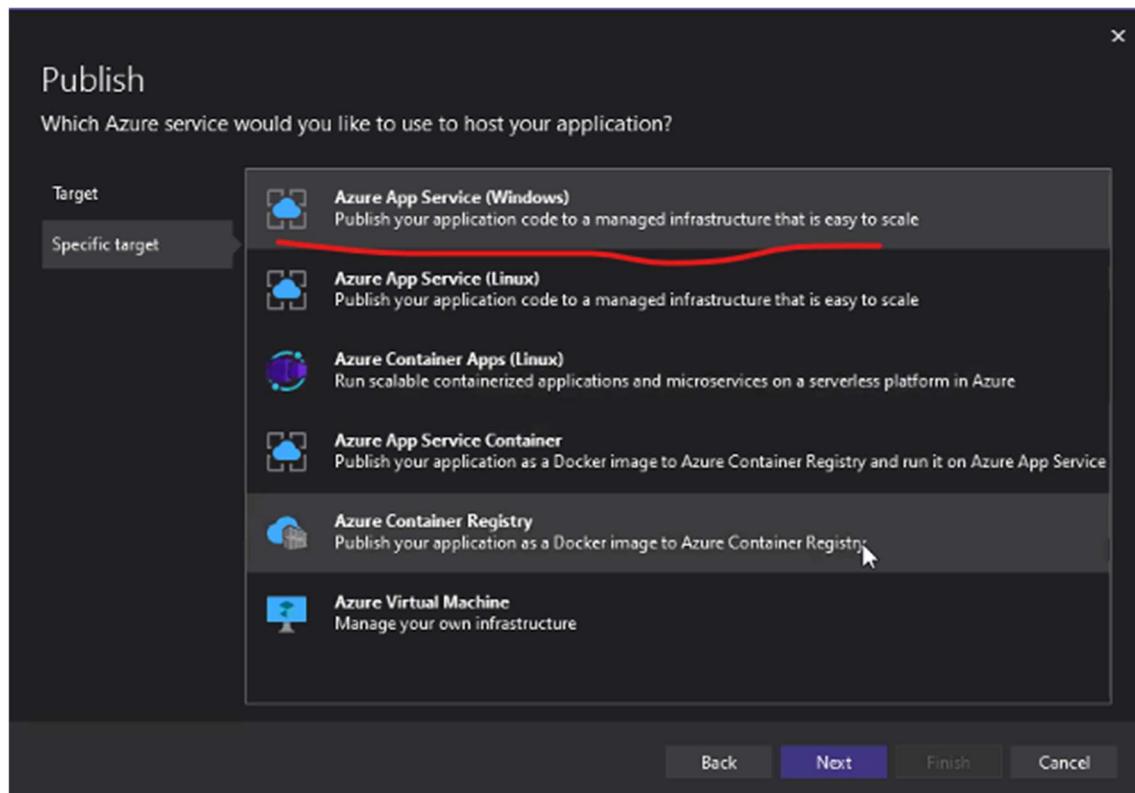
Roberto Ribes (rbo)



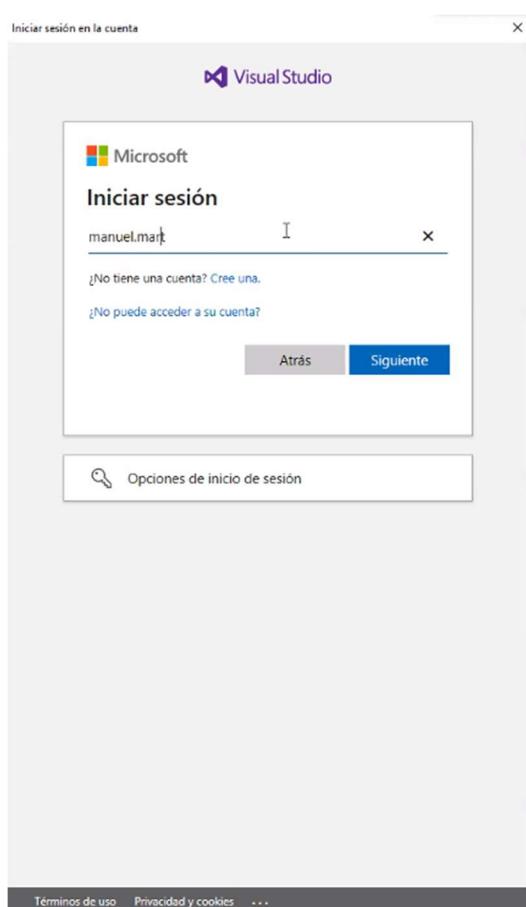
También es posible crear certificados SSL en local para ser utilizados por nosotros a través de Visual Studio cuando debugamos la aplicación:



Es importante hacer énfasis que la información que se guarda localmente en este servicio Web se puede perder en cuanto la aplicación no se está ejecutando. Por ese motivo, el diseño de estas aplicaciones debe ser *stateless*.

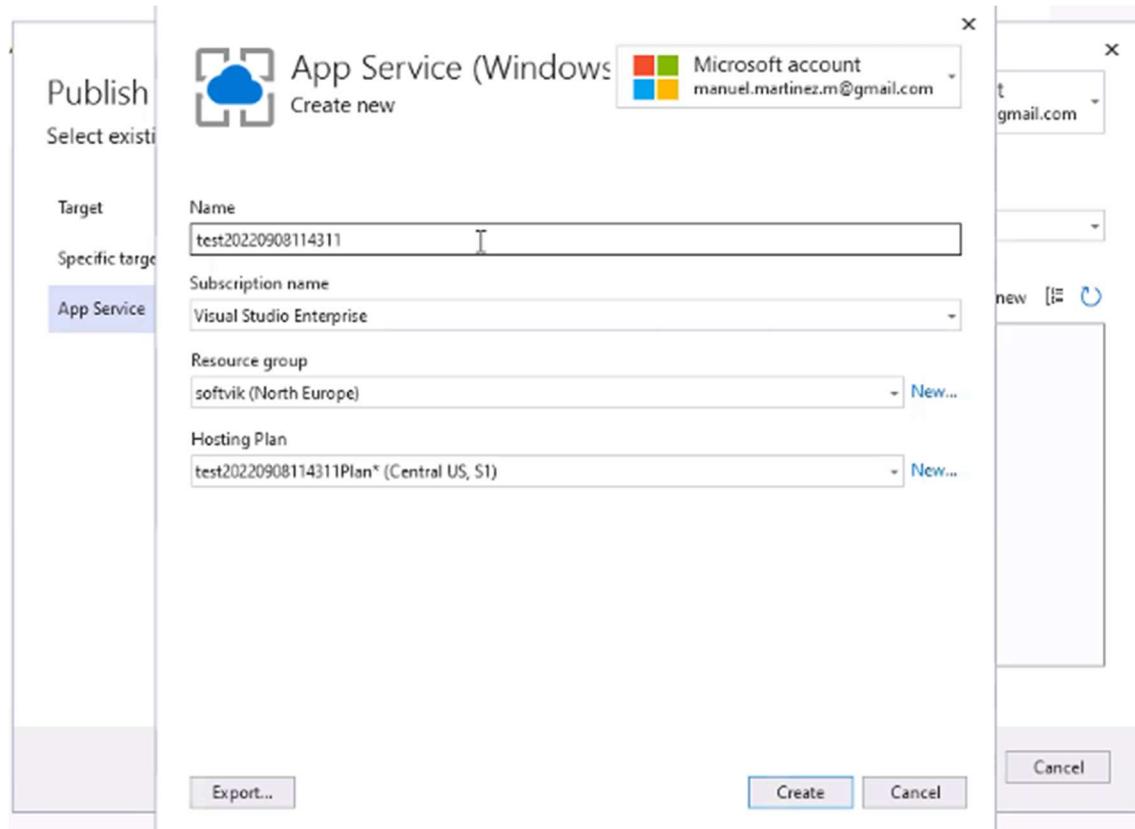


NOTA: Utiliza una cuenta que no esté asociada a la empresa para el Azure Pass (sino se pueden generar problemas):

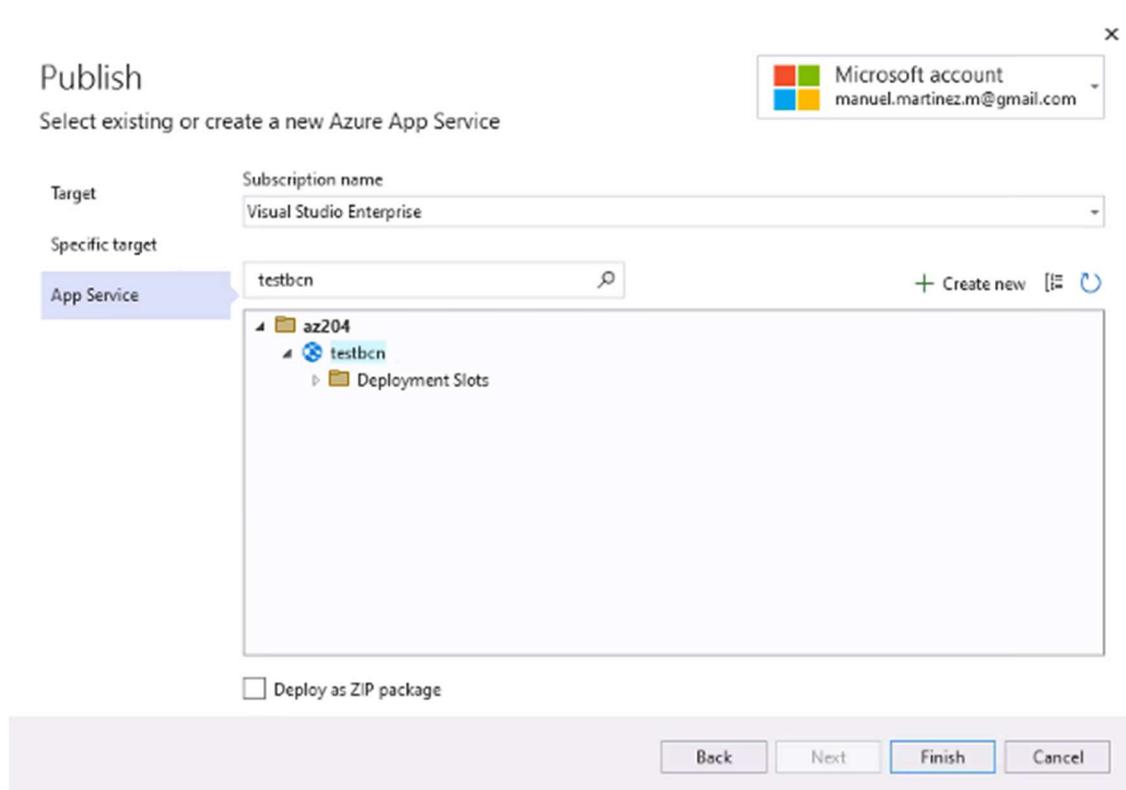
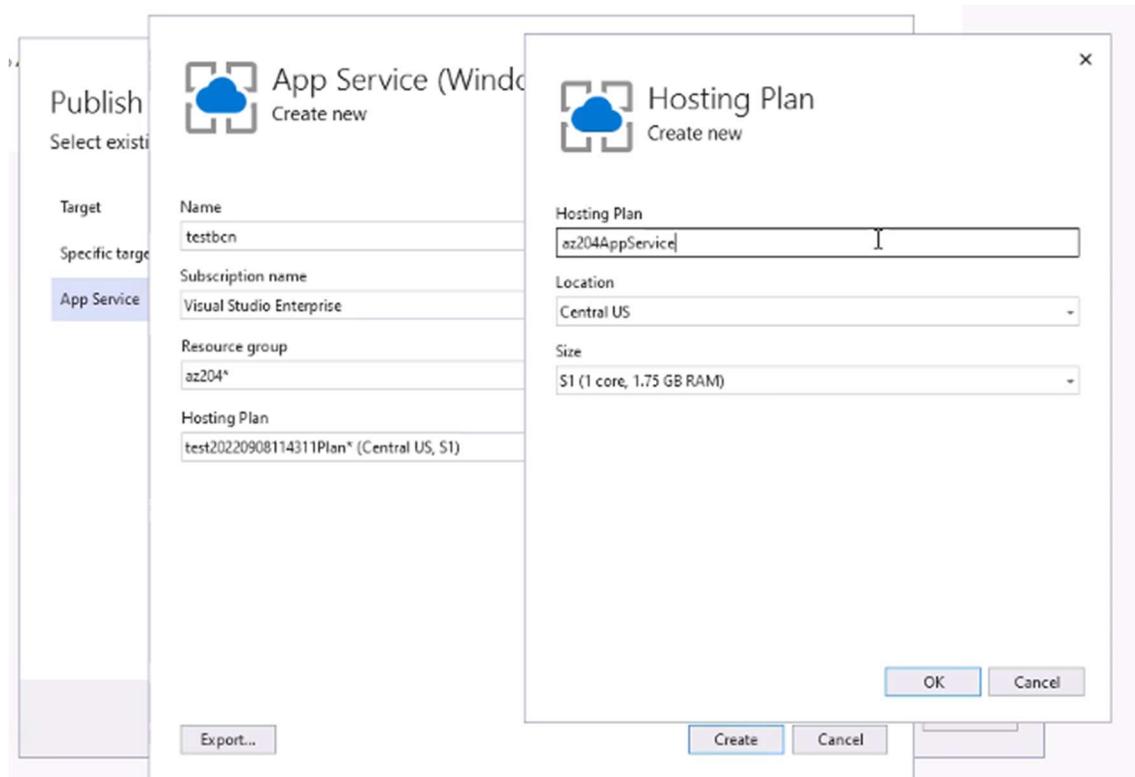


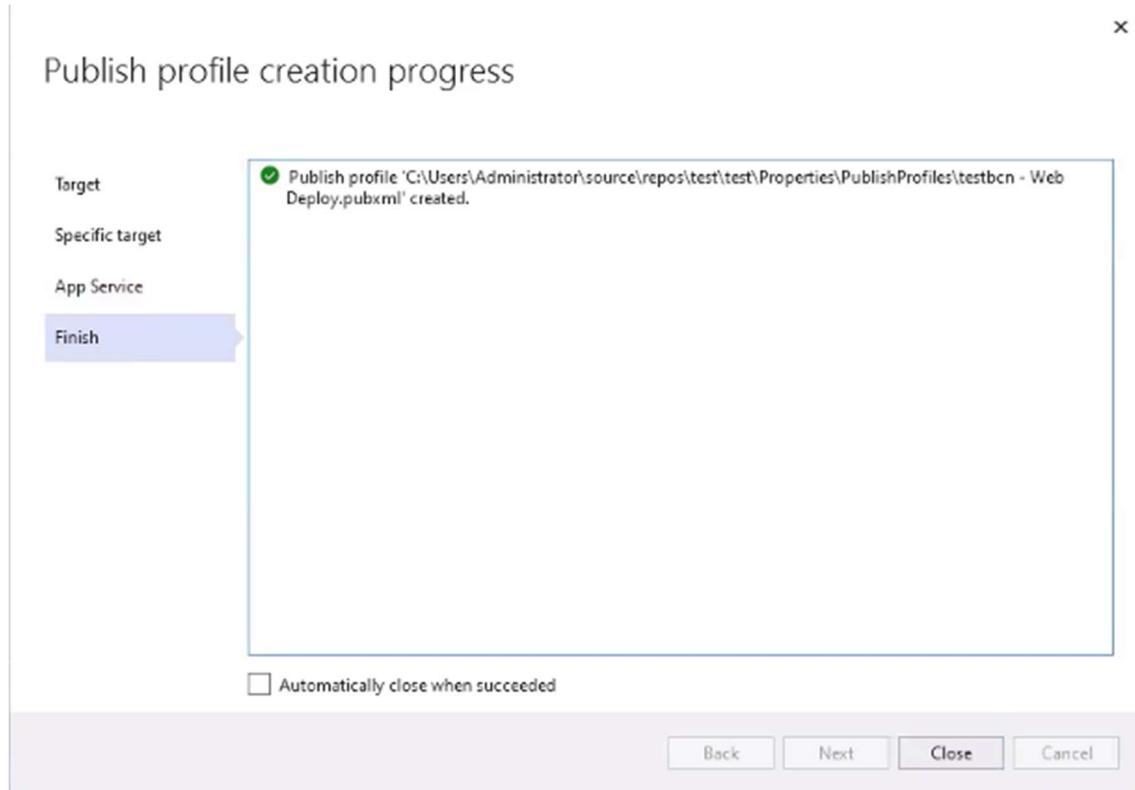
Un paso clave es determinar y generar el **slot** sobre el que se va a ejecutar la aplicación (el hardware). Dependiendo del tipo de plan que configuremos vamos a tener una facturación mejor o peor dependiendo de la potencia y del Hosting plan.

Un grupo de recursos (“Resource group”) es un contenedor o centro de coste que aglutina varios recursos para mejor facturación. En el grupo de recursos ponemos un nombre o etiqueta que aplica para todos los recursos y permite migrarlos o eliminarlos al final del día y no ser facturados.

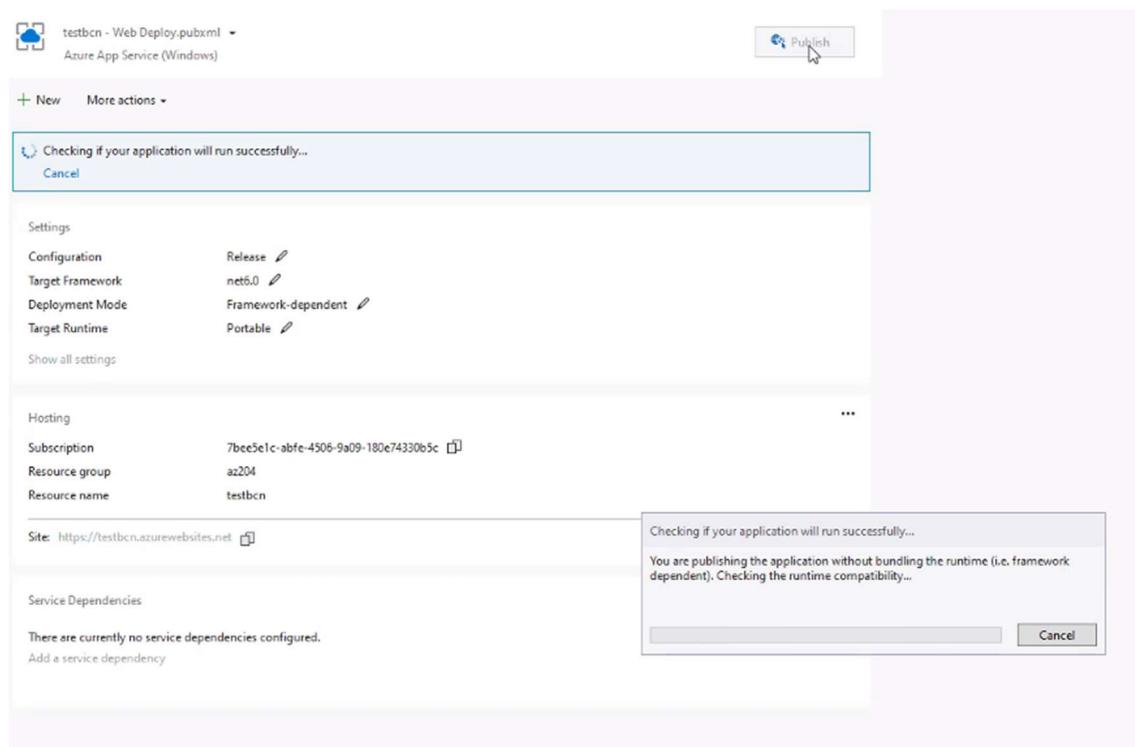


Roberto Ribes (rbo)





Finalmente, una vez configurado el perfil de Azure App service, el código se compila y se sube a la web:



Dependiendo del hosting plan, si es compartido o de las características (size), el coste será diferente.

Roberto Ribes (rbo)

Otra opción disponible es migrar grupos de recursos entre suscripciones de Microsoft Azure, incluido el crédito y hardware. En la propia web <https://portal.azure.com/#home> se puede ver mejor las características del servicio que se quiere desplegar. También se puede configurar el slot con la web de Azure:

Pricing Tier	Total ACU	Memory	Cost
P1V1	210 total ACU	3.5 GB memory	78.00 EUR/Month (Estimated)
P1V2	330 total ACU	5.8 GB memory	136.05 EUR/Month (Estimated)
P2V1	420 total ACU	7.0 GB memory	197.60 EUR/Month (Estimated)
P2V2	640 total ACU	14.0 GB memory	272.10 EUR/Month (Estimated)
P3V1	195 minimum ACU/CPU	8.0 GB memory	315.19 EUR/Month (Estimated)
P3V2	195 minimum ACU/CPU	16.0 GB memory	315.19 EUR/Month (Estimated)
S1	100 total ACU	1.75 GB memory	58.40 EUR/Month (Estimated)
S2	200 total ACU	3.5 GB memory	116.87 EUR/Month (Estimated)
S3	400 total ACU	7.0 GB memory	233.00 EUR/Month (Estimated)

Por ejemplo: S1, S2, S3 equivale a los *Cores* y se puede ver el coste asociado a éstos en la información adicional.

Si seleccionas “Change size” puedes ver el precio, las características y funcionalidades asociadas a esa configuración.

Además se puede seleccionar un Traffic Manager, el cual permite desplegar webs en diferentes regiones/geografías. También es posible aplicar ciertas reglas de ruta en el Traffic Manager (conectando desde Europa, etc) para poder redirigir al usuario a la Web más cercana.

En definitiva, podemos activar la web con más o menos servicios adicionales que encarecen, o no, el precio.

Recommended pricing tiers

P1V2 210 total ACU 3.5 GB memory Dv2-Series compute equivalent 40.51 EUR/Month (Estimated)	P2V2 420 total ACU 7 GB memory Dv2-Series compute equivalent 81.26 EUR/Month (Estimated)	P3V2 840 total ACU 14 GB memory Dv2-Series compute equivalent 161.91 EUR/Month (Estimated)
P1V3 195 minimum ACU/vCPU 8 GB memory 2 vCPU 77.57 EUR/Month (Estimated)	P2V3 195 minimum ACU/vCPU 16 GB memory 4 vCPU 155.13 EUR/Month (Estimated)	P3V3 195 minimum ACU/vCPU 32 GB memory 8 vCPU 310.27 EUR/Month (Estimated)

[See only recommended options](#)

Additional pricing tiers

S1 100 total ACU 1.75 GB memory A-Series compute equivalent 36.94 EUR/Month (Estimated)	S2 200 total ACU 3.5 GB memory A-Series compute equivalent 73.87 EUR/Month (Estimated)	S3 400 total ACU 7 GB memory A-Series compute equivalent 147.75 EUR/Month (Estimated)
P1 100 total ACU 1.75 GB memory A-Series compute equivalent 184.68 EUR/Month (Estimated)	P2 200 total ACU 3.5 GB memory A-Series compute equivalent 369.37 EUR/Month (Estimated)	P3 400 total ACU 7 GB memory A-Series compute equivalent 738.73 EUR/Month (Estimated)

Included features

Every app hosted on this App Service plan will have access to these features:

- Custom domains / SSL**
Configure and purchase custom domains with SNI and IP SSL bindings
- Auto scale**
Up to 10 instances. Subject to availability.
- Staging slots**
Up to 5 staging slots to use for testing and deployments before swapping them into production.
- Daily backups**
Backup your app 10 times daily.
- Traffic manager**
Improve performance and availability by routing traffic between multiple instances of your app.

Included hardware

Every instance of your App Service plan will include the following hardware configuration:

- Azure Compute Units (ACU)**
Dedicated compute resources used to run applications deployed in the App Service Plan. [Learn more](#)
- Memory**
Memory per instance available to run applications deployed and running in the App Service plan.
- Storage**
50 GB disk storage shared by all apps deployed in the App Service plan.

El hardware se clasifica segun el codigo P{N1}V{N2}. Por ejemplo: P1V2 es más viejo que P2V1 pero puede que en hardware sean muy similares. Al contrario, comparando códigos P1V2 y P2V2 puede que haya más diferencia en características.

En ocasiones es mejor generar más nodos de baja potencia, para ser utilizados en momentos de gran demanda, que no tener un unico nodo potente que es infroutilizado la mayor parte del día, excepto en momentos pico.

Por otra parte, se recomienda tener dos instancias ejecutando ya que puede entrar en mantenimiento o el Data Center puede sufrir una avería, lo que provocaría una caída del servicio. Estas caídas de servicio son momentáneas en casi todas las situaciones. Aun así, para garantizar disponibilidad y reducir interrupciones se recomienda configurar zonas de disponibilidad para asegurar que los nodos estan en diferentes racks del data center.

3.7.1.1 Multiples App Services

Es posible tener diferentes App Services (web diferentes) utilizando el mismo App Service Plan. Esto significa que diferentes aplicaciones comparten nodos cada una manteniendo su URL independiente.

3.7.1.2 Desplegando el App Service

Existen diferentes alternativas.

Se recomienda crear *deployment slots* cuando se requiere desplegar un nuevo entorno de producción.

Automated deployment	Manual deployment	Use deployment slots
<ul style="list-style-type: none">Azure DevOpsGitHubBitbucket	<ul style="list-style-type: none">GitCLIZipdeployFTP/S	Whenever possible, use deployment slots when deploying a new production build.

3.7.1.3 Deployment Center (alternativa para desplegar Web)

Podemos configurar Azure a través del Deployment Center para que automáticamente se actualice el App Service cuando se suba nuevo código a una rama concreta. Esto permite operaciones de Continuous Integration (CICD).

The screenshot shows the Microsoft Azure portal with the URL <https://portal.azure.com/#@PUEad.onmicrosoft.com/resource/subscriptions/7bee5e1c-abfe-4506-9a09-180e74330b5c/resourceGroups/az204/providers/Microsoft.Web/sites/az204bcn>. The page title is "az204bcn | Deployment Center". The left sidebar lists various service settings like Overview, Activity log, Access control (IAM), Tags, and Deployment (Quickstart, Deployment slots, Deployment Center). The main content area is titled "Settings" and shows a dropdown menu for "Source*" with the following options:

- Continuous Deployment (CI/CD)
 - GitHub (selected)
 - Bitbucket
 - Local Git
 - Azure Repos
- Manual Deployment (Push)
 - External Git
 - OneDrive
 - Dropbox

A tooltip message at the top of the settings panel says: "You're now in the production slot, which is not recommended for setting up CI/CD. Learn more".

3.7.2 Accediendo el servicio desplegado

Una vez publicada la Web se obtiene un certificado cuando se accede a través de `azurewebsite.net` y una vez disponible.



3.7.3 Modificar la web

Solamente tendríamos que darle a Publish y se sube la nueva versión de la web.

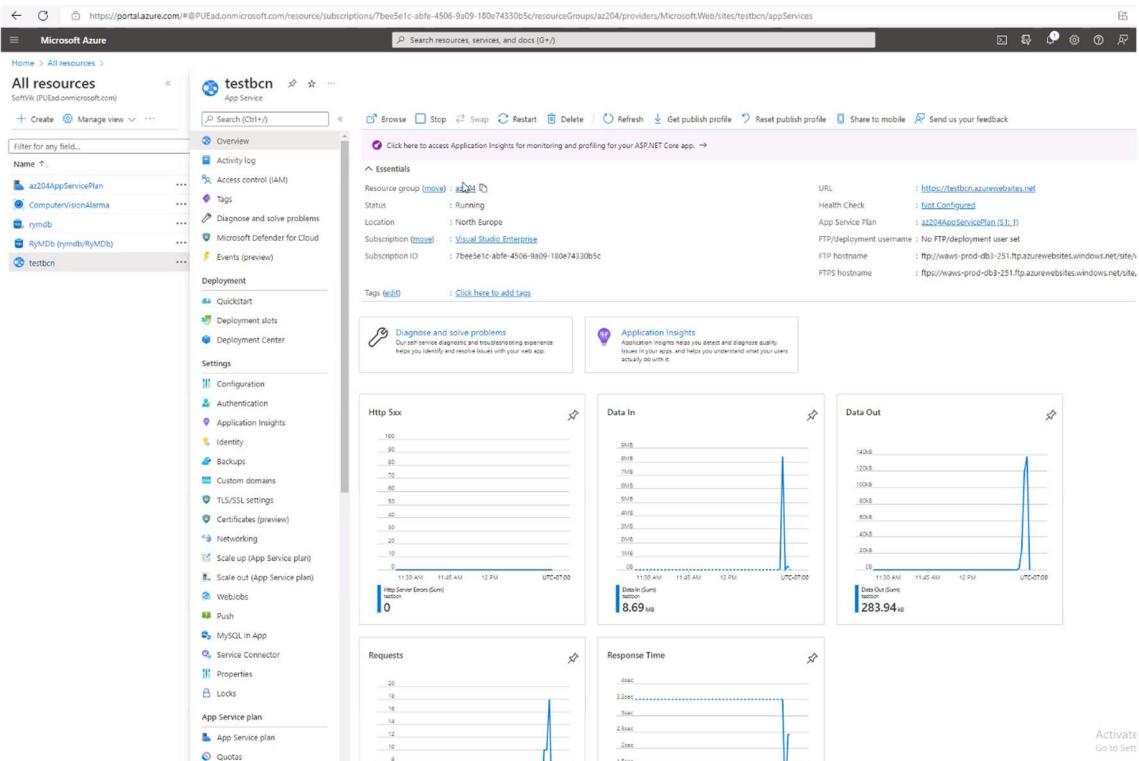
3.7.4 Generación de entornos

Vamos a generar dos entornos:

- Preproducción.
- Producción.

Opción 1: Dentro del mismo App Service Plan duplicamos la aplicación 2 veces.

Opción 2: Slots de duplicación.



Podemos tener multiples webs en el App Service Plan.

Y además, podemos desplegar **slots**. Estos **slots** tienen diferentes **slots** de implementación para una misma web.

Roberto Ribes (rbo)

Deployment Slots

NAME	STATUS	APP SERVICE PLAN
testbcn (PRODUCTION)	Running	az204AppServicePlan
qa	Running	az204AppServicePlan

Add a slot

Name: qa

Clone settings from: testbcn

Para publicar en un **Slot** volvemos a hacer los pasos anteriores para levantar el servicio:

Publish

Select existing or create a new Azure App Service

Subscription name: Visual Studio Enterprise

Target: App Service (az204)

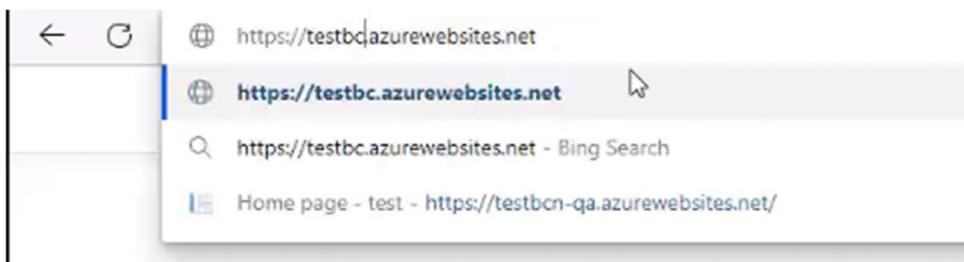
Specific target: Deployment Slots (qa)

Deploy as ZIP package

Back Next Finish Cancel

Roberto Ribes (rbo)

Para acceder a esta nueva web publicada:



Además, para poner en producción este entorno de prueba se puede hacer un *swap* de los slots a nivel de DNS sin necesidad de cambiar el nombre desde el portal de Azure:

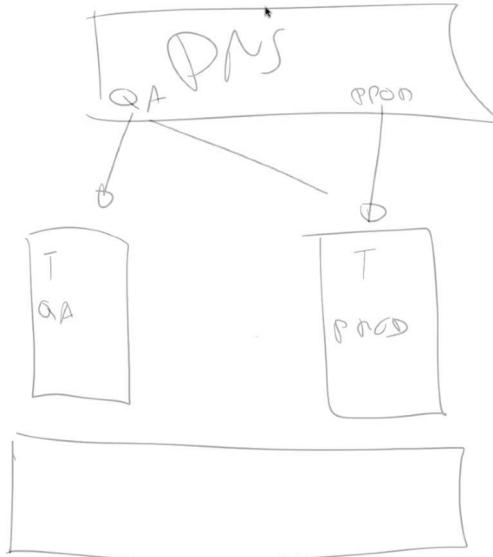
A screenshot of the Microsoft Azure portal. On the left, the navigation menu shows "testbcn | Deployment slots" under the "App Service" section. The main content area displays the "Deployment Slots" table with two rows: "testbcn" (status: Running, app service plan: az204AppServicePlan) and "testbcn-qc" (status: Running, app service plan: az204AppServicePlan). To the right, a "Swap" panel is open, showing "Source" as "testbcn-qc" and "Target" as "PRODUCTION" (highlighted in green). A note says "Swap with preview can only be used with sites that have deploy". There is also a checkbox for "Perform swap with preview". Below this, a "Config Changes" section shows a summary of changes after the swap, with a table titled "Source Changes" showing "No Changes".

Swap

A detailed view of the "Swap" configuration. It shows the "Source" slot as "testbcn-qc" and the "Target" slot as "PRODUCTION" (highlighted in green). A note says "Swap with preview can only be used with sites that have deploy". There is a checkbox for "Perform swap with preview". Below this, a "Config Changes" section shows a summary of changes after the swap, with a table titled "Source Changes" showing "No Changes".

Tambien se pueden generar deployment slots para redirigir tráfico a dos App Services:

NAME	STATUS	APP SERVICE PLAN	TRAFFIC %
testbcn PRODUCTION	Running	az204AppServicePlan	<div style="width: 50%;">50</div>
testbcn-qa	Running	az204AppServicePlan	<div style="width: 50%;">50</div>



3.7.5 Configurando la Azure App

3.7.5.1 Generalidades

 Stack settings The software stack to run the app, including the language and SDK versions.	 Platform settings Configure settings for the hosting platform, including: <ul style="list-style-type: none"> Bitness (32-bit or 64-bit) WebSocket protocol Always On Managed pipeline version HTTP version ARR affinity 	 Debugging Enable remote debugging for ASP.NET, ASP.NET Core, or Node.js apps.	 Incoming client certificates Require client certificates in mutual authentication. TLS mutual authentication is used to restrict access to your app by enabling different types of authentication for it.
--	---	---	---

Podemos decidir si queremos que se desconecte a ciertas horas. Para aplicaciones *stateless* también podemos desactivar ARR affinity.

Por otra parte, se puede configurar también un auto swap.

Roberto Ribes (rbo)

The screenshot shows the Azure portal interface for managing an App Service slot. The left sidebar shows navigation options like Home, Quickstart, Deployment slots, Deployment Center, Settings, Configuration, Authentication, Application Insights, Identity, Backups, Custom domains, TLS/SSL settings, Certificates (preview), Networking, Scale up (App Service plan), Scale out (App Service plan), WebJobs, Push, MySQL in App, Service Connector, Properties, Locks, App Service plan, Quotas, Change App Service plan, Development Tools, Clone App, and Console.

The main content area displays the configuration for the 'qa (testbcn/qa)' slot. The 'General settings' tab is active. Key configuration items include:

- Stack settings**: Stack is set to ".NET" and .NET version is ".NET 6 (LTS)".
- Platform settings**: Platform is "32 Bit", Managed pipeline version is "Integrated", and FTP state is set to "FTPS only". A note indicates that FTP based deployment can be disabled or configured to accept FTP (plain text) or FTPS (secure) connections.
- HTTP version**: Set to "1.1".
- Web sockets**: Set to "Off".
- Always on**: Set to "Off". A note indicates that this prevents the app from being idled out due to inactivity.
- ARR affinity**: Set to "Off". A note indicates that turning off Affinity Cookie improves performance for stateless apps.
- HTTPS Only**: Set to "Off". A note indicates that enabling this feature redirects all HTTP traffic to HTTPS.
- Minimum TLS Version**: Set to "1.2". A note indicates the minimum TLS encryption version required by the app.
- Debugging**: Remote debugging is set to "Off".

Otra opción es comprar un dominio para nuestra web si no disponemos de uno todavía, en lugar de utilizar el proporcionado por Azure:

The screenshot shows the 'App Service Domains' blade in the Azure portal. The top navigation bar includes Home, App Service Domains, and other options. The main content area displays a table of app service domains. The columns are: Name (sorted by ascending), Location (sorted by ascending), Resource group (sorted by descending), Subscription (sorted by ascending), Status (sorted by ascending), and Managed hostnames (sorted by ascending). A search bar at the top right contains the text 'www'. Below the table, a message says 'No App Service domains to display' and 'Try changing or clearing your filters.' A 'Create App Service domain' button is located at the bottom right of the table area.

Roberto Ribes (rbo)

The screenshot shows the 'Create App Service domain' wizard in the Microsoft Azure portal. The top navigation bar includes 'Microsoft Azure', a search bar, and a breadcrumb trail: Home > App Service Domains > Create App Service domain.

The main steps are:

- Basics**: Contact information, Advanced, Tags, Review + create.
- Find and purchase a domain, and use Azure Domain Name System to manage your domains, all within Azure. Azure DNS also gives you a range of secure, reliable domain hosting options.**
- Note: Available top level domains are: com, net, co.uk, org, nl, in, biz, org.uk, and co.in. Learn more**
- Project Details**: Select a subscription to manage deployed resources and costs. Use resource groups like folders to organize and manage all your resources.
- Subscription**: Visual Studio Enterprise
- Resource Group**: az204
- Domain Details**: Enter a domain name and select it from the list. If you don't see the domain you entered, it's not available. All domains shown here are available for \$11.99 USD each.
- Domain**: az400pue.com
- Result**: This domain is available.

El DNS y el certificado tambien se pueden comprar desde la web de Azure. A través de Azure todos los certificados y dominios se renuevan automáticamente cada año:

The screenshot shows the 'DNS zones' management page in the Microsoft Azure portal. The top navigation bar includes 'Microsoft Azure', a search bar, and a breadcrumb trail: Home > DNS zones.

The main interface includes:

- DNS zones**: Shows a single entry: SoftVik (PUUad.onmicrosoft.com).
- Actions**: Create, Manage view, Refresh, Export to CSV, Open query, Assign tags.
- Filters**: Filter for any field..., Subscription equals all, Resource group equals all, Location equals all, Add filter.
- Sort Options**: Name ↑, Numb... ↑, Resource group ↑, Location ↑.
- Information**: No dns zones to display. A brief description of Azure DNS.
- Buttons**: Create dns zone, Create, Learn more.

Microsoft Azure

Home > App Service Certificates > Create App Service certificate ...

Basics Tags Review + create

Create a private App Service certificate that's managed by Azure. You can export copies, renew your certificates automatically, and sync them with your App Service apps. [Learn more](#)

Project Details

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

Once created, App Service Certificates can only be used by other App Services within the same subscription.

Subscription * Visual Studio Enterprise

Resource Group * az204

Certificate details

SKU

- Standard \$69.99 USD/year Can be used with one domain.
- Wildcard \$299.99 USD/year Can be used with multiple sub-domains.

Naked domain hostname * E.g. example.com

Certificate name * Enter certificate name.

Auto renewal

Auto renew prevents untimely expiration and unexpected loss of your certificate. The Certificate Authority (CA) will still require you to verify domain ownership when the certificate is in pending issuance state during renew or rekey, if you haven't verified domain ownership in the last 395 days. This process will not be automated and failure to verify domain ownership will result to failed renewals. You'll be billed annually as a new certificate order purchase upon successful certificate renewal. [Learn more](#)

Enable auto renewal Enable Disable

3.7.5.2 Autenticación

Podemos usar el AD (Active Directory) aunque es más recomendable utilizar el **Microsoft Identity Platform** y sus librerías asociadas.

Why use the built-in authentication	Identity providers enabled by default	How it works	Authentication flow	Authorization behavior
Saves time by providing out-of-the-box authentication with federated identity providers. Allows you to focus on the rest of your application.	Identity providers enabled by default <ul style="list-style-type: none"> Microsoft Identity Platform Facebook Google Twitter 	The authentication and authorization module run in the same sandbox as your application code. When it's enabled, every incoming HTTP request passes through it before being handled by your application code.	<ol style="list-style-type: none"> Sign user in Post-authentication Establish authenticated session Serve authenticated content 	<ul style="list-style-type: none"> Allow unauthenticated requests Require authentication

3.7.5.3 Networking

También es posible ver las IPs privadas y públicas para nuestros servicios web. En este caso se utiliza una IP para acceder a la web deseada fuera (**inbound traffic**) y una IP para acceder desde la web a otros servicios como la base de datos (**outbound traffic**) o devolver respuestas para las peticiones recibidas.

Roberto Ribes (rbo)

The screenshot shows the Azure portal's networking configuration for the app service 'az204bcn'. The left sidebar lists resources like 'az204bcn', 'az204bcnPlan', and 'rymdb'. The main panel has tabs for 'Networking' and 'Properties'. The 'Networking' tab is active, displaying the following sections:

- Inbound Traffic:** Manage access and incoming services. Features include Access restriction (Off), App assigned address (Off), and Private endpoints (Off). Inbound address is listed as 20.107.224.1.
- Web App:** These custom domains direct traffic to your web app. Domains listed: az204bcn.azurewebsites.net.
- Outbound Traffic:** Set up calls to app dependencies like databases. Features include VNet integration (Off) and Hybrid connections (Off). Outbound addresses listed: 20.67.205.170, 20.67.205.231, 20.67.20.5, 5.140.20.67, 20.65.
- Inbound networking features:** Includes Azure CDN and Azure Front Door.
- Outbound networking features:** Includes NAT Gateway (N/A), Network Security Group (N/A), and User Defined Route (N/A).

Multitenant App Service networking features

Azure App Service is a distributed system. All the roles in an App Service deployment exist in a multitenant network.

- Inbound features
 - App-assigned address
 - Access restrictions
 - Service endpoints
 - Private endpoints
- Outbound features
 - Hybrid Connections
 - Gateway-required VNet Integration
 - VNet Integration

Single-tenant networking

Azure App Service Environment hosts Isolated SKU plans directly in your Azure virtual network. There are two deployment types for an App Service Environment.

- **External:** Exposes the hosted apps by using an IP address that is accessible on the internet.
- **Internal load balancer:** Exposes the hosted apps on an IP address inside your virtual network.

Con un **escalado horizontal**, por ejemplo, podemos crear un gateway que nos conecte todas las webs que se han escalado a una única IP que es lo que se ve desde el exterior.

Existe un coste adicional asociado a tener la IP pública que va en función del tráfico y de la transferencia de datos. Cuando lo que contratás es una máquina virtual la dirección IP viene por defecto (*ipconfig*).

Roberto Ribes (rbo)

The screenshot shows the Azure Pricing calculator interface. On the left, a sidebar lists categories: Integración, Identidad, Seguridad, Herramientas para desarrollad..., DevOps, Administración y Gobernanza, Multimedia, Migración, Realidad mixta, and Híbrido y multinube. The main area displays several network-related services:

- Network Watcher**: Solución de diagnósticos y supervisión del rendimiento de la red.
- Ancho de banda**: Datos transferidos fuera de los centros de datos de Azure.
- Direcciones IP**: Una dirección dinámica o reservada utilizada para identificar una máquina virtual determinada o un servicio en la nube.
- Azure Firewall**: Proteja sus recursos de Azure Virtual Network con seguridad de red nativa en la nube.
- Virtual WAN**: Optimiza y automatiza la conectividad rama a rama con Azure.
- Azure Bastion**: Servicio totalmente administrado que ayuda a proteger el acceso remoto a las máquinas virtuales.
- Azure Private Link**: Acceso privado a servicios hospedados en la plataforma que mantienen sus datos en la red de Microsoft.
- Azure Firewall Manager**: Administración central de rutas y directivas de seguridad de red para perímetros definidos por software y distribuidos globalmente.
- Azure Front Door**: Red CDN moderna en la nube que ofrece experiencias optimizadas a los usuarios en cualquier lugar.

Below the service cards, there's a section titled "Su presupuesto" (Your budget) with a "+ Add" button. A detailed breakdown for "Ancho de banda" is shown:

TIPO DE TRANSFERENCIA DE DATOS:	REGION DE ORIGEN:	REGION DE DESTINO:
Interregional	West US	East Asia

Buttons for edit, delete, and copy are available for this item. The total monthly cost is listed as "Mensualmente: 0,00 ...".

Cuando creamos un App Service podemos elegir si queremos que se accede de manera pública o la queremos alojar en una red virtual existente. Con el siguiente ejemplo habilitaríamos la opción de alojarla en una red virtual:

Inicio > App Services >
Crear aplicación web ...

Datos básicos Implementación **Redes** Supervisión Etiquetas Revisar y crear

Las Web Apps se pueden aprovisionar con la dirección de entrada pública a Internet o aislada en una red virtual de Azure. Las Web Apps también pueden aprovisionarse con el tráfico saliente capaz de llegar a los puntos de conexión de una red virtual, regirse por grupos de seguridad de red o verse afectadas por rutas de red virtual. De forma predeterminada, la aplicación está abierta a Internet y no puede acceder a ninguna red virtual. Estos aspectos también se pueden cambiar una vez que se haya aprovisionado la aplicación. [Más información](#)

Habilitar la inserción de red *

Activado Desactivado

Virtual Network

Seleccione o cree una red virtual que esté en la misma región que la nueva aplicación.

Virtual Network *

Se necesita una red virtual nueva.
[Crear nuevo](#)

Otra opción, como no, es crear reglas de entrada y salida especiales para permitir o bloquear puertos:

Roberto Ribes (rbo)

Microsoft Azure

Inicio > Az204RobertoApi | Redes >

○ Restricciones de acceso ...

○ Agregar regla

Prioridad	Nombre	Origen	Estado del punto de conexión	Encabezados HTTP	Acción
2147483647	Allow all	Any	Sin configurar		Allow

3.7.5.4 Escalado vertical

Escalar verticalmente también es posible con las opciones predefinidas y automáticas de Azure:

testbcn | Scale up (App Service plan)

Dev / Test Production Isolated

Recommended pricing tiers

P1V1	P2V2	P3V3	P4V4
210 total ACU 3.5 GB memory Dv2-Series compute equivalent Loading...	420 total ACU 7 GB memory Dv2-Series compute equivalent Loading...	840 total ACU 14 GB memory Dv2-Series compute equivalent Loading...	195 minimum ACU/vCPU 8 GB memory 2 vCPU Loading...

See only recommended options

Additional pricing tiers

S1	S2	S3	P1
100 total ACU 3.5 GB memory A-Series compute equivalent Loading...	200 total ACU 3.5 GB memory A-Series compute equivalent Loading...	400 total ACU 7 GB memory A-Series compute equivalent Loading...	100 total ACU 1.75 GB memory A-Series compute equivalent Loading...
P2	P3		
200 total ACU 3.5 GB memory A-Series compute equivalent Loading...	400 total ACU 7 GB memory A-Series compute equivalent Loading...		

Included features

- Custom domains / SSL
- Auto scale
- Staging slots
- Daily backups

Included hardware

- Azure Compute Units (ACU)
- Memory
- Storage

O manualmente, aunque hay riesgo de no hacerlo correctamente o que no se haga automáticamente.

NOTA: Es posible utilizar entornos de prueba gratuitos con 1GB de memoria y 60 minutos de tiempo activo de manera gratuita. Una desventaja es que las opciones gratuitas no permiten utilizar dominios propios ni escalar varias máquinas:

3.7.5.5 Escalado horizontal

NOTA: El escalado horizontal solamente funciona si se utiliza un plan de producción de App Service.

Selector de especificaciones

Desarrollo y prueba
Para cargas de trabajo menos exigentes.

Producción
Para la mayoría de cargas de trabajo de producción

Aislado
Escalado y redes avanzadas

El primer núcleo Básico (B1) para Linux es gratis durante los primeros 30 días.

Planes de tarifa recomendados

P1V2 Total de ACU: 210 3.5 GB de memoria Equivalente de proceso de serie Dv2 68.33 EUR/mes (estimado)	P2V2 Total de ACU: 420 7 GB de memoria Equivalente de proceso de serie Dv2 136.05 EUR/mes (estimado)	P3V2 Total de ACU: 840 14 GB de memoria Equivalente de proceso de serie Dv2 272.10 EUR/mes (estimado)
P1V3 Mínimo de ACU/vCPU 195 8 GB de memoria 2 vCPU 104.65 EUR/mes (estimado)	P2V3 Mínimo de ACU/vCPU 195 16 GB de memoria 4 vCPU 209.31 EUR/mes (estimado)	P3V3 Mínimo de ACU/vCPU 195 32 GB de memoria 8 vCPU 418.61 EUR/mes (estimado)

Características incluidas

Las aplicaciones hospedadas en este plan de App Service tendrán acceso a estas características:

- Domini personalizados/SSL**
Configurar y comprar dominios personalizados con enlaces SSL IP y SNI
- Escalado automático**
Hasta 20 instancias. Sujeto a disponibilidad.
- Espacios de ensayo**
Se pueden usar hasta 20 espacios de ensayo para pruebas e implementaciones antes de cambiarlos a producción.

Hardware incluido

Cada instancia del plan de App Service incluirá la configuración de hardware siguiente:

- Unidades de Azure Compute (ACU)**
Recursos de proceso dedicados que se usan para ejecutar aplicaciones implementadas en el plan de App Service....
- Memoria**
Memoria por instancia disponible para ejecutar aplicaciones implementadas y en ejecución en el plan de App Service.
- Almacenamiento**
250 GB de almacenamiento en disco compartido por todas las aplicaciones implementadas en el plan de App Service.

Aplicar

Roberto Ribes (rbo)

El escalado horizontal permite desplegar varias máquinas o nodos mientras que el escalado vertical se centra en las características individuales de hardware de cada equipo.

The screenshot shows the Azure portal interface for managing an App Service plan. The left sidebar lists various configuration options like Overview, Activity log, Access control (IAM), Tags, Diagnose and solve problems, Microsoft Defender for Cloud, Events (preview), Deployment, Quickstart, Deployment slots, Deployment Center, Settings, Configuration, Authentication, Application Insights, Identity, Backups, Custom domains, TLS/SSL settings, Certificates (preview), Networking, Scale up (App Service plan), and Scale out (App Service plan). The 'Scale out (App Service plan)' option is currently selected. The main content area displays the 'testbcn | Scale out (App Service plan)' configuration. It includes tabs for Overview, Configure (which is selected), Run history, JSON, Notify, and Diagnostic settings. The 'Configure' tab contains a section titled 'Autoscale' which explains its purpose: 'Autoscale is a built-in feature that helps applications perform their best when demand changes. You can choose to scale your resource manually to a specific instance count, or via a custom Autoscale policy that scales based on metric(s) thresholds, or schedule instance count which scales during designated time windows. Autoscale enables your resource to be performant and cost effective by adding and removing instances based on demand.' Below this, there are two options: 'Manual scale' (selected) and 'Custom autoscale'. The 'Custom autoscale' section allows creating an 'Autoscale setting name' (set to 'az204AppServicePlan-Autoscale-808'), selecting a 'Resource group' (set to 'az204'), and specifying an 'Instance count' (set to 10). A 'Default' scale condition is listed, which is auto-created and based on a single metric. It includes fields for 'Delete warning', 'Scale mode' (set to 'Scale based on a metric'), 'Instance count' (set to 1), and a note: 'This scale condition is executed when none of the other scale condition(s) match'. There is also a link to '+ Add a scale condition'.

The screenshot shows the 'All resources' blade in the Azure portal. The top navigation bar includes 'Home > All resources' and a search bar. Below the navigation are buttons for '+ Create', 'Manage view', 'Refresh', 'Export to CSV', 'Open query', 'Assign tags', and 'Delete'. A filter bar at the top allows filtering by 'Subscription equals all', 'Resource group equals all', 'Type equals all', 'Location equals all', and 'Add filter'. The main list of resources includes: 'az204bcn' (App Service, az204, North Europe), 'az204bcnPlan' (App Service plan, az204, North Europe), 'az900appservice' (App Service plan, az900, North Europe), 'az900bcn' (App Service, az900, North Europe), 'ComputerVisionAlarma' (Computer vision, softvilk, North Europe), 'rymdb' (SQL server, softvilk, North Europe), and 'RyMDB (rymldb/RyMDB)' (SQL database, softvilk, North Europe). The 'az204bcn' resource is selected, and its detailed properties are shown in the main pane: Type (App Service), Resource group (az204), Location (North Europe), and a table of metrics including CPU usage, Requests, and Memory usage.

Si seleccionamos la aplicación podemos ver las métricas de respuesta e información:

Roberto Ribes (rbo)

The screenshot shows the Microsoft Azure portal interface for the 'az204bcn' App Service. The left sidebar lists various resources under 'All resources'. The main pane shows the 'az204bcn' App Service details. Key information includes:

- Resource group: az204
- Status: Running
- Location: North Europe
- Subscription: Visual Studio Enterprise

Application Insights status: Not Configured.

Metrics charts:

- Http 5xx: 0 errors
- Data In: 3.54 MB
- Data Out: 49.64 MB

Para ver el consumo real del hardware seleccionamos el plan en lugar de la web:

The screenshot shows the Microsoft Azure portal interface for the 'az204bcnPlan' App Service plan. The left sidebar lists various resources under 'All resources'. The main pane shows the 'az204bcnPlan' App Service plan details. Key information includes:

- Resource group: az204
- Status: Ready
- Location: North Europe
- Subscription: Visual Studio Enterprise

App Service Plan: az204bcnPlan (\$1: 1)

Metrics charts:

- CPU Percentage: 36.4286%
- Memory Percentage: 65.4286%
- Data In: 3.31 MB
- Data Out: 3.31 MB (partially visible)

Podemos observar las opciones para configurar el escalado vertical y horizontal:

Scale up = escalado vertical:

Roberto Ribes (rbo)

The screenshot shows the Azure portal interface for an App Service plan named 'az204bcnPlan'. On the left, there's a sidebar with various monitoring and diagnostic tools. The main area displays 'Recommended pricing tiers' for the 'Production' tier, which is highlighted with a dashed blue border. It lists several tiers with their respective configurations and estimated costs:

Tier	Total ACU	Memory	Compute Equivalent	Estimated Price
P1V2	210	3.5 GB	Dv2-Series	40.51 EUR/Month (Estimated)
P2V2	420	7 GB	Dv2-Series	81.26 EUR/Month (Estimated)
P3V2	840	14 GB	Dv2-Series	161.91 EUR/Month (Estimated)
P1V3	195	8 GB	vCPU	77.57 EUR/Month (Estimated)
P2V3	195	16 GB	vCPU	153.13 EUR/Month (Estimated)
S1	100	1.75 GB	A-Series	36.94 EUR/Month (Estimated)
S2	200	3.5 GB	A-Series	73.87 EUR/Month (Estimated)
S3	400	7 GB	A-Series	147.75 EUR/Month (Estimated)
P2	200	3.5 GB	A-Series	369.37 EUR/Month (Estimated)
P3	400	7 GB	A-Series	738.73 EUR/Month (Estimated)

Scale out = escalado horizontal:

Despliegue de nodos regionales o para balancear la carga que llega a la web.

The screenshot shows the Azure portal interface for an App Service plan named 'az204bcn'. On the left, there's a sidebar with various monitoring and diagnostic tools. The main area displays the 'Scale out (App Service plan)' configuration. Under the 'Custom autoscale' section, the 'Instance count' is set to 2. The 'Default' scale condition is configured to scale to a specific instance count of 1, with start and end times set for September 14, 2022, from 12:00:00 AM to 11:59:00 PM.

Como mínimo habría que seleccionar dos instancias que estuvieran en distintos racks y tener duplicidad.

También podemos añadir condiciones para que a ciertas horas del día se active o desactiven webs.

También se pueden añadir que esta función de escalado incluya métricas:

Roberto Ribes (rbo)

The screenshot shows the 'Profile 2' configuration page in the Azure portal. Under 'Scale mode', the 'Scale based on a metric' option is selected. In the 'Rules' section, there is a tooltip: 'Scale is based on metric trigger rules but no rule(s) is defined; click [Add a rule](#) to create a rule. For example: 'Add a rule that increases instance count by 1 when CPU Percentage is above 70%'. If no rules is defined, the resource will be set to default instance count.' Below this, 'Instance limits' are set to Minimum: 4, Maximum: 8, and Default: 4. The 'Schedule' section shows 'Specify start/end dates' selected. The 'Timezone' is set to '(UTC-08:00) Pacific Time (US & Canada)'. The 'Start date' is 09/14/2022 at 12:00:00 AM, and the 'End date' is 09/14/2022 at 11:59:00 PM.

Clicando en “Add a rule” podemos crear metricas. En este caso podemos definir que si la CPU esta a más del 70% durante 10 minutos entonces levanta una instancia adicional hasta pasados 5 minutos del pico.

The screenshot shows the 'Scale rule' configuration dialog. It starts with a 'Metric source' of 'Current resource (az204bcnPlan)'. Under 'Criteria', 'Time aggregation' is set to 'Average'. The 'Metric namespace' is 'App Service plans standard metrics' and the 'Metric name' is 'CPU Percentage'. A chart shows the CPU percentage over time, with a red line at 70% and a blue line fluctuating below it. The 'CpuPercentage (Average)' value is 5.78%. The 'Operator' is 'Greater than' and the 'Metric threshold to trigger scale action' is 70. The 'Duration (minutes)' is 10, and the 'Time grain (minutes)' is 1. Under the 'Action' section, the 'Operation' is 'Increase count by' and the 'Cool down (minutes)' is 5. The 'Instance count' is set to 1. At the bottom, there is a blue 'Add' button.

Roberto Ribes (rbo)

También es importante ver reglas de desescalado. Como ejemplo de desescalado puede ser en función del porcentaje de memoria. En este caso cuando la memoria esté por debajo del 30% durante 5 minutos, entonces reduce en 1 el número de nodos.

Scale rule

Talking:

Metric source: Current resource (az204bcnPlan)

Resource type: App Service plans / az204bcnPlan

Criteria

Time aggregation: Average

Metric namespace: App Service plans standard metrics / Metric name: Memory Percentage

Dimension Name: Operator: Dimension Values: Add

Instance: = All values +

If you select multiple values for a dimension, autoscale will aggregate the metric across the selected values, not evaluate the metric for each values individually.

MemoryPercentage (Average): 61.72 %

Enable metric divide by instance count

Operator: Less than / Metric threshold to trigger scale action: 30 %

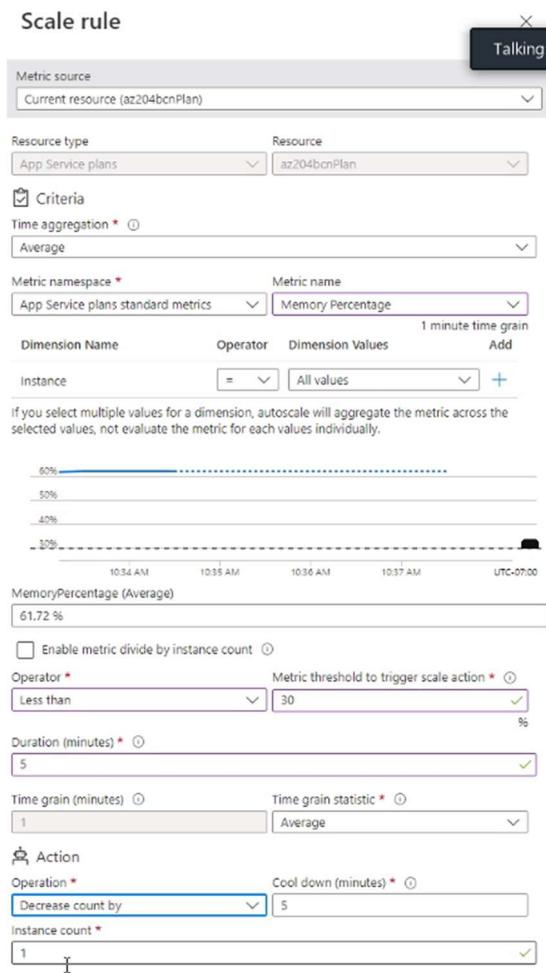
Duration (minutes): 5

Time grain (minutes): 1 / Time grain statistic: Average

Action

Operation: Decrease count by 5

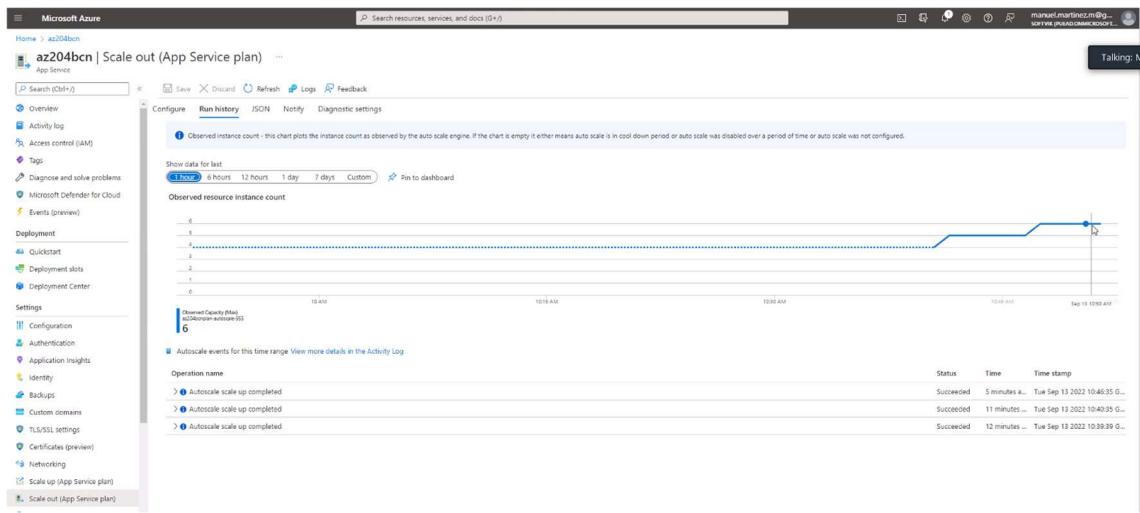
Instance count: 1



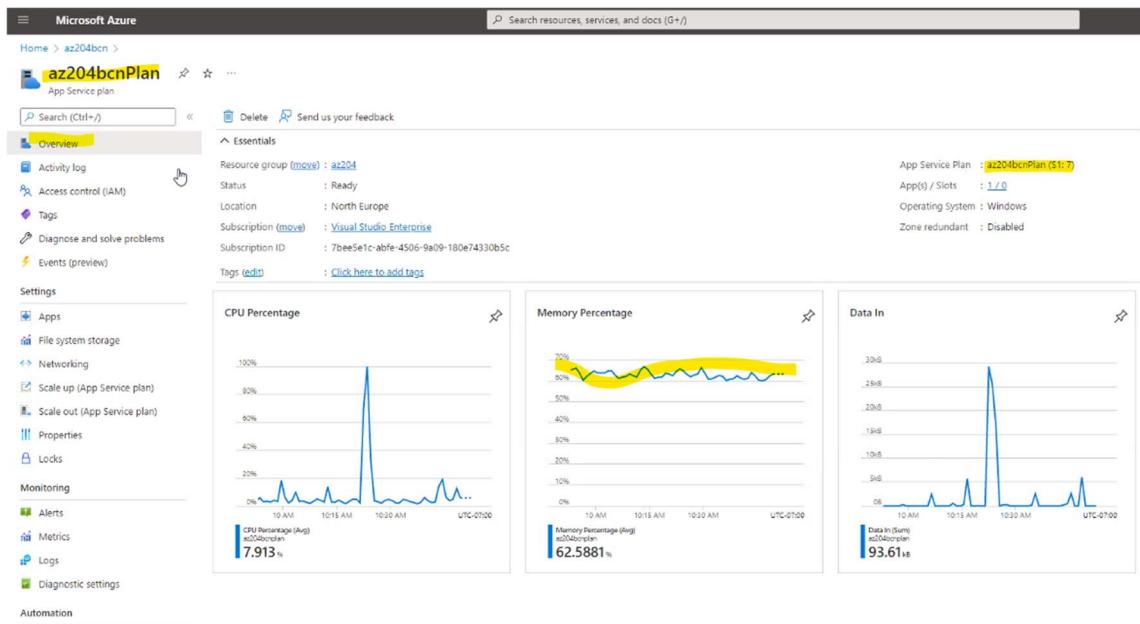
La prioridad de las reglas aplica de arriba a abajo cuando no se alcanzan las condiciones de las superiores aplican las siguientes de la lista en caso de contradicción.

Es posible visualizar el histórico de nodos que una aplicación está utilizando y cómo evoluciona en el tiempo:

Roberto Ribes (rbo)



Asimismo, en el resumen del plan podemos ver la configuración de hardware que se está utilizando así como la evolución de ciertos parámetros:



"S1: 7" significa que se han desplegado 7 nodos de tipo S1 para dar servicio a la demanda de solicitudes.

Establecer métricas por CPU es muy beneficioso. En cambio, métricas por memoria podrían no reflejar el estado actual de la máquina ya que el Garbage Collector (GC) limpia cada cierto tiempo la memoria cuando dejan de utilizarse. La memoria no se borra de manera instantánea y eso puede dar lugar a problemas de escalado.

Es también recomendable que la aplicación no esté siempre "On" ya que impide que el servicio se desescalde cuando no hay solicitudes.

Microsoft Azure

Home > az204bcn

az204bcn | Configuration

Search (Ctrl+ /) Refresh Save Discard Leave Feedback

Overview Activity log Access control (IAM) Tags Diagnose and solve problems Microsoft Defender for Cloud Events (preview)

Deployment Quickstart Deployment slots Deployment Center

Settings Configuration Authentication Application Insights Identity Backups Custom domains TLS/SSL settings

General settings * Application settings Default documents Path mappings

Stack settings

Stack: .NET

.NET version: .NET 6 (LTS)

Platform settings

Platform: 32 Bit

Managed pipeline version: Integrated

FTP state: FTPS only

HTTP version: 1.1

Web sockets: On Off

Always on

On Off

Prevents your app from being idled out due to inactivity. [Learn more](#)

Las aplicaciones stateless además permiten desactivar el Affinity Cookie que puede mejorar el rendimiento.



El crecer y decrecer dinámicamente es crítico para impedir que durante el proceso de crecimiento los usuarios sufren interrupciones porque el escalado vertical no ha sucedido suficientemente rápido ante incrementos súbitos de demanda.

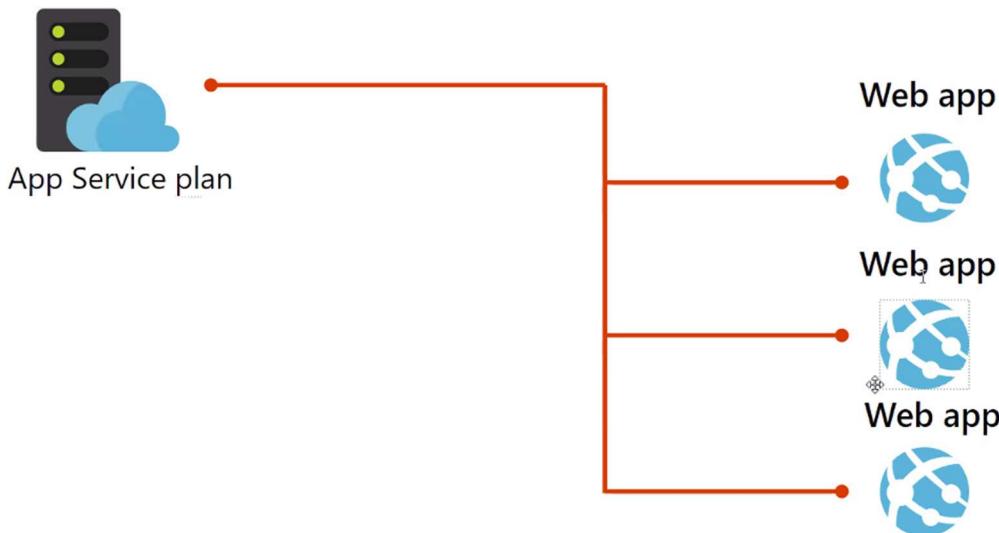
Es más, cuando entra un Nuevo nodo que acaba de arrancar la primera solicitud suele necesitar mayor tiempo de respuesta para cargar todos los datos y estructura necesarios.

3.7.6 Distinguir aplicación del app service

Resources

Recent Favorite

Name	Type	Last Viewed
az204bcnPlan	App Service plan	a few seconds ago
az204bcn	App Service	35 minutes ago



Es importante distinguir la aplicación Web del App Service plan.

3.7.7 Application insights

Podemos configurar en Azure el application insights para tener un reporte avanzado del estado de nuestra App Service:

- Profilers.
- RAM snapshots.
- Etc.

Así como muchas otras herramientas que se publican en el “Log Analytics Workspace”.

The screenshot shows the Microsoft Azure portal interface. At the top, there is a navigation bar with the text "Microsoft Azure" and a search bar. Below the navigation bar, the URL "Home > az204bcn > az204bcn - Application Insights" is visible. The main content area is titled "az204bcn - Application Insights" and "App Service". It contains sections for "Application Insights", "Collect application monitoring data using Application Insights", "Enable" (button), "Disable" (button), and "Feedback". A note states: "Instrumentation key will be added to App Settings. This will overwrite any instrumentation key value in web app configuration files. Your app will be connected to an auto-created Application Insights resource: az204bcn". Another note says: "As part of using Application Insights instrumentation, we collect and send diagnostic data to Microsoft. This data helps us run and improve Application Insights. You have the option to disable non-essential data collection. Learn more". Below this, there is a section titled "Change your resource" with a "Create new resource" button. A note here says: "Application insights and workspace resources are created in current subscription and resource group scope. If you want to choose a different scope, please create a new AI component by visiting: Create a new Application Insights resource and then return to this page." At the bottom, there are fields for "New resource name" (set to "az204bcn") and "Location" (set to "North Europe"). A dropdown menu for "Log Analytics Workspace" shows "(new) DefaultWorkspace-7bee5e1c-abfe-4506-9a09-180e74330b5c [northeurope]".

Una vez desplegado el Application Insight podemos visualizar información clave sobre el funcionamiento de la aplicación:

Roberto Ribes (rbo)

Microsoft Azure

az204bcn > az204bcn > Application Insights

Search resources, services, and docs (Ctrl+F)

az204bcn Application Insights

Application Dashboard Getting started Search Logs Monitor resource group Feedback Favorites Rename Delete

Overview

Activity log

Access control (IAM)

Tags

Diagnose and solve problems

Investigate

Application map

Smart detection

Dependencies

Transaction search

Availability

Failures

Performance

Troubleshooting guides (preview)

Monitoring

Alerts

Metrics

Resource group (move) : az204bcn

Location : North Europe

Subscription (move) : Visual Studio Enterprise

Subscription ID : 7be5e51c-a0fe-4500-9a09-180e74330b5c

Tags (edit) : Click here to add tags

Instrumentation Key : f96f5bf-bd3d-4bad-bd15-2094d90dd3

Connection String : instrumentationKey=f96f5bf-bd3d-4bad-bd15-2094d90dd3;log�point=https://north

Workspace : defa_1tworkspace-7ba5e41c-4f8f-4506-9309-180e74330b5c-NEU

Show data for last: 30 minutes 1 hour 6 hours 12 hours 1 day 3 days 7 days 30 days

Failed requests

Server response time

Server requests

Availability

Failed requests (Count) 0

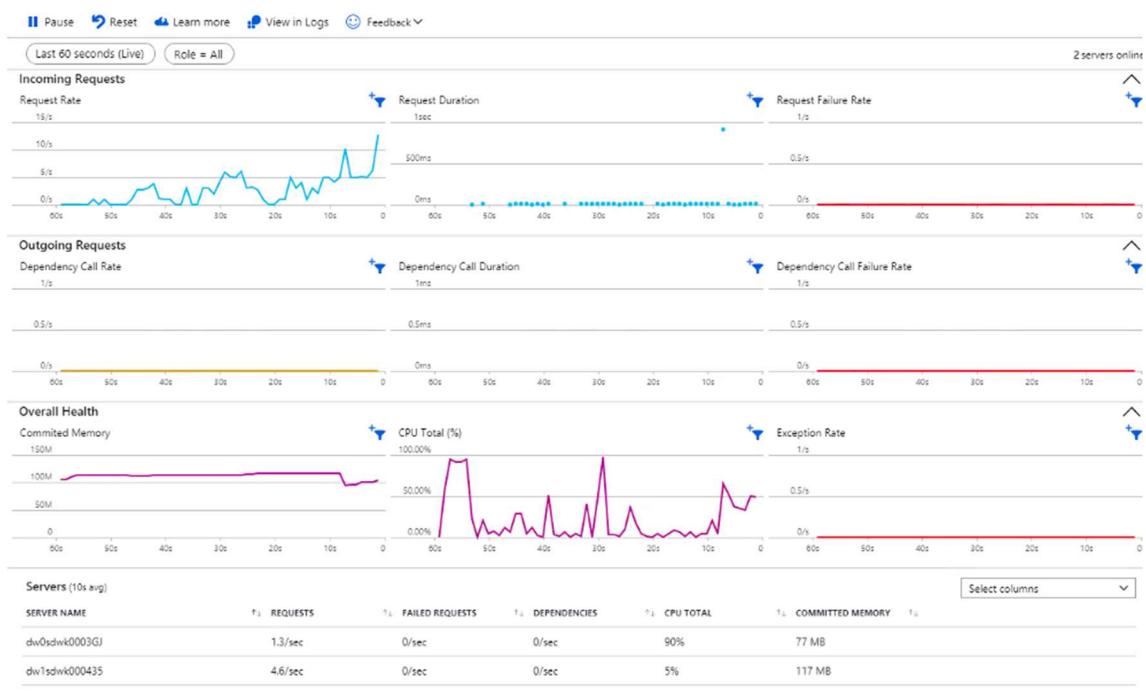
Server response time (Avg) 0ms

Server requests (Count) 0

Availability (Avg) 100%

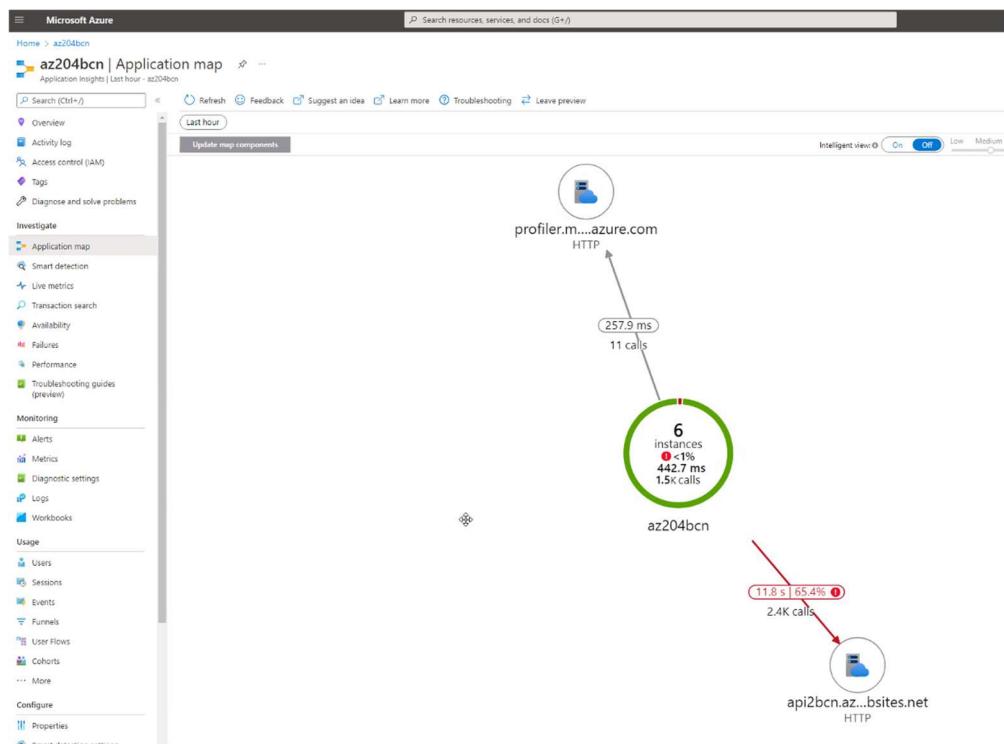
10:45 AM 11 AM 11:15 AM UTC-07:00

La telemetría en directo de cada nodo también está disponible en el insights:



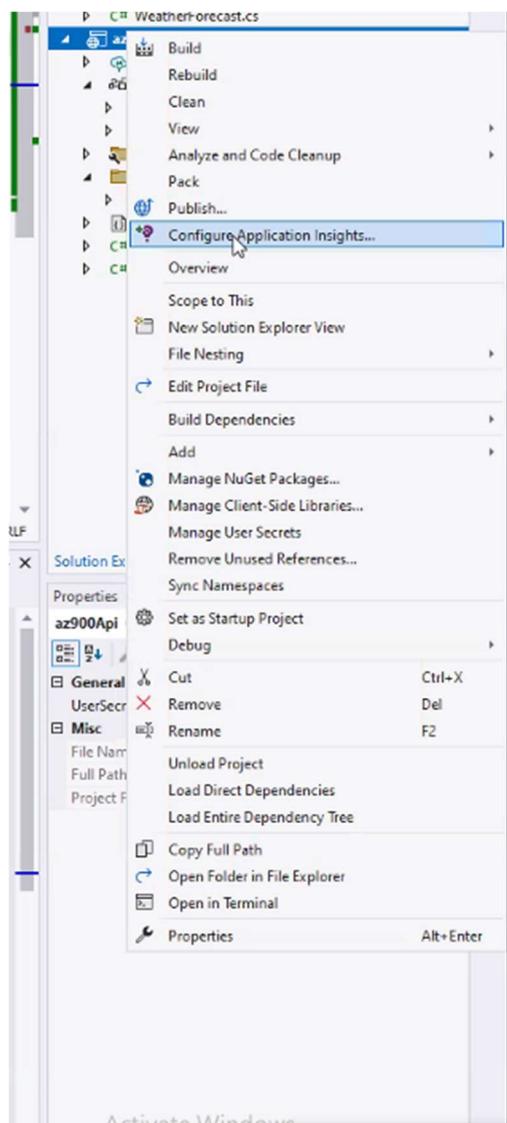
En el apartado de “Application Map” podemos ver una serie de estadísticas que nos dibuja un grafo de llamadas externas e internas. Asimismo, el mapa nos muestra el numero de llamadas al servicio externo y al nuestro propio, así como si hay problemas con algún servicio.

Roberto Ribes (rbo)

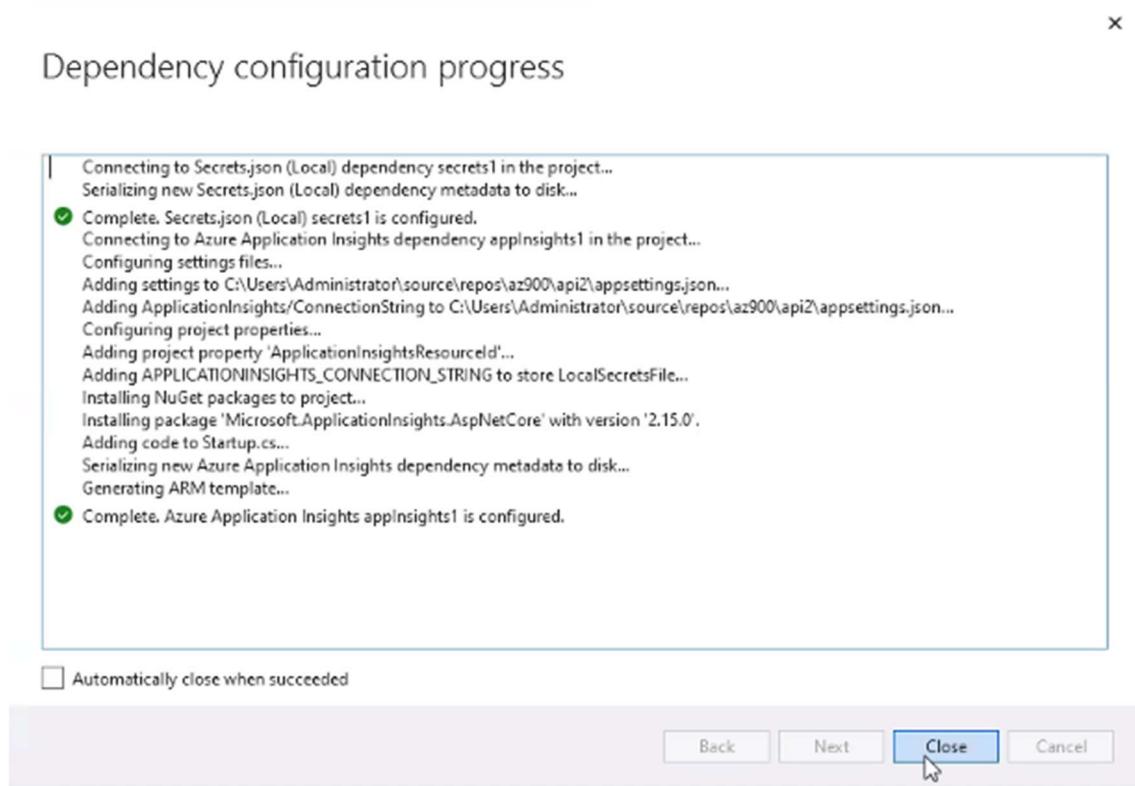


Es posible configurar el Application Insights en local con Visual Studio:

Roberto Ribes (rbo)



Con esa opción, Visual Studio te descarga y realiza todos los cambios necesarios en el Proyecto para sacar todo el provecho:



En local, si ahora decidimos ejecutar la aplicación, ahora veremos características avanzadas de insights cuando busquemos en el portal de AZURE la App web:

SERVER NAME	REQUESTS	FAILED REQUESTS	DEPENDENCIES	CPU TOTAL	COMMITTED MEMORY
WIN-N9MBG806DN	0/sec	0/sec	0/sec	2%	12154 MB

Roberto Ribes (rbo)

Hay tambien la posibilidad de ver reportes de performance y de troubleshooting:

The screenshot shows the Microsoft Azure Application Insights interface for troubleshooting. The left sidebar includes sections like Overview, Activity log, Access control (IAM), Tags, Diagnose and solve problems, Investigate (with Application map, Smart detection, Live metrics, Transaction search, Availability, Failures, and Performance), Monitoring (Alerts, Metrics, Diagnostic settings, Logs, Workbooks), and Usage. The main area displays a chart titled 'New Failure (Sum)' with a value of 175. Below it is a table titled 'Failure Details' showing various request names, their result codes, failure counts, and users affected. The table includes rows for 'GET /favicon.ico', 'GET /', 'GET /TontoQuienLoLea', 'GET /hello', 'GET WeatherForecast/Get', 'GET /WeatherForeCast/I', and 'GET /WeatherForecast/pete'. A legend indicates that red diamonds represent 'New Failure' and blue diamonds represent 'Existing Failure'.

The screenshot shows the Microsoft Azure Application Insights interface for performance monitoring. The left sidebar is identical to the troubleshooting view. The main area features a timeline chart for 'Request count' over the last 24 hours, with a significant spike visible around 12:00 PM. To the right, there are several performance-related cards: 'Overall Distribution' (Request count vs Duration), 'Insights (2)' (including a 99% CI result and Top 3), and a detailed table for 'Select operation' under 'Overall'. The table lists various API operations with their average duration, count, and PIN. The top row, 'GET WeatherForecast/Get', has a duration of 3.28 sec and a count of 1.83k.

3.8 Azure API Management

3.8.1 Introducción

API Management permite exponer interfaces HTTP y REST API en internet. La API management permite registrar estas interfaces y realizará las funciones de PROXY. Además, tiene servicios con los que se puede balancear las peticiones, protegerlo de ataques y realizar otra serie de acciones de seguridad, etc.

The role of API management

- API management provides core functions to ensure a successful API program through developer participation, business insight, analysis, security, and protection.
- Each API consists of one or more operations, and each API can be added to one or more products.

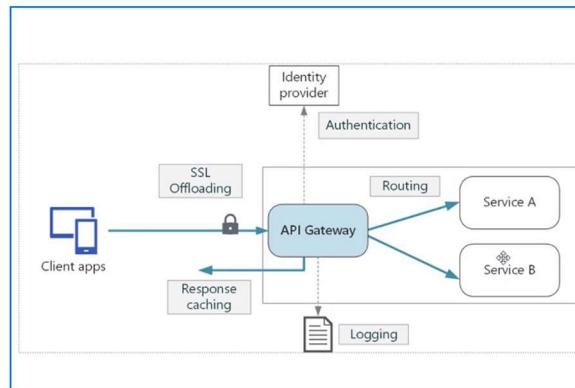
The system is made up of the following components:

- API gateway
- Azure portal
- The Developer portal

Se suele utilizar para modernizar APIs antiguas a los nuevos tiempos. Cada API puede ser configurada para uno o varios servicios backend.

API gateway role

- An API gateway sits between clients and services.
- It acts as a reverse proxy, routing requests from clients to services.
- It may also perform tasks such as authentication, SSL termination, and rate limiting.



Peticiones:

- Certificación SSL.
- Enrutador de llamadas.
- Autenticación.
- Limitando llamadas.
- Agrupando peticiones en una sola llamada.

Las principales misiones y riesgos de no utilizar API management son:

Potential issues when deploying an API without a gateway

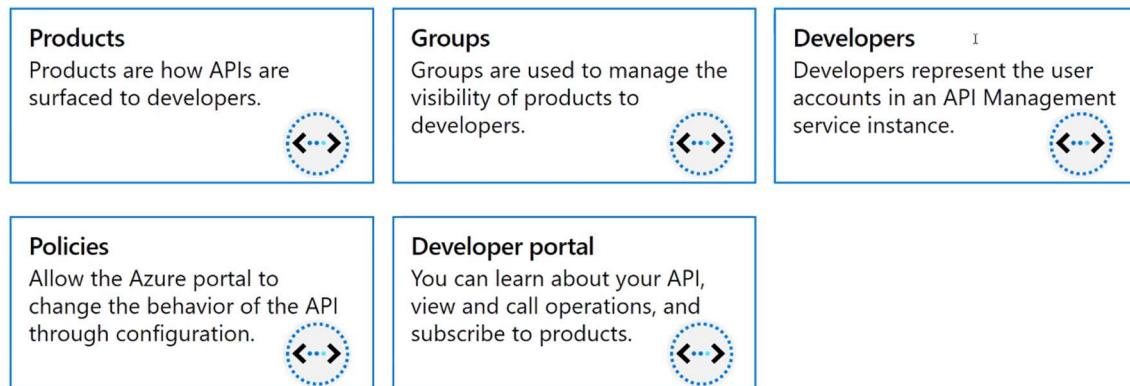
- Lead to complex client code.
- Create coupling between the client and the backend.
- A single operation may need to call multiple services.
- Every public-facing service must be dealt with.
- The service must expose a client-friendly protocol.

Functional design patterns

- **Gateway routing:** Use a gateway as a reverse proxy to route requests to one or more back-end services
- **Gateway aggregation:** Use a gateway to aggregate multiple individual requests into one request.
- **Gateway Offloading:** Use the gateway to offload functionality from individual services to the gateway, particularly cross-cutting concerns.

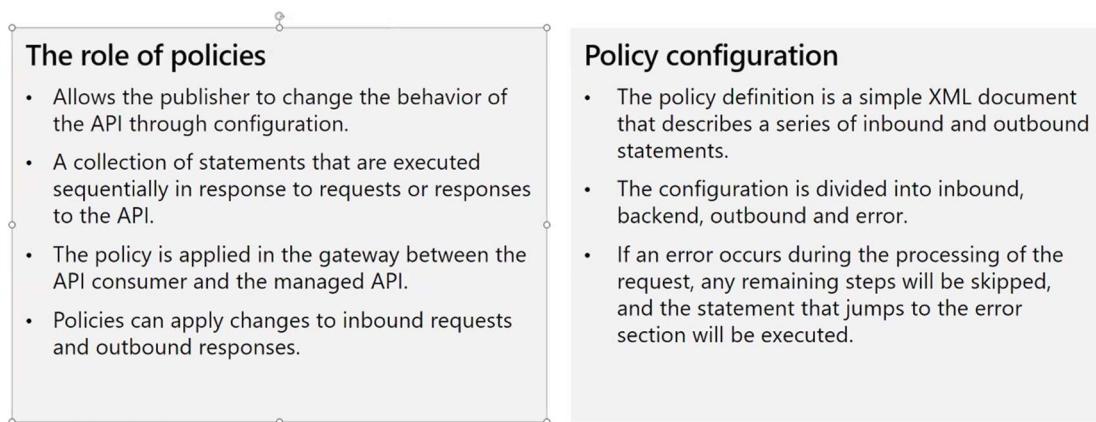
Cuando como desarrolladores creamos una API, si no configuramos un Gateway hay bastantes riesgos a los que exponemos nuestra función: llamadas a multiples servicios por una operación, protocolos obsoletos, etc.

3.8.2 Funcionalidades del API management



- Productos. Son grupos de una o más APIs.
- Grupos. Permite gestionar visibilidad de productos.
- Developers. Es el usuario que es asignado a uno o varios grupos y accede a la API.
- Policies. Permite cambiar el comportamiento de una API mediante configuración.

En lo que respecta a policies:



Podemos configurar como se comporta la API antes peticiones o diferentes escenarios. En el ejemplo de abajo podemos ver como se puede limitar al backend llamadas concurrentes, timeout de peticiones o como registrar trazas.

```

<limit-concurrency key="expression" max-count="number">
    <!-- nested policy statements -->
</limit-concurrency>

<forward-request timeout="time in seconds" follow-redirects="true | false"/>

<log-to-eventhub logger-id="id of the logger entity" partition-id="index of the partition where
messages are sent" partition-key="value used for partition assignment">
    <!-- Expression returning a string to be logged -->
</log-to-eventhub>

```

3.8.3 Políticas avanzadas de API management

API management policy

Control flow Conditionally applied based on the evaluation result of the Boolean expression.	Forward request Forward the request to the backend service.	Limit concurrency Prevent policies from executing more than the specified number of requests at a time.
Log to Event Hub Send the message in the specified format to the event center defined by the Logger entity.	Mock response The pipeline execution is aborted and the simulated response is returned directly to the caller.	Retry Retry the execution of the contained policy statement until the condition is met.

3.8.4 Seguridad y autenticación

La seguridad, autenticación o las configuraciones pueden aplicarse a diferentes niveles:

- Todas las APIs.
- Una única API.
- APIs que pertenecen a un producto.

Subscription key scopes

Scope	Details
All APIs	Applies to every API accessible from the gateway
Single API	This scope applies to a single imported API and all of its endpoints
Product	A product is a collection of one or more APIs that you configure in API Management. You can assign APIs to more than one product. Products can have different access rules, usage quotas, and terms of use.

API management soporta mecanismos de autenticación con *OAuth2.0*, certificados de cliente, rangos de IP.

Tambien es posible cifrar las comunicaciones a nivel de TLS:

Transport Layer Security client authentication

Property	Description
Certificate Authority (CA)	Only allow certificates signed by a particular CA
Thumbprint	Allow certificates containing a specified thumbprint
Subject	Only allow certificates with a specified subject
Expiration Date	Only allow certificates that have not expired

Two methods to verify a certificate:

- Check who issued the certificate.
- If the certificate is issued by the partner, verify that it came from them.

La comunicación entre cliente y el nuestra API existen multitud de alternativas.

A continuación vemos algunos ejemplos:

Examples

```
<!--Check the thumbprint of a client certificate-->
<choose>
    <when condition="@{context.Request.Certificate == null || context.Request.Certificate.Thumbprint != "desired-thumbprint"}" >
        <return-response>
            <set-status code="403" reason="Invalid client certificate" />
        </return-response>
    </when>
</choose>
```

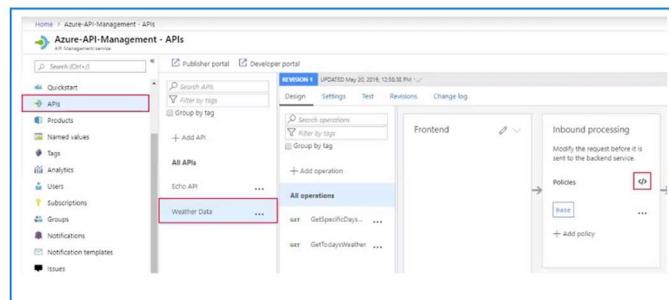
```
<!--Check the issuer and subject of a client certificate-->
<choose>
    <when condition="@{context.Request.Certificate == null || context.Request.Certificate.Issuer != "trusted-issuer" || context.Request.Certificate.SubjectName.Name != "expected-subject-name"}" >
        <return-response>
            <set-status code="403" reason="Invalid client certificate" />
        </return-response>
    </when>
</choose>
```

3.8.5 Visualización

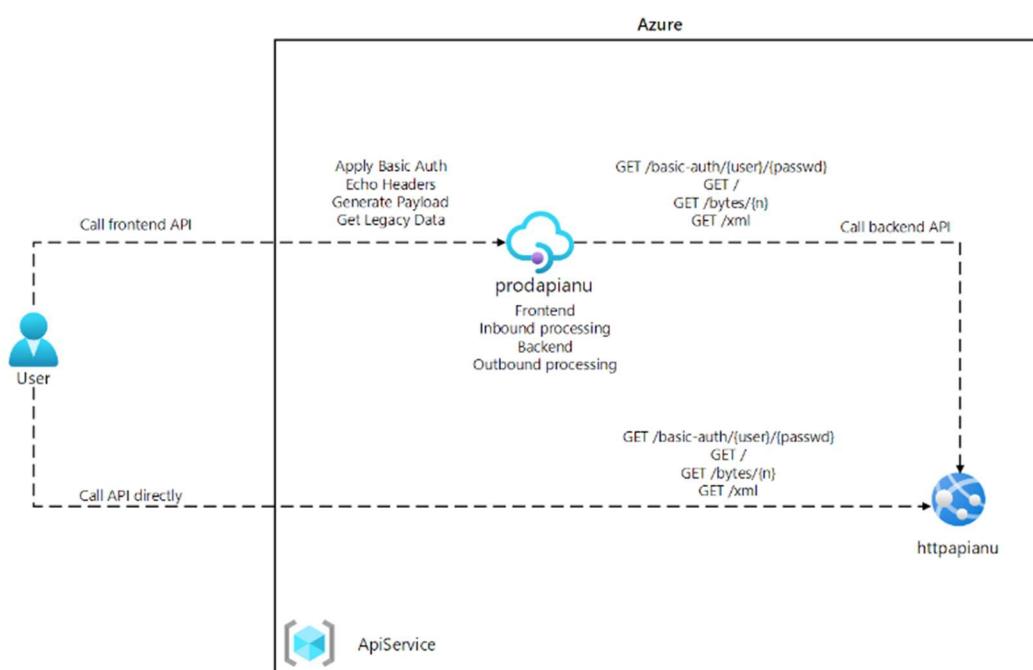
Al final desde el API management, se puede ver la API (controlador), con todos los métodos y diferentes configuraciones.

Secure APIs by using certificates (2 / 4)

- Accepting client certificates in the Consumption tier
- Certificate Authorization Policies
- Check the thumbprint of a client certificate
- Check the thumbprint against certificates uploaded to API Management
- Check the issuer and subject of a client certificate



Architecture diagram



3.8.6 Creando API Management

3.8.6.1 Creamos el recurso en Azure

Home > API Management services >

Install API Management gateway

API Management service

Basics Monitoring Scale Managed identity Virtual network Protocol settings Tags Review + install

Project details

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

Subscription * (Azure Pass - Sponsorship)

Resource group * (ApiService) Create new

Instance details

Region * (US) East US

Resource name * proapianu

Organization name * Contoso

Administrator email * admin@contoso.com

Pricing tier

API Management pricing tiers vary in computing capacity per unit and the offered feature set - for example, support for virtual networks, multi-regional deployments, or self-hosted gateways. To accommodate more API requests, consider adding API Management service units instead. [Learn more](#)

⚠ You can create only 20 Consumption tier API Management services in an Azure subscription. Each Consumption tier service can manage up to 50 APIs. [Learn more](#)

Pricing tier (Consumption (99.95% SLA))

Review + create < Previous Next: Monitoring >

3.8.6.2 Define API

Una vez tenemos el API management podemos clicar para crear una nueva API desde multiples opciones. Aunque nosotros seleccionamos crear en blanco:

Microsoft Azure

Inicio > 635aca7cdcb38080cf5e355fe11 Información general > ApiManagementRBO

ApiManagementRBO | API

Servicio API Management

Buscar recursos, servicios y documentos (G+/-)

+ Buscar

Información general

Registro de actividad

Control de acceso (IAM)

Etiquetas

Diagnosticar y solucionar problemas

Eventos

Settings

Propiedades

APIs

API

Productos

Suscripciones

Valores con nombre

Backends

Fragments de directiva

Etiquetas de API

Esquemas

Autorizaciones (vista previa)

Power Platform

OAuth 2.0 y OpenID Connect

Supervisión

Application Insights

Search APIs Filter by tags Group by tag

+ Add API All APIs No APIs to display.

Create from definition

- HTTP Manually define an HTTP API
- WebSocket Streaming, full-duplex communication with a WebSocket server
- GraphQL Access the full capabilities of your data from a single endpoint.
- OpenAPI Standard, language-agnostic interface to REST APIs
- WADL Standard XML representation of your RESTful API
- WSDL Standard XML representation of your SOAP API

Create from Azure resource

- Logic App Scalable hybrid Integrations and workflows.
- App Service API hosted on App Service.
- Function App Serverless, event driven experience on App Service.
- Container App Serverless containers for microservices.

Roberto Ribes (rbo)

En los siguientes campos solamente es necesario establecer el nombre y la URL de la web:

<https://az204testrboapi.azurewebsites.net/>

General

* Display name	HTTPWeather
* Name	httpweather
Description	(empty)
Web service URL	https://az204testrboapi.azurewebsites.net/
URL scheme	<input type="radio"/> HTTP <input checked="" type="radio"/> HTTPS <input type="radio"/> HTTP(S)
API URL suffix	e.g. httpbin
Base URL	https://apimanagementrbo.azure-api.net/
Tags	e.g. Booking
Products	No products selected

Subscription

Subscription required	<input type="checkbox"/>
Header name	Ocp-Apim-Subscription-Key
Query parameter name	subscription-key

3.8.6.3 Define operación

Una vez creado la API hay que definir los métodos/operaciones en el menu:

The screenshot shows the Microsoft Azure API Management RBO interface. On the left, there's a navigation sidebar with options like 'Información general', 'Registro de actividad', 'Control de acceso (IAM)', 'Etiquetas', 'Diagnosticar y solucionar problemas', 'Eventos', 'Settings', 'Propiedades', and 'APIs'. Under 'APIs', 'HTTPWeather' is selected. The main area shows a list of operations for this API, with 'All operations' highlighted. A modal window titled 'REVISION 1' is open, showing a 'Design' tab with search and filter fields. Below it, a 'Frontend' section displays a single operation: 'GET Weather Forecast ...'. The entire interface has a light blue theme.

Roberto Ribes (rbo)

Solamente nos queda introducir el método o la URL así como el tipo de método (GET, POST, etc):

The screenshot shows the 'Design' tab of a new API operation named 'Weather Forecast'. The URL is set to 'GET /weatherforecast'. The 'Template' tab is selected, and the 'Template parameters' section is visible at the bottom.

Si guardamos los cambios ya deberíamos ser capaces de acceder a <https://az204testrboapi.azurewebsites.net/> a través del API Gateway <https://apimanagementrbo.azure-api.net/weatherforecast>.

3.8.6.4 Definiendo inbound policies

Podemos añadir inbound policies.

The screenshot shows the 'Inbound processing' section of the API management service. A new policy named 'base' is being added under the 'Policies' section.

En este caso añadiremos una de tipo "Set Headers" con nombre "source" y valor "azure-api-mgmt":

Inbound processing

Modify the request before it is sent to the backend service.

Set headers

Set policy to add, remove or change headers that are passed to the backend service.

[Learn more about "set-header" policy.](#)

NAME	VALUE	ACTION	DELETE
source	azure-api-mgmt	append	
+ Add header	azure-api-mgmt		
+ Add value			

De esta manera se añadiría un header cuando se hace la llamada al backend:

REVISION 1 CREATED Oct 27, 2022, 8:19:42 PM

Design Settings Test Revisions Change log

Search operations Filter by tags Group by tag + Add operation All operations GET Weather Forecast ...

HTTPWeather > All operations > Policies

```
1 <!--
2   IMPORTANT:
3   - Policy elements can appear only within the <inbound>, <outbound>, <backend> section elements.
4   - To apply a policy to the incoming request (before it is forwarded to the backend service), place a corr
5   - To apply a policy to the outgoing response (before it is sent back to the caller), place a correspondin
6   - To add a policy, place the cursor at the desired insertion point and select policy from the sidebar.
7   - To remove a policy, delete the corresponding policy statement from the policy document.
8   - Position the <base> element within a section element to inherit all policies from the corresponding sec
9   - Remove the <base> element to prevent inheriting policies from the corresponding section element in the
10  - Policies are applied in the order of their appearance, from the top down.
11  - Comments within policy elements are not supported and may disappear. Place your comments between policy
12 -->
13 <policies>
14   <inbound>
15     <base />
16     <set-header name="source" exists-action="append">
17       <value>azure-api-mgmt</value>
18     </set-header>
19     <set-backend-service base-url="https://az204testrboapi.azurewebsites.net/headers" />
20   </inbound>
21   <backend>
22     <base />
23   </backend>
24   <outbound>
25     <base />
26   </outbound>
27   <on-error>
28     <base />
29   </on-error>
30 </policies>
```

3.8.6.5 Definiendo outbound policy

Tambien podemos añadir reglas de salida para los resultados que devuelven los métodos:

Roberto Ribes (rbo)

The screenshot shows the Azure API Management portal. On the left, the sidebar includes options like 'Información general', 'Control de acceso (IAM)', 'Etiquetas', 'Diagnosticar y solucionar problemas', 'Eventos', 'Settings', 'Propiedades', and 'APIs'. The main area is titled 'REVISION 1' and shows a list of operations for 'HTTPWeather'. One operation, 'GET Weather Forecast', is selected. The right side is titled 'Add outbound policy' and contains several policy categories: 'Set headers' (with 'set-header' option), 'Validate content' (with 'validate-content' option), 'Validate headers' (with 'validate-headers' option), 'Validate status code' (with 'validate-status-code' option), and 'Other policies' (with a link to 'Navigate to the code editor to implement other policies directly in XML file').

En este caso añadimos otras policies para los resultados que se devuelven en la URL. Podemos serializar de JSON a XML:

```
<outbound>
  <base />
  <xml-to-json kind="direct" apply="always" consider-accept-header="false" />
</outbound>
```

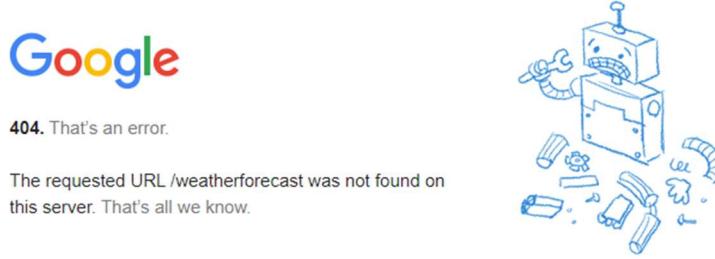
3.8.6.6 Definiendo backend

Si queremos sobrescribir la URL base con la que se configura la API solamente tenemos que clicar en el ícono del lápiz en Backend:

The screenshot shows the 'Backend' configuration for the 'Weather Forecast' operation. It consists of three main sections: 'Frontend', 'Inbound processing', and 'Backend'. The 'Frontend' section shows the operation details. The 'Inbound processing' section has a 'Policies' section containing 'base' and 'set-header' policies. The 'Backend' section shows the 'HTTP(s) endpoint' set to 'https://az204testrboapi.azurewebsites.net/'. There is also a 'Policies' section with a 'base' policy.

Y sobreescibir (override) el endpoint al que se redirige:

The screenshot shows the 'Backend' configuration for the 'Weather Forecast' operation. In the 'Backend' section, under 'Target', 'HTTP(s) endpoint' is selected. The 'Service URL' field is set to 'https://www.google.es' and the 'Override' checkbox is checked. Other options like 'Azure Logic App' and 'Gateway credentials' are also visible.



Si desactivamos el “Override” se redirige a la página oficial configurada.

3.9 Azure Virtual Machines

Ejemplo

3.9.1 Introducción

Vamos a hablar de una herramienta IaaS. Imaginemos que nosotros queremos configurar una máquina virtual en una region (por ejemplo Norte de Europa). Esta máquina virtual tendrá:

- CPU
- RAM
- Sistema Operativo

Design considerations for virtual machine creation

- Availability
- VM size
- VM limits
- VM image
- VM disks

Virtual machine extensions

- Run custom scripts
- Deploy and manage configurations
- Collect diagnostics data

3.9.2 Opciones



Availability zones: Azure availability zones are physically separate locations within each Azure region that are tolerant to local failures.



Availability sets: A logical grouping of VMs that allows Azure to understand how your application is built to provide for redundancy and availability.



Virtual machine scale sets: Create and manage a group of load balanced VMs . Number of VM instances can automatically increase or decrease in response to demand or a defined schedule



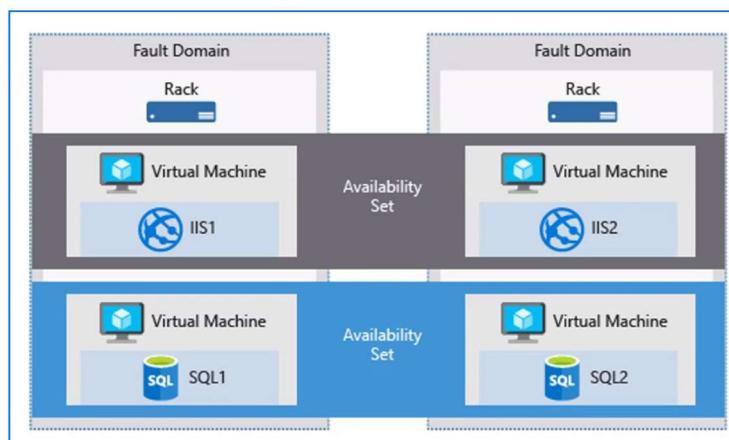
Load balancer: A Layer-4 (TCP, UDP) load balancer that provides high availability by distributing incoming traffic among healthy VMs.

- **Grupo de disponibilidad.** Nos garantiza que cada máquina virtual está en un dominio de fallo diferente (en distintos racks). En el ejemplo que podemos ver abajo, hemos creado dos máquinas y dos bases de datos que dan el mismo servicio con un balanceador de carga. Para asegurar que, en caso de incidencia, no perdamos las dos máquinas, debemos configurar un grupo de disponibilidad.
Los grupos de disponibilidad tambien crean dominios de actualización, que impiden que dos máquinas no caigan ante una actualización.

Availability sets

Fault domains

A fault domain is a logical group of underlying hardware that share a common power source and network switch, similar to a rack within an on-premises datacenter.

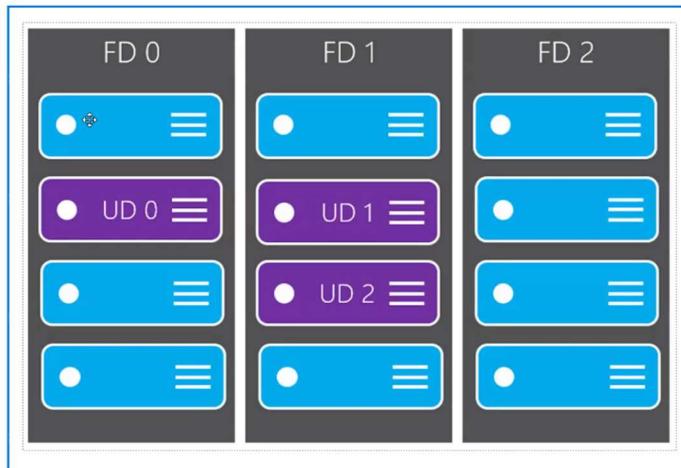


Compare virtual machine availability options (3 / 3)

Availability sets

Update domains

Update domains enable targeting specific sets of hardware for maintenance or rebooting.



- **Determinar el hardware de la VM.** La serie “S” es la más económica pero dependiendo de la carga de trabajo que tenemos para nuestra aplicación podemos solicitar GPU, RAM, CPU, etc.

VM Type	Description
General Purpose	Balanced CPU-to-memory ratio. Ideal for testing and development, small to medium databases, and low to medium traffic web servers.
Compute Optimized	High CPU-to-memory ratio. Good for medium traffic web servers, network appliances, batch processes, and application servers.
Memory Optimized	High memory-to-CPU ratio. Great for relational database servers, medium to large caches, and in-memory analytics.
Storage Optimized	High disk throughput and IO ideal for Big Data, SQL, NoSQL databases, data warehousing and large transactional databases.
GPU	Specialized virtual machines targeted for heavy graphic rendering and video editing, as well as model training and inferencing (ND) with deep learning. Available with single or multiple GPUs.
High Performance Compute	Our fastest and most powerful CPU virtual machines with optional high-throughput network interfaces (RDMA).

3.9.3 Configuración

3.9.3.1 Básico

The screenshot shows the 'Create a virtual machine' wizard in Microsoft Azure, specifically the 'Basics' step. The page title is 'Create a virtual machine'. A note at the top states: 'Based on the number of availability zones selected, 2 virtual machines will be created. The following settings will be applied to each virtual machine.'

Project details:
Subscription: Visual Studio Enterprise
Resource group: az204 (selected), Create new
Virtual machine names: vm1-1, vm1-2

Instance details:
Region: (Europe) North Europe
Availability options: Availability zone
Availability zone: Zones 1, 2 (Zone 1 and Zone 2 are checked)
Security type: Standard
Image: Ubuntu Server 20.04 LTS - Gen2
VM architecture: x64
Run with Azure Spot discount: Unchecked
Size: Standard_B2s - 2 vcpus, 4 GiB memory (€27.70/month)

Administrator account:
Authentication type: SSH public key (radio button selected)

Networking:
Seleccionar puertos de entrada: HTTP (80), HTTPS (443), SSH (22)
Warning message: **⚠ Esto permitirá que todas las direcciones IP accedan a la máquina virtual.** Esto solo se recomienda para las pruebas. Use los controles avanzados de la pestaña Redes a fin de crear reglas para limitar el tráfico entrante a las direcciones IP conocidas.

Buttons at the bottom: Review + create, < Previous, Next : Disks >

Parámetros:

- Subscripción.
- Grupo de recursos (centro de costs).
- Nombre de las máquinas virtuales: puedes configurar una o varias.
- Región.
- Zonas de disponibilidad. Puedes crear o ninguna o hasta 3 máquinas virtuales en diferentes zonas para aumentar la disponibilidad.
- Tipo de imagen: Windows, Ubuntu. También tienes diferentes modelos con tamaño de disco ([smalldisk], etc.
- Arquitectura: x64, etc.
- Size: hay muchos tipos de máquinas virtuales. Aunque la Serie D (la serie más potente) y la Serie B (picos de CPU pero no usa demasiado, más barato en función de creditos de CPU) son las que más se utilizan.
- Puertos: selecciona todos para varios protocolos.

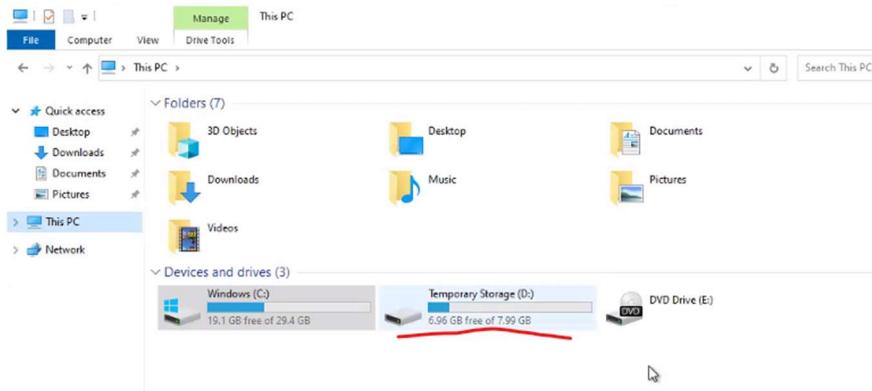
Select a VM size ...

Showing 665 VM sizes. Subscription: Visual Studio Enterprise | Region: North Europe | Current size: Standard_B2s | Image: [smalldisk] Windows Server 2022 Datacenter: Azure Edition | Learn more about VM sizes ↗

VM Size ↑↓	Type ↑↓	vCPUs ↑↓	RAM (GiB) ↑↓	Data disks ↑↓	Max IOPS ↑↓	Temp storage (GiB) ↑↓
The most used sizes by users in Azure						
D51_v2 ↗	General purpose	1	3.5	4	1200	7
D3s_v3 ↗	General purpose	2	8	4	1200	16
D2s_v4 ↗	General purpose	2	8	4	1200	16
B2s ↗	General purpose	2	4	4	1280	8
B1s ↗	General purpose	1	1	2	120	4
B2ms ↗	General purpose	2	8	4	1920	16
D52_v2 ↗	General purpose	2	7	8	6400	14
B4ms ↗	General purpose	4	16	8	2880	32
D4s_v3 ↗	General purpose	4	16	8	6400	32
D53_v2 ↗	General purpose	4	14	16	12800	28
D8s_v3 ↗	General purpose	8	32	16	12800	64
> D-Series v5						
The latest generation D family sizes recommended for your general purpose needs						
> D-Series v4						
The 4th generation D family sizes for your general purpose needs						
> B-Series						
Ideal for workloads that do not need continuous full CPU performance						
> E-Series v5						
The latest generation E family sizes for your high memory needs						
> E-Series v4						
The 4th generation E family sizes for your high memory needs						
> F-Series v2						
Up to 2X performance boost for vector processing workloads						
> L-Series						
High throughput, low latency, directly mapped to local NVMe storage						
> D-Series v3						
The 3rd generation D family sizes for your general purpose needs						
> E-Series v3						
The 3rd generation E family sizes for your high memory needs						
> D-Series v2						
The 2nd generation D family sizes for your general purpose needs						
> Non-premium storage VM sizes						
Premium storage is recommended for most workloads						
> Previous generation sizes						
> Size not available						
See the info bubble next to a size for details on availability						
> Insufficient quota - family limit						
Family vCPUs are insufficient to deploy these sizes						
> Unsupported generation						
The VM generation selected is not supported for these sizes						
> Availability zone restriction						
Sizes are not supported in zone 1						

Es recomendable detener las máquinas virtuales cuando no se utilizan. En ese caso se recomienda no utilizar información sensible de perderse en el disco temporal.

Roberto Ribes (rbo)



Utilizar siempre que se pueda “Premium disk” con opción “Supported”.

- Tipo de autenticación: mejor utilizar por contraseña.

3.9.3.2 Discos

En la siguiente página podemos configurar el tipo de disco sobre el que queremos montar la máquina virtual:

LUN	Name	Size (GiB)	Disk type	Host caching	Delete with VM
-----	------	------------	-----------	--------------	----------------

Podemos, además, crear discos de datos nuevos (unidad D:) o añadir existentes:

The screenshot shows the 'Create a new disk' page in the Microsoft Azure portal. The top navigation bar includes 'Home', 'Virtual machines', 'Create a virtual machine', and 'Create a new disk'. The main section is titled 'Create a new disk' with a sub-instruction: 'Create a new disk to store applications and data on your VM. Disk pricing varies based on factors including disk size, storage type, and number of transactions. [Learn more](#)'.

The configuration fields are as follows:

- Name ***: vm1_DataDisk_0
- Source type ***: None (empty disk)
- Size ***: 1024 GiB (Premium SSD LRS) - Change size
- Encryption type ***: (Default) Encryption at-rest with a platform-managed key
- Enable shared disk**: No (radio button selected)
- Delete disk with VM**: Unchecked checkbox

Como viene siendo habitual, podemos cambiar el tamaño del disco si no queremos el que Azure nos asigna por defecto.

3.9.3.3 Redes

Una vez finalizado podemos configurar una red virtual:

The screenshot shows the 'Networking' tab of the Azure VM creation wizard. It includes fields for selecting a virtual network (az204-vnet), subnet (default), and public IP (vm1-ip, vm2-ip). It also shows options for network security groups (Basic selected) and inbound ports (None selected). A note indicates that all traffic from the internet will be blocked by default. There are checkboxes for deleting public IP and NIC when the VM is deleted, and for enabling accelerated networking (disabled for the selected VM size).

- Virtual network: red virtual donde se configurará.
- Subnet: por defecto.
- IPs públicas: que se asignan a cada máquina virtual que se está configurando. Se pueden utilizar preexistentes o crear nuevas.
- Load balancing: podemos elegir si configurar ahora o más adelante el Load Balancer.

3.9.3.4 Administración

En la pestaña de administración podemos configurar:

- Si la máquina virtual se para automáticamente.
- Site recovery: replica de la máquina virtual a recuperar en cualquier momento si sucede algún accidente y deja de funcionar.

Roberto Ribes (rbo)

The screenshot shows the 'Create a virtual machine' wizard in the Microsoft Azure portal. The 'Management' tab is selected. A note at the top states: 'Based on the number of availability zones selected, 2 virtual machines will be created. The following settings will be applied to each virtual machine unless specified otherwise.'

Identity

- Enable system assigned managed identity
- Login with Azure AD
RBAC role assignment of Virtual Machine Administrator Login or Virtual Machine User Login is required when using Azure AD login. [Learn more](#)

Auto-shutdown

- Enable auto-shutdown
- Shutdown time: 7:00:00 PM
- Time zone: (UTC) Coordinated Universal Time
- Notification before shutdown
- Email *: Automatic by OS (Windows Automatic Updates)

Site Recovery

- Enable Disaster Recovery Azure-orchestrated: Orchestrates patches across availability sets. Best for workload availability.
- Manual updates: Turns off Windows Automatic Updates. Install patches manually or pick a different solution.
- Image default: Uses the image's default patch option.

Guest OS updates

- Enable hotpatch
- Patch orchestration options: Automatic by OS (Windows Automatic Updates)
Some patch orchestration options are not available for this image. [Learn more](#)

Añadir [Tags] a los recursos es muy útil para crear más adelante consultas y filtros que serán útiles para analizar, agrupar o encontrar. Por ejemplo, el coste total de los recursos con '[Tag]=MFC'.

3.9.4 Accediendo la máquina virtual

The screenshot shows the 'Deployment' blade for a virtual machine named 'CreateVm-MicrosoftWindowsServer.WindowsServer-202-20220915101859'. The 'Overview' tab is selected. A message at the top says: 'Deployment is in progress'.

Deployment details

Resource	Type	Status
vm1	Microsoft.Compute/virtualMachines	Created
vm2	Microsoft.Compute/virtualMachines	Created
vm1689_z2	Microsoft.Network/networkInterfaces	Created
vm1975_z1	Microsoft.Network/networkInterfaces	Created
vm1_DataDisk_0	Microsoft.Compute/disks	OK
az204-vnet	Microsoft.Network/virtualNetworks	OK
vm2-ip	Microsoft.Network/publicIPAddresses	OK
vm1-nsg	Microsoft.Network/networkSecurityGroups	OK
vm1-ip	Microsoft.Network/publicIPAddresses	OK

Roberto Ribes (rbo)

The screenshot shows the Microsoft Azure portal interface for 'Virtual machines'. It lists three virtual machines: 'vm1' (Windows Server 2022 Datacenter), 'vm2' (Windows Server 2022 Datacenter), and 'vm3' (Windows Server 2022 Datacenter). The table includes columns for Name, Type, Subscription, Resource group, Location, Status, Operating system, Size, Public IP address, and Disks.

Name	Type	Subscription	Resource group	Location	Status	Operating system	Size	Public IP address	Disks
vm1	Virtual machine	Visual Studio Enterprise	az204	North Europe	Running	Windows	Standard_B2s	52.158.46.74	2
vm2	Virtual machine	Visual Studio Enterprise	az204	North Europe	Running	Windows	Standard_B2s	52.158.33.133	1
vm3	Virtual machine	Visual Studio Enterprise	az204	North Europe	Running	Windows	Standard_B2s	52.158.46.74	2

Una vez creadas las máquinas virtuales se pueden como recursos y se puede observar toda la información incluida la IP pública.

Podemos clicar en el recurso y ver lo siguiente:

The screenshot shows the detailed view of the 'vm1' virtual machine. It includes sections for Overview, Activity log, Tags, Diagnose and solve problems, Settings, Networking, Connect, Windows Admin Center, Disk, Size, Microsoft Defender for Cloud, Advisor recommendations, Extensions + applications, Continuous delivery, Availability + scaling, Configuration, Identity, Properties, Locks, Operations, Bastion, Auto-shutdown, Backup, Disaster recovery, Updates, Inventory, Change tracking, Automate (preview), and Configuration management. The main pane displays the VM's configuration, including its operating system (Windows Server 2022 Datacenter), size (Standard_B2s), and network settings (public IP address 52.158.46.74).

Podemos ver que el nombre DNS no está configurado y otra serie de opciones para configurar la máquina virtual:

The screenshot shows the 'Configuration' page for the public IP address of 'vm1'. It allows setting the IP address assignment (Static) and provides an optional DNS name label ('vmbcn1'). It also includes sections for Alias record sets, Subscription, DNS zone, and Help links related to custom domains and SSL/TLS.

Con el DNS es mucho más fácil luego referenciarla para acceder en lugar de utilizar la IP.

Roberto Ribes (rbo)

Connect ▾ Start ▾ Restart ▾ Stop ▾ Capture ▾ Delete ▾ Refresh ▾ Open in mobile ▾ CLI / PS ▾ Feedback

Resource group (move) : az204

Status : Running

Location : North Europe (Zone 1)

Subscription (move) : Visual Studio Enterprise

Subscription ID : 7b0ee5e1c-abfe-4506-9a09-180674330b5c

Availability zone : 1

Tags (edit) : ERP : Cluster

Operating system : Windows (Windows Server 2022 Datacenter Azure Edition)

Size : Standard B2s (2 vcpus, 4 GiB memory)

Public IP address : 52.158.46.74

Virtual network/subnet : az204-vnet/default

DNS name : vm19751.northeurope.cloudapp.azure.com

Properties Monitoring Capabilities (8) Recommendations Tutorials

Una vez vemos la DNS configurada podemos darle a “Connect”. Sin embargo, para conectar hay que ir a networking y crear una regla de acceso a la máquina virtual:

Home > vm1

vm1 | Networking Virtual machine

Search resources, services, and docs (G+)

Overview Activity log Access control (IAM) Tags Diagnose and solve problems

Networking Connect Windows Admin Center (preview) Disks Size Microsoft Defender for Cloud Advisor recommendations Extensions + applications Continuous delivery Configuration Identity Properties Locks Operations

vm1975_1 IP configuration (1) ipconfig (Primary)

Network Interface: vm1975_1 Effective security rules Troubleshoot VM connection issues Topology

Virtual network/subnet: az204-vnet/default NIC Public IP: 52.158.46.74 NIC Private IP: 10.0.0.4 Accelerated networking: Disabled

Inbound port rules Outbound port rules Application security groups Load balancing

Network security group vm1-nsgr (attached to network interface: vm1975_1) Impacts 0 subnets, 2 network interfaces

Priority	Name	Port	Protocol	Source	Destination
65000	AllowVnetInbound	Any	Any	VirtualNetwork	VirtualNetwork
65001	AllowAzureLoadBalancerInbound	Any	Any	AzureLoadBalancer	Any
65500	DenyAllInbound	Any	Any	Any	Any

Need help? Understand Azure load balancing ⓘ Quickstart: Create a public load balancer to load balance Virtual Machines ⓘ Quickstart: Direct web traffic with Azure Application Gateway ⓘ

Checking for additional rule...
Checking for additional rule...

Roberto Ribes (rbo)

 Add inbound security rule X
vm1-nsg

Source (1)

Source port ranges (1)

Destination (1)

Service (1)

Destination port ranges (1)

Protocol
 Any
 TCP
 UDP
 ICMP

Action
 Allow
 Deny

Priority (1)

Name *

Description

⚠ RDP port 3389 is exposed to the Internet. This is only recommended for testing. For production environments, we recommend using a VPN or private connection.

Una vez la regla se ha creado, hay que esperar antes de poder crear nuevas reglas de acceso.

Con la regla configurada podríamos ya acceder a la máquina virtual:

⚠ To improve security, enable just-in-time access on this VM. →

RDP SSH Bastion

Connect with RDP

▲ Suggested method for connecting

Azure has checked the status for the most common prerequisites when connecting using this method.

✔ Checking network security group for inbound access from your client's IP address. [Learn more](#) ✔

✔ The VM's network interface has a Public IP address. [Learn more](#) ✔

✔ The VM is running.

To connect to your virtual machine via RDP, select an IP address, optionally change the port number, and download the RDP file.

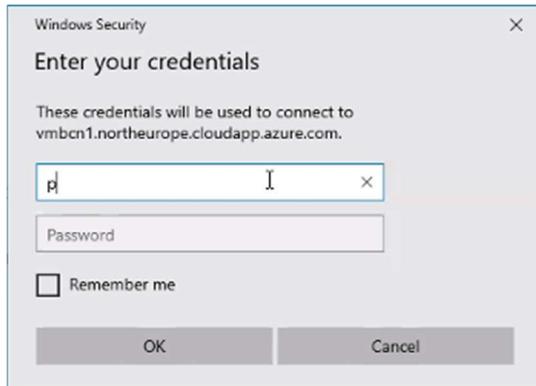
IP address *

Port number *

Download RDP File

Can't connect?
🔗 Test your connection
🔗 Troubleshoot RDP connectivity issues

How's it going?
🔗 Tell us about your connection experience



3.9.4.1 Acceso Web (puerto 80)

Añadimos la regla para poder accede al Puerto 80 para protocolo HTTP:

The screenshot shows the Azure portal interface for a virtual machine named "vm1975_z1". On the left, the "Networking" blade is open, showing the "Inbound port rules" section. On the right, a modal window titled "Add inbound security rule" is displayed, allowing the creation of a new rule for port 80 (HTTP) from any source.

Priority	Name	Port	Protocol	Source	Destination	Action
100	AllowMyIpAddressRDPinbound	3389	TCP	83.44.8.255	Any	Allow
65000	AllowVnetInbound	Any	Any	VirtualNetwork	VirtualNetwork	Allow
65001	AllowAzureLoadBalancerInbound	Any	Any	AzureLoadBalancer	Any	Allow
65500	DenyAllInbound	Any	Any	Any	Any	Deny

Observar abajo las prioridades para visualizar que reglas aplican sobre otras (a menor numero, mayor prioridad).

The screenshot shows the Azure portal interface for a virtual machine named "vm1975_z1". On the left, the "Networking" blade is open, showing the "Inbound port rules" section. On the right, a modal window titled "Add inbound security rule" is displayed, allowing the creation of a new rule for port 80 (HTTP) from any source.

Priority	Name	Port	Protocol	Source	Destination	Action
100	AllowMyIpAddressRDPinbound	3389	TCP	83.44.8.255	Any	Allow
110	AllowAnyHTTPinbound	80	TCP	Any	Any	Allow
65000	AllowVnetInbound	Any	Any	VirtualNetwork	VirtualNetwork	Allow
65001	AllowAzureLoadBalancerInbound	Any	Any	AzureLoadBalancer	Any	Allow
65500	DenyAllInbound	Any	Any	Any	Any	Deny

Ten en cuenta que las reglas aplican por “Network security group”, y en este caso, afectan a 2 máquinas virtuales y sus interfaces de red correspondientes:

The screenshot shows the Azure portal interface for a network security group named "vm1-nsg". It displays the "Inbound port rules" section, which includes a rule for port 80 (HTTP) from any source.

Priority	Name	Port	Protocol	Source	Destination	Action
110	AllowAnyHTTPinbound	80	TCP	Any	Any	Allow

Hay que asegurarse de que instalamos IIS para páginas web en nuestra máquina:

Roberto Ribes (rbo)

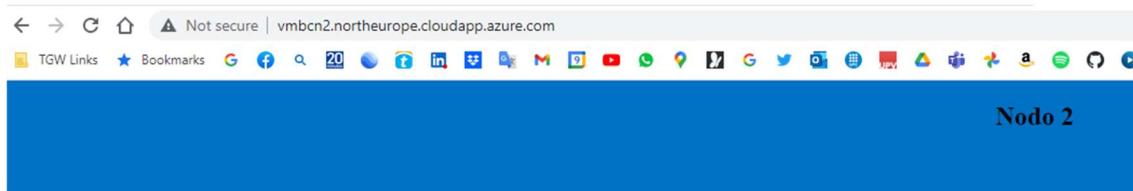
The screenshot shows the 'Add Roles and Features Wizard' in the Server Manager. The 'Server Roles' tab is selected. Under 'Roles', the 'Web Server (IIS)' checkbox is checked. A description box states: 'Web Server (IIS) provides a reliable, manageable, and scalable Web application infrastructure.' At the bottom, there are 'Install' and 'Cancel' buttons, and two 'BPA results' sections.

ROLES AND SERVER GROUPS
Roles: 2 | Server groups: 1 | Servers total: 1

File and Storage Services	IIS	Local Server	All Servers
Manageability	Manageability	Manageability	Manageability
Events	Events	Events	Events
Performance	Services	Services	Services
BPA results	Performance	Performance	Performance
	BPA results	BPA results	BPA results

IIS nos monta una web por defecto estática con la que podemos hacer pruebas:

The screenshot shows a Windows File Explorer window displaying the contents of the 'wwwroot' folder at 'This PC > Windows (C:) > inetpub > wwwroot'. It contains two files: 'iisstart.htm' (Microsoft Edge HTML, 1 KB) and 'iisstart.png' (PNG File, 98 KB). Below the file explorer is a browser window showing the URL 'vmbcn1.northeurope.cloudapp.azure.com' with the title 'IIS Windows Server'. The browser displays a blue page with the text 'NODO 1'.



3.9.5 Configurando máquina virtual

3.9.5.1 Balanceador de carga

Es importante que el balanceador de carga sea public si queremos que sea accessible desde fuera:

A screenshot of the Microsoft Azure 'Create load balancer' wizard. The top navigation bar shows 'Microsoft Azure' with a search icon. Below it, the breadcrumb navigation is 'Home > Load balancing | Load Balancer > Create load balancer ...'. The main tabs are 'Basics', 'Frontend IP configuration', 'Backend pools', 'Inbound rules', 'Outbound rules', 'Tags', and 'Review + create'.

Basics

Azure load balancer is a layer 4 load balancer that distributes incoming traffic among healthy virtual machine instances. Load balancers uses a hash-based distribution algorithm. By default, it uses a 5-tuple (source IP, source port, destination IP, destination port, protocol type) hash to map traffic to available servers. Load balancers can either be internet-facing where it is accessible via public IP addresses, or internal where it is only accessible from a virtual network. Azure load balancers also support Network Address Translation (NAT) to route traffic between public and private IP addresses. [Learn more](#).

Project details

Subscription *: Visual Studio Enterprise

Resource group *: az204

[Create new](#)

Instance details

Name *: az204LB

Region *: North Europe

SKU *: Standard

Standard
 Gateway
 Basic

Microsoft recommends Standard SKU load balancer for production workloads.
[Learn more about pricing differences between Standard and Basic SKU](#)

Type *: Public

Public
 Internal

Tier *: Regional

Regional
 Global

El balanceador de carga neceista una IP publica:

Roberto Ribes (rbo)

Ponemos la IP en la subred que ya hemos creado anteriormente:

Hay que decirle a que subnet buscar las máquinas virtuales que estarán dentro:

Resource Name	Resource group	Type	IP configuration	IP Address	Availability set	Tags
vm1	az204	Virtual machine	ipconfig1	10.0.0.4	-	{"ERP": "Cluster"}
vm2	az204	Virtual machine	ipconfig1	10.0.0.5	-	{"ERP": "Cluster"}

El siguiente paso es generar las inbound rules para balanceo (para asignar al Puerto 80):

Roberto Ribes (rbo)

The screenshot shows the Azure portal interface for creating a load balancer. On the left, there's a navigation bar with 'Home', 'Load Balancing', 'Load Balancer', 'Create load balancer', 'Basics', 'Frontend IP configuration', 'Backend pools', 'Inbound rules', 'Outbound rules', 'Tags', and 'Review + create'. The 'Inbound rules' tab is selected.

Load balancing rule: A load balancing rule distributes incoming traffic that is sent to a selected IP address and port combination across a group of backend pool instances. The load balancing rule uses a health probe to determine which backend instances are eligible to receive traffic.

Add a load balancing rule: Name: http, IP Version: IPv4, Frontend IP address: iplb (To be created), Backend pool: PoolVms, Protocol: TCP, Port: 80, Backend port: 80, Health probe: healthy, Sessionersistence: None, Idle timeout (minutes): 4, TCP reset: Disabled, Floating IP: Enabled.

Inbound NAT rule: An inbound NAT rule forwards incoming traffic sent to a selected IP address and port combination to a specific virtual machine.

Add an inbound nat rule: Name: rdpNodo2, Type: Azure virtual machine, Target virtual machine: vm2, Network IP configuration: ipconfig1 (10.0.0.5), Frontend IP address: iplb (To be created), Frontend Port: 3390, Service Tag: Custom, Backend port: 3389, Protocol: TCP, Enable TCP Reset: unchecked, Idle timeout (minutes): 4, Enable Floating IP: unchecked.

Esta configuración nos permite derivar conexiones HTTP por el Puerto 80 al puerto 80 de las máquinas de la subred

También se pueden asignar reglas NAT (reglas para conexiones tipo RDP u otro tipo, para derivar a un nodo o a otro las conexiones y conectar remotamente a las máquinas virtuales sin utilizar la IP pública de éstas):

Add inbound NAT rule az204LB

Information: An inbound NAT rule forwards incoming traffic sent to a selected IP address and port combination to a specific virtual machine.

Name: rdpNodo2

Type: Azure virtual machine

Target virtual machine: vm2

Network IP configuration: ipconfig1 (10.0.0.5)

Frontend IP address: iplb (To be created)

Frontend Port: 3390

Service Tag: Custom

Backend port: 3389

Protocol: TCP

Enable TCP Reset: unchecked

Idle timeout (minutes): 4

Enable Floating IP: unchecked

En este caso conexiones de escritorio remoto (RDP) son derivadas al nodo 2.

Roberto Ribes (rbo)

Hay que configurar una regla NAT para todos los nodos de la subred si no queremos usar su IP publica para accede a escritorio remote.

Finalmente obtenemos un load balancer con una IP publica:

The screenshot shows the 'Frontend IP configuration' section for a load balancer named 'iplb'. The 'Type' is set to 'Public' and 'IP type' is 'IP address'. The 'Public IP address' dropdown is set to 'ip (20.166.16.238)'. The 'Gateway Load balancer' dropdown is set to 'None'. Below this, a 'Used by' section lists three resources: 'Http' (Load balancing rule), 'rdpNodo1' (Inbound NAT rule), and 'rdpNodo2' (Inbound NAT rule).

Y como siempre, podemos solicitar una DNS para nuestra IP publica:

The screenshot shows the 'Configuration' tab for a public IP address named 'ip'. The 'IP address assignment' is 'Static' with the address '20.166.16.238'. The 'Idle timeout (minutes)' is set to 0. In the 'DNS name label (optional)' field, 'clustef' is entered. A note says 'DNS name label not available. Try using a different label.' Below this, there's information about using the IP as an 'A' DNS record or creating an alias record. The 'Subscription' and 'DNS zone' sections show 'No results.'

Y ya podríamos utilizar la DNS para accede a la web:

The screenshot shows a browser window with the URL 'bcnapp.northeurope.cloudapp.azure.com'. The page content is a blue header with the text 'Nodo 2'.

3.9.5.1.1 Monitorizando Load Balancer

3.9.5.1.2 Quitar IP publica con Outbound rules

Si queremos que no se pueda acceder a las VMs desde internet (eliminar las IPs publicas).

Debemos configurar la salida de las VMs a Internet:

Home > az204LB | Outbound rules >

Add outbound rule ...

az204LB

Name *

IP Version * IPv4 IPv6

Frontend IP address *

Protocol All TCP UDP

Idle timeout (minutes) Max: 100

TCP Reset Enabled Disabled

Backend pool *

Port allocation

Azure automatically assigns the number of outbound ports to use for source network address translation (SNAT) based on the number of frontend IP addresses and backend pool instances. [Learn more about outbound connectivity](#)

Port allocation

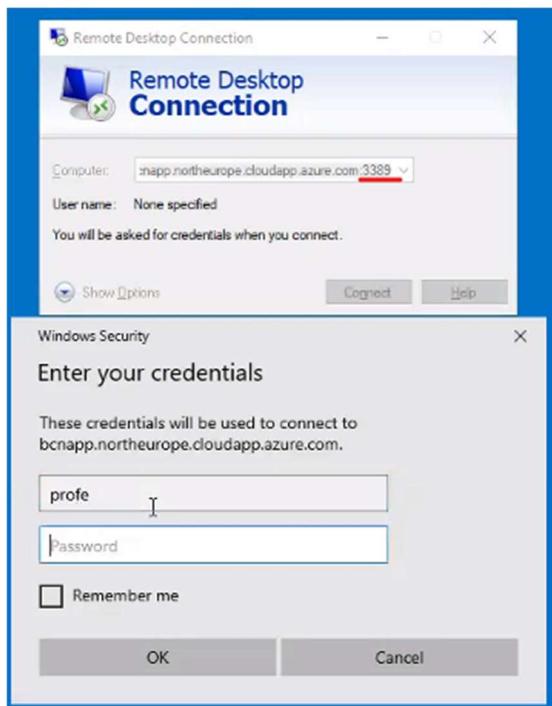
Outbound ports

Choose by *

Available Frontend Ports

NOTA: es necesario eliminar las IPs publicas asociadas a las VMs antes de poder seleccionar el Pool.

Para conectar ahora por escritorio remote despues de eliminar las IPs, debemos utilizar la IP/DNS del load balancer y el Puerto configurado en la inbound rule:



De esta manera ya no tendríamos que asociar una IP publica a las VMs.

3.9.5.1.3 Seguridad Firewall

El balanceador de carga no tiene Firewall y únicamente tiene el nivel de seguridad que se haya configurado en el grupo de red.

3.9.5.2 *Traffic manager*

Ya no queremos que el tráfico vaya por el balanceador de carga. Ahora lo haremos a través de una conexión directa, en la que el Traffic Manager nos devolverá la DNS del recurso a acceder.

Para que el Traffic Manager funcione necesitamos que los recursos tengan IP pública ya que el Traffic Manager nos redirige directamente a la DNS escogida.

Una solución de red es tener un Traffic Manager en un nivel y dentro de éste un Load Balancer que actúa de interfaz.

En este ejemplo, el Traffic manager redirigirá o bien al Load Balancer o bien a una App Service.

NOTA IMPORTANTE. La App Service normalmente se configura con protocolo HTTPS. Para configurar por Puerto 80 (HTTP) hay que configurarlo en la App Service:

Roberto Ribes (rbo)

The screenshot shows the 'bcn | TLS/SSL settings' page in the Azure portal. The left sidebar lists various settings like Overview, Activity log, and Deployment. The main area shows 'Protocol Settings' with 'HTTPS Only' turned 'On'. It also displays 'TLS/SSL bindings' with a note that no bindings are configured. A search bar at the top is empty.

Ahora, configuraremos el Traffic Manager:

The screenshot shows the 'az204 | Configuration' page in the Azure portal. The left sidebar lists settings like Overview, Activity log, and Monitoring. The main area shows configuration for a 'Traffic Manager profile' with 'Routing method' set to 'Performance'. Other settings include 'DNS time to live (TTL)' of 60 seconds, 'Protocol' set to 'HTTP', 'Port' set to 80, and 'Path' set to '/'. There are sections for 'Custom Header settings', 'Expected Status Code Ranges', and 'Fast endpoint failover settings'.

En la siguiente pantalla debemos configurar los end points para el balanceador de carga y la App Service:

Roberto Ribes (rbo)

The screenshot shows the Azure portal interface for creating a Traffic Manager endpoint. On the left, the 'Load balancing' section is visible. In the center, the 'az204 | Endpoints' blade is open, showing a table with columns: Name, Status, Monitor status, and Type. A new endpoint named 'webapp' is being added. On the right, the 'Add endpoint' dialog is displayed, with the 'Type' set to 'Azure endpoint'. The 'Name' field contains 'webapp', 'Target resource type' is 'App Service', and 'Target resource' is 'bcn (North Europe)'. The 'DNS name' field is pre-filled with 'http://az204.trafficmanager.net'. The 'Monitor status' is 'Online' and the 'Type' is 'Azure endpoint'. The 'Public IP address' dropdown is set to 'Choose public IP address'.

Finalmente hay que activar el servicio de Traffic Manager.

En la pantalla de configuración vemos la DNS publica del Traffic Manager:

The screenshot shows the 'az204' Traffic Manager profile configuration screen. The 'Overview' tab is selected. Key details shown include: Resource group: 'az204', Status: 'Enabled', Subscription: 'Visual Studio Enterprise', and Tags: 'Click here to add.tags'. The 'DNS name' is listed as 'http://az204.trafficmanager.net'. The 'Endpoints' table lists two entries: 'loadBalancer' and 'webapp', both with 'Status' set to 'Enabled' and 'Monitor status' set to 'Online'. The 'Type' for both endpoints is 'Azure endpoint'.

Accediendo a <http://az204.trafficmanager.net/> se puede acceder o bien al Load Balancer o a la página web que hemos añadido.

Nota: nslookup y la web que queremos nos debería dar cual es el DNS al que apuntamos.

Roberto Ribes (rbo)

```
C:\WINDOWS\system32\cmd.exe - nslookup
Microsoft Windows [Version 10.0.19044.1889]
(c) Microsoft Corporation. All rights reserved.

C:\Users\rbo>nslookup
Default Server: UnKnown
Address: fe80::d663:feff:fe67:cfcf

> google.es
Server: UnKnown
Address: fe80::d663:feff:fe67:cfcf

Non-authoritative answer:
Name: google.es
Addresses: 2a00:1450:4003:806::2003
142.250.184.3

> az204.trafficmanager.net
Server: UnKnown
Address: fe80::d663:feff:fe67:cfcf

Non-authoritative answer:
Name: bcnapp.northeurope.cloudapp.azure.com
Address: 20.166.16.238
Aliases: az204.trafficmanager.net
```

El punto débil del Traffic Manager es que si algo pasa a la DNS a la que estás conectando (caída de servicio o similar), las configuraciones de Cache y locales de internet pueden hacer que tardes tiempo en ser redireccionado a las otras webs disponibles.

3.9.5.3 Application Gateway

Para configurar un application gateway hay que estar en una red virtual que no tenga load balancers o traffic managers configurados.

The screenshot shows the 'Create application gateway' wizard in the Microsoft Azure portal. The 'Basics' tab is selected. The page title is 'Create application gateway'. The top navigation bar includes 'Home', 'Load balancing | Application Gateway', and a '...' button. Below the title, there's a brief description: 'An application gateway is a web traffic load balancer that enables you to manage traffic to your web application.' with a 'Learn more about application gateway' link. The 'Project details' section contains fields for 'Subscription' (Visual Studio Enterprise) and 'Resource group' (az204). The 'Instance details' section includes fields for 'Application gateway name' (bcn), 'Region' (North Europe), 'Tier' (Standard V2), 'Enable autoscaling' (No selected), 'Instance count' (2), 'Availability zone' (None), and 'HTTP2' (Disabled). The 'Configure virtual network' section includes fields for 'Virtual network' (az204-vnet) and 'Subnet' (default (10.0.0.0/24)). A note at the bottom of this section states: 'Subnet must only have application gateway'.

El siguiente paso es asignarle una IP pública o crear una si no tenemos disponibles:

The screenshot shows the Microsoft Azure 'Create application gateway' wizard at the 'Frontends' step. The 'Public' option is selected for the Frontend IP address type. A modal window titled 'Add a public IP' is open, showing fields for Name (with a placeholder 'IP'), SKU (Basic or Standard selected), Assignment (Dynamic or Static selected), and Availability zone (None). The 'OK' button is highlighted.

El siguiente paso es añadir las endpoints que hay detrás del application gateway:

The screenshot shows the Microsoft Azure 'Create application gateway' wizard at the 'Backends' step. A modal window titled 'Add a backend pool' is open, showing a dropdown for 'Name' (set to 'No') and a 'Targets' section where 'bot.azurewebsites.net' is listed. The 'OK' button is highlighted.

3.10 Redes virtuales

3.10.1 Introducción

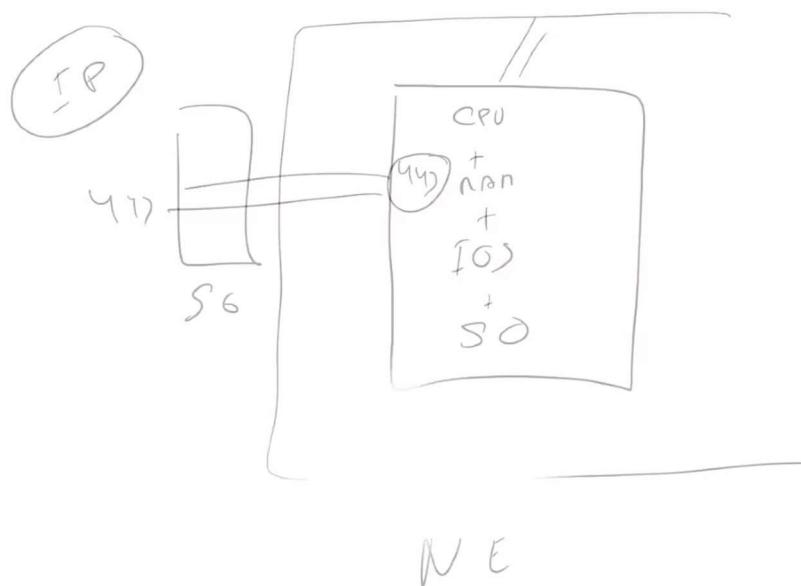
Las máquinas virtuales, por ejemplo, van configuradas dentro de una red virtual (virtual network) que es lo equivalente a nuestra red privada profesional.

La máquina virtual a diferencia de los App Service tienen que ir dentro de una red virtual (los App Service no se pueden asignar a una red virtual).

Además, podemos configurar una gateway en nuestra red virtual que nos permite recibir o enviar llamadas a otros endpoints.



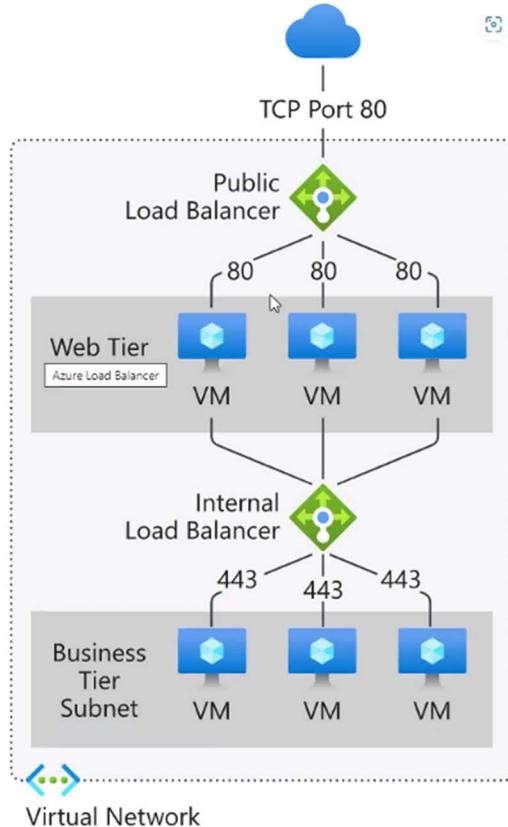
Otra manera de conseguir conexión con el mundo exterior es a través de un grupo de seguridad. Cada máquina virtual tiene su propio grupo de seguridad o firewall que permite seleccionar puertos que están abiertos y disponibles para recibir conexiones. En este caso necesitaremos una IP pública para el recurso.



3.10.2 Balanceador de carga (Load Balancer)

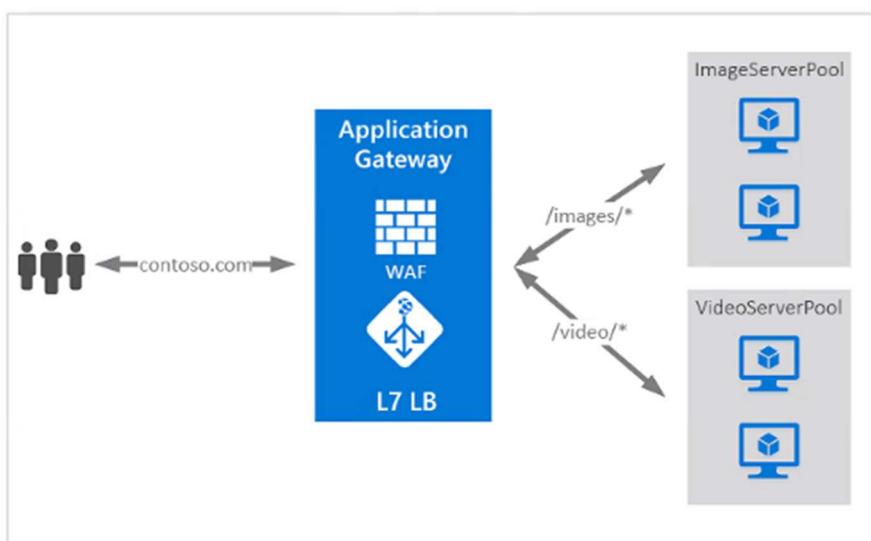
Siguiendo parámetros para un modelo escalable. Configuramos una segunda máquina virtual con una IP distinta y su propio grupo de seguridad (firewall). Bajo esta premisa, el balanceo de carga puede cumplir dos funciones:

- Permitir el acceso solamente a través de un Puerto, una IP y una protocol (TCP, UDP, etc).
- Balanceo de carga de aplicación. Los clientes solamente pueden acceder a través del balanceador de carga y un puerto a las aplicaciones.



3.10.3 Application gateway

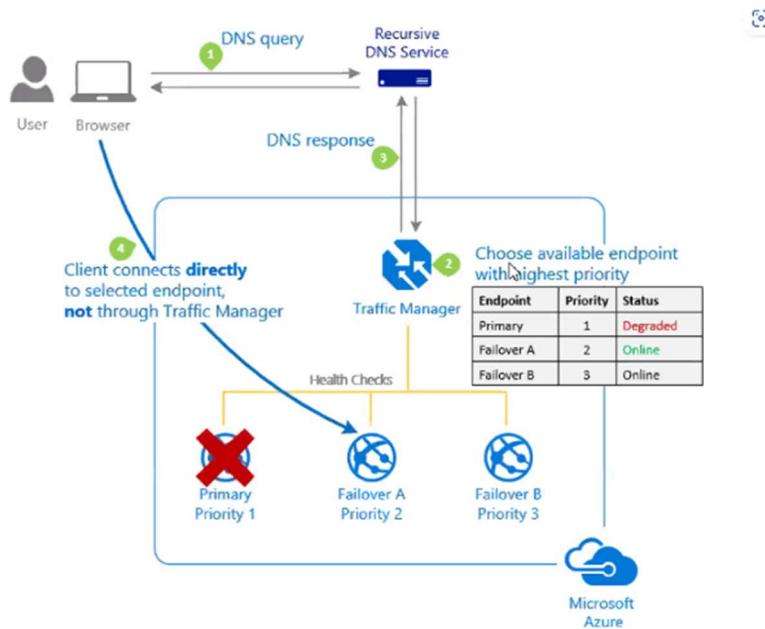
Un balanceador de carga que aplica en la capa 4 de transporte. Si queremos reglas de acceso más refinadas, podemos utilizar un Aplicación de Gateway que nos permite un mayor refinamiento para balancear a nivel de rutas o cabeceras http:



Bajo todas estas soluciones, tenemos problemas de cuellos de botella en el acceso al servicio.

3.10.4 Traffic manager

El Traffic Manager, además, impide cuellos de botella, ya que únicamente devuelve una dirección DNS (bajo ciertos criterios) al usuario y éste se conecta directamente al servidor con una redirección.



Traffic Manager routing methods

Article • 07/13/2022 • 13 minutes to read • 13 contributors



Azure Traffic Manager supports six traffic-routing methods to determine how to route network traffic to the various service endpoints. For any profile, Traffic Manager applies the traffic-routing method associated to it to each DNS query it receives. The traffic-routing method determines which endpoint is returned in the DNS response.

The following traffic routing methods are available in Traffic Manager:

- **Priority:** Select **Priority** routing when you want to have a primary service endpoint for all traffic. You can provide multiple backup endpoints in case the primary or one of the backup endpoints is unavailable.
- **Weighted:** Select **Weighted** routing when you want to distribute traffic across a set of endpoints based on their weight. Set the weight the same to distribute evenly across all endpoints.
- **Performance:** Select **Performance** routing when you have endpoints in different geographic locations and you want end users to use the "closest" endpoint for the lowest network latency.
- **Geographic:** Select **Geographic** routing to direct users to specific endpoints (Azure, External, or Nested) based on where their DNS queries originate from geographically. With this routing method, it enables you to be in compliance with scenarios such as data sovereignty mandates, localization of content & user experience and measuring traffic from different regions.
- **Multivalue:** Select **MultiValue** for Traffic Manager profiles that can only have IPv4/IPv6 addresses as endpoints. When a query is received for this profile, all healthy endpoints are returned.
- **Subnet:** Select **Subnet** traffic-routing method to map sets of end-user IP address ranges to a specific endpoint. When a request is received, the endpoint returned will be the one mapped for that request's source IP address.

Roberto Ribes (rbo)

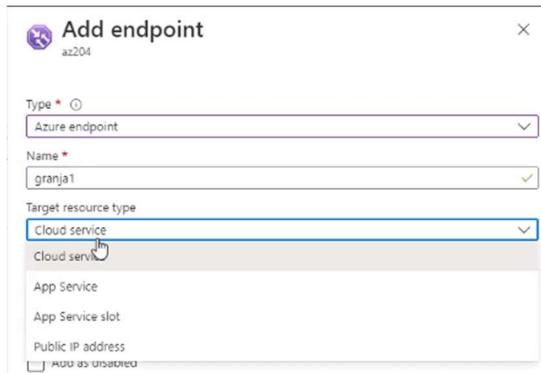
Una solución más simple, desde el punto de vista del diseño, es utilizar Azure Traffic Manager que equilibra las cargas basado en DNS. Distribuye el tráfico basado en criterios de DNS: en función de la proximidad del DNS con el centro de datos más próximo.



Podemos configurar un Traffic Manager para derivar usuarios al centro de datos más próximo.

Los Trafic Manager se pueden configurar en modo anidado para tener un acceso mucho más granulado.

Para configurar los endpoints (VM, Azure App Service) que tenemos que poner detras del traffic manager podemos observer la imagen inferior.



Parámetros:

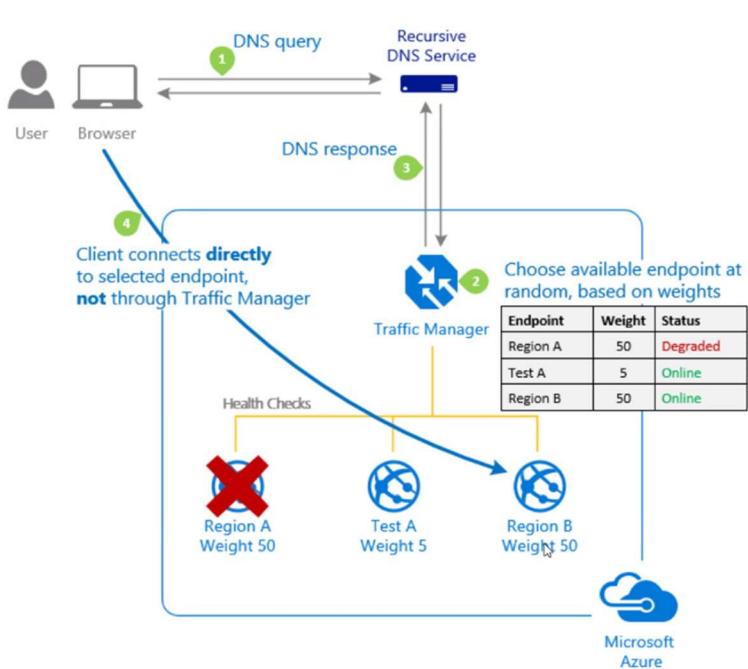
- Tipo de endpoint (Azure endpoint, nested, external, etc ...)
- Nombre. Nombre del endpoint.
- Tipo de recurso. App service (la web), IP publica (para VMs).

Para configurar el traffic manager vemos la imagen inferior.

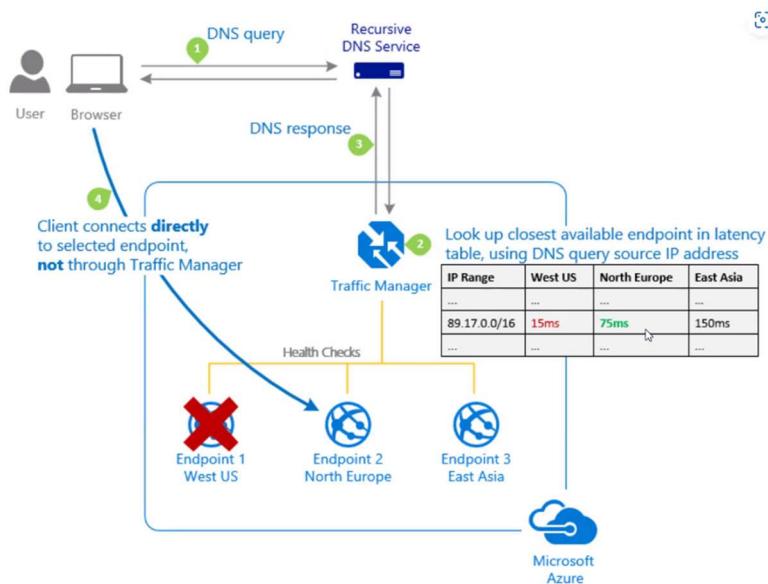
The screenshot shows the Azure portal interface for configuring a Traffic Manager profile named 'az204'. The left sidebar lists various settings like Overview, Activity log, Access control (IAM), Tags, Diagnose and solve problems, Configuration (selected), Real user measurements, Traffic view, Endpoints, Properties, Locks, Monitoring, Alerts, Metrics, Diagnostic settings, Logs, Automation, Tasks (preview), Export template, and Support + troubleshooting. The main panel displays configuration details for the selected 'Configuration' tab. It includes fields for Routing method (Priority), DNS time to live (TTL) set to 60 seconds, Endpoint monitor settings (Protocol: HTTPS, Port: 443, Path: /), Custom Header settings, Expected Status Code Ranges (default: 200), Fast endpoint failover settings (Probing interval: 30 seconds, Tolerated number of failures: 3, Probe timeout: 10 seconds), and Resource health.

De Nuevo, los parámetros para configurar el Traffic Manager:

- Routing method: **prioridad** (prioridad de cada nodo)/**peso** (por peso de cada nodo)/**performance** (latencia)/**geografía**.
- DNS time to live (TTL). Tiempo para saber si el servidor está en marcha.
- Protocolo: TCP, HTTP, HTTPS.
- Puerto: 443, por ejemplo.
- Path:
- Expected Status Code Ranges: código que se considera OK para Traffic Manager para considerer que el servidor funciona normalmente.
- Fast endpoint failover/Probing interval: Intervalo de tiempo tras el cual se hace petición de servicio.
- Probe timeout: tiempo tras el cual se declara el servicio caído si no se obtiene respuesta.
- Tolerated number of failures: numero de fallos que se requieren seguidos antes de declarer servidor caído.

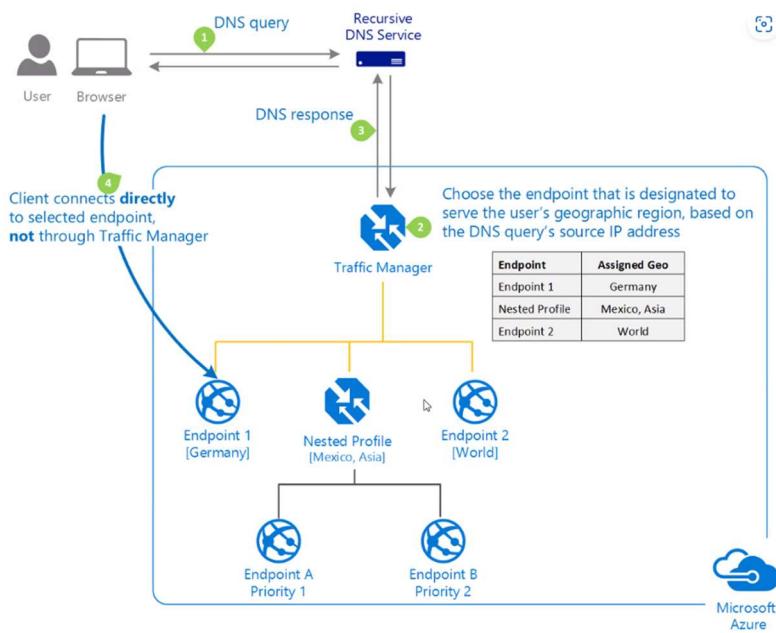


Si se configuran los nodos por peso y no por prioridad se pueden balancear las peticiones entre los nodos segun el peso con el que se configuran.



Tambien se puede distribuir el tráfico por performance según la latencia. De manera que se dirige al usuario al endpoint con el que hay menos latencia (más cercano).

Aunque el Azure App Service tiene su propia herramienta de balanceo, no es tan avanzada en configuración como el Azure Traffic Manager.

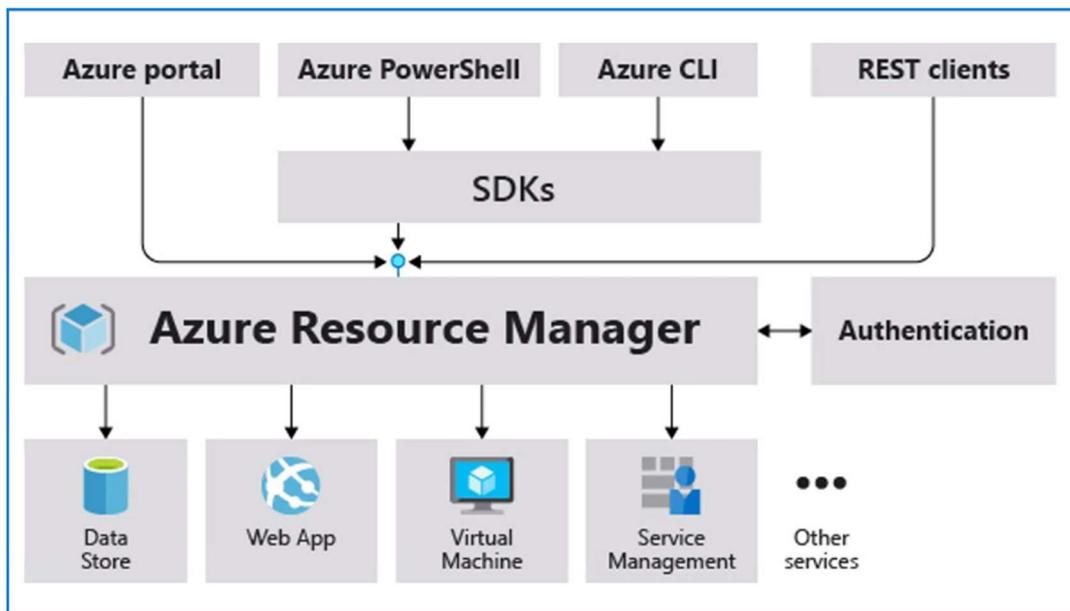


Por ultimo, está el criterio geográfico para elegir el servidor que dará servicio al cliente. Para granular más el servicio pueden configurarse traffic manager anidados que pueden incluso configurarse bajo criterios diferentes.

3.11 Azure Resource Manager

El Azure Resource Manager tiene una serie de APIs que permiten realizar la gestión de recursos a través de:

- Azure Portal.
- Azure PowerShell.
- Azure CLI.
- Llamada HTTP para generar los recursos via JSON.



Podemos generar plantillas en formato .JSON que nos permite reutilizar recursos y clonar fácilmente o guardarlos:

- Plantilla para generar máquina virtual.
- Plantilla para generar redes virtuales.
- Etc.

Advantages of using templates:

- **Declarative syntax:** Azure Resource Manager templates allow you to create and deploy an entire Azure infrastructure declaratively.
- **Repeatable results:** Reliably deploy your infrastructure throughout development.
- **Orchestration:** You don't have to worry about the complexities of ordering operations.

Template file

You can write template expressions that extend the capabilities of JSON. These expressions make use of the functions provided by Resource Manager.

Template deployment

```
"resources": [
  {
    "type": "Microsoft.Storage/storageAccounts",
    "apiVersion": "2019-04-01",
    "name": "mystorageaccount",
    "location": "westus",
    "sku": {
      "name": "Standard_LRS"
    },
    "kind": "StorageV2",
    "properties": {}
  }
]
```

Convert to REST

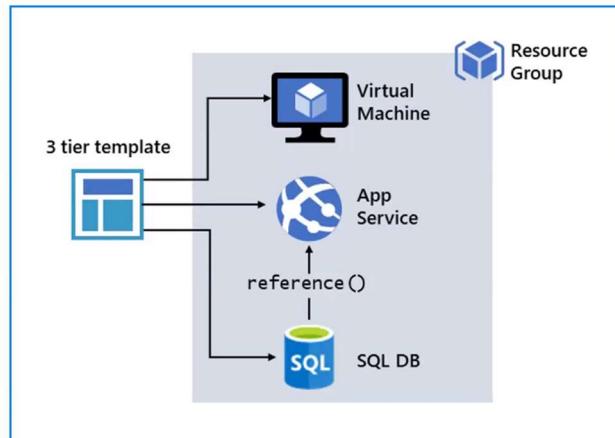
```
PUT
https://management.azure.com/subscriptions/{subscriptionId}/...?api-version=2019-04-01
REQUEST BODY
{
  "location": "westus",
  "sku": {
    "name": "Standard_LRS"
  },
  "kind": "StorageV2",
  "properties": {}
}
```

3.11.1 Tier templates

Un mismo template nos podría generar un entorno de ejecución de una aplicación al completo.

Three-tier template

Three-tier application through a single Resource Manager template.

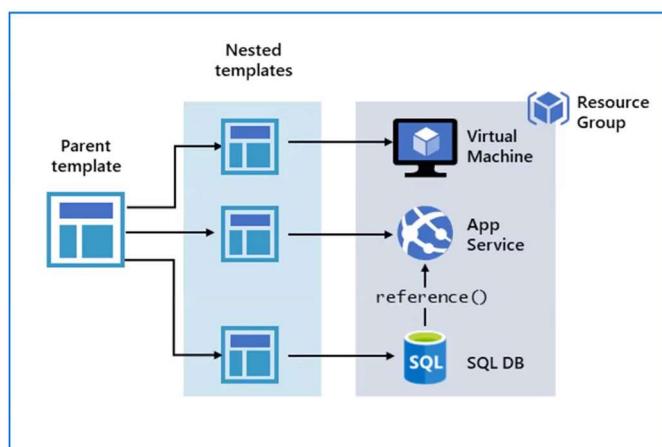


3.11.2 Nested templates

Templates pueden llamar a otros templates para desplegar un entorno de ejecución entero de una aplicación. La mecánica es referenciar plantillas (hijas) desde otras plantillas (padres).

Nested templates

Nested templates deploying a similar three-tier application



3.11.3 Plantillas condicionales

Las plantillas pueden escribirse para ejecutar condiciones bajo las que ciertos recursos se crean, se reutilizan o no se despliegan del todo.

Optional deployment

- Use the `condition` element to specify whether the resource is deployed.
- The value for the condition resolves to true or false.

Create or use existing resource

- You can use conditional deployment to create a new resource or use an existing one.

Runtime functions

- If you use a `reference` or `list` function with a resource that is conditionally deployed, the function is evaluated even if the resource isn't deployed. You get an error if the function refers to a resource that doesn't exist.
- Use the `if` function to make sure the function is only evaluated for conditions when the resource is deployed.

3.11.4 Plantillas incrementales

Plantillas incrementales permiten desplegar recursos sin eliminar los existentes y sobrescribir los existentes. En cambio, plantillas completas hacen un borrado previo de los recursos y los despliegan.

Complete mode

In complete mode, Resource Manager deletes resources that exist in the resource group but aren't specified in the template.

Incremental mode

In incremental mode, Resource Manager leaves unchanged resources that exist in the resource group but aren't specified in the template.

Resource Group contains	Template contains	Incremental result	Complete result
Resource A	Resource A	Resource A	Resource A
Resource B	Resource B	Resource B	Resource B
Resource C	Resource D	Resource C Resource D	Resource D

- When deployed in **incremental** mode, Resource D is added to the existing resource group.
- When deployed in **complete** mode, Resource D is added and Resource C is deleted.

Set the correct deployment mode (3 / 3)

Set deployment mode

To set the deployment mode when deploying with Azure CLI, use the `mode` parameter.

```
az deployment group create \
--mode Complete \
--name ExampleDeployment \
--resource-group ExampleResourceGroup \
--template-file storage.json
```

3.12 Azure Container Instances

3.12.1 Introducción

Discover the Azure Container Registry (1 / 2)

Use the Azure Container Registry (ACR) service with your existing container development and deployment pipelines or use Azure Container Registry Tasks to build container images in Azure.

Use cases

Pull images from an Azure container registry to various deployment targets:

- **Scalable orchestration systems** that manage containerized applications across clusters of hosts.
- **Azure services** that support building and running applications at scale.

Azure Container Registry service tiers

Azure Container Registry is available in multiple service tiers.

- Basic
- Standard
- Premium

Si nuestra aplicación apuesta por Docker, entonces podemos utilizar **Azure Container Instances**.

Alternativamente existe la opción de utilizar el **Azure App Service** para publicar un contenedor de Docker:

Roberto Ribes (rbo)

The screenshot shows the 'Create Web App' wizard in the Microsoft Azure portal. The 'Basics' tab is selected. In the 'Project Details' section, the subscription is set to 'Visual Studio Enterprise' and the resource group is '(New) Resource group'. In the 'Instance Details' section, the web app name is 'Web App name.', publish method is 'Docker Container', operating system is 'Linux', and the region is 'Central US'.

Registraremos el contenedor dentro del **Azure App Service** y gestionamos la aplicación como **PaaS**.

En cambio, podemos utilizar el **Kubernetes services** para desplegar y gestionar contenedores.

The screenshot shows the 'Kubernetes services' blade in the Microsoft Azure portal. It displays a message 'No Kubernetes services to display' with a note about using Azure Kubernetes Service to create and manage clusters. It includes buttons for 'Create' and 'Create Kubernetes cluster'.

Y seleccionar el tipo de cluster:

Roberto Ribes (rbo)

The screenshot shows the 'Create Kubernetes cluster' wizard in the Microsoft Azure portal. The top navigation bar includes the Microsoft Azure logo, a search bar, and a 'Search resources, services, and docs (G+ /)' button. Below the navigation, the breadcrumb trail shows 'Home > Kubernetes services > Create Kubernetes cluster'. The main title 'Create Kubernetes cluster' is followed by a three-dot ellipsis.

The 'Basics' tab is selected, indicated by a blue underline. Other tabs include 'Node pools', 'Access', 'Networking', 'Integrations', 'Advanced', 'Tags', and 'Review + create'. A descriptive text block explains that Azure Kubernetes Service (AKS) manages your hosted Kubernetes environment, making it quick and easy to deploy and manage containerized applications without container orchestration expertise. It also eliminates the burden of ongoing operations and maintenance by provisioning, upgrading, and scaling resources on demand, without taking your applications offline. A link to 'Learn more about Azure Kubernetes Service' is provided.

Project details

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

Subscription * ⓘ: Visual Studio Enterprise

Resource group * ⓘ: (New) Resource group

Create new

Cluster details

Cluster preset configuration: Standard (\$\$)

Standard (\$\$): Best for getting started to deploy production ready applications out of the box quickly. ⓘ

Dev/Test (\$): Best for experimenting with AKS or deploying a test app.

Cost-optimized (\$): Best for reducing costs on production workloads that can tolerate interruptions.

Batch processing (\$\$\$): Best for machine learning, compute-intensive, and graphics-intensive workloads.

Hardened access (\$\$\$): Best for large enterprises that need full control of security and stability.

See comparison table for all preset configurations

Asimismo, revisamos la region, las zonas de disponibilidad y otras configuraciones:

Create Kubernetes cluster ...

Basics Node pools Access Networking Integrations Advanced Tags Review + create

Azure Kubernetes Service (AKS) manages your hosted Kubernetes environment, making it quick and easy to deploy and manage containerized applications without container orchestration expertise. It also eliminates the burden of ongoing operations and maintenance by provisioning, upgrading, and scaling resources on demand, without taking your applications offline.

[Learn more about Azure Kubernetes Service](#)

Project details

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

Subscription * ⓘ	Visual Studio Enterprise
Resource group * ⓘ	(New) Resource group
	Create new

Cluster details

Cluster preset configuration	Standard (\$\$)
To quickly customize your Kubernetes cluster, choose one of the preset configurations above. You can modify these configurations at any time. Learn more and compare presets	
Kubernetes cluster name * ⓘ	
Region * ⓘ	(Canada) Canada Central
Availability zones ⓘ	Zones 1,2,3
High availability is recommended for standard configuration.	
Kubernetes version * ⓘ	1.23.8 (default)
API server availability ⓘ	<input checked="" type="radio"/> 99.95% Optimize for availability. <input type="radio"/> 99.5% Optimize for cost. 99.95% API server availability is recommended for standard configuration.

Es importante configurar los nodos y su escalabilidad:

Primary node pool

The number and size of nodes in the primary node pool in your cluster. For production workloads, at least 3 nodes are recommended for resiliency. For development or test workloads, only one node is required. If you would like to add additional node pools or to see additional configuration options for this node pool, go to the 'Node pools' tab above. You will be able to add additional node pools after creating your cluster. [Learn more about node pools in Azure Kubernetes Service](#)

Node size * ⓘ	Standard DS2 v2
	Standard DS2_v2 is recommended for standard configuration. Change size
Scale method * ⓘ	<input type="radio"/> Manual <input checked="" type="radio"/> Autoscale Autoscaling is recommended for standard configuration.
Node count range * ⓘ	<input type="text" value="1"/> <input type="range"/> <input type="text" value="5"/>

En las siguientes páginas podemos configurar los nodos, la configuración de red, así como, el acceso al Azure Container Registry para poder descargar los contenedores:

Roberto Ribes (rbo)

Home > Kubernetes services >
Create Kubernetes cluster ...

Basics Node pools Access Networking Integrations Advanced Tags Review + create

Connect your AKS cluster with additional services.

Azure Container Registry
Connect your cluster to an Azure Container Registry to enable seamless deployments from a private image registry. You can create a new registry or choose one you already have. [Learn more about Azure Container Registry](#)

Container registry Create new

Azure Monitor
In addition to the CPU and memory metrics included in AKS by default, you can enable Container Insights for more comprehensive data on the overall performance and health of your cluster. Billing is based on data ingestion and retention settings.
[Learn more about container performance and health monitoring](#)
[Learn more about pricing](#)

Container monitoring Enabled Disabled
Azure monitor is recommended for standard configuration.

Log Analytics workspace Create new

Use managed identity (preview)

Azure Policy
Apply at-scale enforcements and safeguards for AKS clusters in a centralized, consistent manner through Azure Policy.
[Learn more about Azure Policy for AKS](#)

Azure Policy Enabled Disabled

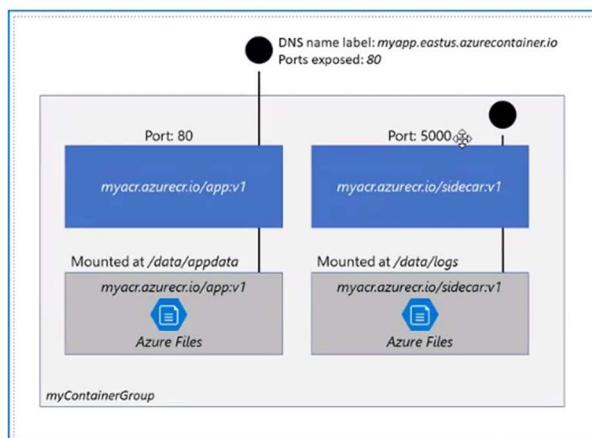
3.12.2 Desplegando con Azure Container Instances

Explore Azure Container Instances (2 / 3)

Container groups

The top-level resource in Azure Container Instances is the container group.

The containers in a container group share a lifecycle, resources, local network, and storage volumes.



Mount an Azure file share in Azure Container Instances (1 / 2)

Overview

- By default, Azure Container Instances are stateless. If the container crashes or stops, all of its state is lost.
- To persist state beyond the lifetime of the container, you must mount a volume from an external store.

Limitations

- You can only mount Azure Files shares to Linux containers.
- Azure file share volume mount requires the Linux container run as *root*.
- Azure File share volume mounts are limited to CIFS support.

Nota: Azure Files permite compartir archivos entre recursos de Azure a modo de Dropbox.

3.13 Azure Storage

3.13.1 Introducción

Explore Azure Blob storage (1 / 2)

Storage Accounts				
Disks Persistent disks for Azure IaaS VMs Premium storage disk options	Files Fully managed file shares in the cloud SMB and REST access "Lift and shift" legacy apps Sync with on-premises	Blobs Highly scalable, REST-based cloud object store Block blobs: Sequential file I/O Page blobs: Random-write pattern data Append blobs	Tables Massive auto-scaling NoSQL store Dynamic scaling based on load	Queues Reliable queues at scale for cloud services Decouple and scale components Message visibility
Built on a unified Distributed Storage System Durability, Encryption at Rest, Strongly Consistent Replication, Fault Tolerance, Auto Load-Balancing				

Diferentes metodologías para gestionar discos que ya no son directamente gestionados como IaaS sino como SaaS:

1. Blob.
2. Tablas.
3. Queues.
4. Files.

Hay dos tipos de cuenta Azure: Standard y Premium.

Explore Azure Blob storage (2 / 2)

Performance level	Storage account type	Supported storage services
Standard	Standard general-purpose v2	Blob, Queue, and Table storage, Azure Files
Premium	Premium block blobs	Blob storage
Premium	Premium page blobs	Page blobs only

La opción premium orientada a Blob solo permite usar Blob storage pero con una latencia muy baja. En cambio la opción premium orientada a page blob nos permite guardar bloques contiguos de espacio de forma muy similar a la manera en que se guarda en discos. La opción estándar es muy recomendada.

3.13.2 Estrategia de persistencia

Cuando se trata de utilizar la mayoría de tecnologías de persistencia de Azure (Blob, Table, Cosmos) hay que olvidarse del concepto de base de datos relacional clásica de toda la vida. En este caso, a la hora de diseñar como persistimos la información, hay que prever como se va a leer y a utilizar la información. Las tablas relacionales se diseñaron en un momento en que los discos duros eran muy caros y la potencia de cálculo no era un limitante. Hoy en día el espacio no es lo más restrictivo, sino las latencias y la potencia de cálculo. En las tecnologías de persistencia de Azure podrían haber múltiples contenedores que contienen el mismo dato o la misma información sin que exista un motor de indexación que nos vaya a comprobar la unicidad o la duplicidad. De manera que la información podría estar duplicada en varios contenedores, y podría no estar actualizado en todas sus ubicaciones.

La transaccionalidad de tecnologías de persistencia de Azure solamente se puede lograr a nivel de código. Y el rollback si algo falla solamente se puede conseguir si escribimos el código de la transacción.

La clave es persistir por objetos y que cada línea de negocio ataque a un motor de persistencia o una tecnología diferente.

3.13.3 Configurando Azure Storage Account

Para utilizar cualquier tipo de tecnología de storage hay que crear un “storage account” en el portal de Azure:

Microsoft Azure

Search resources, services, and

Home > All resources >

Create a resource

Get Started

Recently created

Categories

- AI + Machine Learning
- Analytics
- Blockchain
- Compute
- Containers
- Databases
- Developer Tools
- DevOps
- Identity
- Integration
- Internet of Things
- IT & Management Tools
- Media
- Migration
- Mixed Reality
- Monitoring & Diagnostics
- Networking
- Security
- Storage
- Web

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[Create](#) | [Learn more](#)
-  Azure Kubernetes Service (AKS)
[Create](#) | [Docs](#) | [MS Learn](#)
-  Azure Cosmos DB
[Create](#) | [Docs](#) | [MS Learn](#)
-  Function App
[Create](#) | [Docs](#)
-  SQL Database
[Create](#) | [Docs](#) | [MS Learn](#)
-  Storage account
[Create](#) | [Docs](#) | [MS Learn](#)
-  DevOps Starter
[Create](#) | [Docs](#) | [MS Learn](#)
-  Web App
[Create](#) | [Docs](#) | [MS Learn](#)
-  Key Vault
[Create](#) | [Docs](#) | [MS Learn](#)
-  Template deployment (deploy using custom templates)
[Create](#) | [Learn more](#)

Roberto Ribes (rbo)

The screenshot shows the 'Create a storage account' wizard in the Microsoft Azure portal. The 'Project details' step is selected, showing the subscription as 'Azure Pass - Sponsorship' and the resource group as 'EsPueAz204ApiResourceGroup'. The 'Instance details' step follows, where the storage account name is 'ribesstorageaccount', the region is '(US) East US', and the performance tier is set to 'Standard'. The redundancy is 'Geo-redundant storage (GRS)' with the 'Make read access to data available in the event of regional unavailability' checkbox checked.

Desde el punto de vista de redes tenemos diversas opciones de configuración:

The screenshot shows the 'Redes' (Network) configuration page for the 'ribesstorageaccount'. Under 'Firewalls y redes virtuales', the 'Habilitado desde todas las redes' (Enabled from all networks) option is selected. Under 'Enrutamiento de red', the 'Enrutamiento de red de Microsoft' (Microsoft network routing) option is selected. Other options like 'Enrutamiento de Internet' (Internet routing) and 'Enrutamiento de red de Microsoft' (Microsoft network routing) are also listed.

Y otro tipo de ajustes más genéricos:

Roberto Ribes (rbo)

Tipo de cuenta

StorageV2 (uso general v2)

Rendimiento [?](#)

Standard Premium

 Esta configuración no se puede cambiar después de crear la cuenta de almacenamiento.

Se requiere una transferencia segura [?](#)

Deshabilitado Habilitado

Permitir el acceso público a blobs [?](#)

Deshabilitado Habilitado

Permitir el acceso a la clave de la cuenta de almacenamiento [?](#)

Deshabilitado Habilitado

Permitir el límite superior recomendado para el intervalo de expiración de la firma de acceso compartido (SAS) [?](#)

Deshabilitado Habilitado

Usar la autorización de Azure Active Directory como predeterminada en Azure Portal [?](#)

Deshabilitado Habilitado

Versión de TLS mínima [?](#)

Versión 1.2

Ámbito permitido para las operaciones de copia (versión preliminar) [?](#)

Desde cualquier cuenta de almacenamiento

Nivel de acceso de blob (predeterminado) [?](#)

Esporádico Frecuente

Recursos compartidos de archivos grandes [?](#)

Deshabilitado Habilitado

Finalmente, una vez configuradas todas las pestañas, tendremos acceso a un “storage account” desde el cual podremos desplegar servicios de almacenamiento (files, table, queues, etc).

Roberto Ribes (rbo)

The screenshot shows the Azure Storage account configuration page for 'az204bcn'. The left sidebar contains navigation links for Overview, Activity log, Tags, Diagnose and solve problems, Access Control (IAM), Data migration, Events, Storage browser, Data storage (Containers, File shares, Queues, Tables), Security + networking (Networking, Azure CDN, Access keys, Shared access signature, Encryption, Microsoft Defender for Cloud), Data management (Redundancy, Data protection, Object replication, Block snapshots), and Almacenamiento de datos (Contenedores, Recursos compartidos de archivos, Colas, Tablas). The main content area displays the 'Essentials' tab with details about the resource group (EsPueAz204ApiResourceGroup), location (North Europe), subscription (Azure Pass - Sponsorship), and disk state (Primary: Available, Secondary: Available). It also shows performance settings (Standard), replication (Read-access geo-redundant storage (RA-GRS)), account kind (StorageV2 (general purpose v2)), provisioning state (Succeeded), and creation date (9/22/2022, 9:19:34 PM). The 'Properties' tab is selected, showing sections for Blob service, File service, and Queue service, along with security, networking, and endpoint settings. A note at the bottom right says 'Activate Windows'.

Otro ejemplo de configuración de Storage Account:

The screenshot shows the Azure Storage account configuration page for 'ribesstorageaccount'. The left sidebar contains navigation links for Información general, Registro de actividad, Etiquetas, Diagnosticar y solucionar problemas, Control de acceso (IAM), Migración de datos, Eventos, Explorador de almacenamiento (versión preliminar), Almacenamiento de datos (Contenedores, Recursos compartidos de archivos, Colas, Tablas), Seguridad y redes (Redes, CDN de Azure, Claves de acceso, Firma de acceso compartido, Cifrado, Microsoft Defender for Cloud). The main content area displays the 'Essentials' tab with details about the resource group (TestResources), location (North Europe), subscription (Pase para Azure: patrocinio), and disk state (Disponible). It also shows performance settings (Estándar), replication (Almacenamiento con redundancia local (LRS)), account kind (StorageV2 (uso general v2)), provisioning state (Correcto), and creation date (9/28/2022, 3:15:13 PM). The 'Properties' tab is selected, showing sections for Blob service, File service, and Queue service, along with security, networking, and endpoint settings.

3.13.4 Seguridad

- Azure Storage can be set up to use Azure Active Directory (Azure AD) and Role-Based access.
- Data can be secured during its transit between ends.
- Azure Storage automatically encrypts all data and enabled automatically.
- Azure Key Vault to store secrets and connection strings.

Explore Azure Storage security features

Azure Storage provides a comprehensive set of security capabilities:

- Azure Active Directory (Azure AD) and Role-Based Access Control (RBAC) are supported for Azure Storage
- Data can be secured in transit between an application and Azure
- Delegated access to the data objects in Azure Storage can be granted using a shared access signature

Azure Storage encryption for data at rest

- Azure Storage automatically encrypts your data
- Azure Storage encryption is enabled for all new and existing storage accounts and cannot be disabled.
- Storage accounts are encrypted regardless of their performance tier (standard or premium) or deployment model
- Encryption does not affect Azure Storage performance.

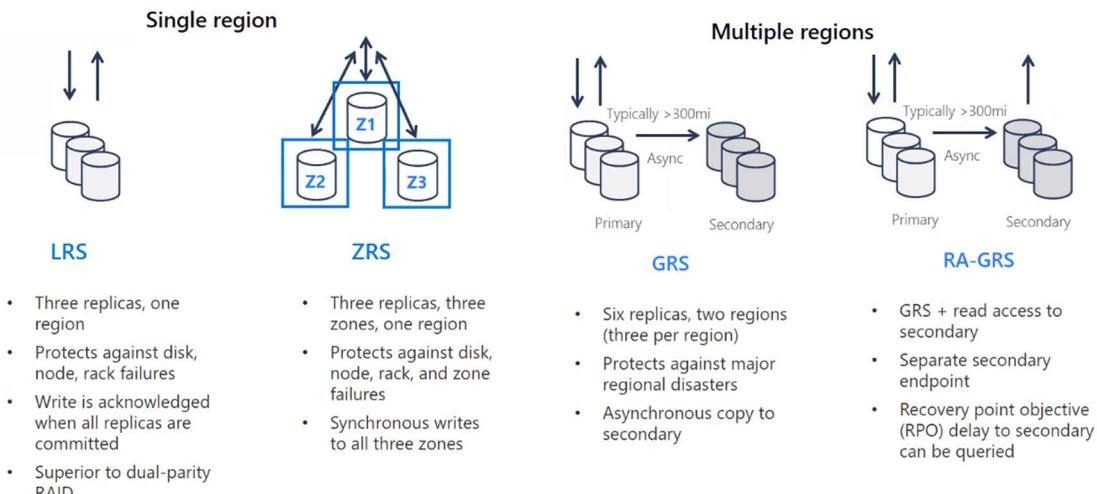
3.13.5 Redundancia de los datos

Cuando creamos cualquier tipo de storage. Tenemos que establecer el nivel de redundancia de los datos que almacenamos.

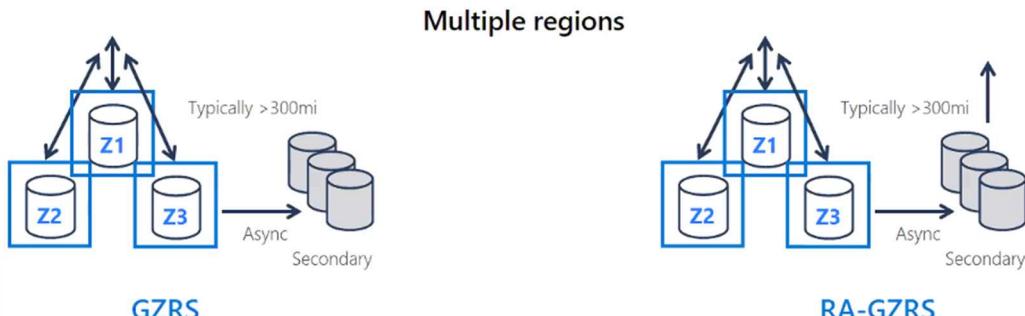
- **LRS:** tres replicas en una region.
- **ZRS:** Tres replicas en tres zonas diferentes en la misma region. El duplicado es una actividad síncrona que nos quita performance.
- **GRS:** Séis replicas en dos regions diferentes. El duplicado es una actividad síncrona que no nos quita performance.
- **RA-GRS:** GRS + modo lectura para los datos secundarios en todo momento y no solamente desastre.

Nota: ten en cuenta que las zonas tipicamente se hallan distanciadas más de 300 mi (millas).

Evaluate Azure Storage redundancy options (1 / 2)



Las opciones avanzadas permiten replicas multi-zona y multi-región con replicaciones síncronas y asíncronas:



GZRS

- Six replicas, 3+1 zones, two regions
- Protects against disk, node, rack, zone, and region failures
- Synchronous writes to all three zones and asynchronous copy to secondary

RA-GZRS

- GZRS + read access to secondary
- Separate secondary endpoint
- RPO delay to secondary can be queried

En nuestro caso, tenemos un storage account configurado con RA-GRS:

The screenshot shows the Azure Storage account configuration for 'az204bcn'. The 'Redundancy' tab is selected, displaying the following details:

- Redundancy:** Read-access geo-redundant storage (RA-GRS) is selected.
- Last failover time:** Not specified.
- Storage endpoints:** View all. Primary Blob Service Endpoint: https://az204bcn.blob.core.windows.net/. Secondary Blob Service Endpoint: https://az204bcn-secondary.blob.core.windows.net/.
- Location:** North Europe (Primary) and West Europe (Secondary).
- Data center type:** Primary and Available.

A world map indicates the locations of the storage accounts. The right side of the screen displays the 'Storage account endpoints' section, listing various service endpoints for the account.

Endpoint Type	Endpoint URL
Primary Blob Service Endpoint	https://az204bcn.blob.core.windows.net/
Primary File Service Endpoint	https://az204bcn.file.core.windows.net/
Primary Queue Service Endpoint	https://az204bcn.queue.core.windows.net/
Primary Table Service Endpoint	https://az204bcn.table.core.windows.net/
Primary Azure Data Lake Storage file system endpoint	https://az204bcn.dfs.core.windows.net/
Primary static website endpoint	https://az204bcn.z16.web.core.windows.net/
Secondary Blob Service Endpoint	https://az204bcn-secondary.blob.core.windows.net/
Secondary Queue Service Endpoint	https://az204bcn-secondary.queue.core.windows.net/
Secondary Table Service Endpoint	https://az204bcn-secondary.table.core.windows.net/
Secondary Azure Data Lake Storage file system endpoint	https://az204bcn-secondary.dfs.core.windows.net/
Secondary static website endpoint	https://az204bcn-secondary.z16.web.core.windows.net/

En la pestaña de “Redundancy” podemos ver todos los endpoints. Si una zona entera cae podemos olvidarnos de su administración y Azure se encarga de gestionar más tarde la recuperación.

La opción de “Redundancy” puede ser cambiada en cualquier momento para el storage account.

3.13.6 Azure Files

Azure Files permite compartir archivos entre recursos de Azure a modo de Dropbox. Es como un disco duro compartido en nuestros recursos.

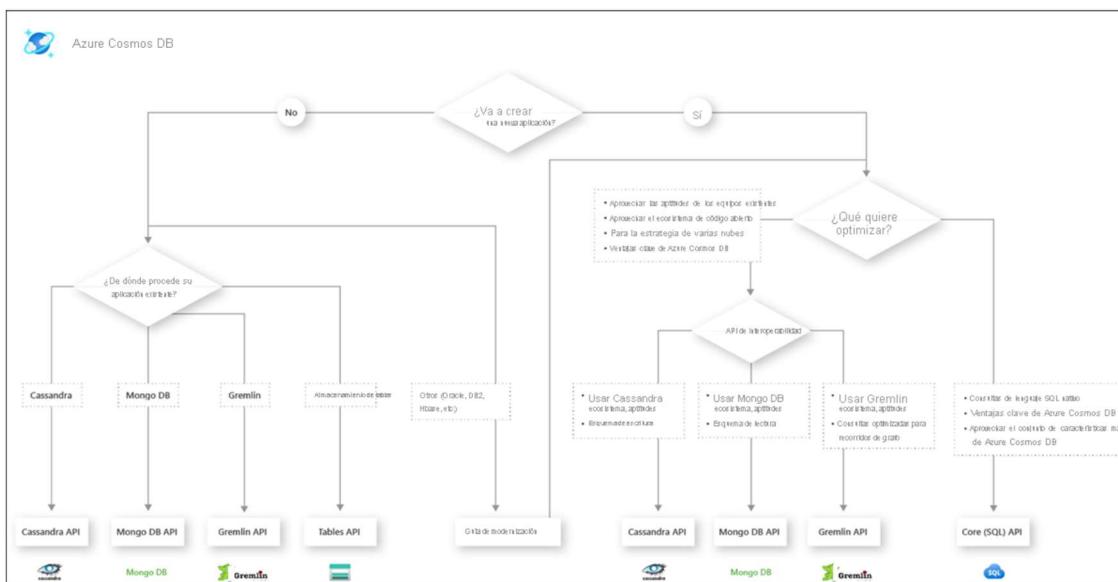
3.13.7 Azure CosmosDB

3.13.7.1 Introducción

Es un motor capaz de soportar distintas versiones de bases de datos NoSQL. Está muy orientado a bajar latencias y acceso global.

Azure Cosmos DB es una base de datos NoSQL totalmente administrada para el desarrollo de aplicaciones modernas. Tiempos de respuesta de milisegundos de un solo dígito y la escalabilidad automática e instantánea garantizan la velocidad a cualquier escala.

Hay diferentes maneras de acceder Cosmos DB, el siguiente árbol nos ayuda a elegir la mejor API de acceso a CosmosDb:



La API nativa de Cosmos (Core (SQL) API) siempre tiene las últimas mejoras y fixes. La Core API es la mejor opción si comienzas una aplicación nueva. Si se trata de una tecnología existente, entonces puedes utilizar la específica para dicha tecnología.

Tables API es la misma que utilizamos para Azure Table Storage.

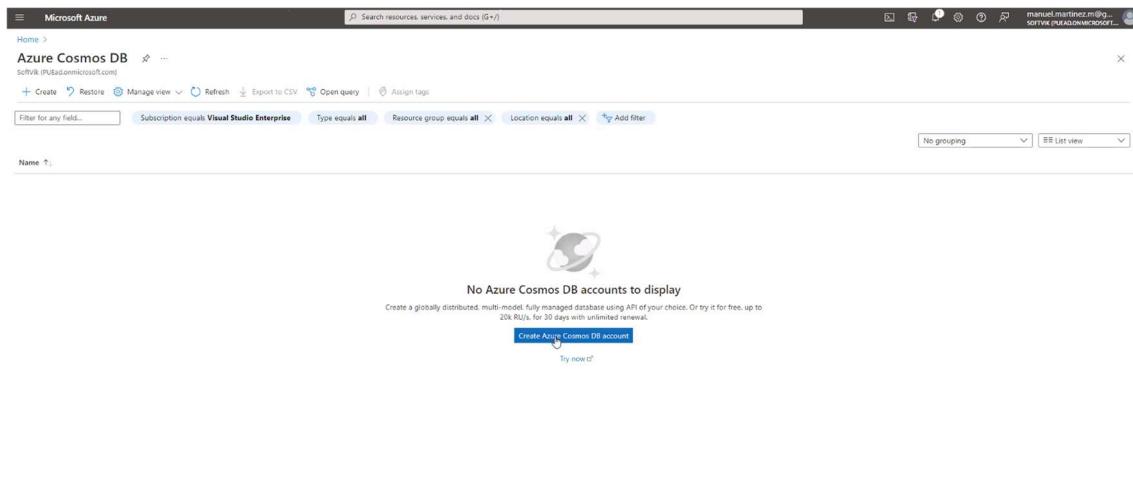
3.13.7.2 Configurando

Restricciones de las tablas:

- Las columnas no pueden tener más de 2MB.

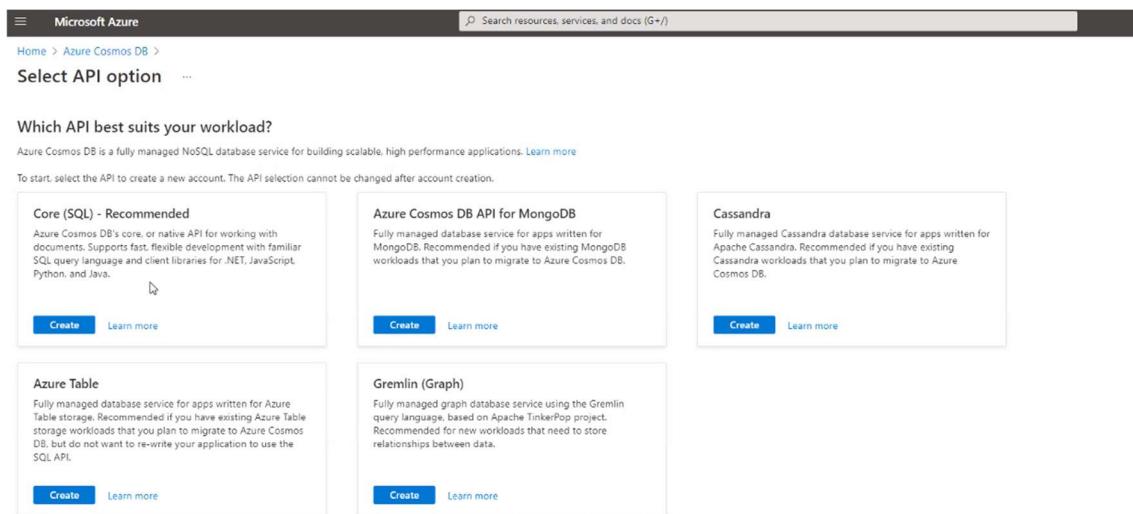
Elegimos crear una nueva cuenta de Azure Cosmos DB:

Roberto Ribes (rbo)



The screenshot shows the Microsoft Azure portal interface. At the top, there's a navigation bar with 'Microsoft Azure' and a search bar. Below it, the 'Azure Cosmos DB' blade is open, showing a list of accounts. There are filters at the top of the list view, including 'Subscription equals Visual Studio Enterprise', 'Type equals all', 'Resource group equals all', and 'Location equals all'. A 'Create filter' button is also present. On the left, there's a 'Name' filter dropdown. The main content area says 'No Azure Cosmos DB accounts to display' and includes a small icon of a globe with a star. Below that, it says 'Create a globally distributed, multi-model, fully managed database using API of your choice. Or try it for free, up to 20K RU/s, for 30 days with unlimited renewal.' It features a prominent blue 'Create Azure Cosmos DB account' button with a 'try now!' link below it.

Seleccionamos la API que utilizaremos, aunque la recomendación es utilizar “Core (SQL)”:



The screenshot shows the 'Select API option' blade in the Azure portal. At the top, it says 'Which API best suits your workload?'. It notes that Azure Cosmos DB is a fully managed NoSQL database service for building scalable, high performance applications. Below this, it says 'To start, select the API to create a new account. The API selection cannot be changed after account creation.' The blade lists five options:

- Core (SQL) - Recommended**: Described as the recommended API for working with documents. It supports fast, flexible development with familiar SQL query language and client libraries for .NET, JavaScript, Python, and Java. Buttons: 'Create' (blue), 'Learn more'.
- Azure Cosmos DB API for MongoDB**: Fully managed database service for apps written for MongoDB. Recommended if you have existing MongoDB workloads that you plan to migrate to Azure Cosmos DB. Buttons: 'Create' (blue), 'Learn more'.
- Cassandra**: Fully managed Cassandra database service for apps written for Apache Cassandra. Recommended if you have existing Cassandra workloads that you plan to migrate to Azure Cosmos DB. Buttons: 'Create' (blue), 'Learn more'.
- Gremlin (Graph)**: Fully managed graph database service using the Gremlin query language, based on Apache TinkerPop project. Recommended for new workloads that need to store relationships between data. Buttons: 'Create' (blue), 'Learn more'.
- Azure Table**: Fully managed database service for apps written for Azure Table storage. Recommended if you have existing Azure Table storage workloads that you plan to migrate to Azure Cosmos DB, but do not want to re-write your application to use the SQL API. Buttons: 'Create' (blue), 'Learn more'.

La siguiente página de configuración nos permite seleccionar la suscripción, región, etc.

Una elección importante es si elegimos “Provisionado” o “Serverless”. El modelo provisionado es compartido y más barato. El modelo “Serverless” aumenta recursos bajo alta demanda que puede salir más caro.

Roberto Ribes (rbo)

Azure Cosmos DB is a fully managed NoSQL database service for building scalable, high performance applications. Try it for free, for 30 days with unlimited renewals. Go to production starting at \$14/month per database, multiple containers included. [Learn more](#)

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

Subscription: Azure Pass - Sponsorship
Resource Group: EsPuA2024ApResourceGroup
Create new

Instance Details
Account Name: testbcn
Location: (US) West US
Capacity mode: Provisioned throughput Serverless
Learn more about capacity mode
With Azure Cosmos DB free tier, you will get the first 1000 RU/s and 25 GB of storage for free in an account. You can enable free tier on up to one account per subscription. Estimated \$64/month discount per account.
Apply Free Tier Discount: Apply Do Not Apply
Limit total account throughput: Limit the total amount of throughput that can be provisioned on this account
This limit will prevent unexpected charges related to provisioned throughput. You can update or remove this limit after your account is created.

En la siguiente página configuraremos la accesibilidad global de la cuenta de Azure Cosmos y en cuantas regiones y zonas se replica la información:

Configure global distribution and regional settings for your account. You can also change these settings after the account is created.

Geo-Redundancy: Enable Disable
Multi-region Writes: Enable Disable
Availability Zones: Enable Disable

La siguiente página, red simplemente elegimos si todas las redes pueden acceder o no Cosmos DB. Normalmente elegiremos que “todas las redes” lo pueden acceder.

Todas las redes podrán acceder a esta cuenta de Cosmos DB. [Más información](#)

Conceptos básicos Distribución global Redes Directiva de copia de seguridad Cifrado Etiquetas Revisar y crear

Conectividad de red
Puede conectarse a su cuenta de Cosmos DB de forma pública (mediante puntos de conexión de servicio o direcciones IP públicas) o de forma privada (con un punto de conexión privado).

Método de conectividad: Todas las redes
 Punto de conexión público (redes seleccionadas)
 Punto de conexión privado

Roberto Ribes (rbo)

A continuación, configuraremos el backup de la base de datos: con qué periodicidad se realiza un backup. El backup interval nos permite seleccionar la periodicidad del backup y tambien si se replica a nivel de region, zona, etc.

Microsoft Azure

Home > Azure Cosmos DB > Select API option >

Create Azure Cosmos DB Account - Core (SQL) ...

Basics Global Distribution Networking **Backup Policy** Encryption Tags Review + create

Azure Cosmos DB provides three different backup policies. You will not be able to switch to Periodic mode once you adopt Continuous mode. [Learn more](#) about the differences of the backup policies and pricing details.

Backup policy Periodic
Backup is taken at periodic interval based on your configuration

Continuous (7 days)
Provides backup window of 7 days / 168 hours and you can restore to any point of time within the window. This mode is available for free.

Continuous (30 days)
Provides backup window of 30 days / 720 hours and you can restore to any point of time within the window. This mode has cost impact.

Backup interval Minute(s)

Backup retention Hours(s)

Copies of data retained

Backup storage redundancy * Geo-redundant backup storage
 Zone-redundant backup storage
 Locally-redundant backup storage

Finalmente, el recurso se crea:

Microsoft Azure

Inicio > Microsoft.Azure.CosmosDB-20221004182551 | Información general >

robertocosmosdb Cuenta de Azure Cosmos DB

Buscar Actualizar Mover Explorador de datos Eliminar cuenta

Información general Registro de actividad Control de acceso (IAM) Etiquetas Diagnóstico y solución de problemas Cost Management Inicio rápido Notificaciones Explorador de datos Configuración

Welcome to your Azure Cosmos DB Free Tier account! Your first 1000 RU/s and 25 GB of storage will be free for the lifetime of this account. Click here to learn more.

Estado: En línea

Grupo de recursos (mover): TestResources

Suscripción (mover): Base para Azure: patrocinio

Id. de suscripción: a0a60b29-f28d-44b3-ad6c-c9ee373e94ec

Límite de rendimiento total: 1000 RU/s

Ubicaciones de lectura: France Central, France South

Ubicaciones de escritura: France Central

URI: https://robertocosmosdb.documents.azure.com:443/

Descuento en el nivel Gr...: Participa

Modo de capacidad: Rendimiento aprovisionado

Ver más

Contenedores

Explorador de datos

Supervisión

En la parte de “Inicio rápido” deberíamos crear containers:

Roberto Ribes (rbo)

The screenshot shows the Microsoft Azure portal interface for the 'robertocosmosdb' account. The left sidebar contains navigation links like 'Información general', 'Registro de actividad', 'Control de acceso (IAM)', etc. The main content area is titled 'robertocosmosdb | Inicio rápido'. It displays a message: '¡Enhorabuena! Se ha creado su cuenta de Azure Cosmos DB.' Below this, it says 'Ahora, nos conectaremos a ella con una aplicación de ejemplo:' and 'Elegir una plataforma' with options for '.NET', 'Xamarin', 'Java', 'Node.js', and 'Python'. Step 1: 'Paso 1: adición de un contenedor' (Create the 'Items' container). Step 2: 'Paso 2: descarga y ejecución de la aplicación .NET' (Download and run the .NET sample app). A 'Descargar' (Download) button is shown.

Creamos el contenido y a continuación lo descargamos:

This screenshot is identical to the one above, showing the 'robertocosmosdb' account dashboard in the Microsoft Azure portal. The 'Inicio rápido' section is highlighted, providing instructions to create a container and download a .NET sample application. The 'Descargar' (Download) button is visible.

Nos crea un ejemplo de solución que podemos analizar como crear bases de datos, contenedores, añadir, modificar, consultar o borrar elementos:

This screenshot shows the Visual Studio IDE with the 'CosmosGettingStartedTutorial' project open. The 'Program.cs' file is the active code editor, containing C# code for interacting with Azure Cosmos DB. The code includes methods for creating a client, databases, and containers. The 'Solution Explorer' pane on the right shows the project structure with files like 'App.config', 'Family.cs', and 'Program.cs'.

"ScaleContainer" nos permite añadir potencia al contenedor.

En el “explorador de datos” vemos la información de Cosmos DB guardada:

Podemos configurar la potencia de cálculo de las queries, pero a riesgo de que se encarezca el coste del servicio:

La propiedad de autoescalar permite adaptar la potencia en función del rendimiento actual. Aunque también se puede hacer desde código.

3.13.7.3 Accediendo la información

Seguimos teniendo columna “Id” y “PartitionKey”. Particionando la información correctamente se reducen muchísimo las RUs.

Necesitamos unas claves para el connection string dependiendo de si es lectura o también escritura. Cuando creamos el *CosmosClient* necesitaremos el *endpointUri* y el *primaryKey* que obtenemos en la parte de Keys:

Roberto Ribes (rbo)

The screenshot shows the Azure portal interface for the 'testbcn2' Cosmos DB account. On the left, there's a navigation sidebar with various options like Overview, Activity log, Access control (IAM), Tags, Diagnose and solve problems, Cost Management, Quick start, Notifications, Data Explorer, Settings, Features, Replicate data globally, Default consistency, Backup & Restore, Networking, CORS, Dedicated Gateway, Keys, and Advisor Recommendations. The 'Keys' option is highlighted. The main content area is titled 'testbcn2 | Keys' and shows the 'Read-write Keys' tab selected. It contains fields for 'URI' (https://testbcn2.documents.azure.com:443/), 'PRIMARY KEY' (a long hex string), 'SECONDARY KEY' (another long hex string), 'PRIMARY CONNECTION STRING' (AccountEndpoint=https://testbcn2.documents.azure.com:443/;AccountKey=...), and 'SECONDARY CONNECTION STRING' (AccountEndpoint=https://testbcn2.documents.azure.com:443/;AccountKey=...). There are also sections for 'Read-only Keys' and 'Connection strings'.

El endpointUri también se puede obtener en el Overview o resumen:

The screenshot shows the Azure portal interface for the 'robertocosmosdb' account. The left sidebar includes options like Buscar, Información general, Registro de actividad, Control de acceso (IAM), Etiquetas, Diagnosticar y solucionar problemas, Cost Management, and Iniciar rápido. The main content area has a message: 'Welcome to your Azure Cosmos DB Free Tier account! Your first 1000 RU/s and 25 GB of storage will be free for the lifetime of this account. Click here to learn more.' Below it, the 'Información general' section is expanded, showing details such as Estado (En línea), Grupo de recursos (TestResources), Suscripción (Pase para Azure: patrocinio), Id. de suscripción (a0a60b29-f28d-44b3-ad6c-c9ee373e94ec), Límite de rendimiento (1000 RU/s), Ubicaciones de lectura (France Central, France South), Ubicaciones de escritura (France Central), and Endpoint Uri (https://robertocosmosdb.documents.azure.com:443/). The 'Ubicaciones de escritura' and 'Endpoint Uri' fields are highlighted in yellow.

La información se puede visualizar desde el portal Azure o desde código .NET (como en el ejemplo descargado):

The screenshot shows the Azure portal interface for the 'robertocosmosdb' account. The left sidebar includes options like Buscar, Información general, Registro de actividad, Control de acceso (IAM), Etiquetas, Diagnosticar y solucionar problemas, Cost Management, Inicio rápido, Notificaciones, Explorador de datos, Configuration, Características, Replicación global de datos, Coherencia predeterminada, Copia de seguridad y restauración, Redes, CORS, Puerta de enlace dedicada, Claves, Recomendaciones de Advisor, Security Center, and Identidad. The 'Explorador de datos' option is highlighted. The main content area is titled 'robertocosmosdb | Explorador de datos'. It shows the 'SQL API' interface with a query: 'SELECT * FROM c WHERE partitionKey = "Wakefield"'. The results pane displays a JSON document for an item named 'Wakefield'. The JSON structure includes properties like id, partitionKey, FirstName, LastName, Parents, Children, and Pets, with values corresponding to the Wakefield family members and their pets.

```
1  {
2     "id": "Wakefield.7",
3     "partitionKey": "Wakefield",
4     "LastName": "Wakefield",
5     "Parents": [
6         {
7             "FamilyName": "Wakefield",
8             "FirstName": "Robin"
9         },
10        {
11            "FamilyName": "Hiller",
12            "FirstName": "Ben"
13        }
14    ],
15    "Children": [
16        {
17            "FamilyName": "Merlin",
18            "FirstName": "Jesse",
19            "Gender": "Female",
20            "Grade": 8,
21            "Pets": [
22                {
23                    "GivenName": "Goofy"
24                },
25                {
26                    "GivenName": "Shadow"
27                }
28            ]
29        },
30        {
31            "FamilyName": "Hiller",
32            "FirstName": "Lisa",
33            "Gender": "Female",
34            "Grade": 1,
35            "Pets": null
36        }
37    ]
38}
```

Además, desde el Portal se pueden realizar consultas SQL:

```

SELECT * FROM c
WHERE cid = 'f0d'
WHERE cid = 'f0d' ORDER BY c.ts DESC
  
```

```

1  [
2    {
3      "id": "Andersen.1",
4      "partitionKey": "Andersen",
5      "lastName": "Andersen",
6      "parents": [
7        {
8          "familyName": null,
9          "firstName": "Thomas"
10        },
11        {
12          "familyName": null,
13          "firstName": "Mary Kay"
14        }
15      ],
16      "children": [
17        {
18          "familyName": null,
19          "firstName": "Henriette Thaulow",
20          "gender": "female",
21          "grade": 5,
22          "pets": [
23            {
24              "givenName": "Fluffy"
25            }
26          ]
27        }
28      ],
29      "address": {
30        "state": "WA",
31        "country": "King",
32        "city": "Seattle"
33      },
34      "isRegistered": false,
35      "_rid": "33cdA1HjB2I8AAAAAAAAdA==",
36      "_self": "/db/23cdA1HjB2I8/coll/c1/33cdA1HjB2I8AAAAAAAAdA==/",
37      "_attachments": "attachments/",
38      "_ts": 1664981828
39    }
  
```

Las consultas se pueden editar para admitir cierta complejidad:

```
select i from Items i join p in i.Parents where p.FirstName='Thomas'
```

```

select i from Items i join p in i.Parents where p.FirstName='Thomas'
  
```

```

1  select i from Items i join p in i.Parents where p.FirstName='Thomas'
  
```

Finalmente, aquello que llamamos partitionKey puede tener un nombre cualquiera en nuestra entidad de negocio. Simplemente utilizando el atributo **JsonProperty** podemos renombrar las variables:

```
namespace Es.Pue.Az204.Model.PersistenceLayerImpl.AzureCosmosDB.CosmosEntities
{
    class LoginCosmosEntity
    {
        [JsonProperty(PropertyName = "id")]
        public Guid Id { get; set; }

        [JsonProperty(PropertyName = "partitionKey")]
        public string LoginName { get; set; }
        public string Password { get; set; }
    }
}
```

3.13.7.3.1 Utilizando Linq queries

Es posible utilizar [expresiones LINQ](#) para recuperar información de Cosmos DB utilizando librerías especiales.

You can create a LINQ query with `GetItemLinqQueryable`. This example shows LINQ query generation and asynchronous execution with a `FeedIterator`:

```
using (FeedIterator<Book> setIterator = container.GetItemLinqQueryable<Book>()
    .Where(b => b.Title == "War and Peace")
    .ToFeedIterator<Book>())
{
    //Asynchronous query execution
    while (setIterator.HasMoreResults)
    {
        foreach(var item in await setIterator.ReadNextAsync()){
            {
                Console.WriteLine(item.cost);
            }
        }
    }
}
```

Supported LINQ operators

The LINQ provider included with the SQL .NET SDK supports the following operators:

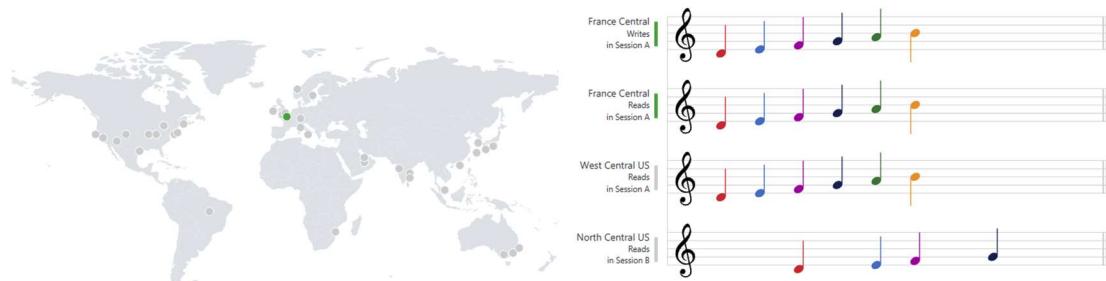
- **Select**: Projections translate to [SELECT](#), including object construction.
- **Where**: Filters translate to [WHERE](#), and support translation between &&, ||, and ! to the SQL operators
- **SelectMany**: Allows unwinding of arrays to the [JOIN](#) clause. Use to chain or nest expressions to filter on array elements.
- **OrderBy** and **OrderByDescending**: Translate to [ORDER BY](#) with ASC or DESC.

- **Count, Sum, Min, Max, and Average** operators for [aggregation](#), and their async equivalents **CountAsync, SumAsync, MinAsync, MaxAsync, and AverageAsync**.
- **CompareTo**: Translates to range comparisons. Commonly used for strings, since they're not comparable in .NET.
- **Skip and Take**: Translates to [OFFSET and LIMIT](#) for limiting results from a query and doing pagination.
- **Math functions**: Supports translation from .NET Abs, Acos, Asin, Atan, Ceiling, Cos, Exp, Floor, Log, Log10, Pow, Round, Sign, Sin, Sqrt, Tan, and Truncate to the equivalent [built-in mathematical functions](#).
- **String functions**: Supports translation from .NET Concat, Contains, Count, EndsWith,IndexOf, Replace, Reverse, StartsWith, SubString, ToLower, ToUpper, TrimEnd, and TrimStart to the equivalent [built-in string functions](#).
- **Array functions**: Supports translation from .NET Concat, Contains, and Count to the equivalent [built-in array functions](#).
- **Geospatial Extension functions**: Supports translation from stub methods Distance, IsValid, IsValidDetailed, and Within to the equivalent [built-in geospatial functions](#).
- **User-Defined Function Extension function**: Supports translation from the stub method [CosmosLinq.InvokeUserDefinedFunction](#) to the corresponding [user-defined function](#).
- **Miscellaneous**: Supports translation of Coalesce and [conditional operators](#). Can translate Contains to String CONTAINS, ARRAY_CONTAINS, or IN, depending on context.

3.13.7.4 Niveles de coherencia y latencia

Understand Session consistency

It provides write latencies, availability and read throughput comparable to that of eventual consistency but also provides the consistency guarantees that suit the needs of applications written to operate in the context of a user.



Hay una replica que en cuanto escribimos en nuestra CosmosDB principal, las replicas se van creando instantáneamente de manera sincrona, y solamente una en modo asíncrono.

Los precios se encarecen a medida que requerimos mayor sincronización.

Todas las CosmosDB que comparten sesión están sincronizadas. La sesión B no está en sincronía y hay mayor retraso.

El comportamiento que vemos es el por defecto.

Hay diferentes tipos de consistencia de los datos dependiendo de nuestro negocio:

- Si nos importa el orden de las lecturas/escrituras en las replicas.
- Si nos interesa la sincronía en la replicación.
- Si nos interesan latencias elevadas o bajas.

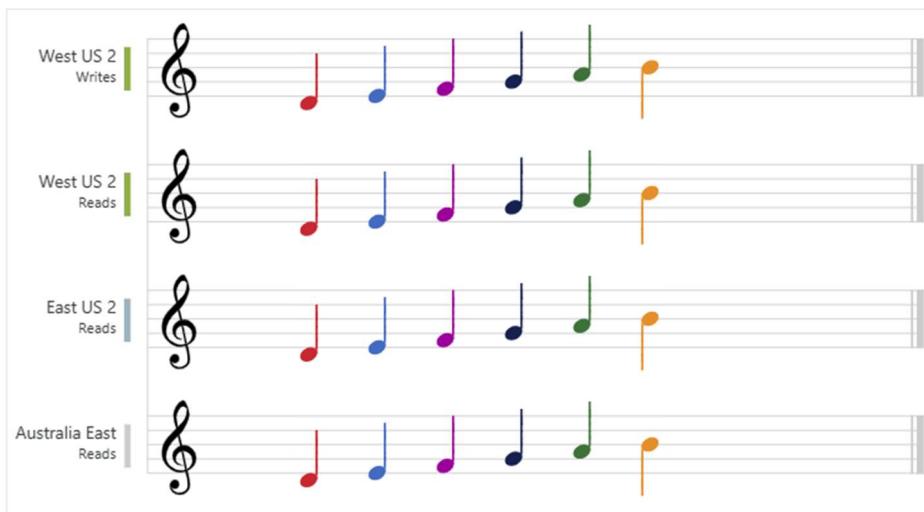
Todas estas opciones tienen impacto en el coste del servicio.

Los niveles de coherencia se seleccionan aquí, con un ejemplo práctico de como funcionaría:

The screenshot shows the Azure portal interface for managing a Cosmos DB database named 'robertocosmosdb'. In the left sidebar, 'Coherencia predeterminada' is selected under 'Replicación global de datos'. The main content area displays the 'Session' tab of the consistency settings. A musical analogy is used to explain the levels: 'ALTA COBOLESCENCIA LIMITADA' (top note), 'SESION' (middle notes), and 'EVENTUAL COHERENTE' (bottom note). Below this, a world map shows regions with their respective consistency guarantees: France Central (Write in Session A), France Central (Reads in Session A), West Central US (Reads in Session A), and North Central US (Reads in Session B).

3.13.7.4.1 Coherencia fuerte

La coherencia fuerte ofrece una garantía de linearización. La linearización hace referencia a la capacidad de servir solicitudes simultáneamente. Se garantiza que las lecturas devuelven la versión más reciente de un elemento. Un cliente nunca ve una escritura no confirmada ni parcial. Se garantiza que los usuarios siempre leerán la escritura confirmada más reciente.

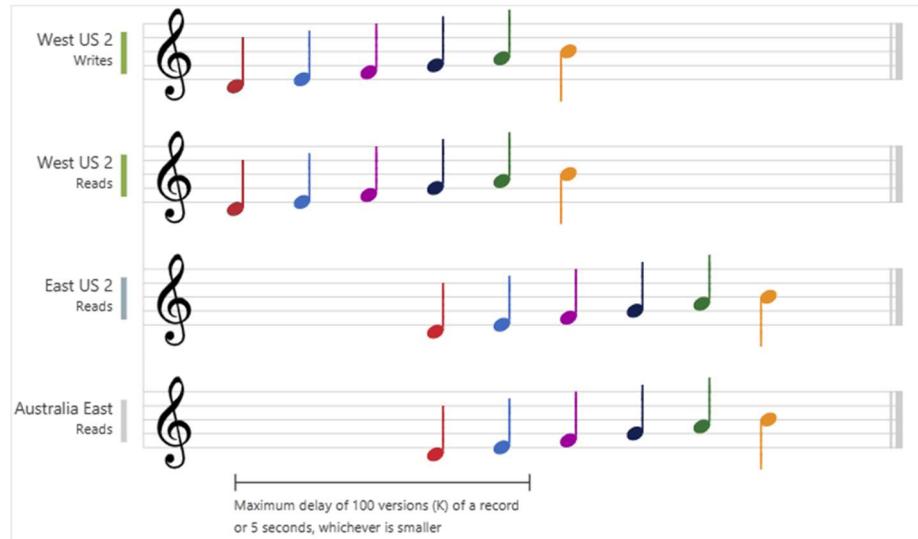


3.13.7.4.2 Coherencia de obsolescencia limitada

En la obsolescencia limitada se garantiza que las lecturas respetan la garantía de prefijo coherente. Las lecturas pueden ir con retraso respecto a las escrituras en un máximo de

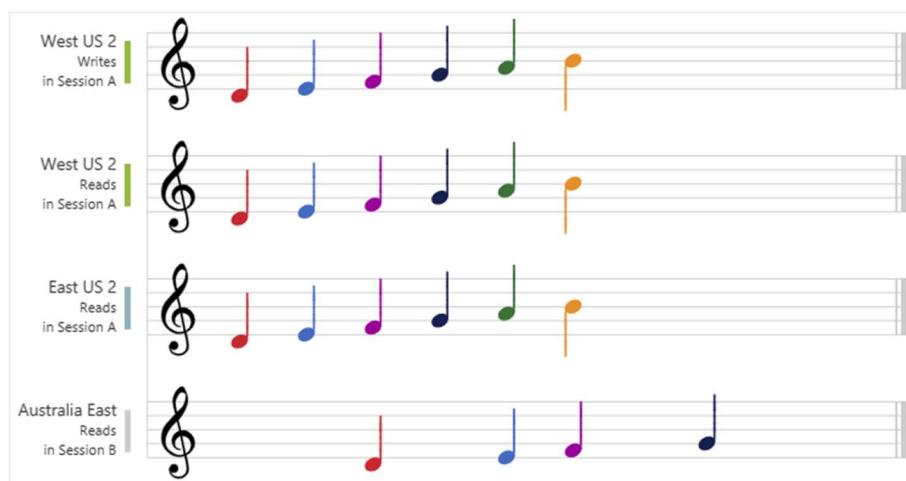
versiones "K" (es decir, "actualizaciones") de un elemento o en el intervalo de tiempo "T" , lo que se lea primero. En otras palabras, cuando elige la obsolescencia limitada, la "obsolescencia" se puede configurar de dos maneras:

1. El número de versiones (K) del elemento
2. El intervalo de tiempo (T) que las lecturas pueden retrasarse con respecto a las escrituras



3.13.7.4.3 Coherencia de sesión

En la coherencia de sesión, en una sesión de cliente individual, se garantiza que las lecturas respetan las garantías de prefijo coherente, lecturas monotónicas, escrituras monotónicas, lectura de la escritura y escritura tras las lecturas. Esto da por hecho una sesión de "escritor" individual o el uso compartido del token de sesión para varios escritores.



3.13.7.4.4 Coherencia final

En la coherencia final, no hay ninguna garantía de ordenación para las lecturas. En ausencia de escrituras adicionales, las réplicas terminarán por converger.

La coherencia final es la forma más débil de coherencia, ya que un cliente puede leer los valores que son más antiguos que los que había leído antes. La coherencia final es adecuada cuando la aplicación no requiere ninguna garantía de ordenación. Entre los ejemplos se incluye el recuento de retweets, Me gusta o comentarios no encadenados. En el gráfico siguiente se ilustra la coherencia final con notas musicales.



3.13.7.4.5 Latencia y niveles de coherencia

Se garantiza que la latencia de lectura de todos los niveles de coherencia siempre es inferior a 10 milisegundos en el percentil 99. La latencia media de lectura (en el percentil 50) es normalmente de cuatro milisegundos o menos.

Se garantiza que la latencia de escritura de todos los niveles de coherencia siempre sea inferior a 10 milisegundos en el percentil 99. La latencia media de escritura (en el percentil 50) es normalmente de cinco milisegundos o menos. Las cuentas de Azure Cosmos que abarcan varias regiones y están configuradas con una coherencia alta son una excepción a esta garantía.

3.13.7.5 Política de indexación

Podemos decir al documento que estructuras son indexables o no para mejorar la búsqueda:

Roberto Ribes (rbo)

The screenshot shows the Azure Cosmos DB Data Explorer interface. On the left, the navigation pane lists 'testbcn' and 'testbcn2'. The right pane displays the 'SQL API' section for 'testbcn2'. Under 'DATA', the 'ToDoList' collection is selected. In the 'Items' section, the 'Scale & Settings' tab is active. The 'Indexing Policy' tab is highlighted with a yellow box. Below it, the throughput is set to 'Throughput (400 - unlimited RU/s)'. The 'Scale' tab is also visible. A note at the bottom says 'Notebooks is currently not available. We are working on it.' A table shows current costs for Hourly, Daily, and Monthly usage.

Hourly	Daily	Monthly
Current Cost \$ 0.040	\$ 0.96	\$ 29.20
(regions: 1, 500 RU/s, \$0.00008/RU) This cost is an estimate and may vary based on the regions where your account is deployed and potential discounts applied to your account		

Storage capacity: Unlimited

Por defecto todo está indexado: “/*” lo define ya que identifica la carpeta raíz.

This screenshot is similar to the previous one, showing the 'SQL API' section for 'testbcn2'. The 'ToDoList' collection is selected under 'DATA'. The 'Indexing Policy' tab is active, showing a JSON configuration. The configuration includes an 'includedPaths' array with a single entry: '"/"'. An 'excludedPaths' array is also present, containing a single entry: '"/"_etag\/*"'.

```
1  {
2    "indexingMode": "consistent",
3    "automatic": true,
4    "includedPaths": [
5      {
6        "path": "/"
7      }
8    ],
9    "excludedPaths": [
10      {
11        "path": "/"_etag\/*"
12      }
13    ]
14 }
```

3.13.7.6 Escalado de rendimiento (RU/s)

El coste de Cosmos DB se calcula en función del almacenamiento, el rendimiento y la configuración adicional, como la replicación.

Roberto Ribes (rbo)

3.13.7.6.1 Por contenedor

The screenshot shows the Azure Cosmos DB Explorer Data blade. On the left, there's a navigation menu with options like Buscar, Redes, CORS, Puerta de enlace dedicada, Claves, Recomendaciones de Advisor, Security Center, Identidad, Bloques, Integraciones (Power BI, Azure Synapse Link, Adición de Azure Cognitive Search, Adición de una función de Azure), and others. The main area displays the SQL API interface for a 'ToDoList' container under the 'DATA' section. It shows items, scale & settings, stored procedures, user-defined functions, and triggers. A note says: 'With free tier, you will get the first 1000 RU/s and 25 GB of storage in this account for free. To keep your account free, keep the throughput low.' Below this, it shows throughput settings (Autoscale or Manual) and a capacity calculator. At the bottom, it lists current costs for hourly, daily, and monthly usage.

3.13.7.6.2 Por cuenta

The screenshot shows the Azure Cosmos DB Cost Management blade. The left sidebar includes options like Información general, Registro de actividad, Control de acceso (IAM), Etiquetas, Diagnóstico y solución de problemas, Cost Management (selected), Inicio rápido, Notificaciones, Explorador de datos, Configuración (Características, Replicación global de datos, Coherencia predeterminada, Copia de seguridad y restauración, Redes, CORS, Puerta de enlace dedicada, Claves). The main content area shows the 'Rendimiento actual de la cuenta' (Current account performance) table with columns for Database, Collection, Throughput mode, and Throughput (RU/s). It also shows the 'Configuración del límite de rendimiento total' (Total performance limit configuration) section, which includes a note about the cost of Cosmos DB being calculated based on storage, performance, and additional features like replication, and a throughput calculator.

3.13.7.7 Activando la replicación global de datos

Nos permite agregar regiones donde replicar datos:

The screenshot shows the Azure Cosmos DB Global Data Replication blade. The left sidebar includes options like Información general, Registro de actividad, Control de acceso (IAM), Etiquetas, Diagnóstico y solución de problemas, Cost Management, Inicio rápido, Notificaciones, Explorador de datos, Configuración (Características, Replicación global de datos selected, Coherencia predeterminada). The main content area features a world map where regions can be added or removed. It includes sections for 'Configuración de regiones' (Configure regions), 'Escrituras en varias regiones' (Writes across regions), and 'Deshabilitar' (Disable). It also shows 'Configurar las regiones para las lecturas, las escrituras y la zona de disponibilidad' (Configure regions for reads, writes, and availability zone) and a 'Zona de disponibilidad' (Availability zone) table.

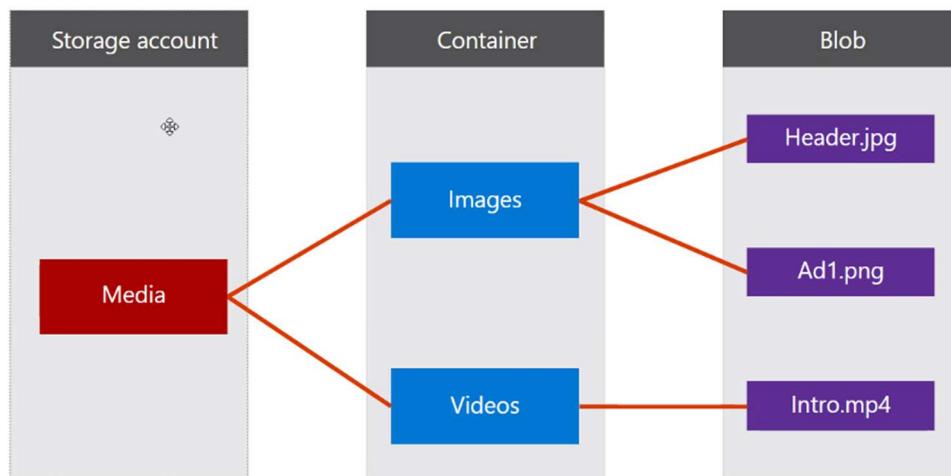
3.13.8 Azure Blob storage

3.13.8.1 Introducción

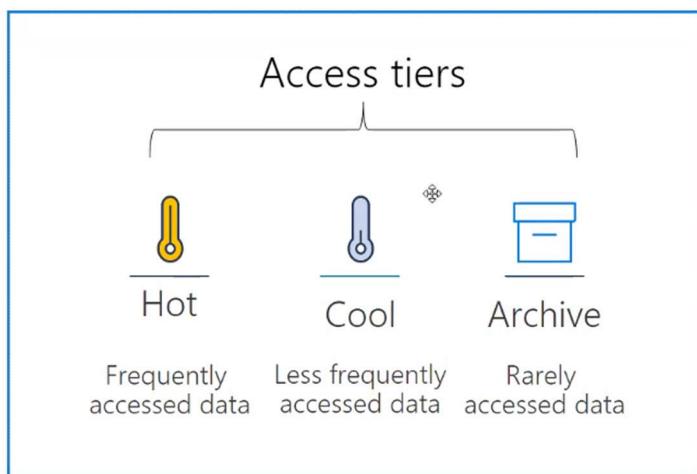
Una cuenta de almacenamiento (“storage account”) permite guardar muchas carpetas diferentes. La storage account tiene un usuario y una contraseña para acceder a la información.

Un caso práctico es utilizar un storage account como si fuera una BBDD y utilizar una por cliente. Cada storage account contiene información aislada que no se puede acceder desde los otros storage account (por ejemplo: SIS, BWS y TRACKING schemas).

Discover Azure Blob storage resource types

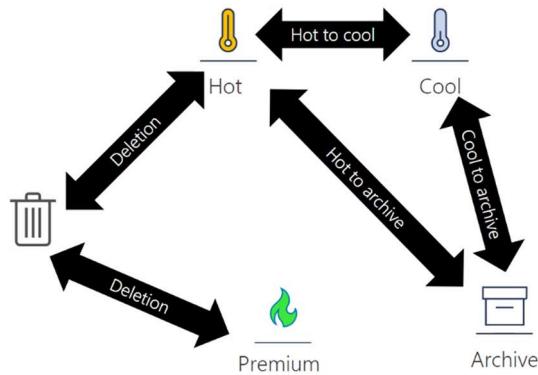


Cuando se utiliza una storage account orientada a almacenamiento Blob (**Premium Blob Blocks**) es posible configurar capas de acceso a la información Blob para determinar la frecuencia con la que se acceden y la latencia que se desea. En cualquier otro caso el “access tier” se determina cuando se carga el archivo Blob:



The lifecycle management policy lets you:

- Transition blobs to a cooler storage tier (hot to cool, hot to archive, or cool to archive) to optimize for performance and cost
- Delete blobs at the end of their lifecycles
- Define rules to be run once per day at the storage account level
- Apply rules to containers or a subset of blobs (using prefixes as filters)



- A policy is a **collection of rules**
- Each rule within the policy has several parameters
 - name
 - enabled
 - type
 - definition

Rules

- Each rule definition includes a filter set and an action set.
- The filter set limits rule actions to a certain set of objects within a container or objects names.
- The action set applies the tier or delete actions to the filtered set of objects.

Policy example

```
{
  "rules": [
    {
      "name": "rule1",
      "enabled": true,
      "type": "Lifecycle",
      "definition": {...}
    },
    {
      "name": "rule2",
      "type": "Lifecycle",
      "definition": {...}
    }
  ]
}
```

Parameter name	Parameter type	Required
name	String	True
enabled	Boolean	False
type	An enum value	True
definition	An object that defines the lifecycle rule	True

3.13.8.2 Accediendo la información

Cuando subimos un fichero, deberíamos cambiarle el nombre para que sea único. En metadatos podemos configurar un GUID para tener el nombre identificable:

Roberto Ribes (rbo)

The screenshot shows the Microsoft Azure Blob storage interface. On the left, there's a sidebar with options like Overview, Diagnose and solve problems, Access Control (IAM), Settings, Shared access tokens, Access policy, Properties, and Metadata. The main area displays a file named "AZ-900T00A-ES-TrainerHandbook.pdf". The file details are as follows:

Property	Value
SIZE	4.36 MB
ACCESS TIER	Hot (Inferred)
ACCESS TIER LAST MODIFIED	N/A
ARCHIVE STATUS	-
REHYDRATE PRIORITY	-
SERVER ENCRYPTED	true
ETAG	0x8DA9CD1BB6911D6
VERSION-LEVEL IMMUTABILITY POLICY	Disabled
CACHE-CONTROL	[empty]
CONTENT-TYPE	application/pdf
CONTENT-MDS	/MYBVlu2QeNFAG6ZPcPmu...
CONTENT-ENCODING	[empty]
CONTENT-LANGUAGE	[empty]
CONTENT-DISPOSITION	[empty]
LEASE STATUS	Unlocked
LEASE STATE	Available
LEASE DURATION	-
COPY STATUS	-
COPY COMPLETION TIME	-

At the bottom, there's a "Metadata" section with a table:

Key	Value
[empty]	[empty]

Buttons at the bottom include "Undelete" and "Delete".

Toda la metadata cuando es información compleja deberia guardarse en table storage y en el "Value" guardar su GUID.

Es importante gestionar los metadatos de los archivos.

Para acceder información Blob tenemos los siguientes datos (que tambien nos permite cambiar los metadatos y las propiedades):

- Blob containers support system properties and user-defined metadata, in addition to the data they contain.
- Retrieve container properties
 - [GetProperties](#)
 - [GetPropertiesAsync](#)
- Set metadata
 - [SetMetadata](#)
 - [SetMetadataAsync](#)

La información se puede acceder via interfaces REST:

Set and retrieve properties and metadata for blob resources by using REST

- Metadata header format: `x-ms-meta-name:string-value`
- URI syntax to retrieve properties and metadata from containers and blobs
 - `GET/HEAD https://myaccount.blob.core.windows.net/mycontainer?restype=container`
 - `GET/HEAD https://myaccount.blob.core.windows.net/mycontainer/myblob?comp=metadata`
- URI syntax to set properties and metadata from containers and blobs
 - `PUT https://myaccount.blob.core.windows.net/mycontainer?restype=container`
 - `PUT https://myaccount.blob.core.windows.net/mycontainer/myblob?comp=metadata`

Con todo, también se puede aplicar una librería nativa de .NET para acceder la información.

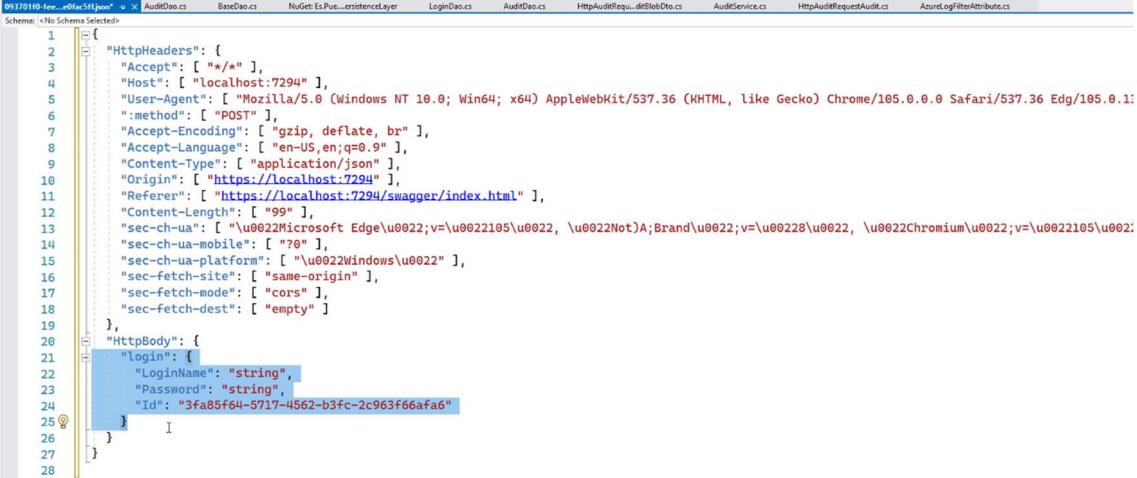
The screenshot shows the Azure portal interface for managing blobs. On the left, there's a sidebar with navigation links like Home, Container, Overview, Diagnose and solve problems, Access Control (IAM), Shared access tokens, Access policy, Properties, and Metadata. The main area displays the properties of a blob named '093701f0-fee7-4938-ac35-410fe0fac5ff.json'. The properties listed include:

Property	Value
URL	https://az204bcn.blob.core.windows.net/093701f0-fee7-4938-ac35-410fe0fac5ff.json
LAST MODIFIED	9/29/2022, 7:13:33 PM
CREATION TIME	9/29/2022, 7:13:33 PM
VERSION ID	2022-09-29T17:13:33.6369681Z
TYPE	Block blob
SIZE	862 B
ACCESS TIER LAST MODIFIED	N/A
ARCHIVE STATUS	-
REHYDRATE PRIORITY	-
SERVER ENCRYPTED	true
ETAG	0x8DAA23DF0676705
VERSION-LEVEL IMMUTABILITY POLICY	Disabled
CACHE-CONTROL	[Empty]
CONTENT-TYPE	application/octet-stream
CONTENT-MD5	keyMomYw3Nd13ghVpE3/Kw...
CONTENT-ENCODING	[Empty]
CONTENT-LANGUAGE	[Empty]
CONTENT-DISPOSITION	[Empty]
LEASE STATUS	Unlocked
LEASE STATE	Available
LEASE DURATION	-
COPY STATUS	-
COPY COMPLETION TIME	-

At the bottom, there's a 'Metadata' section with a 'Key' input field containing 'Talking: Manuel Martinez' and a 'Value' input field. There are also 'Undelete' and 'Delete' buttons.

El archivo se puede descargar desde la web:

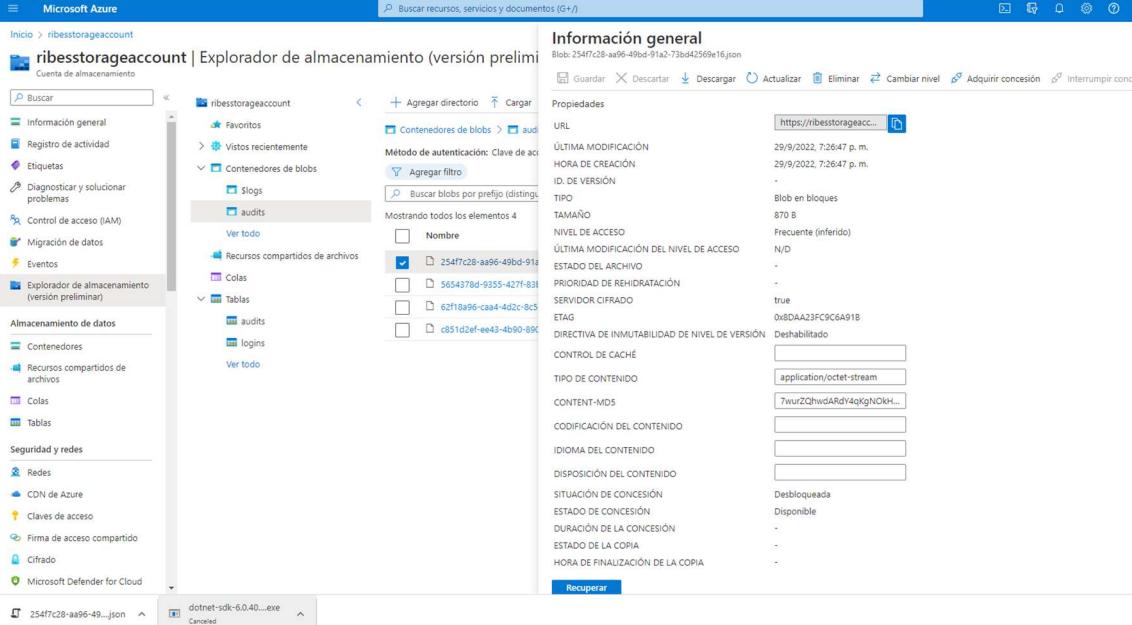
Roberto Ribes (rbo)



```
09370110-fee...-e0fac5f1.json" > AuditDao.cs BaseDao.cs NuGet Es.Pue..._ersistenceLayer LoginDao.cs AuditDao.cs HttpAuditRequ..._dbBlobDto.cs AuditService.cs HttpAuditRequestAudit.cs AzureLogFilterAttribute.cs
Schema: <No Schema Selected>
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
```

```
{
  "HttpHeaders": {
    "Accept": [ "/*" ],
    "Host": [ "localhost:7294" ],
    "User-Agent": [ "Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/105.0.0.0 Safari/537.36 Edg/105.0.1" ],
    ":method": [ "POST" ],
    "Accept-Encoding": [ "gzip, deflate, br" ],
    "Accept-Language": [ "en-US,en;q=0.9" ],
    "Content-Type": [ "application/json" ],
    "Origin": [ "https://localhost:7294" ],
    "Referer": [ "https://localhost:7294/swagger/index.html" ],
    "Content-Length": [ "99" ],
    "sec-ch-ua": [ "\u0022Microsoft Edge\u0022;\u003d\u0022105.\u0022;\u003d\u0022Not)A;Brand\u0022;\u003d\u002222;\u003d\u0022;\u003d\u0022Chromium\u0022;\u003d\u0022105.\u0022;\u003d\u0022" ],
    "sec-ch-ua-mobile": [ "?0" ],
    "sec-ch-ua-platform": [ "\u0022Windows\u0022" ],
    "sec-fetch-site": [ "same-origin" ],
    "sec-fetch-mode": [ "cors" ],
    "sec-fetch-dest": [ "empty" ]
  },
  "HttpBody": {
    "Login": {
      "LoginName": "string",
      "Password": "string",
      "Id": "3fa85f64-5717-4562-b3fc-2c963f66afa6"
    }
  }
}
```

Realmente es muy sencillo una vez la información se sube con .NET, descargarla y visualizarla:



Información general

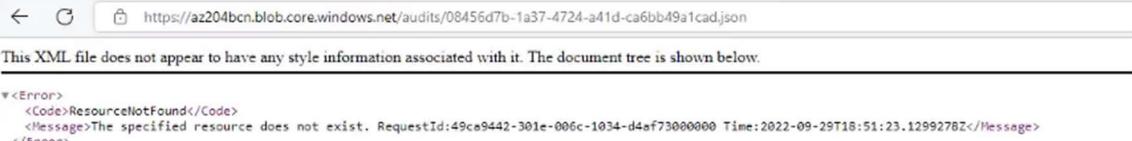
blob: 254fc28-aa96-49bd-91a2-73bd42569e16.json

Propiedades

Propiedad	Valor
URL	https://ribesstorageacc...
ÚLTIMA MODIFICACIÓN	29/9/2022, 7:26:47 p. m.
HORA DE CREACIÓN	29/9/2022, 7:26:47 p. m.
ID. DE VERSIÓN	-
TIPO	Bloq en bloques
TAMAÑO	870 B
NIVEL DE ACCESO	Frecuente (inferido)
ÚLTIMA MODIFICACIÓN DEL NIVEL DE ACCESO	N/D
ESTADO DEL ARCHIVO	-
PRIORIDAD DE REHIDRATACIÓN	-
SERVIDOR CIFRADO	true
ETAG	0x8DAA23FC9C6A91B
DIRECTIVA DE INMUTABILIDAD DE NIVEL DE VERSIÓN	Deshabilitado
CONTROL DE CÁCHE	
TIPO DE CONTENIDO	application/octet-stream
CONTENT-MDS	7wurZQhwdARDy4qKgNOKh...
CODIFICACIÓN DEL CONTENIDO	
IDIOMA DEL CONTENIDO	
DISPOSICIÓN DEL CONTENIDO	
SITUACIÓN DE CONCESIÓN	Desbloqueada
ESTADO DE CONCESIÓN	Disponible
DURACIÓN DE LA CONCESIÓN	-
ESTADO DE LA COPIA	-
HORA DE FINALIZACIÓN DE LA COPIA	-

3.13.8.3 Haciendo públicos recursos Blob

Accediendo la URL de un recurso Blob no va a funcionar:



This XML file does not appear to have any style information associated with it. The document tree is shown below.

```
<Error>
  <Code>ResourceNotFound</Code>
  <Message>The specified resource does not exist. RequestId:49ca9442-301e-006c-1034-d4af73000000 Time:2022-09-29T18:51:23.1299278Z</Message>
</Error>
```

Roberto Ribes (rbo)

The screenshot shows the Azure Storage Explorer interface. On the left, there's a navigation pane with sections like 'Información general', 'Registro de actividad', 'Etiquetas', 'Diagnosticar y solucionar problemas', 'Control de acceso (IAM)', 'Migración de datos', 'Eventos', 'Explorador de almacenamiento (versión preliminar)', 'Almacenamiento de datos', 'Contenedores', 'Recursos compartidos de archivos', 'Colas', 'Tablas', 'Seguridad y redes', 'Redes', 'CON de Azure', 'Claves de acceso', 'Firma de acceso compartido', 'Cifrado', and 'Microsoft Defender for Cloud'. The main area shows a 'Contenedores de blobs' view with a 'audits' container selected. Inside 'audits', there are 'Logs' and another 'audits' folder. The 'audits' folder contains several JSON files. A context menu is open over one of the files, with the option 'Copiar Uri...' highlighted.

Un primer paso para acceder la URL en .NET consiste en: `blobClient.Uri.AbsoluteUri`

```
BlobContainerClient containerClient = await base.CreateContainerIfNotExistWithCors("audits", connectionString);

// Nombre del archivo o del repositorio donde guardaremos el blob
BlobClient? blobClient = containerClient.GetBlobClient($"{httpRequestAudit.Id}.json");

// Serializando contenido del blob
string json = System.Text.Json.JsonSerializer.Serialize(blobDto);

using (Stream ms = new MemoryStream())
{
    // Cargamos el contenido JSON como string en el StreamWriter
    StreamWriter writer = new StreamWriter(ms);
    writer.Write(json);
    writer.Flush();
    ms.Position = 0;

    await blobClient.UploadAsync(ms, overwrite:true);
}

// Guardamos el link o dirección URL del contenido Blob para almacenar más tarde en Table Storage
httpRequestAudit.EntityBlobUrl = blobClient.Uri.AbsoluteUri;

return httpRequestAudit;
```

Sin embargo accediendo está información nos va a resultar imposible:

This XML file does not appear to have any style information associated with it. The document tree is shown below.

```
<Error>
  <Code>ResourceNotFound</Code>
  <Message>The specified resource does not exist. RequestId:4c130e39-801e-0093-4934-d4a09d000000 Time:2022-09-29T18:52:37.6002897Z</Message>
</Error>
```

Necesitamos pedir la firma SAS. Esto se puede hacer desde el portal de Azure:

Roberto Ribes (rbo)

The screenshot shows the Azure Storage Explorer interface. On the left, there's a navigation pane with various sections like 'Información general', 'Control de acceso (IAM)', 'Almacenamiento de datos', and 'Seguridad y redes'. The main area displays a list of blobs in the 'audits' container. A search bar at the top right says 'Buscar blobs por prefijo (distingue mayúsculas de minúsculas)'. The list includes blobs with names like '245c17f3-3b90-4e5c-a62b-d4bbcb31fa580.json', '56547cf8-a996-49b0-91a2-73bd425d9e16.json', and '62f1ba96-caa4-4d2c-8c5d-03f6e81a323a.json'. Columns for 'Última modificación', 'Nivel de acceso', 'Tipo de blob', 'Tamaño', and 'Estado de con...' are shown. On the far right, there's a context menu with options like 'Propiedades', 'Ver/Editar', 'Clonar', 'Copiar URL', etc., with 'General SAS' highlighted.

O desde código .NET, también es posible generar un URL SAS para cada Blob a nuestra elección y de acceso público durante un tiempo:

The screenshot shows Visual Studio with several open files: 'AuditDao.cs', 'AuditService.cs', 'BlobController.cs', and 'Es.Pue.Az204.Model.PersistenceLayer.cs'. The 'AuditDao.cs' file contains C# code for generating a SAS URL:

```
2  using Azure.Storage.Sas;
3  using Es.Pue.Az204.Model.EntitiesLayer.Entities;
4  using Es.Pue.Az204.Model.PersistenceLayer.Api;
5  using Es.Pue.Az204.Model.PersistenceLayer.Impl.AzureBlobStorage;
6  using System;
7  using System.Collections.Generic;
8  using System.Linq;
9  using System.Text;
10 using System.Text.Json;
11 using System.Threading.Tasks;
12
13 namespace Es.Pue.Az204.Model.PersistenceLayer.Impl.AzureBlobStorage
14 {
15     class AuditDao : BaseDao, IAuditDao
16     {
17         public async Task<string> GetSASUrl(string containerName)
18         {
19             var containerClient = await CreateContainerIfNotExists(containerName);
20             var blobClient = containerClient.GetBlobClient("audits");
21
22             var sasBuilder = new BlobSasBuilder()
23             {
24                 BlobContainerName = blobClient.BlobContainerName,
25                 BlobName = blobClient.Name,
26                 Resource = "b",
27                 ExpiresOn = DateTimeOffset.UtcNow.AddMinutes(15),
28             };
29
30             sasBuilder.SetPermissions(BlobAccountSasPermissions.Read);
31
32             string? urlSAS=null;
33
34             if (blobClient.CanGenerateSasUri) {
35                 urlSAS = blobClient.GenerateSasUri(sasBuilder);
36             }
37
38             return urlSAS;
39         }
40
41         public async Task<HttpRequestAudit> SaveHttpRequestAudit(
42             HttpRequestAudit requestAudit)
43         {
44     }
```

To the right, a browser window shows the Swagger UI for the 'BlobController'. It has input fields for 'containerName' (set to 'audits') and 'blobName' (set to '00dda943-e535-4f98-9a81-882ca60bae48.json'). Below the inputs are 'Execute' and 'Clear' buttons. The 'Responses' section shows a successful response with a status code of 200 and a JSON body:

```
curl -X "GET" \
  "https://localhost:7294/api/Blob/GenerateSas/audits/00dda943-e535-4f98-9a81-882ca60bae48.json" \
  -H "Accept: application/json"
```

Further down, the 'Server response' section shows the actual JSON response:

```
HTTP/2.0 200 OK
Content-Type: application/json
Date: Fri, 29 Sep 2022 19:25:21 GMT
Server: Kestrel
```

Las SAS se deben generar siempre por un tiempo limitado. En Amazon AWS se pueden generar SAS que vaya por número de accesos.

Con el URL SAS en explorador se descarga el archivo Blob automáticamente con tan solo dos datos:

1. **Container name:** por ejemplo audits.
2. **Blob name:** el nombre del recurso dentro del container.

Roberto Ribes (rbo)

The screenshot shows the Azure Storage Explorer interface. On the left, there's a sidebar with various navigation options like 'Información general', 'Registro de actividad', and 'Control de acceso (IAM)'. The main area shows a tree view of storage resources under 'ribesstorageaccount'. A folder named 'audits' is selected, indicated by a red number '1'. Inside 'audits', there are several JSON files listed. One specific file, '254f7c28-aa96-49bd-91a2-73bd42569e16.json', is highlighted with a yellow selection bar and a red box, with a red arrow pointing to it from the left. Another red arrow points to this same file from the right side of the interface.

Y finalmente acceder al recurso es tan fácil como introducir la URL y se descargará el archivo:

The screenshot shows a browser window with the URL <https://ribesstorageaccount.blob.core.windows.net/audits/254f7c28-aa96-49bd-91a2-73bd42569e16.json?sv=2021-08-06&se=2022-09-29T1...>. The page displays an error message: 'This site can't be reached' and 'intranet.tgw.local's server IP address could not be found.' It provides troubleshooting steps: 'Try: • Checking the connection • Checking the proxy, firewall, and DNS configuration • Running Windows Network Diagnostics'. The status code is 'ERR_NAME_NOT_RESOLVED'. A blue arrow points from the URL in the address bar down to the error message.

3.13.8.4 Static website

Activamos static websites en Angular para ayudar en el árbol de rutas de las páginas y permitir que las solicitudes API puedan resolverse durante la navegación.

La URL normalmente:

[web]/api: controllers

[web]/: rutas de angular

Es necesario configurarlo con **Traffic Manager** para crear una redirección: con */api* redirige al backend. Sino, redirige al código frontend.

Las rutas de Angular deben indicar que la ruta se mantiene pero el enrutador de Angular debe cargar y prerenderizar la página solicitada.

The image shows two screenshots of the Microsoft Azure portal. The top screenshot displays the 'Storage browser' for the 'az204bcn' storage account. It shows a tree view of blob containers: 'blobchangefeed', 'logs', and 'web'. Under 'web', there are subfolders 'audits', 'test', and 'view all'. The 'Upload blob' section on the right shows a file named 'Index.html' selected for upload. The bottom screenshot shows the 'Static website' configuration for the same storage account. It has a 'Disabled' button that is being changed to 'Enabled'. The 'Primary endpoint' field contains the URL 'https://az204bcn.z16.web.core.windows.net/'. Other fields include 'Index document name' set to 'index.html' and 'Error document path' left empty.

3.13.8.5 Configurando

Una vez tenemos un “Storage Account” podemos utilizar y configurar Blob Storage desde código sin problemas.

El “**container**” es donde guardamos los archivos blob con un nombre:

Roberto Ribes (rbo)

The screenshot shows the Microsoft Azure Storage account interface. In the left sidebar, under 'Data storage', 'Containers' is selected. The main area displays a list of blobs in the 'audits' container. The columns are 'Name', 'Last modified', 'Public access level', and 'Lease state'. The blobs listed are: 'blobchangefeed' (modified 9/22/2022, 9:19:58 PM), 'Slogs' (modified 9/22/2022, 9:19:58 PM), 'audits' (modified 9/29/2022, 7:08:17 PM), and 'test' (modified 9/22/2022, 9:42:18 PM). All blobs are private and available.

Cuando accedemos al contenedor “audits” podemos ver todos los archivos que existen:

The screenshot shows the Microsoft Azure blob container details page for 'audits'. The left sidebar shows 'Información general', 'Diagnosticar y solucionar problemas', 'Control de acceso (IAM)', and 'Configuración'. The main area shows a table of blobs. The columns are 'Nombre', 'Modificado', 'Nivel de acceso', and 'Estado del archivo'. The blobs listed are: '254fc28-aa96-49bd-91a2-73bd42569e16.json' (modified 29/9/2022, 19:26:47), '5654378d-9355-427f-83bc-3e49cd1be35.json' (modified 29/9/2022, 19:26:27), '5f49ba81-859f-480f-88d5-87ad693b0c16.json' (modified 29/9/2022, 19:52:19), '62f18a96-caa4-4d2c-8c5d-85f6e81a323a.json' (modified 29/9/2022, 19:29:23), 'a9400934-03cd-41b9-9fad-7a59c4d8d62ajson' (modified 29/9/2022, 19:51:15), 'b6add3a-5767-4ee9-8034-33ed7926361.json' (modified 29/9/2022, 19:49:41), and 'c851d2ef-ee43-4b90-8905-e43486071b8bjson' (modified 29/9/2022, 19:29:59). All blobs are frequent (inferido).

Para introducir y subir archivos en .NET se tiene que especificar:

- Container.
- Nombre archivo.
- Contenido archivo.

```
BlobContainerClient containerClient = await base.CreateContainerIfNotExistWithCors("audits", connectionString);

// Nombre del archivo o del repositorio donde guardaremos el blob
BlobClient? blobClient = containerClient.GetBlobClient($"{httpRequestAudit.Id}.json");

// Serializando contenido del blob
string json = System.Text.Json.JsonSerializer.Serialize(blobDto);

using (Stream ms = new MemoryStream())
{
    // Cargamos el contenido JSON como string en el StreamWriter
    StreamWriter writer = new StreamWriter(ms);
    writer.Write(json);
    writer.Flush();
    ms.Position = 0;

    await blobClient.UploadAsync(ms, overwrite:true);
}
```

Annotations on the code:

- A red arrow points from the word "Container" to the string "audits" in the first line of code.
- A blue arrow points from the word "Contenido blob" to the variable "blobDto" in the third line of code.
- A purple arrow points from the word "nombre archivo blob" to the variable "httpRequestAudit.Id" in the second line of code.
- A red arrow points from the word "name" to the suffix ".json" in the second line of code.

Es importante desactivar CORS para poder leer/escribir archivos BLOB, se puede hacer en código:

Roberto Ribes (rbo)

The screenshot shows two side-by-side Azure interface pages. The left page is for 'ribesstorageaccount' and the right page is for 'az204bcn'. Both pages show the 'CORS' configuration section under 'Configuración'. The 'Blob service' tab is selected. On the left, the 'Orígenes permitidos' dropdown is set to '(CORS)'. On the right, the 'Allowed origins' dropdown is set to '1' and '0 selected'. Other tabs like 'File service', 'Queue service', and 'Table service' also have their own CORS configuration sections.

3.13.8.6 Utilizando en .NET

3.13.8.6.1 Librerías Nuget

Añadir Nuget package: *Azure.Storage.Blobs*.

También se puede añadir *Microsoft.Azure.Storage.Blob* pero esa versión está deprecada.

The screenshot shows the NuGet Package Manager interface. The search bar at the top contains 'blob'. Below the search bar, there are three tabs: 'Browse' (selected), 'Installed', and 'Updates'. The results list includes:

- Azure.Storage.Blobs** by Microsoft, 71.8M downloads. Version 12.13.1. Description: This client library enables working with the Microsoft Azure Storage Blob service for storing binary and text data. For this release see notes - <https://github.com/Azure/azure-sdk-for-net/blob/main/sdk/storage/Azure.Storage.Blobs/README.md> and [https...](https://...)
- .NET Microsoft.AspNetCore.DataProtection.AzureStorage** by Microsoft, 29.2M downloads. Version 3.1.24. Description: Microsoft Azure Blob storage support as key store. This package version is deprecated. Use [Azure.Extensions.AspNetCore.DataProtection.Blobs](#) instead.
- Serilog.Sinks.AzureBlobStorage** by Chris Williams and Serilog.Sinks.AzureBlobStorage contributors, 1.75M downloads. Version 3.1.3. Description: Serilog event sink that writes to Azure Blob Storage over HTTP.
- Microsoft.Azure.Storage.Blob** by Microsoft, 54.7M downloads. Version 11.2.3. Description: A client library for working with Microsoft Azure Storage Blob service. This package version is deprecated. Use [Azure.Storage.Blobs](#) instead.

3.13.8.6.2 Connection string

Necesitamos la connection string que podemos obtener en el portal de Azure. Es la misma que necesitamos para Table Storage y Queue Storage:

Roberto Ribes (rbo)

The screenshot shows the 'Access keys' section of the Azure Storage account settings. It displays two sets of keys: 'key1' (last rotated 9/27/2022) and 'key2' (last rotated 9/22/2022). Each key has a 'Show' button next to its value. Below each key is a 'Connection string' field with a 'Show' button.

3.13.8.6.3 Returning the blob file

A code editor window showing a C# method. The method takes an `HttpAuditRequestAudit` parameter and returns a `Task<HttpAuditRequestAudit>`. The code creates a `HttpAuditRequestAuditBlobDto` object, sets its `HttpHeaders` and `HttpBody` properties, and then uses a `ContainerClient` to upload the blob. A `Text Visualizer` window is open, showing the value of `httpAuditRequestAudit.EntityblobUrl`, which is a blob URL starting with `https://az204bcn.blob.core.windows.net/audits/093701f0-fe47-4938-ac35-410fe0ac5ff1/abc`.

```
15    var blobDto = new HttpAuditRequestAuditBlobDto();
16    {
17        HttpHeaders = httpAuditRequestAudit.HttpHeaders,
18        HttpBody = httpAuditRequestAudit.Entity
19    };
20
21    var containerClient = await CreateContainerIfNotExistAsync();
22    var blobClient = containerClient.GetBlobClient($"{
23
24    var json = JsonSerializer.Serialize(blobDto);
25
26    using (Stream ms = new MemoryStream())
27    {
28        StreamWriter writer = new StreamWriter(ms);
29        writer.Write(json);
30        writer.Flush();
31        ms.Position = 0;
32
33        await blobClient.UploadAsync(ms, true);
34    }
35
36    httpAuditRequestAudit.EntityblobUrl = blobClient.Uri.AbsoluteUri;
37
38    return httpAuditRequestAudit;
39}
40
41
42
43
44
45
46
```

3.13.9 Azure Queues and Service Bus

3.13.9.1 Introducción

Un Azure Queue permite acumular mensajes para que se vayan procesando a medida que nuestro recurso los solicita, en caso de que no pueda gestionar todas las peticiones en el instante y no importa que tome su tiempo en ejecutarlas.

Hay dos frameworks para lograr esto aunque el más moderno y utilizado es el de Storage:

Consider using Service Bus queues

- Your solution needs to receive messages without having to poll the queue
- Your solution requires the queue to provide a guaranteed first-in-first-out (FIFO) ordered delivery.
- Your solution needs to support automatic duplicate detection.
- You want your application to process messages as parallel long-running streams
- Your solution requires transactional behavior and atomicity when sending or receiving multiple messages from a queue.
- Your application handles messages that can exceed 64 KB but won't likely approach the 256-KB limit.

Consider using Storage queues

- Your application must store over 80 gigabytes of messages in a queue.
- Your application wants to track progress for processing a message in the queue. It's useful if the worker processing a message crashes. Another worker can then use that information to continue from where the prior worker left off.
- You require server side logs of all of the transactions executed against your queues.

Storage Queues no te permite registrarte en diferentes colas. Para garantizar el orden de entrega de mensajes se utilizará Service Bus así como detector duplicados en las colas. En cambio, Storage queues pueden contener hasta 80 GB de información en la cola. En Azure Queues podemos realmente almacenar lo que queramos sin limitaciones. Para *jsons* y *xmls* casi es mejor utilizar Service Bus. En Storage queues cuando desencolamos tenemos un tiempo para liberar el mensaje y extraerlo de la cola. Si no se finaliza el trabajo en la cola entonces el mensaje vuelve a estar disponible en la cola.

3.13.9.2 Sobre Service Bus

Se puede:

- Enviar mensajes.
- Desacoplar aplicaciones con potencias de cálculos diferentes.
- Suscripciones de los mensajes y los receptores de manera que una o varias aplicaciones solamente reciben mensajes de ciertas suscripciones registradas. 1 to n publicaciones en diferentes subscriptores, al contrario que en Azure Queue storage.
- Colas con entrega de mensaje FIFO.
- Configurar reglas de enrutamiento en base a filtros sobre los mensajes.

Explore Azure Service Bus

Premium	Standard
High throughput	Variable throughput
Predictable performance	Variable latency
Fixed pricing	Pay as you go variable pricing
Ability to scale workload up and down	N/A
Message size up to 100 MB.	Message size up to 256 KB

Some common messaging scenarios are:

- **Messaging:** Transfer business data, such as sales or purchase orders, journals, or inventory movements.
- **Decouple applications:** Improve reliability and scalability of applications
- **Topics and subscriptions:** Enable 1:*n* relationships between publishers and subscribers
- **Message sessions:** Implement workflows that require message ordering or message deferral.

Roberto Ribes (rbo)

Service Bus comes in Basic, standard, and premium tiers. Here's how they compare:

Feature	Basic	Standard	Premium
Queues	✓	✓	✓
Scheduled messages	✓	✓	✓
Topics		✓	✓
Transactions		✓	✓
De-duplication		✓	✓
Sessions		✓	✓
ForwardTo/SendVia		✓	✓
Message Size	256 KB	256 KB	100 MB ¹
Resource isolation			✓
Geo-Disaster Recovery (Geo-DR)			✓

¹Requires additional Service Bus Premium namespaces in another region.

Queues

- Queues offer First In, First Out (FIFO) message delivery to one or more competing consumers.

Receive modes

- You can specify two different modes in which Service Bus receives messages: *Receive and delete* or *Peek lock*.

Topics and subscriptions

- Provides a one-to-many form of communication in a publish and subscribe pattern
- In contrast to queues, topics and subscriptions provide a one-to-many form of communication in a publish and subscribe pattern.

Rules and actions

- You can configure subscriptions to find messages that have desired properties and then perform certain modifications to those properties.
- You can use filter actions to copy a subset of those messages to the virtual subscription queue.

Diferentes patrones de comunicación que se pueden establecer son los que se pueden ver a continuación. Tambien se pueden ver diferentes patrones de serialización:

Message routing and correlation

- A few patterns
 - **Simple request/reply:** A publisher sends a message into a queue and expects a reply from the message consumer.
 - **Multicast request/reply:** As a variation of the prior pattern, a publisher sends the message into a topic and multiple subscribers become eligible to consume the message
 - **Multiplexing:** This session feature enables multiplexing of streams of related messages through a single queue or subscription
 - **Multiplexed request/reply:** This session feature enables multiplexing of streams of related messages through a single queue or subscription

Payload serialization

- The *ContentType* property enables applications to describe the payload
- The .NET Framework version of the Service Bus API supports creating *BrokeredMessage* instances by passing arbitrary .NET objects into the constructor.
- When using the legacy SBMP protocol, those objects are then serialized with the default binary serializer, or with a serializer that is externally supplied.
- When using the AMQP protocol, the object is serialized into an AMQP

Para crear un service bus vamos al portal de Azure:

Roberto Ribes (rbo)

The screenshot shows the Microsoft Azure portal with the 'Service Bus' service selected. A tooltip is displayed over the 'Filtrar por...' button, containing the text: 'Guarde las columnas, la ordenación, el filtrado y el resumen como una vista y acceda a las vistas guardadas desde aquí.' Below the tooltip, there are buttons for 'Nombre' (highlighted), 'SIGUIENTE', 'Estado ↑↓', and 'Nivel ↑↓'. The top navigation bar includes 'Microsoft Azure', a search bar, and various action buttons like 'Crear', 'Actualizar', and 'Exportar a CSV'.

Configuración básica del service bus:

The screenshot shows the 'Create Service Bus Namespace' wizard. The current step is 'Datos básicos' (Basic). The 'Suscripción' dropdown is set to 'Pase para Azure: patrocinio (60c39eb1-4722-4254-a727-dd0399143...)' and the 'Grupo de recursos' dropdown is set to '2testresources'. Other tabs visible include 'Avanzado', 'Redes', 'Etiquetas', and 'Revisar y crear' (Review and Create).

Una vez verificada la información, revisamos y creamos:

Roberto Ribes (rbo)

Crear espacio de nombres

Service Bus

Validando...

Datos básicos Avanzado Redes Etiquetas Revisar y crear

Espacio de nombres de Service Bus de Microsoft

Datos básicos

Nombre del espacio de nombres	sbnamespaceRoberto
Suscripción	Pase para Azure: patrocinio
Grupo de recursos	2testresources
Ubicación	West Europe
Plan de tarifa	Basic

Redes

Método de conectividad	Acceso público
------------------------	----------------

Seguridad

Versión de TLS mínima	1.2
Autenticación local	Habilitado

Una vez el recurso ha sido creado, la conexiónstring está disponible para poder ser utilizada:

Inicio > 2testresources > sbnamespaceRoberto

sbnamespaceRoberto | Directivas de acceso compartido

Información general Registro de actividad Control de acceso (IAM) Etiquetas Diagnóstico y solucionar problemas Configuración Directivas de acceso compartido Recuperación geográfica Cifrado Configuración Propiedades Bloques

+ Agregar Buscar en elementos de filtro...

Directiva Reclamaciones

RootManageSharedAccessKey Administrar, Envío, Escuchar

Directiva SAS: RootManageSharedAccessKey

Guardar Descartar Eliminar Regenerar claves principales

Administrador Envío Escuchar Clave principal FNa-WzIf5gw/bWIVCoay7pzffRu26gZ7TRy8B97Q= Clave secundaria VENZ/pefUyYLBHnIB/LAWcIbgjnCjCry/ZbOaOV3Gw= Código de conexión principal Endpoint=sb://sbnamespaceRoberto.servicebus.windows.net/SharedAccessKeyName=... Código de conexión secundaria Endpoint=sb://sbnamespaceRoberto.servicebus.windows.net/SharedAccessKeyName=... Id. de ARM de la directiva SAS /subscriptions/6039eb1-4722-4254-a727-dd0399143a4c/resourceGroups/2testresour...

Para crear una nueva cola vamos a la pestaña de entidades y clicamos en crear:

Inicio > 2testresources > sbnamespaceRoberto

sbnamespaceRoberto | Colas

Información general Registro de actividad Control de acceso (IAM) Etiquetas Diagnóstico y solucionar problemas Configuración Directivas de acceso compartido Recuperación geográfica Cifrado Configuración Propiedades Bloques Entidades Colas

+ Cola Actualizar Buscar para filtrar elementos...

Nombre	Estado	Tamaño máximo
Sin resultados.		

Crear cola

Nombre * ()

Tamaño máximo de cola 1 GB

Número máximo de entregas * 10

Período de vida del mensaje Días Horas Minutos Segundos 14 0 0 0

Duración del bloqueo Días Horas Minutos Segundos 0 0 0 30

Habilitar cola de mensajes fallidos al expiration el mensaje

Habilitar la creación de particiones

Roberto Ribes (rbo)

Una vez volcados los mensajes desde código se pueden visualizar en el portal de Azure:

The screenshot shows the Microsoft Azure Service Bus Explorer interface. The left sidebar has a tree view with nodes like 'Información general', 'Control de acceso (IAM)', 'Diagnosticar y solucionar problemas', 'Service Bus Explorer (versión preliminar)', 'Configuración', 'Directivas de acceso compartido', 'Propiedades', 'Bloqueos', 'Automation', 'Tareas (versión preliminar)', 'Exportar plantilla', and 'Ayuda'. The main area is titled 'messagequeue (sbnamespaceRoberto/messagequeue) | Service Bus Explorer (versión preliminar)'. It shows a table with 12 messages in the queue. The columns are 'Número de secuencia' (Message ID), 'Id. de mensaje' (Message ID), 'Hora a la que se puso en cola' (Enqueued Time), 'Recuento de entregas' (Delivery Count), and 'Etiqueta/Asunto' (Label/Subject). The first message has an ID of 61feb5bdeb24179853fb0e81... and was enqueued on Thu Oct 13 2022 21:03:35 GMT+... with a delivery count of 0.

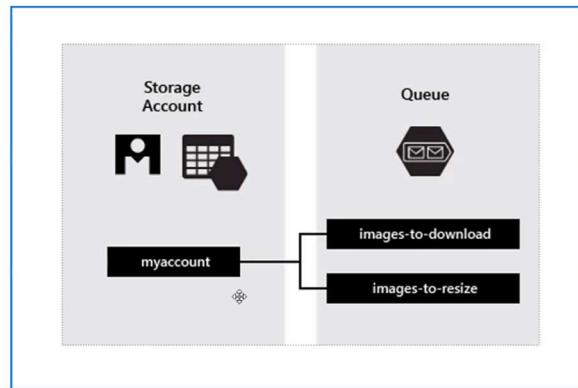
3.13.9.3 Sobre Queue storage

Es una opción realmente barata para almacenar información.

The screenshot shows the Azure Storage Queue pricing calculator. It starts with 'Cuentas de almacenamiento' (Storage accounts) settings: 'REGION: East US', 'TIPO: Queue Storage', 'TIPO DE CUENTA DE ALMACENAMIENTO: Uso general V2', and 'REDUNDANCIA: LRS'. Below this, there's a 'Capacidad' section showing '1000 GB' at a cost of '0,0450 US\$' per GB, totaling '45,00 US\$'. Then, it lists 'Operaciones de clase 1 de cola' (Queue Class 1 operations) at '100' operations (10,000) costing '0,0040 US\$' per 10,000 operations, totaling '0,40 US\$'. A note says: 'Las siguientes operaciones de cola se consideran de clase 1: CreateQueue, ListQueues, PutMessage, SetQueueMetadata, UpdateMessage, ClearMessages, DeleteMessage, DeleteQueue, GetMessageWrite y GetMessagesWrite.' Below that is 'Operaciones de clase 2 de cola' (Queue Class 2 operations) at '100' operations (10,000) costing '0,0040 US\$' per 10,000 operations, totaling '0,40 US\$'. A note says: 'Las siguientes operaciones de cola se consideran de clase 2: GetMessage, GetMessages, GetQueueMetadata, GetQueueServiceProperties, GetQueueAcl, PeekMessage, PeekMessages, GetMessageRead y GetMessagesRead.' At the bottom, it shows the total costs: 'Si costo inicial' is '0,00 US\$', and 'Costo mensual' is '45,80 US\$'.

La cola es básicamente una URL asociada a un storage account:

- Azure Queue Storage is a service for storing large numbers of messages.
- A queue message can be up to 64 KB in size
- The Queue service contains the following components:
 - URL format
 - Storage
 - Queue
 - Message



Creada una cuenta de almacenamiento:

Microsoft Azure Search resources, services, and docs (G+)

Home > Storage accounts >

Create a storage account ...

Basics Advanced Networking Data protection Encryption Tags Review

Azure Storage is a Microsoft-managed service providing cloud storage that is highly available, secure, durable, scalable, and redundant. Azure Storage includes Azure Blobs (objects), Azure Data Lake Storage Gen2, Azure Files, Azure Queues, and Azure Tables. The cost of your storage account depends on the usage and the options you choose below. [Learn more about Azure storage accounts](#)

Project details

Select the subscription in which to create the new storage account. Choose a new or existing resource group to organize and manage your storage account together with other resources.

Subscription: Azure Pass - Sponsorship

Resource group: az900 [Create new](#)

Instance details

If you need to create a legacy storage account type, please click [here](#).

Storage account name:

Region: (US) East US

Performance: Standard: Recommended for most scenarios (general-purpose v2 account)
 Premium: Recommended for scenarios that require low latency.

Redundancy: Geo-redundant storage (GRS)
 Make read access to data available in the event of regional unavailability.

Roberto Ribes (rbo)

The screenshot shows the Microsoft Azure portal interface for a storage account named 'testdfgrth'. The left sidebar navigation bar includes Home, testdfgrth (Storage account), Overview, Activity log, Tags, Diagnose and solve problems, Access Control (IAM), Data migration, Events, Storage browser, Data storage (Containers, File shares, Queues, Tables), Security + networking (Networking, Azure CDN, Access keys, Shared access signature, Encryption, Microsoft Defender for Cloud), and a search bar at the top.

The main content area displays the 'Properties' tab for the storage account. It shows the following details:

Setting	Value
Resource group (move)	a2900
Location	East US
Primary/Secondary Location	Primary: East US, Secondary: West US
Subscription (move)	Azure Pass - Sponsorship
Subscription ID	10760286-4893-41b9-9fde-659bf5bd1a56
Disk state	Primary: Available, Secondary: Available
Tags (edit)	Click here to add tags
Performance	Standard
Replication	Read-access geo-redundant storage (RA-GRS)
Account kind	StorageV2 (general purpose v2)
Provisioning state	Succeeded
Created	10/13/2022, 7:36:04 PM

The 'Properties' tab also contains sections for Blob service (Hierarchical namespace: Disabled, Default access tier: Hot, Blob public access: Enabled, Blob soft delete: Enabled (7 days), Container soft delete: Enabled (7 days), Versioning: Disabled, Change feed: Disabled, NFS v3: Disabled, Allow cross-tenant replication: Enabled) and File service (Large file share: Disabled). The 'Security' section includes Require secure transfer for REST API operations (Enabled), Storage account key access (Enabled), Minimum TLS version (Version 1.2), and Infrastructure encryption (Disabled). The 'Networking' section shows Allow access from (All networks), Number of private endpoint connections (0), Network routing (Microsoft network routing), Access for trusted Microsoft services (Yes), and Endpoint type (Standard).

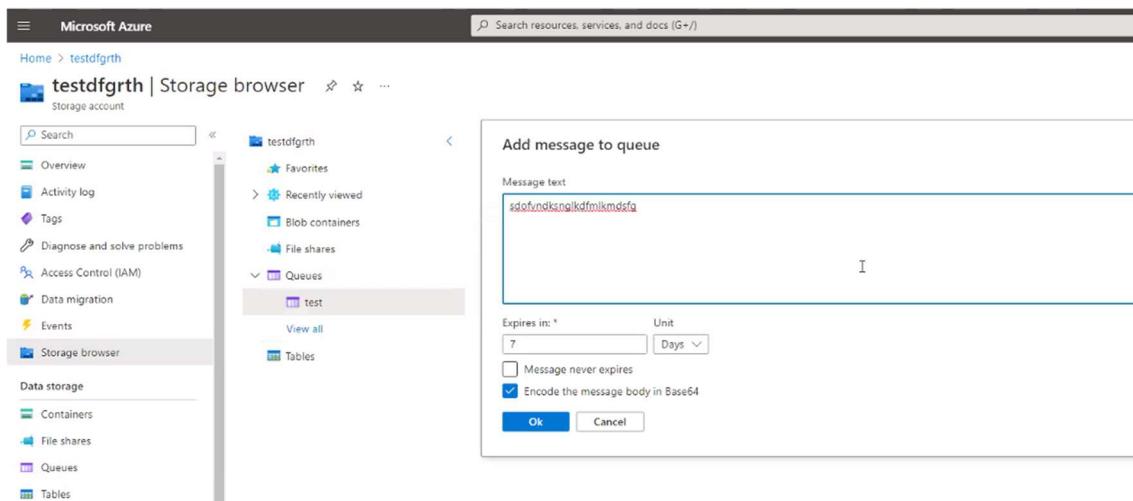
Se crea una cola sencillamente con un nombre y una URL API donde publicarlos o obtenerlos con una API:

The screenshot shows the Microsoft Azure portal interface for the 'Queues' section of the 'testdfgrth' storage account. The left sidebar navigation bar includes Home, testdfgrth | Queues (Storage account), Overview, Activity log, Tags, Diagnose and solve problems, Access Control (IAM), Data migration, Events, Storage browser, Data storage (Containers, File shares, Queues, Tables), and a search bar at the top.

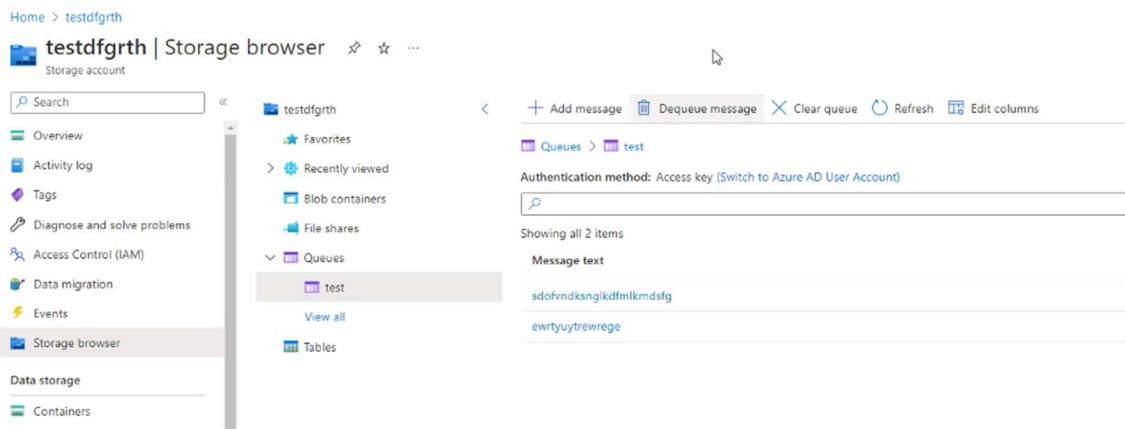
The main content area displays the 'Queues' list. A new queue named 'test' has been created, and its URL is shown: <https://testdfgrth.queue.core.windows.net/test>.

Dese vista preliminar podemos buscar el Queue storage y podemos crear mensaje que guardar en la cola y el tiempo que tenemos antes de que desaparezca:

Roberto Ribes (rbo)



Para desencolar los mensajes solamente hay que clicar en la opción correcto:



Para acceder desde código solamente necesitamos la connection string de la cola y la librería correcta de .NET:

```
// The QueueClient class enables you to retrieve queues stored in Queue storage.  
QueueClient queueClient = new QueueClient(connectionString, queueName);
```

```
// This example shows how to create a queue if it does not already exist  
  
// Get the connection string from app settings  
string connectionString = ConfigurationManager.AppSettings["StorageConnectionString"];  
  
// Instantiate a QueueClient which will be used to create and manipulate the queue  
QueueClient queueClient = new QueueClient(connectionString, queueName);  
  
// Create the queue  
queueClient.CreateIfNotExists();
```

Para insertar un mensaje:

```
//-----
// Insert a message into a queue
//-----
public void InsertMessage(string queueName, string message)
{
    // Get the connection string from app settings
    string connectionString = ConfigurationManager.AppSettings["StorageConnectionString"];

    // Instantiate a QueueClient which will be used to create and manipulate the queue
    QueueClient queueClient = new QueueClient(connectionString, queueName);

    // Create the queue if it doesn't already exist
    queueClient.CreateIfNotExists();

    if (queueClient.Exists())
    {
        // Send a message to the queue
        queueClient.SendMessage(message);
    }

    Console.WriteLine($"Inserted: {message}");
}
```

Para actualizar un mensaje:

```
//-----
// Update an existing message in the queue
//-----
public void UpdateMessage(string queueName)
{
    // Get the connection string from app settings
    string connectionString = ConfigurationManager.AppSettings["StorageConnectionString"];

    // Instantiate a QueueClient which will be used to manipulate the queue
    QueueClient queueClient = new QueueClient(connectionString, queueName);

    if (queueClient.Exists())
    {
        // Get the message from the queue
        QueueMessage[] message = queueClient.ReceiveMessages();

        // Update the me : contents
        queueClient.UpdateMessage(message[0].MessageId,
            message[0].PopReceipt,
            "Updated contents",
            TimeSpan.FromSeconds(60.0) // Make it invisible for another 60 seconds
        );
    }
}
```

Para desencolar un mensaje, lo recibimos y finalmente lo borramos del queue. Se puede definir opcionalmente un tiempo en el que queremos realizar la operación:

```

//-----
// Process and remove a message from the queue
//-----
public void DequeueMessage(string queueName)
{
    // Get the connection string from app settings
    string connectionString = ConfigurationManager.AppSettings["StorageConnectionString"];

    // Instantiate a QueueClient which will be used to manipulate the queue
    QueueClient queueClient = new QueueClient(connectionString, queueName);

    if (queueClient.Exists())
    {
        // Get the next message
        QueueMessage[] retrievedMessage = queueClient.ReceiveMessages();

        // Process (i.e. print) the message in less than 30 seconds
        Console.WriteLine($"Dequeued message: '{retrievedMessage[0].Body}'");

        // Delete the message
        queueClient.DeleteMessage(retrievedMessage[0].MessageId, retrievedMessage[0].PopReceipt);
    }
}

```

The screenshot shows the Azure Storage Explorer interface. On the left, there's a navigation sidebar with sections like 'Información general', 'Registro de actividad', 'Etiquetas', 'Diagnosticar y solucionar problemas', 'Control de acceso (IAM)', 'Migración de datos', 'Eventos', and 'Explorador de almacenamiento (versión preliminar)'. Under 'Almacenamiento de datos', there are 'Contenedores' and 'Recursos compartidos de archivos'. The main area shows a 'Colas' (Queues) section with a 'testqueue' listed. A table below lists 11 messages with columns: 'Texto del mensaje', 'Id.', 'Hora de inserción', 'Hora de expiración', and 'Recuer'. The messages are all of type 'Send message at' with various timestamps.

Texto del mensaje	Id.	Hora de inserción	Hora de expiración	Recuer
Send message at 2022-10-13-20:31:38	98543bc0-3997-4000-8...	10/13/2022, 8:31:38 PM	10/20/2022, 8:31:38 PM	0
Send message at 2022-10-13-20:31:41	3bf1f08c-e980-4d43-88...	10/13/2022, 8:31:41 PM	10/20/2022, 8:31:41 PM	0
Send message at 2022-10-13-20:43:35	f4eed376-b95d-4b48-b...	10/13/2022, 8:24:35 PM	10/20/2022, 8:24:35 PM	1
Send message at 2022-10-13-20:32:08	6dd77f59-5e4b-4e32-b...	10/13/2022, 8:32:08 PM	10/20/2022, 8:32:08 PM	0
Send message at 2022-10-13-20:32:11	78d6bf2c-c6e3-456a-a5...	10/13/2022, 8:32:11 PM	10/20/2022, 8:32:11 PM	0
Send message at 2022-10-13-20:32:47	e0771d6f-9fda-486a-aa8...	10/13/2022, 8:32:47 PM	10/20/2022, 8:32:47 PM	0
Send message at 2022-10-13-20:33:17	9a4bb2f7-dc49-46dc-b8...	10/13/2022, 8:33:17 PM	10/20/2022, 8:33:17 PM	0
Send message at 2022-10-13-20:33:47	535176a1-8c2d-466e-8...	10/13/2022, 8:33:47 PM	10/20/2022, 8:33:47 PM	0
Send message at 2022-10-13-20:34:17	55f13843-cd63-4378-96...	10/13/2022, 8:34:17 PM	10/20/2022, 8:34:17 PM	0

3.13.10 Azure Table Storage

3.13.10.1 Introducción

El table storage se ubica tambien como opción dentro del “storage account”. Table Storage tiene unas características de performance y un motor de búsqueda inmejorable.

3.13.10.2 Configurando

Una tabla no relacional que se puede gestionar desde el portal de Azure.

Restricciones de las tablas:

3. 1 TB de tamaño por tabla.
4. Las columnas no pueden tener más de 1MB.
5. El Timestamp se genera automáticamente y no se puede cambiar.
6. **PartitionKey** y el **RowKey** son únicos y son las únicas columnas indexadas. Para utilizar los índices y buscar un dato hay que **aportar los dos datos**. Normalmente podemos guardar en el **PartitionKey** y **Rowkey** GUIDs pero tambien podemos usar IDs de usuarios, etc (strings, códigos numéricos, datetimes). Alguno carácteres no están aceptados!

Si nuestro storage no es compatible con estas restricciones, la alternativa es utilizar CosmosDB.

Tener muchas particiones es tan problemático como tener pocas. La dimensión correcta de particiones depende de como vamos a acceder la información. Si la información la accedemos de manera semanal, podríamos agrupar todos los datos con una partición por semana.

The screenshot shows the Microsoft Azure Storage browser interface. On the left, there's a navigation sidebar with links like Home, Storage browser, Overview, Activity log, Tags, Diagnose and solve problems, Access Control (IAM), Data migration, Events, and Storage browser. Under Storage browser, it lists Data storage (Containers, File shares, Queues, Tables), Security + networking (Networking, Azure CDN, Access keys, Shared access signature, Encryption), and Microsoft Defender for Cloud. The main area shows the 'az204bcn' storage account. Under Tables, there is a 'test' table. The table has columns: PartitionKey, RowKey, and Timestamp. A message says 'Showing all 0 items'. There are buttons for Add entity, Refresh, Delete, and Edit columns. At the top right, there's a search bar, a user profile, and some icons.

Un ejemplo de aplicación de Table Storage es:

- Utilizamos un Table Storage para los logs.
- Todo el contenido HTTP de un error (que puede ser grande) se guarda en Blob.
- En el Table Storage se crea una columna con una URL que referencia al recurso Blob del contenido HTTP del error.

3.13.10.3 Editando y visualizando la información

Desde el portal de Azure es posible visualizar y editar la información de Table Storage:

The screenshot shows the Microsoft Azure Storage Explorer interface. On the left, there's a navigation sidebar with links like Inicio, ribesstorageaccount, Cuenta de almacenamiento, Información general, Registro de actividad, Etiquetas, Diagnosticar y solucionar problemas, Control de acceso (IAM), Migración de datos, Eventos, Explorador de almacenamiento (versión preliminar), Almacenamiento de datos, Contenedores, Recursos compartidos de archivos, Colas, Tablas, Seguridad y redes, Redes, CDN de Azure, Claves de acceso, Firma de acceso compartido, Cifrado, and Microsoft Defender for Cloud. The main area shows the 'ribesstorageaccount' storage account. Under Contenedores de blobs, there is a 'logs' container. Under 'logs', there is an 'audits' table. The table has columns: PartitionKey, RowKey, Timestamp, Action, ClientIp, and EntityBlobUrl. A specific row is selected with values: PartitionKey = 'c851d2ef-ee43-4b90-8905-e42486071bb8', RowKey = 'c851d2ef-ee43-4b90-8905-e42486071bb8', Timestamp = '2022-09-29T17:30:05.0604935Z', Action = 'A204.Api.Controllers.LoginController/GetLoginsAsync ...', ClientIp = '0.0.0.1', and EntityBlobUrl = 'https://ribesstorageaccount.blob.core.windows.net/audits/c851d2ef-ee43-4b90-8905-e42486071bb8'. An 'Editar entidad' (Edit entity) dialog is open over this row, showing the same field values. Buttons at the bottom of the dialog are 'Actualizar' (Update) and 'Cancelar' (Cancel).

3.13.10.4 Utilizando en .NET

3.13.10.4.1 Librerías Nuget

Hay dos grandes librerías .NET para utilizar Azure Table Storage. Aunque las han cambiado muy a menudo para colmo de los desarrolladores.

- NuGet Microsoft.Azure.Cosmos.Table: se encuentra deprecado por Azure.Data.Tables.
- Azure.Data.Tables.

NuGet Package Manager: Az204.Model.PersistenceLayer

Package source: nuget.org

Microsoft.Azure.Cosmos.Table by Microsoft, 24.8M downloads
This client library enables working with the Microsoft Azure CosmosDB Table API as well as Azure Table Storage.
This package version is deprecated. Use [Azure.Data.Tables](#) instead.

WindowsAzure.Storage by Microsoft, 212M downloads
A client library for working with Microsoft Azure storage services including blobs, files, tables, and queues.
This package version is deprecated. Use [Azure.Storage.Blobs](#) instead.

Microsoft.AzureCosmosTable.Extensions by Stef Heyenneth, 28.7K downloads
Azure Storage Extensions is a .NET library aimed for managing and querying entities from Microsoft Azure Storage.
It's built on top of Microsoft Azure Cosmos Table Library, provides LINQ to Azure Tables queries and async interfaces.

Microsoft.Azure.CosmosDB.Table by Microsoft, 599K downloads
A client library for working with Microsoft Azure Cosmos DB Table API.
This package version is deprecated. Use [Azure.Data.Tables](#) instead.

TechSmith.Hyde by TechSmith Corporation, 227K downloads
Object to Entity mapper for Microsoft Azure.
This package version is deprecated.

3.13.10.4.2 Connection string

Necesitamos la connection string que podemos obtener en el portal de Azure:

az204bcn | Access keys

Storage account

Set rotation reminder Refresh

Access keys authenticate your applications' requests to this storage account. Keep your keys in a secure location like Azure Key Vault, and replace them often with new keys. The two keys allow you to replace one while still using the other.

Remember to update the keys with any Azure resources and apps that use this storage account.
[Learn more about managing storage account access keys](#)

Storage account name: az204bcn

key1 Rotate key
Last rotated: 9/22/2022 (4 days ago)
Key: [REDACTED] Show
Connection string: [REDACTED] Show

key2 Rotate key
Last rotated: 9/22/2022 (4 days ago)
Key: [REDACTED] Show
Connection string: [REDACTED] Show

Podemos definir reglas para políticas de acceso y ganar seguridad en el acceso a tablas:

Roberto Ribes (rbo)

The screenshot shows the Microsoft Azure portal interface for managing storage accounts. On the left, the navigation menu is visible with options like Overview, Activity log, Tags, Diagnose and solve problems, Access Control (IAM), Data migration, Events, Storage browser, Data storage (Containers, File shares, Queues, Tables), Security + networking (Networking, Azure CDN, Access keys, Shared access signature, Encryption, Microsoft Defender for Cloud). The 'Tables' option under 'Data storage' is selected. In the main content area, the 'az204bcn | Tables' page is shown. A modal window titled 'Access policy' is open, showing a form to add a new policy. The 'Identifier' field contains 'test', the 'Permissions' dropdown shows 'Read', and the 'Start time' and 'Expiry time' fields are set to the same date and time ('MM/DD/Y... 10:00:00 AM' and 'MM/DD/Y... 10:00:00 AM'). Both start and expiry times are in '(UTC+01:00) Brussels, Copenhagen, Madrid, Paris'. At the bottom of the modal are 'OK' and 'Cancel' buttons.

Una opción más disponible es utilizar firmas HTTPS:

The screenshot shows the Microsoft Azure portal interface for managing storage accounts. The left navigation menu is identical to the previous screenshot. The 'az204bcn | Shared access signature' page is displayed. A modal window titled 'Shared access signature' is open, allowing configuration of a SAS. It includes sections for 'Allowed services' (Blob, File, Queue, Table checked), 'Allowed resource types' (Service, Container, Object), 'Allowed permissions' (Read, Write, Delete, List, Add, Create, Update, Process, Immutable storage, Permanent delete checked), 'Blob versioning permissions' (Enables deletion of versions), 'Allowed blob index permissions' (Read/Write, Filter), and 'Start and expiry date/time' (Start: 09/27/2022, End: 09/28/2022, both in '(UTC+01:00) Brussels, Copenhagen, Madrid, Paris'). Below these are sections for 'Allowed IP addresses' (For example, 168.1.5.65 or 168.1.5.65-168.1.5.70) and 'Allowed protocols' (HTTPS only checked). At the bottom of the modal are 'OK' and 'Cancel' buttons.

Una última opción de acceso es utilizar el Azure Key Vault que permite guardar las claves y las conexiones (y cualquier otro secreto) y acceder esa información a través de la aplicación.

Siempre dando permisos para que una aplicación accede el Key Vault.

3.13.10.4.3 Cambios dinámicos en las tablas

Azure Table Storage permite cambios dinámicos en las tablas sin que la información previa se vea afectada:

Roberto Ribes (rbo)

The screenshot shows the Microsoft Azure Storage browser interface. On the left, the navigation pane includes Home, az204bcn, Overview, Activity log, Tags, Diagnose and solve problems, Access Control (IAM), Data migration, Events, Storage browser, Data storage, Containers, File shares, Queues, and Tables. The Storage browser option is selected. The main area displays a table named 'logins' with the following data:

	PartitionKey	RowKey	Timestamp	Id	Curso
	profe	12345	2022-09-27T17:30:36.98...	3fa85f64-5717-4562-b3fc-2c963f66a6	Az204
	profe2	12345	2022-09-27T17:47:32.57...	3fa85f64-5717-4562-b3fc-2c963f66a6	

Below the browser, a code editor window titled 'LoginTableEntity.cs' shows the following C# code:

```
// Esta entidad solamente tiene sentido aquí si no queremos referencias Azure Table Storage en otros proyectos.
public class LoginTableEntity : ITableEntity
{
    // Siempre hay que tener un constructor sin parámetros
    public LoginTableEntity()
    {
        ETag = ETag.All;
    }
    public LoginTableEntity(Login login) : this()
    {
        PartitionKey = login.Name;
        RowKey = login.Password;
        Id = login.Id.ToString();
        Curso = "Az204";
    }

    public string PartitionKey { get; set; }
    public string RowKey { get; set; }
    public DateTimeOffset? Timestamp { get; set; }

    // No permite trabajar con la concurrencia de los objetos.
    // El ETag es un GUID por instancia/operación.
    // Si bajamos la entidad y la modificamos el ETag no va a coincidir con el nuevo y la inserción no se permite.
    public ETag ETag { get; set; }

    // Podemos crear nuevas propiedades para persistir en Table Storage
    public string Id { get; set; }
    public string Curso { get; set; }
}
```

3.13.10.4.4 Insertando en batch

Las inserciones en batch pueden configurarse para que sean transaccionales o no: si una falla en insertarla, todas fallan.

The azure table will not allow you to batch more than 100 items.

```
01. public static IEnumerable<IEnumerable<T>> Batch<T>
02.     (this IEnumerable<T> collection, int batchSize)
03.     {
04.         var nextbatch = new List<T>(batchSize);
05.         foreach (T item in collection)
06.         {
07.             nextbatch.Add(item);
08.             if (nextbatch.Count == batchSize)
09.             {
10.                 yield return nextbatch;
11.                 nextbatch = new List<T>(batchSize);
12.             }
13.         }
14.         if (nextbatch.Count > 0)
15.         {
16.             yield return nextbatch;
17.         }
18.     }
```

Step 4.5 - Iterate through each batch insert operation

f Iterate through each batch and each item inside the batch

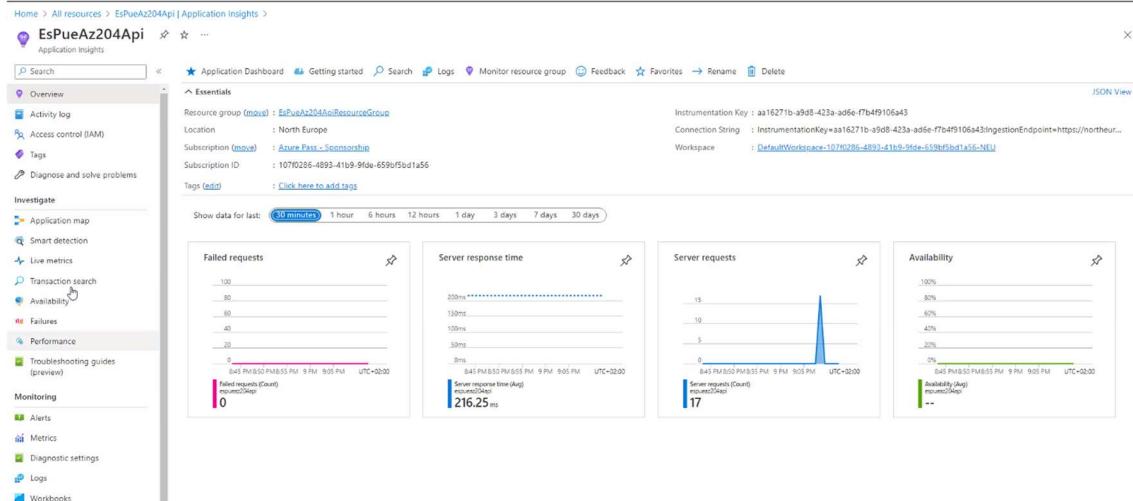
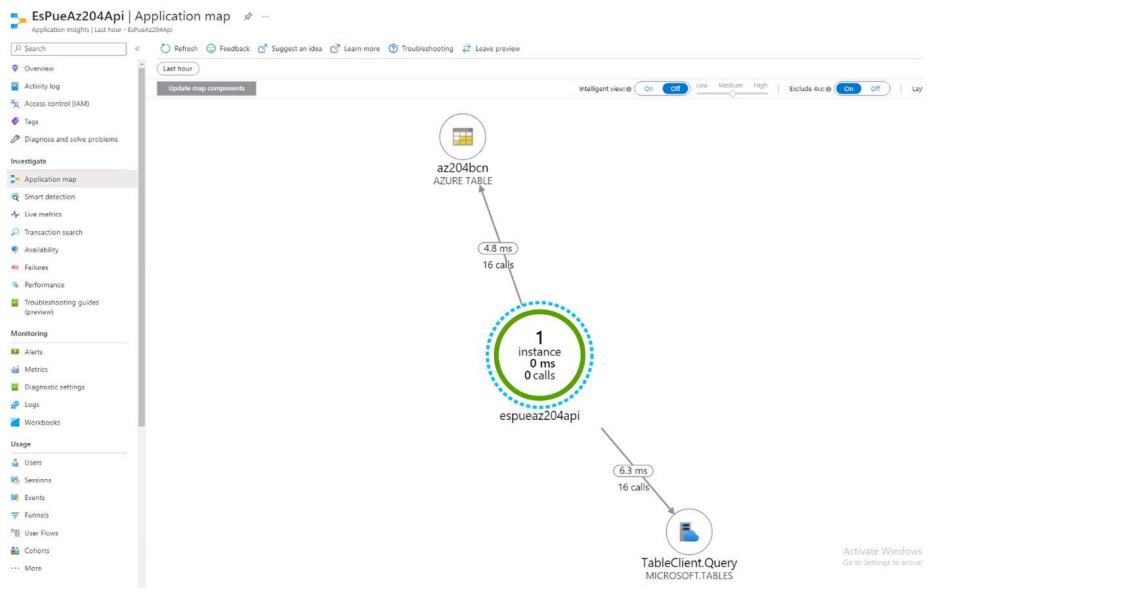
t
in
m
+

```
01. //Creating Batches of 100 items in order to insert them into AzureStorage
02. var batches = contactList.Batch(100);
03.
04. //Iterating through each batch
05. foreach (var batch in batches)
06. {
07.     batchOperationObj = new TableBatchOperation();
08.
09.     //Iterating through each batch entities
10.     foreach (var item in batch)
11.     {
12.         userEntityObj = new UserEntity("HR Department", "rowKey");
13.         {
14.             UserIncrementCounter++;
15.             userEntityObj.PartitionKey = "HR Department";
16.             userEntityObj.RowKey = "User" + UserIncrementCounter.ToString();
17.
18.             userEntityObj.ContactNumber = item;
19.
20.         }
21.         batchOperationObj.InsertOrReplace(userEntityObj);
22.     }
23.
24.     cloudTable.ExecuteBatch(batchOperationObj);
25. }
```

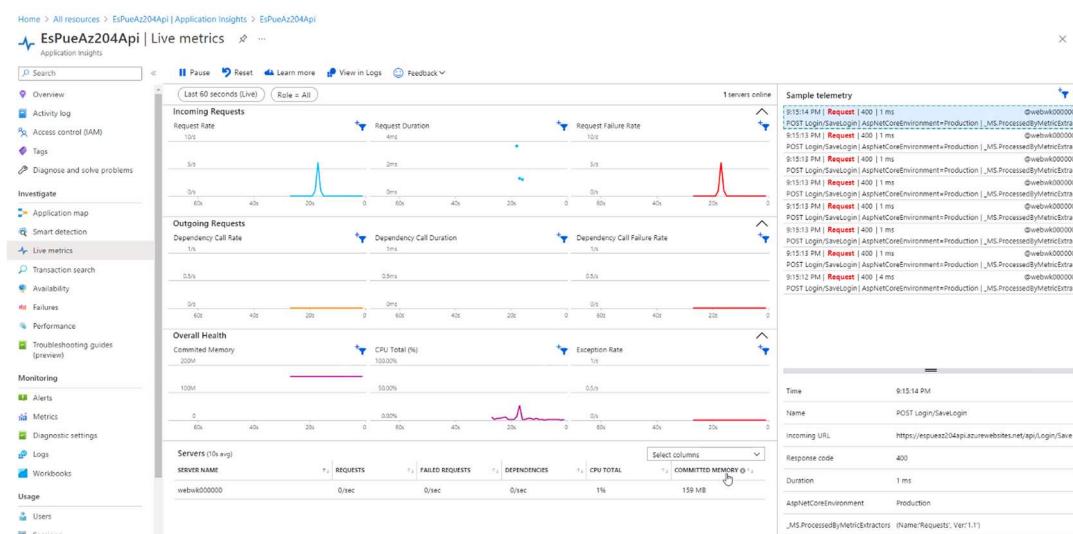
3.13.10.5 Monitoreando

Activando para nuestra App Service el “Application Insights” podemos ver el “Application Map” que nos permite ver y analizar el árbol de llamadas de nuestra app así como otros KPIs para introducir mejoras. Esto nos permite ver la performance del Azure Table Storage así como analizar si las llamadas están optimizadas o no.

Roberto Ribes (rbo)



Podemos analizar los errores que ha habido en las llamadas:



3.14 Azure software

- **Azure Data Studio:** <https://learn.microsoft.com/en-us/sql/azure-data-studio/download-azure-data-studio?view=sql-server-ver16>
- **Azure Storage Explorer:** <https://azure.microsoft.com/en-us/products/storage/storage-explorer/>

3.15 Azure Function

Las funciones pueden configurarse para ejecutarse como App services:

The screenshot shows the 'Create Function App' wizard. At the top, it says 'Home > Function App > Create Function App ...'. The first section is 'Runtime stack *' with a dropdown set to '.NET'. Below it are 'Version *' (set to 6) and 'Region *' (set to North Europe). A note says 'Not finding your App Service Plan? Try a different region or select your App Service Environment.' The next section is 'Operating system' with a note that the operating system is recommended based on the runtime stack. It shows 'Operating System *' with 'Windows' selected. The third section is 'Plan' with a note about how it dictates scaling, features, and pricing. It shows 'Plan type *' as 'App service plan', 'Windows Plan (North Europe) *' as '(New) ASP-testgroup-9f2c', and 'Sku and size *' as 'Standard S1' (100 total ACU, 1.75 GB memory). The final section is 'Zone redundancy' with notes about deployment zones and redundant instances. It shows 'Zone redundancy' with 'Disabled' selected.

Aunque tambien se pueden configurar para ejecutar serverless en microservicios con 1,5GB de RAM y 1 CPU.

3.15.1 Introducción

Esta tecnología se engloba dentro de la programación serverless. Está muy enfocada a los microservicios ya que tienen limitaciones de memoria y tiempo de ejecución. Está pensado para concatenar funciones que generen un workflow o para automatizar triggers en sitios de Azure y lanzar funciones (nuevo elemento añadido en CosmosDB, entonces ejecutar función).

Overview

- Azure Functions are a great solution for processing data, integrating systems, working with the internet-of-things (IoT), and building simple APIs and microservices.
- Consider Functions for tasks like image or order processing, file maintenance, or for any tasks that you want to run on a schedule.
- Azure Functions supports *triggers*, which are ways to start execution of your code, and *bindings*, which are ways to simplify coding for input and output data.

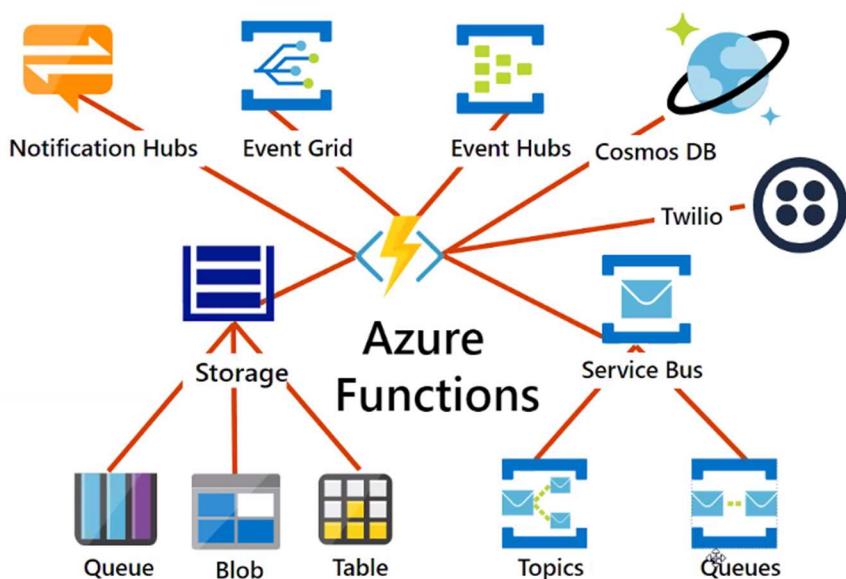
Aplicaciones:

- APIs simples.
- Microservicios.
- IoT.

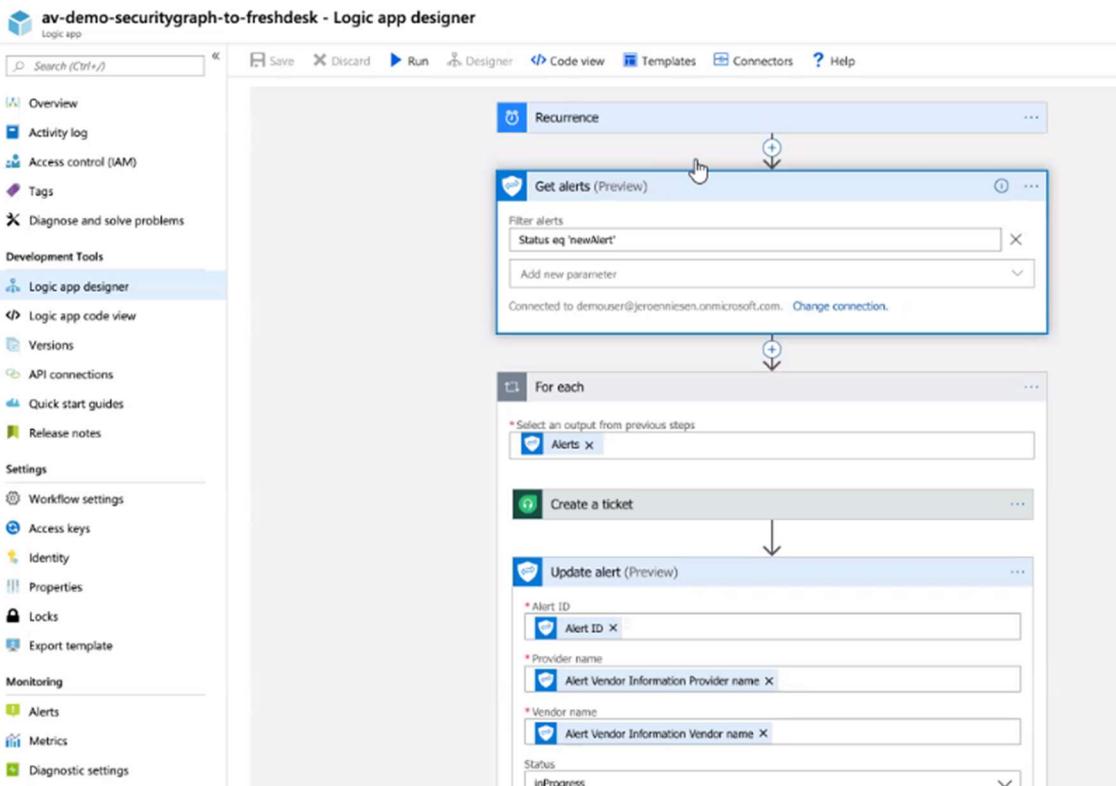
Las Azure Functions están pensadas para aplicaciones que no necesitan mucho CPU ni memoria, es decir, tareas básicas.

Cabe destacar que las Azure functions son *stateless*. Están muy orientados a microservicios y a APIs simples. También existen triggers que desencadenan la ejecución del Azure Function. Existen muchísimos conectores que permiten automatizar cualquier servicio de Azure (cuando un recurso se crea, u otros eventos que suceden en elementos de Azure).

Básicamente, todo lo relativo segmentar rutinas en funciones pequeños y generar un workflow basado en funciones. El Azure es muy útil cuando se añade un Blob, coge de entrada el Blob y de salida llama al escalado de imágenes de Azure. Es como un orquestador pero también admite cierta lógica de negocio.



Una logic app, permite generar aplicaciones conectando nodos de funciones para ejecutar lógicas de negocio (igual que los Workflows) con tareas predefinidas.



Ejemplo de Azure Logic App (workflow)

Una Logic App se programa con una interfaz de usuario. Mientras que las Funciones permiten escribir código, las logic apps utilizan un designer. Azure Functions tiene poca conectividad pero muy orientada a programación y a desarrollar soluciones ad-hoc.

Compare Azure Functions and Azure Logic Apps

	Durable Functions	Logic Apps
Development	Code-first (imperative)	Designer-first (declarative)
Connectivity	About a dozen built-in binding types, write code for custom bindings	Large collection of connectors, Enterprise Integration Pack for B2B scenarios, build custom connectors
Actions	Each activity is an Azure function; write code for activity functions	Large collection of ready-made actions
Monitoring	Azure Application Insights	Azure portal, Azure Monitor logs
Management	REST API, Visual Studio	Azure portal, REST API, PowerShell, Visual Studio
Execution context	Can run locally or in the cloud	Supports run-anywhere scenarios

Por ejemplo, envía un correo electrónico a los usuarios si algún error se notifica o si se para la web.

Casos prácticos:

- Orquestación.
- Notificaciones.

Cuando se requiera algo stateful es mejor utilizar Azure Logic Apps. Aure Logic Apps además tiene infinidad de conexiones.

Compare Functions and WebJobs

	Functions	WebJobs with WebJobs SDK
Serverless app model with automatic scaling	Yes	No
Develop and test in browser	Yes	No
Pay-per-use pricing	Yes	No
Integration with Logic Apps	Yes	No
Trigger events	Timer Azure Storage queues and blobs Azure Service Bus queues and topics Azure Cosmos DB Azure Event Hubs HTTP/WebHook (GitHub Slack) Azure Event Grid	Timer Azure Storage queues and blobs Azure Service Bus queues and topics Azure Cosmos DB Azure Event Hubs File system

Los WebJobs están en desuso ya que básicamente son Web APIs y no estan integradas con Logic Apps.

Los diferentes planes disponibles para Azure Functions son 3:

When you create a function app in Azure, you must choose a hosting plan for your app.

There are three basic hosting plans available for Azure Functions:

- Consumption plan
- Premium plan
- Dedicated plan (App Service)

The hosting plan you choose dictates the following behaviors:

- How your function app is scaled.
- The resources available to each function app instance.
- Support for advanced functionality, such as Azure Virtual Network connectivity.

Consumption plan

The default hosting plan. Scales automatically and you only pay when your functions are running. Instances of the Functions host are dynamically added and removed based on the number of incoming events.

Premium plan

Automatically scales based on demand using pre-warmed workers which run applications with no delay after being idle, runs on more powerful instances, and connects to virtual networks.

Dedicated plan

Run your functions within an App Service plan at regular App Service plan rates. Best for long-running scenarios where Durable Functions can't be used.

En los primeros dos modelos pagas por uso, en cambio en el “plan dedicado” se factura como Azure App Service. La elección de un plan u otro depende de si la app necesita escalarse o si tenemos recursos disponibles o si tenemos que conectarlos dentro de una Azure Virtual Network (solamente posible con el Premium y Dedicated).

Es necesario tener una “storage account” para sacar todo el provecho de las Azure Functions:

Always on

- If you run on an App Service plan, you should enable the **Always on** setting so that your function app runs correctly.
- On an App Service plan, the functions runtime goes idle after a few minutes of inactivity, so only HTTP triggers will "wake up" your functions.

Storage account requirements

- On any plan, a function app requires a general Azure Storage account, which supports Azure Blob, Queue, Files, and Table storage.
- This is because Functions relies on Azure Storage for operations such as managing triggers and logging function executions, but some storage accounts do not support queues and tables.

En un plan de App Service, el tiempo de ejecución de las funciones queda inactivo después de unos minutos de inactividad, por lo que solo los activadores HTTP "activarán" sus funciones. La configuración "Always on" solo está disponible en un plan de App Service. En un plan Consumo, la plataforma activa las aplicaciones de función automáticamente.

3.15.2 Coste

Se paga por uso aunque depende del plan que se establezca. Por ejemplo, en el plan dedicado se factura como Azure App Service.

Plan de consumo:

Cada evento genera una instancia con una memoria dada y unas características bajas.



Plan premium:

Las instancias vienen dadas y están preparadas para ejecutar funciones en cualquier momento. El número de instancias se puede escalar en función de la demanda.

Roberto Ribes (rbo)

Azure Functions

REGIÓN: West US NIVEL: Premium

INSTANCIA: EP1: Núcleos: 1, 3.5 GB de RAM, 250 GB de almacenamiento

Instancias activadas previamente (compartidas por plan)

1	X	730 Horas	= 155,27 US\$
Instancias			

Unidades de escalado horizontal adicionales

La duración de las unidades de escalado horizontal no debe superar la duración de las instancias activadas previamente.

I	H	X	730 Horas	= 155,27 US\$
Instancias				

Si costo inicial 0,00 US\$
Costo mensual 310,54 US\$

Existen instancias predefinidas con diferentes capacidades de hardware:

INSTANCIA:

EP1: Núcleos: 1, 3.5 GB de RAM, 250 GB de almacenamiento	v
EP1: Núcleos: 1, 3.5 GB de RAM, 250 GB de almacenamiento	
EP2: Núcleos: 2, 7 GB de RAM, 250 GB de almacenamiento	→
EP3: Núcleos: 4, 14 GB de RAM, 250 GB de almacenamiento	

Este plan es más autogestionado que el Plan dedicado y tiene mejor performance cuando se trata de escalar.

Plan dedicado:

Basado en configurar un App Service. Permite mayor flexibilidad en el escalado y generando reglas pero tarda más en ejecutar las funciones y en generar su entorno. Se pierde la condición serverless de las instancias. Comprometiéndose a utilizar el plan durante cierto tiempo, puede ser la opción más barata ya que hay menos autogestión y un poco menos de performance mientras se levantan instancias.

Premium V3

INSTANCIA: P1V3: Núcleos: 2, 8 GB de RAM, 250 GB de almacenamiento, 0,079 US\$

1	Instancias
---	------------

Opciones de ahorro

Ahorre hasta un 55 % en los precios de pago por uso con las instancias reservadas para uno o tres años.

- Pago por uso
- 1 año de reserva (descuento aproximado del 35 %)
- 3 años de reserva (descuento aproximado del 55 %)

Opciones de pago:

Mensualmente	= 57,67 US\$
57,67 US\$	Promedio mensual (0,00 US\$ cobrado por adelantado)

Promedio mensual
(0,00 US\$ cobrado por adelantado)

3.15.3 Escalado y ejecución de Azure Functions

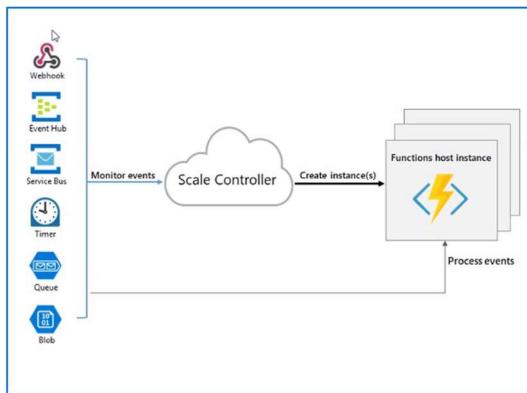
Mientras se van recibiendo eventos y triggers, existe un controlador de escalado que evalúa si nuevas instancias son necesarias para atender a la demanda de peticiones.

Overview

In the Consumption and Premium plans, Azure Functions scales CPU and memory resources by adding additional instances of the Functions host.

Runtime scaling

Azure Functions uses a component called the *scale controller* to monitor the rate of events and determine whether to scale out or scale in. The scale controller uses heuristics for each trigger type.



Scaling behaviors

Scaling can vary on a number of factors, and scale differently based on the trigger and language selected. There are a few intricacies of scaling behaviors to be aware of:

- **Maximum instances:** A single function app only scales out to a maximum of 200 instances. A single instance may process more than one message or request at a time though, so there isn't a set limit on number of concurrent executions.
- **New instance rate:** For HTTP triggers, new instances are allocated, at most, once per second. For non-HTTP triggers, new instances are allocated, at most, once every 30 seconds.

Una sola función puede escalar hasta un máximo de 200 instancias. Una única instancia puede procesar más de un evento o petición. Por lo que no hay límite de ejecuciones concurrentes.

Hay una limitación de una instancia cada segundo (*http requests*) o una cada 30 segundos (resto de *triggers*).

Limit scale out

You may wish to restrict the maximum number of instances an app used to scale out.

This is most common for cases where a downstream component like a database has limited throughput.

Azure Functions scaling in a Dedicated plan

Using an App Service plan, you can manually scale out by adding more VM instances. You can also enable autoscale.

Una función provee un entorno de ejecución:

Function app

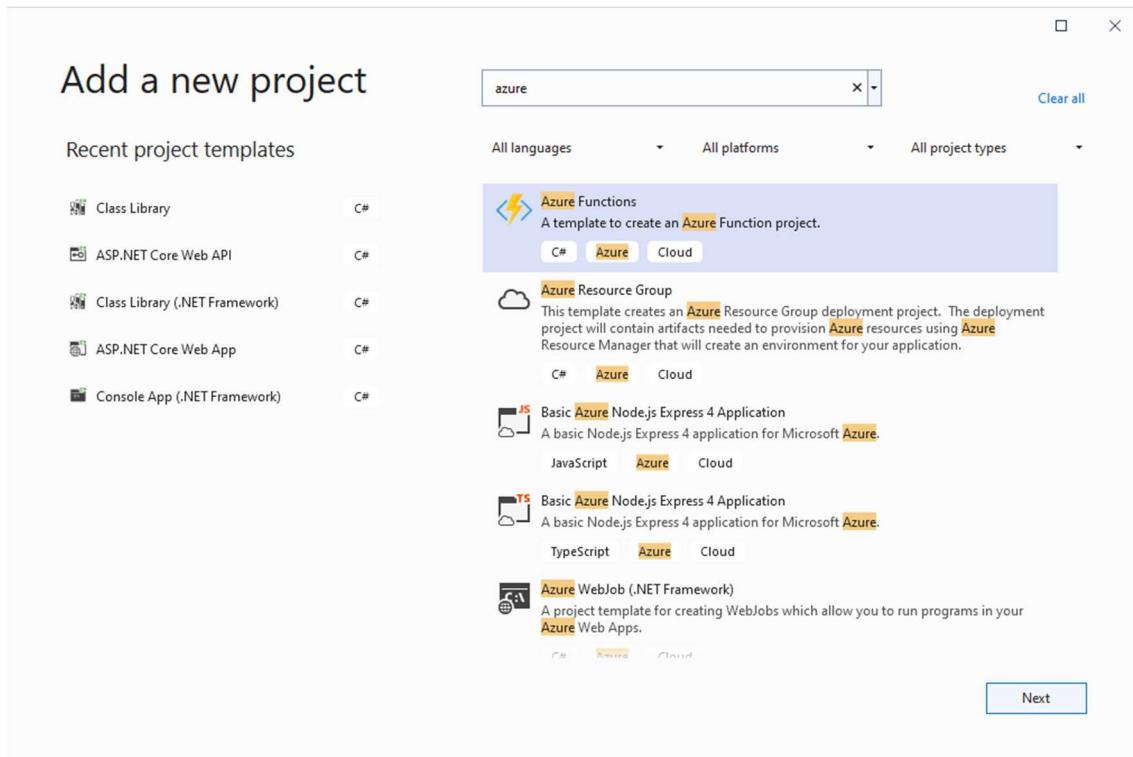
A function app provides an execution context in Azure in which your functions run.

- It is the unit of deployment and management for your functions.
- A function app is comprised of one or more individual functions that are managed, deployed, and scaled together.
- All of the functions in a function app share the same pricing plan, deployment method, and runtime version.
- Think of a function app as a way to organize and collectively manage your functions.

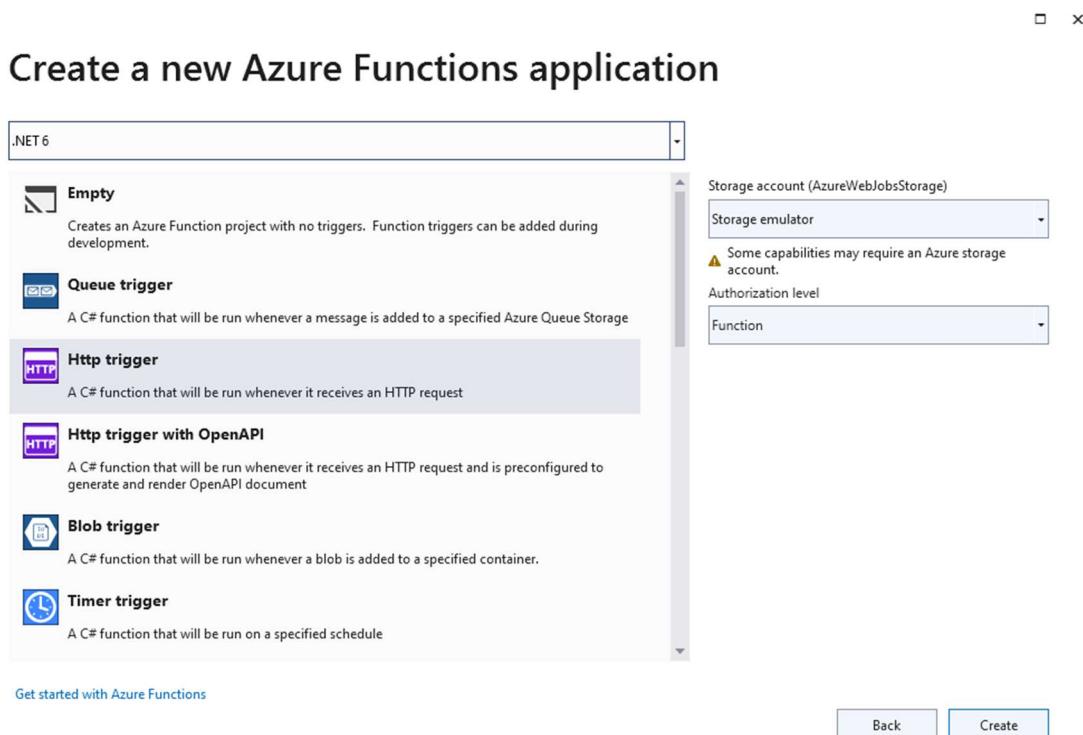
Roberto Ribes (rbo)

3.15.4 Creando Azure Functions

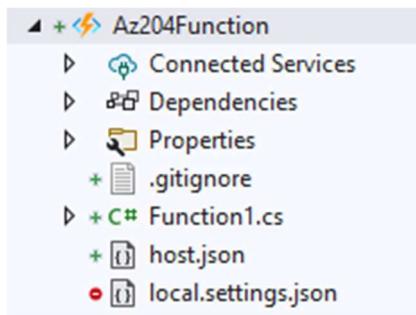
Se pueden crear con Visual Studio:



Se selecciona el Trigger de una lista no demasiado extensa:



Se crea un Proyecto que contiene una clase sobre la que se puede escribir el código:

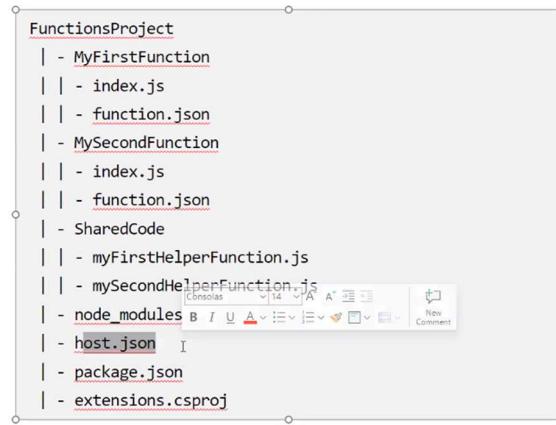


Folder structure

All code for a function app is located in a root project folder that contains a host configuration file.

The `host.json` file contains runtime-specific configurations and is in the root folder of the function app.

Specific folder structures required by the function app depend on language. To the right is an example of the folder structure of a JavaScript project.



La edición de funciones se puede hacer tanto en Visual Studio como Visual Studio Code y probar en local:

Local development environments

Functions makes it easy to use your favorite code editor and development tools to create and test functions on your local computer.

- Your local functions can connect to live Azure services, and you can debug them on your local computer using the full Functions runtime.
- The way in which you develop functions on your local computer depends on your language and tooling preferences.

Los diferentes *bindings* que se pueden configurar permite que basado en un evento podamos guardar elementos en diferentes opciones de **Azure Storage**:

Azure Functions trigger and binding example

You want to write a new row to Azure Table storage whenever a new message appears in Azure Queue storage.

This scenario can be implemented using an Azure Queue storage trigger and an Azure Table storage output binding.



NOTA: Las funciones se pueden escribir en JSON, C#, Javascript.

A la hora de usar Azure Functions hay conexiones o servicios que necesitan autenticarse. En estos casos a veces una connection string es suficiente, en otras deberemos autorizar a la aplicación a acceder a otros servicios o otorgarle permisos según que acciones (utilizando Azure Role-Based Access Control – RBAC).

Configure an identity-based connection

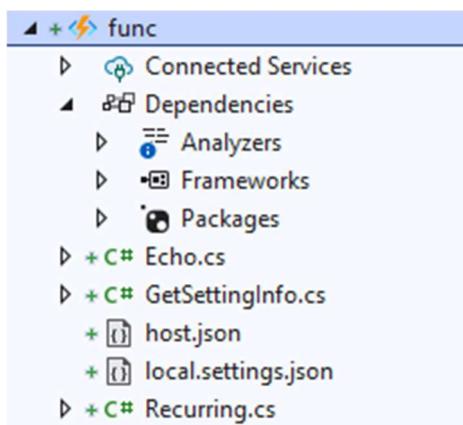
- Some connections in Azure Functions are configured to use an identity instead of a secret. Support depends on the extension using the connection.
- In some cases, a connection string may still be required in Functions even though the service to which you are connecting supports identity-based connections.

Grant permission to the identity

- Whatever identity is being used must have permissions to perform the intended actions.
- This is typically done by assigning a role in Azure RBAC or specifying the identity in an access policy, depending on the service to which you are connecting.

3.15.4.1 Ejemplo de creacion de Function y Blob storage

Basado en <https://microsoftlearning.github.io/AZ-204-DevelopingSolutionsforMicrosoftAzure/>



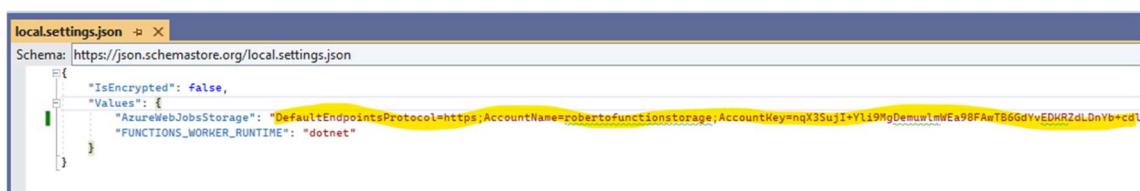
En un Proyecto de Azure Functions se pueden crear diferentes clases para diferentes funciones.

3.15.4.1.1 Requisito: tener un Storage Account

Necesitamos un storage account para poder utilizar esta funcionalidad de Azure Functions.

3.15.4.1.2 Establecer connection string

El siguiente paso es buscar la **ConnectionString** de la *Azure Storage Account* y reemplazarlo en el archivo *local.settings.json*:



2robertofunctionstorage | Claves de acceso

Nombre de la cuenta de almacenamiento
2robertofunctionstorage

key1 Girar clave
Última rotación: 10/13/2022 (hace 0 días)
Clave
Mostrar

Cadena de conexión
DefaultEndpointsProtocol=https;AccountName=2robertofunctionstorage;Accoun...
Ocultar

key2 Girar clave
Última rotación: 10/13/2022 (hace 0 días)
Clave
Mostrar

Cadena de conexión
Mostrar

3.15.4.1.3 Creamos un contenedor

En este ejemplo ponemos *content* como nombre de contenedor.

2robertofunctionstorage | Contenedores

Nombre	Última modificación	Nivel de acceso público
Slogs	13/10/2022, 18:27:37	Privada
azure-webjobs-hosts	13/10/2022, 18:31:47	Privada
azure-webjobs-secrets	13/10/2022, 18:31:44	Privada
content	13/10/2022, 18:35:04	Privada
scm-releases	13/10/2022, 18:30:21	Privada

Con acceso privado.

3.15.4.1.4 Cargar archivo al contenedor

Subimos un archivo al contenedor seleccionándolo de nuestro ordenador:

Roberto Ribes (rbo)

The screenshot shows the Azure Storage Explorer interface. On the left, there's a sidebar with options like 'Información general', 'Diagnosticar y solucionar problemas', 'Control de acceso (IAM)', 'Configuración', 'Tokens de acceso compartido', 'Directiva de acceso', 'Propiedades', and 'Metadatos'. The main area shows a table with one item:

Nombre	Modificado	Nivel de acceso	Estado del archivo
settings.json	13/10/2022, 18:35:42	Frecuente (inferido)	

3.15.4.1.5 Descargar en Blob en una petición HTTP y devolverlo

Hemos definido una función que tiene trigger una http request y le añadimos un archivo que se encuentra en nuestro blob storage en el contenedor “content” y nombre “settings.json”.

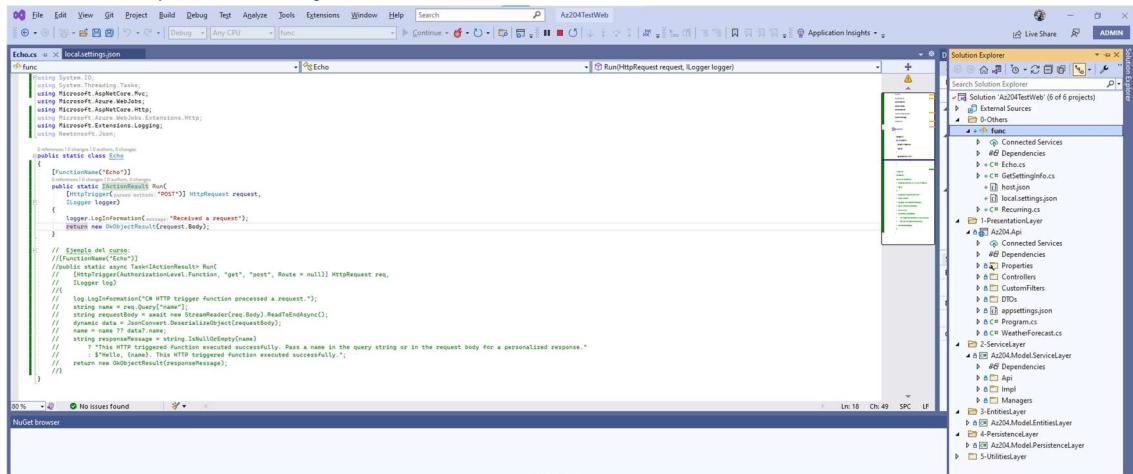
```
[FunctionName("GetSettingInfo")]
public static IActionResult Run(
    [HttpTrigger("GET")] HttpRequest request,
    [Blob("content/settings.json")] string json)
=> new OkObjectResult(json);
```

De manera que cuando navegamos a la página podremos ver algo como esto en el navegador:

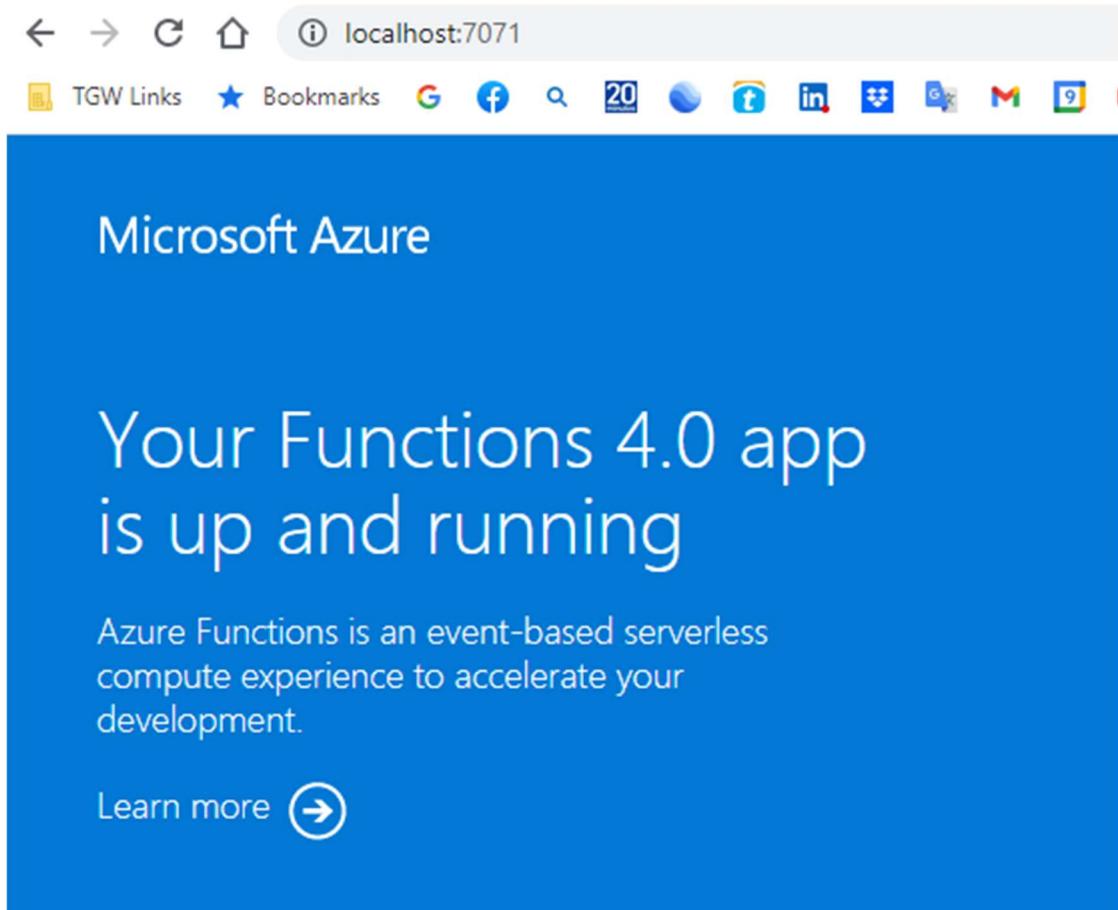
The screenshot shows a browser window with the address bar containing 'localhost:7071/api/GetSettingInfo'. The page content displays the following JSON object:

```
{
  "version": "0.2.4",
  "root": "/usr/libexec/mews_principal/",
  "device": {
    "id": "21e46d2b2b926cba031a23c6919"
  },
  "notifications": {
    "email": "joseph.price@contoso.com",
    "phone": "(425) 555-0162 x4151"
  }
}
```

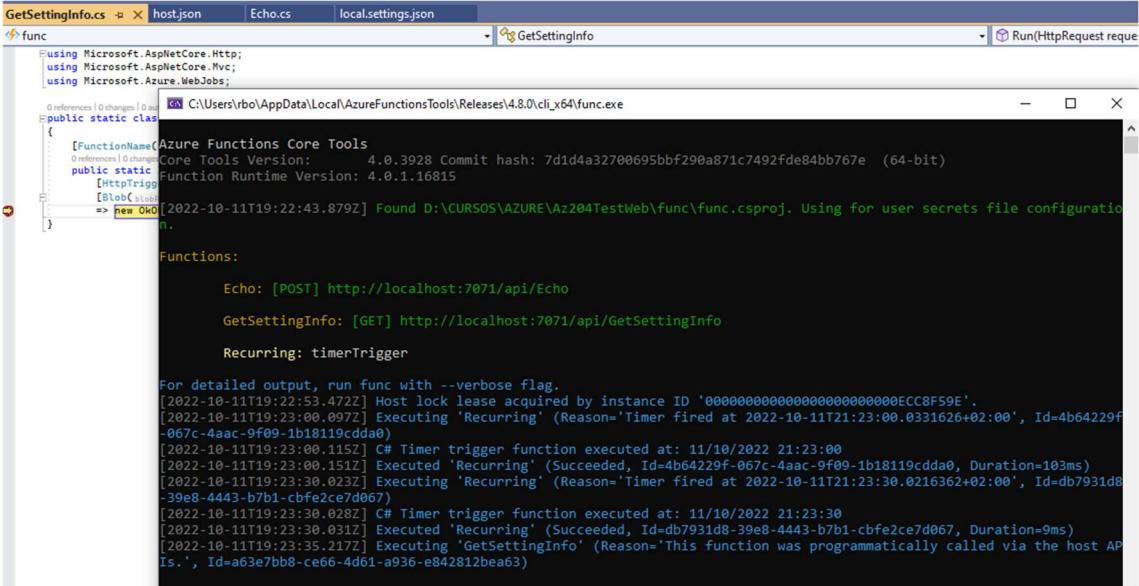
3.15.4.1.6 Ejecuta el Proyecto de Azure Functions



3.15.4.1.7 Navega a la página



Se ejecuta una ventana donde se ve todo sobre las funciones:



The screenshot shows the Visual Studio interface with the Azure Functions host window open. The host window displays logs from the Azure Functions Core Tools. The logs show the execution of functions: Echo (POST to http://localhost:7071/api/Echo) and GetSettingInfo (GET to http://localhost:7071/api/GetSettingInfo). It also shows a recurring timer trigger function executing at 21:23:00 on 10/18/2022. The logs include detailed information about each execution, such as the reason ('Timer fired'), ID, and duration.

```
using Microsoft.AspNetCore.Http;
using Microsoft.AspNetCore.Mvc;
using Microsoft.Azure.WebJobs;

public static class func
{
    [FunctionName("Azure Functions Core Tools")]
    public static void Run([HttpTrigger(AuthorizationLevel.Function, "get", "post", Route = null)] HttpRequest req, ILogger log)
    {
        log.LogInformation("C# HTTP trigger function processed a request.");
    }
}

Functions:

Echo: [POST] http://localhost:7071/api/Echo

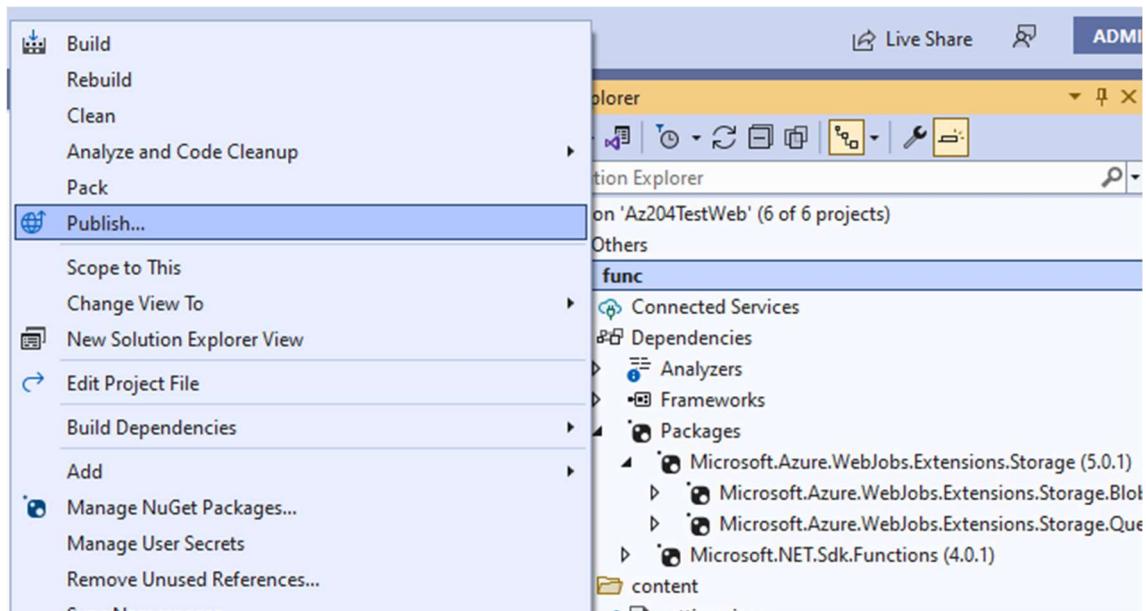
GetSettingInfo: [GET] http://localhost:7071/api/GetSettingInfo

Recurring: timerTrigger

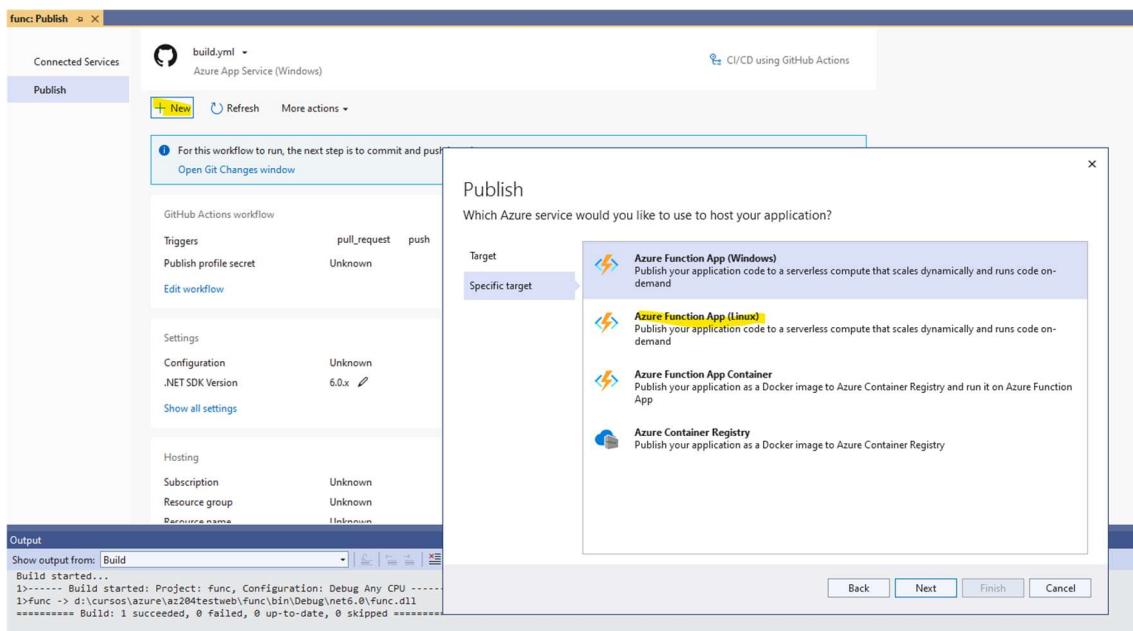
For detailed output, run func with --verbose flag.
[2022-10-11T19:22:43.879Z] Host lock lease acquired by instance ID '000000000000000000000000ECC8F59E'.
[2022-10-11T19:23:00.097Z] Executing 'Recurring' (Reason='Timer fired at 2022-10-11T21:23:00.0331626+02:00', Id=4b64229f-067c-4aac-9f09-1b18119cdda0)
[2022-10-11T19:23:00.115Z] C# Timer trigger function executed at: 11/10/2022 21:23:00
[2022-10-11T19:23:00.151Z] Executed 'Recurring' (Succeeded, Id=4b64229f-067c-4aac-9f09-1b18119cdda0, Duration=103ms)
[2022-10-11T19:23:30.023Z] Executing 'Recurring' (Reason='Timer fired at 2022-10-11T21:23:30.0216362+02:00', Id=db7931d8-39e8-4443-b7b1-cbfe2ce7d067)
[2022-10-11T19:23:30.028Z] C# Timer trigger function executed at: 11/10/2022 21:23:30
[2022-10-11T19:23:30.031Z] Executed 'Recurring' (Succeeded, Id=db7931d8-39e8-4443-b7b1-cbfe2ce7d067, Duration=9ms)
[2022-10-11T19:23:35.217Z] Executing 'GetSettingInfo' (Reason='This function was programmatically called via the host API.')
[2022-10-11T19:23:35.217Z] Executed 'GetSettingInfo' (Succeeded, Id=a63e7bb8-ce66-4d61-a936-e842812bea63)
```

3.15.4.1.8 Publicando en Azure

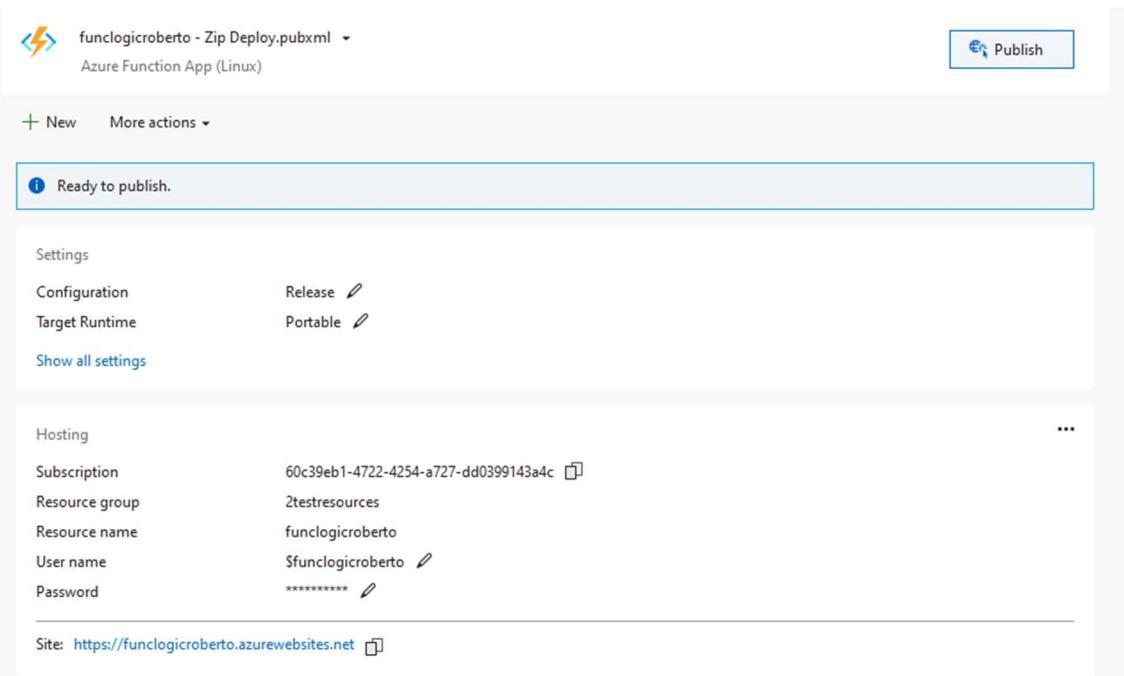
Se pueden publicar con Visual Studio el Proyecto o mejor la solución:



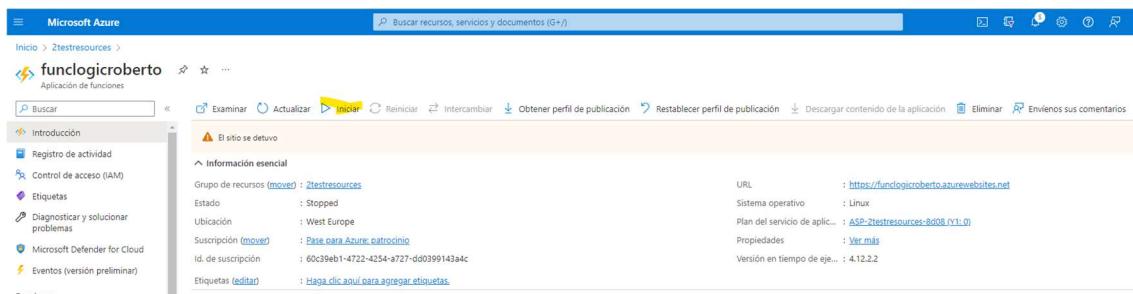
Roberto Ribes (rbo)



Despues de seleccionar el grupo de recursos y la instancia de Azure Function (que tiene que ser previamente creada, entonces podemos publicar:



Si falla la publicación para la función desde Azure:



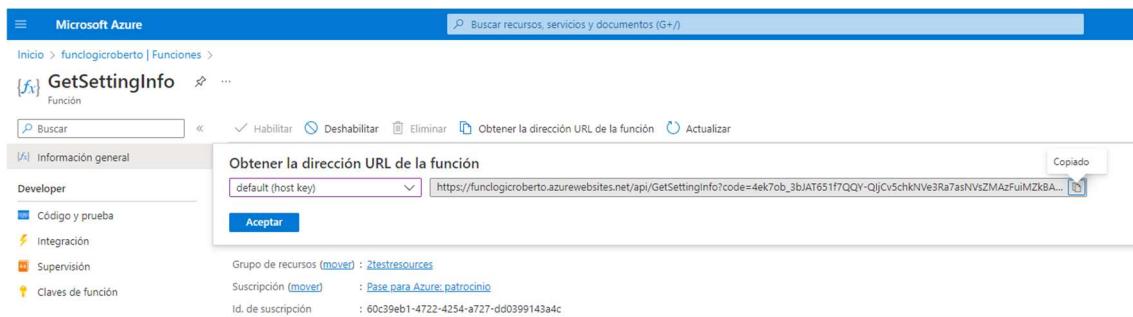
En funciones se deberían ver las que existen configuradas:



The screenshot shows the Azure Functions blade for the 'funclogicroberto' app service. On the left, there's a sidebar with links like 'Introducción', 'Registro de actividad', 'Control de acceso (IAM)', 'Etiquetas', 'Diagnosticar y solucionar problemas', 'Microsoft Defender for Cloud', 'Eventos (versión preliminar)', 'Funciones', and 'Claves de la aplicación'. The main area has a search bar and buttons for 'Crear', 'Actualizar', and 'Eliminar'. A warning message says: 'La edición de funciones en Azure Portal no es compatible con aplicaciones de funciones de consumo para Linux.' Below is a table listing four functions:

Nombre	Desencadenador	Estado
Echo	HTTP	Habilitado
GetSettingInfo	HTTP	Habilitado
Recurring	Timer	Habilitado

Para adquirir un link a la función solamente hay que seleccionar una y clicar en “Obtener la dirección URL de la función”:



The screenshot shows the details blade for the 'GetSettingInfo' function. It has tabs for 'Información general', 'Developer', 'Código y prueba', 'Integración', 'Supervisión', and 'Claves de función'. Under 'Información general', there's a button 'Obtener la dirección URL de la función'. A modal window is open, showing the URL: 'https://funclogicroberto.azurewebsites.net/api/GetSettingInfo?code=4ek7ob_3bjAT651f7QQY-QjCv5chkNv3Ra7asNVsZMAzFuiMZhB...'. There's a 'Copiado' button next to it. Below the modal, there's information about the resource group, subscription, and ID.

3.15.5 Azure Durabe Functions

3.15.5.1 Introducción

Se trata una entidad o función que además guarda datos y los puede persistir (es *stateful*).

Overview

- The *durable functions* extension lets you define stateful workflows by writing *orchestrator functions* and stateful entities by writing *entity functions* using the Azure Functions programming model.
- Behind the scenes, the extension manages state, checkpoints, and restarts for you, allowing you to focus on your business logic.

Supported languages

Durable Functions currently supports the following languages:

- C#
- JavaScript
- Python
- F#
- PowerShell

Application patterns

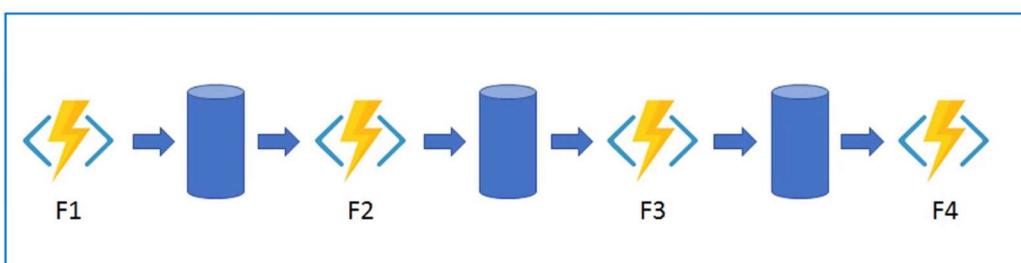
The primary use case for Durable Functions is simplifying complex, stateful coordination requirements in serverless applications.

The following sections describe typical application patterns that can benefit from Durable Functions:

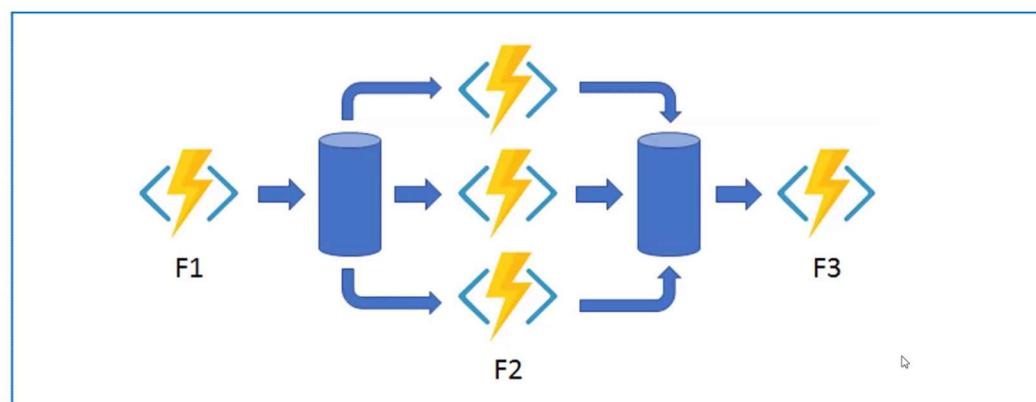
- Function chaining
- Fan-out/fan-in
- Async HTTP APIs
- Monitor
- Human interaction

Una función puede llamar en serie o paralelos a un conjunto de funciones *stateless* y el orquestador guarda de manera *stateful* los datos de las llamadas. A continuación se pueden ver ejemplos de estas cadenas de funciones durables:

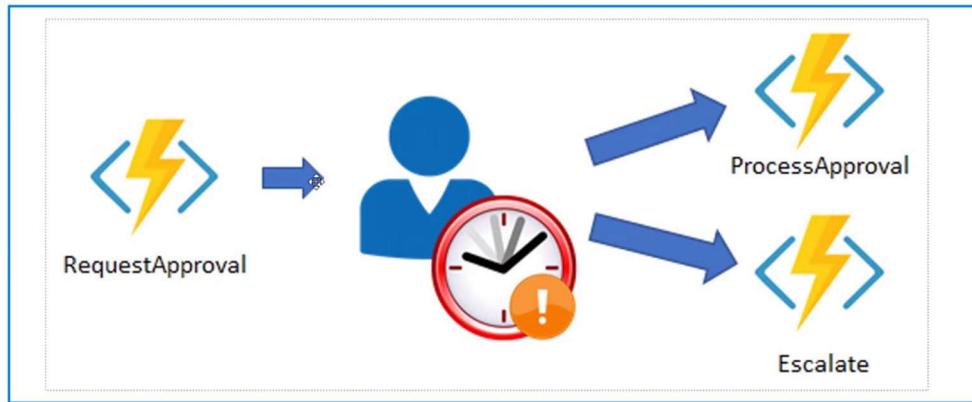
Function chaining



Fan out/fan in

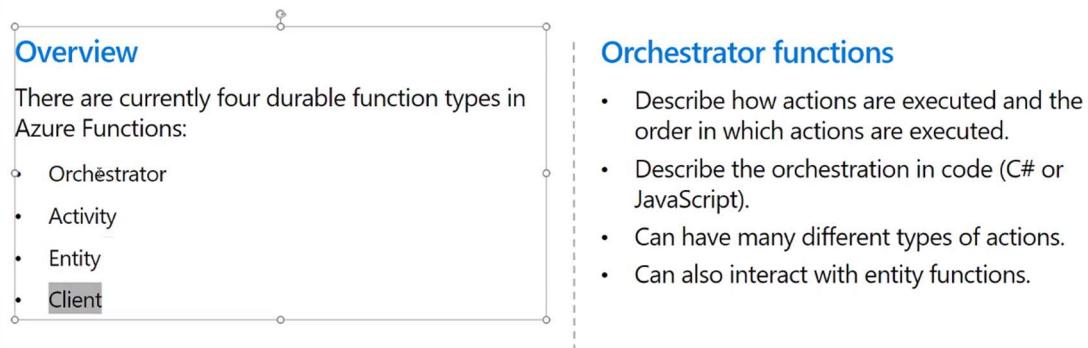


Human interaction



3.15.5.2 Tipos de Durable Functions

- **Orquestadores.** Describe como se relacionan las diferentes acciones y actividades.
- **Activity.** Unidades basicas de trabajo: comprobar inventario, cambiar el cliente, etc.
- **Entity.** Procesan lecturas y escrituras de piezas de datos. Son las entidades *stateful* al guardar el estado.
- **Client.** Define el trigger para el orquestador o el binding.



Activity functions

- Activity functions are the basic unit of work in a durable function orchestration.
- For example, you might create an orchestrator function to process an order. The tasks involve checking the inventory, charging the customer, and creating a shipment.
- Each task would be a separate activity function.
- These activity functions may be executed serially, in parallel, or some combination of both.

Entity functions

- Entity functions define operations for reading and updating small pieces of state. We often refer to these stateful entities as durable entities. Some things to note:
- Entities are accessed via a unique identifier, the entity ID. An entity ID is simply a pair of strings that uniquely identifies an entity instance.
 - Operations on entities require that you specify the **Entity ID** of the target entity, and the **Operation name**, which is a string that specifies the operation to perform.

Client functions

- Orchestrator and entity functions are triggered by their bindings and both of these triggers work by reacting to messages that are enqueued in a task hub.
- The primary way to deliver these messages is by using an orchestrator client binding, or an entity client binding, from within a *client function*. Any non-orchestrator function can be a client function.
- Unlike other function types, orchestrator and entity functions cannot be triggered directly using the buttons in the Azure portal. If you want to test an orchestrator or entity function in the Azure portal, you must instead run a client function that starts an orchestrator or entity function as part of its implementation.

3.15.5.3 Azure Task Hub

El Azure Task Hub requiere una storage account y es el contenedor donde se guardan todos los elementos de una Azure Durable Function.

Explore task hubs (1 / 2)

Overview

- A task hub in Durable Functions is a logical container for durable storage resources that are used for orchestrations and entities.
- Orchestrator, activity, and entity functions can only directly interact with each other when they belong to the same task hub.

Azure Storage resources

A task hub in Azure Storage consists of the following resources:

- One or more control queues.
- One work-item queue.
- One history table.
- One instances table.
- One storage container containing one or more lease blobs.
- A storage container containing large message payloads, if applicable.

3.15.5.4 Controlando el tiempo

Hay métodos especiales a nivel de orquestador para asegurarnos que las actividades no se quedan colgadas o mucho tiempo en ejecución. El control del tiempo de una actividad se hace siempre desde el nivel orquestación.

Control timing in Durable Functions (1 / 3)

Overview

- You can use durable timers in orchestrator functions to implement delays or to set up timeouts on async actions.
- Durable timers should be used in orchestrator functions instead of `Thread.Sleep` and `Task.Delay` (C#), or `setTimeout()` and `setInterval()` (JavaScript), or `time.sleep()` (Python).

Timer limitations

When you create a timer that expires at 4:30 pm, the underlying Durable Task Framework enqueues a message that becomes visible only at 4:30 pm.

When running in the Azure Functions Consumption plan, the newly visible timer message will ensure that the function app gets activated on an appropriate VM.

Usage for timeouts

```
public static async Task<bool> Run([OrchestrationTrigger] IDurableOrchestrationContext context)
{
    TimeSpan timeout = TimeSpan.FromSeconds(30);
    DateTime deadline = context.CurrentUtcDateTime.Add(timeout);
    using (var cts = new CancellationTokenSource())
    {
        Task activityTask = context.CallActivityAsync("GetQuote");
        Task timeoutTask = context.CreateTimer(deadline, cts.Token);

        Task winner = await Task.WhenAny(activityTask, timeoutTask);
        if (winner == activityTask)
        {
            // success case and timeout case
        }
    }
}
```

Esperando a que un externo te mande un evento o señal:

Send and wait for events (1 / 2)

Overview

Orchestrator functions have the ability to wait and listen for external events. This feature of Durable Functions is often useful for handling human interaction or other external triggers.

Wait for events

- The `WaitForExternalEvent` methods of the orchestration trigger binding allows an orchestrator function to asynchronously wait and listen for an external event

```
[FunctionName("BudgetApproval")]
public static async Task Run(
    [OrchestrationTrigger]
    IDurableOrchestrationContext context)
{
    bool approved = await
    context.WaitForExternalEvent<bool>("Approval");
    if (approved)
    {
        // approval
    }
    else
    {
        // approval denied
    }
}
```

Para enviar el evento al que está esperando el ejemplo anterior:

Send and wait for events (2 / 2)

Send events

- The `RaiseEventAsync` method of the orchestration client binding sends the events that `WaitForExternalEvent` waits for.
- The `RaiseEventAsync` method takes `eventName` and `eventData` as parameters.
- The event data must be JSON-serializable.

```
[FunctionName("ApprovalQueueProcessor")]
public static async Task Run(
    [QueueTrigger("approval-queue")] string instanceId,
    [DurableClient] IDurableOrchestrationClient client)
{
    await client.RaiseEventAsync(instanceId, "Approval", true);
}
```

3.15.6 Azure functions y Blob storage

Ver apartado [Ejemplo de creacion de Function y Blob storage](#)

3.15.7 Azure functions y CosmosDB

Se puede configurar triggers para ejecutar Azure functions cuando eventos suceden en CosmosDB.

The screenshot shows the Azure portal interface for creating a new Azure Function. The left sidebar lists various service configurations like Networking, CORS, Keys, Advisor Recommendations, Microsoft Defender for Cloud, Identity, Locks, and Integrations (Power BI, Azure Synapse Link, Add Azure Cognitive Search, Add Azure Function). The main panel is titled "testbcn2 | Add Azure Function" and displays two steps: 1. Select container (with a note about monitoring changes) and 2. Create Azure Function (with fields for Name, Trigger, and Language set to C#).

3.15.8 Azure functions y Queue storage

Intenta diseñar un ejemplo de aplicación que combine Azure Queue storage y Azure functions:

<https://learn.microsoft.com/en-us/azure/azure-functions/functions-create-storage-queue-triggered-function>

<https://learn.microsoft.com/en-us/azure/storage/queues/storage-dotnet-how-to-use-queues?tabs=dotnet>

https://microsoftlearning.github.io/AZ-204-DevelopingSolutionsforMicrosoftAzure/Instructions/Labs/AZ-204_lab_10.html

Creamos una Azure Function asociada a la Storage account que queremos utilizar:

Crear aplicación de funciones ...

Datos básicos Hospedaje Redes Supervisión Implementación Etiquetas Revisar y crear

Resumen

Aplicación de funciones
de Microsoft

Detalles

Suscripción	60c39eb1-4722-4254-a727-dd0399143a4c
Grupo de recursos	2testresources
Nombre	RobertoQueueTestFunction
Pila del entorno en tiempo de ejecución	.NET 6

Hospedaje

Storage	
Cuenta de Storage	2robertofunctionstorage

Plan (nuevo)

Tipo de plan	Consumo (sin servidor)
Nombre	ASP-2testresources-ac8f
Sistema operativo	Windows
Región	West Europe
SKU	Dynamic

Supervisión

Application Insights	Sin habilitar
----------------------	---------------

NOTA: si queremos que se pueda editar online es mejor utilizar SO Windows.

Es recomendable que las Azure Functions se ejecuten en SO Windows para poder crearlas con plantillas:

Microsoft Azure

Crear función

Seleccionar entorno de desarrollo

Entorno de desarrollo

Seleccionar una plantilla

Plantilla

HTTP trigger	A function that will be run whenever it receives an HTTP request, responding based on data in the body or query string
Timer trigger	A function that will be run on a specified schedule
Azure Queue Storage trigger	A function that will be run whenever a message is added to a specified Azure Storage queue
Azure Service Bus Queue trigger	A function that will be run whenever a message is added to a specified Service Bus queue
Azure Service Bus Topic trigger	A function that will be run whenever a message is added to a specified Service Bus topic
Azure Blob Storage trigger	A function that will be run whenever a blob is added to a specified container
Azure Event Hub trigger	A function that will be run whenever an event hub receives a new event

Crear Cancelar

Finalmente seleccionamos el nombre y el nombre de la Azure Queue donde se conecta.

NOTA: No hace falta mencionar que tiene que existir la cola en la Storage Account asociada.

Es recomendable editar y verificar la información de la función así como de la Azure Queue de entrada:

Es interesante desde el menu de integracion como crear y añadir salidas a nuestro código.

En la pestaña de supervisión podemos ver los logs de la función:

Fecha (UTC)	Correcto	Código de resultado	Duración (ms)	Identificador de operación
2022-10-13 19:38:58.395	X	ERROR	0	b267f536cd33dd6cd8bcd22cbc79888
2022-10-13 19:38:57.653	X	ERROR	0	67140adbaa322d26c1d01ee1f569fc60
2022-10-13 19:38:30.063	X	ERROR	0	efaa1f70dc5b21694864abbd64b8f826
2022-10-13 19:38:29.883	X	ERROR	0	ad9bd4b7c3ce4b434b00369f3e42a0ba
2022-10-13 19:38:29.706	X	ERROR	0	3c51682d820ff1321c11f4ff74e787a
2022-10-13 19:38:29.632	X	ERROR	0	809d1fe9995a427ba3c4ff2104eeeff9
2022-10-13 19:38:29.416	X	ERROR	0	4abac854b4f2d31c58131491831ed2
2022-10-13 19:37:59.648	X	ERROR	0	191f3fabada69b9b689dd4dad23827ad
2022-10-13 19:37:59.630	X	ERROR	0	9998d5f12ce2eaecc9b5f7f31ce8c42a9
2022-10-13 19:37:59.606	X	ERROR	0	efd87a09c210f565f26abbfc6e844e5

Desde la pestaña de código vemos que nuestra función lo único que hace es logear. La información que se logea está disponible en la pestaña de supervisión:

```
using System;
```

```
public static void Run(string myQueueItem, ILogger log)
{
    log.LogInformation($"C# Queue trigger function processed:
{myQueueItem}");
```

Roberto Ribes (rbo)

}

En caso de error, al clicar vemos el mensaje:

Invocation Details

[Ejecutar consulta en Application Insights](#)

Marca de tiempo	Mensaje	Tipo
2022-10-13 19:38:58.395	Executing 'Functions.QueueTriggeredFunction' (Reason='New queue message detected on 'testqueue'', Id=d08044a6-c7df-4320-b38e-eea20c75cdf1)	Information
2022-10-13 19:38:58.395	Trigger Details: MessageId: 205e24b0-bce8-44ba-94e7-d3c74f78699a, DequeueCount: 5, InsertionTime: 2022-10-13T19:38:56.000+00:00	Information
2022-10-13 19:38:58.449	The input is not a valid Base-64 string as it contains a non-base 64 character, more than two padding characters, or an illegal character among the padding characters.	Error
2022-10-13 19:38:58.449	Executed 'Functions.QueueTriggeredFunction' (Failed, Id=d08044a6-c7df-4320-b38e-eea20c75cdf1, Duration=1ms)	Error
2022-10-13 19:38:58.450	The input is not a valid Base-64 string as it contains a non-base 64 character, more than two padding characters, or an illegal character among the padding characters.	Error

Una vez solucionados los problemas se ve que se reciben exitosamente llamadas:

[Invocaciones](#) [Registros](#)

Número de operaciones correctas Número de errores
0 75
Últimos 30 días Últimos 30 días

Seguimientos de invocación
Los veinte seguimientos de invocación de función más recientes. Para obtener un análisis más avanzado, ejecute la consulta en Application Insights.

[Ejecutar consulta en Application Insights](#) [Actualizar](#)

Invocaciones de filtros

Fecha (UTC)	Correcto	Código de resultado	Duración (ms)	Identificador de operación
2022-10-13 19:45:41.330	Correcto	0	3	2bc33b30566ecf4fb89cc57178bad88f
2022-10-13 19:44:53.828	Correcto	0	16	8afebe6608b91d2026564e62e80611ae

3.15.9 Azure Logic Apps

Debemos elegir un resource group, un nombre y si lo queremos publicar como workflow o docker container. Finalmente, elegimos la redundancia y el tipo de actividad.

Roberto Ribes (rbo)

Home > Logic apps >
Create Logic App ...

Basics Hosting Monitoring Tags Review + create

Create a logic app, which lets you group workflows as a logical unit for easier management, deployment and sharing of resources. Workflows let you connect your business-critical apps and services with Azure Logic Apps, automating your workflows without writing a single line of code.

Project Details

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

Subscription *

Resource Group *

Instance Details

Logic App name *

.azurewebsites.net

Publish * Workflow Docker Container

Region *

Not finding your App Service Plan? Try a different region or select your App Service Environment.

Plan

The plan type you choose dictates how your app scales, what features are enabled, and how it is priced. [Learn more](#)

Plan type * **Standard:** Best for enterprise-level, serverless applications, with event-based scaling and networking isolation. **Consumption:** Best for entry-level. Pay only as much as your workflow runs.

Windows Plan (Central US) Select a resource group before selecting a plan.

Zone redundancy

An App Service plan can be deployed as a zone redundant service in the regions that support it. This is a deployment time only decision. You can't make an App Service plan zone redundant after it has been deployed. [Learn more](#)

Zone redundancy **Enabled:** Your App Service plan and the apps in it will be zone redundant. The minimum App Service plan instance count will be three. **Disabled:** Your App Service Plan and the apps in it will not be zone redundant. The minimum App Service plan instance count will be one.

Se revisa la información y se crea el recurso, que al final genera un entorno de ejecución en Windows:

Crear aplicación lógica ...

Datos básicos Hospedaje Supervisión Etiquetas **Revisar y crear**

Resumen



Aplicación lógica

de Microsoft

Detalles

Suscripción	a0a60b29-f28d-44b3-ad6c-c9ee373e94ec
Grupo de recursos	TestResources
Nombre	RboTestLogicApp
Pila del entorno en tiempo de ejecución	Node.js 14 LTS

Hospedaje

Storage

Cuenta de Storage ribesstorageaccount

Plan (nuevo)

Tipo de plan	Flujo de trabajo estándar
Nombre	ASP-TestResources-987e
Sistema operativo	Windows
Región	North Europe
SKU	Flujo de trabajo estándar
Tamaño	Pequeño
ACU	Total de ACU: 210
Memoria	3.5 GB de memoria

Creado, creamos el flujo de trabajo:

La captura de pantalla muestra la vista previa de la aplicación "RboTestLogicApp". En la parte superior, se muestra el nombre de la aplicación y una barra de herramientas con opciones como "Examinar", "Actualizar", "Detener", "Reiniciar", "Obtener perfil de publicación", "Restablecer perfil de publicación", "Descargar contenido de la aplicación", "Eliminar" y "Envíenos sus comentarios".

En la sección central, se detallan los datos de la aplicación:

- Información esencial:**
 - Estado: Running
 - Ubicación: North Europe
 - Suscripción: Page para Azure: patrocinio
 - Id. de suscripción: a0a60b29-f28d-44b3-ad6c-c9ee373e94ec
 - Etiquetas: Haga clic aquí para agregar etiquetas.
- URL:** https://rbotestlogicapp.azurewebsites.net
- Sistema operativo:** Windows
- Plan del servicio de aplicación:** ASP-TestResources-987e (WSI: 1)
- Propiedades:** Ver más
- Versión en tiempo de ejecución:** 3.15.0.0

En la parte inferior, se presentan tres secciones principales:

- Comenzar:** Ofrece la opción "Crear un flujo de trabajo en el Directorio".
- Características (6):** Muestra iconos para "Conecciones", "Parámetros", "Artefactos", "Esquemas" y "Mapas".
- Notificaciones (1):** Ofrece la opción "Crear flujo de trabajo" y "Documentación".

Tenemos la opción de elegir si es “stateless” o no:

Nuevo flujo de trabajo

Cree un flujo de trabajo en esta aplicación lógica.

X

Nombre de flujo de trabajo *

TestLogicApp ✓

Tipo de estado *

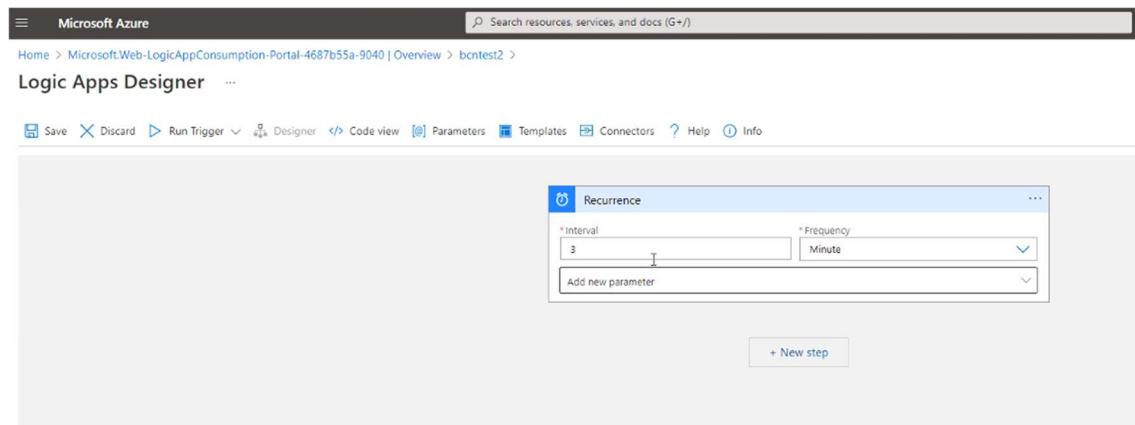
- Con estado: optimizado para alta confiabilidad, ideal para procesar datos de transición de negocio.
- Sin estado: optimizado para baja latencia, ideal para escenarios de solicitud y respuesta y el procesamiento de eventos de IoT.

NOTA: La opción “Stateless” incluye muchas menos operaciones y acciones a realizar y está bastante limitado.

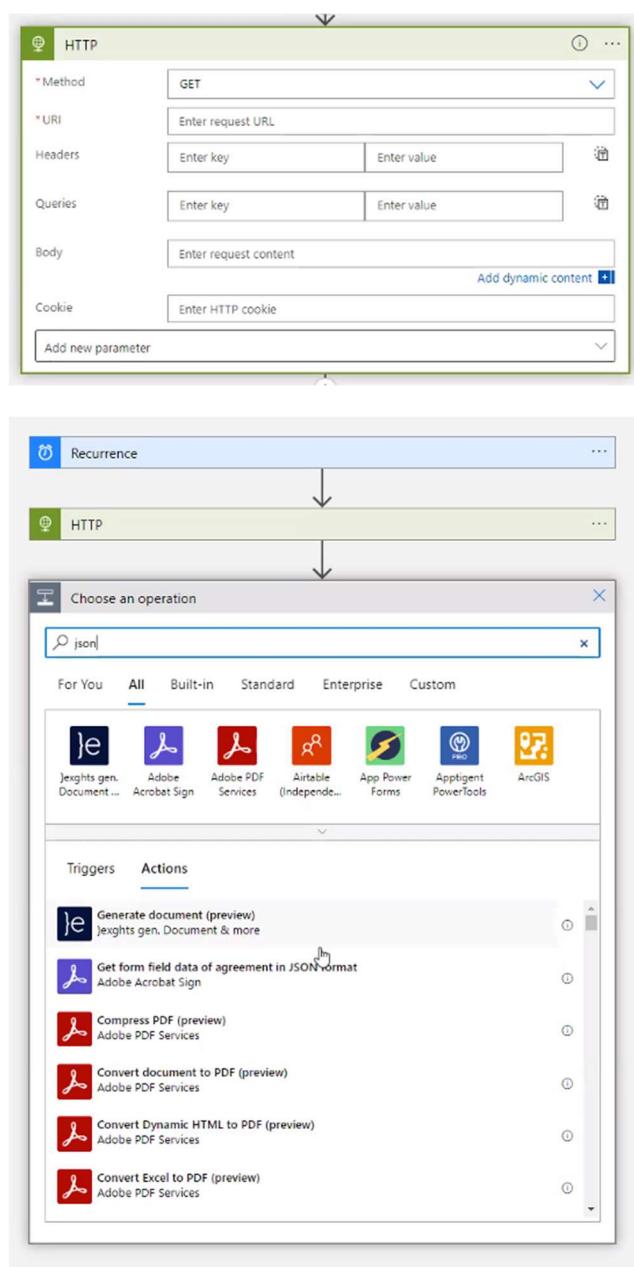
Una vez se ha creado el recurso, podemos crear nuestras propias logic apps o utilizar predefinidas:

A la hora de generar una desde cero, primero elegimos el trigger:

Roberto Ribes (rbo)

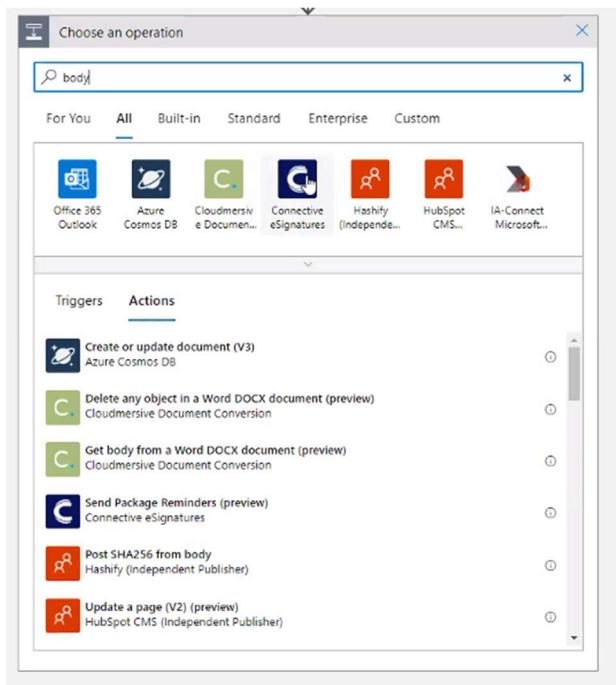


Posteriormente podemos añadir un nuevo paso (*http/get*) y alguna actividad de exportar:



Existen muchas operaciones diferentes a elegir:

Roberto Ribes (rbo)



Además, se pueden añadir decisiones:

The screenshot shows the 'Choose an operation' dialog box with the search term 'con' entered. The 'Actions' tab is selected. The results list includes:

- Extract document information (preview) - Jexights gen. Document & more
- Generate document (preview) - Jexights gen. Document & more
- Add Idea Vote (preview) - 365 Training
- Get Course (preview) - 365 Training
- Get Instructor (preview) - 365 Training
- Get User Profile (preview) - 365 Training

Below this, a 'Condition' dialog box is open, showing an 'And' condition with two dropdowns: 'Choose a value' and 'is equal to'.

The 'True' path is labeled 'True' and has an 'Add an action' button.

The 'False' path is labeled 'False' and has an 'Add an action' button.

Puedes configurar las operaciones con distintas opciones clicando en “...” (esquina superior-derecha de las cajas). En este caso vemos como se puede configurar un “retry”:

Roberto Ribes (rbo)

The screenshot shows the configuration interface for a parallel action in a Logic App. It includes the following sections:

- Automatic decompression:** A toggle switch set to "On".

Automatically decompress gzip response.
- Suppress workflow headers:** A toggle switch set to "On".

Limit Logic Apps to not include workflow metadata headers in the outgoing request.
- Suppress headers:** A toggle switch set to "Off".
- Action Timeout:** A note stating "Limit the maximum duration between the retries and asynchronous responses for this action. Note: This does not alter the request timeout of a single request." with a "Duration" input field containing "Example: P1D".
- Retry Policy:** A note stating "A retry policy applies to intermittent failures, characterized as HTTP status codes 408, 429, and 5xx, in addition to any connectivity exceptions. The default is an exponential interval policy set to retry 4 times." with a dropdown menu set to "Exponential Interval".
 - *Count:** Input field containing "3".
 - *Interval:** Input field containing "Example: PT20S".
 - Minimum Interval:** Input field containing "Example: PT10S".
 - Maximum Interval:** Input field containing "Example: PT1H".
- Content Transfer:** A note stating "Specify the behavior and capabilities for transferring content over HTTP. Large messages may be split up into smaller requests to the connector to allow large message upload. Details can be found at <http://aka.ms/logicapps-chunk#upload-content-in-chunks>".
 - Allow chunking:** A toggle switch set to "Off".
- Tracked Properties:** A table with columns "Key" and "Value".

At the bottom are "Done" and "Cancel" buttons, and a plus sign icon for adding more conditions.

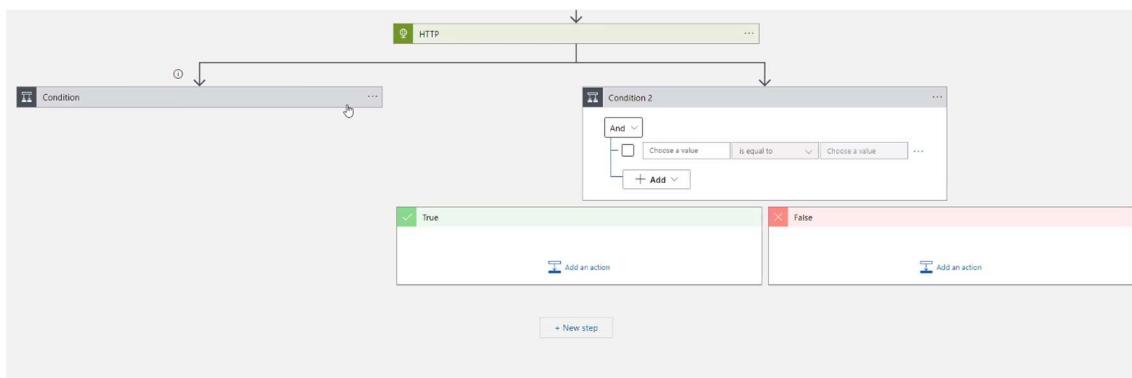
También se puede definir bajo qué condiciones se ejecutan las ramas paralelas:

The screenshot shows the "Condition" configuration dialog with the following content:

'Condition' should run after:

- HTTP** (selected)
- is successful**
- has timed out**
- is skipped**
- has failed**

At the bottom are "Done" and "..." buttons.



Hay conectores de muchos tipos diferentes que se pueden utilizar.

3.16 Azure monitoring and logging

3.16.1 Introducción

En las cuentas de almacenamiento, App Service y otros recursos es posible acceder a información de analytics insight.

Resource group	az900	Performance	Standard
Location	East US	Replication	Read-access geo-redundant storage (RA-GRS)
Primary/Secondary Location	Primary: East US, Secondary: West US	Account kind	StorageV2 (general purpose v2)
Subscription	Azure Pass - Sponsorship	Provisioning state	Succeeded
Subscription ID	10760286-4893-41b9-9fde-659bf5bd1a56	Created	10/13/2022, 7:36:04 PM
Disk state	Primary: Available, Secondary: Available		

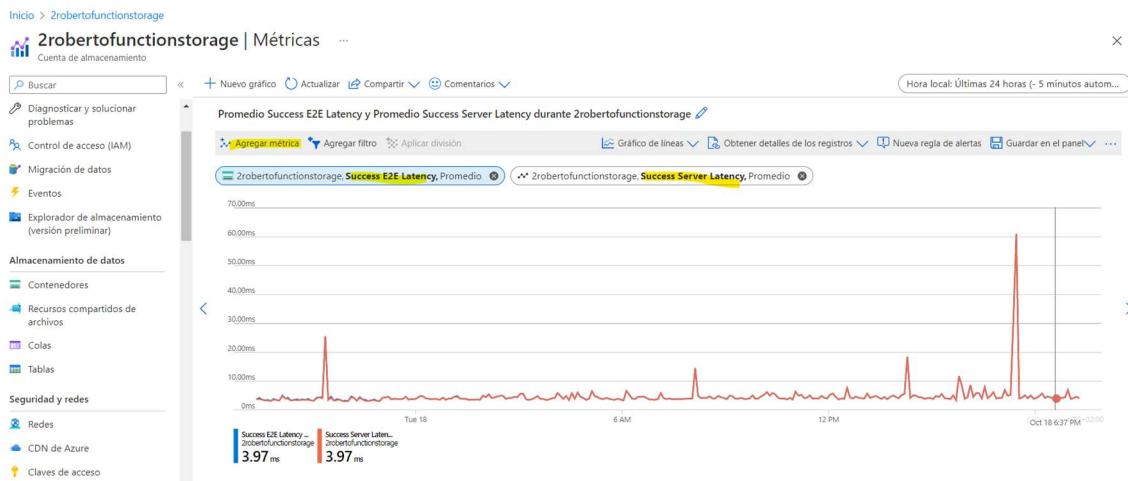
Total egress
Egress (Sum)
Tue 10 06 AM 12 PM 06 PM

Total ingress
Ingress (Sum)
Tue 10 06 AM 12 PM 06 PM

Average latency
Success E2E Latency (Avg)
Activate Windows
Tue 10 06 AM 12 PM 06 PM

Con las opciones de Analytics insights es posible ver el comportamiento de diferentes variables y verlas en gráfico:

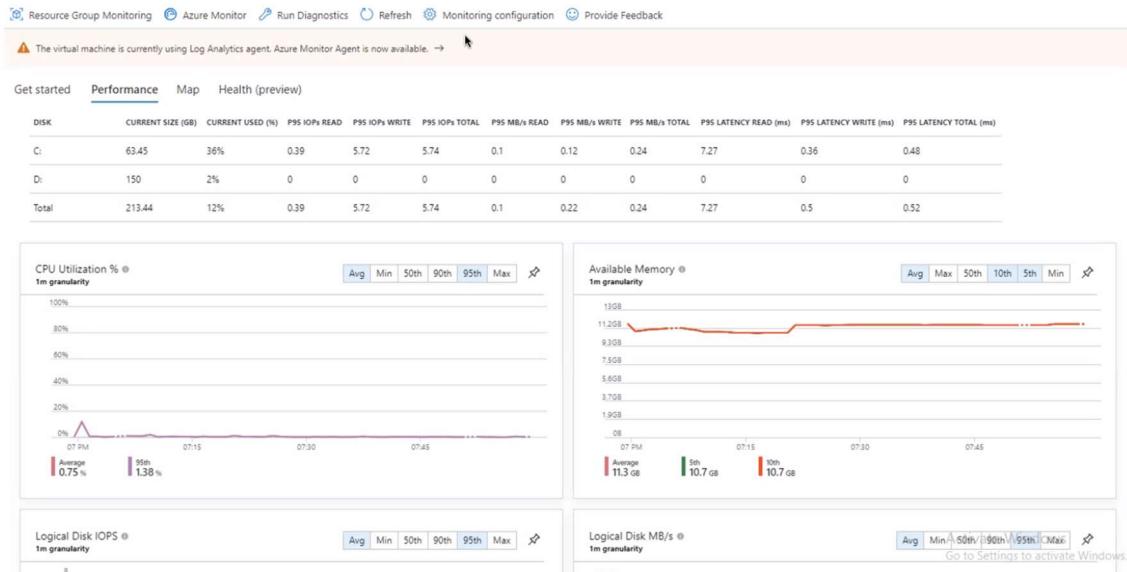
Roberto Ribes (rbo)



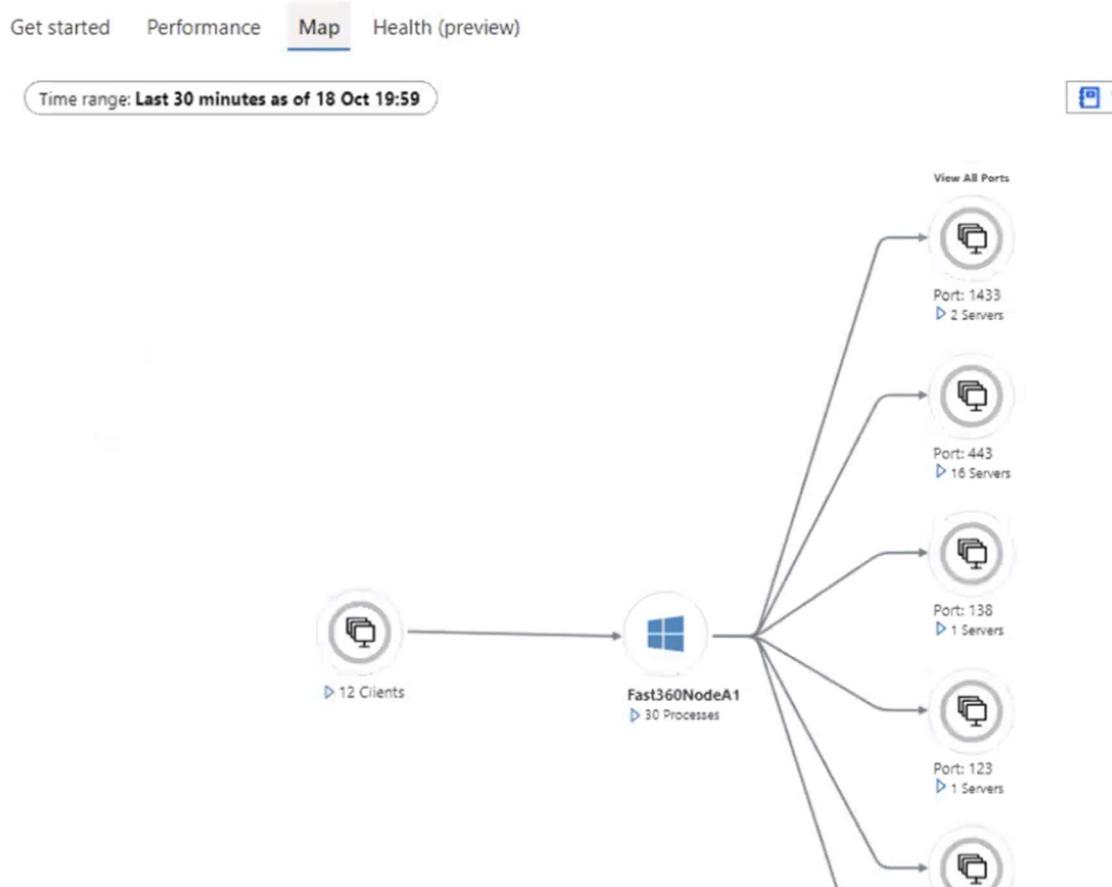
Además de latencia también es importante el parámetro DTU (Database Transaction Unit) para BBDD que es una medida de CPU-memoria-lecturas-escrituras para nuestras operaciones en BBDD.

Para el caso de Azure App Service ya vimos muchas de las bondades de Application Insights en [capítulos anteriores](#).

En el caso de máquinas virtuales vemos otras variables interesantes como el uso del CPU, memoria:



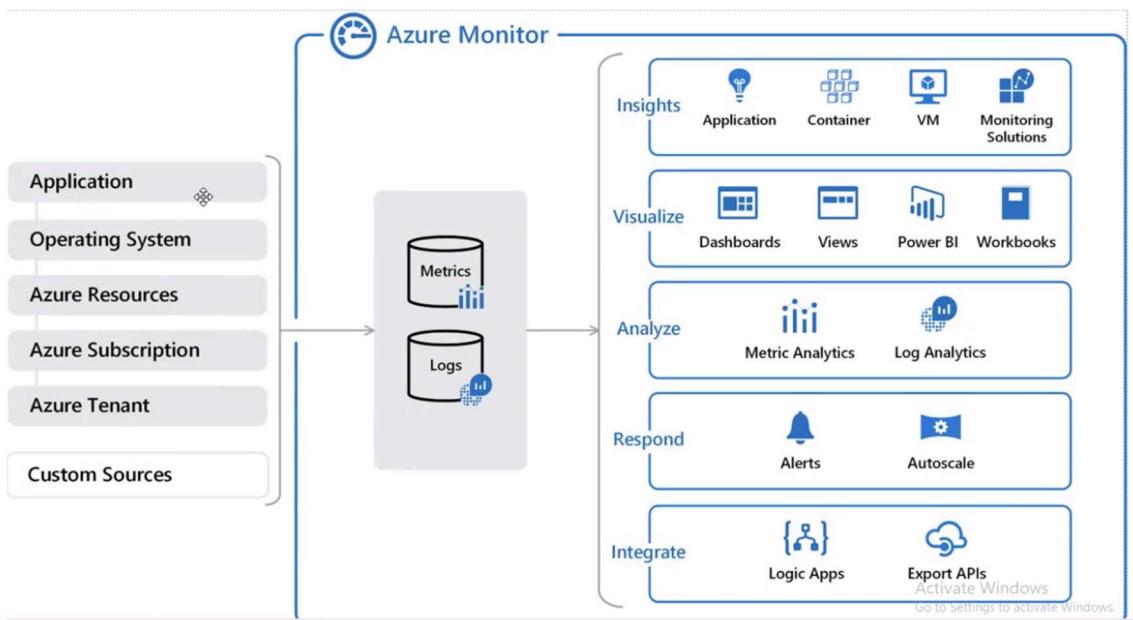
También es posible visualizar los clientes conectados y a que puertos conectan. Sin embargo, no nos da la foto de la aplicación sino del servidor:



3.16.2 Azure Monitor

Azure Monitor crea una serie de métricas, logs y funcionalidades para diferentes tipos de recursos agrupados en diferentes servicios para diferentes misiones:

- Insights. Servicio de pago pero que aporta muchas funcionalidades.
- Visualize.
- Analyze.
- Respond.
- Integrate.



Todas estas funcionalidades pueden estar disponibles en el menu del recurso o en el overview disponibles para activar:

Inicio > 2robertofunctionstorage

2robertofunctionstorage | Información

Cuenta de almacenamiento

Buscar Puntos de conexión Bloqueos Supervisión Información Alertas Métricas Libros Configuración de diagnóstico Registros Supervisión (clásica) Métricas (clásica) Configuración de diagnóstico (clásica) Uso (clásico)

Intervalo de tiempo: Últimas 4 horas

Información general Errores Rendimiento Disponibilidad Capacidad

Todos los datos proporcionados en esta vista de informe son métricas para el almacenamiento de Azure Monitor. Las métricas son valores numéricos que representan algunos aspectos de las solicitudes en una cuenta de almacenamiento en un momento determinado. [Más información](#)

Availability	Transactions	Success E2E Latency	Success Server Latency
100	3112	6,76	6,75
Average Percentage	Sum Count	Average Milliseconds	Average Milliseconds

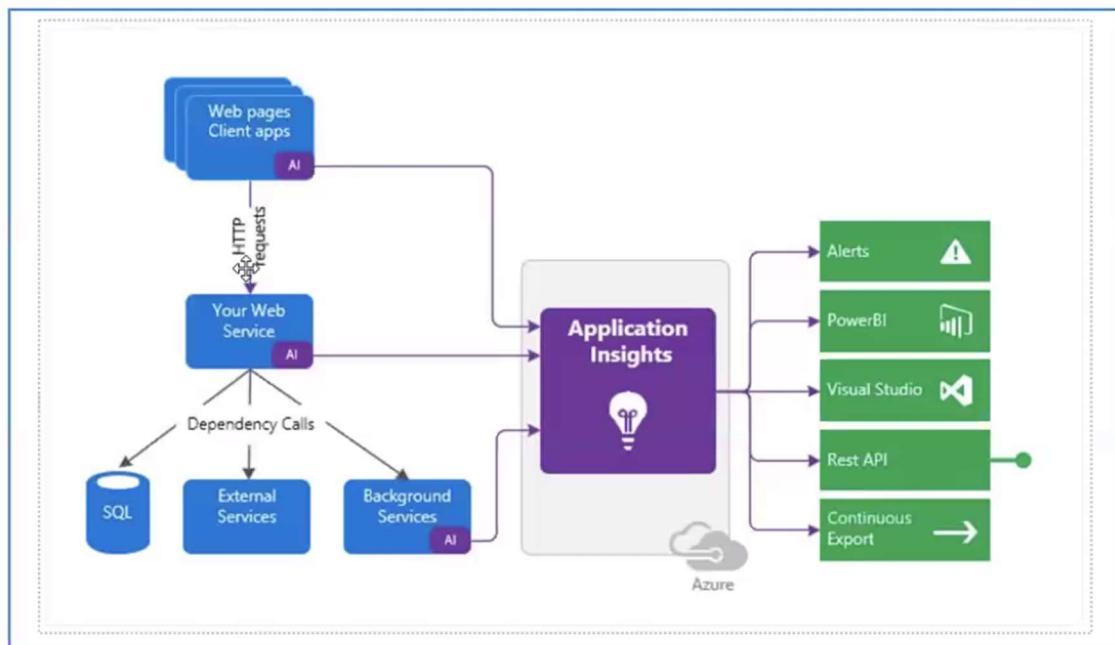
Transactions by storage type ... Transactions by API name

40 40

The screenshot shows the Azure Storage account dashboard for 'robertofunctionstorage'. The left sidebar includes links for 'Información general', 'Registro de actividad', 'Etiquetas', 'Diagnosticar y solucionar problemas', 'Control de acceso (IAM)', 'Migración de datos', 'Eventos', and 'Explorador de almacenamiento (versión preliminar)'. The main area features a 'Desglose de la solicitud' chart showing request volume over time, with a notable spike around 6 AM on Tuesday, May 18. Below the chart, metrics like 'Success (Sana)' at 22.44k and 'ClientOtherError (Sana)' at 3 are displayed. A section titled 'Herramientas de Azure Monitor adicionales' provides links to 'Supervisión a gran escala con la característica de información', 'Recibir alertas de problemas', 'Introducción a Log Analytics', and 'Configurar monitor de conexión'.

3.16.3 Azure Application insights

Application insight permite obtener información de frontend, backend y otros servicios como BBDD. Permite tambien la integracion con otros servicios.



- Application Insights helps you understand how your app is performing and how it's being used. It monitors:
 - Request rates, response times, and failure rates
 - Dependency rates, response times, and failure rates
 - Exceptions
 - Page views and load performance
 - AJAX calls from web pages
 - User and session counts.
 - Performance counters
 - Host diagnostics
 - Diagnostic trace logs
 - Custom events and metrics
- There are several ways to get started monitoring and analyzing app performance
 - At run time
 - At development time
 - Instrument your web pages
 - Analyze mobile app usage
 - Availability tests

Log-based metrics

- The Application Insights backend stores all collected events as logs, and the Application Insights blades in the Azure portal act as an analytical and diagnostic tool for visualizing event-based data from logs.
- Using logs to retain a complete set of events can bring great analytical and diagnostic value.
- Collecting a complete set of events may be impractical (or even impossible) for applications that generate a large volume of telemetry.

Pre-aggregated metrics

- Stored as pre-aggregated time series, and only with key dimensions
- The newer SDKs (Application Insights 2.7 SDK or later for .NET) pre-aggregate metrics during collection
- For the SDKs that don't implement pre-aggregation, the Application Insights backend still populates the new metrics by aggregating the events received by the Application Insights event collection endpoint

Cuando creamos una cuenta de Application Insight para un recurso, es interesante activar los servicios o funcionalidades que queremos:

Roberto Ribes (rbo)

The screenshot shows the Microsoft Azure Application Insights settings for an App Service named 'EsPueAz204Api20221018194720'. It includes sections for 'Profiler' (On), 'Snapshot debugger' (On), and 'Apply monitoring settings' (Yes). A modal dialog is open asking if changes should be applied.

También es posible crear el application insights a nivel de solución para tener más funcionalidades disponibles y para aplicaciones que no sean App Service:

The screenshot shows Visual Studio with multiple projects in the Solution Explorer. A context menu is open over one of the projects, with 'Configure Application Insights...' selected. The status bar indicates the solution contains 10 projects.

Con Application Insights activado podemos tener una aplicación que no necesita estar hospedada en App Service y que automáticamente estará disponible a nivel de nuestra aplicación:

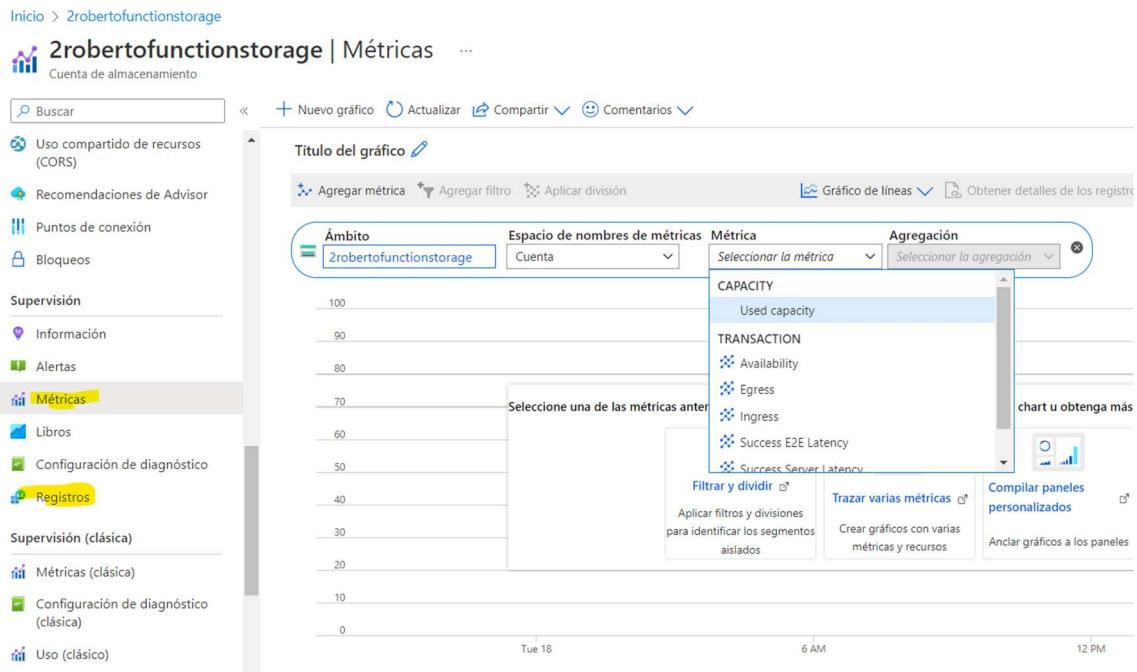
Application insights puede debugarse y la información de CPU y RAM que se visualiza es la de nuestro entorno de debug (nuestro portátil).

3.16.4 Metrics y Logs Analytics

Para cualquier otro recurso que creamos tenemos el Metrics Analytics y el Log analytics (registros y métricas).

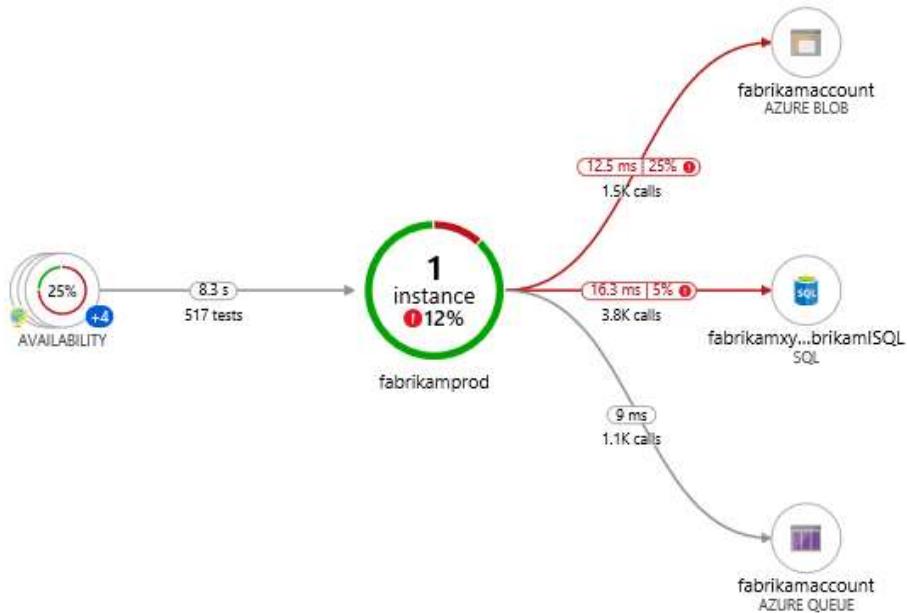
Log Analytics

Metrics Explorer



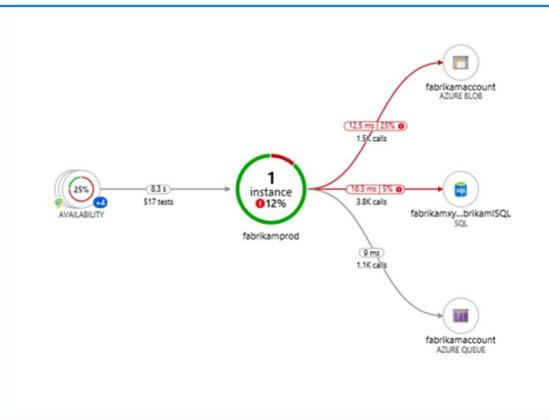
3.16.5 Application map

El Application map permite ver un diagrama de nodos con todos los servicios externos/internos y las llamadas que se están realizando.



Roberto Ribes (rbo)

- Application Map helps you spot performance bottlenecks or failure hotspots across all components of your distributed application.
- Each node on the map represents an application component or its dependencies; and has health KPI and alerts status.
- You can click through from any component to more detailed diagnostics
- Components are independently deployable parts of your distributed/microservices application



Al Application Map (Asignación de aplicaciones) se puede llegar desde Azure Insights:

Microsoft Azure

Buscar recursos, servicios y documentos (G+ /)

Inicio > Recientes > 2testresources > Az204TestRboApi > Az204TestRboApi - Application Insights > Az204TestRboApi

Az204TestRboApi | Asignación de aplicaciones

Application insights | Últimas hora - Az204TestRboApi

Buscar

Información general

Registro de actividad

Control de acceso (IAM)

Etiquetas

Diagnosticar y solucionar problemas

Investigar

Asignación de aplicaciones

Detección inteligente

Métricas en directo

Búsqueda de transacciones

Disponibilidad

Errores

Rendimiento

Guías de solución de problemas (versión preliminar)

Supervisión

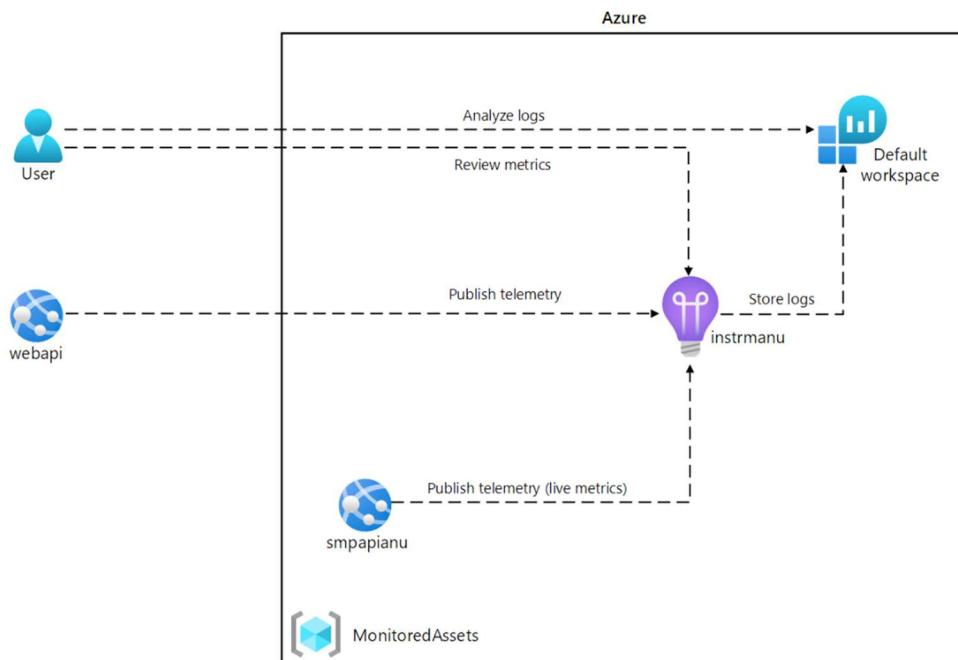
Actualizar componentes de mapa

Vista inteligente: Activado

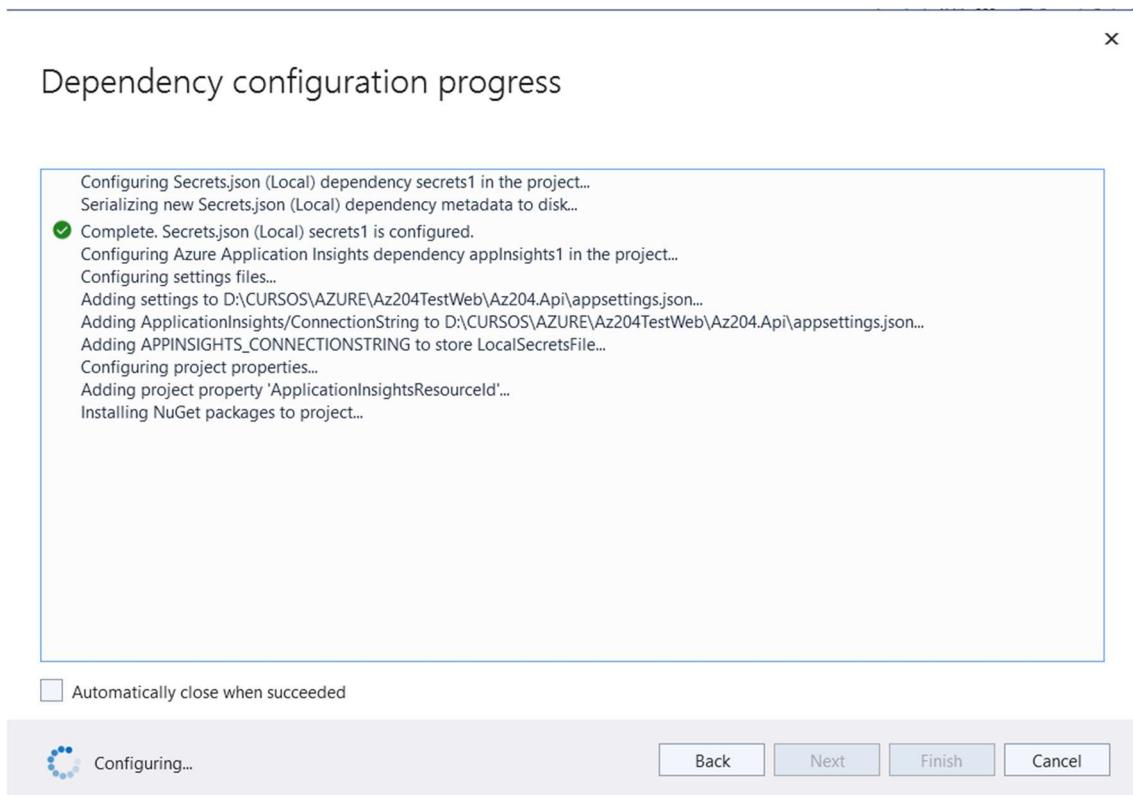
Excluir 4xx: Activado

1 instancia
149.5 ms
1 llamada
az204testrboapi

3.16.6 Ejercicio de Application Insights



Instalamos Application Insights en el Proyecto web:



Automaticamente nos instala los Nuget packages que necesitamos.

3.17 Azure Synapse Analytics

Es un servicio de análisis ilimitado que reúne integración de datos, almacenamiento de datos y análisis de macrodatos. Es un portal en la nube de big data. Podemos utilizar código SQL o código SPARK para analizar los datos.

Permite montar un Azure Storage con la opción de Data Lake y elegir la jerarquía de directorios para poder trabajar como un motor de Big Data.

A nivel de Azure Data Lake jerarquizamos y levantamos varios nodos que nos permite introducir datos de manera muy intensa y levantar nuevos nodos para mejorar la potencia de escritura/lectura.

Los datos procesados por Azure Synapse Analytics pueden ser volcados en un Cosmos DB para poder ser accedidos desde, por ejemplo, PowerBI.

3.18 Caching y content delivery en soluciones

3.18.1 Introducción

Herramientas para cachear el contenido en soluciones web o Azure.

Los ficheros estáticos (que no requieren CPU) pueden ser introducidos:

- Azure Storage.
- Cache Redis.
- Storage on CDNs.

No tiene sentido que para cada petición del usuario halla que ir a la Base de Datos (BBDD) para hacer cualquier pregunta. En ese caso, la BBDD se convierte en el cuello de botella ya que la Base de Datos escala muy mal en el caso de almacenamiento en SQL (except Blob). Puede ser interesante cachear la información que se obtiene de la BBDD para poder ser utilizada.

Si tenemos el caso en que un usuario envía una petición, entonces la BBDD entrega la información y podemos guardarla en la RAM (memoria) de nuestro servicio. El problema, es que si hay varios nodos para recibir peticiones, entonces la RAM no es un recurso compartido y el resto de nodos no tendrían la información recuperada de la BBDD.

Otra alternativa sería descargar la información de la BBDD en un *.json* que dejamos en cada uno de los nodos para información que frecuentemente se utiliza. Un aplicativo con logos de compañía centralizados en un Storage, podemos descargarlo a la memoria local y a partir de ahí atacamos siempre la copia local del recurso, reduciendo el tráfico hacia el Storage.

Por ejemplo, desde un App Service podemos definir cuánto espacio tenemos para utilizar en nuestro nodo:

Spec Picker

Recommended pricing tiers

P1V2 210 total ACU 3.5 GB memory Dv2-Series compute equivalent 68.33 EUR/Month (Estimated)	P2V2 420 total ACU 7 GB memory Dv2-Series compute equivalent 136.05 EUR/Month (Estimated)	P3V2 840 total ACU 14 GB memory Dv2-Series compute equivalent 272.10 EUR/Month (Estimated)
P1V3 195 minimum ACU/vCPU 8 GB memory 2 vCPU 78.80 EUR/Month (Estimated)	P2V3 195 minimum ACU/vCPU 16 GB memory 4 vCPU 157.60 EUR/Month (Estimated)	P3V3 195 minimum ACU/vCPU 32 GB memory 8 vCPU 315.19 EUR/Month (Estimated)

[See additional options](#)

Press Alt+A to unmute your microphone, or the SPACE key to temporarily unmute.

Included features

Every app hosted in this App Service plan will have access to these features:

- Custom domains / SSL**
Configure and purchase custom domains with SNI and IP SSL bindings
- Auto scale**
Up to 20 instances. Subject to availability.
- Staging slots**
Up to 20 staging slots to use for testing and deployments before swapping them into production.
- Daily backups**
Backup your app 50 times daily.

Included hardware

Every instance of your App Service plan will include the following hardware configuration:

Azure Compute Units (ACU) Dedicated compute resources used to run applications deployed in the App Service Plan. Learn more
Memory Memory per instance available to run applications deployed and running in the App Service plan.
Storage 250 GB disk storage shared by all apps deployed in the App Service plan.

3.18.2 Almacenamiento del Redis Cache

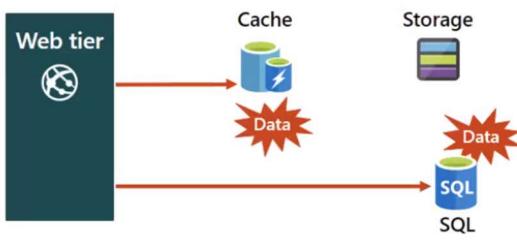
Las Caches de Redis permiten establecer un servicio que puede ser compartido para ser utilizado por todas las instancias o nodos. El Cache de Redis permite acceder a la información de manera instantánea información que de otra manera solamente podría accederse desde la BBDD.

Existe también la posibilidad de utilizar la Azure HPC Cache como alternativa con menos latencia y mayores rendimientos. El precio de este servicio es mucho más caro.

Overview

Azure Cache for Redis provides an in-memory data store based on the [Redis](#) software.

- Redis improves the performance and scalability of an application that uses backend data stores heavily.
- It's able to process large volumes of application requests by keeping frequently accessed data in the server memory, which can be written to and read from quickly.
- Redis brings a critical low-latency and high-throughput data storage solution to modern applications.



Cada objeto que utiliza la Cache tiene un tiempo de vida. Cuando ese tiempo de vida llega a su final, el cache carga de Nuevo la información.

En Azure Cache se puede guardar información para sesiones, datos, contenidos, mensajería basada en colas y transacciones distribuidas con commit (gestión de la transaccionalidad con Redis Cache a mano).

Key scenarios

Azure Cache for Redis improves application performance by supporting common application architecture patterns.

- Data cache
- Content cache
- Session store
- Job and message queuing
- Distributed transactions

3.18.3 Coste de Redis Cache y características

El coste va subiendo en función del nivel (Standard, Premium, Enterprise Flash) y las características de la instancia.

Service tiers

Azure Cache for Redis is available in these tiers:

- Basic
- Standard
- Premium
- Enterprise
- Enterprise Flash

La latencia de este Cache es el tráfico en la red ya que la recuperación de la información es instantánea.

Azure Cache for Redis

REGIONE: West US NIVEL: Premium INSTANCIA: P1: 6144 Caché de MB, 0,554 US\$/hora

Premium ①

1	x	0	x	1	x	730 Horas
partición por instancia		réplicas adicionales por partición		Instancia		

[Ver cálculo de costos ①](#)

Opciones de ahorro

Pago por uso
 1 año de reserva (Ahorro del ~36%)
 3 años de reserva (Ahorro del ~55%)

404,42 US\$ = 404,42 US\$

Cada nivel de suscripción permite utilizar una serie de características:

Descripción de la característica	Básico	Estándar	Premium	Enterprise	Enterprise Flash
Acuerdo de Nivel de Servicio (SLA) ↗	-	✓	✓	✓	✓
Cifrado de datos en tránsito	✓	✓	✓	✓	✓
Aislamiento de red	✓	✓	✓	✓	✓
Escalado	✓	✓	✓	-	-
Agrupación en clústeres de OSS	-	-	✓	✓	✓
Persistencia de los datos	-	-	✓	Vista previa	Vista previa
Redundancia de zona	-	-	✓	✓	✓
Replicación geográfica	-	-	✓	✓	✓
Módulos de Redis	-	-	-	✓	Vista previa
Import/Export	-	-	✓	✓	✓
Reboot	✓	✓	✓	-	-
Actualizaciones programadas	✓	✓	✓	-	-

3.18.4 Creación y configuración de una Redis Cache

Cada Cache que configuramos necesita:

- Nombre.
- Región.
- Tipo de suscripción.
- En red virtual o en red pública.

Create and configure an Azure Cache for Redis instance

There are several parameters you will need to decide in order to configure the cache properly for your purposes.



Microsoft Azure Search resources, services, and docs (G+/-)

Home > Azure Cache for Redis >

New Redis Cache

Basics Networking Advanced Tags Review + create

Azure Cache for Redis helps your application stay responsive even as user load increases. It does so by leveraging the low latency, high-throughput capabilities of the Redis engine. [Learn more](#)

Project details

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

Subscription *: Azure Pass - Sponsorship

Resource group *: az900

Create new

Instance Details

DNS name *: enter a name .redis.cache.windows.net

Location *: South Central US

Cache type (View full pricing details) *: Standard C1 (1 GB Cache, Replication)

See which features are available on each Azure Cache for Redis tier: [Learn more](#)

Como siempre, hay que elegir una DNS para acceder y una region. El tamaño de la cache permite varias configuraciones:



El coste de Redis Cache irá en función del tipo de cache que elijamos.

3.18.5 Operaciones con Redis Cache

Operaciones que se pueden realizar via commandos.

Accessing the Redis instance

Redis has a command-line tool for interacting with an Azure Cache for Redis as a client.

Redis supports a set of known commands.

Command	Description	Command	Description
<code>ping</code>	Ping the server. Returns "PONG".	<code>get [key]</code>	Gets a value from the cache.
<code>set [key] [value]</code>	Sets a key/value in the cache. Returns "OK" on success.	<code>exists [key]</code>	Returns '1' if the key exists in the cache, '0' if it doesn't.
<code>incr [key]</code>	Increment the given value associated with key by '1'. The value must be an integer or double value. This returns the new value.	<code>incrby [key] [amount]</code>	Increment the given value associated with key by the specified amount. The value must be an integer or double value. This returns the new value.
<code>type [key]</code>	Returns the type associated to the value for the given key .	<code>del [key]</code>	Deletes the value associated with the key .
<code>flushdb</code>	Delete all keys and values in the database.		

Con “`flushdb`” fuerzas a la base de datos a volver a leer los datos de la BBDD.

Redis ese en realidad un diccionario gigante de clave/valor (key/value).

Cuando la clave expira, ésta es borrada:

- **Adding an expiration time to values**

In Redis we expire values when they are stale by applying a time to live (TTL) to a key.

When the TTL elapses, the key is automatically deleted, exactly as if the DEL command were issued.

- Expirations can be set using seconds or milliseconds precision.
- The expire time resolution is always 1 millisecond.
- Information about expires are replicated and persisted on disk, the time virtually passes when your Redis server remains stopped (this means that Redis saves the date at which a key will expire).

```
> set counter 100
OK
> expire counter 5
(integer) 1
> get counter
100
... wait ...
> get counter
(nil)
```

3.18.6 Accediendo a Redis Cache

Es accesible a través de HTTPs utilizando la clave, esto devolverá el valor guardado en json.

Accessing a Redis cache from a client

To connect to an Azure Cache for Redis instance, you'll need the host name, port, and an access key for the cache. You can retrieve this information in the Azure portal.

- The host name is the public Internet address of your cache, which was created using the name of the cache. For example `sportsresults.redis.cache.windows.net`.
- The access key acts as a password for your cache. There are two keys created: primary and secondary.

Executing commands on the Redis cache

A popular high-performance Redis client for the .NET language is [StackExchange.Redis](#). The package is available through NuGet and can be added to your .NET code using the command line or IDE.

```
//Creating a connection

using StackExchange.Redis;
...
var connectionString = "[cache-name].redis.cache.windows.net:6380,password=[password-here],ssl=True,abortConnect=False";
var redisConnection = ConnectionMultiplexer.Connect(connectionString);
```

Once you have a `ConnectionMultiplexer`, there are 3 primary things you might want to do:

- Access a Redis Database (example below)
- Make use of the publisher/subscript features of Redis. (Outside the scope of this lesson.)
- Access an individual server for maintenance or monitoring purposes.

```
// Accessing a database
IDatabase db = redisConnection.GetDatabase();

// Example of storing a key/value in the cache
bool wasSet = db.StringSet("favorite:flavor", "i-love-rocky-road");

// Retrieving the value
string value = db.StringGet("favorite:flavor");
Console.WriteLine(value); // displays: "i-love-rocky-road"
```

Existen otros tipos de operaciones que se pueden realizar:

Method	Description
<u>CreateBatch</u>	Creates a group of operations that will be sent to the server as a single unit, but not necessarily processed as a unit.
<u>CreateTransaction</u>	Creates a group of operations that will be sent to the server as a single unit and processed on the server as a single unit.
<u>KeyDelete</u>	Delete the key/value.
<u>KeyExists</u>	Returns whether the given key exists in cache.
<u>KeyExpire</u>	Sets a time-to-live (TTL) expiration on a key.
<u>KeyRename</u>	Renames a key.
<u>KeyTimeToLive</u>	Returns the TTL for a key.
<u>KeyType</u>	Returns the string representation of the type of the value stored at key. The different types that can be returned are: string, list, set, zset and hash.

3.18.7 Almacenamiento en CDNs

Para guardar ficheros estáticos podemos utilizar una **Content Delivery Network**.

Overview

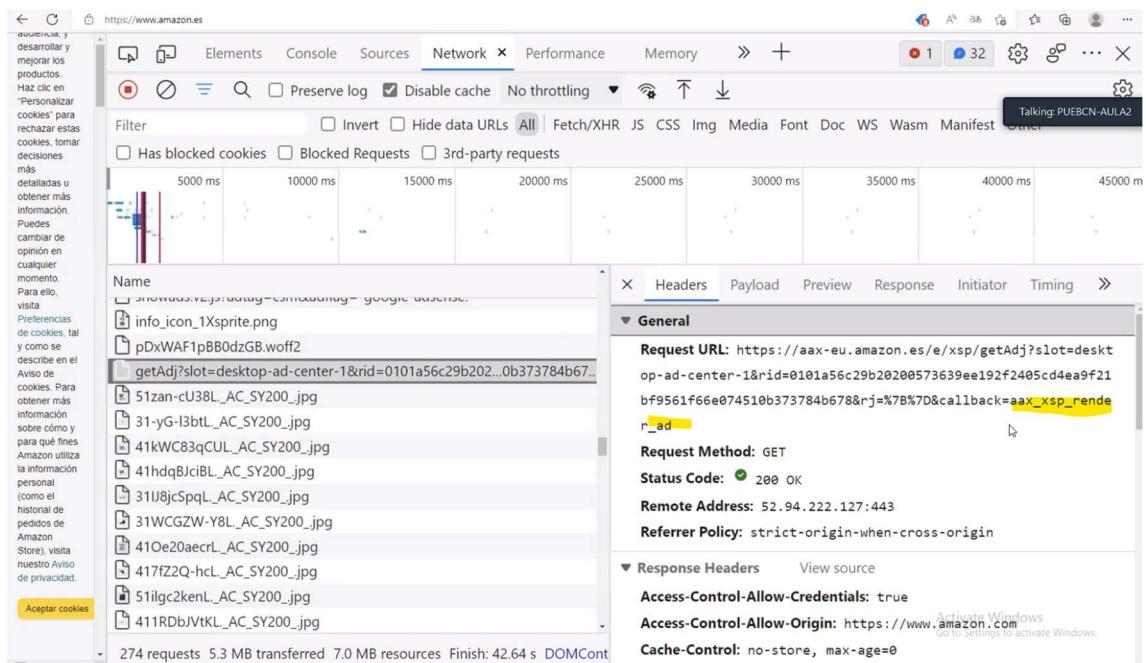
- Azure Content Delivery Network (CDN) offers developers a global solution for rapidly delivering high-bandwidth content to users by caching their content at strategically placed physical nodes across the world.
- Azure CDN can also accelerate dynamic content, which cannot be cached, by leveraging various network optimizations using CDN POPs.

Benefits

- Better performance and improved user experience for end users, especially when using applications in which multiple round-trips are required to load content.
- Large scaling to better handle instantaneous high loads, such as the start of a product launch event.
- Distribution of user requests and serving of content directly from edge servers so that less traffic is sent to the origin server.

Un CDN permite distribuir recursos ubicados globalmente para ser utilizados en el frontend de manera más rápida. Si una web necesita una imagen, la CDN puede cargar de manera estática esa imagen y evitar a la web acceder al recurso remoto en el endpoint final. Pasado un tiempo el CDN permite actualizar la foto o la información cuando se solicita acceder.

Por ejemplo, muchas webs guardan en cache imágenes con una clave. Si ese recurso caduca o cambia entonces la clave no funciona y hay que buscar de nuevo la imagen para guardarla con cache con una nueva clave.

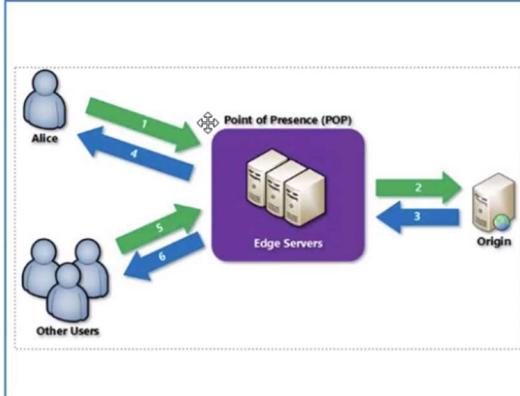


El CDN entrega contenido en la red para poder ser utilizado de manera rápida y replicada en el navegador del usuario. En teoría un CDN es más rápido que el Azure Redis Cache.

El funcionamiento es el siguiente:

How Azure Content Delivery Network works

1. Alice requests a file by using a URL with a special domain name, such as `<endpoint name>.azureedge.net`.
2. If no edge servers in the POP have the file in their cache, the POP requests the file from the origin server.
3. The origin server returns the file to an edge server in the POP.
4. An edge server in the POP caches the file and returns the file to the original requestor (Alice).
5. Additional users can then request the same file by using the same URL that Alice used.
6. If the TTL for the file hasn't expired, the POP edge server returns the file directly from the cache.



Requirements

- To use Azure CDN you need to create at least one CDN profile, which is a collection of CDN endpoints.
- Every CDN endpoint represents a specific configuration of content deliver behavior and access.
- To organize your CDN endpoints by internet domain, web application, or some other criteria, you can use multiple profiles.

Limitations

Each Azure subscription has default limits for the following resources:

- The number of CDN profiles that can be created.
- The number of endpoints that can be created in a CDN profile.
- The number of custom domains that can be mapped to an endpoint.

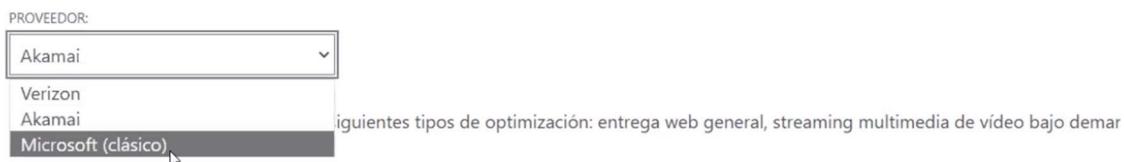
Se pueden tener diferentes CDN endpoints geográficamente habilitados para ayudar a los usuarios a cargar contenido en sus navegadores.

Sin embargo, hay limitaciones en el número de perfiles CDN que se pueden crear y número de CDN endpoints que se pueden ubicar en cada perfil.

3.18.8 Coste de Azure CDNs

Te permite desplegar diferentes CDNs por regiones con diferentes proveedores:

Content Delivery Network



Zona 1 de CDN estático: Norteamérica, Europa

1	TB	▼
---	----	---

Zona 2 de CDN estático: Asia Pacífico, Japón

0	GB	▼
---	----	---

Zona 3 de CDN estático: Brasil

Los precios son similares independientemente del proveedor que se elija. El mayor defecto diferencial es en cuantas regiones despliega CDNs.

3.18.9 Configuración de una Azure CDN

Es importante establecer el mecanismo que refresca el contenido del recurso en el CDN. Mientras el CDN no sepa que el recurso ha caducado, sigue mandando directamente al cliente el que está en el cache.

Overview

- Because a cached resource can potentially be out-of-date or stale (compared to the corresponding resource on the origin server), it is important for any caching mechanism to control when content is refreshed.
- To save time and bandwidth consumption, a cached resource is not compared to the version on the origin server every time it is accessed. Instead, as long as a cached resource is considered to be fresh, it is assumed to be the most current version and is sent directly to the client.
- A cached resource is considered to be fresh when its age is less than the age or period defined by a cache setting.

Para controlar el comportamiento bajo el que se refrescan los recursos hay dos mecanismos principales. Mientras el **contenido no haya caducado** (caching rule) o la **clave de string de la URL no haya caducado** (query string caching), seguimos utilizando el recurso que se encuentra en la CDN:

Controlling caching behavior

Azure CDNs provide two mechanisms for caching files. However, these configuration settings depend on the tier you've selected.

Caching rules in Azure CDN Standard for Microsoft are set at the endpoint level and provide three configuration options. Other tiers provide additional configuration options, which include:

- **Caching rules.**
- **Query string caching.**

With the Azure CDN Standard for Microsoft Tier, caching rules are as simple as the following three options:

- Ignore query strings.
- Bypass caching for query strings.
- Cache every unique URL.

Normalmente, CDN sirve contenido hasta que TTL caduca. Para asegurar que todos los usuarios recien la ultima version de un recurso, es recomendado incluir una clave string en la URL del recurso. Este mecanismo permite que el CDN recupere el nuevo recursos inmediatamente. De otra manera, hay que esperar a que el CDN caduque el recurso y un cliente haga una nueva petición al mismo recurso.

Content updating

- In normal operation, an Azure CDN edge node will serve an asset until its TTL expires. The edge node reconnects to the origin server when the TTL expires and a client makes a request to the same asset. The node will fetch another copy of the asset, resetting the TTL in the process.
- To ensure that users always receive the latest version of an asset, consider including a version string in the asset URL. This approach causes the CDN to retrieve the new asset immediately.
- Alternatively, you can purge cached content from the edge nodes, which refreshes the content on the next client request. You might purge cached content when publishing a new version of a web app or to replace any out-of-date assets.

Puedes crear filtros por region para que haya contenido que sea diferente en cada region o directamente no esté disponible.

Geo-filtering

- Geo-filtering enables you to allow or block content in specific countries, based on the country code.
- In the Azure CDN Standard for Microsoft Tier, you can only allow or block the entire site.
- With the Verizon and Akamai tiers, you can also set up restrictions on directory paths.

3.18.10 Accediendo al CDN

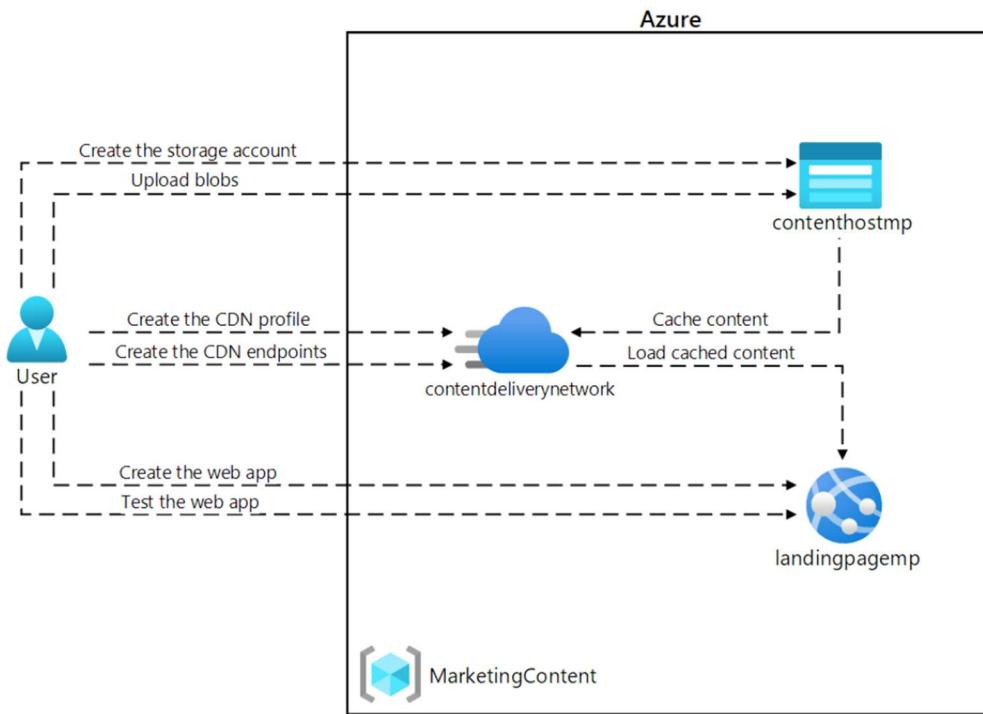
Create a CDN client

```
static void Main(string[] args)
{
    // Create CDN client
    CdnManagementClient cdn = new CdnManagementClient(new TokenCredentials(authResult.AccessToken))
    { SubscriptionId = subscriptionId };
}
```

```
private static void ListProfilesAndEndpoints(CdnManagementClient cdn)
{
    // List all the CDN profiles in this resource group
    var profileList = cdn.Profiles.ListByResourceGroup(resourceGroupName);
    foreach (Profile p in profileList)
    {
        Console.WriteLine("CDN profile {0}", p.Name);

        //List all the CDN endpoints on this CDN profile
        Console.WriteLine("Endpoints:");
        var endpointList = cdn.Endpoints.ListByProfile(p.Name, resourceGroupName);
        foreach (Endpoint e in endpointList)
        {
            Console.WriteLine("-{0} ({1})", e.Name, e.HostName);
        }
        Console.WriteLine();
    }
}
```

3.18.11 Ejercicio creando Content Delivery Network



Los requisitos son:

- Azure Storage Account.
- Azure App Service.

3.18.11.1 Crear el recurso CDN

Hay que seleccionar “Front Door and CDN Profiles”.

Roberto Ribes (rbo)

The screenshot shows the Microsoft Azure portal interface. At the top, there's a blue header bar with the Microsoft Azure logo and a search bar labeled "Buscar recursos, servicios y documentos (G+/)". Below the header, the page title is "Front Door and CDN profiles" with a Microsoft logo. There are navigation links like "Inicio >" and "...". A "Plan" dropdown menu is open, showing "Front Door and CDN profiles" with a "Crear" (Create) button next to it. The overall theme is light blue and white.

Inicio > Front Door and CDN profiles > Comparar ofertas >

Crear un perfil de Front Door ...

Microsoft Azure

This is a configuration page for creating a Front Door profile. It includes a warning message: "Al cambiar las opciones básicas, es posible que se restablezcan las selecciones realizadas. Revise todas las opciones antes de crear el perfil de Front Dc". The "Ubicación del grupo de recursos" is set to "West Europe". The "Detalles del perfil" section shows the "Nombre" as "rbocontentdelivery" (marked with a green checkmark). The "Nivel" is set to "Estándar" (Standard), which is described as "Entrega de contenido optimizada" (Content delivery optimized). The "Configuración del punto de conexión" section shows the "Nombre del punto de conexión" as "rbocontentdelivery" (marked with a green checkmark), the "Nombre de host del punto de conexión" as "rbocontentdelivery-hvbya0g9gcfdhzgt.z01.azurefd.net", the "Tipo de origen" as "App Services", and the "Nombre del host de origen" as "az204testrboapi.azurewebsites.net". There's also an unchecked checkbox for "Almacenamiento en caché".

3.18.11.2 Añadir endpoint

Para añadir endpoint podemos crear un Nuevo punto de conexión o añadirlo al existente.

Roberto Ribes (rbo)

The screenshot shows the Microsoft Azure Front Door Admin interface for the 'rboccontentdelivery' resource. The left sidebar is collapsed, and the main area displays the 'Rutas' (Routes) section for the endpoint 'rboccontentdelivery-hvbya0g9gcfdhzgt.z01.azurefd...'. A single route named 'default-route' is listed, which maps to the origin group 'default-origin-group' and is marked as 'Habilitado' (Enabled). The status bar at the top indicates 'Endpoint enabled status : Todo' and 'Endpoint provisioning state : Todo'.

Si lo añadimos al existente solamente hay que clicar en agregar ruta:

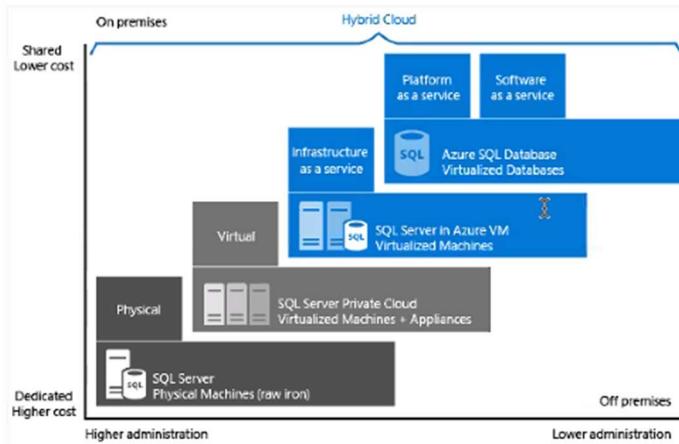
The screenshot shows the Microsoft Azure Front Door Admin interface for the 'rboccontentdelivery' resource. The left sidebar is collapsed, and the main area displays the 'Rutas' (Routes) section for the endpoint 'resources-route-cthgbggfcacf3ag.z01.azurefd.net'. The table is empty, showing the message 'No hay ningún resultado.' (No results found.).

En todo caso si existen ya rutas podemos utilizar la existente:

Rutas	Dominios	Grupo de origen	Estado	Estado de aprovisionamiento
default-route	1 seleccionadas	default-origin-group	✓ Habilitado	✓ Correcto
rbocontentdelivery-hvbya0g9gcfhzgt.z01.azurefd...				

3.19 Azure SQL Database

Comparación de servicios



Explore los servicios de base de datos de Azure SQL

<p>SQL Server en Azure Virtual Machines</p> <p>Migre sus cargas de trabajo de SQL a Azure con facilidad, al tiempo que mantiene toda la compatibilidad con SQL Server y el acceso a nivel de sistema operativo.</p>	<p>Azure SQL Managed Instance</p> <p>Modernice sus aplicaciones personalizadas y proporcionadas por el proveedor de SQL Server a escala y a su propio ritmo, con un servicio inteligente y totalmente administrado.</p>	<p>Azure SQL Database</p> <p>Admita aplicaciones en la nube modernas en un servicio inteligente totalmente administrado que incluye proceso sin servidor y almacenamiento de hiperescala.</p>	<p>Azure SQL Edge</p> <p>Amplíe sus aplicaciones a puentes de enlace y dispositivos IoT perimetrales para obtener información en tiempo real en entornos conectados, desconectados o híbridos.</p>
--	--	--	---

- **SQL Server en Azure Virtual Machine.** SQL Server en Azure Virtual Machines forma parte de la familia de Azure SQL de bases de datos. Migre sus cargas de trabajo de SQL Server a la nube para obtener el rendimiento y la seguridad de SQL Server combinados con la flexibilidad y la conectividad híbrida de Azure. Reduzca el costo total de propiedad (TCO) y obtenga una administración automatizada y de seguridad.

integrada y gratuita al registrar las máquinas virtuales (VM) con la extensión de SQL Server IaaS Agent sin coste adicional.

- **Azure SQL Managed Instance.** SQL Managed Instance es un servicio inteligente de base de datos en la nube que combina la compatibilidad del motor de SQL Server más reciente (de vuelta a SQL Server 2008) con las ventajas de una plataforma como servicio completamente administrada y actualizada. Con la evaluación correcta en Azure Migrate o Azure Data Studio, modernice con confianza sus aplicaciones personalizadas y proporcionadas por el proveedor en Azure.
- **Azure SQL Database.** Azure SQL Database es un servicio de base de datos relacional totalmente administrado y siempre actualizado creado para la nube. Cree su próxima aplicación con la simplicidad y flexibilidad de una base de datos multimodelo que se escala para satisfacer la demanda.

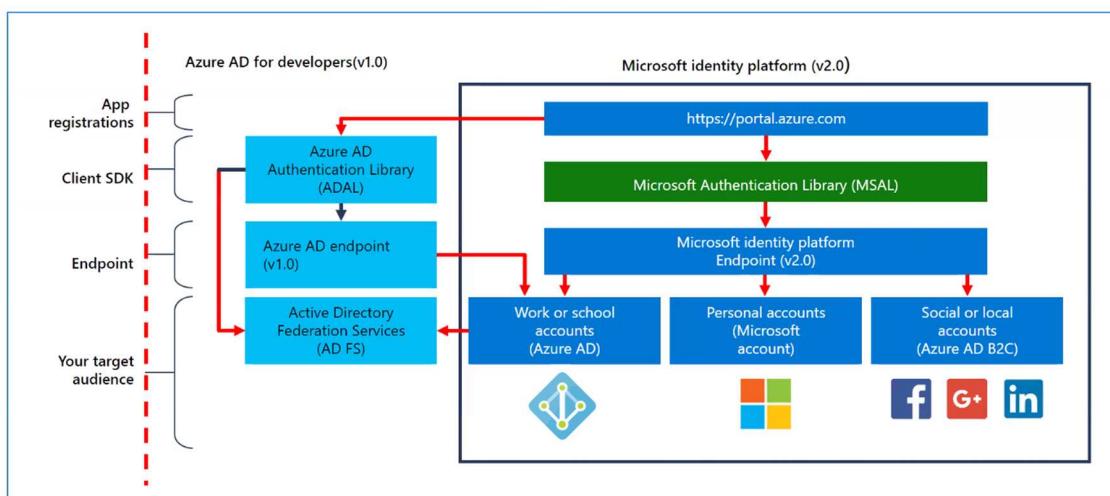
3.20 Autenticación y autorización con Azure

3.20.1 Introducción

Con el Azure AD ya deprecado, podemos centralizar las identidades de usuarios, aplicaciones, grupos de seguridad y roles.

El primer paso sería registrar la aplicación para tener una identidad y permitir que la aplicación se conecte a Azure. De esta manera se evita que un usuario tenga que introducir usuario/contraseña y la propia aplicación se convierte en usuario. Podemos también establecer registros a partir del rango IPs con el que una aplicación se conecta.

Para acceder al Microsoft Identity Platform podemos usar las librerías MSAL y así consumir todos los servicios publicados. A través del portal utilizamos MSAL para conectar al Microsoft Identity Platform Endpoint



3.20.2 Registrando aplicaciones

Podemos registrar aplicaciones en Azure para que sean “Single tenant” (solo accesible en un tenant) o “Multi-tenant”.

Si registramos la aplicación en un portal, entonces en el “home tenant” se creará la aplicación que se conecta y el “service principal” que hace de enlace entre la aplicación y el acceso a servicios de Azure.

When you register an app in the Azure portal, you choose whether it is:

- Single tenant: only accessible in your tenant
- Multi-tenant: accessible in other tenants

If you register an application in the portal, below objects are automatically created in your home tenant.

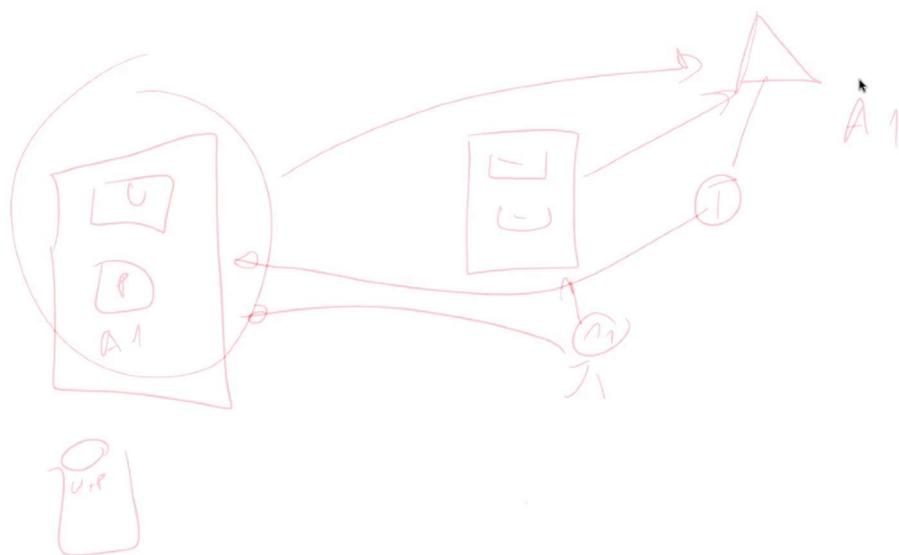
- Application object
- Service principal object - Application, Managed identity, Legacy

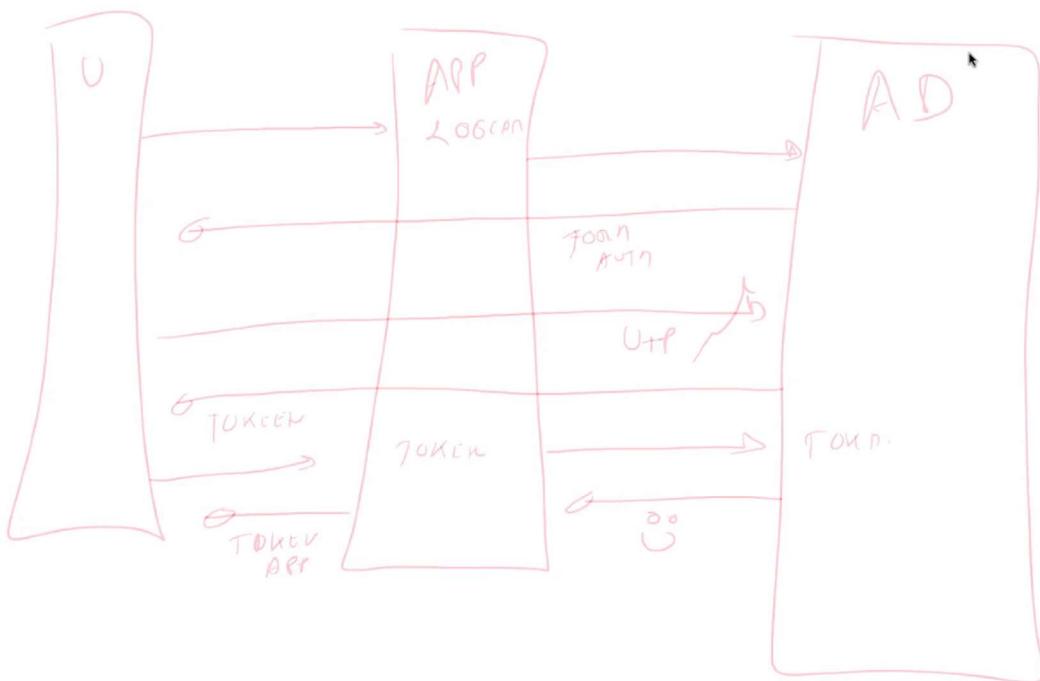
Relationship between application objects and service principals

An application object has:

- A 1:1 relationship with the software application, and
- A 1:many relationship with its corresponding service principal object

Esto se puede visualizar de la siguiente manera:





1. Usuario hace petición de Login a la aplicación.
2. La aplicación envia la petición al Active Directory.
3. El Active Directory envía al usuario el formulario de autenticación.
4. El usuario rellena el formulario con usuario/contraseña.
5. El Active Directory envía token a usuario.
6. Usuario conecta a la aplicación con token de sesión.
7. La aplicación envia el token de sesión a Active Directory.
8. Active Directory contesta a la aplicación si el token de sesión es correcto o no.
9. La aplicación envía al usuario el token de sesión con la aplicación.

Como se ve, todo está centralizado con el Active Directory.

3.21 Azure Key Vault

3.21.1 Introducción

Azure Key Vault provides

- **Secrets Management:** For safe storage and strict control
- **Key Management:** Used as a key management solution
- **Certificate Management:** Provision, manage, and deploy public and private SSL/TLS certificates

Key benefits of using Azure Key Vault:

- **Centralized application secrets:** Control their distribution.
- **Securely store secrets and keys:** Requires proper authentication and authorization to gain access
- **Monitor access and use:** Enable logging to monitor activity.
- **Simplified administration of application secrets:** Follow the life cycle and have high availability.

Three ways to authenticate

- **Managed identities for Azure resources:** When you deploy an app on a virtual machine in Azure, you can assign an identity to your virtual machine that has access to Key Vault.
- **Service principal and certificate:** You can use a service principal and an associated certificate that has access to Key Vault.
- **Service principal and secret:** Although you can use a service principal and a secret to authenticate to Key Vault, we don't recommend it.

Two ways to obtain a service principal

- Enable a system-assigned managed identity for the application deployed to a variety of services.
- If you cannot use managed identity, you instead register the application with your Azure AD tenant.

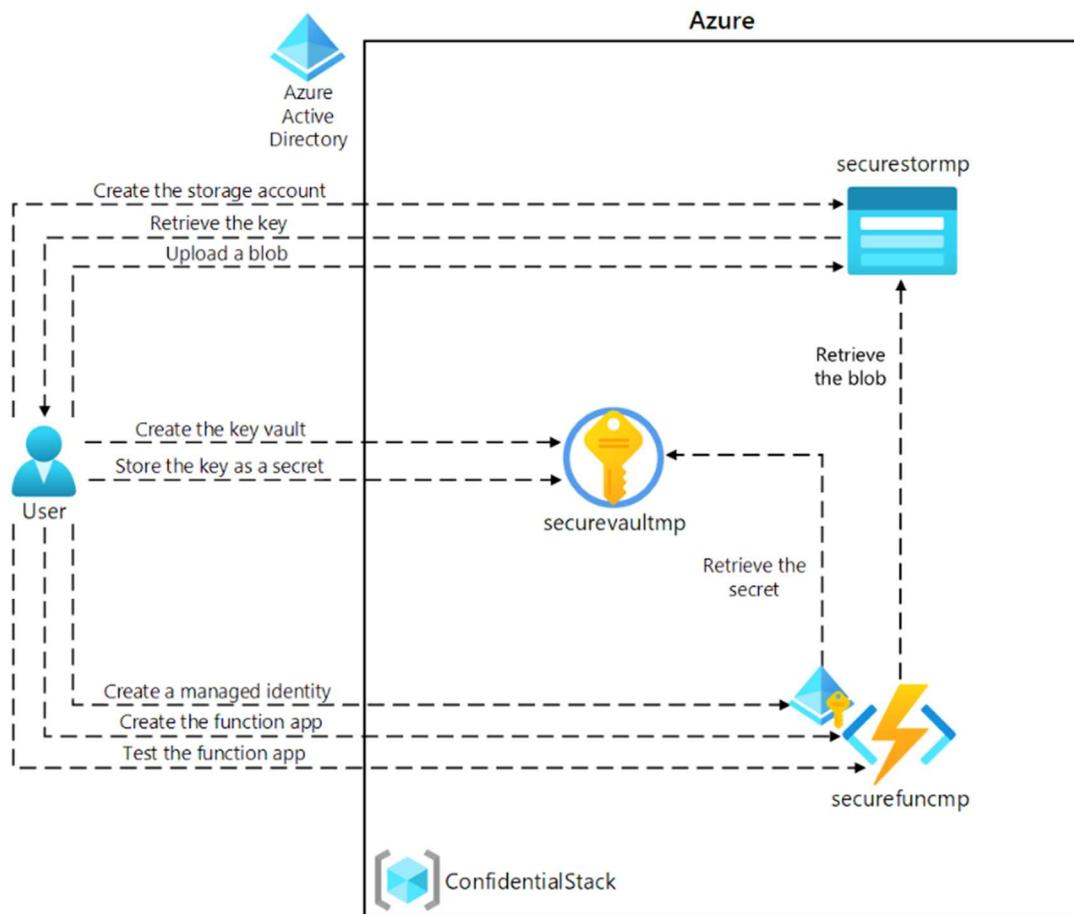


Note: It is recommended to use a system-assigned managed identity.

Best practices

- **Use separate key vaults:** Recommended to use a vault per application per environment.
- **Control access to your vault:** Key Vault data is sensitive and business critical.
- **Backup:** Create regular back ups of your vault on update/delete/create of objects within a Vault.
- **Logging:** Be sure to turn on logging and alerts.
- **Recovery options:** Turn on soft-delete and purge protection if you want to guard against force deletion of the secret.

Architecture diagram



Ejemplo de uso de Key Vault

Roberto Ribes (rbo)

3.21.2 Creando Key Vault

The screenshot shows the 'Create a key vault' wizard in the Microsoft Azure portal. The 'Basics' tab is selected. The 'Subscription' dropdown is set to 'Visual Studio Enterprise'. The 'Region' dropdown is set to 'East US'. Under 'Pricing tier', 'Standard' is selected. In the 'Recovery options' section, 'Soft-delete' is enabled, and 'Days to retain deleted vaults' is set to 90. The 'Purge protection' section has 'Disable purge protection' selected.

Cuando tenemos que seleccionar el permiso de acceso:

The screenshot shows the 'Access policy' configuration page. Under 'Access configuration', 'Vault access policy' is selected. Under 'Resource access', 'Azure Virtual Machines for deployment' is checked. Under 'Access policies', a table lists a single user policy: 'manuel.martinez.m@gmail.com' with 'Get, List, Update, Create, Import, Delete, Recover, Backup, Restore, Get ...' permissions.

La opción de “Vault access policy” requiere definir las políticas de acceso en el propio Key Vault. En cualquier otro caso utilizar acceso con roles. La creación de estas policies también se puede hacer desde el menu del recurso.

En caso de crear policies se pueden crear permisos:

Create an access policy X

① Permissions ② Principal ③ Application (optional) ④ Review + create

Configure from a template
Select a template ▼

Key permissions	Secret permissions	Certificate permissions
Key Management Operations	Secret Management Operations	Certificate Management Operations
<input type="checkbox"/> Select all	<input type="checkbox"/> Select all	<input type="checkbox"/> Select all
<input type="checkbox"/> Get	<input checked="" type="checkbox"/> Get	<input type="checkbox"/> Get
<input checked="" type="checkbox"/> List	<input type="checkbox"/> List	<input type="checkbox"/> List
<input type="checkbox"/> Update	<input type="checkbox"/> Set	<input type="checkbox"/> Update
<input type="checkbox"/> Create	<input type="checkbox"/> Delete	<input type="checkbox"/> Create
<input type="checkbox"/> Import	<input type="checkbox"/> Recover	<input checked="" type="checkbox"/> Import
<input type="checkbox"/> Delete	<input type="checkbox"/> Backup	<input type="checkbox"/> Delete
<input type="checkbox"/> Recover	<input type="checkbox"/> Restore	<input type="checkbox"/> Recover
<input type="checkbox"/> Backup		<input type="checkbox"/> Backup
<input type="checkbox"/> Restore		<input type="checkbox"/> Restore
Cryptographic Operations	Privileged Secret Operations	
<input type="checkbox"/> Select all	<input type="checkbox"/> Select all	<input type="checkbox"/> Manage Contacts
<input type="checkbox"/> Decrypt	<input type="checkbox"/> Purge	<input type="checkbox"/> Manage Certificate Authorities
<input type="checkbox"/> Encrypt		<input type="checkbox"/> Get Certificate Authorities
<input checked="" type="checkbox"/> Unwrap Key		<input type="checkbox"/> List Certificate Authorities
<input type="checkbox"/> Wrap Key		<input type="checkbox"/> Set Certificate Authorities
<input type="checkbox"/> Verify		<input type="checkbox"/> Delete Certificate Authorities
<input type="checkbox"/> Sign		
Privileged Key Operations		Privileged Certificate Operations
<input type="checkbox"/> Select all		<input type="checkbox"/> Select all
<input type="checkbox"/> Purge		<input type="checkbox"/> Purge
<input type="checkbox"/> Release		
Rotation Policy Operations		
<input type="checkbox"/> Select all		
Activate Windows Go to Settings to activate Windows.		

Previous Next

Para distintos usuarios/roles/aplicaciones:

Create an access policy

X

Permissions Principal Application (optional) Review + create

Only 1 principal can be assigned per access policy.
Use the new embedded experience to select a principal. The previous popup experience can be accessed here. [Select a principal](#)

Search by object ID, name, or email address

-  aciapi
c5b17a4f-cc6f-4649-9480-684280a2af3a
-  AD Hybrid Health
6ea8091b-151d-447a-9013-6845b83ba57b
-  Afdx Resource Provider
92b61450-2139-4e4a-a0cc-898eced7a779
-  AI900_ML
4b9a6fe9-da85-4008-b9a4-fd725d033647
-  Application Insights Configuration Service
6a0a243c-0886-468a-a4c2-eff52c7445da
-  AzNet Security Guard
38808189-fa7a-4d8a-807f-eba01edacca6
-  Azure Application Change Service
3edcf11f-df80-41b2-a5e4-7e213cca30d1
-  Azure Container Instance Service
6bb8e274-af5d-4df2-98a3-4fd78b4cafcd
-  Azure Container Scale Sets
63ea3c01-7483-456e-8073-d3fed34fbdda
-  Azure Cosmos DB Virtual Network To Network Resource Provider

Selected item

No item selected

Roberto Ribes (rbo)

Create an access policy

Permissions Principal Application (optional) Review + create

Authorizes this application to perform the specified permissions on the User's or Group's behalf.
Use the new embedded experience to select an application. The previous popup experience can be accessed here. [Select an application](#)

Search by object ID, name, or email address

- Microsoft.Azure.ActiveDirectoryIUX
bb8f18b0-9c38-48c9-a847-e1ef3af0602d
- Microsoft.EventGrid
4962773b-9cdb-44cf-a8bf-237846a00ab7
- MicrosoftAppPlatEMA
dee7ba80-6a55-4f3b-a86c-746a9231ae49
- MS-PIM
01fc3a7-78ba-4d2f-a4b7-768e336e890e
- NetworkTrafficAnalyticsService
1e3e4475-288f-4018-a376-df66fd7fac5f
- NFV Resource Provider
328fd23b-de6e-462c-9433-e207470a5727
- VS DevTest Lab
1a14be2a-e903-4cec-99cf-b26209259a0f
- Windows Azure Service Management API
797f4846-ba00-4fd7-ba43-dac1f8f63013
- Windows.Azure.DeviceRegistration
01cb2876-7ebd-4aa4-9cc9-d28bd4d359a9

Only the first 50 results are shown. Please include a search term to get more specific results.

Selected item

No item selected

3.21.3 Creando un secreto

Microsoft Azure

Home > secretosmuysecretos | Overview > secretosmuysecretos | Secrets >

Create a secret ...

Upload options	Manual
Name *	ClaveSecreta
Secret value *	Enter the secret.
Content type (optional)	
Set activation date	<input type="checkbox"/>
Set expiration date	<input type="checkbox"/>
Enabled	<input checked="" type="radio"/> Yes <input type="radio"/> No
Tags	0 tags

Podemos seleccionar si la información expira o desde cuando está active.

3.21.4 Obteniendo secreto

Es mejor obtener el secreto desde código.

Roberto Ribes (rbo)

secretosmuysecretos | Secrets

Name Type Status

Name	Type	Status
ClaveSecreta		Enabled

View sample code

The Azure Key Vault secret client allows you to manage secrets. The following code sample demonstrates how to create a client, set a secret, retrieve a secret, and delete a secret.

Create a file named Program.cs that contains this code.

```
using System;
using System.Threading.Tasks;
using Azure.Identity;
using Azure.Security.KeyVault.Secrets;
using Microsoft.Extensions.Configuration;
namespace key_vault_console_app
{
    class Program
    {
        static async Task Main(string[] args)
        {
            const string secretName = "SECRET_NAME";
            var keyVaultName = "KEY_VAULT_NAME";
            var kvUri = $"https:///{keyVaultName}.vault.azure.net";
            var client = new SecretClient(new Uri(kvUri), new DefaultAzureCredential());
            var secretValue = "SECRET_VALUE";
            await client.SetSecretAsync(secretName, secretValue);
            Console.WriteLine($"Creating a secret in {keyVaultName} called '{secretName}'");
            await client.DeleteSecretAsync(secretName);
        }
    }
}
```

Otra opción es generar la clave RSA con certificado para acceder a secretos:

Home > secretosmuysecretos | Keys > rsaSectreta >

 **bf05ea4f31504f5392873597b9d5e6a4** ✎ ⋮

Key Version

 Save  Discard changes  Download public key

Properties

Key type	RSA
RSA key size	2048
Created	10/25/2022, 8:46:57 PM
Updated	10/25/2022, 8:46:57 PM

Key Identifier <https://secretosmuysecretos.vault.azure.net/keys/rsaSectreta/bf05ea4f31504f5392873597b9d5e6a4> 

Settings

Set activation date ⓘ

Set expiration date ⓘ

Enabled  Yes  No

Tags 0 tags

Permitted operations

Encrypt

Decrypt

Sign

Verify

Wrap Key

Unwrap Key

3.21.5 Creando una identidad administrada

Nos permite crear identidades para que, por ejemplo, nuestras aplicaciones puedan acceder a Key Vault.

Roberto Ribes (rbo)

No managed identities to display
Try changing or clearing your filters.
[Create managed identity](#)
[Learn more](#)

Al final es como crear un usuario al que se pueden asignar roles:

Subscription	Resource Type	Assigned To	Condition
Azure Pass - Sponsorship (2b5c5ccb-5390-4d33-993d-099cc698f883)		Visual Studio Enterprise	

3.21.6 Azure App Configuration

Podemos distribuir la configuración de nuestros servicios y aplicaciones de manera distribuida y segura (*https*). De esta manera, los archivos de configuración se encuentran en un lugar separado.

Application configuration provides benefits:

- A fully managed service that can be set up in minutes
- Flexible key representations and mappings
- Tagging with labels
- Point-in-time replay of settings
- Dedicated UI for feature flag management
- Comparison of two sets of configurations on custom-defined dimensions
- Enhanced security through Azure-managed identities
- Complete data encryptions, at rest or in transit
- Native integration with popular frameworks

App Configuration implementation scenarios:

- Centralize management and distribution of hierarchical configuration data for different environments and geographies
- Dynamically change application settings without the need to redeploy or restart an application
- Control feature availability in real-time

Centraliza y administra la jerarquía de configuraciones key-value (como un *GlobalAppConfig.xml*).

Se trata además de un servicio dinámico, si se realizan cambios en las settings, estos se actualizan automáticamente y los nuevos valores están disponibles.

The easiest way to add an App Configuration store to your application is through a client library that Microsoft provides.

Programming language and framework	How to connect
.NET Core and ASP.NET Core	App Configuration provider for .NET Core
.NET Framework and ASP.NET	App Configuration builder for .NET
Java Spring	App Configuration client for Spring Cloud
Others	App Configuration REST API

Encrypt configuration data by using customer-managed keys

Enable customer-managed key capability:

- Standard tier Azure App Configuration instance
- Azure Key Vault with soft-delete and purge-protection features enabled
- An RSA or RSA-HSM key within the Key Vault

Allow Azure application configuration to use Key Vault keys:

- Assign a managed identity to the Azure App Configuration instance
- Grant the identity permissions in the target Key Vault's access policy.

Private endpoints and managed identities

Use private endpoints for Azure App Configuration

- Secure your application configuration details by configuring the firewall to block all connections to App Configuration on the public endpoint.
- Increase security for the virtual network (VNet) ensuring data doesn't escape from the VNet.
- Securely connect to the App Configuration store from on-premises networks that connect to the VNet using VPN or ExpressRoutes with private-peering.

Managed identities

- A system-assigned identity is tied to your configuration store. It's deleted if your configuration store is deleted. A configuration store can only have one system-assigned identity.
- A user-assigned identity is a standalone Azure resource that can be assigned to your configuration store. A configuration store can have multiple user-assigned identities.

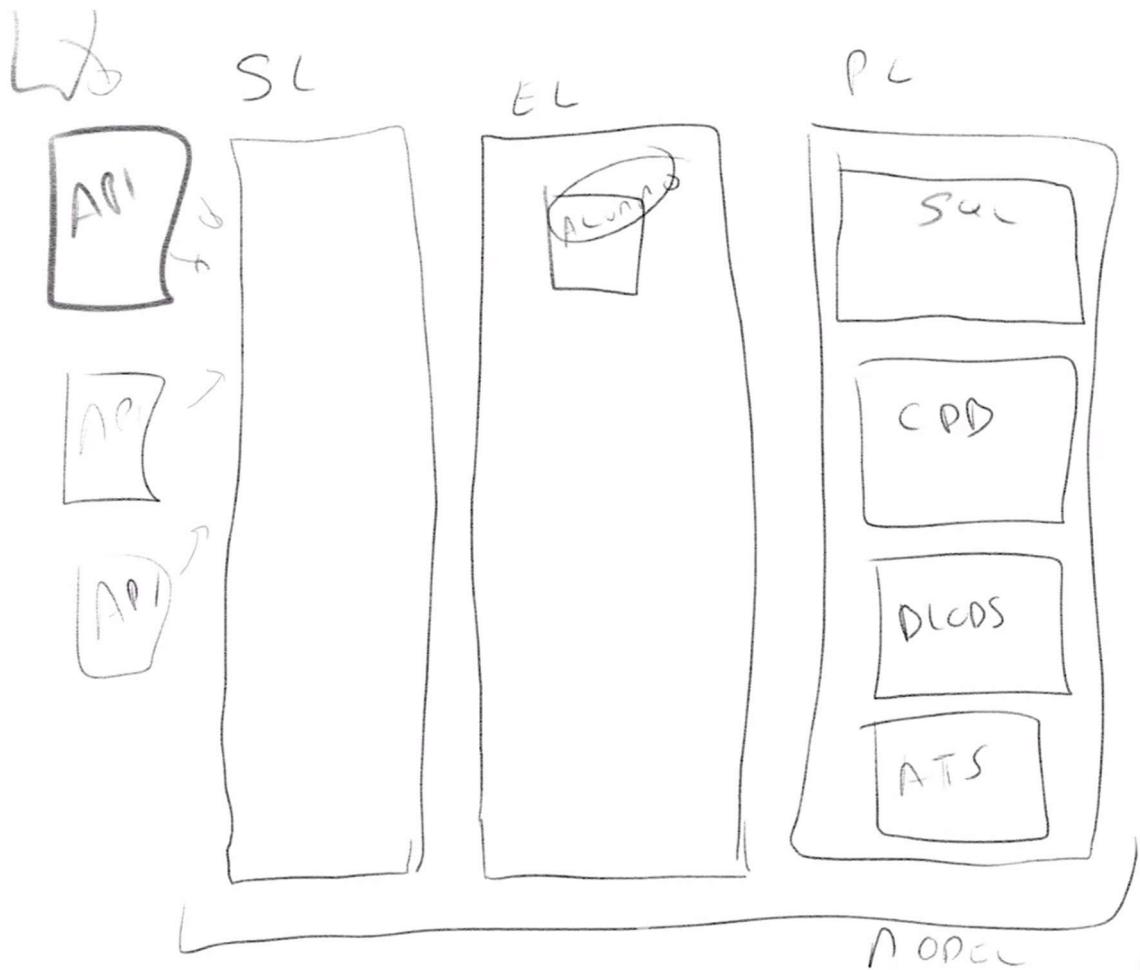
3.22 Diseñando aplicaciones

3.22.1 Repositorio ejemplo

<https://github.com/reb0rt081/Az204Training>

3.22.2 Introducción

Aplicación stateless y persistencia agnóstica en cualquier tecnología.



3.22.3 Capa de presentación

La capa de presentación suele ser una web API. La aplicación llama a la API y conecta con la capa de servicios. Para abrir esa API el mundo podemos crear una serie de aplicaciones que se conectan al negocio a través de APIs. Estas APIs se pueden exponer a internet a través de Azure.

Hoy en día, la mayoría de tecnologías Web (Angular, Reacts, VUE.js) se basan en traspasar al FrontEnd (el ordenador del cliente) la mayoría de cálculos y de lógica que sino se haría en el BackEnd.

3.22.4 Capa de servicios

Es la capa que ejecuta el modelo de negocio. Expone la lógica necesaria a la capa de presentación para que el usuario, a través de la interfaz, interactúe con las funcionalidades de la aplicación.

3.22.5 Capa de persistencia

Diferentes alternativas:

- SQL.

- **CosmosDB.** Base de datos NoSQL de Azure donde se pueden montar diferentes tecnologías.
- **Blobs.** Se suele utilizar para ficheros.
- **Azure Table Storage.**

El modelo SQL se creó en una época en la que la memoria era un factor limitante y era necesario impedir información duplicada y reutilizar al máximo. El coste, por contra, tener que crear capas lógicas muy complejas con estructuras relacionales.

A veces para recuperar una entidad necesitamos ejecutar multiples joins y para insertar esa entidad necesitamos ejecutar multiples inserts. Esto provoca problemas de rendimiento.

En cambio, hoy que el espacio no es un factor limitante, se pueden utilizar tecnologías que persisten la información de manera bruta y que sea accessible rápidamente y sin problemas de rendimiento.

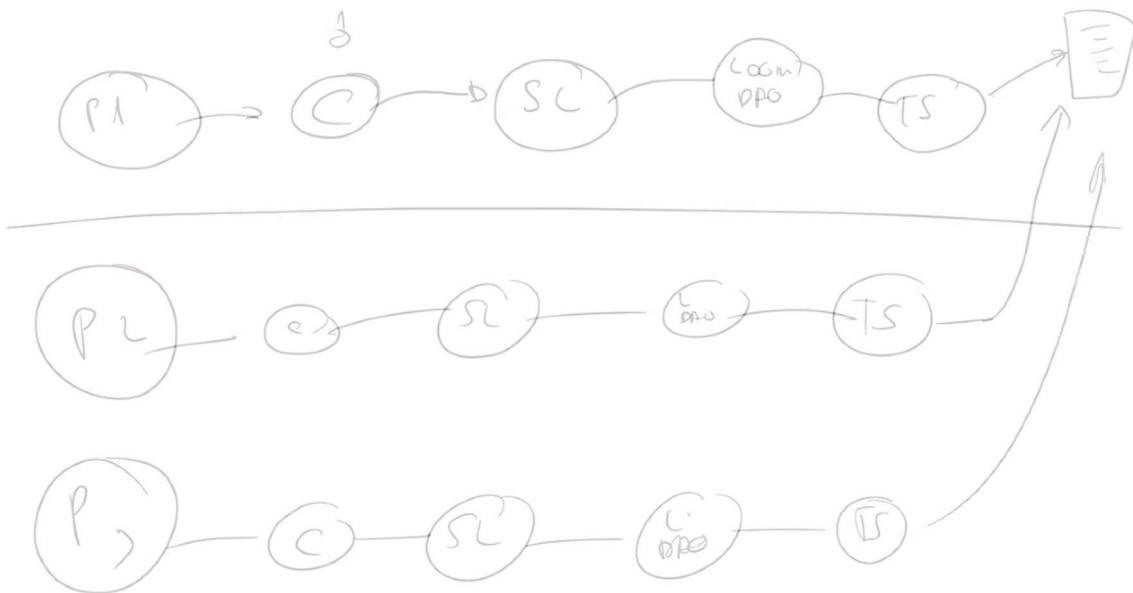
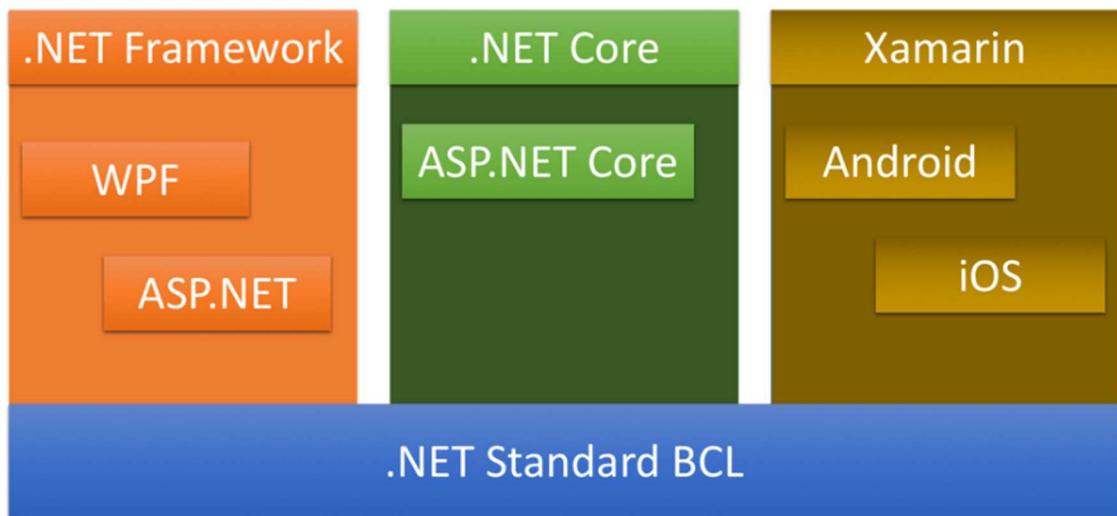
3.22.6 Autenticación

Necesitamos introducir usuario/contraseña y guardarlos en un lugar seguro. Con el Azure Table Storage permite indexer la clave de partición (login) y el hash de password: podemos buscar fácilmente si hay algun match en la tuple usuario/password. Es una alternativa al CosmosDB mucho más barata aunque hay inconvenientes en la estrategia de indexación del Azure Table Storage.

Hoy en día, las aplicaciones deben diseñarse con protocolo HTTPS por defecto. De esta manera hay todo el soporte TLS 1.0 y 2.0.

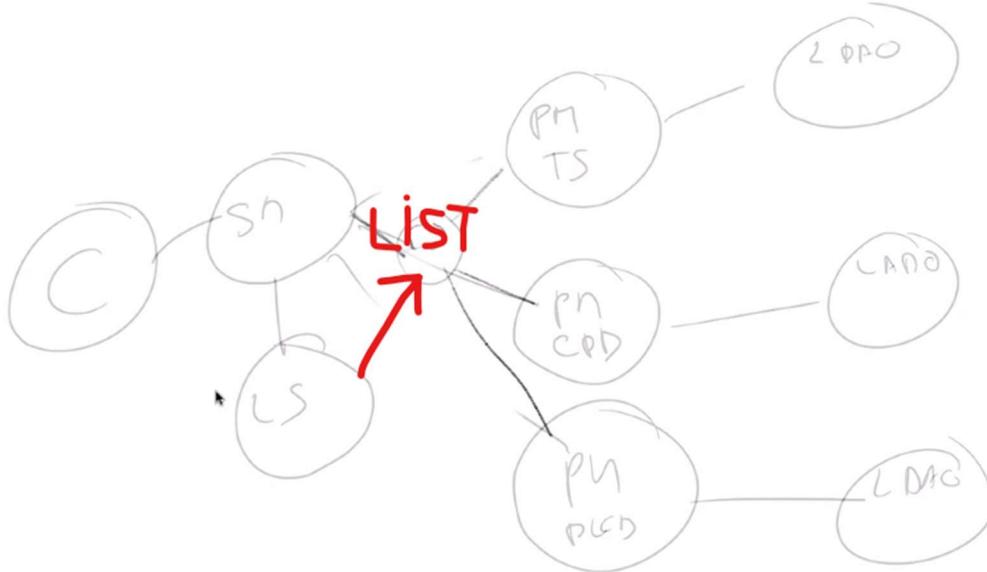
3.22.7 Arquitectura

Una aplicación stateless no guarda estados a nivel de aplicación. Nuestro framework ASP.NET instancia un objeto de controlador de eventos por cada petición que recibe. Por defecto, el framework de ASP.NET no genera una única instancia de controlador de eventos para todas las peticiones (singleton). Hay que intentar evitar que las peticiones comparten instancias e información. Así, cada instancia tendrá su propio controlador de eventos que realiza las llamadas.



Dada una petición de entrada, levantamos toda la estructura necesaria de memoria y para dar la respuesta y luego destruimos el objeto. Con singleton, reutilizando objetos es muy sencillo que cometamos errores de datos o seamos más vulnerables. Esta arquitectura stateless permite escalar mucho más flexiblemente a distintos nodos que se encargan de gestionar las peticiones.

Dada una misma petición, todas las operaciones para escribir en una base de datos, los datos, los servicios, las instancias y la petición se reutilizan a lo largo de toda la petición. Posteriormente, toda la estructura levantada tiene que eliminarse cuando la petición se responde.



Como se puede ver en este ejemplo, el Controlador (C) contacta con el Service Manager (SM). Éste encuentra el Login Service (LS) que selecciona de una lista al Persistence Manager (PM) que por contrato se encarga de gestionar la petición recibida. Por ejemplo, un PM para datos Blob, otro PM para Table Storage o CosmosDB.

3.22.8 Azure Table Storage en nuestra app

En el caso de nuestra app usaremos Table Storage:

- **PartitionKey:** login name. No es la mejor opción porque deberíamos particionar mayor.
- **RowKey:** hash del password.

Al final la tupla PartitionKey-RowKey tiene que ser única.

The screenshot shows the Azure Storage browser interface for the 'az204bcn' storage account. The left sidebar lists various storage services: Overview, Activity log, Tags, Diagnose and solve problems, Access Control (IAM), Data migration, Events, and Storage browser. The 'Storage browser' option is selected. The main pane displays the 'Tables' section, specifically the 'test' table. The table has columns: PartitionKey, RowKey, and Timestamp. A message at the bottom states 'Showing all 0 items'. The top navigation bar includes links for Add entity, Refresh, Delete, and Edit columns, along with a search bar and a favorites icon.

3.22.9 Azure Blob Storage en nuestra app

Queremos que la aplicación nos guarde un log de todas las peticiones que entran en la web y suba un fichero .json a un Blob storage con la petición completa.

Roberto Ribes (rbo)

The screenshot shows the Microsoft Azure Storage browser interface. On the left, there's a sidebar with options like Overview, Activity log, Tags, Diagnose and solve problems, Access Control (IAM), Data migration, Events, and Storage browser. The main area shows a storage account named 'az204bcn'. Under 'Tables', there is a table named 'logins'. A single row is displayed with the following columns: PartitionKey (profe), RowKey (12345), Timestamp (2022-09-27T17:30:36.98...), and Id (3fa85f64-5717-4562-b3fc-2c963f66af6). The table has columns for PartitionKey, RowKey, Timestamp, and Id.

Creamos una clase que implementa `IAsyncActionFilter`, recibe toda la información que necesita antes de establecer la ruta.

The screenshot shows the Visual Studio code editor with a file named 'AzureLogFilterAttribute.cs'. The code implements the `IAsyncActionFilter` interface with a single method: `OnActionExecutionAsync`. Inside this method, a `NotImplementedException` is thrown. A tooltip is shown over the `OnActionExecutionAsync` method, providing details about the parameters: `ActionExecutingContext context, ActionExecutionDelegate next`. The `context` parameter is described as `[Microsoft.AspNetCore.Mvc.Filters.ControllerActionInvoker.ActionExecutingContext]`.

Con toda esta información, lo único que vamos a hacer es subir la información HTTP o JSON a un Blob storage y el resto de la información de logging en Azure Table Storage.

La información Blob:

The screenshot shows the Microsoft Azure Storage Explorer interface. It's connected to a storage account named 'ribesstorageaccount'. In the left sidebar, there are sections for Información general, Registro de actividad, Etiquetas, Diagnóstico y solución de problemas, Control de acceso (IAM), Migración de datos, Eventos, Explorador de almacenamiento (versión preliminar), Almacenamiento de datos, Seguridad y redes, and a download progress bar for 'dotnet-sdk-6.0.40...exe'. The main area shows a blob named '2547fc28-aa96-49bd-91a2-73bd42569e16.json'. The properties pane on the right provides detailed information about the blob, including URL (`https://ribesstorageacc...`), ÚLTIMA MODIFICACIÓN (29/9/2022, 7:26:47 p.m.), HORA DE CREACIÓN (29/9/2022, 7:26:47 p.m.), ID. DE VERSIÓN (null), TIPO (BLOB EN BLOQUES), TAMAÑO (870 B), NIVEL DE ACCESO (Frecuente (inferido)), ÚLTIMA MODIFICACIÓN DEL NIVEL DE ACCESO (N/D), ESTADO DEL ARCHIVO (null), PRIORIDAD DE REHIDRATACIÓN (null), SERVIDOR CIFRADO (true), ETAG (0x6AA23FC9C6A91B), DIRECTIVA DE INMUTABILIDAD DE NIVEL DE VERSIÓN (Deshabilitado), CONTROL DE CÁCHE (null), TIPO DE CONTENIDO (application/octet-stream), CONTENT-MD5 (7wurZQhwdARdY4qKgN0H...), CODIFICACIÓN DEL CONTENIDO (null), IDIOMA DEL CONTENIDO (null), DISPOSICIÓN DEL CONTENIDO (null), SITUACIÓN DE CONCESIÓN (Desbloqueada), ESTADO DE CONCESIÓN (Disponible), DURACIÓN DE LA CONCESIÓN (null), ESTADO DE LA COPIA (null), and HORA DE FINALIZACIÓN DE LA COPIA (null).

La información en Table Storage:

Roberto Ribes (rbo)

The screenshot shows the Azure Storage Explorer interface. On the left, the navigation pane includes sections like 'Información general', 'Registro de actividad', 'Etiquetas', 'Diagnosticar y solucionar problemas', 'Control de acceso (IAM)', 'Migración de datos', 'Eventos', and 'Explorador de almacenamiento (versión preliminar)'. The main area displays a table named 'audits' under the 'Tables' section. The table has columns: PartitionKey, RowKey, Timestamp, Action, Clientip, and EntityBlobUrl. One row is visible: c851d2ef-ee43-4b90-89... at 2022-09-29T17:30:05.06... with Action: Az204.Api.Controllers.L... and EntityBlobUrl: https://ribesstorageacco... . A message at the top right says 'Método de autenticación: Clave de acceso (Cambiar a la cuenta de usuario de Azure AD)'.

La columna **EntityBlobUrl** debería enlazar al contenido Blob generado.

3.22.10 Azure Cosmos DB Storage en nuestra app

Queremos activar la opción de guardar la información de nuevos logins en una base de datos Cosmos DB.

The screenshot shows the Microsoft Azure portal with the search bar set to 'Buscar'. The left sidebar lists 'Información general', 'Registro de actividad', 'Control de acceso (IAM)', 'Etiquetas', 'Diagnosticar y solucionar problemas', 'Cost Management', 'Inicio rápido', 'Notificaciones', and 'Explorador de datos'. The 'Explorador de datos' section is selected. In the center, it shows the 'robertocosmosdb' account with the 'Cuenta de Azure Cosmos DB' label. Under 'DATA', it shows 'TestWebDatabase' with a 'Logins' item selected. The 'Items' table shows one entry: id: ea061018-8e18-437a-8892-925235973098, /partitionKey: /rules. To the right, a JSON representation of the document is shown:

```
1 "id": "ea061018-8e18-437a-8892-925235973098",
2 "partitionKey": "rules",
3 "Password": "12345",
4 "_rid": "0XpGAIrzvdU/AAAAAAA=",
5 "_self": "0XpGAIrzvdU/cols/0XpGAIrzvdU/_docs/0XpGAIrzvdU/AAAAAAA=/",
6 "_etag": "Vz0d40m55-0000-0e00-0000-633c81b20000",
7 "_attachments": "attachments/",
8 "_ts": 1664909746
```

3.23 Webs de preparación:

<https://www.pass4success.com/microsoft/exam/az-204>

<https://www.itexams.com/exam/AZ-204>

<https://www.examtopics.com/>

<https://www.dumpscollection.net/dumps/AZ-204/>

3.24 Test 4/10/2022

Nota 7 sobre 10.

1. Dada una instancia local de MS Sql Server 2019 Enterprise Edition. ¿Qué servicio Cloud elegirías con las siguientes premisas? Dispones de Stored Procedures con procesos, ejecutados regularmente por el SQL Agent. La elección tiene que suponer la menor carga de administración posible del servicio.

- a) Sql Azure Database
- b) Instancia Administrada de Azure SQL**
- c) Sql Server 2019 Enterprise Edition sobre Azure Virtual Machine

NOTA: SQL Azure Database no tiene SQL Agent.

2. Dada una aplicación Web. ¿Que servicios de azure me permiten agilizar la configuración de entornos de pruebas, integración o testing sobre un hardware de idénticas características?
 - a) Azure App Service**
 - b) Azure Virtual Machine

NOTA: App Service puede configurar las restricciones de hardware.

3. ¿Qué servicio permite la creación de unidades compartidas de red mediante el protocolo SMB en Microsoft Azure?
 - a) Azure Storage File Service**
 - b) Azure Storage Blob Service
 - c) Azure Storage Table Service
4. ¿Qué servicio permite el almacenamiento de ficheros con un coste menor?
 - a) Azure Storage File Service
 - b) Azure Storage Blob Service**
 - c) Azure Storage Table Service

5. ¿Qué servicio permite el almacenamiento de datos parcialmente indexados?
 - a) Azure Storage File Service
 - b) Azure Storage Blob Service
 - c) Azure Storage Table Service**
6. ¿Qué tipo de balanceador de carga me permite, fácilmente, redirigir el tráfico del cliente a centros de datos situados en su misma región?
 - a) Azure Traffic Manager**
 - b) Azure Load Balancer
 - c) Azure Application Gateway

NOTA: Azure Traffic Manager con balanceador DNS permite llevarte al más cercano de tu región.

7. Una Shared Access Signature permite el acceso a un blob privado sin exponer la clave privada de la cuenta de almacenamiento.
 - a) SI**
 - b) NO
8. Microsoft Exchange Online es un servicio que puede ser definido como:
 - a) SaaS**
 - b) PaaS
 - c) IaaS
9. Azure Load Balancer a través del balanceo de carga, permite el failover en caso de que uno de los miembros del Backend Pool, sea afectada la disponibilidad de su servicio.
 - a) SI**
 - b) NO
10. Azure Sql Database es una solución del tipo.
 - a) SaaS

- b) Paas
- c) IaaS
- d) DBaaS**

3.25 Test 27/10/2022

¿Qué servicio de almacenamiento de datos, permite en Azure, dar servicio a una aplicación que requiera MongoDb como motor de base de datos?

Seleccione una:

- a) Sql Azure Database
- b) Instancia Administrada de Azure SQL
- c) Azure Cosmos Db**

¿Qué servicio de computación serverless disponible en Azure, permite ejecutar lógica de negocio al recibir un fichero nuevo en un container de Azure Storage?

Seleccione una:

- a) Azure Functions**
- b) Cognitive Azure Load Advisor Monitor Active Resource
- c) Azure App Service

¿Qué servicio de Azure me permite una protección centralizada frente a múltiples amenazas de los servicios de azure?

Seleccione una:

- a) Microsoft Guard Dog
- b) Microsoft Defender for Cloud**
- c) Microsoft Mana Potion Service

¿Qué servicio de Azure permite remplazar, con el mínimo esfuerzo, un servicio Kafka para un entorno de Big Data?

Seleccione una:

- a) Azure Event Grid
- b) Azure Storage Queue
- c) Azure Event Hub**

¿Qué nivel de coherencia en la réplica de CosmosDB garantiza que, lecturas concurrentes de distintas sesiones, contra nodos replicados geográficamente, ven la misma información, en el mismo orden y en el mismo momento con el menor impacto para el rendimiento?

Seleccione una:

- a) Coherencia fuerte
- b) Coherencia de obsolescencia limitada
- c) Coherencia de sesión
- d) Coherencia de prefijo coherente
- e) Coherencia final

¿Qué nivel de coherencia en la réplica de CosmosDB garantiza que, lecturas concurrentes de la misma sesión, contra nodos replicados geográficamente, ven la misma información, en el mismo orden y en el mismo momento con el menor impacto para el rendimiento?

Seleccione una:

- a) Coherencia fuerte
- b) Coherencia de obsolescencia limitada
- c) Coherencia de sesión
- d) Coherencia de prefijo coherente
- e) Coherencia final

¿Qué servicio de Azure permite almacenar, en una misma cuenta, ficheros, datos tabulares y una cola de mensajes?

Seleccione una:

- a) Azure Functions
- b) Azure Logic Apps
- c) Azure Storage Service

¿Qué servicio de Azure permite ver el rendimiento, errores y accesos a dependencias externas, de una aplicación .NET Core, ejecutada sobre un Azure App Service, sin modificar el código fuente de esta?

Seleccione una:

- a) Azure Application Insights
- b) Azure Application Tuning Advisor
- c) Azure Synapse Analytics

¿Qué servicio de Azure “Codeless” permite realizar Workflows que conecten con distintos servicios?

Seleccione una:

- a. Azure Functions
- b. Azure Logic Apps
- c. Azure SQL Database HyperScale Tier

Roberto Ribes (rbo)

¿Qué servicio me permite implementar, utilizando un sdk, la autenticación de una cuenta de Microsoft 365 en una aplicación .net core, integrando a demás la autenticación de doble factor?

Seleccione una:

- a) Microsoft Identity Platform
- b) Microsoft Single Sign Out Service
- c) Microsoft Singer Sign Song Service